



**CITY COUNCIL**  
ANDY RYDER  
Mayor

CYNTHIA PRATT  
Deputy Mayor

LENNY GREENSTEIN  
MICHAEL STEADMAN  
CAROLYN COX  
ED KUNKEL  
MALCOLM MILLER

**CITY MANAGER**  
SCOTT SPENCE

## **LACEY CITY COUNCIL AGENDA**

**MARCH 18, 2021**

**7:00 P.M.**

**REMOTE ATTENDANCE**

To comply with Governor Inslee's [Proclamation 20-28](#), the City Council meeting will be conducted remotely, not in-person. You may view the Council meeting by watching live through video streaming on [Live Meetings](#), [YouTube](#), [Facebook](#), or Thurston Community Media, Channel 3 with your local cable provider.

The public may also listen to the meeting via telephone by dialing toll-free:

**(888) 788-0099 or (877) 853-5247** - when prompted enter Webinar ID **841 7040 1435**  
press # (participant ID not required)

### **CALL TO ORDER:**

- 1. PLEDGE OF ALLEGIANCE**
- 2. APPROVAL OF AGENDA & CONSENT AGENDA ITEMS\***
  - A. [Council Worksession minutes of February 11, 2021](#)
  - B. [Council Meeting minutes of February 18, 2021](#)
  - C. [Council Worksession minutes of February 25, 2021](#)
  - D. [A motion to approve payment of claims, wages, and transfers for February 9, 2021 through March 11, 2021](#)

*\*Items listed under the consent agenda are considered to be routine and will be enacted by one motion and one vote. There will be no separate discussion of these items. If discussion is desired, that item will be removed from the Consent Agenda and will be considered separately.*

- 3. PUBLIC RECOGNITIONS AND PRESENTATIONS:**
- 4. PUBLIC COMMENT ON ITEMS NOT ON THE AGENDA\*\***

#### **VERBAL PUBLIC COMMENT**

Persons wishing to provide verbal public comment on items NOT on the agenda must preregister to speak at [https://us02web.zoom.us/webinar/register/WN\\_Sg5NT3POTfmUbMK3INb-ZA](https://us02web.zoom.us/webinar/register/WN_Sg5NT3POTfmUbMK3INb-ZA). Instructions and access details will be provided once registration is complete. Registration for verbal public comment closes at 3:00 p.m. on March 18, 2021.

#### **WRITTEN PUBLIC COMMENT**

Public comments may also be submitted by email to [publiccomment@ci.lacey.wa.us](mailto:publiccomment@ci.lacey.wa.us). Written comments will be provided to the City Council electronically prior to the meeting. Comments will not be addressed during the Council meeting; however, comments received will be added to the official record. The commenting period will close at 12:00 p.m. on March 18, 2021.

5. PUBLIC HEARING:
6. PROCLAMATIONS:
7. REFERRAL FROM PLANNING COMMISSION:
  - A. [Ordinance 1585 approving the Shoreline Master Program Periodic Review](#) (Ryan Andrews)
8. REFERRAL FROM HEARINGS EXAMINER:
  - A. [Planned Residential Development and Site Plan Review – Griffin MultiFamily Project #19-553](#) (Ryan Andrews)
9. RESOLUTIONS:
  - A. [Resolution 1103 accept invitation to join Nisqually River Council](#) (Julie Rector)
10. ORDINANCES:
  - A. [Ordinance 1586 approving the 2020 Budget Encumbrance Carryover](#) (Troy Woo)
  - B. [Ordinance 1587 amending LMC 7.04.040 - Animal Service License Fees](#) (Dave Schneider)
11. MAYOR'S REPORT:
12. CITY MANAGER'S REPORT:
  - A. [WRIA 13 Watershed Restoration and Enhancement Plan](#) (Julie Rector)
  - B. [Intercity Transit Interlocal Agreement - Transit Signal Priority](#) (Martin Hoppe)
  - C. [Joint Animal Services Amended Interlocal Agreement](#) (Sarah Hock)
  - D. Lacey Cares – Community Outreach Initiative (Shannon Kelley-Fong, Steve Kirkman)
  - E. [Award Bid for Capitol City Golf Course – West \(Project PW2020-30\)](#) (Jason Kashani)
    - a. Executive Session - Potential Litigation RCW 42.30.110(1)i)
13. STANDING GENERAL COMMITTEE:
  - A. [Finance & Economic Development Committee \(02.23.2021\)](#)
  - B. [General Government & Public Affairs Committee \(02.23.2021\)](#)
  - C. [Land Use Committee \(02.23.2021\)](#)
  - D. [Community Relations & Public Affairs Committee \(03.01.2021\)](#)
  - E. [Transportation Committee \(03.02.2021\)](#)
14. OTHER BUSINESS:
15. BOARDS, COMMISSIONS AND COMMITTEE REPORTS:
  - A. Mayor Andy Ryder:
    1. Mayors' Forum
    2. Thurston Chamber Shared Legislative Committee
    3. Transportation Policy Board (TPB)
  - B. Deputy Mayor Cynthia Pratt:
    1. Joint Animal Services Commission (JASCOM)
    2. LOTT Clean Water Alliance
    3. Olympic Region Clean Air Agency (ORCAA)



- C. Councilmember Carolyn Cox:
  - 1. Regional Housing Council
  - 2. Intercity Transit (IT)
- D. Councilmember Lenny Greenstein:
  - 1. Emergency Medical Services (EMS)
  - 2. TCOMM911
- E. Councilmember Malcolm Miller:
  - 1. Thurston Regional Planning Council (TRPC)
  - 2. Thurston Thrives
  - 3. Lodging Tax Advisory Committee (LTAC)
  - 4. Thurston County Coalition Against Trafficking (TCCAT)
- F. Councilmember Michael Steadman:
  - 1. Community Action Council
  - 2. Thurston County Law & Justice
- G. Councilmember Ed Kunkel:
  - 1. Olympia-Lacey-Tumwater Visitor & Convention Bureau (VCB)
  - 2. Lacey South Sound Chamber
  - 3. Economic Development Council (EDC)
  - 4. Solid Waste Advisory Committee (SWAC)

**16. ADJOURN**

## MINUTES OF THE LACEY CITY COUNCIL WORKSESSION

FEBRUARY 11, 2021

4:00 P.M. – 5:30 P.M.

REMOTE ONLY

COUNCIL PRESENT: MAYOR RYDER, DEPUTY MAYOR PRATT, COUNCILMEMBERS GREENSTEIN, STEADMAN (AUDIO ONLY) COX, KUNKEL, MILLER

STAFF PRESENT: S. SPENCE, S. HOCK, D. SCHNEIDER, R. WALK, J. BRANDT, W. DUFFY, E. FONTAINE

Mayor Ryder amended the agenda to add *City Snow Response Update*.

ACTION: APPROVE WORKSESSION AMENDED AGENDA

MOTION: MOTION MADE, SECONDED AND CARRIED BY COUNCILMEMBER GREENSTEIN AND DEPUTY MAYOR PRATT

### **DRAFT LETTER REQUESTING THE IMPLEMENTATION OF THE WASHINGTON STATE ENERGY CODE BEGIN JULY 1, 2021**

STAFF: WADE DUFFY, BUILDING OFFICIAL & FIRE MARSHAL  
ANGELA WHITE, EXECUTIVE OFFICER WITH OLYMPIA MASTER BUILDERS

ACTION: MOTION TO AUTHORIZE MAYOR RYDER TO SIGN THE DRAFT LETTER REQUESTING THE IMPLEMENTATION OF THE WASHINGTON STATE ENERGY CODE BE EXTENDED TO JULY 1, 2021.

MOTION: MOVED AND SECONDED BY COUNCILMEMBERS GREENSTEIN AND KUNKEL.

MOTION CARRIED WITH MAYOR RYDER, COUNCILMEMBERS GREENSTEIN, STEADMAN, MILLER, AND KUNKEL VOTING IN FAVOR. DEPUTY MAYOR PRATT AND COUNCILMEMBER COX VOTED AGAINST.

Council and staff reviewed a draft letter to the Governor requesting reconsideration of the 2018 Washington State Building and Energy Codes from February 1, 2021 – July 1, 2021.

It is estimated that the 2018 energy code along will add \$10,000-\$30,000 to the cost of new homes after February 2021. Although the new energy code will provide cost relief and utility savings long-term, the extra cost associated with the implementation of the 2018 energy code has short-term cost impacts to residents purchasing new homes.

Council and staff highlighted the projected cost increases to new home construction does not align with the current economic uncertainty caused by COVID-19, or with affordable housing concerns. Council expressed the desire to further work with builders to come up with long-term, strategic recommendations to combat affordable housing.

Council expressed the need to update the letter language, due to the current implementation date being in the past.

#### **REVIEW AMENDED ANIMAL SERVICES INTERLOCAL AGREEMENT**

STAFF: SARAH HOCK, ANIMAL SERVICES EXECUTIVE DIRECTOR

ACTION: INFORMATION ONLY

The Joint Animal Services Commission (JASCOM) recommends the adoption of the amendments to the Intergovernmental Agreement (ILA), the document that regulates the operation of Joint Animal Services. The last time the document was updated was in 2014.

In November 2020, JASCOM reviewed and recommended changes to the ILA. It is important to note that the basic document is unchanged except for updates to language and revisions necessary to reflect the changes recommended to ensure Animal Services operations are optimal.

There are four changes of note in this agreement:

1. Section 3 (a) (5) - In reference to the members of the governing body known as JASCOM. One optional member selected by a nonprofit organization based in Thurston County with shared animal welfare priorities. Such nonprofit shall be selected by members of the commission.
2. Section 3. (f) (6) – In reference to powers and duties of the commission. License fees shall be established by JASCOM.
3. Section 7 (c) – In reference to the jurisdictions responsibility to pay off the loan obtained for the current shelter facility. This section was removed. The loan for the building and renovation has been repaid.
4. Section 8 – In reference to the commission's ability to contract with other parties to provide services. Animal Services can provide services to

nonmembers through a contract. Revenue received for such services cannot be less than the cost to provide such services. JASCOM shall approve all nonmember contracts related to additional services.

The ILA is being reviewed by the other partner jurisdictions (i.e., Thurston County and the cities of Olympia and Tumwater). Once this process is complete, a final ILA will be forwarded to a future Lacey City Council meeting for adoption.

### **REGIONAL CLIMATE ACTION PLAN – PHASE 3 INTERLOCAL AGREEMENT**

STAFF: RICK WALK, COMMUNITY & ECONOMIC DEVELOPMENT DIRECTOR  
JESSICA BRANDT, ASSOCIATE PLANNER

ACTION: INFORMATION ONLY

Staff provided a briefing on the Interlocal Agreement (ILA) between City of Lacey, City of Olympia, City of Tumwater, Thurston County, and Thurston Regional Planning Council for Phase 3 of the Regional Climate Mitigation Plan Regional Coordination.

The City Council signed an Interlocal Agreement with Thurston County, Olympia, and Tumwater in April 2018 to complete Phase 1 of a Regional Climate Mitigation Plan. Phase 1 focused on assessing existing policies and targets of each jurisdiction for gaps and consistencies, recommending a regional emissions target, identifying each jurisdiction's implemented mitigation actions to date, and recommend regional emissions reduction targets.

The recommended targets were adopted July 12, 2019. The targets are as follows:

- Achieve a 45% reduction of 2015 greenhouse gas levels by 2030.
- Achieve an 85% reduction of 2015 greenhouse gas levels by 2050.

#### **Phase 1**

Phase 1 adopted targets and produced a recommended scope of work for Phase 2, which included a public engagement strategy, assessment of actions sufficient to reach shared emissions targets, and implementation strategies. On October 11, 2018, the Council approved the ILA for Phase 2. In February 2019, TRPC hired a consultant team, Cascadia Consulting, to assist with Phase 2.

#### **Phase 2**

Phase 2 of the planning process, which started in early 2019 and has just concluded, and included the following steps:

1. Develop steering committee and charter (January 2019)

2. Develop stakeholder advisory committee (February – March 2019)
3. Engage the general public and develop potential actions list (July – Sept 2019)
4. Assess potential actions and develop scenarios (September – June 2019)
5. Develop plan and strategies (March – July 2020)
6. Engage the general public (September 2020)
7. Accept plan and strategies (October – December 2020)

### Phase 3

Phase 3 is a one-year agreement and scope of work that will focus on regional implementation options and approaches. This does not preclude jurisdictions from prioritizing and implementing actions individually. The agreement provides funds for Thurston Regional Planning Council staff to continue convening, researching, engaging, and monitoring as directed by partner jurisdictions. The major tasks in the scope of work include:

1. Convening a climate action implementation committee and multijurisdictional staff team
2. Supporting policy research
3. Developing a monitoring and assessment program
4. Conducting public outreach

The Planning Commission is continuing with the formal adoption process under their 2021 work program and following the Comprehensive Plan Amendment process. The Comprehensive Plan Amendment process includes staff work sessions with the Planning Commission where they will assist in prioritizing actions and engaging the public, and then hold a public hearing, and make a recommendation to Council in July 2021.

Regional implementation coordination will continue under the Phase 3 interlocal agreement and existing CR2 Plan, which is an appendix to the Environmental Element in the Comprehensive Plan, until the TCMP is formally adopted.

Councilmember Greenstein and Kunkel expressed the desire to have public involvement increased during beginning steps.

### **CITY SNOW RESPONSE UPDATE**

STAFF: SCOTT EGGER, PUBLIC WORKS DIRECTOR  
ACTION: INFORMATION ONLY

Scott Egger, Public Works Director provided an update on the City of Lacey response to the snow forecast.

All City trucks (three for de-icing, three for sanding), are plowing primary and secondary routes. Primary routes are estimated to take 14-16 hours to plow.

Staff and Council acknowledged that City plows are used for arterial roads and will not be used for residential or private use. Staff advised that HOA's can fill out a form and have contractors plow residential neighborhoods.

### **EXECUTIVE SESSION**

Mayor Ryder convened to an Executive Session at 5:08 p.m. for 22 minutes to discuss current litigation pursuant to RCW 42.30.110(1)(i).

Mayor Ryder concluded the Executive Session at 5:30pm and reconvened the Worksession. No action was taken.

Mayor Ryder adjourned the Worksession at 5:30 p.m.

MINUTES OF A REGULAR MEETING OF THE  
LACEY CITY COUNCIL HELD THURSDAY,  
FEBRUARY 18, 2021, REMOTE ATTENDANCE

- CALL TO ORDER: Mayor Ryder called the meeting to order at 7:00 p.m.
- PLEDGE OF ALLEGIANCE: Mayor Ryder led the Pledge of Allegiance.
- COUNCIL PRESENT: A. Ryder, C. Pratt, L. Greenstein, C. Cox, S. Steadman, E. Kunkel, M. Miller
- STAFF PRESENT: S. Spence, R. Almada, J. Burbidge, S. Egger, M. Hardie, S. Kelley-Fong, D. Schneider, R. Walk, T. Woo, R. Andrews, W. Duffy, J. Brandt, P. Edmonds
- APPROVAL OF AGENDA  
AND CONSENT AGENDA: Consent Agenda Items:  
A. Council Worksession minutes of January 28, 2021.  
B. Council Meeting minutes of February 4, 2021.  
C. A motion to approve payment of claims, wages and transfers for January 29, 2021, through February 8, 2021.
- COUNCILMEMBER GREENSTEIN MOVED TO APPROVE THE AGENDA AND CONSENT AGENDA. COUNCILMEMBER COX SECONDED. MOTION CARRIED.
- PUBLIC COMMENT: Persons wishing to provide public comment on items not on the agenda must pre-register to speak. Registration closed at 3:00 p.m. today.

Augustine Dalton requested Council support for grocery employee hazard pay.

Kayla Kirkendall requested Council support for grocery employee hazard pay, specifically for union companies.

Paul Perz thanked the City for their help in putting together a warming shelter. Unfortunately, there were not enough volunteers to staff the shelter.

Public comments may also be submitted by email by 12:00 p.m. today. Comments will be provided to the City Council electronically prior to the meeting. Comments will not be addressed during the meeting; however, comments received will be added to the official record.

No written public comments were received.

**PUBLIC RECOGNITIONS  
AND PRESENTATIONS:**

Rick Walk, Community & Economic Development Director, presented a Public Service Award to Sharon Kophs for her service on the Planning Commission.

**ORDINANCES:**

Wade Duffy, Building Official and Fire Marshal, presented Ordinance 1584 to adopt the 2018 Edition of the International Building Codes.

Historically, every three years, the International Building Code, International Fire Code, International Residential Code and all other codes that are officially adopted by the City of Lacey are updated on a national level by the International Building Code Council and on a state level by the State Building Code Council. Once the State Building Code Council has completed their review, amendments, and adoption of the International Code series to reflect the State's goals, local jurisdictions must then adopt the updated codes for local implementation.



For this particular code cycle, the official date of adoption of the 2018 International series of codes has been pushed back to February 1, 2021, due to delays in code development and COVID-19.

The most significant changes in the 2018 code cycle will come from the Washington State Energy Code. The Washington State Energy Codes are in effect with the adoption by the State and already recognized by the Lacey Municipal Code. As a result, the new energy codes are not included in the ordinance being considered by Council as they have already been officially adopted at the state level for automatic implementation statewide.

Staff requests Council adopt a new appendix for tiny houses. Tiny houses are required to meet all of the requirements of a typical single family dwelling unit minus a few exceptions.

Mayor Ryder noted Council sent a letter to Governor Inslee requesting the implementation date be changed for the Washington State Building and Energy Codes from February 1, 2021, to July 1, 2021, as recommended by the State Building Code Council.

DEPUTY MAYOR PRATT MOVED TO ADOPT ORDINANCE 1584 TO AMEND LMC CHAPTERS 14.03, 14.04, 14.05, 14.06, 14.07, 14.09, 14.13, 14.15, 14.16, 14.17, AND APPENDICES INCORPORATING THE PROVISIONS OF THE 2018 INTERNATIONAL BUILDING CODES AS ADOPTED BY THE WASHINGTON STATE BUILDING CODE COUNCIL. COUNCILMEMBER COX SECONDED. MOTION CARRIED.

**MAYOR'S REPORT:**

Mayor Ryder recommended the appointment of Kyrian MacMichael to the Planning Commission.

MAYOR RYDER MOVED TO APPOINT KYRIAN MACMICHAEL TO THE PLANNING COMMISSION. COUNCILMEMBER STEADMAN SECONDED. MOTION CARRIED.

Mayor Ryder recommended the re-appointment of John Grausam to the Capital Area Regional Public Facilities District Board of Directors.

MAYOR RYDER MOVED TO RE-APPOINT JOHN GRAUSAM TO THE CAPITAL AREA REGIONAL PUBLIC FACILITIES DISTRICT BOARD OF DIRECTORS. COUNCILMEMBER COX SECONDED. MOTION CARRIED.

CITY MANAGER'S REPORT: Ryan Andrews, Planning Manager, presented the Capitol City/Chambers Estates Annexation, Project No. 21-08 annexation proposal.

The City received a notice of intent to commence annexation proceedings for the area including Capitol City Golf Club Estates, Chambers Estates, Capitol City Townehomes, and the Capitol City Golf Course. This is the first step in the annexation process under the petition method, which requires a petition filed by property owners representing a minimum of 10% of the valuation of the area proposed for annexation. The City verified the ownership does comprise a minimum of more than 10 percent of the assessed valuation for general taxation purposes of the properties for which annexation is requested.

After filing the petition, the City Council must pass a motion notifying the petitioners of its approval, rejection, or modification of the annexation area's geographical boundaries. Prior to full Council review of the annexation, the Utilities Committee reviewed the application for the provision of utilities and is recommending approval.

If the Council votes to approve the petition, then the applicant moves forward on obtaining a petition from a total of 60% of the assessed valuation of the area. Once the City receives the 60% petition, the City can move forward on annexation proceedings.

COUNCILMEMBER STEADMAN MOVED TO APPROVE THE CAPITOL CITY/CHAMBERS ESTATES ANNEXATION PROPOSAL THAT INCLUDES THE FOLLOWING PROVISIONS:

1. AUTHORIZE A PETITION BE SUBMITTED REPRESENTING AT LEAST 60% OF THE ASSESSED VALUE OF THE PROPERTY TO BE ANNEXED; AND
2. REQUIRE THE ASSUMPTION OF ALL OR ANY PORTION OF EXISTING CITY INDEBTEDNESS BY THE AREA TO BE ANNEXED.

DEPUTY MAYOR PRATT SECONDED. MOTION CARRIED.

Scott Egger, Public Works Director, requested Council award PW 2021-04 for the Carpenter Road Utility Improvements to Pape & Sons Construction, Inc., in the amount of \$1,047,187.74.

The contract provides for the installation of approximately 3,000 LF of 6-inch, 8-inch and 12-inch diameter water main and 4,000 LF of 4-inch and 6-inch diameter sanitary sewer main along Carpenter Road SE between Stanfield Road SE and 37th Ave SE. Work will include service lines, meters, valves, transfer of water service, connections to existing water system, connections to existing sanitary sewer system, pavement restoration, lawn restoration, and other work.

The project was advertised for two weeks and bids were opened January 29, 2021. Fifteen bids were received ranging from \$1,047,187.74 to \$66,299,714.63 (please

note there was a mathematical error that artificially inflated the upper range). The Engineer's Estimate is \$1,230,750.00.

COUNCILMEMBER STEADMAN MOVED TO AWARD LACEY CONTRACT NUMBER PW 2021-04 TO LOW BIDDER PAPE & SONS CONSTRUCTION, INC. FROM GIG HARBOR, WASHINGTON IN THE AMOUNT OF \$1,047,187.74. DEPUTY MAYOR PRATT SECONDED. MOTION CARRIED.

Jessica Brandt, Associate Planner, presented an Interlocal Agreement (ILA) between Thurston County, the cities of Lacey, Olympia, Tumwater, and Thurston County, and Thurston Regional Planning Council for Phase 3 of the Regional Climate Mitigation Plan Regional Coordination.

The City Council signed an ILA with Thurston County, Olympia and Tumwater in April 2018 to complete Phase 1 of a Regional Climate Mitigation Plan, which focused on assessing existing policies and targets of each jurisdiction for gaps and consistencies, recommending a regional emissions target, identifying each jurisdiction's implemented mitigations actions to date, and recommending regional emissions reduction targets. The recommended targets were adopted July 12, 2019.

In October 2018, the City Council approved an ILA for Phase 2, which included a public engagement strategy, assessment of actions sufficient to reach shared emissions targets, and implementation strategies. Phase 2 of the planning process, which started in early 2019 has just concluded.

Phase 3 is a one-year agreement and scope of work that will focus on regional implementation options and approaches. The agreement provides funds for TRPC staff to continue convening, researching, engaging, and monitoring as directed by partner jurisdictions.

Regional implementation coordination will continue under the Phase 3 ILA and existing CR2 Plan, which is an appendix to the Environmental Element in the Comprehensive Plan, until the Thurston County Mitigation Plan (TCMP) is formally adopted.

DEPUTY MAYOR PRATT MOVED TO AUTHORIZE THE CITY MANAGER TO EXECUTE AN INTERLOCAL AGREEMENT BETWEEN THE CITIES OF LACEY, OLYMPIA, AND TUMWATER, THURSTON COUNTY, AND THURSTON REGIONAL PLANNING COUNCIL FOR PHASE 3 OF REGIONAL CLIMATE MITIGATION PLAN REGIONAL COORDINATION. COUNCILMEMBER STEADMAN SECONDED. MOTION CARRIED WITH MAYOR RYDER, DEPUTY MAYOR PRATT, AND COUNCILMEMBERS COX, MILLER, AND STEADMAN VOTING IN FAVOR. COUNCILMEMBERS GREENSTEIN AND KUNKEL VOTED AGAINST.

Scott Spence, City Manager, provided an update on the recent snow storm.

STANDING COMMITTEES:

Community Relations and Public Affairs Committee

Councilmember Steadman reported the Committee met on February 1, 2021, to receive an update on vaccination sites, the Strategic Communications Plan and Parks Outreach Plan. Councilmember Steadman will remain the Committee chair.

Utilities Committee

Councilmember Kunkel reported the Committee met on February 1, 2021, to discuss the Capitol City Estates Annexation Project. Councilmember Kunkel will remain the Committee chair.

## BOARDS, COMMISSIONS

### AND COMMITTEE REPORTS: Mayor's Forum

Mayor Ryder reported a meeting was held on February 5, 2021, and discussed issues within the community.

### Transportation Policy Board

Mayor Ryder reported on the following items:

- Election of officers:
  - o Chair - Mayor Ryder
  - o Vice-Chair - Graeme Sackrison
  - o Emeritus Business Representative - Doug DeForest
- State of the Transportation System-Sidewalks
- Sidewalk Policy

### LOTT

Deputy Mayor Pratt reported on the following items:

- Draft 2021 Work Plan
- 2020 Revenue and COVID Impacts
- Vaccination request for wastewater staff
- Election of officers:
  - o President – Councilmember Kmet, Tumwater City Council
  - o Vice President - Deputy Mayor Pratt,

### Olympia Area Clean Air Agency

Deputy Mayor Pratt reported on several items:

- Outdoor burning
- Discussed increase in complaints in 2020
- Air quality update

### Regional Housing Council

Councilmember Cox reported on the following items:

- Election of officers:
  - o Chair - Jim Cooper, Olympia Councilmember
  - o Vice-Chair - Carolina Mejia, Thurston County Commissioner

- Discussion on 1406 revenues
- Approved application process for over \$8 million in housing and basic needs
- Scattered safe parking
- Tentative new meeting time of 4<sup>th</sup> Wednesday, 4-5:30 pm

Intercity Transit Authority

Councilmember Cox reported on the following items:

- Authorized ILA with City of Lacey relating to transit signal priority and coordinators
- Computer-assisted dispatching system

TRPC

Councilmember Miller reported the Thurston PUD will begin a 10-year phase down in operations to focus more on just Thurston County, and received an update on buildable lands.

Mayor Ryder adjourned the Council Meeting at 8:37 p.m.

MAYOR: \_\_\_\_\_

ATTESTED BY CITY CLERK: \_\_\_\_\_

DATE APPROVED: \_\_\_\_\_

## **MINUTES OF THE LACEY CITY COUNCIL WORKSESSION**

FEBRUARY 25, 2021

4:00 P.M. – 4:58 P.M.

REMOTE ONLY

COUNCIL PRESENT: MAYOR RYDER, DEPUTY MAYOR PRATT, COUNCILMEMBERS  
GREENSTEIN, STEADMAN (AUDIO ONLY) COX, KUNKEL, MILLER

STAFF PRESENT: S. SPENCE, J. BURBIDGE, D. SCHNEIDER, J. RECTOR, E.  
FONTAINE

ACTION: APPROVE WORKSESSION AGENDA

MOTION: MOTION MADE, SECONDED AND CARRIED BY COUNCILMEMBER  
GREENSTEIN AND DEPUTY MAYOR PRATT

### **WRIA 13 WATERSHED RESTORATION AND ENHANCEMENT PLAN**

STAFF: JULIE RECTOR, WATER QUALITY ANALYST  
ANGELA JOHNSON, STREAMFLOW RESTORATION PLANNER

ACTION: INFORMATION ONLY

Angela Johnson, Streamflow Restoration Planner with the Washington Department of Ecology, and lead coordinator for the WRIA 13 Watershed Restoration and Enhancement Committee (“WREC”) provided a presentation to Council on the process and the Plan.

The following provides some highlights from the Plan, including elements where the City will have a major role in Plan implementation.

Members on the WREC represent a wide range of stakeholders in WRIA 13, which is comprised of the Deschutes River watershed and a number of other sub-basins including the Woodland Creek sub-basin. The City has been active on the committee since its inception in October 2018. Deputy Mayor Pratt is Lacey’s designated representative on the WREC and participated on its technical sub-committees.

The final draft Plan has recently been completed, and the Executive Summary provided to Council. The Plan must be approved by the stakeholder jurisdictions and then by the full WREC before it is sent to the Department of Ecology (DOE) for final approval. Because the law requires DOE to review and approve the Plan by June 30,



2021, the schedule requires stakeholders to approve the Plan by March, and for the WREC to approve sending the plan to DOE in April.

As required by law, the Plan accomplishes the following:

- Identifies the projected number of new permit-exempt domestic groundwater wells within the boundaries of WRIA 13 for the 20-year period of 2018 – 2038.
- Estimates instream flow impacts from the consumptive use of these wells, within the entire basin as well as within defined sub-basins.
- Identifies projects for offsetting the instream flow impacts from these wells.
- Quantifies the water offsets to be provided by these projects and provides assurances that implementation will also provide a net ecological benefit to the watershed.

It is anticipated that the City will have a role in implementing the following recommendations:

- Participation on a long-term implementation group that will oversee and track implementation of this Plan. The WREC is referring to this group as the Deschutes River Council.
- A lead role in implementing the Hicks Lake Stormwater. This project that will upgrade Lacey's existing stormwater facility to provide additional water quality treatment and to incorporate groundwater infiltration which will provide water offsets. This is the only viable water offset project proposed in the Woodland Creek sub-basin.
- Thurston County will look at their policies for opportunities to promote connections to Group A water systems.

Other policies of interest to the City include:

- Thurston County policy to revisit the current restrictions on the use of reclaimed water within the county.
- Improvements to DOE well log database, to clarify details on well construction and improve publicly accessible well log data.
- Creating a position at DOE for a South Sound water steward.
- Investigate whether changes are needed to the instream flow rules in WRIA 13.

Most of the funding for implementation is expected to come from state grants, including Streamflow Restoration grants administered by the DOE.

A request to authorize approval of the WRIA 13 Watershed Restoration Enhancement plan will be presented to full Council at the March 18, 2021, Council meeting.

#### **NISQUALLY RIVER COUNCIL UPDATE**

STAFF: JULIE RECTOR, WATER QUALITY ANALYST

ACTION: INFORMATION ONLY

Julie Rector, Water Quality Analyst, briefed Council on an invitation to the City of Lacey to serve as a voting member on the Nisqually River Council.

The Nisqually River Council (NRC) is a voluntary coordination organization created in 1987 by the State Legislature. Its mission is to create sustainability in the Nisqually River watershed by developing a common culture of environmental, social, and economic balance.

The NRC currently has 24 member agencies representing state, federal, tribal and local governments, as well as an active citizen's advisory committee. The NRC is a forum for planning and collaboration among the governments and community members of the Nisqually Watershed. The actions of the NRC are guided by the Nisqually Watershed Stewardship Plan, which promotes efforts for engaging the public, promoting sustainable businesses, restoring and enhancing fish habitat, and in general promoting a healthy, vibrant watershed for people who live and recreate in the watershed.

The NRC also has close relationships with several programs that help to implement its mission. These include the Nisqually River Foundation, the Nisqually River Education Project, Nisqually Stream Stewards, Nisqually Land Trust, and the Nisqually Community Forest. Each of the NRC committees and its partner programs provide reports at each Council meeting.

The City of Lacey has long been both a formal and informal stakeholder in planning and stewardship processes for the Nisqually Watershed. In particular, Lacey has been actively participating on the WRIA 11 Planning Unit which developed the 2004 *Nisqually River Watershed Plan* as well as its 2019 addendum which plans for offsetting instream impacts from new permit exempt wells.

While the WRIA 11 Planning Unit and the NRC have many mutual and overlapping interests, they have been operating separately, under different mandates and funding sources. It was proposed that efficiencies in operation, and better coordination, can be gained by consolidating the Planning Unit under the umbrella of the NRC. In August 2020, the NRC approved moving forward with a proposal to incorporate the

WRIA 11 Planning Unit as a permanent standing committee of the NRC. This will further facilitate planning and coordination within the watershed.

Further, it was recognized that not all entities represented on the WRIA 11 Planning Unit were represented on the NRC. To address this, the Chair of the NRC extended invitations to the Cities of Lacey, Olympia, and DuPont, to become members of the NRC.

By joining the NRC, the City's designated representative will be the City's liaison with the NRC, and consequently will be expected to attend monthly meetings. The representative will also vote as needed on issues put before the NRC, such as public comment letters, or letters of support for grants and other initiatives that further its goals for a healthy watershed.

A Resolution to accept the invitation to join the NRC will be presented to full Council at the March 18, 2021 City Council meeting.

**UPDATE FROM LACEY PARKS, CULTURE & RECREATION DEPARTMENT**

STAFF: JEN BURBIDGE, PARKS, CULTURE & RECREATION DIRECTOR

ACTION: INFORMATION ONLY

Jen Burbidge, Parks, Culture & Recreation Director provided an update on Department programs and their response to the COVID-19 pandemic.

Council and staff discussed restrictions for upcoming events, to include a modified 3<sup>rd</sup> of July Fireworks show. Staff advised that multiple scenarios are being considered and will be inclusive to whatever State restrictions are in place at the time.

A more detailed comprehensive briefing will be provided at the March 1, 2021, Community Relations & Public Affairs Committee meeting.



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** Disbursement Approval

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**RECOMMENDATION:** By motion, approve payment of claims, wages, and transfers.

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**STAFF CONTACT:** Troy Woo, Finance Director *TW*

**ORIGINATED BY:** Troy Woo, Finance Department

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### BACKGROUND:

The action requested of the City Council is by motion to approve payment of claims, wages and transfers for 2/9/2021 through 3/11/2021. The disbursements consist of the following:

| Checks: | <u>Week of</u> | <u>Beg. Check No.</u> | <u>End. Check No.</u> | <u>Amount</u> |
|---------|----------------|-----------------------|-----------------------|---------------|
|         | 2/12/2021      | 255407                | 255496                | 360,689.95    |
|         | 2/19/2021      | 255497                | 255611                | 303,467.53    |
|         | 2/19/2021      | 255612                | 255612                | 725.00        |
|         | 2/26/2021      | 255613                | 255679                | 496,871.56    |
|         | *2/26/2021     | 255680                | 255681                | 921.64        |
|         | 3/5/2021       | 255682                | 255784                | 1,526,464.79  |

| Electronic Transfers: | <u>Week of</u> | <u>Amount</u> |
|-----------------------|----------------|---------------|
|                       | 1/21/2021      | 102.92        |
|                       | 1/26/2021      | 10.01         |
|                       | 1/27/2021      | 137.44        |
|                       | 2/2/2021       | 11,487.82     |
|                       | 2/9/2021       | 387.34        |
|                       | 2/11/2021      | 11,752.96     |
|                       | 2/12/2021      | 602,896.68    |
|                       | 2/16/2021      | 11,962.55     |
|                       | 2/17/2021      | 4,266.94      |
|                       | 2/19/2021      | 233,273.44    |
|                       | 2/19/2021      | 17.72         |
|                       | 2/25/2021      | 77,679.63     |
|                       | 2/26/2021      | 886,681.80    |
|                       | *2/26/2021     | 1,489,909.19  |
|                       | *2/26/2021     | 34,537.18     |
|                       | 2/28/2021      | 61,657.37     |
|                       | 3/2/2021       | 99.95         |

|          |            |
|----------|------------|
| 3/3/2021 | 11,230.75  |
| 3/3/2021 | 10.53      |
| 3/5/2021 | 447,175.80 |
| 3/8/2021 | 1,989.00   |
| 3/8/2021 | 80.20      |
| 3/9/2021 | 255.00     |
| 3/9/2021 | 11,075.83  |

|          |                     |              |
|----------|---------------------|--------------|
| Payroll: | <u>Month Ended:</u> | <u>Wages</u> |
|          | *2/26/2021          | 1,565,910.48 |

Significant Disbursements:

| <u>Vendor</u>             | <u>Amount</u>  | <u>Description</u>                 |
|---------------------------|----------------|------------------------------------|
| City of Lakewood          | \$ 50,000.00   | SSMCP Partnership                  |
| City of Olympia           | \$ 161,549.00  | Annual LERMS Fee                   |
| Sunset Air                | \$ 437,206.47  | Veterans Services Hub Improvements |
| Barcott Construction, LLC | \$ 200,407.09  | Ruddell Road Retaining Wall        |
| Puget Sound Energy, Inc.  | \$ 91,565.29   | Utilities                          |
| Reed Trucking & Excav.    | \$ 87,572.26   | Fitz Hugh Watermain                |
| Thurston Co. Pub. Health  | \$ 66,375.00   | 2021 Human Services Fund           |
| Barcott Construction, LLC | \$ 190,782.37  | Ruddell Road Retaining Wall        |
| South Sound Contactors    | \$ 418,769.35  | Cap City Water/Sewer               |
| Thurston Co. Pub. Works   | \$ 342,213.99  | Mullen Road Utilities              |
| LOTT Wastewater Alliance  | \$1,370,470.87 | LOTT Reserve Cap Fees/ERU's        |
| Puget Sound Energy, Inc.  | \$ 82,594.43   | Utilities                          |
| T Bailey, Inc.            | \$ 308,872.29  | Hawks Prairie Sister Standpipe     |

\* Disbursements for employee out-of-pocket deductions and employee benefits.



**LACEY CITY COUNCIL MEETING**  
**March 18, 2021**

**SUBJECT:** Shoreline Master Program- Periodic Review

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**RECOMMENDATION:** Adopt an ordinance to complete the required periodic update to the City of Lacey's Shoreline Master Program and associated regulations.

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Rick Walk, Community and Economic Development Director *RW*  
Ryan Andrews, Planning Manager *RA*  
Jessica Brandt, Associate Planner *JB*

**ORIGINATED BY:** Community and Economic Development Department

**ATTACHMENTS:**

1. [Shoreline Master Program Periodic Update Checklist](#)
2. [Shoreline Master Program Amendments](#)
3. [Shoreline Designation Map](#)
4. [Ordinance 1585](#)

**FISCAL NOTE:** Shoreline Master Program Grant from Dept. of Ecology for \$28,000

**PRIOR REVIEW:** 02/23/2021 - Land Use Committee  
07/21/20 - Planning Commission  
06/23/20 - Land Use Committee  
02/06/20 - Land Use Committee  
12/05/19 - City Council Meeting  
12/03/19 - Planning Commission Work Session

---

**BACKGROUND:**

Updating the City's Shoreline Master Program has been on the Community and Economic Development work plan since last year, per a state-mandated periodic review.

Washington State law, as administered by the Department of Ecology, requires cities with areas designated as "Shorelines of the State" periodically update their Shoreline Master

Program (SMP) in accordance with the Washington State Shoreline Management Act and the State Shoreline Master Programs Guidelines.

Lacey adopted its first SMP in 1972, with a first major update in 2011 with other background documents including a Shoreline Restoration Plan and the Cumulative Impacts Analysis for Lacey's Shorelines. The City completed a minor update in 2015 to comply with state changes to wetlands regulations.

The SMA requires that Cities and Counties review and revise their SMP, if needed, on an eight-year schedule established by the State Legislature. This review ensures that the City's SMP stays current with changes in State laws and rules, remains consistent with Lacey's Plan and regulations, and is responsive to changed circumstances, new information, and improved data.

Washington State Department of Ecology provided grant funding to complete this update. The full amount of the grant has been used to pay for contracted support from The Watershed Company, awarded through the City's competitive process. The City has lead the public participation process.

Due to the unavailability of in-person meetings and events as planned, a virtual open house was held April 22, 2020, to kick-off community outreach on the SMP update. The presentation is available online on the City Website at [www.ci.lacey.wa.us/SMP](http://www.ci.lacey.wa.us/SMP). The presentation provided information about the update process and the anticipated amendments. Generally, the shoreline policies and regulations will not substantively change. The amendments are intended to make the regulations easier for staff to administer and clearer for the public to understand.

Staff has reviewed the amendments provided by the consulting team. The recommended updates will provide:

1. Consistency with state laws
2. Integration of current critical areas regulations
3. Consistency with the Comprehensive Plan and other development regulations
4. Clarification on: exemptions, definitions, nonconformance standards, enforcement, and vegetation management.

A joint public hearing and formal comment period with the Washington State Department of Ecology was held in October of 2020. Public comments were minimal and did not result in the need to make substantive changes to the proposed amendments.

The Land Use Committee heard a briefing on the proposed updates on February 23, 2021.

Upon local adoption, the Department of Ecology conducts a final review and adoption. Changes to the SMP will become effective upon state adoption.

**ADVANTAGES:**

1. The City will be in compliance with the state-mandated periodic update.

**DISADVANTAGES:**

1. None identified.



# City of Lacey Shoreline Master Program

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## Final Draft Gap Analysis Report

Prepared on behalf of:



City of Lacey  
Planning Division  
Community & Economic Development  
420 College Street SE  
Lacey, WA 98503

Prepared by:



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July 2020

The Watershed Company Reference Number:  
190918

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## 1. Introduction

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In accordance with the Washington State Shoreline Management Act, local jurisdictions with “Shorelines of the State” are required to conduct a periodic review of their Shoreline Master Programs (SMPs) (Washington Administrative Code [WAC] 173-26-090). The periodic review is intended to keep SMPs current with amendments to state laws, changes to local plans and regulations, changes in local circumstances, and new or improved data and information.

The Shorelines of the State in the City of Lacey (City) include freshwater shorelines Chambers Lake, Hicks Lake, Long Lake and Woodland Creek, Pattison Lake, Southwick Lake and a small section of marine shoreline near 61st Ave NE near the northern most boundary of the City.

The City completed a comprehensive update of its SMP, October 2011, revised in April 2015 with the latest shoreline environment designation map approved in 2018. The current SMP outlines goals and policies for the shorelines of the City and establishes regulations for development occurring within shoreline jurisdiction in a standalone, uncodified, document. The City’s current SMP incorporates by reference the city-wide critical areas regulations which are codified under Lacey Municipal Code (LMC) Title 14, with certain exclusions.

As a first step in the periodic review process, the City’s current SMP was reviewed by City staff and consultants. The purpose of this Gap Analysis Report is to provide a summary of the review and inform updates to the SMP. This report is organized into the following sections:

- **Section 2** identifies gaps the SMP has in consistency with state laws. This analysis is based on a list of amendments between 2007 and 2019 as summarized by the Washington State Department of Ecology (Ecology) in its Periodic Review Checklist.
- **Section 3** identifies gaps in consistency the City’s critical areas ordinance has with current guidance. LMC Title 14 is incorporated by reference into the current SMP.
- **Section 4** identifies gaps in consistency with the City’s Comprehensive Plan, and with implementing sections of the City’s development regulations other than the critical areas regulations.
- **Section 5** identifies other issues to consider as part of the periodic update process to produce a more effective SMP, including those issues identified by staff during the implementation of the SMP since 2011.

This report includes several tables that identify potential revision actions. Where potential revision actions are identified, they are classified as follows:

- **“Mandatory”** indicates revisions that are required for consistency with state laws.
- **“Recommended”** indicates revisions that would improve consistency with state laws, but are not strictly required.

- **“Optional”** indicates legislative amendments that can be adopted at the City’s preference but are not required.
- **“No action necessary”** indicates the current SMP meets the intent of or already contains listed legislative updates, changes to critical areas, comprehensive plan or zoning code.

This document attempts to minimize the use of abbreviations; however, a select few are used to keep the document concise. These abbreviations are compiled below in Table 1-1.

Table 1-1. Abbreviations used in this document.

| Abbreviation | Meaning                                |
|--------------|----------------------------------------|
| BAS          | Best Available Science                 |
| CAO          | Critical Areas Ordinance               |
| City         | City of Lacey                          |
| Ecology      | Washington State Department of Ecology |
| LMC          | Lacey Municipal Code                   |
| RCW          | Revised Code of Washington             |
| SDP          | Substantial Development Permit         |
| SMP          | Shoreline Master Program               |
| SED          | Shoreline Environment Designation      |
| WAC          | Washington Administrative Code         |

## 2. Consistency with State Laws

Table 2-1 summarizes potential revisions to the City’s SMP based on a review of consistency with amendments to state laws identified in the Periodic Review Checklist provided by Ecology. Topics are organized chronologically by year from 2019 to 2007. The

Only a limited number of revisions in Table 2-1 are classified as “mandatory.” Furthermore, the revisions classified as “mandatory” are anticipated to be minor in effect.

Table 2-1. Summary of consistency with amendments to state laws and potential revisions.

| Row         | Summary of change                                                                                                      | Review                                                                                                                                                                 | Action                                                                                                                                                                                             |
|-------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2019</b> |                                                                                                                        |                                                                                                                                                                        |                                                                                                                                                                                                    |
| <b>a.</b>   | Washington State Office of Financial Management (OFM) adjusted the <b>cost threshold for building freshwater docks</b> | SMP 17.15.261 ‘Substantial Development’<br><br>In addition to the general Substantial Development Permit (SDP) cost threshold (see item 2017a below), the SMA includes | <b>Mandatory:</b><br><br>The City should update the cost threshold dollar figure for when an SDP is triggered on single-family freshwater and dock replacement projects as follows:<br>17.30.035.7 |

| Row       | Summary of change                                                                                                                              | Review                                                                                                                                                                                                                                                   | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |                                                                                                                                                | <p>a separate dollar threshold for when construction of a freshwater dock triggers an SDP. No threshold changes apply to saltwater docks.</p> <p>SMP 17.30.035.7 'Shoreline Exemptions Listed' references the out of date dollar figure of \$10,000.</p> | <p><i>(B) In fresh waters the fair market value of the dock does not exceed:</i></p> <p><i>(i) twenty-two thousand five hundred dollars (\$22,500) for docks that are constructed to replace existing docks, are of equal or lesser square footage than the existing dock being replaced; or</i></p> <p><i>(ii) eleven thousand two hundred (\$11,200) dollars for all other docks constructed in fresh waters.</i></p> <p><i>However, if subsequent construction occurs within five years of completion of the prior construction, and the combined fair market value of the subsequent and prior construction exceeds the amount specified above, the subsequent construction shall be considered a substantial development for the purpose of this chapter.</i></p> <p><b>Recommended:</b></p> <p>The SMP could reference the RCW directly and eliminate a specific cost threshold allowing greater flexibility with future legislative changes.</p> <p>Staff may consider revising permit application forms with the new cost threshold for front counter customers.</p> |
| <b>b.</b> | The Legislature removed the requirement for a shoreline permit for <b>disposal of dredged materials at Dredged Material Management Program</b> | There are no DMMP sites within the City.                                                                                                                                                                                                                 | No action necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>c.</b> | Legislature added <b>restoring native kelp, eelgrass beds</b>                                                                                  | Habitat enhancement project exemptions per RCW 77.55.181                                                                                                                                                                                                 | No action necessary. The Washington Department of Fisheries and Wildlife streamlined permit review process for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Row         | Summary of change                                                                                                          | Review                                                                                                                                                                                    | Action                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | <b>and native oysters</b> as fish habitat enhancement projects.                                                            | are not discussed in the current SMP.                                                                                                                                                     | fish habitat enhancement projects (RCW 77.55.181) applies if or if not mentioned in the SMP. The process exempts certain enhancement projects from local permits.                                                                                                                                                                                                                                                   |
| <b>2017</b> |                                                                                                                            |                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| a.          | OFM adjusted the <b>cost threshold for substantial development to \$7,047.</b>                                             | SMP 17.15.261 'Substantial Development' and SMP 17.30.035.1, 'Shoreline Exemptions Listed' state out of date dollar figures.                                                              | <p><b>Mandatory:</b></p> <p>The City must update the threshold-dollar figure and leave the provision stating cost thresholds are periodically amended, due to inflation.</p> <p>The SMP can refer directly to WAC 173-27-040 and eliminate reference to a specific cost threshold for greater code flexibility.</p>                                                                                                 |
| b.          | Ecology permit rules clarified the <b>definition of "development"</b> does not include dismantling or removing structures. | The SMP definition for 'development' in SMP 17.15.057 does not exclude projects that involve only dismantling or removing structures without any associated development or redevelopment. | <p><b>Recommended:</b></p> <p>The City should consider adding the following Ecology recommended language:<br/> <u>"Development" does not include dismantling or removing structures if there is no other associated development or re-development.</u></p>                                                                                                                                                          |
| c.          | Ecology adopted rules clarifying <b>exceptions to local review under the SMA.</b>                                          | The current SMP does not have a section dedicated to exceptions.                                                                                                                          | <p><b>Recommended:</b></p> <p>The City should consider adding a section regarding developments within Section 17.30, Shoreline Permits, that are not required to obtain a shoreline permit or undergo local review that refers directly to the exceptions in WAC 173-27-044, and -045, as amended.</p> <p>Ecology provides model SMP language. Exempt projects must still comply with the standards of the SMA.</p> |

| Row | Summary of change                                                                                                                                                      | Review                                                                                                                                                                                                                                                                                                                          | Action                                                                                                                                                                                                                                                                                                                                                  |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| d.  | Ecology amended rules that clarify <b>permit filing procedures</b> consistent with a 2011 statute.                                                                     | <p>The current Shoreline Permits section 17.30.000 of the SMP cross- references other city documents for permit filing process and procedures. Within these procedures, there is no mention of Ecology permit filing procedures.</p> <p>Ecology amended WAC 173-27-130 to incorporate a 2011 law relating to permit filing.</p> | <p><b>Recommended:</b></p> <p>The City may consider incorporating the date of filing to Ecology for Shoreline Substantial Development Permits, Shoreline Conditional Use, and Shoreline Variance Permits directly within SMP 17.30.000 to be consistent with state guidance. This can be accomplished through a direct reference to WAC 173-27-130.</p> |
| e.  | Ecology amended <b>forestry use regulations</b> to clarify that forest practices that only involves timber cutting are not SMA “developments” and do not require SDPs. | SMP 17.56.010 Forestry/Mining – Development Standards, indicates Forestry uses are prohibited in all SEDs.                                                                                                                                                                                                                      | No action necessary.                                                                                                                                                                                                                                                                                                                                    |
| f.  | Ecology clarified the SMA does not apply to lands under <b>exclusive federal jurisdiction</b>                                                                          | There are no City shorelines, under exclusive federal jurisdiction.                                                                                                                                                                                                                                                             | No action necessary.                                                                                                                                                                                                                                                                                                                                    |
| g.  | Ecology clarified “default” provisions for <b>nonconforming uses and development</b> .                                                                                 | SMP ‘Definitions’ 17.15.000 addresses nonconforming building/structure, nonconforming lot, and nonconforming use. Ecology rule created to separate uses, structure and lot definitions, the city’s SMP already contains them.                                                                                                   | No action necessary.                                                                                                                                                                                                                                                                                                                                    |
| h.  | Ecology adopted rule amendments to clarify the scope and process for conducting <b>periodic reviews</b> .                                                              | This is optional and the current SMP does not address the periodic review scope or procedures, and therefore it is not necessary to consider reviewing sections of code for consistency.                                                                                                                                        | No action necessary.                                                                                                                                                                                                                                                                                                                                    |

| Row         | Summary of change                                                                                                                                             | Review                                                                                                                                                                             | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| i.          | Ecology adopted a new rule creating an <b>optional SMP amendment process</b> that allows for a shared local/state public comment period.                      | LMC 14.26.050 'Amendments' includes local amendment procedures for the SMP, which then cross-reference the City of Lacey Development Guidelines & Public Work Standards (2014)     | <b>Recommended:</b><br><br>The City may consider revising LMC 14.26.050, adding WAC 173-26 reference, to ensure existing procedures allow a combined local/state amendment process in order to expedite SMP updates/mapping amendments.                                                                                                                                                                                                                                                                                                                                      |
| j.          | <b>Submittal</b> to Ecology of proposed SMP amendments.                                                                                                       | SMP 17.10.005 and 17.10.035 references processing amendments per WAC 173-26.                                                                                                       | No action necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>2016</b> |                                                                                                                                                               |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| a.          | The Legislature created a new shoreline permit exemption for retrofitting existing structures to comply with the <b>Americans with Disabilities Act (ADA)</b> | SMP 17.30.035 'Shoreline Exemptions Listed', spells out SDP statutory exemptions and does not simply cite the RCW's list of exemptions.                                            | <b>Recommended:</b><br><br>The City may consider revising their exemptions list, adding a new shoreline exemption – <i>SMP 17.30.035.13</i><br><br><i>The external or internal retrofitting of an existing structure with the exclusive purpose of compliance with the Americans with Disabilities Act, 1990 or as amended, to otherwise provide physical access to the structure by individuals with disabilities.</i><br><br><i>Optional:</i> Revise SMP 17.30.035 to cite the RCW exemptions list, eliminating future the need for future updates (RCW available online). |
| b.          | Ecology updated <b>wetlands critical areas guidance</b> including implementation guidance for the 2014 wetlands rating system.                                | Ecology's most updated rating system is already captured within the City's wetland code (LMC Chapter 14.28). The CAO is already adopted as part of the SMP, with a few exceptions. | No action necessary.<br><br>Changes to the CAO are discussed in further detail in Section 3 below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>2015</b> |                                                                                                                                                               |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| a.          | The Legislature adopted a <b>90-day target</b> for local                                                                                                      | This is optional. However, it appears WSDOT does have ROW within or near Lacey's                                                                                                   | <i>Optional:</i> Provide a reference to the 90-day review target as a reference in the SMP for consistency with state law.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



| Row         | Summary of change                                                                                                                        | Review                                                                                                                                                                                                                                                                                            | Action                                                                                             |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|             | review of Washington State Department of Transportation (WSDOT) projects.                                                                | shorelines at Woodland Creek and I-5 at the I5 turnaround, Carpenter's Street NE.                                                                                                                                                                                                                 |                                                                                                    |
| <b>2014</b> |                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                    |
| a.          | The Legislature created a new definition and policy for <b>floating on-water residences</b> legally established before 7/1/2014.         | No stationary floating residences exist in Lacey. SMP Section 17.24.010, Table 3, omits floating on-water residences. Therefore, this regulation does not apply, and no amendments are needed.                                                                                                    | No action necessary.                                                                               |
| <b>2012</b> |                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                    |
| a.          | The Legislature amended the SMA to clarify <b>SMP appeal procedures</b> .                                                                | Throughout the SMP it is indicated that appeals of the administrator's decision shall be made in accordance with LMC 2.30 and Development Guidelines and Public Works Standards, Ch. 1. This amendment outlines appeal of the SMP itself, however. It does not need to be covered within the SMP. | No action necessary.                                                                               |
| <b>2011</b> |                                                                                                                                          |                                                                                                                                                                                                                                                                                                   |                                                                                                    |
| a.          | Ecology adopted a rule requiring that wetlands be delineated in accordance with the approved <b>federal wetland delineation manual</b> . | The current CAO captures the federal wetland manual and applicable regional supplements, stating under LMC 14.28.090.                                                                                                                                                                             | No action necessary.<br><br>Changes to the CAO are discussed in further detail in Section 3 below. |
| b.          | Ecology adopted rules for new commercial <b>geoduck aquaculture</b> .                                                                    | There on area of saltwater shoreline in the City, Nisqually Reach, located in the Natural SED. SMP Section 17.24.010, Table 3 – Uses and Activities by Shoreline Environment Designation, does not allow                                                                                          | No action necessary. Commercial aquaculture in all saltwater shorelines prohibited by the SMP.     |

| Row | Summary of change                                                                                                                        | Review                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                                                                                          | commercial aquaculture in the Natural Designation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| c.  | The Legislature created a new definition and policy for <b>floating homes</b> permitted or legally established prior to January 1, 2011. | <p>The SMP is silent on floating homes. They are however, included in the SMP Residential Development definition Residential Development within SMP Section 17.15.208, Tables for Permitted Uses, limits residential types to Single Family Dwellings, Attached Single Family Dwellings &amp; Multi-Family in all SEDs.</p> <p>The SMP Section 17.15.208, does however include floating homes within the definition of 'Residential Development'.</p>                                                                                                                        | <p><b>Recommended:</b><br/>No floating homes exist in fresh or marine waters. A definition might be added to clarify what floating homes are, consistent with the state statute as follows:</p> <p><b>Floating home</b>, means a single family dwelling unit constructed on a float that, is moored, anchored, or otherwise secured in water, and is not a vessel, even though it may be capable of being towed.</p> <p><i>Optional:</i> Strike out 'floating home' from SMP Section 17.15.208 if decision makers desire to prohibit the use by omission.</p> |
| d.  | The Legislature authorized a new <b>option to classify existing residential structures as conforming.</b>                                | <p>SMP Section 17.25.000, Nonconforming Uses, Lots and Structures for when and how nonconforming residential structures can be continued, expanded, maintained, repaired or replaced.</p> <p>It is unclear if the City considered this option before the September 8, 2011 SMP adoption. The legislative update became effective 7/22/2011; applicable to all comprehensive SMP updates after September 1, 2011.</p> <p>This legislative action does not impact future development; it merely treats existing legally permitted nonconforming development as conforming.</p> | <p><i>Optional:</i></p> <p>The City may adopt this provision to allow for existing non-conforming development, so long as it was legally permitted prior to SMP adoption, to be conforming to provisions of the SMP.</p> <p>SMP Section 17.25.000 represents combined nonconformance policies and standards, please see Section 5 'Other Issues to Consider' for options to improve clarity and flow in this section.</p>                                                                                                                                     |

| Row         | Summary of change                                                                                                                                                       | Review                                                                                                                                                                                    | Action                                                                                                                                                                                                        |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2010</b> |                                                                                                                                                                         |                                                                                                                                                                                           |                                                                                                                                                                                                               |
| a.          | The Legislature adopted <b>Growth Management Act – Shoreline Management Act clarifications.</b>                                                                         | SMP 17.10.005, ‘Authority’, contains references to WAC 173-26, State Master Program, and references herein SMP approval/amendment procedures and master program guidelines of WAC 173-27. | <b>Recommended:</b><br>The City may consider a revision to Section 17/10/040 to include the language, ‘effective 14 days from Ecology’s written notice of final action’.                                      |
| <b>2009</b> |                                                                                                                                                                         |                                                                                                                                                                                           |                                                                                                                                                                                                               |
| a.          | The Legislature created new “relief” procedures for instances in which a <b>shoreline restoration project within a UGA</b> creates a shift in Ordinary High Water Mark. | The SMP Section 17.42.020, ‘General Development Standards for Restoration’ does not address relief procedures.                                                                            | <b>Recommended:</b><br>The City may consider referencing relief procedures consistent with the criteria and procedures in WAC 173-27-215 under SMP 17.42.020 by referencing a new subsection SMP 17.42.020.5. |
| b.          | Ecology adopted a rule for certifying <b>wetland mitigation banks.</b>                                                                                                  | The rule is referenced under LMC 14.28.455 of the critical areas code, referring to the wetland mitigation bank certification process.                                                    | No action necessary.                                                                                                                                                                                          |
| c.          | The Legislature added <b>moratoria authority</b> and procedures to the SMA.                                                                                             | Moratoria procedures are not required to be included in SMP. The City may rely on statute: WAC 173-27-085, if they choose to include this provision at a later date.                      | <b>Recommended:</b><br>The City may consider adding a section that incorporates moratoria by using Ecology’s example wording.                                                                                 |
| <b>2007</b> |                                                                                                                                                                         |                                                                                                                                                                                           |                                                                                                                                                                                                               |
| a.          | The Legislature clarified options for defining “ <b>floodway</b> ” as either the area that has been established in FEMA maps, or the floodway criteria set in the SMA.  | Floodway is defined in SMP Section 17.15.087, Definitions and covers both Ecology prescribed options and includes excerpt of from state law (RCW 90.58.030)                               | No action necessary.                                                                                                                                                                                          |

| <i>Row</i> | <i>Summary of change</i>                                                                                                                                                                     | <i>Review</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Action</i>                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>b.</b>  | Ecology amended rules to clarify that comprehensively updated SMPs shall include a <b>list and map of streams and lakes</b> in shoreline jurisdiction.                                       | The areas of shoreline jurisdiction are shown under Section 17.20.030, in addition to the Comprehensive Plan.                                                                                                                                                                                                                                                                                                                       | No action necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>c.</b>  | Ecology's rule listing statutory exemptions from the requirement for an SDP was amended to include <b>fish habitat enhancement projects</b> that conform to the provisions of RCW 77.55.181. | <p>SMP 17.30.035 'Shoreline Exemptions Listed', does not include reference to fish habitat enhancement projects under RCW 77.55.181.</p> <p>Further, the list of types of projects which qualify under RCW 77.55.181 was recently expanded (2019) by the legislature to include "restoration of native kelp and eelgrass beds and restoring native oysters" (RCW 77.55.181.(1)(a)(iv) which is not included in the current SMP.</p> | <p><b>Recommended:</b><br/>Update the language in SMP 17.30.035 to include fish habitat enhancement projects and to include restoration of native kelp and eelgrass beds and restoring native oysters (although marine shoreline in Lacey is limited), for consistency with the revised criteria of RCW 77.55.181.</p> <p>See Section 5 'Other Issues to Consider' below regarding amendments to Shoreline Exemptions Listed' for SMP usability.</p> |

### 3. Integration of Current Critical Areas Regulations

The City's current SMP incorporates by reference the city-wide Critical Areas Ordinances, which are codified under Lacey Municipal Code (LMC) Title 14. In 2015, the City made a minor amendment to their SMP, adopting a more recent version of their Wetland Protection chapter 14.28, adopting the most recent 2014 Ecology Wetland Rating System. The SMP also lists certain exceptions from Title 14 which are not incorporated into the SMP due to inconsistency with the Shoreline Management Act.

Table 3-1 below summarizes recommendations to address recent State guidance for critical areas regulations

Table 3-1. Summary of consistency with the SMP and Critical Areas Ordinance and potential revisions.

| # | Issue                                     | Relevant Location(s) <sup>1</sup>                                                                        | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|-------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Linkage between CAO and SMP               | <b>Location:</b><br>SMP 17.10.020.2(A),<br>References to Plans,<br>Regulations or<br>Information Sources | <b>Review:</b><br>The SMP regulates critical areas in shoreline jurisdiction by a series of adopted ordinances, based upon critical areas type.<br><br><b>Action</b><br><i>Recommended:</i> The City should update each Critical Areas ordinance listed with the most recently adopted version, as required by Ecology, such as Geologically Sensitive Areas and Flood Hazard, Ordinance 1505; Tree and Vegetation Protection and Preservation, Ordinance 1539; and replacing Zero Effect Drainage Discharge with LMC 14.27 Stormwater Management, Ordinance 1525. |
| 2 | July 2018 Ecology Wetland Buffer Guidance | SMP 17.10.020.2(A) -<br>LMC 14.28 Wetlands<br>Protection                                                 | <b>Review:</b><br>Ecology updated their wetland rating guidance in July 2018. Changes include modified habitat score ranges in wetland buffer tables. SMP adopts the wetland buffer table in LMC 14.28.280. Updating this table to reflect Ecology's 2018 guidance would result in a decrease in buffer widths for lower rated wetlands. A discussion is provided below.<br><br><b>Action:</b><br>The City will consider revising their wetland buffers to be consistent with the most recent Ecology guidance. A discussion and code analysis is provided below.  |

| #                                                                                                                                                                                                                                    | Issue | Relevant Location(s) <sup>1</sup> | Review & Action |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|-----------------|
| <sup>1</sup> This column attempts to capture the primary relevant location(s) of content related to the item described in the Summary of Change column; however, due to length of the SMP, all relevant locations may not be listed. |       |                                   |                 |

## Ecology Wetland Buffer Guidance

In July 2018, Ecology updated its guidance for wetland ratings. The change represents best available science (BAS) and includes modified habitat score ranges used in wetland buffer tables. The change in guidance is the result of Ecology's continued evaluation of the 2014 wetland rating system as it relates to the 2004 wetland rating system. Ecology's continued evaluation resulted in revised buffer guidance that is more in line with rating system reference wetland data. This differs from the City's current buffer table (see Table 3-2 below), which only incorporates habitat scores and separates high and low intensity land uses for determining wetland buffers. In incorporating Ecology's guidance, use of wetland categories results in a general reduction of buffers in lower functioning wetlands (see Table 3-3) when compared to the City's current buffer table below. We propose the City modify its wetland regulations to follow Ecology's new guidance, although not required by Ecology at this time. Table 3-2 shows the existing buffer widths under LMC 14.28.280 and Table 3-3 shows Ecology's most recent 2018 guidance.

Table 3-2. Current standard wetland buffer table per LMC 14.28.280

| Points for Habitat from Wetland Rating Form | 3  | 4   | 5   | 6   | 7   | 8   | 9   |
|---------------------------------------------|----|-----|-----|-----|-----|-----|-----|
| Alternative 3A High Intensity               | 80 | 100 | 140 | 180 | 220 | 260 | 300 |
| Alternative 3A Low Intensity                | 60 | 75  | 105 | 135 | 165 | 195 | 225 |

Table 3-3. Reduced wetland buffer widths per July 2018 updated Ecology guidance when minimization measures and corridor are provided

| Wetland Category and Type         | Buffer Width (in feet) Based on Habitat Score |              |            |
|-----------------------------------|-----------------------------------------------|--------------|------------|
|                                   | 3- 5 (Low)                                    | 6-7 (Medium) | 8-9 (High) |
| I: Estuarine and Coastal wetlands | 150                                           |              |            |
| I: All others                     | 75                                            | 110          | 225        |
| II: Estuarine wetlands            | 110                                           |              |            |
| II: All                           | 75                                            | 110          | 225        |
| III: All                          | 60                                            | 110          | 225        |
| IV: All                           | 40                                            |              |            |

In order to adopt these revised buffers, minimization measures must also be met (Table 3-4). To be consistent with Ecology's guidance, the use of minimization measures must also require protection of a wildlife corridor, when appropriate. To better align with BAS, a wildlife corridor protection requirement is recommended for wetlands with a habitat score of 6 or more. The wildlife corridor is only required, and may apply to the City in areas owned by the county, if an existing, relatively undisturbed corridor at least 100 feet in width exists between the subject wetland and another Washington Department of Fish and Wildlife priority habitat, *and* the off-site portion of the corridor is already protected by a legal mechanism. (Legal mechanisms may include conservation easements, public dedications or tracts etc. established in perpetuity). If so, the applicant must extend the wildlife corridor protection onto the subject parcel to connect it to the wetland. If such a wildlife corridor exists but the protection is not provided, the wetland buffers must be increased by 25%. If no wildlife corridor is present, the buffers shown in Table 3-3 may be used with application of the minimization measures alone.

Table 3-4. Measure to Minimize Impacts to Wetlands.

| Disturbance                | Required Measures to Minimize Impacts                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lights                     | <ul style="list-style-type: none"> <li>• Direct lights away from wetland</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                      |
| Noise                      | <ul style="list-style-type: none"> <li>• Locate activity that generates noise away from wetland</li> <li>• If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source</li> <li>• For activities that generate relatively continuous, potentially disruptive noise, such as certain heavy industry or mining, establish an additional 10' heavily vegetated buffer strip immediately adjacent to the outer wetland buffer</li> </ul> |
| Toxic runoff               | <ul style="list-style-type: none"> <li>• Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered</li> <li>• Establish covenants limiting use of pesticides within 150 feet of wetland</li> <li>• Apply integrated pest management</li> </ul>                                                                                                                                                                                           |
| Stormwater runoff          | <ul style="list-style-type: none"> <li>• Retrofit stormwater detention and treatment for roads and existing adjacent development</li> <li>• Prevent channelized flow from lawns that directly enters the buffer</li> <li>• Use Low Intensity Development techniques</li> </ul>                                                                                                                                                                                           |
| Change in water regime     | <ul style="list-style-type: none"> <li>• Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns</li> </ul>                                                                                                                                                                                                                                                                                                              |
| Pets and human disturbance | <ul style="list-style-type: none"> <li>• Use privacy fencing OR plant dense vegetation to delineate buffer edge and to discourage disturbance using vegetation appropriate for the ecoregion</li> <li>• Place wetland and its buffer in a separate tract or protect with a conservation easement</li> </ul>                                                                                                                                                              |
| Dust                       | <ul style="list-style-type: none"> <li>• Use best management practices to control dust</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        |

## 4. Consistency with Comprehensive Plan & Other Development Regulations

Based on a review of the City's Comprehensive Plan, LMC Title 16 'Zoning', Title 14 'Buildings and Construction' and the City's Development Guidelines and Public Works Standards, no major inconsistencies were observed within the City's SMP. The City's zoning map contains a Shoreline Master Program overlay indicating the shoreline environment designation.

The table below summarizes an over-arching change that can improve the consistency and administration of the SMP.

Table 4-1. Summary of recommended SMP, LMC & Comprehensive Plan revisions to improve consistency

| #                     | Issue                                  | Relevant Location(s) <sup>1</sup>                     | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|----------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Administration</b> |                                        |                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1                     | <b>SMP Goals and Policies</b>          | <b>Entire SMP</b>                                     | <p><b><u>Review:</u></b><br/>The SMP goals and policies are interspersed with development regulations, making it difficult for residents and other non-professionals to navigate the document to locate development regulations. Applicants nor do staff need SMP goals and policies for reviews. In addition, policies utilizing shall or must will be converted to development standards.</p> <p><b><u>Action:</u></b><br/>The City may re-locate policies for all development activities as a standalone section in the SMP, further down and separate from existing formatted development standards.</p> |
| 2                     | <b>Remove SMP date cross reference</b> | <b>LMC 14.26.010 Shoreline Master Program Adopted</b> | <p><b><u>Review:</u></b><br/>Referencing the SMP adoption date indicates this section will have to be continuously updated.</p> <p><b><u>Action:</u></b><br/>Remove effective date to avoid having to update code.</p> <p>The SMP is adopted and by this reference made a part of this chapter as though fully set forth herein, at length, those certain plans, rules and</p>                                                                                                                                                                                                                               |



| #                                                                                                                                                                                                                                    | Issue                                                          | Relevant Location(s) <sup>1</sup>                                               | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                      |                                                                |                                                                                 | regulations known as the “City of Lacey Shoreline Master Program, September, 2011”, <u>as revised</u> , as the master program for the regulation and development of the shorelines within the jurisdiction of the city, subject to the supplemental local ordinance contained within this code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3                                                                                                                                                                                                                                    | <b>Shoreline related regulations in several city documents</b> | Located throughout associated development regulations, guidelines and standards | <p><b><u>Review:</u></b><br/>Shoreline jurisdiction permit activities are regulated by three separate associated development regulations and guidelines standards, the Lacey Municipal Code, 2014 Development Guidelines and Public Works Standards.</p> <p><b><u>Action:</u></b><br/>In the future, the City may consider consolidating all items in the Development Guidelines and Public Works Standards Manual regarding shorelines in the LMC <i>or</i> SMP. The Manual appears to be administrated by the PW Department. Alternatively compose development bulletins outlining the process for applicants that can be amended easily as regulations change versus having to change the LMC, SMP and Development Guidelines and Public Works Standards.</p> |
| 4                                                                                                                                                                                                                                    | <b>Signage Reference</b>                                       | SMP 17.67 Signage, LMC 16.75 Sign Regulations                                   | <p><b><u>Review:</u></b><br/>The policy refers to an incorrect sign code reference for home occupations. In addition, this is more a regulation than a policy.</p> <p><b><u>Action:</u></b><br/>The City will consider referencing LMC 16.75.090 and relocating to the regulations portion of the SMP.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <sup>1</sup> This column attempts to capture the primary relevant location(s) of content related to the item described in the Summary of Change column; however, due to length of the SMP, all relevant locations may not be listed. |                                                                |                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 5. Other Issues to Consider

In addition to the issues discussed in the previous sections of this report, several other issues in the current SMP could be addressed as part of the periodic update process to produce a more effective and as requested by city staff, as a user friendly and a well-organized document. Other issues are described in Table 5-1 below.

Table 5-1. Other issues that could be addressed to produce a more effective SMP.

| #                     | Issue                                          | Relevant Location(s) <sup>1</sup>                                     | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Administration</b> |                                                |                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1                     | <b>Shoreline Exemptions</b>                    | SMP 17.30.035<br>Shoreline Exemptions Listed                          | <p><b>Review:</b><br/>Shoreline exemptions listed in WAC 173-27-040 are amended by the legislature. It appears items 1-12 mirror those listed in the WAC. City staff my cross-reference the most up to date exemptions online as the majority of the city's shorelines are single-family residential.</p> <p><b>Action:</b><br/>The City may consider striking out 17.30.035 and replace with <u>'To qualify for an exemption, the proposed use, activity, or development must meet the requirements for a exemption as described in WAC 173-27-040, or as amended.'</u></p>                                                                                                                                                                |
| 2                     | <b>Definition for 'qualified professional'</b> | SMP 17.15.000<br>'Definitions'                                        | <p><b>Review:</b><br/>No definition for qualified professional exists within the SMP.</p> <p><b>Action:</b><br/>City may consider revising section SMP 17.15.273 to state, for example: <i>A qualified professional for critical areas shall have a minimum of five (5) years of experience in the pertinent scientific discipline and experience in preparing critical area reports. A qualified critical area professional must have obtained a Bachelor's degree in biology, engineering, geology, environmental studies, fisheries, geomorphology, or a related field. The Planning Official may require professionals to demonstrate the basis for qualifications and shall make the final determination as to qualifications.</i></p> |
| 3                     | <b>Scrivener's error</b>                       | SMP Introduction<br>Appendix 3 –<br>Restoration Plan A3-5,<br>Para. 3 | <p><b>Review:</b><br/>A typo was found in the intro section of the SMP. Note, Appendix 3, Restoration Plan is going to be removed from the SMP document.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| # | Issue                                         | Relevant Location(s) <sup>1</sup>                                                                                                                | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                               |                                                                                                                                                  | <p>The Restoration Plan will be a standalone supporting document.</p> <p><b>Action:</b><br/>More ecologically friendly, soft bioengineered approaches for beach stabilization may not meet the definition of development or substantial development so may be exempt from having to obtain a Shoreline Substantial <del>Development</del> <u>Development</u> permit.</p>                                                                                                                                                                                                                                                                                                                                                                                 |
| 4 | Nonconformance policies and standards         | SMP Section 17.25.000                                                                                                                            | <p><b>Review:</b><br/>Nonconformance is a key issue for grandfathered structures and uses for residential shoreline property owners.</p> <p><b>Action:</b><br/>The City may consider reviewing, summarizing and streamlining development regulations in one easy to use section, cleaning up phrasing, in addition to moving it further back in the SMP, behind residential development standards.</p>                                                                                                                                                                                                                                                                                                                                                   |
| 5 | Consolidate residential development standards | SMP 17.24.000 Tables for Permitted Uses, Development Standards and Modifications; SMP 17.63 Residential Development; LMC 16.19, Shoreline Zoning | <p><b>Review:</b><br/>Residential development standards are within Part Three, the alphabetically organized section of the SMP. As a predominant use along the shoreline, residential provisions would benefit from a re-location to near the top of the SMP.</p> <p><b>Action:</b><br/>The City may consider consolidating residential development standards and use matrices into one place under SMP 17.26, and Piers and Docks, a frequently referenced residential standard, to SMP 17.25. In addition, shoreline modifications listed under SMP 17.45 can be re-located to within this section, as it provides a good reference to the location of common shoreline activities. All remaining development standards would remain alphabetical.</p> |

| # | Issue                                                                    | Relevant Location(s) <sup>1</sup>                                                              | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | <b>Expand enforcement and violations section</b>                         | SMP 17.30.055 Penalties and Enforcement                                                        | <p><b><u>Review:</u></b><br/>The current enforcement provisions could be improved to address violations with more specificity.</p> <p><b><u>Action:</u></b><br/>The City may consider modeling their enforcement provisions after comparable lake-oriented jurisdictions.<br/>The City of Federal Way includes direct reference to WAC 173-27-270 – 300 which describe the step by step process for Order to cease and desist, Civil penalty, Appeal of civil penalty, and Criminal penalty. The City of Kirkland calls for immediate abatement of illegal activities, providing a general reference to WAC 173-27 for authority under KZC 83.550. The City of Bothell, under BMC 13.17.140 Enforcement Authority, references enforcement action by the City or Ecology under their violations chapter 11.20, as well as WAC 173-27-240 – 300.</p> |
| 7 | <b>Vegetation Management – Clearer expectations needed for applicant</b> | SMP 17.41, Table 1 Vegetation Management Appendix 2, shoreline practices and planting template | <p><b><u>Review:</u></b><br/>SMP 17.41 Table 1 does not give clear direction for the applicant where the vegetation management restoration is to occur, nor does it provide concise directions on site plan requirements.</p> <p><b><u>Action:</u></b><br/>The City may consider providing more concise standards such as emphasizing placement of shoreline vegetation within the first 10-feet along the shoreline. In addition, shoreline practices and planting template examples listed in Appendix 2 would benefit directly within this SMP section. Furthermore, thresholds for development with no increase to impervious surfaces in vegetation management areas may forgo requiring a landscape architect, should they meet the right plant spacing and site plan requirements.</p>                                                      |
| 8 | <b>Remove SMP Appendices</b>                                             | SMP Part 4 Appendices 1-7                                                                      | <p><b><u>Review:</u></b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| #  | Issue                                 | Relevant Location(s) <sup>1</sup>                                                       | Review & Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----|---------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                       |                                                                                         | <p>While SMP appendices are useful reference documents, they are not required to be attached to the current SMP development regulations parts 1-3.</p> <p><b><u>Action:</u></b><br/>The City may consider removing Part 4 – Appendices 1-7 from the SMP and treating them as a separate standalone document. These can remain as standalone appendices to be otherwise referenced. The SED map should remain as an appendix.</p>                                                                    |
| 9  | Combine SMP Parts 1-3                 | Table of Contents, SMP 17.10.000, 17.24.000, 17.30.000, 17.40.000, 17.43.000, 17.70.000 | <p><b><u>Review:</u></b><br/>the current SMP development regulations are currently separated into three separate parts. This can cause confusion for an applicant in determining which part(s) they should refer to when proposing an activity or development within SMP jurisdiction.</p> <p><b><u>Action:</u></b><br/>The City may consider removing/combining these parts into separate articles with headings describing the contents within each article for ease of access and reference.</p> |
| 10 | Remove Table references               | 17.24, 17.41.021                                                                        | <p><b><u>Review:</u></b><br/>the current SMP Table references are out of order (Table 1 is further down in the document than Tables 3-5, for example) and are adjacent to code sections.</p> <p><b><u>Action:</u></b><br/>The City may consider removing table # references and using the direct code reference for readability.</p>                                                                                                                                                                |
| 11 | Woodland Creek Shoreline Jurisdiction | 17.20.030                                                                               | <p><b><u>Review:</u></b><br/>Woodland Creek shoreline jurisdiction is not clearly defined under this section.</p> <p><b><u>Action:</u></b><br/>The City may consider adding the WAC definition for streams that qualify under</p>                                                                                                                                                                                                                                                                   |

| #                                                                                                                                                                                                                                    | Issue | Relevant Location(s) <sup>1</sup> | Review & Action                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                      |       |                                   | shoreline jurisdiction: streams with a 20 cubic feet per second, mean annual flow requirement. |
| <sup>1</sup> This column attempts to capture the primary relevant location(s) of content related to the item described in the Summary of Change column; however, due to length of the SMP, all relevant locations may not be listed. |       |                                   |                                                                                                |

## 6. References

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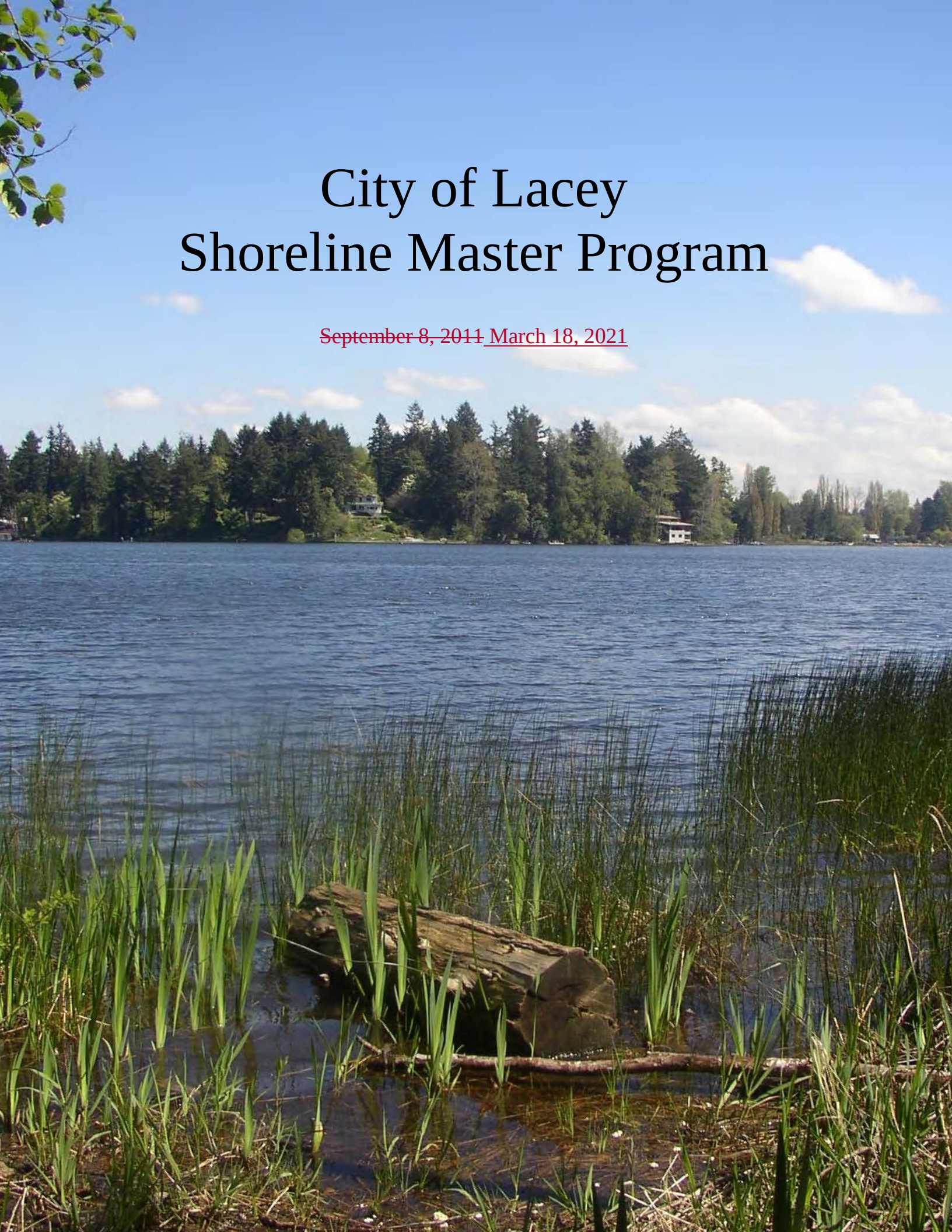
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Washington Administrative Code. 2018. Washington State Legislature. Available online:  
<http://apps.leg.wa.gov/WAC/default.aspx>.



A scenic view of a lake with a forested shoreline and reeds in the foreground. The sky is blue with some clouds. The text "City of Lacey Shoreline Master Program" is centered at the top. Below it, the date "September 8, 2014" is crossed out and "March 18, 2021" is added, both in red text.

# City of Lacey Shoreline Master Program

~~September 8, 2014~~ March 18, 2021



## **CITY OF LACEY MISSION**

**Our mission is to enrich the quality of life in Lacey for all our citizens. To build an attractive, inviting, and secure community; We pledge to work in partnership with our residents to foster community pride, to develop a vibrant, diversified economy, to plan for the future, and to preserve and enhance the natural beauty of our environment.**



**Picture of the open house held January 2010 at Lacey City Hall to review the draft Lacey Shoreline Master Program developed by the Lacey Planning Commission and to kick off an effort to update the City's Comprehensive Plan for Outdoor Recreation. Over 100 citizens participated in the event.**

**Picture by Lori Flemm**

**~~LACEY CITY COUNCIL~~**

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Virgil Clarkson, Deputy Mayor  
Jeff Gadman  
Jason Hearn  
Ron Lawson  
Cynthia Pratt  
Andy Ryder~~

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| <u>Review and Revision History</u> |                                                           |
|------------------------------------|-----------------------------------------------------------|
| <u>Date</u>                        | <u>Notes</u>                                              |
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| <u>April 9, 2015</u>               | <u>Revisions per state changes to wetland protections</u> |
| <u>March 18, 2021</u>              | <u>Revisions per state periodic update</u>                |

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~~Steve Morrison, Senior Planner and Project Manager  
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Jan Weydemeyer, Senior Planner for Olympia  
Cindy Wilson, Senior Planner for Thurston County  
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Photographs taken by David R. Burns, AICP, Principal Planner, unless noted otherwise.

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# PART ONE

~~GENERAL PROVISIONS, FRAMEWORK, DEFINITIONS, JURISDICTION AND ENVIRONMENTAL DESIGNATIONS, TABLES FOR USE, STANDARDS AND MODIFICATIONS, NONCONFORMING USES, PERMITS, RELATIONSHIP TO OTHER LAND USE REGULATIONS~~<sup>[AC5]</sup>



View of wetland system south of Hicks Lake. This wetland was dedicated to the City of Lacey by Boston Harbor Land Company when the Southlake plat was developed. The dedication puts the wetland and its associated 200 foot buffer under City ownership for long term preservation. The dedication also provided the opportunity to establish a section of trail around the outside of the wetland buffer for limited public access to this resource



## **Article 1. General Provisions, Definitions, jurisdiction and environmental designations****[AC6]**

### **17.10 General Provisions**

1. All development and use of shorelines of the state shall be carried out in a manner that is consistent with this SMP and the policy of the Act as required by RCW 90.58.140(1), whether or not a shoreline permit or statement of exemption is required.
2. No use, land or water alteration, or development shall be undertaken within jurisdiction of the Shoreline Management Act by any person without first obtaining a permit, except the Administrator may issue a letter of exemption from a substantial development permit under Section 17.30.030.
3. Permit processes and fees related to implementation of this Shoreline Master Program (SMP) are contained within the City's Development Guidelines and Public Works Standards (DGPWS). The processes outlined in the City DGPWS follow the requirements of state law and provide a local process for implementation of Lacey's Shoreline Master Program.
4. The regulations, and associated policies, for the following sections should be reviewed for any project proposal, consistent with the requirements under WAC 173-26-221. These provisions apply to all shoreline areas or to shoreline areas that meet the specified criteria of the provision without regard to environment designation. These include:
  - a. 17.35 Critical areas;
  - b. 17.40 Shoreline Ecological Functions;
  - c. 17.41 Vegetation Management;
  - d. 17.46 Public Access;
  - e. 17.57 Historical and Archeological; and
  - f. 17.67 Water Quality.**[AC7]**

#### **17.10.005 Authority**

Authority for enactment and administration of this Shoreline Master Program (SMP) is the Shoreline Management Act of 1971, Chapter 90.58, Revised Code of Washington (RCW), also referred to herein as the "SMA". All SMPs must satisfy the requirements of Chapter 173-26, Washington Administrative Code (WAC), State master program approval/amendment procedures and master program guidelines, and Chapter 173-27 WAC, Shoreline permitting and enforcement procedures.

#### **17.10.010 Title**

This document shall be known and may be cited as the "City of Lacey Shoreline Master Program."

## 17.10.015 Short Title

This document may be referred to herein as the "SMP," or the "master program."

## 17.10.017 Intent and Framework

### 1. Three pillars provide the framework:

The state Shoreline Management Act was adopted by the voters in 1972. It demonstrated a broad public support for the wise management of the state's shoreline resources. There are three pillars of the Act that provide the fundamental concepts implemented in this Shoreline Master Program (SMP). These are:

- A. Protection of environmental functions and values of our shoreline resources;
- B. Prioritizing the use of shorelines dependent upon the need to be located on shorelines (water ~~dependant~~dependent use);
- C. Public access and public use and enjoyment of shoreline resources.

### 2. Fundamental Goals of the Shoreline Management Act:

The Shoreline Act's policy of protecting ecological functions, fostering reasonable use and maintaining the public's right of navigation, access and corollary uses encompasses the following general goals:

- A. Goal: The use of shorelines for economically productive uses that are particularly ~~dependant~~dependent on shoreline location or use (RCW 90.58.020);
- B. Goal: The use of shorelines and waters they encompass for public access and recreation (RCW 90.58.020);
- C. Goal: Protection and restoration of the ecological functions of shoreline natural resources (RCW 90.58.020);
- D. Goal: Protection of the public right of navigation and corollary uses of waters of the state (RCW 58.020);
- E. Goal: The protection and restoration of buildings and sites having historic, cultural and educational value (~~RCW~~RCW 90.58.100);
- F. Goal: Planning for public facilities and utilities correlated with other shoreline uses (RCW 90.58.100);
- G. Goal: Prevention and minimization of flood damage (RCW 90.58.100);
- H. Goal: Recognizing and protecting private property rights (RCW 90.58.020);
- I. Goal: Preferential accommodation of single family uses (RCW 90.58.020);

**J. Goal: Coordination of shoreline management with other relevant, local, state and federal programs (RCW 90.58.020).**

**3. Shorelines of Statewide Significance and Fundamental Policies:**

**A. Shorelines of Statewide Significance:** The Shoreline Management Act identifies certain shorelines as “shorelines of statewide significance” and raises their status by setting use priorities and requiring “optimum implementation” of the Act’s policy.

**B. Preference for Use:** In accordance with RCW 90.58.020 Shorelines of the State which are defined as Shorelines of Statewide Significance shall be given preference to uses, in the following order of priority:

- 1) Recognize and protect the state-wide interest over local interest;
- 2) Preserve the natural character of the shoreline;
- 3) Result in long-term over short-term benefit;
- 4) Protect the resources and ecology of the shoreline;
- 5) Increase public access to publicly-owned areas of the shorelines;
- 6) Increase recreational opportunities for the public on the shoreline;
- 7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary.

**4. Summary of Fundamental Goals and Policies for Lacey's Shoreline Master Program:**

**These goals and policies provide the framework for development of Lacey’s Shoreline Program and compliance with state requirements.**

**A. Goal: Provide an opportunity for public participation in the update of the Shoreline Master Program to help identify key issues for Lacey, develop a program meeting state and local objectives and achieve community support for the wise management, protection, restoration and use of Lacey’s shoreline resources.**

- 1) **Policy:** Ensure the public has opportunity to provide early, continuous and meaningful input into development of Lacey’s shoreline program and periodic updates and amendments.
- 2) **Policy:** Look for and utilize a full range of -approaches for educating and informing the public about shoreline management concepts that promote healthy shorelines, water quality, more productive habitat and other public interests.

**B. Goal: Identify functions and values specific to Lacey’s shoreline resources to develop a program tailored to Lacey’s needs that will provide protection, restoration and utilization of these resources.**

- 1) **Policy:** Identify and designate each distinct shoreline reach with a classification based upon its function, values and public benefit.

- 2) **Policy:** Use the shoreline inventory to achieve the best utilization and management of Lacey's shoreline resources:
- 3) **Policy:** Base land use decisions on the shoreline designation and what is necessary to maintain shoreline functions and values and provide priority shoreline use to the public.
- 4) **Policy:** Designate and preserve those shorelines of this region which are notable for their aesthetic, scenic, historic or ecological qualities.
- 5) **Policy:** Preserve large, intact ecological systems such as floodplains, wetlands or tidelands.
- 6) **Policy:** Designate an adequate supply of land for future water-dependent or water-related uses.

**C. Goal: Develop a Shoreline Master Program that will achieve:**

- 1) **Integration with the state Growth Management Act (GMA) to provide a long range community vision for the wise management and use of Lacey's shoreline resources over the long term;**
- 2) **Provide development standards designed to regulate and protect areas within shoreline jurisdiction as Lacey faces urbanization under GMA;**
- 3) **No net loss of ecological functions and restoration of impacted areas to protect and improve the public's long term interest in shoreline resources.**
  - a) **Policy:** To provide consistent treatment of critical areas in shoreline jurisdiction, reference and apply critical area ordinance standards as part of the SMP.
  - b) **Policy:** Provide opportunities for land use form that will achieve GMA goals for urbanization, while providing superior opportunities for protection of shoreline processes and public access opportunities.
  - c) **Policy:** Design, locate and construct residential development in a manner that will:
    - i. Maintain existing public access to the publicly-owned shorelines,
    - ii. Not interfere with the public use of water areas fronting such shorelines, and
    - iii. Not adversely affect aquatic habitat.
  - d) **Policy:** Adopt a full range of development standards and incentive opportunities to protect and achieve no net loss of existing shoreline ecological functions and processes.

**D. Goal: Achieve public access opportunities necessary to serve the needs of the Lacey community.**

- 1) **Policy:** Develop a public access plan that will use a full range of strategies and incentive program(s) approved by the Lacey Council to gain public access and acquire ownership of shoreline resources for the Lacey community.

## 17.10.020 References to Plans, Regulations or Information Sources

1. Where this Program makes reference to any RCW, or WAC, as amended and the current edition of other state, or federal regulations, shall apply.
2. Local Lacey plans and codes being referenced in this Shoreline Master Program include the following:
  - A. Title 14 of the Lacey Municipal Code (LMC): The Lacey Title on Buildings and Construction that includes Lacey's critical area ordinances and design review chapters, specific sections referenced include:
    1. LMC Chapter 14.04, International Building and International Residential Code;
    2. LMC Chapter 14.23, Design Review;
    3. LMC Chapter 14.24, Environmental Policy;
    4. LMC Chapter 14.28, Wetlands Protection\* (Ordinance ~~1295XX~~, ~~10xx/xx25/xx07~~);
    5. LMC Chapter ~~14.29~~~~14.31~~, ~~Zero Effect Drainage Discharge~~~~Stormwater Management~~ (Ordinance ~~1525~~, ~~12/21/17~~);
    6. LMC Chapter 14.32, Tree and Vegetation Protection and Preservation\* (Ordinance ~~1269~~~~1539~~, ~~07/27/06~~~~01/17/19~~);
    7. LMC Chapter 14.33, Habitat ~~Conservation Area~~ Protection (Ordinance ~~1505~~, ~~03/09/2017~~)\* (~~Ordinance 1215~~, ~~11/06/03~~);
    8. LMC Chapter 14.34, Flood Hazard ~~Prevention~~\* (~~Ordinance 1265~~, ~~06/08/06~~);[AC8]
    - ~~8.9.~~ LMC Chapter 14.36, Wellhead Protection and Critical Aquifer Recharge Areas
    - ~~9.10.~~ LMC Chapter 14.37, Geologically Sensitive Area ~~Protections~~\* (Ordinance ~~1208~~~~1505~~, ~~08/18/03~~~~03/09/17~~); [AC9]
  - B. Title 15 of the LMC: The Lacey Land Division Ordinance;
  - C. Title 16 of the LMC: The Lacey Zoning Code;
  - D. Development Guidelines and Public Works Standards (DGPWS)\*;
  - E. The Lacey Comprehensive Land Use Plan developed under the State Growth Management Act (GMA) and all of its elements. Elements specifically referenced include:
    - ~~1.~~ City of Lacey and Thurston County Land Use Plan for the Urban Growth Area;
    - ~~2.~~ City of Lacey Housing Element
    - ~~3.~~ Environmental Protection and Resource Conservation Plan and its Urban Forest Management Plan;
    - ~~4.~~ Lacey Comprehensive Plan for Outdoor Recreation;
    - ~~5.~~ City of Lacey 2030 Transportation Plan;
    - ~~6.~~ City of Lacey Public Access Plan
  - F. Other supporting documents
    - ~~1.~~ ~~Appendix 2~~ Vegetation/Landscaping Examples and Guidelines
    - ~~2.~~ ~~Appendix 3~~ Shoreline Environmental Designations
    - ~~3.~~ ~~Appendix 4~~ Portions of the original Inventory and Characterization Report and Environmental Designations that apply to Lacey. ~~For informational purposes the full report is provided in CD format in the slipcover of this appendix.~~
    - ~~4.~~ ~~Appendix 5~~ Cumulative Impacts Report

- ~~Appendix 6 Shoreline Environmental Designations~~
- ~~5. Appendix 7~~ Referenced City of Lacey Ordinances Used in this Document

#### NOTES REGARDING REFERENCED DOCUMENTS:

~~Lacey Municipal Codes designated with \* are adopted by reference, as of the dated ordinance, into the Shoreline Master Program, subject to the exceptions noted in 17.35.020. Inclusion of future amendments to these codes into the SMP requires an amendment of the SMP and approval by Ecology. \* denotes a reference considered by the Department of Ecology to be mandatory fulfilling an identified requirement of local SMPs and required to be identified by date of adoption and adopted version and attached as an appendix to the SMP.~~

~~References not identified by an \* are considered “loose” reference by the Department of Ecology and are not required to be adopted in an appendix.~~

~~Portions of the LMC referenced as a requirement of the SMP and designated with an \* will be the version in effect at the time of adoption of the Shoreline Master Program and will not include amendments made to those Plans or sections of the LMC after the date of adoption.~~

~~Pursuant to a determination made by the Department of Ecology, later amendments to ordinances designated with an \* will not be considered applicable to and will not change content of the Shoreline Master Program and therefore will not require amendment of the Shoreline Master Program. If the City wants to update the Shoreline Master Program to include such amendments in those areas under Shoreline Jurisdiction, Lacey may file for amendment of the Shoreline Master Program to include the amendments. Otherwise, the Shoreline Master Program will continue to use the version of the \* referenced document in effect at the time the Shoreline Master Program was adopted, as shown in the applicable appendix.~~

~~Pursuant to a determination made by the Department of Ecology those ordinances “loosely” referenced will apply to shoreline areas when updated, but will not require amendment of the SMP.~~

[AC10]

## 17.10.025 Liberal Construction

As provided for in RCW 90.58.900, the SMA is exempted from the rule of strict construction; the SMA and this Program shall therefore be liberally construed to give full effect to the purposes, goals, objectives, and policies for which the SMA and this Program were enacted and adopted, respectively.

## 17.10.030 Severability

If any provision of this Program or its application to any person or legal entity or circumstances is held invalid, the remainder of the Program, or the application of the provision to other persons or legal entities or circumstances, shall not be affected.

The SMA and this SMP adopted pursuant thereto comprise the basic state and City regulations for the use of shorelines in the City. In the event provisions of this SMP conflict with other applicable City policies or regulations, the more restrictive shall prevail. Should any section or provision of this SMP be declared invalid, such decision shall not affect the validity of this SMP as a whole.

## 17.10.035 Amendments

Amendments to this SMP including changes to the mapped shoreline environment designations shall be processed per WAC 173-26.

## 17.10.040 Effective Date

This SMP and all amendments thereto shall become effective ~~immediately upon 14 days from final approval and adoption~~ written notice of final action ~~[LW11]~~ by the Washington State Department of Ecology (Department).

## 17.15 Definitions

### 17.15.005 Shoreline Definitions - General

The terms used throughout this Program shall be defined and interpreted as indicated below. When consistent with the context, words used in the present tense shall include the future; the singular shall include the plural, and the plural the singular.

**17.15.011 Act or SMA.** The Shoreline Management Act of 1971 (~~Chapter 90.58 RCW~~, as amended).

**17.15.012 Accessory Building, Structure or Use.** A building, structure, part of a building or structure, or use which is subordinate to, and the use of which is customarily incidental to that of the main building, structure or use on the same lot.

**17.15.013 Administrator.** That person as appointed by the City to administer the provisions of these regulations within the boundaries of the City of Lacey.

**17.15.014 Adoption By Rule.** An official action by the Washington Department of Ecology to make a local government shoreline master program effective through rule consistent with the requirements of the Administrative Procedure Act, ~~Chapter 34.05 RCW~~, thereby incorporating the adopted shoreline master program or amendment into the state master program.

**17.15.015 Agricultural Activities.** Agricultural uses and practices including, but not limited to: Producing, breeding, or increasing agricultural products; rotating and changing agricultural crops; allowing land used for agricultural activities to lie fallow in which it is plowed and tilled but left unseeded; allowing land used for agricultural activities to lie dormant as a result of adverse agricultural market conditions; allowing land used for agricultural activities to lie dormant because the land is enrolled in a local, state, or federal conservation program, or the land is subject to a conservation easement; conducting agricultural operations; maintaining, repairing, and replacing agricultural equipment; maintaining, repairing, and replacing agricultural facilities, provided that the replacement facility is no closer to the shoreline than the original facility; and maintaining agricultural lands under production or cultivation. This definition of agricultural activities excludes “urban agriculture” as defined in LMC 16.06.747 and as outlined in City of Lacey Ordinance Number 1368, dated June 9, 2011.

**17.15.016 Amendment.** A revision, update, addition, deletion, and/or reenactment to an existing shoreline master program.

**17.15.017 Applicable Master Program.** The master program approved or adopted by the Department pursuant to ~~RCW 90.58.090(6)~~ or ~~90.58.190(4)~~ prior to acceptance of a complete application by local government.

**17.15.018 Approval.** An official action by a local government legislative body agreeing to submit a proposed shoreline master program or amendments to the department for review and official action pursuant to ~~WAC 173-26~~; or an official action by the department to make a local government shoreline master program effective, thereby incorporating the approved shoreline master program or amendment into the state master program.

**17.15.019 Aquacultural Practices.** Include the hatching, cultivating, planting, feeding, raising, harvesting and processing of aquatic plants and animals, and the maintenance and construction of necessary equipment, buildings and growing areas. Methods of aquaculture include but are not limited to fish hatcheries, fish pens, shellfish rafts, racks and longlines, seaweed floats and the culture of clams and oysters on tidelands and subtidal areas. For the purposes of this SMP, this term does not



include associated peripheral activities such as staging areas, warehousing, processing, or packaging of products. These peripheral activities shall take place out of shoreline jurisdiction in appropriate commercial or light industrial zoning designation designed for these types of activities. Per WAC 173-26-020(6), Aquaculture does not include the harvest of wild geoduck associated with the state managed wildstock geoduck fishery. [AC12]

**17.15.020 Average Grade Level.** The average of the natural or existing topography of the portion of the lot, parcel, or tract of real property which will be directly under the proposed building or structure: In the case of structures to be built over water, average grade level shall be the elevation of the ordinary high water mark. Calculation of the average grade level shall be made by averaging the ground elevations at the midpoint of all exterior walls of the proposed building or structure.

**17.15.021 Backshore Marina.** Refer to “Marina, Backshore”.

**17.15.022 Beach.** The zone along the shoreline where there is continuous movement of sediment both laterally and vertically. This zone extends from the daily low tide mark to where the permanent line of vegetation begins, or where the topography abruptly changes.

**17.15.023 Beach Enhancement.** The alteration of terrestrial and tidal shorelines along with submerged shorelines for the purpose of stabilization, recreational enhancement or aquatic habitat creation, or restoration using native or similar material.

**17.15.024 Beach Feeding.** The introduction of sand or gravel to beaches to enhance recreation, wildlife or to preserve natural physical character of the shoreline.

**17.15.025 Bedlands.** Those submerged lands below the line of extreme low tide in marine waters and below the line of navigability of navigable lakes and rivers.

**17.15.026 Berm.** One or several linear deposits of sand and gravel generally paralleling the shore at or landward of OHWM; berms are naturally stable because of material size or vegetation.

**17.15.027 Bioengineering.** The practice of using natural vegetative materials (and often structural components) to stabilize shorelines and prevent erosion.

**17.15.028 Boardwalk.** A structure made of planks parallel to the waterfront or beach for non-motorized public access. A promenade with construction similar to a dock.

**17.15.029 Boathouse.** A structure designed for storage of vessels located over water or in upland areas.

**17.15.030 Boat Ramp.** See “Launch ramp”.

**17.15.031 Boating Facilities.** Marinas located both landward and waterward of the OHWM (dry storage and wet-moorage types); launch ramps; covered moorage; and marine travel lifts.

**17.15.032 Bog.** A unique type of wetland dominated by mosses at the surface and that form peat soils. Bogs form in areas where the climate allows the accumulation of peat to exceed its decomposition. The water regime in bogs is dominated by precipitation rather than surface inflow. The plant community is specialized to survive in the nutrient-poor and highly acidic conditions typical of bog systems.

**17.15.034 Breakwater.** Protective structure usually built off-shore to protect harbor areas, moorage, navigation, beaches and bluffs from wave action. A breakwater may be fixed (e.g., a rubble mound or rigid wall), open-pile or floating.

**17.15.035 Buffer.** An area measured landward perpendicularly from the ordinary high water mark, or associated critical area, that is intended to reduce the adverse impacts of adjacent land uses on shoreline or critical area ecological functions and provide important habitat for wildlife. For the purposes of this Shoreline Master Program, the term buffer is often used in association with the term setback, as setbacks often have the same purpose and function as a buffer. One distinction between the two terms, is buffers generally restrict a range of activity and use in a designated area, while setbacks generally only apply to location of a structure within a designated area; see also definition of setback, 17.15.222.

**17.15.036 Building.** Any structure designed for or used for the support, shelter or enclosure of persons, animals or personal property, and which is used in a fixed location on land, shorelands or tidelands.

**17.15.037 Bulkhead.** Either public or private wall usually constructed parallel to the shore. Their primary purpose is to contain and prevent the loss of soil caused by erosion or wave action. A bulkhead may also be termed as a “seawall” for more massive public works structures along the open coast. Under the jurisdiction of this SMP, bulkheads may only be utilized if other more naturalized approaches are determined to not be practical to accomplish the objectives. If utilized, bulkheads will be located landward of the OHWM. Because of the function bulkheads are designed for, bulkheads are not subject to the same setbacks as other structures.

**17.15.040 Certified Local Government.** Those Local governments that establish a historic preservation program meeting federal and state standards are eligible to apply to the State Historic Preservation Officer (SHPO) and the National Park Service for certification.

**17.15.041 Channelization.** The straightening, deepening or lining of stream channels, and/or prevention of natural meander progression of stream ways, through artificial means such as relocation of channels, dredging, and/or placement of continuous levees or bank revetments along significant portions of the stream. Dredging of sediment or debris alone is excluded from this definition.

**17.15.042 Clearing.** The direct and indirect removal of trees and/or ground cover from any public or private undeveloped, partially developed, or developed lot, public lands or public right-of-way. This shall also include any destructive or inappropriate activity applied to a tree that will result in its death or effectively destroy the trees appearance and/or functionality, such as topping.

**17.15.043 Cluster Development.** A residential development which reserves substantial portions of land as open space or recreational areas for the joint use of the occupants of the development. This land may be provided by allowing dwelling units to be placed on lots smaller than the legal minimum site for regular subdivisions, as long as the density does not exceed prescribed standards.

**17.15.044 Commercial Development.** Those uses involved in wholesale, retail, service and business trade. Examples include hotels, motels, grocery markets, shopping centers, restaurants, shops, offices and private or public indoor recreation facilities. For purposes of this SMP, this definition does not include Home Occupations as defined and described in LMC 16.69.

**17.15.045 Comprehensive Land Use Plan, Lacey.** Means the Comprehensive Land Use Plan for Lacey and the Lacey urban growth area, including its many elements, as adopted under the State Growth Management Act, and as amended from time to time.

**17.15.046 Conditional Use.** A use, development, or substantial development which is classified as a conditional use or is not classified within this Master Program.

**17.15.047 Covered Moorage.** A roofed structure for the wet or dry storage of one or more boats. Boathouses are a type of covered moorage.

**17.15.048 Critical Areas.** Those areas with especially fragile biophysical characteristics and/or with significant environmental resources as identified in a scientifically documented inventory. RCW 36.70A.030 defines “critical areas” as: wetlands; areas with a critical recharging effect on aquifers used for potable waters; fish and wildlife habitat conservation areas; frequently flooded areas; and geologically hazardous areas. In addition to standards within this SMP, critical areas are protected under ordinances Lacey has adopted in Chapter 14 of the Lacey Municipal Code (LMC). These ordinances are adopted by reference as part of the SMP. The ordinance referenced is the version in effect ~~in shoreline jurisdiction on the day of adoption of the SMP and shown in the applicable appendix attached to this SMP~~ [AC13].

**17.15.049 Critical Freshwater Habitats.** River and stream corridors from the headwaters to the mouth and including the channel, associated channel migration zone, wetlands and the floodplain to the extent such areas fall in shoreline jurisdiction, including hydrologic connections between water bodies, water courses, lake basins and associated wetlands.

**17.15.050 Critical Salt Water Habitats.** All kelp beds; eelgrass beds; spawning and holding areas for forage fish such as herring, smelt and sandlance; subsistence, commercial and recreational shellfish beds; mudflats; intertidal habitats with vascular plants; and areas with which priority species have a primary association.

- A. Kelp beds are found in marine and estuarine intertidal and subtidal areas with a depth of up to 15 meters below mean lower low water (MLLW). The beds can be found on various bottom materials.
- B. Eelgrass beds are found in marine and estuarine intertidal and subtidal areas.
- C. Surf smelt spawning beds are located in the upper portions of sand or gravel beaches (intertidal areas) in salt water.
- D. Pacific herring spawning beds include the lower portions of salt water beaches (intertidal areas), eelgrass beds, kelp beds, other types of salt water vegetation such as algae and other bed materials such as subtidal worm tubes.
- E. Pacific sand lance spawning beds are located in the upper portions of sand or gravel beaches (intertidal areas) in salt water.
- F. Rock sole spawning beds are located in the upper and middle portions of sand or gravel beaches (intertidal areas) on salt water.
- G. Rockfish settlement and nursery areas are located in kelp beds, in eelgrass beds, on other types of salt water vegetation and on other bed materials.
- H. Lingcod settlement and nursery areas are located on beaches (intertidal areas) and subtidal areas with beds of sand, eelgrass, subtidal worm tubes or other bed materials.
- I. Shellfish beds. The following shellfish beds are included: the Pacific oyster (*Crassostrea gigas*), the Olympia oyster (*Ostrea lurida*), the razor clam (*Silqua patula*), the native little neck clam (*Protothaca staminea*), the Manila clam (*Venerupis japonica*), the butter clam (*Saxidomus giganteus*), the Geoduck (*Panope generosa*), the horse clam (*Schizothaerus nuttalli* and *Schizothaerus capax*), the cockle (*Clinocardium nuttalli*), the macoma (*Macoma* spp.) and the eastern soft shell clam (*Mya arenaria*).
- J. Salmon and steelhead habitats include gravel bottomed streams, creeks and rivers used for spawning; streams, creeks, rivers, side channels, ponds, lakes and wetlands used for rearing,

feeding and cover and refuge from predators and high water; streams, creeks, rivers, estuaries and shallow areas of salt water bodies used as migration corridors; and salt water bodies used for rearing, feeding and refuge from predators and currents.

**17.15.055 Density.** A ratio expressing the number of dwelling units which may be established on a specific land area. In Lacey's zoning code this is expressed as dwelling units per gross acre. Density calculation is based on the entire project area above the ordinary high water mark (i.e., Dry Land Area) minus any wetland area.

**17.15.056 Department.** The Washington State Department of Ecology.

**17.15.057 Development.** A use consisting of the construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal of any sand, gravel or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters overlying lands subject to this chapter at any state of water level. Development does not include dismantling or removing structures if there is no other associated development or re-development. [DN14]

**17.15.058 Development Regulations.** The controls placed on development or land uses by the City of Lacey, including, but not limited to, the zoning ordinances, critical areas ordinances, all portions of the Shoreline Master Program other than goals and policies approved or adopted under Chapter 90.58 RCW, the land division ordinances, the Development Guidelines and Public Works Standards, development standards contained in the Stormwater Manual, together with any amendments thereto.

**17.15.059 Dike.** An embankment to prevent flooding by a stream or other water body, often referred to as a levee.

**17.15.060 Director.** The Director of the Department of Ecology.

**17.15.061 Dock.** Refer to "Pier".

**17.15.062 Document of Record.** The most current shoreline master program officially approved or adopted by rule by the department for a given local government jurisdiction, including any changes resulting from appeals filed pursuant to RCW 90.58.190.

**17.15.064 Dredging.** The removal or displacement of earth or sediments such as gravel, sand, mud or silt and/or other materials or debris from any stream, river, lake or marine water body and associated shorelines and wetlands.

**17.15.065 Drift Cell, Drift Sector, or Littoral Cell.** A particular reach of marine shore in which littoral drift may occur without significant interruption and which contains any natural sources of such drift and also accretion shore forms created by such drift.

**17.15.066 Drilling.** The process of cutting a hole into the earth for the purpose of obtaining natural resources.

**17.15.067 Dry Land.** All areas above the elevation of the Ordinary High-Water Mark (OHWM).

**17.15.068 Dwelling.** A building or portion thereof, designed or used for residential occupancy. The term dwelling shall not be construed to mean a motel, rooming house, hospital or other accommodation used for more or less transient occupancy.

**17.15.070 Ecological Functions or Shoreline Functions.** The work performed or role played by the physical, chemical, and biological processes that contribute to the maintenance of the aquatic and terrestrial environments that constitute the shoreline's natural ecosystem.

**17.15.071 Ecosystem-Wide Processes.** The suite of naturally occurring physical and geologic processes of erosion, transport, and deposition; and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions.

**17.15.072 Education.** Any use or development undertaken for the support of public or private research or education.

**17.15.073 Emergency.** An unanticipated and imminent threat to public health, safety or the environment which requires immediate action with a time too short to allow full compliance with this master program. Emergency construction does not include development of new permanent protective structures where none previously existed. Where new protective structures are deemed by the administrator to be the appropriate means to address the emergency situation, upon abatement of the emergency situation the new structure shall be removed and any permits which would have been required by this SMP or the SMA, absent an emergency, must be obtained. Generally, flooding or other seasonal events that can be anticipated and may occur but are not imminent is not an emergency.

**17.15.074 Environment.** See “Shoreline Environment Designations”.

**17.15.075 Exempt.** Developments set forth in [WAC 173-27-040](#) and [RCW 90.58.030 \(3\)\(e\)](#), [90.58.140\(9\)](#), [90.58.147](#), [90.58.355](#), and [90.58.515](#) which are not required to obtain a substantial development permit but which must otherwise comply with applicable provisions of the act and the local master program.

**17.15.076 Extreme High Tide.** The highest tide level line water will reach in any one year.

**17.15.077 Extreme Low Tide.** The lowest line on the land reached by a receding tide.

**17.15.080 Fair market value.** The open market bid price for conducting the work, using the equipment and facilities, and purchase of the goods, services and materials necessary to accomplish the development. This would normally equate to the cost of hiring a contractor to undertake the development from start to finish, including the cost of labor, materials, equipment and facility usage, transportation and contractor overhead and profit. The fair market value of the development shall include the fair market value of any donated, contributed or found labor, equipment or materials.

**17.15.081 Feasible.** An action, such as a development project, mitigation, or preservation requirement, which meets all of the following conditions:

- A. The action can be accomplished with technologies and methods that have been used in the past in similar circumstances, or studies or tests have demonstrated in similar circumstances that such approaches are currently available and likely to achieve the intended results;
- B. The action provides a reasonable likelihood of achieving its intended purpose; and
- C. The action does not physically preclude achieving the project's primary intended legal use.
- D. In cases where these guidelines require certain actions unless they are infeasible, the burden of proving infeasibility is on the applicant.
- E. In determining an action's infeasibility, the reviewing agency may weigh the action's relative public costs and public benefits, considered in the short- and long-term time frames.

**17.15.082 Feeder Bluff.** A reach of shoreline which contains both an eroding beach and a feeding upland as identified on the Coastal Drift maps of the Coastal Zone Atlas of Washington, Volume 8, or similar source from the Washington Department of Ecology.

**17.15.083 Fill.** The addition of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land.

**17.15.084 Floats, Recreational.** Those platform structures anchored in fresh or marine waters for water recreational purposes such as swimming, diving or water skiing to include jump ramps. They may serve as temporary moorage facilities but for the purposes of this SMP are not intended to be used as boat storage.

**17.15.085 Floating Home.** A single family dwelling unit constructed on a float that, is moored[LW15], anchored, or otherwise secured in water, and is not a vessel, even though it may be capable of being towed.

**17.15.0865 Flood Plain.** Synonymous with one hundred-year flood plain and means that land area susceptible to inundation with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act.

**17.15.0876 Flood Plain Management.** A long-term local government program to reduce flood damages to life and property and to minimize public expenses due to floods through a comprehensive system of planning, development regulations, building standards, structural works and monitoring and warning systems.

**17.15.0887 Floodway.** The area, as identified in a master program, that either: (i) has been established in Federal Emergency Management Agency (FEMA) flood insurance rate maps or floodway maps; ~~or (ii) consists of those portions of a river valley lying streamward from the outer limits of a watercourse upon which flood waters are carried during periods of flooding that occur with reasonable regularity, although not necessarily annually, said floodway being identified, under normal condition, by changes in surface soil conditions or changes in types or quality of vegetative ground cover condition, topography, or other indicators of flooding that occurs with reasonable regularity, although not necessarily annually. Regardless of the method used to identify the floodway, t~~ The floodway shall not include those lands that can reasonably be expected to be protected from flood waters by flood control devices maintained by or maintained under license from the federal government, the state, or a political subdivision of the state.

**17.15.0898 Foreshore Marina.** Refer to “Marina, Foreshore”.

**17.15.09089 Forestry or Forest Practices.** The raising and harvesting of trees as a crop as defined by WAC 222-16, as amended. Within the City or its urban growth area all class 1, 2 or 3 forest practices shall be administered as class 4 conversions, and shall be subject to local land use regulations.

**17.15.0910 Functions and Values.** When referred to in the text of the SMP, this term includes the full range of physical characteristics, processes and resources attributed to a shoreline reach if allowed to function in its natural capacity. Each reach of shoreline has identified processes and particular ecological components that make up the character of the reach and its potential as a resource with identified values. Generally, this might include such things as associated wetlands that would act as storm water storage and help water quality, habitat for a range of species that might include salmon, trout and other fish. It might also include significant natural physical processes like long shore drift and feeder bluffs that are important for the maintenance of stretches of beach that if modified could potentially change the character of an entire beach shoreline.



**17.15.089~~21~~** **Gabions.** Cages, cylinders, or boxes filled with soil, sand, or rock that are used in civil engineering, for erosion control, dams or foundation construction. They may be used to stabilize shorelines or slopes against erosion. Other uses include retaining walls, temporary floodwalls, to filter silt from runoff, for small or temporary/permanent dams, river training, or channel lining. They may be used to direct the force of a flow of flood water around a vulnerable structure. Gabions have also been used as fish barriers on small streams.

**17.15.09~~32~~** **Geologically Hazardous Areas.** Areas susceptible to severe erosion or slide activity, such as unstable bluffs, and including areas with high potential for earthquake activity. They may be identified in critical areas inventories or the Coastal Zone Atlas. In general, they are not suitable for placing structures or locating intense activities or uses due to the inherent threat to public health and safety.

**17.15.09~~43~~** **Geotechnical Report or Geotechnical Analysis.** A scientific study or evaluation conducted by a qualified expert that includes a description of the ground and surface hydrology and geology, the affected land form and its susceptibility to mass wasting, erosion, and other geologic hazards or processes, conclusions and recommendations regarding the effect of the proposed development on geologic conditions, the adequacy of the site to be developed, the impacts of the proposed development, alternative approaches to the proposed development, and measures to mitigate potential site-specific and cumulative geological and hydrological impacts of the proposed development, including the potential adverse impacts to adjacent and down-current properties. Geotechnical reports shall conform to accepted technical standards and must be prepared by qualified professional licensed engineer(s) or geologist(s) who have sufficient professional expertise about the regional and local shoreline geology and processes.

**17.15.09~~54~~** **Grading.** The movement or redistribution of the soil, sand, rock, gravel, sediment, or other material on a site in a manner that alters the natural contour of the land.

**17.15.09~~65~~** **Grandfathered Status.** Is a status given to a legal nonconforming structure or use that recognizes it as an existing use and provides the use with limited rights. Limited rights include the ability to continue the use and to accomplish normal repair and maintenance activities necessary for the use to continue operation. A grandfathered use is subject to all requirements of a nonconforming use.

**17.15.09~~76~~** **Groin.** Structure built seaward perpendicular to the shore for the purpose of building or preserving an accretion beach by trapping littoral sand drift. Generally narrow and of varying lengths, a groin may be built in a series along the shore.

**17.15.09~~87~~** **Guidelines or SMP Guidelines.** Those standards adopted to implement the SMA policy for regulation of use of the shorelines of the state prior to adoption of master programs, and to provide criteria to local governments and Ecology for developing shoreline master programs (SMP). Chapter 173-26 WAC or as amended.

**17.15.100 Hazard Tree.** Any tree that is dead, dying, damaged, diseased, or structurally defective, recently exposed by adjacent clearing, or some other factor that will subject the tree to failure and the tree could reasonably reach a target, as determined by the City's tree protection professional. Pursuant to Chapter 14.32.050 B. of the Lacey Municipal Code, the City of Lacey "tree protection professional" makes the determination of what tree(s) are designated hazard tree(s).

**17.15.101 Hearings Board.** The State Shorelines Hearings Board established by the Act in [RCW 90.58.170](#).

**17.15.102 Height.** Is measured from average grade level to the highest point of a structure. Provided that television antennas, chimneys, and similar appurtenances shall not be used in calculating height, except where it obstructs the view of a substantial number of residences on areas adjoining such

shorelines, or the applicable master program provides otherwise. Provided further that temporary construction equipment is excluded in this calculation.

**17.15.103 Historic Building or Historic Site.** A building, structure, or site on the local, State or National Register of Historic Places.

**17.15.104 Houseboat.** A vessel, principally used as an over-water residence. Houseboats are licensed and designed for use as a mobile structure with detachable utilities or facilities, anchoring, and the presence of adequate self-propulsion and steering equipment to operate as a vessel. A registered water-going vessel where the owner lives aboard shall not be construed as a "houseboat."

**17.15.106 Instream Structure.** Is a structure that is waterward of the ordinary high water mark and either causes or has the potential to cause water impoundment or diversion, obstruction or modification of water flow.

**17.15.110 Impervious Surface.** Those surfaces that either prevent or obstruct the downward passage of water.

**17.15.111 Industrial Developments.** Facilities for processing, manufacturing and storage of finished or semi-finished goods.

**17.15.115 Jetties.** Structures generally built singly or in pairs perpendicular to the shore at harbor entrances or river mouths to prevent the shoaling or accretion of littoral sand drift. Jetties also protect channels and inlets from storm waves and cross-currents.

**17.15.116 Junk.** Old iron, steel, brass, cooper, tin, lead or other base metals; old cordage, ropes, rags, fibers or fabrics; old rubber; old bottles or other glass, bones; wastepaper, plastic and other waste or discarded material which might be prepared to be used again in some form; any or all of the foregoing; and motor vehicles, no longer used as such, to be used for scrap metal or stripping of parts; however, "junk" shall not include materials or objects accumulated by a person as by-products, waste or scraps from the operation of his own business or materials or objects held and used by a manufacturer as an integral part of his own manufacturing process.

**17.15.120 Landfilling.** Refer to "Fill".

**17.15.121 Land Division.** Land division is a general term that refers to the division of land by means described in Chapter 15 of the Lacey Municipal Code, including land divided through a plat, short plat, binding site plan or condominium.

**17.15.122 Launch Ramp.** An inclined slab, set of pads, planks, or graded slope used for launching boats with trailers. Parking and turn-around areas are usually accessory to such a site.

**17.15.123 Legislative Body.** The City Council of the City of Lacey.

**17.15.124 Levee.** A natural or man-made embankment on the bank of a stream for the purpose of keeping flood waters from inundating adjacent land. Some levees have revetments on their sides.

**17.15.125 Local Government.** Any county, incorporated city or town which contains within its boundaries shorelines of the state subject to [Chapter 90.58 RCW](#).

**17.15.126 Lot.** "Lot" means a platted or unplatted parcel of land unoccupied, occupied or intended to be occupied by a principal use or building and accessory buildings, together with all yards, open spaces and setbacks required by the Lacey zoning code (LMC Chapter 16).

**17.15.127 Lot Area.** "Lot area" means the total land space or area contained within the boundary lines of any lot, tract or parcel of land and may be expressed in square feet or acres.



**17.15.128 Lot, Front.** “Lot Front” means that portion of a lot which is located along an existing or dedicated public street, or, where no public street exists, along a public right of way or private way.

**17.15.129 Lot Length.** The maximum lineal dimension of a lot, not including an access road(s) less than twenty five (25) feet in width.

**17.15.130 Lot Width.** “Lot width” means the horizontal distance between side lot lines measured at right angles to the lines comprising the depth of the lot at a point midway between the front lot line and the rear lot line.

**17.15.131 Low Intensity Recreation.** See “Recreation, Low Intensity”.

**17.15.140 Marina.** A facility with water-dependent components that consists of boat launch facilities and piers, buoys or floats to provide moorage for five (5) or more boats.

**17.15.141 Marina, Backshore.** Marina located landward of the OHWM. There are two types of backshore marinas, one with wet-moorage that is dredged out of the land to artificially create a basin; and the other, dry moorage with upland storage that uses a hoist, marine travel lift or ramp for water access.

**17.15.142 Marina, Foreshore.** Marina located in the intertidal or offshore zone waterward of the ordinary high water mark and may require breakwaters of open type construction (floating breakwater and/or open pile work) and/or solid type construction (bulkhead and landfill), depending on the location.

**17.15.143 Marine.** Pertaining to tidally influenced waters, including oceans, sounds, straits, marine channels, and estuaries, including the Pacific Ocean, Puget Sound, Straits of Georgia and Juan de Fuca, and the bays, estuaries and inlets associated therewith.

**17.15.144 Marsh.** A low, flat area on which the vegetation consists mainly of herbaceous plants such as cattails, bulrushes, tules, sedges, skunk cabbage, and other aquatic or semi-aquatic plant. Shallow water usually stands on a marsh, at least during a considerable part of the year. The surface is commonly soft mud or muck.

**17.15.145 Master Program.** The comprehensive use plan for a described area, and the use regulations together with maps, diagrams, charts, or other descriptive material and text, a statement of desired goals, and standards developed in accordance with the policies enunciated in [RCW 90.58.020](#).

**17.15.146 Maximum Density.** The largest number of dwelling units per acre allowed by the SMP or local development regulations.

**17.15.147 Maximum Impervious Surface.** The largest amount of hard surfaces allowed with a parcel, which could include roof area, pavement, patios, walkways, driveways and gravel parking areas. Provided hard surfaces designed to be pervious may be exempt from impervious surface calculations pursuant to guidance in the City of Lacey Drainage Manual.

**17.15.148 May.** "May" implies discretionary authority exercised by the City, based upon complexity of issues that are not necessarily routine or predictable and need to be considered in the bigger picture of the public's best interest and community vision. This term will often apply to a situation, use or action that might be acceptable, provided it conforms to the provisions of this chapter, meets the intent of provisions of the Lacey Comprehensive Land Use Plan and is approved by the administrator after consideration of issues that could adversely impact the public's best interest or compromise the long range vision of the community.

**17.15.149 Mixed Use Development.** A single structure with two (2) or more different land uses, or a group of physically integrated and easily accessible structures with two (2) or more different land

uses. Combinations of land uses might include residential, office, retail, public, or entertainment. The uses need not be mixed within the same structure, but can include separate uses within different buildings.

**17.15.150 Mooring Buoy.** Floating object anchored to the bottom of a water body to provide tie-up capabilities for vessels.

**17.15.151 Multi-Use Path.** Refer to “Shared Use Path”.

**17.15.152 Must.** Denotes a mandate; the action is required.

**17.15.160 Native Vegetation.** Refer to “Vegetation, Native”.

**17.15.161 Natural or existing topography.** The topography of the lot, parcel, or tract of real property immediately prior to any site preparation or grading, including excavation or filling.

**17.15.162 Nonconforming Development or Nonconforming Building or Structure.** A building or structure or portion thereof which was lawfully erected, altered or maintained, but no longer conforms with ~~to the~~ present regulations such as setbacks, buffer or yards, area; bulk height or density or standards of the Master Program.

**17.15.163 Nonconforming Lot.** A parcel of land legally established prior to May 21, 1976 (the effective date of the City’s first Shoreline Master Program) which does not conform to the lot size or area requirements of this Master Program.

**17.15.164 Nonconforming Use.** ~~“Nonconforming use” means a~~ An activity in a structure or on a tract of land that was legally ~~established in existence~~ prior to the effective date of the act or shoreline master program ordinance codified in this title, which does not conform to the use regulations of the current site zoning use district in which it is located. [LW16]

**17.15.165 Nonwater-Oriented Uses.** Those uses that are not water-dependent, water-related, or water-enjoyment.

**17.15.166 Normal Maintenance.** This includes those usual acts to prevent a decline, lapse or cessation from a lawfully established condition.

**17.15.167 Normal Repair.** To restore a development to a state "comparable" to its original condition within a "reasonable period" after decay or partial destruction, except where repair involves "significant replacement" which is not common practice or causes substantial adverse effects to the shoreline resource or environment. For the purposes of this definition "comparable" shall include but not be limited to its size, shape, configuration, location and external appearance; "significant replacement" shall be defined as repair or replacement valued at 50% or more of the value of the structure being replaced; and "reasonable period" shall be less than 2 years.

**17.15.170 On-Premise Sign.** Refer to “Sign, On Premise”.

**17.15.171 Off-Premise Sign.** Refer to “Sign, Off Premise”.

**17.15.172 Open Space.** Land and natural wetlands which retain their natural or semi-natural character because they have not been developed with structures, paving or other development or modification and, for the purposes of this program, are normally required of residential and/or recreation developments. In the context of urban land divisions, open space refers to land within specific tracts required for recreational purposes and for tree tract requirements under Lacey's Land Division regulations, Urban Forest Management Plan and tree protection ordinance. Open Space does not refer to submerged lands or tidelands waterward of the OHWM that are sometimes shown platted in waterfront parcels.

**17.15.173 Ordinary High Water Mark (OHWM).** The mark on all lakes, streams and tidal water which will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department: PROVIDED, that in any area where the ordinary high-water mark cannot be found, the ordinary high-water mark adjoining salt water shall be the line of mean higher high tide and the ordinary high-water mark adjoining fresh water shall be the line of mean high water.

**17.15.174 Over Water.** Location of a structure or development above the surface of the water, or waterward of the OHWM including placement of buildings on pilings, floats, or perimeter rock foundations.

**17.15.180 Parcel.** A lot or contiguous lots owned by an individual, related individuals, an organization or organizations having similar membership.

**17.15.181 Parking.** Any space or area specifically allotted for the purpose of temporary, daily or overnight off-street storage of motor vehicles as an accessory use.

**17.15.182 Party of Record.** Includes all persons, agencies or organizations who have submitted written comments in response to a notice of application; made oral comments in a formal public hearing conducted on the application; or notified local government of their desire to receive a copy of the final decision on a permit and who have provided an address for delivery of such notice by mail.

**17.15.183 Pedestrian path or trail.** A path or trail designed and intended to serve only pedestrians. A pedestrian path will typically be less than seven feet wide and may be either soft or hard surfaced. Surface may use wood chips, a boardwalk, or other surface type if appropriate to the setting and use. Pedestrian paths and trails are environmental friendly and material and width will consider location, use and design for protection of shoreline functions and values.

**17.15.184 Permit.** Any substantial development, variance, conditional use permit, or revision authorized under [Chapter 90.58 RCW](#).

**17.15.185 Person.** An individual, partnership, corporation, association, organization, cooperative, public or municipal corporation, or agency of the state or local governmental unit however designated.

**17.15.186 Pier and Dock.** Structure generally built from the shore extending out over the water to provide moorage for commercial or private recreation. "Piers" are those structures built on fixed platforms above the water, whereas "docks" are those structures which float upon the water. When a pier or dock is to serve five (5) or more boats, it is considered a marina.

**17.15.187 Planned Residential Development.** A residential development which permits departures from the conventional siting, setback and density requirements of other sections of the Lacey zoning code in the interest of achieving superior site development, creating open space, and encouraging imaginative design by permitting design flexibility.

**17.15.188 Planning Department.** A part of the City of Lacey's Community Development Department responsible for land use planning and authorized to administer the provisions of the Act, WACs and this master program.

**17.15.189 Ports.** Centers for waterborne traffic that have become gravitational points for industrial/manufacturing firms.

**17.15.190 Pre-Existing Approved Use.** A status only given to a specific use at a specific site called out in the policy of the Shoreline Master Program that is based upon unique land use and environmental circumstances of a particular site and use. The designation provides the one specific site and use with all rights and privileges normally granted of a permitted use but with special requirements that must be satisfied for expansion.

**17.15.191 Priority Habitat.** A habitat type with unique or significant value to one or more species. An area classified and mapped as priority habitat must have one or more of the following attributes:

- A. Comparatively high fish or wildlife density;
- B. Comparatively high fish or wildlife species diversity;
- C. Fish spawning habitat;
- D. Important wildlife habitat;
- E. Important fish or wildlife seasonal range;
- F. Important fish or wildlife movement corridor;
- G. Rearing and foraging habitat;
- H. Important marine mammal haul-out;
- I. Refugia habitat;
- J. Limited availability;
- K. High vulnerability to habitat alteration;
- L. Unique or dependent species; or
- M. Shellfish bed.

A priority habitat may be described by a unique vegetation type or by a dominant plant species that is of primary importance to fish and wildlife (such as oak woodlands or eelgrass meadows). A priority habitat may also be described by a successional stage (such as, old growth and mature forests). Alternatively, a priority habitat may consist of a specific habitat element (such as a consolidated marine/estuarine shoreline, talus slopes, caves, snags) of key value to fish and wildlife. A priority habitat may contain priority and/or nonpriority fish and wildlife.

**17.15.192 Priority Species.** Species requiring protective measures and/or management guidelines to ensure their persistence at genetically viable population levels. Priority species are those that meet any of the criteria listed below:

- A. State-listed or state proposed species. State-listed species are those native fish and wildlife species legally designated as endangered (WAC 232-12-014), threatened (WAC 232-12-011), or sensitive (WAC 232-12-011). State proposed species are those fish and wildlife species that will be reviewed by the Department of Fish and Wildlife (POL-M-6001) for possible listing as endangered, threatened, or sensitive according to the process and criteria defined in WAC 232-12-297.
- B. Vulnerable aggregations. Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to congregate. Examples include heron colonies, seabird concentrations, and marine mammal congregations.
- C. Species of recreational, commercial, and/or tribal importance. Native and nonnative fish, shellfish, and wildlife species of recreational or commercial importance and recognized species used for tribal ceremonial and subsistence purposes that are vulnerable to habitat loss or degradation.
- D. Species listed under the federal Endangered Species Act as proposed, threatened or endangered.

**17.15.193 Property Lines.** The exterior boundaries of a lot or parcel.

**17.15.194 Provisions.** Policies, regulations, standards, guideline criteria or environment designations.

**17.15.195 Public Access.** A trail, path, road, easement, park, parcel of land, launching ramp, view corridor, or other mechanism/feature by which the general public is provided an opportunity to reach, public waters. This term can also be applied to an opportunity to view public water, such as a designated view corridor where no physical access is available.

**17.15.196 Public Interest.** The interest shared by the citizens of the state or community at large in the affairs of government, or some interest by which their rights or liabilities are affected including, but not limited to, an effect on public property or on health, safety, or general welfare resulting from a use or development.

**17.15.200 Qualified Professional.** A qualified professional for critical areas shall have a minimum of five (5) years of experience in the pertinent scientific discipline and experience in preparing critical area reports. A qualified critical area professional must have obtained a Bachelor's degree in biology, engineering, geology, environmental studies, fisheries, geomorphology, or a related field. The Planning Official may require professionals to demonstrate the basis for qualifications and shall make the final determination as to qualifications. [AC17]

**17.15.203 Recreational Development.** Provides opportunities for the refreshment of body and mind through forms of play, sports, relaxation, amusement or contemplation. It includes facilities for passive recreational activities such as hiking, photography, viewing and fishing. It also includes facilities for active or more intensive uses such as parks, campgrounds, golf courses and their support buildings, and other outdoor recreation areas.

**17.15.204 Recreational Floats.** See "Floats, Recreational".

**17.15.205 Residence, Multifamily** "Multifamily" means two or more living units under the same ownership where land has not been divided, i.e., duplex, triplex, quadraplex and apartment units.

**17.15.206 Residence, Single-Family detached.** A building designed for occupancy by one (1) family and containing one (1) dwelling unit and may include an accessory dwelling. With the exception of an accessory dwelling, the residence will be detached from other dwelling units and will normally be the only dwelling unit on the lot that it occupies.

**17.15.207 Residence, Single-Family Attached.** A building containing a number of dwelling units for individual families under individual ownership. This housing form can include condominiums, townhomes and other concepts that have multiple attached dwelling units in individual ownership.

**17.15.208 Residential Development.** One or more buildings, structures, lots, parcels or portions thereof that are designed for and used or intended to be used to provide a place of abode for human beings. Residential development includes single-family dwellings; duplexes; other detached dwellings; floating homes; multi-family development (apartments, townhouses, mobile home parks, other similar group housing); condominiums; subdivisions; and short subdivisions, together with accessory and appurtenant uses and structures normally applicable to residential uses including but not limited to garages, sheds, tennis courts, swimming pools, parking areas, fences, cabanas, saunas and guest cottages.

**17.15.209 Restore, Restoration or Ecological Restoration.** The reestablishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including, but not limited to, revegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

**17.15.210 Revetment.** A sloped shoreline structure (constructed of riprap or other substantial material) built to protect an existing eroding shoreline or newly placed fill against waves, wakes, currents, or weather.

**17.15.211 Riprap.** Broken stone placed on shoulders, slopes or other such places to protect them from erosion.

**17.15.212 Roads and Railroads.** Those passageways, and associated facilities and activities used by or associated with pedestrians, vehicles and trains, including but not limited to: all public and private roads; major highways; freeways; railways; the corridors in which they are placed; bridges; culverts; riprapping; landfills; cuts; turnouts; rest stations; viewpoints; picnic areas; landscaping; and soil erosion safeguards.

**17.15.220 Scientific Education.** Any activity undertaken for the support of public or private science education, such as scientific studies, classroom field trips and observation, interpretive trails and similar generally low impact activities. This category also includes sites and areas having scientific and educational values. For the purposes of this SMP this term does not include development of structures for habitation or institutional education such as schools or museums.

**17.15.221 Seawalls.** Structures normally more massive than bulkheads and revetments, built for the purpose of protecting the shore and uplands from heavy wave action and incidentally, retaining uplands and fills. Seawalls are not common to the Puget Sound region.

**17.15.222 Setback.** An area in which development of structures is restricted. Setbacks apply to structures and in general are intended to maintain a certain distance from some designated point to accomplish certain objectives. Objectives include such things as:

- A. To maintain a minimum distance on a side yard to provide adequate light, circulation and air between adjacent structures (side yard setback);
- B. To maintain a minimum distance in a front yard between a structure and the right of way to maintain a desired streetscape, provide area for future right of way expansion, to provide area for utility (front yard area setback);
- C. To keep a structure located a safe distance from an unstable bluff (critical area setback from unstable slopes with a buffer function);
- D. To keep enough space between a structure and natural shoreline processes (e.g. wave action and erosion) to avoid the need for bulkheading or other shoreline stabilization measures (shoreline setback from ordinary high water mark with a buffer function);
- E. To maintain distance from critical/sensitive areas to protect the critical/sensitive area from disturbance (critical area setback with a buffer function);
- F. To leave area for retention of natural vegetation or establishing naturalized landscaping to provide buffering and protective functions for designated areas (Shoreline setback from ordinary high water mark with buffering function);
- G. To improve shoreline aesthetics and protect shoreline views by the restriction of structures (shoreline setback from ordinary high water mark).

For the purposes of this Shoreline Master Program, the term setback will often be used in association with the term buffer, as the purpose(s) and function(s) of the setback will often overlap with the purpose(s) and functions of a buffer as described above. One distinction between the two terms, is buffers generally restrict a range of activity and use in a designated area, while setbacks generally



only apply to location of a structure within a designated area or more specifically location of the structure a certain distance from a particular point. See also definition of buffer, 17.15.035.

**17.15.223 Shall.** Denotes a mandate; the action must be done.

**17.15.224 Shared Use Path.** A facility physically separated from motorized vehicular traffic within the highway right-of-way or on an exclusive right-of-way with minimal crossflow by motor vehicles. It is designed and built primarily for use by bicycles, but is also used by pedestrians, joggers, skaters, wheelchair users (both non-motorized and motorized), equestrians, and other non-motorized users.

**17.15.225 Shorelands or Shoreland Areas.** Means those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the Department of Ecology.

**17.15.226 Shoreline Access Incentive Dedication Agreement Program.** The Shoreline Access Incentive Dedication Agreement Program is a program designed to achieve dedication of public access objectives of shoreline areas for public use and protection. In return for dedication of shoreline areas to the public, density bonuses and transfers are provided for development to upland areas on the subject site, outside of shoreline jurisdiction, or other areas throughout the city that are determined to be consistent with the intent of the Comprehensive Land Use Plan.

To promote innovative developments with superior quality and functionality, the program combines economic incentives for the development community (through significant density credit) goals of the Comprehensive Land Use Plan (for quality urban neighborhoods) and flexible application of normal zoning code standards (to permit flexibility and encourage innovation).

**17.15.227 Shoreline Areas and Shoreline Jurisdiction.** Means all shorelines of the state and shorelands as defined in [RCW 90.58.030](#).

**17.15.228 Shoreline Environment Designation.** Means the categories of shorelines of the state established by the master program to differentiate between areas whose features imply differing objectives regarding their use and future development.

**17.15.229 Shoreline Jurisdiction.** All "shorelands" as defined in [RCW 90.58.030](#). Refer to "Shorelands or Shoreland Areas". For the purposes of this SMP, this term refers to all lands and aquatic area falling under the jurisdiction of this SMP; generally including all land within 200 feet landward of the OHWM, all designated associated wetland areas, and area waterward of the OHWM under the jurisdiction of the City of Lacey.

**17.15.230 Shoreline Management Act.** The Shoreline Management Act of 1971 (Chapter 90.58 RCW, as amended).

**17.15.231 Shoreline Master Program or Master Program.** Means the comprehensive use plan element for a described area, and the use regulations together with maps, diagrams, charts, or other descriptive material and text, a statement of desired goals, policies and standards developed in accordance with the policies enunciated in [RCW 90.58.020](#).

As provided in [RCW 36.70A.480](#), the goals and policies of a shoreline master program for a city approved under [Chapter 90.58 RCW](#) shall be considered an element of the city's comprehensive land use plan. All other portions of the shoreline master program for a county or city adopted under [Chapter 90.58 RCW](#), including use regulations, shall be considered a part of the city's development regulations.

**17.15.232 Shoreline Modifications.** Those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such as a dike, breakwater, pier, weir, dredged basin, fill, bulkhead, or other shoreline structure. They can include other actions, such as clearing, grading, or application of chemicals.

**17.15.233 Shoreline Permit.** Refer to “Permit”.

**17.15.234 Shoreline Stabilization/Protection.** Action taken to reduce adverse impacts caused by current, flood, wake or wave action. This action includes all structural and nonstructural means to reduce these impacts due to flooding, erosion and accretion. Specific structural and nonstructural means included in this use activity are bulkheads, dikes, levees, riprap, sea walls, shoreline berms, beach feeding and breakwaters.

**17.15.235 Shorelines.** All of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except

~~N.A.~~ Shorelines of statewide significance;

~~O.B.~~ Shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and

~~P.C.~~ Shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes.

**17.15.236 Shoreline Access Segment.** Is a part of the shoreline parcel which is fifteen (15) linear feet wide parallel to the shoreline or twenty percent (20%) of the parcel width, whichever is smaller, and extends upland to the existing or proposed structure.

**17.15.237 Shorelines of Statewide Significance.** The following shorelines of the state are so designated:

~~E.A.~~ The area between the ordinary high water mark and the western boundary of the state from Cape Disappointment on the south to Cape Flattery on the north, including harbors, bays, estuaries, and inlets;

~~A.B.~~ Those areas of Puget Sound and adjacent salt waters and the Strait of Juan de Fuca between the ordinary high water mark and the line of extreme low tide as follows:

- 1) Nisqually Delta -- from DeWolf Bight to Tatsolo Point,
- 2) Birch Bay -- from Point Whitehorn to Birch Point,
- 3) Hood Canal -- from Tala Point to Foulweather Bluff,
- 4) Skagit Bay and adjacent area -- from Brown Point to Yokeko Point, and
- 5) Padilla Bay -- from March Point to William Point.

~~B.C.~~ Those areas of Puget Sound and the Strait of Juan de Fuca and adjacent salt waters north to the Canadian line and lying seaward from the line of extreme low tide;

~~C.D.~~ Those lakes, whether natural, artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark;

~~D.E.~~ Those natural rivers or segments thereof as follows:

- 1) Any west of the crest of the Cascade range downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more,
- 2) Any east of the crest of the Cascade range downstream of a point where the annual flow is measured at two hundred cubic feet per second or more, or those portions of rivers east



of the crest of the Cascade range downstream from the first three hundred square miles of drainage area, whichever is longer.

~~E.F.~~ Those shorelands associated with A, B, D, and E.

**17.15.238 Shorelines of the State.** The total of all shorelines and shorelines of statewide significance within the State of Washington.

**17.15.239 Should.** Denotes that the particular action is required unless there is a demonstrated, compelling reason, based on policy of the Shoreline Management Act, WAC 173-26 (2), against taking the action.

**17.15.240 Sign.** Means any commercial communication device, structure or fixture that is intended to aid an establishment in identification and to advertise and/or promote a business, service, activity or interest. For the purpose of this chapter, a sign shall not be considered to be building or structural design, but shall be restricted solely to graphics, symbols or written copy that is meant to be used in the aforementioned way.

**17.15.241 Sign, Off-Premise.** Means a permanent sign not located on the premises of use or activity to which the sign pertains.

**17.15.242 Sign, On-Premise.** Any sign identifying the premises on which located or the occupant(s) thereof, or relating to goods or services manufactured, produced or available on the premise.

**17.15.243 Sign, Off-Premise Directional.** Means an off-premise sign designed to guide the public to an area, place, business or service.

**17.15.244 Sign, Real Estate or Property for Sale, Rental or Lease Sign.** Means any sign pertaining to the sale, lease or rental of land or buildings.

**17.15.245 Sign, Wayfinding.** A type of street sign which provides directions to local attractions and sites.

**17.15.246 Significant Vegetation Removal.** Means the direct and indirect removal of trees and/or ground cover from any public or private undeveloped, partially developed, or developed lot, public lands or public right-of-way. This shall also include any destructive or inappropriate activity applied to a tree that will result in its death or effectively destroy the trees appearance and/or functionality, such as topping. The removal of invasive or noxious weeds does not constitute significant vegetation removal.

**17.15.247 Single Family Residence.** See Residence, Single Family.

**17.15.248 Solid Waste.** All solid, semi-solid, and liquid wastes including garbage, rubbish, ashes, plastics, industrial wastes, wood wastes and sort yard wastes associated with commercial logging activities, swill, demolition and construction wastes, abandoned vehicles and parts of vehicles, household appliances and other discarded commodities.

**17.15.249 Stairs.** A series of steps or flights of steps for passing from one level to another.

**17.15.250 Stair Tower.** A structure twelve (12) feet or taller in height typically consisting of one (1) or more flights of stairs, usually with landings to pass from one level to another.

**17.15.251 Stairway.** One or more flights of stairs, usually with landings to pass from one level to another.

**17.15.252 State Master Program.** The cumulative total of all master programs approved or adopted by the Department of Ecology.

**17.15.253 Streambank.** The area running along the course of a stream and rising from the ordinary high water mark (OHWM) up to the first significant break in slope. The first significant break in slope is a bench at least fifteen (15) feet wide. The streambank ends at the top of the bank where that break in slope occurs. NOTE: This definition is not intended to include the concept of a buffer for streams. It is only a definition of a physical feature associated with streams.

**17.15.254 Streamway.** That corridor of a single or multiple channel or channels within which the usual seasonal or stormwater runoff peaks are contained. The flora, fauna, soil and topography is dependent on or influenced by the height and velocity of the fluctuating currents.

**17.15.255 Street.** See Road.

**17.15.256 Street, Flanking.** A street, alley or right of way other than the one on which a corner lot has its main frontage.

**17.15.257 Street, Public.** A street in public ownership.

**17.15.258 Structure.** A permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner, whether installed on, above, or below the surface of the ground or water, except for vessels.

**17.15.259 Submerged Lands.** Those areas below the ordinary high-water mark of marine waters, lakes and rivers.

**17.15.260 Substantially Degrade.** Means to cause significant ecological impact.

**17.15.261 Substantial Development.** Any development of which the total cost or fair market value exceeds ~~five thousand dollars (\$5,718), the amount identified in WAC 173-27-040 and RCW 90.58.030(3)(e)~~ or any development which materially interferes with the normal public use of the water or shorelines of the state. ~~The dollar threshold established in this subsection must be adjusted for inflation by the office of financial management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. "Consumer price index" means, for any calendar year, that year's annual average consumer price index, Seattle, Washington area, for urban wage earners and clerical workers, all items, compiled by the bureau of labor and statistics, United States Department of Labor. The Office of Financial Management must calculate the new dollar threshold and transmit it to the office of the code reviser for publication in the Washington State Register at least one month before the new dollar threshold is to take effect.~~ [AC18]

~~The following developments listed within WAC 173-27-040 are exempt from substantial development permit and shall not be considered substantial developments for the purpose of this master program.:~~

~~A. Normal maintenance or repair of existing structures or developments, including damage by accident, fire, or elements;~~

~~B. Construction of the normal protective bulkhead common to single family residences;~~

~~C. Emergency construction necessary to protect property from damage by the elements;~~

~~D. Construction and practices normal or necessary for farming, irrigation, and ranching activities, including agricultural service roads and utilities on shorelands, and the construction and maintenance of irrigation structures including but not limited to head gates, pumping facilities, and irrigation channels. A feedlot of any size, all processing plants, other activities~~

- of a commercial nature, alteration of the contour of the shorelands by leveling or filling other than that which results from normal cultivation, shall not be considered normal or necessary farming or ranching activities. A feedlot shall be an enclosure or facility used or capable of being used for feeding livestock hay, grain, silage, or other livestock feed, but shall not include land for growing crops or vegetation for livestock feeding and/or grazing, nor shall it include normal livestock wintering operations;
- E. Construction or modification of navigational aids such as channel markers and anchor buoys;
- F. Construction on shorelands by an owner, lessee, or contract purchaser of a single family residence for his own use or for the use of his or her family, which residence does not exceed a height of thirty five feet above average grade level and which meets all requirements of the state agency or local government having jurisdiction thereof, other than requirements imposed pursuant to WAC 173-26;
- G. Construction of a dock, including a community dock, designed for pleasure craft only, for the private noncommercial use of the owner, lessee, or contract purchaser of single and multiple family residences. This exception applies if either: (A) In salt waters, the fair market value of the dock does not exceed two thousand five hundred dollars; or (B) in fresh waters, the fair market value of the dock does not exceed ten thousand dollars, but if subsequent construction having a fair market value exceeding two thousand five hundred dollars occurs within five years of completion of the prior construction, the subsequent construction shall be considered a substantial development for the purpose of WAC 173-26 or this Master Program;
- H. Operation, maintenance, or construction of canals, waterways, drains, reservoirs, or other facilities that now exist or are hereafter created or developed as a part of an irrigation system for the primary purpose of making use of system waters, including return flow and artificially stored groundwater for the irrigation of lands;
- I. The marking of property lines or corners on state owned lands, when such marking does not significantly interfere with normal public use of the surface of the water;
- J. Operation and maintenance of any system of dikes, ditches, drains, or other facilities existing on September 8, 1975, which were created, developed, or utilized primarily as a part of an agricultural drainage or diking system;
- K. Site exploration and investigation activities that are prerequisite to preparation of an application for development authorization under this chapter, if:
- a. The activity does not interfere with the normal public use of the surface waters;
  - b. The activity will have no significant adverse impact on the environment including, but not limited to, fish, wildlife, fish or wildlife habitat, water quality, and aesthetic values;
  - c. The activity does not involve the installation of a structure, and upon completion of the activity the vegetation and land configuration of the site are restored to conditions existing before the activity;
  - d. A private entity seeking development authorization under this section first posts a performance bond or provides other evidence of financial responsibility to the local jurisdiction to ensure that the site is restored to preexisting conditions; and
  - e. The activity is not subject to the permit requirements of RCW 90.58.550.
- L. The process of removing or controlling an aquatic noxious weed, as defined in RCW 17.26.020, through the use of an herbicide or other treatment methods applicable to weed control that are recommended by a final environmental impact statement published by the

~~Department of Agriculture or the department jointly with other state agencies under RCW 43.21C.~~[AC19]

**17.15.262 Surface Water Body.** Any water area which is within ~~the shoreline~~ jurisdictions of the state.

**17.15.270 Tideland.** The land on the shore of marine water bodies between OHWM or MHHW and the line of extreme low tide which is submerged daily by tides.

**17.15.271 Transmit.** To send from one person or place to another by means of mail, email, or hand delivery. The date of transmittal for mailed items is the date that the document is postmarked for emailed items the date emailed and for hand-delivered items the date of receipt at the destination.

**17.15.272 Transportation Facilities.** Those structures and developments that aid in land and water surface movement of people, goods and services. They include roads and highways, bridges and causeways, bikeways, trails, railroad facilities, ferry terminals, float plane terminals, heliports and other related facilities.

**17.15.273 Utilities.** Services and facilities that produce, convey, store, process or dispose of electric power, gas, water, sewage, stormwater, communications (including cellular towers), oil, waste and the like.

**17.15.274 Utilities, Accessory.** Those small-scale on-site services connected directly to a primary use along the shoreline.

**17.15.275 Variance.** Is a means to grant relief from the specific bulk, dimensional or performance standards set forth in the applicable master program and not a means to vary a use of a shoreline.

**17.15.276 Vegetation, Native.** Native plants commonly found in Thurston County. Generally comprised of three vegetative levels including an overstory of trees, an understory of shrubs, and a floor of herbs.

**17.15.277 Vegetation Management, Active.** Involves aquatic weed control as well as the restoration of altered or threatened shorelines using a technology called soil bioengineering. Soil bioengineering reestablishes native plant communities as a dynamic system that stabilizes the land from the effects of erosion.

**17.15.278 Vegetation Management, Passive.** Deals with protection and enhancement of existing diverse native plant communities along all shorelines including rivers, wetlands, lakes and steep bluffs.

**17.15.279 Vessel.** This includes ships, boats, barges or any other floating craft that is designed and used for navigation and does not interfere with the normal public use of the water.

**17.15.280 Water-Dependent Use.** A use or portion of a use which cannot exist in a location that is not adjacent to the water and which is dependent on the water by reason of the intrinsic nature of its operations.

Water-dependent uses include, but are not limited to:

- A. Aquaculture,
- B. Boat launch facilities,
- C. Ferry terminals,
- D. Hydroelectric power plants,
- E. Marinas,

- F. Marine construction, dismantling and repair,
- G. Marine and limnological research and education,
- H. Private and public docks for moorage,
- I. Terminal and transfer facilities for marine commerce and industry,
- J. Water intakes and outfalls,
- K. Log booming, and
- L. Tug and barge facilities.

**17.15.281 Water-Enjoyment Use.** A recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment.

Water-enjoyment uses include but are not limited to:

- ~~1-A.~~ Aquarium, with direct water intake,
- ~~2-B.~~ Restaurants,
- ~~3-C.~~ Public golf courses,
- ~~4-D.~~ Museums,
- ~~5-E.~~ Shared use paths,
- ~~6-F.~~ Boardwalks, and
- ~~7-G.~~ Viewing towers.

**17.15.282 Water-Oriented Use.** A use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.

**17.15.283 Water Quality.** The physical characteristics of water within shoreline jurisdiction, including water quantity, hydrological, physical, chemical, aesthetic, recreation-related, and biological characteristics. Where used in this master program, the term "water quantity" refers only to development and uses regulated under this chapter and affecting water quantity, such as impermeable surfaces and storm water handling practices. Water quantity, for purposes of this chapter, does not mean the withdrawal of ground water or diversion of surface water pursuant to [RCW 90.03.250 through 90.03.340](#).

**17.15.284 Water-Related Use.** A use or portion of a use which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because:

- A. The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or
- B. The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

Water-related uses include, but are not limited to:

- ~~1-A.~~ Warehousing or storage facilities,
- ~~2-B.~~ Support services for fish hatcheries,
- ~~3-C.~~ Seafood processing plants,
- ~~4-D.~~ Wood products manufacturing,
- ~~5-E.~~ Log storage,
- ~~6-F.~~ Watercraft sales, and

~~7.G.~~ Boating supplies.

**17.15.285 Weir.** A device placed in a stream or river to raise or divert the water.

**17.15.286 Wetlands.** Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

## 17.20 Jurisdiction, Designations and Map

### 17.20.005 Shoreline Jurisdiction, Designations and Map - Conflicts Between Designation and Criteria

In the event that any of the boundaries shown on the maps conflict with the criteria outlined in Sections 17.20.010 to 17.20.035, the criteria shall control.

It is anticipated that all areas within Lacey's shorelines are properly mapped and designated. ~~This authority is set forth in RCW 35.21.160 which extends jurisdiction to the middle of waterbodies including lakes, rivers and sounds. [AC20]~~ However, if for any reason an area within shoreline jurisdiction is not mapped and/or designated, it shall automatically be assigned an ~~urban conservancy~~Urban Conservancy designation until the shoreline can be re-designated through a master program amendment.

### 17.20.010 Shorelines of the State

The jurisdiction of this master program is "shorelines of the state", which includes all "shorelines" and "shorelines of statewide significance", as defined in RCW 90.58.030. This includes jurisdiction over adjacent waters to the middle of such bays, sounds, lakes, rivers or other navigable waters fronting on lands within the City. (RCW 35.21.160). [AC21]

### 17.20.015 Shoreline Jurisdiction for Marine Waters

Shoreline jurisdiction for tidal or marine waters shall include the shorelines of Puget Sound and:

1. Those lands which extend landward two hundred (200) feet as measured on a horizontal plane from the ordinary high water mark; and
2. Those wetlands which are in proximity to and either influence or are influenced by the tidal water. This influence includes but is not limited to one or more of the following: periodic tidal inundation, hydraulic continuity, formation by tidally influenced geohydraulic processes, or a surface connection through a culvert or tide gate.

### 17.20.020 Shoreline Jurisdiction for Lakes

Shoreline jurisdiction for lakes ~~larger than~~twenty (20) acres ~~or larger~~ [AC22]in \_\_ size shall include:

1. Those lands which extend landward two hundred (200) feet as measured on a horizontal plane from the ordinary high water mark; and
2. Those wetlands which are in proximity to and either influence or are influenced by the lake. This influence includes but is not limited to one or more of the following: periodic inundation or hydraulic continuity.

## 17.20.025 Shoreline Jurisdiction for Streams and Flood Plains

Shoreline jurisdiction for streams where the mean annual flow is twenty (20) cubic feet per second or greater shall include the greater of the following:

- ~~A.1.~~ Those lands which extend landward two (200) hundred feet as measured on a horizontal plane from the ordinary high water mark;
2. Floodways and contiguous flood plain areas landward two hundred feet from such floodways;
- ~~B. All of the one hundred (100) year flood plain within the associated shorelands;~~
- ~~C.3.~~ Those wetlands which are in proximity to and either influence or are influenced by the stream. This influence includes but is not limited to one or more of the following: periodic inundation; location within a flood plain, or hydraulic continuity; and
- ~~D.4.~~ Those lands within a river delta flood plain ~~except for those lands that can reasonably be expected to be protected from flood waters by flood control devices maintained by or maintained under license from the federal government, the state, or a political subdivision of the state.~~

## 17.20.027 Shoreline Jurisdiction and Relationship to Associated Wetland Buffers

For the purposes of this SMP, the shoreline jurisdiction shall not include the buffer of an associated wetland or other critical area buffer, except those portions of the buffer located on shorelands within 200 feet of the OHWM.

## 17.20.030 Shorelines within the City of Lacey and its Urban Growth Area

The City of Lacey shall have authority over those shorelines within its municipal boundaries. The shoreline environment designation for a pre-designated shoreline environment designation in the Urban Growth Area shall take effect upon annexation consistent with WAC 173-26-150. [AC23] Those shorelines within the City of Lacey and its Urban Growth Area which have been inventoried and found to meet the criteria of the Sections 17.20.015, 17.20.020, and 17.20.025 are as follows:

- ~~A.1.~~ Marine Waters:
  - ~~a.A.~~ Nisqually Reach

- ~~B.2.~~ Lakes:
  - ~~E.A.~~ Chambers Lake
  - ~~F.B.~~ Hicks Lake
  - ~~G.C.~~ Long Lake
  - ~~H.D.~~ Pattison Lake
  - ~~I.E.~~ Southwick Lake

3. Streams and Floodplains:
  - ~~G.A.~~ Woodland Creek - Where it meets the streamflow requirements for 20 cubic feet per second, mean annual flow. [AC24]

## 17.20.035 Shoreline Jurisdiction for Shorelines of Statewide Significance



Shoreline jurisdiction for "shorelines of statewide significance" shall include:

Those areas of Puget Sound between the ordinary high water mark and the line of extreme low tide as follows: Nisqually Delta from Dewolf Bight to Tatsolo Point.

Those shorelands associated with the above referenced areas; and those areas of Puget Sound lying seaward from the line of extreme low tide.

## **17.22 Shoreline Environment Designations**

### **17.2022.040 Purpose and Intent**

The Shoreline Master Program Guidelines (Chapter 173-26 WAC) recommends a classification system for designating shorelines. The purpose and designation criteria, for each of these "Shoreline Environment Designations" or "SEDs" are described in Sections 17.20.045 to 17.20.075.

### **17.2022.045 Aquatic – Purpose**

The purpose of the ~~aquatic~~Aquatic environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark.

### **17.2022.046 Aquatic – Designation Criteria**

Assign an ~~aquatic~~Aquatic environment designation to lands waterward of the ordinary high-water mark (OHWM).

### **17.2022.050 Aquatic – Management Policies**

1. Allow new over-water structures only for water-dependent uses, public access, or ecological restoration.
2. The size of new over-water structures should be limited to the minimum necessary to support the structure's intended use.
3. In order to reduce the impacts of shoreline development and increase effective use of water resources, multiple use of over-water facilities should be encouraged.
4. All developments and uses on navigable waters or their beds should be located and designed to minimize interference with surface navigation, to consider impacts to public views, and to allow for the safe, unobstructed passage of fish and wildlife, particularly those species dependent on migration.
5. Uses that adversely impact the ecological functions of critical saltwater and freshwater habitats should not be allowed except where necessary to achieve the objectives of RCW 90.58.020, and then only when their impacts are mitigated according to the sequence described in Section 17.40.015 of this SMP as necessary to assure no net loss of ecological functions.
6. Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and alteration of natural hydrographic conditions.

### **17.2022.055 Natural - Purpose**

The purpose of the ~~natural~~Natural environment is to protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems require that only very low intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes. Consistent with the policies of the designation, local government should include planning for restoration of degraded shorelines within this environment.

## **17.~~2022~~.060 Natural Designation - Criteria**

The ~~natural~~Natural environment designation has been applied to shoreline areas with the following characteristics:

1. The shoreline is ecologically intact and therefore currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity;
2. The shoreline is considered to represent ecosystems and geologic types that are of particular scientific and educational interest;
3. The shoreline is unable to support new development or uses without significant adverse impacts to ecological functions or risk to human safety.

Lacey's shoreline areas that meet this criteria include largely undisturbed portions of shoreline areas with wetlands, the Woodland Creek stream corridor system and the ecologically intact shoreline habitat by Butterball Cove in the Hawks Prairie Planned Community.

Ecologically intact shorelines, as used here, means those shoreline areas that retain the majority of their natural shoreline functions, as evidenced by the shoreline configuration and the presence of native vegetation. Lacey's ecologically intact shorelines around Hicks Lake and the Woodland Creek corridor are generally free of structural shoreline modifications, structures, and intensive human uses. These areas have been designated as OSI under Lacey's zoning code for over a decade to protect wetland areas. Prior to that time they were not developed because other properties that were easier to develop were available.

The marine area in the Hawks Prairie Planned Community is also considered "ecologically intact". These areas are generally forested and include native vegetation with diverse plant communities, multiple canopy layers, and the presence of large woody debris available for recruitment to adjacent water bodies. These areas have also been protected by critical area regulations and ownerships that have been good land stewards. Much of the Woodland Creek corridor is under the ownership of Saint Martin's Abbey that has placed a high priority on preservation of the Creek's natural functions and values and has protected the Creek from development. The Hawks Prairie Planned Community also included protection of the marine area by designating it as open space and protecting its natural character.

The term "ecologically intact shorelines" applies to all shoreline areas meeting the above criteria ranging from larger reaches that may include multiple properties to small areas located within a single property.

## **17.~~2022~~.061 Natural Designation – Management Policies**

1. Any use that would substantially degrade the ecological functions or natural character of the shoreline area should not be allowed.
2. The following new uses should not be allowed in the "~~natural~~Natural" environment:
  - A. Commercial uses,
  - B. Industrial uses,
  - C. Nonwater-oriented recreation,
  - D. Roads, utility corridors, and parking areas that can be located outside of "~~natural~~Natural" designated shorelines.
3. Single family residential development may be allowed but limited to a density and intensity of such use as necessary to protect ecological functions and be consistent with the purpose of the environment designation. Incentive programs are also planned to make transfer of densities off site to upland areas outside of shoreline jurisdiction more valuable than development of the property within shoreline jurisdiction.
4. Scientific, historical, cultural, educational research uses, and low-intensity water-oriented recreational access uses may be allowed provided that no significant ecological impact on the area will result.
5. New development or significant vegetation removal that would reduce the capability of vegetation to perform normal ecological functions should be prohibited. Development of property in a configuration that, to achieve its intended purpose, will require significant vegetation removal or shoreline modification that adversely impacts ecological functions should be prohibited. Incentives will be developed that encourage development outside of shoreline jurisdiction in exchange for significant density transfer bonuses.

## 17.~~2022~~.065 Urban Conservancy - Purpose

The purpose of the ~~urban conservancy~~Urban Conservancy environment is to protect and restore ecological functions of open space, flood plain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.

## 17.~~2022~~.066 Urban Conservancy - Designation Criteria

The ~~urban conservancy~~Urban Conservancy environment designation has been applied to shoreline areas appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area. These areas are generally not suitable for water-dependent uses. Areas designated ~~urban conservancy~~Urban Conservancy generally have the following characteristics:

- ~~A.1.~~ Shoreline areas that are suitable for water-related or water-enjoyment uses;
- ~~B.2.~~ Shoreline areas that are open space, flood plain or other sensitive areas that should not be more intensively developed;
- ~~C.3.~~ Shoreline areas that have potential for ecological restoration;
- ~~D.4.~~ Shoreline areas that retain important ecological functions, even though partially developed; or

~~E-5.~~ Shoreline areas that have the potential for development that is compatible with ecological restoration.

## **17.~~2022~~.067 Urban Conservancy - Management Policies**

1. Uses that preserve the natural character of the area or promote preservation of open space, floodplain or sensitive lands either directly or over the long term should be the primary allowed uses. Uses that result in restoration of ecological functions should be allowed if the use is otherwise compatible with the purpose of the environment and the setting.
2. Standards have been established for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications within the "~~urban conservancy~~Urban Conservancy" designation. These standards are designed to promote no net loss of shoreline ecological functions or values.
3. Public access and public recreation objectives shall be implemented according to priorities of Lacey's Public Access Plan whenever feasible and significant ecological impacts can be mitigated.
4. Water-oriented uses will be given priority over non-water oriented uses.

## **17.~~2022~~.070 Shoreline Residential - Purpose**

The purpose of the ~~shoreline residential~~Shoreline Residential environment is to accommodate residential development and appurtenant structures that are consistent with the SMP, state guidelines and this chapter. An additional purpose is to provide appropriate public access and recreational uses.

## **17.~~2022~~.072 Shoreline Residential Designation - Criteria**

The ~~shoreline residential~~Shoreline Residential environment designation is designed for shoreline areas inside urban growth areas, as defined in RCW 36.70A.110, and incorporated municipalities and areas that are predominantly developed with single-family or multifamily residential development or are planned and platted for residential development. Areas meeting this criterion within Lacey have been designated ~~shoreline residential~~Shoreline Residential.

## **17.~~2022~~.075 Shoreline Residential - Management Policies**

1. Standards for density, setbacks, buffers within the setback area, lot coverage limitations, shoreline stabilization policies and standards, vegetation conservation and restoration requirements, critical area protection, and water quality have been set based upon the inventory and characterization report and existing use to promote no net loss of shoreline ecological functions.
2. Shoreline environment designations take into account the environmental limitations and sensitivity of specific shoreline area (reaches). Designations also consider the level of

infrastructure and services available, recommendations from state agencies with expertise and other comprehensive planning considerations.

3. Areas that have been designated Shoreline Residential meet criteria for this designation are generally already urbanized to some extent and are planned for residential use under Lacey's GMA based Comprehensive Land Use Plan.
4. Multifamily and multi-lot residential and recreational developments should be required to provide public access according to Lacey's Public Access Plan. Flexibility in land form (type of residential development planned; SFR, attached, detached, multifamily etc.), will be allowed to encourage residential forms that can be clustered to minimize environmental impacts and accomplish public access objectives.
5. Access, utilities, and public services should be provided to be available and adequate to serve proposed and future development.

## 17.~~2022~~.100 Official Map

1. Approximate Shoreline Jurisdiction and the Shoreline Environment Designations are delineated on a map, hereby incorporated as a part of this SMP that shall be known as the "City of Lacey Shoreline Master Program Map"; see ~~Map 1~~Appendix 1A, Shoreline Environment Designation Maps. [AC25]
2. For the purposes of coordination of shoreline requirements with general land use regulations and the City Comprehensive Land Use Plan, the shoreline designations are also shown as an overlay on the Comprehensive Land Use Plan Map and Zoning map.
3. The boundaries of shoreline jurisdiction on the map are approximate. The extent of shoreline jurisdiction shall be based upon an on-site inspection and the criteria found in Sections 17.20.015 to 17.20.035.
4. The official copy of this map shall reside with the Washington State Department of Ecology.

Copies of this map are available for public use from the City of Lacey, Community Development Department.





A marker delineates a wetland associated with the major wetlands system south of Hicks Lake. The delineation will mark off the area that is wetland and a required buffer that is dedicated to the City for preservation of the system and its functions and values over the long term.



Picture showing the view residents enjoy from the north side of Chambers Lake.

## **Article 2. Use and Development Standards Matrix, Nonconformances, Piers and Docks, and Residential Development**



## 17.24 Tables for Permitted Uses, Development Standards and Modifications

### 1. Uses and Activities:

- A. Guidelines for vegetative improvements, when required, are provided in Section 17.41.021.
- B. Uses and activities may be allowed by shoreline environment designation as listed in ~~Table 3~~17.24.010.
- C. Uses and activities shall be subject to the development standards for the specific use(s) or activity and as provided in ~~Table 4~~17.24.015.
- D. When there are no development standards for a specific use or activity, application for such use or activity shall be processed as a CUP and the design of the proposed use shall satisfy the goals and policies in Section 17.44 and promote no net loss of shoreline ecological functions and values.
- E. The tables are considered summary information for quick review.  
If there is a conflict between the standards provided in the tables and text of sections dealing with specific uses, modifications or activities, the text shall prevail; individual text sections provide detailed consideration of the topic with the intent behind the standards.

### 2. Shoreline Modifications, Table of Shoreline Modifications by Shoreline Environment Designation:

- A. Shoreline modifications may be allowed by shoreline environment designation as listed in ~~Table 5~~17.24.020.
- B. Shoreline modifications shall be subject to the development standards for the specific type of shoreline alteration as described in separate sections dealing with each type of modification and as listed in ~~Table 4~~17.24.015.
- ~~B. C.~~—When there are no development standards for a specific shoreline modification, the shoreline modification shall follow the intent described in general goals and policies provided throughout this SMP, as well as applicable discussion and any goals and policies provided that are applicable to the specific modification. The fundamental requirement to promote no net loss of shoreline ecological functions expressed throughout this SMP shall be used as benchmark for consideration.

# 17.24.010 **Table 3--Uses and Activities**<sup>[AC26]</sup> **Matrix**

**Table 3--Uses and Activities by Shoreline Environment Designation**

| USES & ACTIVITIES <sup>[VZK(27)][JB28)][DN29]</sup>  | Shoreline Residential | Urban Conservancy | Natural | Aquatic |
|------------------------------------------------------|-----------------------|-------------------|---------|---------|
| <b>Agriculture</b>                                   | X                     | X                 | X       | X       |
| <b><u>Aquaculture</u></b>                            |                       |                   |         |         |
| 1.● Shellfish Aquaculture                            | S                     | S                 | C       | S*      |
| 2.● Fish Hatcheries and other Commercial Aquaculture | S                     | S                 | X**     | S*      |
| <b><u>Boating Facilities</u></b>                     |                       |                   |         |         |
| • Launch Ramps                                       | S                     | S                 | C       | S*      |
| • Marinas                                            | X                     | X\S+              | X       | S*      |
| • Covered Moorage                                    | X                     | X                 | X       | X       |
| <i>(Refer to Table 517.25 for Piers and Docks)</i>   |                       |                   |         |         |
| <b>Commercial</b>                                    | X                     | X                 | X       | X       |
| <b>Forestry</b>                                      | X                     | X                 | X       | X       |
| <b><u>Historical or Archeological</u></b>            |                       |                   |         |         |
| 1.● Protection, Rehabilitation and Restoration       | N/A                   | N/A               | N/A     | N/A     |
| 2.● Reconstruction of Replica                        | C                     | C                 | C       | C       |
| <b>Industrial</b>                                    | X                     | X                 | X       | X       |
| <b>Mining</b>                                        | X                     | X                 | X       | X       |

For description of permit types see Section 17.30.

S = Requires a Shoreline Substantial Development Permit

E = Requires a Shoreline Exemption; and must comply with applicable Master Program sections

C = Requires a Shoreline Conditional Use Permit

X = Prohibited; not eligible for a Substantial Development or Conditional Use Permit

**NA = Not applicable, refer to the appropriate Master Program section for additional standards**<sup>[AC30]</sup>

1 = Within one hundred (100) feet of the ordinary high water mark

2 = From one hundred (100) feet from the OHWM to the landward edge of shoreline jurisdiction

**+= New marinas are prohibited until and unless the City's Comprehensive Plan for Outdoor Recreation demonstrates a need. See additional provisions in Section 17.49.020.**

\* = In the Aquatic environment the use or shoreline modification may be allowed if it is allowed in the adjacent upland shoreline environment designation

\*\*Existing uses shall be given a status of "pre-existing approved use and treated as a permitted use. Provided the use meets requirements of Section 17.47 and any expansion is processed as a conditional use permit.

**Table 3– Uses and Activities by Shoreline Environment Designation Matrix**

| USES & ACTIVITIES                                                                                                                                                                                                                                                                                                                                                                                                                    | Shoreline Residential                                                            | Urban Conservancy                                                              | Natural                                                                        | Aquatic                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------|
| <b><u>Parking</u></b><br>1. <u>    </u> Serving an approved use<br>2. <u>    </u> Primary useServing any other use including paid                                                                                                                                                                                                                                                                                                    | S<br>X                                                                           | S<br>X                                                                         | S***<br>X                                                                      | X<br>X                                             |
| <b><u>Recreation</u></b><br>• Water-dependent<br>• Water-related<br>• Water-enjoyment<br>• Non-water oriented<br><br>• Pedestrian trail, surfaced with wood chips or other natural permeable material. Designed to minimize impact to shoreline functions and values.<br><br>• Pedestrian trail in a boardwalk design in sensitive area or buffer for public access. Designed to minimize impacts to shoreline functions and values. | S<br><br>S<br><br>S<br><br>C <sup>1</sup> / S <sup>2</sup><br><br>N/A<br><br>N/A | S<br><br>S<br><br>S<br><br>C <sup>1</sup> / S <sup>2</sup><br><br>N/A<br><br>S | S<br><br>S<br><br>S<br><br>X <sup>1</sup> / C <sup>2</sup><br><br>N/A<br><br>S | S<br><br>S<br><br>C<br><br>X<br><br>N/A<br><br>N/A |
| <b><u>Residential</u></b><br>• Single-Family<br>• Land Division<br>• Attached Single Family & Multi-Family                                                                                                                                                                                                                                                                                                                           | E<br>C<br>S                                                                      | E<br>C<br>S                                                                    | C<br>C<br>X                                                                    | X<br>X<br>X                                        |
| <b><u>Scientific or Educational</u></b>                                                                                                                                                                                                                                                                                                                                                                                              | N/A****<br>_                                                                     | N/A****<br>_                                                                   | C                                                                              | N/A****<br>_                                       |
| <b><u>Signage</u></b><br>1. <u>    </u> On Premise and Way Finding<br>2. <u>    </u> Off Premise                                                                                                                                                                                                                                                                                                                                     | N/A<br>X                                                                         | N/A<br>X                                                                       | N/A<br>X                                                                       | N/A<br>X                                           |
| <b>Solid Waste Disposal</b>                                                                                                                                                                                                                                                                                                                                                                                                          | X                                                                                | X                                                                              | X                                                                              | X                                                  |
| <b><u>Transportation</u></b><br>• Roads and Railroads<br>• Shared Use Path                                                                                                                                                                                                                                                                                                                                                           | C <sup>1</sup> / S <sup>2</sup><br>S                                             | C <sup>1</sup> / S <sup>2</sup><br>S                                           | C<br>S                                                                         | C*<br>S*                                           |
| <b><u>Utilities</u></b><br>• <b>Primary</b><br><br>• <b>Accessory to primary use</b>                                                                                                                                                                                                                                                                                                                                                 | C <sup>1</sup> / S <sup>2</sup><br><br><i>Refer to primary use</i>               | C <sup>1</sup> / S <sup>2</sup><br><br><i>Refer to primary use</i>             | C<br><br><i>Refer to primary use</i>                                           | C*<br><br><i>Refer to primary use</i>              |

S = Requires a Shoreline Substantial Development Permit

E = Requires a Shoreline Exemption; and must comply with applicable Master Program sections

C = Requires a Shoreline Conditional Use Permit

X = Prohibited; not eligible for a Substantial Development or Conditional Use Permit

N/A=Not applicable, refer to the appropriate Master Program section for additional standards. Such uses and activities may not meet the definition of development or threshold to be considered “substantial development”.

1 = Within one hundred (100) feet of the ordinary high water mark

2 = From one hundred (100) feet from the OHWM to the landward edge of shoreline jurisdiction

+= New marinas are prohibited until and unless the City’s Comprehensive Plan for Outdoor Recreation demonstrates a need. See additional provisions in Section 17.49.020.

\* = In the Aquatic environment the use or shoreline modification may be allowed if it is allowed in the adjacent upland shoreline environment designation

\*\*Existing uses shall be given a status of “pre-existing approved use and treated as a permitted use. Provided the use meets requirements of Section 17.47 and any expansion is processed as a conditional use permit.

~~\*\*\*~~ Parking in the ~~natural~~Natural designation is limited to a single family garage attached to the house. Public access sites may have limited surface parking meeting development standards appropriate to the use provided the applicant illustrates it is infeasible to locate necessary parking outside the shoreline jurisdiction.

~~\*\*\*~~ Provided a Conditional Use Permit may be required according to the provisions of Section 17.66 1.G. of this SMP

## 17.24.015 Development Standards Matrix

**~~Table 4—Development Standards Matrix by Shoreline Environment Designation~~**

| DEVELOPMENT STANDARDS                                                                                                                                                                                                                                                                                                                                                                                     | Shoreline Residential                                                                                              | Urban Conservancy                                                                                      | Natural                                                                                                             | Aquatic                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Aquaculture</b><br>OHWM setback@<br>Building height                                                                                                                                                                                                                                                                                                                                                    | 15'<br>35'                                                                                                         | 25'<br>35'                                                                                             | 50'<br>35'                                                                                                          | NA<br>10'                                                                 |
| <b>Boating Facilities</b><br>(Boat Launches, Marinas)<br><br><b>Water-dependent</b><br>OHWM setback@<br>Building height<br><br><b>Water-related</b><br>OHWM setback@<br>Building height                                                                                                                                                                                                                   | <br><br><br>0'<br>30'<br><br>15'<br>30'                                                                            | <br><br><br>0'<br>30'<br><br>15'<br>30'                                                                | <br><br><br>0'<br>25'<br><br>25'<br>25'                                                                             | <br><br><br>NA<br>20'<br><br>NA<br>NA                                     |
| <b>Parking facilities</b> (surface)                                                                                                                                                                                                                                                                                                                                                                       | 50'                                                                                                                | 75'                                                                                                    | 150'                                                                                                                | N/A                                                                       |
| <b>Recreation Development</b><br><br><b>Water-dependent</b><br>OHWM Setback@<br>Building Height<br><br><b>Water-related &amp; enjoyment</b><br>OHWM Setback@<br>Building Height<br><br><b>Nonwater-oriented</b><br>OHWM Setback@<br>Building Height<br><br><b>Shared Use Path</b><br>OHWM Setback@<br><br><b>Pedestrian Trails and Shoreline Access Segment</b>                                           | <br><br>25'<br>25'<br><br>50'<br>25'<br><br>100'<br>25'<br><br>25'***<br><br>0'                                    | <br><br>25'<br>25'<br><br>50'<br>25'<br><br>100'<br>25'<br><br>50'***<br><br>0'                        | <br><br>25'<br>25'<br><br>50'<br>25'<br><br>100'<br>25'<br><br>75'***<br><br>0'                                     | <br><br>NA<br>10'<br><br>NA<br>10'<br><br>NA<br>10'<br><br>NA             |
| <b>Residential Development</b><br><b>Single-Family Dwellings</b><br><br>Maximum Density<br>OHWM Setback@<br>Building Height<br>Maximum Impervious Surfaces<br>Minimum Lot Size/Width<br><br><b>Attached Single Family &amp; Multi-Family Dwellings</b><br>Maximum Density<br>OHWM Setback@<br>Building Height<br>Maximum Impervious Surfaces<br>Minimum Lot Size/Width<br><br><b>Accessory structures</b> | <br><br>4* [DN31] du/ac<br>50'<br>35'<br>50%<br>7,500 s.f./50'<br><br>4* du/ac<br>50 feet<br>35'<br>50%<br><br>50' | <br><br>1 du*/ac<br>100'<br>35'<br>30%<br>+/50'<br><br>1* du/ac<br>100'<br>35'<br>30%<br>+<br><br>100' | <br><br>1du*/10 ac<br>150'<br>35'<br>10%<br>+/50'<br><br>1* du/10 ac****<br>150'<br>35'<br>10%****<br>+<br><br>150' | <br><br>NA<br>NA<br>NA<br>NA<br>NA<br><br>NA<br>NA<br>NA<br>NA<br><br>N/A |

| DEVELOPMENT STANDARDS                                                                | Shoreline Residential                                                              | Urban Conservancy                                                                  | Natural                                                                             | Aquatic                                            |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>Transportation</b><br><b>Roads and Railroads</b><br>OHWM setback@                 | 50'                                                                                | 75'                                                                                | 150'                                                                                | NA                                                 |
| <b>Utilities</b><br>OHWM setback@<br>Building height<br><br>Accessory to primary use | 50', 0'***<br>25 <sup>1</sup> / 35 <sup>2</sup><br><br><i>Refer to Primary Use</i> | 75', 0'***<br>25 <sup>1</sup> / 35 <sup>2</sup><br><br><i>Refer to Primary Use</i> | 150', 0'***<br>20 <sup>1</sup> / 30 <sup>2</sup><br><br><i>Refer to Primary Use</i> | NA, 0'***<br>NA<br><br><i>Refer to Primary Use</i> |

OHWM = Ordinary high water mark

NA = Not applicable, refer to the appropriate Master Program section for additional standards

+ = Refer to residential lot size and width provisions in Section 17.2663[AC32].025.

1 = Within one hundred (100) feet from the ordinary high water mark

2 = From one hundred (100) feet to the edge of the shoreline jurisdiction

@ = Refer to shoreline vegetation conservation provisions in Sections 17.41.

\*\*Water ~~dependant~~dependent utilities (such as a desalination plant) may extend into the water and will not be subject to a setback, as determined by the administrator.

\*\*\* The Administrator may authorize lesser setbacks upon granting of a variance, according to a site specific analysis considering purpose, need, environmental conditions and design, and provided no other alignment is practical or feasible. If a lesser setback is permitted, objectives of no net loss shall be satisfied.

\*\*\*\* Housing must be clustered and be designed to have the least impact to shoreline resources, including utilization of low impact development techniques. Emphasis is to encourage use of incentive programs, providing higher value and density opportunities when shoreline area is dedicated to the public. Under incentive programs all development and associated density is transferred out of shoreline jurisdiction to a designated receiving area.

## 17.24.020 ~~Table 5~~ <sup>[AC33]</sup> Shoreline Modifications Matrix ~~by Shoreline Environment Designation~~

| SHORELINE MODIFICATIONS                                                                 | Shoreline Residential                            | Urban Conservancy                 | Natural | Aquatic |
|-----------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------|---------|---------|
| <b>Dredging</b>                                                                         | NA                                               | NA                                | NA      | C       |
| <b>Grading and Fill</b>                                                                 |                                                  |                                   |         |         |
| Ecological Restoration Project                                                          | S                                                | S                                 | S       | S       |
| All Other Activities                                                                    | C                                                | C                                 | X       | C       |
| <b>Overwater Structures</b>                                                             |                                                  |                                   |         |         |
| Buoy                                                                                    | S                                                | S                                 | C       | *       |
| Pier and Dock                                                                           | C <sup>1</sup> / S <sup>2</sup> / C <sup>3</sup> | C <sup>1,3</sup> / S <sup>2</sup> | C**     | C**     |
| Recreational Float                                                                      | S                                                | S                                 | C       | *       |
| <b>Shoreline Stabilization</b>                                                          |                                                  |                                   |         |         |
| Beach Restoration and Enhancement                                                       | S                                                | S                                 | S       | S       |
| Bioengineering                                                                          | S                                                | S                                 | C       | C       |
| Revetment and Gabion                                                                    | C                                                | C                                 | X       | C       |
| Bulkhead                                                                                | C                                                | C                                 | X       | C       |
| Breakwater, Jetty, Groin and Weirs                                                      | X                                                | X                                 | X       | X       |
| Dike, Levee and Instream Structure                                                      | C                                                | C                                 | X       | C*      |
| <b>Stair Tower</b>                                                                      | X                                                | X                                 | X       | X       |
| <b>****Replacement of Modification</b> (repair exceeds 50% of replacement value)        | C                                                | C                                 | C       | C       |
| <b>**** Repair of Modification</b> (repair value is less than 50% of replacement value) | E                                                | E                                 | E       | E       |

S = Requires a Shoreline Substantial Development Permit

E = Requires a Shoreline Exemption; and must comply with applicable Master Program sections

C = Requires a Shoreline Conditional Use Permit

X = Prohibited; not eligible for a Substantial Development or Conditional Use Permit

NA = Not applicable, refer to the appropriate Master Program section for additional standards

1 = Serving one (1) property

2 = Serving two (2) or more properties and exceeding the exemption threshold for a Substantial Development Permit pursuant to Section 17.30.035-~~(7)~~.3 = Serving more than one property but under the exempt threshold for a Substantial Development Permit pursuant to Section 17.30.035-~~(7)~~.<sup>[AC34]</sup>

\*The use or shoreline modification may be allowed in the Aquatic Environment if it is allowed in the adjacent upland environment. In such case the underlying permit process will be used for review and conditioning of the use or modification to ensure mitigation and no net loss of function or value.

\*\* Use is prohibited in the Natural designation, and Aquatic designation when located adjacent to shorelands with the Natural designation, except as provided in Section 17.61.020 (4), (8) and (9)

\*\*\*\* Value will be calculated from the International Building Code Tables used to calculate the value of improvements for determining the cost of permits. If no value can be assigned from the IBC, other means for determining the “fair market value” will be utilized.

## **17.25 Piers and Docks**

### **17.2561.0120 Piers and Docks - Development Standards**<sup>[AC35]</sup>

1. New piers and docks shall be allowed only for water-dependent uses or public access. As used here, a dock associated with a single-family residence is a water-dependent use provided that it is designed and intended as a facility for access to watercraft and otherwise complies with the provisions of this section.
2. Pier and dock construction shall be restricted to the minimum size necessary to meet the needs of the proposed water-dependent use.
3. New pier or dock construction, excluding docks accessory to single-family residences, shall be permitted only when the applicant has demonstrated that a specific need exists to support the intended water-dependent uses.
4. If the City has performed a needs analysis associated with its Comprehensive Plan for Outdoor Recreation, or Public Access Plan, and it determines a pier or dock is necessary and consistent with this Program, it shall serve as the necessary justification for pier or dock design, size, and construction. The intent of this provision is to allow the City the flexibility necessary to provide for existing and future public recreational opportunities associated with the use of piers and docks.
5. New residential development of two or more dwellings must provide joint use or community dock facilities, when feasible, rather than allow individual docks for each residence.
6. Piers and docks, including those accessory to single-family residences, shall be designed and constructed to avoid or, if that is not possible, to minimize and mitigate the impacts to ecological functions, critical areas resources such as eelgrass beds and fish habitats and processes such as currents and littoral drift. See Section 17.35.
7. Piers and docks shall adhere to the Green Shoreline Guidelines concepts in the Green Shoreline Landscaping: Examples and Guidelines <sup>[AC36]</sup>Appendix 2 and construct such structures of materials that have been approved by applicable state agencies.
8. New piers and docks in the marine environment shall only be permitted when identified as a public need in Lacey’s Comprehensive Plan for Outdoor Recreation, and when owned and maintained by the City of Lacey. No net loss of function and value of shoreline resources shall be demonstrated.
9. An existing pier/dock in the ~~natural~~Natural environment designation may be maintained provided it has an identified value to the general public, as identified in Lacey’s Comprehensive Plan for Outdoor Recreation, and it is owned and maintained by the City for public benefit.



10. Residential moorage shall include no more than one moorage type (i.e. buoy or pier/dock) per waterfront lot.
11. Prior to approval of a residential pier or dock, the applicant shall document why the use of a mooring buoy or shared moorage are not feasible.
12. Shared moorage proposed for lease to upland property owners shall be reviewed as a marina and shall be subject to requirements for marinas as identified in this SMP. This provision does not apply when the upland property owners share a shoreline open space area with shoreline property owners and shared moorage facilities are provided as outlined in Section 17.55.020 (1).
13. Docks and piers are prohibited on lakes where the distance to the opposite shore is one hundred fifty (150) feet or less. This is to insure the maintenance of navigation.
14. Prior to final project approval of a residential development, a usable area shall be set aside for a community pier or dock unless there is no suitable area.
15. All pier and dock development shall be painted, marked with reflectors or otherwise identified so as to prevent unnecessarily hazardous conditions for water surface users during day or night.
16. The standards for new or repaired piers or docks in fresh water are as follows:
  - A. Pier and dock surface coverage shall not exceed: four hundred and eighty (480) square feet for single user structures, seven hundred (700) square feet for two (2) party joint use, and one thousand (1,000) square feet for residential pier/docks serving three (3) or more residences.
  - B. Piers shall not exceed four (4) feet in width and must be fully grated with at least sixty percent (60%) open area.
  - C. Ramps shall not exceed three (3) feet in width and must be one hundred percent (100 %) grated.
  - D. Docks shall not rest on the fresh water substrate at any time. Stoppers on the pilings anchoring the dock or stub pilings shall be installed so that the bottom of the docks floatation is a minimum of one (1) foot above the level of the beach substrate.
  - E. Except for docks with floats the bottom of all structures shall be a minimum of one and one half (1.5) feet above the ordinary high water elevation.
  - F. The first in-water (nearest shore) set of pilings shall be steel, a maximum of four (4) inches in diameter and at least eighteen (18) feet from the ordinary high water mark. Additional piling shall be spaced a minimum of eighteen (18) feet apart and shall not exceed twelve (12) inches in diameter.
  - G. Docks with floats or ells shall be limited to one of the following size options:
    - 1) Up to six (6) feet wide by twenty (20) feet long with a two (2) foot strip of grating down the center;
    - 2) Up to six (6) feet wide by twenty six (26) feet long with grating, providing that there is a sixty percent (60%) open area over the entire ell or float; or
    - 3) A single two (2) feet wide by twenty (20) feet long, with one hundred percent (100 %) grated finger ell.
17. Docks and piers shall be setback from the side property line ten (10) feet on fresh water.
18. The required side yard setbacks may be waived with a shared use moorage facility for two (2) or more property owners. The applicant or proponents shall file with the Thurston County Auditor a legally enforceable joint use agreement or other legal instrument which addresses the following as a condition of permit approval:
  - A. Apportionment of construction and maintenance expenses;

- B. Maintenance responsibilities for the facility and associated upland area in perpetuity by identified responsible parties;
- C. Easements and liability agreements;
- D. Use restrictions; and
- E. The easement must acknowledge that each property owner is giving up the right to construct a separate single-family moorage.

## **17.26 Residential Development**

In addition to the Residential Development Standards, project proposals should also address relevant standards, and associated policies, found in the following sections:

17.35 Critical areas

17.40 Shoreline Ecological Functions

17.41 Vegetation Management

17.46 Public Access

17.57 Historical and Archeological, and

17.67 Water Quality.

For accessory residential development standards, see 17.25 for Docks and Piers, in addition to Articles 4 and 5, Shoreline Ecology and Vegetation Management Standards and Remaining Development Standards, respectively.<sup>[AC37]</sup>

## **17.2663.025 Residential – Development Standards**

- 1. Permitted Uses and Activities:** Residential uses/activities and development shall be permitted according to environment designations as outlined in Section 17.24.010, ~~Table 3~~. Residential activity, use, or development shall not result in a net loss of shoreline ecological functions and values and shall follow the mitigation sequence ~~per Section 17.40.015~~<sup>[AC38]</sup>.
- 2. Prohibited Uses:** Prohibited residential uses are identified in ~~Table 3~~the Uses and Activities Matrix under Section 17.24.010. New over water residences are prohibited.
- 3. Density:** Residential densities ~~on~~ authorized on lands within shoreline jurisdiction are identified in Section 17.24.015, ~~Table 4~~Development Standards Matrix.
- 4. Housing Form:** Residential housing forms permitted within each shoreline environment designation are outlined in the Uses and Activities Matrix under Section 17.24.010~~Table 3~~. A range of housing form options are provided to encourage projects that are compatible with shoreline resources, meet GMA goals for density and provide a quality residential environment.
- 5. Clustering:** Compact housing forms that consolidate large areas of open space by reducing individual lot size and clustering units and/or lots shall be encouraged. This provides the

opportunity for a design that can achieve a higher level of compatibility with the shoreline environment. This may include condominium, townhome, courtyard cottage or other design forms that accomplish the same objectives.

**6. Design:** Design of residential structures shall incorporate and follow to the extent possible existing, natural topographic contours. Residential development shall be sufficiently setback from the OHWM or otherwise located so that future shoreline stabilization or armoring is not necessary to protect it.

**7. Bulk and Dimensional Standards:** All development within shoreline jurisdiction shall meet setback and vegetation management area requirements as outlined in Section 17.24.015, Development Standards MatrixTable 4, Section 17.41, and all other applicable sections of this SMP. Any modifications to the dimension, content or vegetation within such areas shall also comply with all policies and standards in this SMP.

**8. Setbacks for Porches/Decks/Steps:** Uncovered porches, decks or steps attached to principle residential structures may project into the required setback from the OHWM provided all of the following requirements are met:

A. Uncovered porches and decks are limited to an 8-foot-deep encroachment and the structure may be no higher than thirty (30) inches above average grade;

B. Material used for porches shall be pervious and approved as a low impact development material by the City;

C. Uncovered porches and decks that encroach on the OHWM setback shall follow the mitigation sequence, and provide compensatory mitigation for any unavoidable impacts to the vegetation management area by providing vegetation proportionate to the surface area covered by the encroachment elsewhere in the vegetation management area; and

D. The structure does not compromise other goals, policies or standards of this Shoreline Master Program.

**9. Front Yard and Side Yard Setback:** The following is the requirement for front and side yard setbacks:

Front yard setback: 20 feet from the fronting right of way, provided this may be reduced to 10 feet if the garage is recessed behind the front façade of the house. This applies to all urban housing forms.

Side yard setback: For detached housing forms, 5 feet or a minimum 10 foot separation. | [AC39]Attached or “zero lot line” developments shall observe side yard setbacks in accordance with the applicable design or development chapter of the Lacey Municipal Code.

To accommodate better preservation or protection of shoreline ecological function, an applicant may request a modified front or side yard setback. The unique setback shall be based on a particular development concept and design that is justified for the targeted urban form and shall demonstrate an ability to protect resources and fulfill other purposes of setbacks and structure separation equivalent to standard setbacks. The burden of demonstration will be on the applicant. Approval of any modification is at the discretion of the City.

## **10. Size and Shape of Single Family Detached Lots:**

A. Minimum lot area, seven thousand five hundred (7,500) square feet or as permitted under another development concept such as clustering, as provided in this section of the SMP or in LMC Section 14.23.072, particularly LMC Section 14.23.072 (L).

B. Minimum lot width, fifty (50) feet.

**11. Size and Shape of Lots Intended for Attached Single Family Development:** Lots intended for attached single family residences shall be reviewed and approved through a subdivision, townhouse, or PRD process where the concept is identified and the project is reviewed and approved subject to design requirements of LMC Section 14.23.080.

**12. Maximum Building Area Coverage:** Fifty (50) percent.

**13. Maximum Development Coverage:** Residential lot development coverage standards for lots within shoreline jurisdiction are identified in Section 17.24.015, Development Standards MatrixTable 4.

**14. Maximum Height:** For principle structures, as described in Development Standards MatrixTable 4. The maximum height for a residential accessory building is sixteen (16) feet. An additional two (2) feet in height shall be permitted for any residential structure with a green roof occupying at least fifty percent of the area of the roof, as long as such additional height does not block the view of a substantial number of existing residences.

**15. Accessory buildings:** All accessory buildings shall comply with the setback, critical area buffer and vegetation management area provisions of this SMP; however, if an accessory building is less than two hundred square feet in total size, the following side and front yard setbacks are permitted provided the OHWM setback shall not be reduced:

A. Front yard, fifteen (15) feet.

B. Side yard, five (5) feet.

Accessory buildings shall be constructed in such a manner as to be complementary to the basic architectural character of the main building on the lot, or appropriate to the accessory use. Such uses shall generally meet the same design requirements of the primary structures and shall result in no net loss of shoreline ecological functions.

**16. Design Review:**

**A. Unique Shoreline Qualities:**

In shoreline areas, emphasis will be placed upon protection and long term management of shoreline resources and public use based on unique opportunities specific sites may provide.

**B. Emphasis for Shoreline Areas:**

1) Specific shoreline emphasis will be for integration of the development with a site's specific unique shoreline features and preservation and respect for the site's natural processes and functions.

- 2) Emphasis will include design for a sustainable development that will have minimal impact upon the environment and provide an opportunity for residents to enjoy the shoreline resources.

C. Residential Development within shoreline jurisdiction shall comply with all applicable standards of LMC 14.23, Design Review.

**17. Views:**

A. Development in shorelines jurisdiction shall allow views for new residents while maintaining views enjoyed by surrounding residents and the traveling public.

B. To the extent reasonable objectives of the builder can be achieved, residential development shall be arranged and designed to:

- 1) Protect views, vistas and aesthetic values of the shoreline;
- 2) Minimize impacts to the character of the shoreline environment;
- 3) Minimize impacts to the views neighboring property owners enjoy.

**18. Public Access:** Public access shall be considered, evaluated, required, located, planned, designed, constructed and maintained in accordance with the provisions in Section 17.46 and Appendix 1 of this SMP Public Access Plan.

## **17.2663.034 Shoreline Access Incentive Dedication Agreement - Density Credit**

**1. Density Bonus:**

A. With a Shoreline Access Incentive Dedication project implemented under the development agreement process of RCW 36.70B, and provisions of LMC 16.58 and Section 17.46 of this SMP, density credit available for transfer to receiving sites outside of shoreline jurisdiction shall be granted for up to 20 units per gross acre in the Shoreline Residential, Urban Conservancy and Natural designations.

B. To qualify for the density credit, the shoreline project shall include dedication of the 200 foot shoreline jurisdiction area to the public and transfer of the development and density credit to lands outside of the 200 foot shoreline designation and to a receiving area approved by the City. Receiving sites may include lands within the same ownership, a contiguous ownership, or any other site reviewed and approved by the Administrator.

**2. Receiving Sites Location and Criteria for Development:**

Receiving site(s) shall meet criteria established in LMC 16.58.

**3. Wetlands Excluded from Calculations:**

Wetlands and lands below the ordinary high water mark shall not be included in calculations of lot area or allowed densities.

## **17.2663.038 Environmental Performance Standards for Residential Development**

**1. Nuisance Characteristics:**

Authorized residential uses shall create no noise, emissions, odors or other nuisances which are demonstrably disruptive or disturbing to other uses in the area, or which are of a quality or quantity not normally associated with such a residential use.

**2. Dedication of Critical Areas:**

Design of land divisions and location of land uses shall protect streams, wetlands, wetland buffers, floodways, channel migration zones, and geologic hazards by locating these features within a separate tract or parcels when land division is proposed. Such areas shall be dedicated to the City of Lacey or held in common by the subdivision landowners as determined by the City pursuant to LMC 14.28.030.

## **17.2663.039 Off-Street Parking**

Off-street parking standards shall be provided in accordance Chapter 16.72 of the Lacey Municipal Code.

## **17.2663.040 Landscaping**

**Landscaping Required Generally:**

Preservation, maintenance and revegetation or landscaping of residential lots or subdivisions shall be required in accordance with all applicable standards of Section 17.41 of this SMP and LMC 14.32, LMC 16.12, and LMC 16.80.

## **17.2663.045 Stormwater Runoff**

**1. General Requirement:**

All requirements of the Lacey Drainage Manual shall be satisfied.

**2. Special Drainage Considerations in a Shoreline Designation:**

A. An emphasis shall be placed on low impact development techniques.

B. Infrastructure associated with community stormwater systems shall not be located within shoreline jurisdiction, where feasible. In no case shall community drainage improvements, other than natural landscaping, be placed within a designated setback area and its associated vegetation management area. This does not apply to rain gardens for a single family residence on an individual lot.

C. All applicable requirements of Section 17.7067 of this SMP shall be satisfied.

## **17.275 Nonconforming Uses, Lots, and Structures** [AC40]

Lacey's SMP has been written with the concern of having a home that is designated as nonconforming in mind. Lacey's strategy simply excludes the footprint of an existing legally established residence located within the shoreline setback from the ordinary high water mark (OHWM) from being labeled as nonconforming, while achieving no net loss of shoreline resources through mitigation as redevelopment or expansion occurs. Such houses will be referred to as "conforming, expansion limited".

## 17.275.005 Nonconforming Concept and Lacey's Use of this Concept in this SMP:

### 1. Traditional application of the term nonconforming:

The terms nonconforming use or nonconforming structure are used in zoning ordinances. Generally in zoning ordinances, a legal nonconforming status indicates a structure or use does not meet a standard in the current ordinance which has changed and is different from the standard in the ordinance in place at the time the use or structure was legally established.

Because of the public interest, the nonconforming structure or use may be strictly regulated. Dependent upon a jurisdiction's emphasis on gaining compliance over time, regulations can vary from being permissive to very restrictive.

Restrictive treatment might include preventing replacement of a structure or restrictions on any expansion. However, generally a balanced approach is taken weighing the public interest with the fair treatment of structures and uses legally established prior to the code requirement.

### 2. Concern with implications:

Because of possible adverse implications a designation of "nonconforming" could have on a home, the City of Lacey has chosen not to create a situation where existing, legally established single family homes are labeled nonconforming as a result of new setbacks from the OHWM in this SMP. As discussed under 17.27.000, legally established single-family homes will be "conforming, expansion limited".

At the same time, the City has determined the new setbacks and associated vegetation management areas and retention standards are necessary to achieve protection of shoreline resources and functions such as water quality.

### 3. Lacey's approach for setbacks and related vegetation management areas for existing, legally established residential houses: eConforming, expansion limited residences – Setbacks and vegetation management areas:

[AC41]

**A. Standard:** When establishing the setback from the OHWM on a waterfront lot for purposes of administering this SMP, the City will "draw" the setback and the associated vegetation management area around the footprint of any single family residential house that falls within the new OHWM setback and vegetation management area. In such cases, the setback and vegetation management area will wrap around the existing house in a configuration that excludes the footprint of the residence from the OHWM setback and vegetation management area. This will provide for a setback and vegetation management area surrounding the house and a 10-foot building setback boundary line for maintenance use only, but will exclude the footprint of the existing residence from being labeled as nonconforming because of its location within such area.

**B. Policy:** An existing, legally established home where the setback and vegetation management area wrap around its perimeter, as outlined above, will be considered conforming to the



~~OHWB setback standards in this SMP. Because of its location in relationship to the setback from the OHWB which surrounds it, such houses will be referred to as “conforming, expansion limited”.~~ [AC42]

**4. Maintaining conforming status with an approved expansion:**

- A. Standard:** A proposal for enlargement or expansion of a residence that is designated “conforming, expansion limited” will be considered in the same way as a proposal for expansion of a structure that is designated nonconforming. Both should meet applicable requirements of this SMP for avoidance, minimization, and mitigation of impacts and no net loss of shoreline function and value.
- B. Standard:** If expansion of a “conforming, expansion limited” house can be accommodated pursuant to the policies and standards of Sections 17.275.015 and 17.275.020, upon approval of the expansion the setback line and vegetation management area may be redrawn around the new footprint of the expanded structure to maintain the residence’s status as “conforming, expansion limited”.

**5. Nonconforming ~~accessory structures; term~~ [AC43] ~~used for other structures:~~**

**Policy Standard:** The term nonconforming will be applied to accessory residential structures, such as garages, storage sheds, decks and similar structures not used as the principle living area where such structures are located within the setback and/or vegetation management area.

**6. General provisions:**

- a.A. Policy Standard:** Uses, lots, or structures within shoreline jurisdiction that were legally established prior to Lacey’s update of this SMP on October 13, 2011, which do not meet the specific standards of this Master Program, are subject to the provisions of Section 17.275.
- B. Standard Policy:** Subject to the provisions of this program, a nonconforming use, lot, or structure lawfully existing prior to the effective date of this program, October 13, 2011 or any amendment thereto, which is rendered nonconforming or “conforming, expansion limited” by adoption of the Program or an amendment, may continue as is and in the manner and to the extent that it existed upon the effective date of the Program or amendment, respectively.

## 17.275.010 Continuance - Contiguous Lots

**Policy Standard** [AC44]: When a nonconforming lot is contiguous to another lot and both lots have the same owner, the contiguous lots are deemed a single, undivided lot for purposes of this Program unless:

1. Each lot has a dwelling;
2. The purchase of an adjacent lot is subsequent to the adoption of this Program (i.e., May 21, 1976); or
3. Pursuant to RCW 58.17.170, one or more of the lots is a platted lot, and less than five (5) years has lapsed since the final plat in which either of the lots is located was filed for record.



## 17.275.015 Alterations and Expansions of Nonconforming or “Conforming, Expansion Limited” Residential Structures

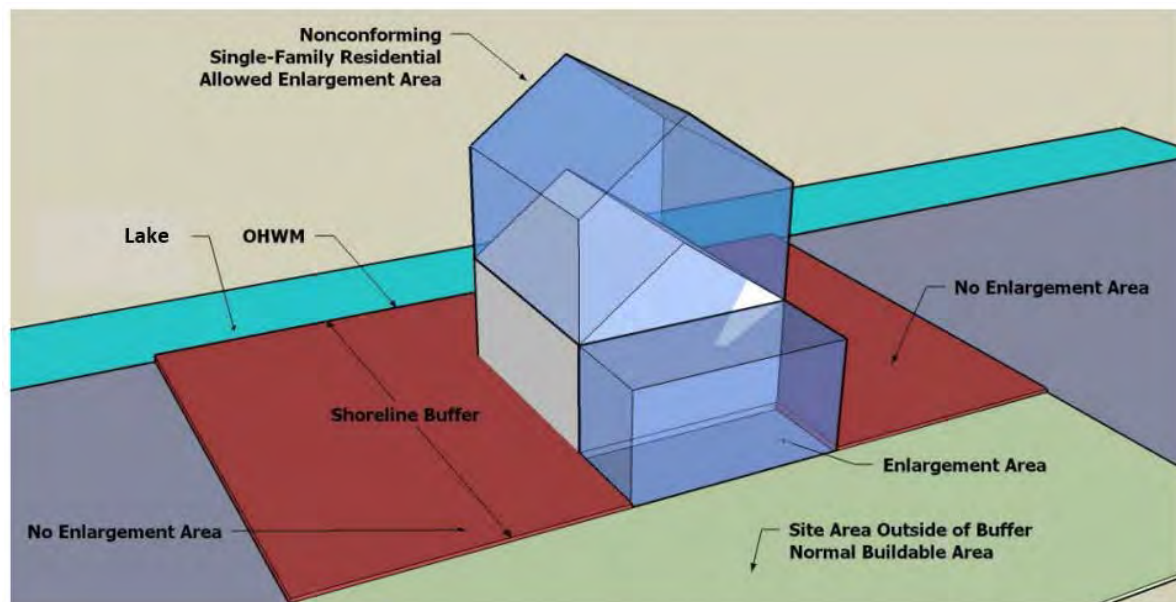
### 1. General PoliciesStandards:

**A. Policy:** Expansion of all residential structures should meet requirements and standards of the environment designation in which they are located, including setbacks from the OHWM.

1. **Policy:** Proposals for expansion of a non-conforming structure, or a structure designated “conforming, expansion limited”, should include consideration of the potential for loss of ecological function.

2. **Policy:** Expansion of a nonconforming structure or “conforming, limited expansion” structure should meet the test of no increase in nonconformance. No increase in nonconformance means an action will not increase an aspect of the structure that resulted in it being designated nonconforming or “conforming, expansion limited” and that it does not materially interfere or jeopardize further the public interest.

**A. PolicyStandard:** Vertical expansions (within permissible height restrictions), expansion to the side (within permissible side yard restrictions)[AC45]; or expansion away from the OHWM will generally not be considered an increase in nonconformity. However, expansions vertically or to the side in areas that overlap the OHWM setback or vegetation management area may be considered an increase in nonconformance. Expansion requests of this type should comply with mitigation sequencing and minimize impacts to views and view corridors. See graphic below.



3.

4. **Policy:** Dependent upon impacts identified and appropriate use of the mitigation sequence, expansion of a nonconforming structure or a structure designated “conforming, expansion limited” may be able to expand without increasing overall impact to shoreline resources and result in no net loss of ecological functions.

~~5. **Policy:** Landscaping standards of this SMP should be used to help implement the community's expectations for protection of Lacey's natural aesthetic qualities and capitalize on the benefits trees and native vegetation provide as identified in Lacey's Urban Forest Management Plan.~~

~~6.B. **PolicyStandard:** Expansion of a structure within the OHWM setback area or vegetation management area will require a vegetation management and mitigation plan to ensure all unavoidable impacts are mitigated for and that no net loss of shoreline ecological function occurs.~~[AC46]

## 2. Mitigation Standards:

~~1.A. **Standard:** Requests for expansion of a nonconforming structure or "conforming, expansion limited" residential structure shall utilize the mitigation sequence and mitigation strategies set forth in this SMP to satisfy no net loss requirements.~~

~~2.B. **Standard:** Expansions of nonconforming or "conforming, expansion limited" structures within the vegetation management area shall provide compensatory mitigation in accordance with the thresholds outlined in Section 17.41.021, Table 1.~~

C. **Standard:** If expansion of a nonconforming structure or "conforming, expansion limited" structure will result in better management of shoreline resources expansion shall be approved.

D. ~~**Standard:**~~ If impacts cannot be mitigated or the proposal cannot demonstrate protection and/or the maintenance of ecological function of shoreline resources expansion may be denied.

## 3. Expansion of any structure for a nonconforming use prohibited:

~~A. **Standard:** **Policy:** Expansions of a structure into the OHWM setback is prohibited when the expansion is to accommodate a nonconforming use. However, when expansion of a structure involves encroachment into setbacks other than the setback from the OHWM, said expansion may be permitted pursuant to other requirements of this SMP.~~[AC47]

## 4. Permit requirements for expansion of a nonconforming structure or a structure designated "conforming, expansion limited":

A. **Standard:** Expansion of a nonconforming structure or a structure designated "conforming, expansion limited" where such expansion is proposed to further encroach on the OHWM setback by decreasing the distance between the structure and the OHWM, shall require a variance under Section 17.30.020. This does not apply to expansions ~~to the side~~ [AC48] ~~or vertically, consistent with the height restrictions, or to the rear of the structure within the setback/vegetation management area.~~

B. **Standard:** Expansion of a nonconforming structure or a structure designated "conforming, expansion limited", where such expansion does not further encroach into the OHWM setback or vegetation management area by decreasing the distance between it and the OHWM, shall follow permit process requirements outlined in Section 17.30 ~~and Table 3.~~

# 17.275.025 Expansions of Nonconforming Uses

**Standard:** The expansion of a nonconforming use shall be prohibited. An intensification of use is permitted when the intensified use is contained within the existing structure, or area which has been

in use, and is not different in kind from the existing nonconforming use. Refer to Section 17.47 for policies and standards relating to expansion of a pre-existing approved use as defined in this SMP.

### **17.275.030 Relocation of Nonconforming or “Conforming, Expansion Limited” Structure**

1. **Standard:** When a nonconforming structure or a structure designated “conforming, expansion limited” is moved, the new location should decrease the nonconformance or increase the setback from the OHWM and not result in an impact on shoreline functions and values. In circumstances where compliance with the OHWM setback is not possible or would result in extraordinary hardship, the Administrator may allow the structure up to 200 square feet to be moved to a new location within the setback area.
2. **Standard:** A nonconforming or “conforming, expansion limited” structure shall be brought into compliance with the Shoreline Master Program when it is moved. The decision to allow such a structure to be relocated to another location within the setback area shall be at the sole discretion of the Administrator, through application of the mitigation sequence.
3. **Standard:** The process for reviewing relocation of a nonconforming structure or “conforming, expansion limited” structure to another location within the setback area shall be a conditional use permit.<sup>[AC49]</sup>

### **17.275.035 Resumption of Discontinued or Abandoned Nonconforming Use**

**Standard:** A nonconforming use, when abandoned or discontinued, shall not be resumed. Discontinuance or abandonment is presumed to occur when land or a structure is not used for a particular use for eighteen (18) consecutive months pursuant to Lacey's nonconforming use provisions in LMC 16.93.030. Any person may appeal the Administrator's determination that discontinuance or abandonment has occurred pursuant to the requirements of LMC 2.30 and Chapter One of the Development Guidelines and Public Works Standards.

### **17.275.040 Development of a Nonconforming Lot**

**Policy Standard**<sup>[AC50]</sup>: When the shape or size of an existing, legally created lot would prevent development consistent with the applicable bulk or dimensional requirements in this SMP, the Administrator may authorize development under the following conditions:

- A. A written request is received from the project proponent;
- B. The development will be located as far landward as possible from the ordinary high-water mark;
- C. The decision of the Administrator is based upon the shoreline variance criteria found in Section 17.30.020.

## 17.2~~75~~.045 Notification for Development of a Nonconforming Lot

1. **Standard:** Upon receiving a written request, the Administrator shall mail notice of the request to all property owners within three hundred (300) feet. At a minimum, the notice shall state the following:
  - ~~1.A.~~ The decision on the request will be made within ten days from the date that the notice was mailed; and
  - ~~2.B.~~ Interested citizens may contact the Shoreline Administrator for further information and to learn the Administrator's decision.
2. **Standard:** Appeal of the Administrator's decision shall be made in accordance with the procedures of appeal established in LMC 2.30 and Chapter One of the Development Guidelines and Public Works Standards.

## 17.2~~75~~.050 Reconstruction of a Nonconforming Structure

1. **Standard:** In the event that a nonconforming structure is destroyed by fire, explosion, natural catastrophe, or act of public enemy, nothing in this Program shall prevent the reconstruction of that or a more conforming structure provided a building permit must be obtained for reconstruction within one (1) year after the destruction and timely progress towards completion of the reconstruction must be demonstrated.
2. **Standard:** If progress towards completion is not demonstrated the building permit shall expire without an opportunity for renewal.

## 17.2~~75~~.055 Conversion of a Nonconforming Use

**Standard:** A nonconforming use may not be converted to a prohibited use.

## **Article 3. Permits**

### **17.30 Shoreline Permits**

1. Shoreline permits and exemptions shall be processed according to the procedures described in Chapter I of the City Development Guidelines and Public Works Standards.
2. ~~The City shall follow shoreline permit filing procedures are outlined in WAC 173-27-130 or as amended. After all local permit administrative appeals or reconsideration periods are complete and the permit documents are amended to incorporate any resulting changes, the City will mail the permit using return receipt requested mail to the Department of Ecology regional office and the Office of the Attorney General. Projects that require both Conditional Use Permits and or Variances must be mailed simultaneously with any Substantial Development Permits for the project. [AC51]~~
- ~~4.3. WAC 173-27-044 lists developments otherwise not required to obtain shoreline permits or local reviews. WAC 173-27-045 lists developments not subject to the Shoreline Management Act. [AC52]~~

### **17.30.010 Substantial Development Permit Criteria**

1. A shoreline substantial development permit shall be required for all proposed uses and developments of shorelines unless the proposal is specifically exempted by Section 17.30.030.
2. In order to be approved, the City of Lacey shall find that the proposal is consistent with the following criteria:
  - A. All regulations of this program appropriate to the shoreline environment designation and the type of use or development proposed shall be met, except those bulk and dimensional standards that have been modified by approval of a shoreline variance under Section 17.30.020;
  - B. All general goals and policies of this program, and goals, policies and standards specific to the appropriate shoreline environment designation and the type of use or development activity proposed shall be considered and substantial compliance demonstrated.
3. Consideration shall be given to the cumulative environmental impact of additional requests for like actions in the shoreline vicinity. For example, if shoreline substantial development permits were granted for other developments in the area where similar circumstances exist, the sum of the permitted actions should also remain consistent with the policy of RCW 90.58.020 and should not produce significant adverse effects to the shoreline ecological functions and processes or other users.
4. The City of Lacey is the final authority for a Shoreline Substantial Development Permit, unless there is an appeal filed with the State Shoreline Hearing Board.

### **17.30.015 Shoreline Conditional Use Permit**

The purpose of a conditional use permit is to provide a system within the master program which allows flexibility in the application of use regulations in a manner consistent with the policies of [RCW 90.58.020](#). In authorizing a conditional use, the City or Department may attach special conditions to the permit to prevent undesirable effects of the proposed use and/or to assure consistency of the project with the Act and the local master program.

1. Uses which are classified or set forth in the City of Lacey's Shoreline Master Program as conditional uses may be authorized provided that the applicant demonstrates all of the following:
  - A. That the proposed use is consistent with the policies of [RCW 90.58.020](#) and the master program;
  - B. That the proposed use will not interfere with the normal public use of public shorelines;
  - C. That the proposed use of the site and design of the project is compatible with other authorized uses within the area and with uses planned for the area under the Comprehensive Land Use Plan and Shoreline Master Program;
  - D. That the proposed use will cause no significant adverse effects to the shoreline environment in which it is to be located; and
  - E. That the public interest suffers no substantial detrimental effect.
2. In the granting of all conditional use permits, consideration shall be given to the cumulative impact of additional requests for like actions in the area, for example, if conditional use permits were granted for other developments in the area where similar circumstances exist. The total of the conditional uses shall also remain consistent with the policies of [RCW 90.58.020](#) and shall not produce substantial adverse effects to the shoreline environment.
3. Other uses which are not classified or set forth in Lacey's Master Program may be authorized as conditional uses provided the applicant can demonstrate consistency with the requirements of this section, and the requirements for conditional uses contained in the Shoreline Master Program, and the intent of provisions of the Comprehensive Land Use Plan.
4. Uses which are specifically prohibited by the Shoreline Master Program may not be authorized.

## 17.30.020 Shoreline Variance Permit

The purpose of a variance permit is strictly limited to granting relief from specific bulk, dimensional or performance standards set forth in the applicable master program where there are extraordinary circumstances relating to the physical character or configuration of property such that the strict implementation of the master program will impose unnecessary hardships on the applicant or thwart the policies set forth in [RCW 90.58.020](#).

1. Variance permits should be granted in circumstances where denial of the permit would result in a thwarting of the policy enumerated in [RCW 90.58.020](#). In all instances the applicant must demonstrate that extraordinary circumstances shall be shown and the public interest shall suffer no substantial detrimental effect.
2. Variance permits for development and/or uses that will be located landward of the ordinary high water mark (OHWM) and/or landward of any wetland as defined in this Master Program may be authorized provided the applicant can demonstrate all of the following:
  - A. That the strict application of the bulk, dimensional or performance standards set forth in Lacey's Master Program precludes or significantly interferes with reasonable use of the property;

- B. That the hardship described in (A.) of this subsection is specifically related to the property, and is the result of unique conditions such as irregular lot shape, size, or natural features and the application of the master program, and not, for example, from deed restrictions or the applicant's own actions;
  - C. That the design of the project is compatible with other authorized uses within the area and with uses planned for the area under the Comprehensive Land Use Plan and Shoreline Master Program and will not cause adverse impacts to the shoreline environment;
  - D. That the variance will not constitute a grant of special privilege not enjoyed by the other properties in the area;
  - E. That the variance requested is the minimum necessary to afford relief; and
  - F. That the public interest will suffer no substantial detrimental effect.
3. Variance permits for development and/or uses that will be located waterward of the ordinary high water mark (OHWM) or within any wetland as defined in this Master Program may be authorized provided the applicant can demonstrate all of the following:
- A. That the strict application of the bulk, dimensional or performance standards set forth in Lacey's Master Program precludes all reasonable use of the property;
  - B. That the proposal is consistent with the criteria established under Section 17.20.030. 2 A-F; and
  - C. That the public rights of navigation and use of the shorelines will not be adversely affected.
4. In the granting of all variance permits, consideration shall be given to the cumulative impact of additional requests for like actions in the area, for example, if variances were granted to other developments and/or uses in the area where similar circumstances exist. The total of the variances shall also remain consistent with the policies of RCW 90.58.020 and shall not cause substantial adverse effects to the shoreline environment.
5. Variances from the use regulations of the Shoreline Master Program are prohibited.
6. Water-oriented and water-related uses may be located within the required shoreline setback and vegetation management area without a shoreline variance, provided other required permits are obtained and the mitigation sequence is followed. Uses that may locate within the setback and vegetation management area without a variance include the following:
- ~~1-A.~~ Boating facilities accessory to a single-family residential development including piers, docks, buoys and floats;
  - ~~2-B.~~ Pedestrian beach access structures including stairs, ~~except with the exception of~~ stair towers; and,
  - ~~3-C.~~ Public access trails and paths and structures for public access including but not limited to stairways, piers, docks, or floats.



## **17.30.025 Washington State Department of Transportation Procedures** [LW53]

1. Permit review time for projects on a state highway:
  - ~~a.A.~~ Pursuant to RCW 47.01.485, the Legislature established 90-day expedited review for local governments.
  - B. Optional process allowing construction to commence twenty-one days after the date of filing. Pursuant to RCW 90.58.140, WSDOT projects that address significant public safety risks may begin twenty-one days after the date of filing if all components of the project will achieve no net loss of ecological shoreline functions.

## **17.30.030 Shoreline Exemption Criteria**

1. An exemption from the substantial development permit process is not an exemption from compliance with the Act or this Program, or from any other regulatory requirements. To be authorized, all uses and developments must be consistent with the policies and regulatory provisions of this Program and the Act. A statement of exemption shall be obtained for exempt activities.
2. Exemptions shall be construed narrowly. Only those developments that meet the precise terms of one or more of the listed exemptions may be granted exemptions from the substantial development permit process.
3. The burden of proof that a development or use is exempt is on the applicant or proponent.
4. If any part of a proposed development is not eligible for exemption, then a substantial development permit is required for the entire project.
5. A development or use that is listed as a conditional use pursuant to this Program or is an unlisted use must obtain a shoreline conditional use permit even if the development or use does not require a shoreline substantial development permit.
6. When a development or use is proposed that does not comply with the bulk, dimensional and/or performance standards of the Program, such development or use shall only be authorized by approval of a shoreline variance even if the development or use does not require a substantial development permit.
7. All permits or statements of exemption issued for development or use within the shoreline jurisdiction shall include written findings prepared by the Administrator, including compliance with bulk, dimensional standards and policies and regulations of this Master Program. The Administrator may attach conditions to the approval of exempt developments and/or uses as necessary to assure consistency of the project with the Act and the Program.

## **17.30.035 Shoreline Exemptions Listed** [LW54]



~~—Certain developments are exempt from the requirement to obtain a Substantial Development Permit. Such developments still may require a Shoreline Variance or Conditional Use Permit, and all development within the shoreline is subject to the requirements of this Shoreline Program, regardless of whether a Substantial Development Permit is required. Developments which are exempt from the requirement for a Substantial Development Permit are identified in WAC 173-27-040, RCW 90.58.030(3)(e), RCW 90.58.147 and RCW 90.58.515.~~

~~The following shall be considered exempt from the requirement to obtain a shoreline substantial development permit.~~

~~1. —Any development of which the total cost or fair market value is less than five thousand seven hundred and eighteen dollars (\$5,718) ,and does not materially interfere with the normal public use of the water or shorelines of the state. The dollar threshold established in this subsection must be adjusted for inflation by the Office of Financial Management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. "Consumer price index" means for any calendar year that year's annual average consumer price index of all items in the Seattle, Washington area for urban and clerical workers, compiled by the Bureau of Labor and Statistics, United States Department of Labor. The Office of Financial Management must calculate the new dollar threshold and transmit it to the Office of the Code Reviser for publication in the Washington State Register at least one month before the new dollar threshold is to take effect.~~

~~2. —Normal maintenance or repair of existing structures or developments, including damage by accident, fire, or elements; see also section defining “normal” maintenance and repair and permit requirements for maintenance that does not qualify under this exemption.~~

~~3. —Construction of the normal protective bulkhead common to single family residences.~~

~~4. —Emergency construction necessary to protect property from damage by the elements.~~

~~5. —Construction or modification of navigational aids such as channel markers and anchor buoys.~~

~~6. —Construction on shorelands by an owner, lessee, or contract purchaser of a single family residence for his own use or for the use of his or her family. The residence must not exceed a height of thirty five feet above average grade level, and meet all requirements of the state agency or local government having jurisdiction thereof, other than requirements imposed pursuant to this chapter.~~

~~7. Construction of a dock, including a community dock, designed for pleasure craft only, for the private noncommercial use of the owner, lessee, or contract purchaser of single and multiple family residences. This exception applies if either: (A) In salt waters, the fair market value of the dock does not exceed two thousand five hundred dollars; or (B) in fresh waters, the fair market value of the dock does not exceed ten thousand dollars, but <sup>[LW55]</sup> if subsequent construction having a fair market value exceeding two thousand five hundred dollars occurs within five years of completion of the prior construction, the subsequent construction shall be considered a substantial development for the purpose of this chapter.~~

~~8. Operation, maintenance, or construction of canals, waterways, drains, reservoirs, or other facilities that now exist or are hereafter created or developed as a part of an irrigation system for the primary purpose of making use of system waters, including return flow and artificially stored groundwater for the irrigation of lands.~~

~~9. The marking of property lines or corners on state owned lands, when such marking does not significantly interfere with normal public use of the surface of the water.~~

~~10. Operation and maintenance of any system of dikes, ditches, drains, or other facilities existing on September 8, 1975, which were created, developed, or utilized primarily as a part of an agricultural drainage or diking system.~~

~~11. Site exploration and investigation activities that are prerequisite to preparation of an application for development authorization under this chapter, if:~~

~~1. The activity does not interfere with the normal public use of the surface waters;~~

~~2. The activity will have no significant adverse impact on the environment including, but not limited to, fish, wildlife, fish or wildlife habitat, water quality, and aesthetic values;~~

~~3. The activity does not involve the installation of a structure, and upon completion of the activity the vegetation and land configuration of the site are restored to conditions existing before the activity;~~

~~4. A private entity seeking development authorization under this section first posts a performance bond or provides other evidence of financial responsibility to the City of Lacey local jurisdiction to ensure that the site is restored to preexisting conditions; and~~

~~5. The activity is not subject to the permit requirements of RCW 90.58.550.~~

~~1. The process of removing or controlling an aquatic noxious weed, as defined in RCW 17.26.020, through the use of an herbicide or other treatment methods applicable to weed control that~~

~~are recommended by a final environmental impact statement published by the Department of Agriculture or the Department jointly with other state agencies under RCW 43.21C.~~

2. ~~[LW56]~~

3. ~~\_\_\_\_\_~~

1. ~~\_\_\_\_\_~~

## 17.30.040 Letter of Exemption from Substantial Development Permit Process

~~A The proponent of a project that qualifies for an exemption must obtain confirmation in writing that it conforms to the master programShoreline Master Program and to state law. If it complies with shoreline regulationsenforms, an exemption letter of exemption will be issued stating that there are no further shoreline permits to obtain, is issued by the Administrator and may be subject to conditionscontain conditions which the proponent must meet. Letters of exemptions for projects requiring federal permits[LW57] shall be issued consistent with WAC 173-27-050.[AC58]~~

## 17.30.045 Unclassified Uses

~~This program does not attempt to identify or foresee all conceivable shoreline uses or types of development. When a use or development is proposed which is not readily classified within anand not identified or defined as a type of existing use in the master program or development category, a it shall require a conditional use permit shall apply. During processing of the application, the Administrator and/or Hearing Examiner will shall identify and apply those program policies and regulations, most closely related to which will best promote the policies of the Shoreline Management Act and the Shoreline Master Program, with special reference to the subject environmental designation. the policies of the environmental designation in which the use will be located. In addition, general goals, policies and standards shall also apply.[LW59]~~

## 17.30.047 Maintenance and Repair Activities - Exemption Threshold and Activity Not Exempted

1. Normal maintenance and repairs to an existing shoreline modification (see description of modification in Section 17.45.000), shall be exempt from acquiring a substantial development permit in accordance with Section 17.30.035 if such repair and maintenance activities are valued at less than 50% of the replacement value of the structure or modification.
2. Where the value of repair of an existing modification is equal to or exceeds 50% of the replacement value, it shall be considered a replacement and a conditional use permit shall be required.

3. When a conditional use permit is required for replacement and the existing modification does not meet standards in this SMP and may be having an adverse impact on shoreline functions and values, review shall include consideration of, and preference for, other more ecologically sound practices that can achieve the same function.
4. Placement of a modification or replacement of an existing modification designed for stabilization must be designed for protection or stabilization of a residence(s) that is in danger from active erosion. Such modification may be permitted through a conditional use permit, if it is demonstrated by a qualified geotechnical engineer, that it is the only feasible way to protect the residence(s), and such modification will not result in a net loss of ecological function or otherwise conflict with the public's interest.
5. Where it is demonstrated that replacement of a modification is necessary for the maintenance of shoreline ecological functions and is in the public interest, such activity may be exempt from permit requirements as determined by the administrator if such replacement does not exceed the exemption threshold for a Substantial Development Permit pursuant to Section 17.30.035  
(7).[AC60]

## 17.30.050 Inspections

Pursuant to [RCW 90.58.200](#), the Administrator or his authorized representative(s) of that local government may enter land or structures to enforce the provisions of this program. Entry shall be at reasonable times. If the land or structures are occupied, the Administrator shall first present proper credentials and request entry; and if the land or structures are unoccupied, the Administrator shall first make a reasonable effort to locate the owner, or other person having control of the property, and request entry.

## 17.30.055 Penalties and Enforcement

The Shoreline Management Act imposes significant penalties for violation of the act, regulations and master programs. Enforcement action by the City of Lacey or Department of Ecology under LMC 14.17, LMC 16.102, and WAC 173-27-040 through 173-27-990, may be taken whenever a person has violated any provision of the SMA or City SMP provision. A violation constitutes a gross misdemeanor, which is punishable by fine or imprisonment ([RCW 90.58.220](#)). In addition to the criminal penalty, the Act imposes liability on any person violating the act or conditions of a permit for all damage to public or private property arising from the violation. Furthermore, the violator may have to restore an area affected by a violation, and pay the entire cost of restoration, including attorney's fees and court costs ([RCW 90.58.230](#)). There may also be civil penalties that apply ([RCW 90.25.210](#)). Any nonconformance that was illegal when initiated must immediately be brought into conformance with this chapter. The City may, using the provisions of Chapter 173-27 WAC, abate any nonconformance that was illegal when initiated.[AC61]



## 17.35 Relationship to Other Land Use Regulations

### 17.35.005 Local Permits, Approvals and Shoreline

#### **Exemptions**Authorizations<sup>[AC62]</sup>

1. **Activities requiring Shoreline Permits** - In the case of development subject to the shoreline permit requirement of this program, the Administrator shall not issue a building permit for such development until a shoreline permit has been granted. Also, any permit issued by the Administrator for such development shall be subject to the same terms and conditions that apply to the shoreline permit.
2. **Activities exempt from shoreline permit requirements** - In the case of development subject to regulations of this program but exempt from the shoreline substantial development permit requirement, any required statement of exemption shall be obtained prior to issuance of the building permit or applicable approval. For single family residences, a building permit reviewed and signed off by the Administrator and including any conditions, may substitute for a written statement of exemption.
3. **Developments not required to obtain shoreline permits<sup>[LW63]</sup> or reviews.** Requirements to obtain a Substantial Development Permit, Conditional Use Permit, Variance, Shoreline Exemption, or other review to implement the Shoreline Management Act do not apply to projects listed under WAC 173-27-044 and -045, as amended, including, but not limited to the following:
  - A. Remedial actions. Pursuant to RCW 90.58.355, any person conducting a remedial action at a facility pursuant to a consent decree, order, or agreed order issued pursuant to chapter 70.105D RCW, or to the department of ecology when it conducts a remedial action under chapter 70.105D RCW.
  - B. Boatyard improvements to meet NPDES permit requirements. Pursuant to RCW 90.58.355, any person installing site improvements for storm water treatment in an existing boatyard facility to meet requirements of a national pollutant discharge elimination system storm water general permit.
  - C. WSDOT facility maintenance and safety improvements. Pursuant to RCW 90.58.356, Washington State Department of Transportation projects and activities meeting the conditions of RCW 90.58.356 are not required to obtain a Substantial Development Permit, Conditional Use Permit, Variance, letter of exemption, or other local review.
  - D. Projects consistent with an environmental excellence program agreement pursuant to RCW 90.58.045.
  - E. Projects authorized through the Energy Facility Site Evaluation Council process, pursuant to chapter 80.50 RCW.
4. **All land use planning permits** - The City shall use a “shoreline zoning overlay” designation to integrate the Shoreline Master Program map and all master program standards of the Shoreline Master Program with the Lacey zoning code and map. This overlay zoning will provide the provides the basis for review and application of standards and conditions for all of the City's land use planning processes and permits. For all planning shoreline permits and exemptions and approvals the Administrator may apply shall attach conditions and mitigation measures reasonably necessary to eliminate or minimize any undesirable effects of granting approval. Conditions that are included become a part of the decision. as necessary to

~~ensure that the design, development, functionality and use is consistent with the goals, policies, standards and intent of this program.~~[LW64]

## 17.35.010 Compliance with Existing Development Regulations

Use and development within shoreline jurisdiction shall comply with City development standards, and applicable state and federal regulations, provided they do not conflict with the shoreline goals, shoreline policies, and development regulations of this program. In the case of conflicts between specific standards and regulations the most restrictive shall usually apply and goals and policies of the Shoreline Management Act and this Master Program shall always guide interpretation of the most appropriate standard to apply.

## 17.35.020 Critical Areas Regulations within Shoreline Jurisdiction

### 1. Adoption of Critical Area ordinances of LMC Chapter 14, with exceptions:

The City of Lacey Critical Area Ordinances, in Title 14 of the Lacey Municipal Code, shall be adopted as a part of this SMP ~~as set forth in section 17.10.020~~[AC65], with a few exceptions. The intent of referencing and use of critical area legislation is to provide the best protection for these resources. It is also the intent of this SMP, to apply a consistent and efficient consolidated process for review and action on proposals involving these resources. To these purposes, the critical area ordinances are adopted as part of the SMP with the following exceptions:

#### A. Exceptions of certain provisions in conflict with the intent of the SMP.

Where there are provisions in chapter 14 that are less restrictive than the SMP, those provisions will not be applied. However, where there are provisions that are more restrictive than the SMP, they will generally be applied, except as provided for in this section of the SMP (17.35). The intent is to ensure the provision providing the most protection is always applied. To this purpose, the following provisions within Chapter 14 shall not apply to proposals involving critical areas that are within shoreline jurisdiction:

- 1) "Exempt uses and activities" or "exceptions" or "exemptions" – LMC 14.28.140, LMC 14.33.080, and LMC 14.37.080. The only "exemptions" allowed within shoreline jurisdiction are those listed as being exempt from a shoreline substantial development permit.
- 2) "Administratively authorized uses and activities" or "allowed activities" - Any activity which is not exempt within shoreline jurisdiction will require a shoreline substantial development permit, shoreline conditional use permit, or shoreline variance.
- 3) ~~"Reduction of standard wetland buffer zone width" – LMC 14.28.300. Reduction of the standard wetland buffer width within shoreline jurisdiction may be permitted in accordance with subsection (C) below. When outside the shoreline residential Shoreline Residential designation, reductions may be permitted in accordance with the provisions outlined in LMC 14.28.3100, when not used in combination with provisions for buffer averaging. Further reductions will require a shoreline variance.~~[AC66]

- 34) “Administrative variances” - Administrative variances, being variances authorized by the administrator without the use of a shoreline variance, are prohibited within shoreline jurisdiction.
- 45) “Standard buffer width averaging” – LMC 14.28.310, LMC 14.33.116 G (3) and LMC 14.33.117 D (4). Wetland buffer averaging within shoreline jurisdiction is allowed ~~not permitted when used in combination with buffer reduction.~~ [AC67] If averaging is permitted, the buffer width shall not be reduced by more than 25% of the standard buffer or be less than 35 feet in any location; further averaging will require a shoreline variance. In the case of an associated wetland, the edge of the wetland is the edge of the shoreline jurisdiction. Habitat buffers for both riparian and non-riparian habitats may be averaged if such averaging does not result in a buffer width of less than 75% of the recommended buffer width. Averaging may not be used in combination with reductions. Further averaging will require a shoreline variance.
- 56) “Reduction to wetland replacement ratios” – LMC 14.28.445 (B) and 14.28.450 D (2). A reduction of the wetland replacement ratio within shoreline jurisdiction will require a shoreline variance.
- 67) “Reasonable use exception” – LMC 14.28.350 (E). Within a shoreline jurisdiction, a shoreline conditional use permit and/or shoreline variance will serve as a reasonable use exception review. The Administrator shall determine whether a CUP or variance is required depending upon the proposed activity and purpose for which relief is sought; see Sections 17.30.015-17.30.020 of the SMP.
- 78) ~~Determination of a Wetland Boundary—LMC 14.28.090. Within shoreline jurisdiction, identification of wetlands and delineation of their boundaries shall be done in accordance with the approved federal wetland delineation manual and applicable regional supplements. See WAC 173-22-035.~~ [AC68]
- 9) —“Building Setback Lines” – Within shoreline jurisdiction, the requirement to locate the setback line a distance that corresponds to the required yard area setback for the underlying zone from the edge of a wetland buffer (LMC 14.28.340) or designated priority habitat or species buffer (LMC 14.33.190) shall not apply.
- B. Exception of certain provisions related to permit process and timing:**  
Permit processes: Where processes or timelines identified in the SMP conflict with critical area ~~permit processes or~~ timelines in LMC Chapter 14, the requirements of the SMP, in addition to Article 3, Permits, [AC69] shall apply. Specific permits used to review and condition proposals within chapter 14 of the LMC shall be dovetailed with the underlying SMP permit or approval. The underlying permit, process and timeline used in the SMP shall be utilized.
- C. Exception related to buffer widths for freshwater critical areas in the Shoreline residential zone:** Within the ~~shoreline residential~~ Shoreline Residential environment designation, buffers for freshwater critical areas along lake front platted lots may be reduced to match setbacks from the OHWM as identified for the most intensive use expected for the property as illustrated in Section 17.24.015, Table 4.
- 2. Standards of critical area ordinances and principals-principles and requirements of the SMP:**
- A. All standards and provisions of the critical area ordinances, relative to performance standards and protection of critical areas and resources are considered a fundamental requirement.
- B. No net loss of ecological function and value and mitigation sequencing are the baseline criteria for permit and exemption actions.

### 3. Critical Area Principles



**Principles:** The following principles are embodied within Lacey's Critical Area Ordinances, but are not so stated in relationship to shoreline management areas. These principals are stated here for clarity of purpose in application in shoreline jurisdiction under this SMP:

- ~~1.1~~ **Planning Objectives:** The planning objective for critical areas in shoreline jurisdiction is the protection of existing ecological functions and ecosystem-wide processes and restoration of degraded ecological functions and ecosystem-wide processes.
- ~~2.2~~ **Regulatory provisions:** The regulatory provisions for critical areas are intended to protect existing ecological functions and ecosystem-wide processes.
- ~~3.3~~ **Protection, use and enjoyment:** An underlying intent is to promote human uses and values that are compatible with the other objectives of the Shoreline Management Act and this Shoreline Master Program, such as public access and aesthetic values, provided they do not significantly adversely impact critical areas and shoreline ecological functions.

## 17.35.030 Critical Saltwater Habitat and Marine Riparian Habitat

- 1. Location and type:** The marine shoreline in Lacey runs generally from the Butterball Cove area to Mallard Cove. The shorelands are adjacent to aquatic areas that are designated as critical saltwater habitat, which includes pocket estuaries, eelgrass beds, forage fish spawning habitat and feeder bluffs; ~~see Map L14 in the inventory.~~
- 2. Shoreline Designation:** With the exception of the area where an existing marina is located in Mallard Cove, area landward of the OHWM and associated wetlands and pocket estuaries have been designated as Natural. Areas immediately surrounding the marina are designated Urban Conservancy. Areas water-ward of the OHWM are designated Aquatic; ~~see Appendix 6.~~
- 3. Land Use:** The majority of this area is in the Hawks Prairie Planned Community. Conditions for the planned community restrict development and preserve the area for enjoyment as passive open space. Trails provide visual and physical access to the beach. The trail is owned by the Planned Community's homeowners association, but historically this access has also been used by the general public.

The existing marina in Mallard Cove is private and belongs to the Beachcrest Community. The Beachcrest subdivision is located in Thurston County, but a portion of the Marina falls within the Hawks Prairie Planned Community and within the City of Lacey.

## ~~17.35.031 Goals and Policies for Protection of Marine Riparian Habitat~~ [AC70]

- ~~**1. Goal: Protect Lacey's marine riparian habitat areas and achieve no net loss of ecological functions or values in these areas.**~~

~~A. Policy: Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans, as provided for in LMC 14.33 and incorporated into this SMP, for activities in marine riparian habitat areas.~~

~~B. Policy: Utilize standards in Lacey's critical areas ordinances and tree and vegetation protection legislation, as appropriate, to protect marine riparian areas and achieve no net loss objectives of this SMP.~~

~~C. Policy: Utilize the recommendations and "general conclusions" of the white paper "Protection Of Marine Riparian Functions In Puget Sound, Washington" prepared by the State's Aquatic Habitat Guidelines (AHG) Program when considering the importance of marine riparian areas and reviewing proposed uses and activities in these areas, including:~~

- ~~1) "General conclusions" identified in Section VI of the report~~
- ~~2) "Overarching" recommendations identified in Section VI of the report~~
- ~~3) "Impact specific" recommendations identified in Section VI of the report.~~

~~D. Policy: Adopt the “general conclusions” in Section IV of the AHG white paper as findings in regard to the importance of marine riparian areas. These conclusions should be considered when designing projects and developing management strategies for activities proposed within marine riparian areas.~~

~~1. Riparian areas perform important hydrologic, geomorphic, and biological functions. These areas encompass complex above- and below-ground habitats created by the convergence of biophysical processes in the transition zone between aquatic and terrestrial ecosystems.~~

~~2. Riparian areas cannot be thought of in isolation from associated water bodies. The characteristic geomorphology, plant communities, and associated aquatic and wildlife species of riparian and marine systems are intrinsically linked.~~

~~3. Natural riparian systems have adapted to specific disturbance regimes. Managing riparian areas without regard to their dynamic patterns and influences of adjacent water bodies ignores a fundamental aspect of how these systems function.~~

~~4. Riparian areas, in proportion to their area within a watershed, perform more biologically productive functions than do uplands. Riparian areas provide a wide range of functions, such as~~

~~microclimate modification and shade, bank stabilization and modification of sediment processes, contributions of organic matter and large wood to aquatic systems, nutrient retention and cycling, wildlife habitat, and general food web support for a wide range of aquatic and terrestrial organisms.~~

~~5.—Riparian areas are effective in filtering and transforming materials (such as dissolved and particulate nonpoint source pollutants) from hill slope runoff.~~

~~6.—Because riparian areas are located at the convergence of terrestrial and aquatic ecosystems, they are regional hot spots of biodiversity and often exhibit high rates of biological productivity in marked contrast to the larger landscape.~~

~~7.—During the last decade, a patchwork of federal, state, and local laws and programs has come to acknowledge the importance of riparian areas and to require or encourage special management to restore or protect their essential functions, although the degree of protection, the focus, and the spatial coverage of these laws and programs are highly variable among federal, state, and local levels.~~

~~1.—Policy: Adopt the “overarching recommendations” in Section IV of the AHG white paper as management strategies for marine riparian~~

~~areas. These strategies should be considered in the design and management of all projects proposed within marine riparian areas.~~

~~1. —Protect marine riparian soils and vegetation— prevent damage to native riparian soils and vegetation, including clearing and grading, compaction, covering (paving) and removal.~~

~~2. —Restore damaged marine riparian habitat— restore vegetation, soil characteristics.~~

~~3. —Account for scale issues (temporal and spatial) when evaluating riparian conditions, current functions and potential for future functions, and cumulative effects of alterations. The dynamic nature and connectivity of riparian areas and linkages between riparian and aquatic systems operate at multiple scales.~~

~~4. —Exclude all major sources of contamination from the riparian buffer, including construction, impervious surfaces, mining, septic system drain fields, agricultural activity, clear cutting and application of pesticides and herbicides.~~

~~5. —Manage riparian areas for the long-term. For many sites, substantial time, on the order of years to decades, will be required for vegetation to become fully functional.~~

## 17.35.032 Standards for Protection of Marine Riparian Habitat

1. **Standard:** The following “Recommendations to Avoid or Minimize Specific Impacts” from the ~~AHG-State’s Aquatic Habitat Guidelines~~ white paper, as modified, shall be incorporated into the design and management of all projects within marine riparian areas. Compliance with these standards shall be detailed within a habitat management plan. If one of the provisions below is less restrictive than another applicable provision in Lacey’s critical area regulations and in this SMP, the most restrictive and protective shall apply:
  - A. Vegetation removal on shorelines and bluffs shall be avoided to the maximum extent possible. If vegetation must be removed, the area and amount removed shall be minimized and located as far landward of the ordinary high water mark as possible. Ground disturbance, removal of mature trees, and introduction of nonnative vegetation, especially invasive species such as English Ivy, shall be minimized.
  - B. Impervious surfaces shall not be located in marine riparian areas. If impervious surfaces must be located within or adjacent to marine riparian areas, the footprint shall be minimized and impacts shall be mitigated through techniques such as the use of pervious surfaces like pervious pavers and concrete, bioretention facilities such as rain gardens, green roofs, cisterns, etc. Pollutant loading shall be minimized. Bioretention and other facilities that infiltrate water, if located along slopes and bluffs, shall be designed so as to not increase the likelihood of mass failures or erosion.
  - C. Shoreline modification shall be avoided to the maximum extent possible. Existing native vegetation shall be maintained, particularly at and near the land-water interface. If shoreline alterations must occur they shall be done in a way that minimizes potential negative impacts to natural functions and shall use the least intrusive methods including bioengineering or relocating structures where feasible and practicable. All adverse impacts shall be fully mitigated.
  - D. Invasive plant species shall be removed from marine riparian areas. Purple Loosestrife, Himalayan blackberry, English Ivy and other invasive plants compete with native species, particularly in disturbed sites along marine bluffs and shorelines.
  - E. As appropriate through the mitigation sequence, restore and replant marine riparian areas with native vegetation to improve the connectivity between upland and marine riparian habitat and to restore functions that benefit the nearshore and beach ecosystems. Replanted marine riparian areas shall be properly maintained so as to guarantee plant survival.
  - F. Buildings shall be discouraged within the riparian buffers. If authorized through the appropriate permitting process contained in this SMP, the footprint and site disturbance of structures shall be minimized and structures shall be located as far landward of the water’s edge areas as possible.
  - G. Septic systems and new waste water systems are prohibited in marine riparian areas. Existing systems within the drainage basin that could impact the riparian area shall be maintained, and operated in such a way that human waste and nutrients are prevented from leaching into local water bodies.
  - H. Disturbance to native vegetation shall be avoided in marine riparian areas, especially near the water’s edge, with the goal of maintaining vegetation communities that are resilient to

disturbance from surrounding land uses and able to regenerate with minimal human intervention. Nutrients, pathogens, toxics, and fine sediments associated with land-use practices shall be prevented from entering marine water bodies.

- I. Salvage or removal of downed trees, LWD or snags in riparian areas and on beaches shall be avoided. All efforts shall be made to maintain complex, multi-aged riparian forest cover and wide buffers to allow natural recruitment of LWD over long time frames.
- J. Mitigation sequencing of Section 17.40.015 shall be utilized for all activities in marine riparian buffers. Impacts that cannot be avoided shall be fully mitigated.

### **~~17.35.033 Goals and Policies for Protection of Critical Saltwater Habitat~~** [AC71]

#### **~~1. Goal: Protect Lacey's critical saltwater habitat areas and achieve no net loss of ecological functions or values in these areas.~~**

**~~A. Policy:~~** Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans for projects intruding into or over critical saltwater habitat areas.

**~~B. Policy:~~** Because ecological functions of marine shorelands can affect the viability of critical saltwater habitat, effective protection of critical saltwater habitats should integrate the policies for management of shorelands, outlined in Section 17.35.031, with management policies for submerged areas.

**~~C. Policy:~~** Activities in, over or adjacent to critical saltwater habitat should consider the following, where applicable:

- ~~1) Protecting a system of fish and wildlife habitats with connections between larger habitat blocks and open spaces and restoring such habitats and connections where they are degraded;~~
- ~~2) Protecting existing and restoring degraded riparian and estuarine ecosystems, especially salt marsh habitats;~~
- ~~3) Establishing adequate buffer zones around these areas to separate incompatible uses from the habitat areas;~~
- ~~4) Protecting existing and restoring degraded near-shore habitat;~~
- ~~5) Protecting existing and restoring degraded or lost salmonid habitat;~~
- ~~6) Protecting existing and restoring degraded upland ecological functions important to critical saltwater habitats, including riparian vegetation;~~
- ~~7) Improving water quality;~~
- ~~8) Protecting existing and restoring degraded sediment inflow and transport regimens; and~~
- ~~9) Correcting activities that cause excessive sediment input where human activity has led to mass wasting.~~



## 17.35.035 Standards for Protection of Critical Saltwater Habitat

1. **Standard:** Docks, bulkheads, bridges, fill, floats, jetties, utility crossings, and other human-made structures shall not intrude into or over critical saltwater habitats except when all of the conditions below are met.
  - A. The public's need for such an action or structure is clearly demonstrated and the proposal is consistent with protection of the public trust, as embodied in [RCW 90.58.020](#);
  - B. Avoidance of impacts to critical saltwater habitats by an alternative alignment or location is not feasible or would result in unreasonable and disproportionate cost to accomplish the same general purpose;
  - C. The project including any required mitigation will result in no net loss of ecological functions associated with critical saltwater habitat.
  - D. The project is consistent with the state's interest in resource protection and species recovery.
  - E. Docks for community use may be authorized provided that:
    - 1) Avoidance of impacts to critical saltwater habitats by an alternative alignment or location is not feasible;
    - 2) The project, including any required mitigation, will result in no net loss of ecological functions associated with critical saltwater habitat.

## 17.35.036 Buffer requirements for Protection of Lacey's Marine Riparian Areas and Critical Saltwater Habitat

1. **Standard:** The minimum baseline marine riparian habitat area buffer shall be 200 feet measured landward from the OHWM. The Administrator may authorize reduction of the standard buffer under the conditions and through the process provided for in LMC 14.33.[116.G](#) and incorporated into this SMP. [The buffer width may not be reduced by more than 25% in any location. Any greater reduction requires a shoreline variance.](#)
- [\[AC72\]](#)
2. **Standard:** Activities and structures associated with water oriented public access opportunities may intrude into marine riparian area or critical saltwater habitat area buffers, provided such public access is consistent with the intent and applicable provisions of Lacey's Public Access Plan, is approved and maintained by the City of Lacey, is the minimum intrusion necessary to support the authorized use, and the mitigation sequence is followed.

## 17.35.037 Critical Fresh Water Habitat

1. **Location and Type:** Critical fresh water habitat areas in Lacey include Woodland Creek, its floodplain, and the associated, almost continuous, stretch of wetland complex that connects and extends around portions of area lakes; including Hicks Lake, Pattison Lake, and Long Lake, to



the extent such areas fall within shoreline jurisdiction, and the lake basins. ~~See map L-1 in the inventory.~~

2. **Shoreline Designation:** The ~~shoreline residential~~Shoreline Residential designation has been applied to properties around Lacey's lakes where residential development has occurred. These areas are predominantly built out. Woodland Creek is designated ~~Urban~~Conservancy and ~~Natural~~, and the large, associated wetland complex connecting them all is designated ~~natural~~Natural. Protection of the vast complex of wetland areas surrounding Hicks, Pattison and Long Lake has come naturally as it was considered unusable. Most all of this complex has been protected and remains undeveloped.
3. **Land use:** Land use along Woodland Creek and Lakes within Lacey and Lacey's UGA is somewhat variable, ranging from undeveloped land to low density residential, with some commercial land uses along Woodland Creek's associated wetlands north of Martin Way. Most of Woodland Creek from this point north within Lacey and its UGA is undeveloped and has maintained critical area functions, particularly in regard to flood storage capacity and habitat associated with wetland areas. Where lakefront property contained developable area, it has generally been platted and developed with residential uses. Continuation of the residential uses and reasonable expansions are anticipated to continue to occur.

## ~~17.35.038 Goal and Policies for Protection of Critical Fresh Water Habitat~~

1. ~~Goal: Protect Lacey's critical fresh water habitats and achieve no net loss of function or value in these areas. Strive for greater levels of ecological function in vegetation management areas over the long term.~~
  - ~~A. Policy: Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans for activities proposed within or adjacent to critical freshwater habitat.~~
  - ~~B. Policy: Utilize standards in Lacey's critical areas ordinances and tree and vegetation protection legislation as incorporated into this SMP, as appropriate, to protect critical freshwater habitat areas and achieve no net loss objectives of this SMP.~~
  - ~~C. Policy: Accommodate existing uses while achieving no net loss of functions and values with new development and implement mitigation strategies designed to improve the functionality of vegetation management areas.~~
  - ~~D. Policy: Emphasize protection and no net loss of ecological function of critical fresh water habitat in the future under GMA and when considering future land uses in shoreline areas.~~
  - ~~E. Policy: Where critical areas occur along designated critical freshwater habitat, buffer requirements should be based upon standards identified in Lacey's critical area ordinances as incorporated into this SMP. Exceptions to this policy are outlined in Section 17.35.020 (1) (C).~~
  - ~~F. Policy: Water dependant uses and structures or modifications supporting public access or such uses should be authorized uses within critical freshwater habitat, critical areas, critical area buffers and the OHWM setback within any shoreline designation.~~

## 17.35.039 Standards for Critical Fresh Water Habitat

1. Uses, structures or modifications that are not water ~~dependant~~dependent or do not provide public access shall not be permitted within critical freshwater habitat areas or critical areas or their buffers.
2. A water ~~dependant~~dependent or public access use, structure, or modification may be approved within critical freshwater habitat areas and critical areas and their buffers provided it meets all of the following requirements:
  - ~~1.A.~~ Such use, structure, or modification is associated with a residential use on the same property, or if a public use is identified in the Comprehensive Plan for Outdoor Recreation or the Public Access Plan.
  - ~~2.B.~~ All standards of this SMP applicable to the use, structure or modification are met including provisions within the SMP.
  - ~~3.C.~~ The intrusion is the minimum amount necessary to support the authorized use and the proposal complies with mitigation sequencing.
  - ~~4.D.~~ The proposal can demonstrate no net loss of shoreline ecological function and value.
3. Proposals for activities within critical freshwater habitat areas shall include development of a habitat management plan. The habitat management plan shall illustrate how the proposal complies with the goals, policies and standards relating to critical freshwater habitat areas and critical areas, as applicable, in this SMP.

## 17.36 Moratoria Authority [LW73]

1. The City has authority to adopt a moratorium control or other interim control on development under RCW 90.58.590.
2. To adopt a moratorium control or other interim control, the City must:
  - A. Hold a public hearing on the date of adoption, or within sixty days of the date of adoption;
  - B. Adopt detailed findings of fact that include, but are not limited to justifications for the proposed or adopted actions and explanations of the desired and likely outcomes;
  - C. Notify the department of Ecology of the moratorium or control immediately after its adoption. The notification must specify the time, place, and date of any public hearing required by this subsection.
  - D. Provide that all lawfully existing uses, structures, or other development shall continue to be deemed lawful conforming uses and may continue to be maintained, repaired, and redeveloped, so long as the use is not expanded, under

the terms of the land use and shoreline rules and regulations in place at the time of the moratorium.

3. A moratorium or control adopted under this section may be effective for up to six months if a detailed work plan for remedying the issues and circumstances necessitating the moratorium or control is developed and made available for public review.
4. A moratorium or control may be renewed for one or more six-month period if the City complies with the requirements in subsection (B) above before each renewal.

## ~~PART TWO~~

# ~~ENVIRONMENTAL CONCEPTS, SHORELINE VALUES AND FUNCTIONS, VEGETATION AND RESTORATION~~

## **Article 4. Shoreline Ecology and Vegetation Management Standards**

### **17.40 Shoreline Ecological Functions**

#### **17.40.005 General Provisions**

The SMA and the Guidelines for the SMP place an emphasis on the protection of ecosystem-wide processes and ecological functions. This SMP must contain policies, regulations and standards designed to achieve “no net loss” of these processes and functions. To accomplish this objective, Lacey has developed this SMP with the necessary goals, policies and development regulations to assure development within the shoreline jurisdiction will promote no net loss of ecological functions necessary to sustain the natural shoreline.

#### **~~17.40.007 General Goals and Policies for Protection of Ecological Functions~~**

[AC74]

~~1. — Goal: Use the comprehensive unique inventory and characterization report provided in Appendix 4 to recognize, appreciate and respect the individual nature of Lacey’s shoreline reaches and the natural ecological processes important to the health and vitality of these shorelines.~~

~~A. — Policy: Designate shorelines based upon findings of the shoreline inventory and what designation is best suited to each individual reach considering its identified functions and values.~~

~~B. — Policy: Require design that is sensitive to shoreline processes and the requirements necessary for protection of identified functions and values. Design and density shall promote no net loss of ecological functions. To further this intent, the City will consider incentive programs to encourage dedication of shoreline property to the City for management and protection over the long term.~~

~~2. — Goal: Plan land use around shoreline resources considering the characterization report and cumulative impacts analysis, and responsibly balance impacts from urbanization required under GMA with the necessary protection of these limited and valuable resources over the long term.~~

~~A. — Policy: Require a vegetation management area appropriate to each designation and expected use, to promote the natural functions of stormwater absorption and treatment and promote water quality and natural habitat functions and values.~~

~~B. — Policy: Allow alternatives for vegetation improvements within the vegetation management area as long as the area will achieve similar results in mitigating upland development and impacts of urbanization on the shorelines natural functions and values.~~

~~3. — Goal: Achieve goals of the Shoreline Management Act for state interests, and achieve local interests for the protection of identified functions and values. This shall include enjoyment~~

~~of these resources for both passive and active recreation opportunities, as appropriate given characteristics, functions and values of individual shoreline areas.~~

~~A. Policy: Ensure that uses and activities address the goals and policies in Sections 17.40 through 17.70.~~

~~B. Policy: Public use of shoreline will be a priority pursuant to the City Public Access Plan. However, public access must be balanced with the needs of each individual reach for maintaining a healthy shoreline and its ecological functions and values.~~

~~C. Policy: Public access with active or intensive uses should not be planned where critical areas are present or the shoreline would be particularly sensitive to the planned use.~~

~~D. Policy: Access should be integrated into shoreline areas with the least amount of impact possible and impacts should be mitigated to promote no net loss of ecological function.~~

~~E. Policy: To balance public access and use of shoreline resources with ecological function, Lacey will consider offsite mitigation and restoration consistent with priorities in the City's Restoration Plan. Offsite mitigation can be used to achieve no net loss on a community wide basis if this cannot be achieved onsite.~~

~~4. Goal: Promote new development only where appropriate for the shoreline designation and ensure all development is sensitive to and protects ecological processes and functions.~~

~~A. Policy: Design and locate all development and structures, including residential development, to make beach stabilization measures and other shoreline modifications unnecessary, including but not limited to, protective measures such as filling, beach feeding, bulkheading, shoreline berms, construction groins or jetties, or substantial grading of the site.~~

~~B. Policy: Ensure that permits for shoreline modifications address the goals and policies in Sections 17.40 through 17.70.~~

~~C. Policy: Ensure that exemptions and permits for uses, activities and shoreline modifications use mitigation sequencing in Section 17.40.015.~~

~~D. Policy: Programs that enhance opportunities for the development community as well as meet City and state goals for shoreline protection should be given priority. An example is a program that would allow significant increased density credit that can be transferred to upland areas outside shoreline jurisdiction or off site in exchange for dedication of the shoreline area to the public. This can enhance development opportunities and achieve GMA goals and environmental protection of shoreline resources over the long term.~~

[AC75]

## 17.40.015 Mitigation Sequencing

A shoreline permit applicant or project proponent shall include measures in their proposal to mitigate environmental impacts not otherwise avoided or mitigated by compliance with the SMP and other applicable regulations. Where required, mitigation shall occur in the following prioritized order:

A.1. Avoiding the adverse impact altogether by not taking a certain action or parts of an action, or moving the action.

- ~~B.2.~~ Minimizing adverse impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology and engineering, or by taking affirmative steps to avoid or reduce adverse impacts.
- ~~C.3.~~ Rectifying the adverse impact by repairing, rehabilitating or restoring the affected environment.
- ~~D.4.~~ Reducing or eliminating the adverse impact over time by preservation and maintenance operations during the life of action.
- ~~E.5.~~ Compensating for the adverse impact by replacing, enhancing, or providing similar substitute resources or environments and monitoring the adverse impact and the mitigation project and taking appropriate corrective measures.

## 17.40.020 Development Standards for Protection of Ecological Functions

1. **Standards applicable to ecological functions, generally:** The entire Shoreline Master Program has an emphasis on protection of ecological functions and promoting no net loss of ecological functions and values. Standards achieving this are found throughout the document under sections dealing with specific uses and modifications. All goals, policies and standards in this section of the SMP (LMC 17.40) are applicable to protection of ecological functions and are considered fundamental to management of shoreline resources. All goals, policies and standards in LMC 17.40 shall be satisfied with any use, activity, structure or modification under shoreline jurisdiction:
  - A. General goals, policies and standards applicable to all uses, activities and modifications in Sections 17.44 and 17.45.
  - B. General goals, policies and standards for uses and modifications in Sections 17.46 through 17.70.
  - C. All vegetation management policies and standards of Section 17.41.
  - D. All restoration policies and standards of Section 17.42.
2. **Vegetation management areas when critical areas are not present:** Where no designated critical area exists within shoreline jurisdiction, a vegetation management area shall be required to overlay the setback from the OHWM for the primary and most intensive use planned for the site.

Along lakes in Lacey, the most intensive use will generally be residential homes. Matching the vegetation management area with the setback for the most intensive use permitted on the property is intended to correspond to the general needs and character of each shoreline designation and uses permitted within the designation.
3. **Buffers when critical area is present:** Where critical areas occur, the intent and requirements of Sections 17.35.020 shall be satisfied.
4. **Vegetation requirements for vegetation management areas:** Vegetation Management Areas required in item 17.40.020 (2) above shall consist of native species typical to riparian areas, or a functional equivalent. There are several intents to this provision which include:

- A. To promote no net loss of ecological functions as further urbanization or more intensive use of individual sites occur.
- B. To maintain the health and value of the shoreline, as well as individual properties, when new development takes place by maintaining areas that can help mitigate impacts and result healthy riparian areas over the long term.
- C. To implement requirements that are flexible to meet individual needs (provide a tool box of options accomplishing the intended objectives) and are proportionate to planned improvements.

See Section 17.41.021 ~~Table 1~~ for vegetation guidelines for vegetation management areas.

**5. Uses designated for location within a vegetation management area must promote shoreline goals:** Generally, structures and activities that do not promote shoreline goals as expressed in the SMA and this SMP are prohibited within the designated vegetation management and setback areas. Examples include:

- A. New or expanded lawns and gardens (typically heavily fertilized, contaminate the water body through nutrient loading, generally not efficient in filtering runoff or allowing water to infiltrate and provide little habitat value);
- B. New or expanded parking and stormwater facilities (potential to contribute significant contaminants);
- C. New or expanded fences (that degrade the natural look and aesthetics of shorelines and restrict movement of wildlife and people); and
- D. New or expanded accessory structures (which can have a range of adverse impacts).
- E. New or expanded uses, structures, activities and modifications not otherwise permitted in this SMP that can adversely impact shoreline functions and values.

## ~~17.41.010 Importance of Vegetation~~

~~Native vegetation along the shoreline provides and supports many ecological functions or processes which are critical to the health, vitality, function and~~

~~value of Lacey's shorelines. These functions and values include but are not limited to:~~

~~A. — Providing shade necessary to maintain water temperatures required by salmonids, forage fish, and other aquatic biota.~~

~~B. — Regulating microclimate in riparian and nearshore areas.~~

~~C. — Providing organic inputs necessary for aquatic life, including providing food in the form of various insects and other benthic macro invertebrates.~~

~~D. — Stabilizing banks, minimizing erosion and sedimentation, and reducing the occurrence/severity of landslides.~~

~~E. — Reducing fine sediment input into the aquatic environment by minimizing erosion, aiding infiltration, and retaining runoff.~~

~~F. — Improving water quality through filtration and vegetative uptake of nutrients and pollutants;~~



~~G. — Providing a source of large woody debris to moderate flows, create hydraulic roughness, form pools, and increase aquatic diversity for salmonids and other species.~~

~~H. — Providing habitat for wildlife, including connectivity for travel and migration corridors.~~

~~Based upon identified functions and values and the role vegetation plays in maintenance of these functions and values, Lacey will promote proper restoration, landscaping and maintenance of its shoreline areas. The goals and policies in Sections 17.41.015 and general development standards in Section 17.41.020 are intended to provide the vision and general framework for this effort.~~

## ~~17.41.015 Vegetation Management – Goals and Policies~~

~~1. — Goal: Over the long term, achieve vegetated shorelines with materials supportive of natural shoreline functions and values that will help maintain and improve water quality and habitat.~~

~~**A. Policy: Limit the removal of vegetation within shoreline jurisdiction to the minimum necessary to accommodate authorized shoreline development. Designate a vegetation management area corresponding to each designation's setback area as outlined in Section 17.24.010, Table 4. To be providing buffering functions, it is assumed such areas are well vegetated with native species appropriate to the eco-region. Where buffering functions are compromised by loss of, lack of, or replacement of native vegetation, vegetation management plans should focus on improving buffering function.**~~

~~**B. Policy: Native/approved vegetation is desired within designated vegetation management areas to further the City's goals of shoreline restoration and to promote no net loss of ecological function and value with new development. A Vegetation Management Plan should be developed for uses and activities proposed in shoreline jurisdiction, and should consider legitimate competing interests for shoreline areas. These interests include but are not limited to habitat, views and compatibility and integration of the full range of land use activities anticipated in the applicable shoreline environment**~~

~~and adjacent uplands. Example Vegetation Management Plans are provided in Appendix 2.~~

~~C. Policy: The Administrator may allow selective pruning of native/approved vegetation for view corridors and limited vegetation removal for shoreline access segments, provided ecological functions are not compromised. Proposals to remove vegetation for shoreline access segments should follow the mitigation sequence. All proposals for vegetation removal or pruning should be reviewed by the City Forester/Arborist, who will provide a recommendation to the Administrator. See Sections 17.41.020 (3) and 17.41.020 (10).~~

~~D. Policy: Preserve existing native vegetation along the shoreline, encourage and incentivize planting when it does not exist, and avoid, minimize and mitigate for impacts to shoreline vegetation.~~

~~E. Policy: Provide flexibility when balancing overlapping shoreline policies and priorities in including vegetation conservation, preferences for water-dependant uses, and requirements to provide public access.~~

~~F. Policy: When nonconforming or “conforming, expansion limited” structures are expanded within designated vegetation management areas and native/approved vegetative does not exist within the vegetation management area, the City should encourage the installation of vegetation within these areas to the level the site can reasonably accommodate and commensurate to offset the proposed level of expansion. If through review of the Vegetation Management Plan, the Administrator determines there is not adequate space onsite to accommodate vegetation that will adequately offset and mitigate impacts anticipated from the expansion, the Administrator may consider offsite mitigation or payment of fees in lieu of onsite mitigation.~~

~~G. Policy: Vegetation within designated vegetation management areas should be comprised of three vegetative levels including an over story of trees, an understory of shrubs, and a floor of herbs and with native plants commonly found in riparian areas of Thurston County; see example Vegetation Management Plans in Appendix 2.~~

~~H. Policy: Where revegetation of vegetation management areas is anticipated, such areas should~~

~~be planted to resemble native conditions. The Administrator may consider and approve use of other vegetative materials that are demonstrated through the Vegetation Management Plan to achieve protection or maintenance of shoreline ecological function equivalent to native vegetation.~~

~~I. Policy: Where uses or activities are proposed along shorelines that also contain critical areas, Vegetation Management Plans may be consolidated with Habitat Management Plans required under Section 17.35.~~

~~2. Goal: Develop and implement public information efforts that put shoreline vegetation restoration and management tools in the hands of shoreline property owners.~~

~~A. Policy: Because of the importance of vegetation in managing water quality, the City will promote public education on this topic.~~

~~**B. Policy: Develop a full range of materials to share with the public ranging from how to implement shoreline revegetation requirements in accordance with this SMP to basic information regarding shoreline functions and values and how vegetation management can be involved in maintaining shoreline property.**~~

~~**C. Policy: The City will support efforts of realtors and work in partnership with the local Board of Realtors to inform new and existing shoreline property owners of protective covenants that may be applicable to shoreline properties, and on the topic of ecologically friendly vegetation management. This may include a range of strategies such as educational presentations at realtor membership meetings, presentations to home owner associations, scheduling informational meetings with lot owners or perspective buyers and helping to develop brochures for general circulation to interested groups.**~~

## **17.41 Vegetation Management** [AC76]

### **17.41.020 Vegetation Management - Development Standards**

1. **Standard:** A Shoreline Vegetation Management Plan shall be developed and implemented for any shoreline parcel as a requirement of a shoreline substantial development permit, shoreline conditional use permit, shoreline variance and any action requiring an exemption letter. If there

is no permit or exemption letter required for an activity, structure or use, a Shoreline Vegetation Management Plan is not required. However, in such situations any new landscaping of the site must adhere to the goals, policies and standards of the SMP with regard to the intent to promote natural functions and values of shoreline property. See ~~Appendix Green Shoreline Landscaping: Examples and Guidelines 2~~ for sample Vegetation Management Plans.

Parcels within shoreline jurisdiction which do not front onto a lake or stream and have property within a required shoreline buffer shall still be required to develop and implement a Shoreline Vegetation Management Plan pursuant to requirements for this section. Said plan will have a different focus than lots with shoreline frontage. Focus for these parcels will be runoff and drainage treatment, overstory vegetation to promote tree canopy and proper maintenance, involving use and minimizing fertilizers and other contaminants that could impact water quality.

**2. Standard:** The Shoreline Vegetation Management Plan shall include or address the following:

- A. The plan shall cover the entire project area or parcel(s) upon which uses or activities requiring authorization are proposed, as outlined above. The plan shall illustrate the location of the OHWM, the dimensions and location of the vegetation management area and of any shoreline access segment or clear zone established under Section 17.41.020 (7). The plan shall also illustrate the contours and general slope of the lot, the dimension of all existing and proposed structures (principle and accessory), impervious surfaces, lawn or turf areas, easements, and utility lines/connections. The plan shall illustrate general areas, approximate dimensions, and species makeup of vegetated areas located on portions of the subject site within shoreline jurisdiction but outside of the designated vegetation management area. Where combined with a Habitat Management Plan, the combined plan shall also illustrate the location and type of critical area(s) existing on the site in accordance with the provisions in Section 17.35 of this SMP. This plan shall be prepared by a licensed landscape architect, Washington certified nurseryperson or Washington certified landscape professional. When combined with a Habitat Management Plan, the plan shall also incorporate information from a qualified biologist or ecologist. The Administrator may waive the requirement for a qualified professional to prepare the plan, under appropriate circumstances as determined by the Administrator.
- B. The Plan shall provide for the retention and/or replanting of native shoreline vegetation, or its functional equivalent, within the required vegetation management area; see example Vegetation Management Plans in ~~the Green Shoreline Landscaping: Examples and Guidelines~~Appendix 2. When expansion of a nonconforming structure, “conforming, expansion limited” structure, or development of a nonconforming lot is proposed within the vegetation management area, or when the impacts of development outside of the vegetation management area cannot be offset because of insufficient native vegetation in the vegetation management area, vegetative improvements (replanting) proposed to offset unavoidable impacts through the mitigation sequence shall be provided according to the schedule and tier threshold provisions in Section 17.41.021, ~~Table 1~~.
- C. Authorized uses or development shall retain all vegetation occurring on the lot until such time as a building permit or shoreline authorization is issued. Such permit or authorization shall specify the extent to which and in what locations vegetation can be removed. Development occurring outside of vegetation management areas will generally satisfy the first step in the mitigation sequence (avoidance). If, in the opinion of the Administrator, the use or activity may still result in a net loss of shoreline ecological function due to the character of the proposed activity or because of specific site conditions, the Administrator may require compensatory mitigation commensurate to offset identified impacts.



- D. Specific revegetation strategies that are developed to meet objectives of this SMP may differ from those in ~~Table 1~~ provided the Administrator finds such strategies are proportionate to provide for equivalent levels of shoreline function.
- E. The Administrator may waive the requirement for preparation of a Shoreline Vegetation Management Plan when the proposed permit or action seeks to improve ecological functions of the shoreline, such as the removal of a bulkhead. In this situation, the level of functional improvement resulting from the proposed action shall be proportionate to that which would be provided through implementation of a Vegetation Management Plan, as determined by the Administrator.
- F. Example Vegetation Management Plan: To aid applicants in preparation of a Shoreline Vegetation Management Plan, the City has provided example Vegetation Management Plans and a general list of preferred species for Lacey's shoreline areas in the Green Shoreline Landscaping: Examples and Guidelines Appendix 2. Species listed in this document Appendix 2 have been selected based upon characteristics that contribute and support the natural functions and values of the shorelines. The example plans shall be utilized by applicants to achieve mitigation or incentivized restoration efforts unless an alternative approach is authorized by the Administrator utilizing the criteria outlined in 17.41.020 (D) above.
- 3. Standards for Review of Vegetation Management Plan:** The Shoreline Vegetation Management Plan shall be reviewed by the City Arborist and Tree Protection Professional who shall utilize guidance from the Department of Fish and Wildlife and the information in Green Shoreline Landscaping: Examples and Guidelines Appendix 2 to evaluate preferred and proposed species and functional needs. The Arborist/Tree Protection Professional shall consult the Shoreline Inventory, Characterization and Analysis Reports for information on shoreline functions and values relative to the individual shoreline and subject reach where activities are proposed. Based upon the review, he/she shall provide recommendations to the Administrator for action on the Plan. Plans that do not protect and mitigate for impacts to shoreline ecological functions will not be approved.
- 4. Standards for Maintenance:** Each Shoreline Vegetation Management Plan shall contain a maintenance component that details maintenance requirements. This shall include proper use of fertilizers to reduce impacts to water quality, irrigation needs and responsibilities, and adaptive management requirements to guarantee implementation of the plan.
- 5. Standards to Ensure Retention:** Each Shoreline Vegetation Management Plan shall be retained and implemented throughout the life of the use and/or development by means of a conservation easement or similar legal instrument recorded with the Thurston County Auditor, prior to issuance of a permit or exemption.
- 6. Standards for Use of Lawn as Landscaping:** Lawn or turf is not permitted within the designated vegetation management area because it compromises the buffering effectiveness of the area and does not serve a buffering function. Turf also generally encourages fertilization, which can result in an increased the nutrient load to the water body and compromise water quality. Turf shall only be permitted within the vegetation management area in the following situations when approved by the Administrator:
- ~~b.C.~~        When expansion of an existing nonconforming or "conforming, expansion limited" structure is authorized, or when construction on a nonconforming lot involves encroaching into a designated vegetation management area, the portion of the vegetation management area within 10 feet of the structure, as allowed pursuant to Section 17.41.020 (7), may include or remain turf. New development shall apply the mitigation sequence to avoid conflicts with



vegetation such that this clear zone for turf or lawn within the vegetation management area is not needed, to the extent feasible.

~~e.D.~~ When new construction is proposed, turf shall not be utilized in the designated vegetation management area. However if the Administrator determines there is no reasonable alternative that provides the applicant with usable yard space, lawn or turf may be utilized within up to 10 feet of the principle structure within the vegetation management area. The Administrator shall review the proposal utilizing the variance criteria in Section 17.30.020 and shall only approve such requests utilizing the mitigation sequence and when the allowance is the minimum necessary to afford relief.

C. Wherever lawn is permitted it shall meet requirements of Section 17.41.020 (4) concerning proper use of fertilizer.

**7. Standards for Shoreline Access Segments and Clear Zones Permitted around Structures:**

Nonconforming or “conforming, expansion limited” structures proposing to expand may maintain non buffer related vegetative improvements adjacent to and within a 10 foot radius of the structure (clear zone). As outlined above, new residential construction shall be sited so that any lawn or turf area is located outside of the vegetation management area, to the extent feasible. New residential uses on shoreline parcels may establish a shoreline access segment as defined in 17.15.236. In locating shoreline access segments or locating clear zones, the mitigation sequence shall be followed. Compensatory mitigation shall offset direct impacts from structural expansion as well as from any resulting loss of function due to expansion of the clear zone further into the vegetation management area, if applicable. Compensatory mitigation shall also be provided for unavoidable impacts resulting from the establishment of shoreline access segments. Compensatory mitigation shall be authorized by the Administrator and may include such things as:

- A. Vegetative improvements in other portions of the vegetation management area, as outlined in 17.41.021~~Table 1~~;
- B. Strategies designed to provide more effective buffering functions within the vegetation management area, such as installation of rain garden that is particularly effective in mitigating runoff impacts;
- C. Activity that improves the existing function and value of the shoreline in ways other than installing vegetation, as outlined in 17.41.021~~Table 1~~. Such activities may include removing overwater structures that do not provide public access or serve a water dependent use, replacing materials on docks with light penetrating materials, or removing hard shoreline stabilization structures where softer measures would provide adequate shoreline stabilization;
- D. Other strategies or techniques designed to provide functions proportionate to and to compensate for buffering functions within the vegetation management area that are lost, as approved by the Administrator.
- E. If reasonable effective opportunities for compensatory mitigation have been exhausted on site, off site mitigation may be conducted at priority restoration sites as determined by the Administrator. At such time as the City has designed and implemented a fee in lieu of program, paying a fee in lieu of additional on site mitigation shall also be an option at the sole discretion of the Administrator.

**8. Standards for Covenants for New Plats:** Protective covenants and articles of incorporation for new plats shall include discussion of the location of and required maintenance for designated

vegetation management areas. The discussion shall include a responsibility for the homeowners association to call the attention of residents to policies and standards in this SMP. It shall also detail the responsibility of individual lot owners to follow prescribed rules in regard to protection and maintenance of vegetation and appropriate maintenance practices to preserve water quality.

9. **Standards for Hazard Trees:** Hazard trees within vegetation management areas or critical area buffers may be converted to habitat tree or pushed over toward the aquatic area and retained as large woody debris. Such proposals shall be reviewed by the City's Tree Protection Professional and approved by the Administrator in accordance with the process for hazard tree review in LMC 14.32 as incorporated into this SMP.
10. **Standards for Limbing Trees:** The limbing or crown thinning of trees larger than three (3) inches in caliper shall comply with National Arborist Association pruning standards, unless the tree is a hazard tree as defined by the Program. No more than twenty-five percent (25%) of the limbs on any single tree may be removed and no more than twenty-five percent (25%) of the canopy cover in any single stand of trees may be removed for a single view corridor. All limbing shall comply with Lacey's Tree Protection and Preservation Ordinance (LMC 14.32) and applicable policies and criteria of the Lacey Urban Forest Management Plan, as incorporated into this SMP.
11. **Standard:** Requirements of this SMP to maintain and conserve vegetation shall not apply to the removal of aquatic weeds and fresh water algae undertaken pursuant to WAC 173-201.

## 17.41.021 ~~Table 1~~<sup>[AC77]</sup>: Vegetation Management - Re-vegetation and Mitigation Schedule and Tiers

Because use of vegetation management for mitigation and restoration may involve a myriad of activities and designs that can meet the objectives of this SMP, the description of tiers/improvements given in this table should be used as a guideline. ~~The table 4 below~~ is intended to provide a basic framework for meeting objectives and should be used when considering expectations for revegetation and mitigation, when necessary. However, the thresholds listed in this table are standards and shall be utilized in all Vegetation Management Plans.

Improvements specified in the table and example plans provided in Appendix 2the Green Shoreline Landscaping: Examples and Guidelines <sup>[AC78]</sup> can be used by applicants that prefer a standardized approach. As outlined in Section 17.41.020, applicants may develop a non-standard plan utilizing other strategies and approaches provided the plan incorporates the thresholds included in ~~Table 4the table below~~ and that the plan meets the same objectives for functional equivalency and no net loss of shoreline ecological function. These thresholds and tiers/improvements are in addition to applicable requirements for revegetation of disturbed areas and landscaping in the Lacey Zoning Codes.

| Level of Expansion/Action in the Vegetation Management Area                                                                     | Thresholds *    | Description of Tiers/Improvements * ** |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------|
| No expansion permit – Permit associated with residential structure and no expansion; Electrical, plumbing, roofing permit, etc. | Not applicable. | Not applicable.                        |

|                                                                                                                                                                                                                                                                                                                                         |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Low Impact Expansion</b> – Expansion with no increase in impervious surface (vertical)                                                                                                                                                                                                                                               | <b>Tree and Tier One<sup>△</sup></b> | <b>Tree Tier</b> - Meet minimum tree requirements of Chapter 14.32, as incorporated into this SMP. Required trees must be placed within vegetation management area.<br><br><b>Tier One<sup>△</sup></b> – Provide a 10–foot strip of landscaped area of native plants in the vegetation management area <u>as close to the OHWM as possible. If this cannot be achieved due to lot and/or view constraints, provide strip within 25' of the OHWM. Landscape strip may be two segments.</u> [AC79]                                                                                                                                                                                                                                                                                                                                                 |
| <b>Minor Expansion</b> - Expansion of building footprint by up to 500 square feet or up to 10% of structure (whichever is less)<br><br>OR<br><br>Expansion of impervious surface by up to 1,000 square feet or up to 10% (whichever is less)                                                                                            | <b>Tier Two</b>                      | <b>Tier Two</b> - Install native vegetation in at least <b>50%</b> of the vegetation management area. Priority given to overstory vegetation along the shoreline.<br><br>OR<br><br><b>*Reduced Vegetation/Structure and Use Option</b> – Install native vegetation in at least 25% of the vegetation management area. Priority given to overstory vegetation along the shoreline. AND, do one of the following: <ul style="list-style-type: none"> <li>• Replace solid surfaces on piers and docks with light penetrating surfacing materials.</li> <li>• Remove over water structures that do not provide public access, or do not serve a water dependent use.</li> <li>• Remove and replace hard shoreline stabilization structures with bioengineered or softer shoreline stabilization measures.</li> </ul>                                 |
| <b>Moderate Expansion</b> - Expansion of the building footprint by more than 500 square feet or between 10.1 to 25% (whichever is less)<br><br>OR<br><br>Expansion of impervious surface by more than 1,000 square feet, or between 10.1 to 25% (whichever is less)                                                                     | <b>Tier Three</b>                    | <b>Tier Three</b> – Install native vegetation in at least <b>80%</b> of the vegetation management area. Priority given to overstory vegetation along the shoreline.<br><br>OR<br><br><b>*Reduced Vegetation/Structure and Use Option</b> – Install native vegetation in at least 50% of the vegetation management area. Priority given to overstory vegetation along the shoreline. AND, do one of the following: <ol style="list-style-type: none"> <li>1. <u>•</u> Replace solid surfaces on piers and docks with light penetrating surfacing materials.</li> <li>2. <u>•</u> Remove over water structures that do not provide public access, or do not serve a water dependent use.</li> <li>3. <u>•</u> Remove and replace hard shoreline stabilization structures with bioengineered or softer shoreline stabilization measures.</li> </ol> |
| <b>Major Expansion</b> – Expansion of the building footprint by more than 25%, or redevelopment (replacement/teardown) of existing structures involving more than 25% of the square footage of the existing structure, or all new construction on an undeveloped lot.<br><br>Or<br><br>Expansion of impervious surface by more than 25% | <b>Tier Four</b>                     | <b>Tier Four</b> – Install native vegetation in 100% of the vegetation management area.<br><br>OR<br><br><b>*Reduced Vegetation/Structure and Use Option</b> – Install native vegetation in at least 75% of the vegetation management area. Priority given to overstory vegetation along the shoreline. AND, do one of the following: <ol style="list-style-type: none"> <li>4. <u>•</u> Replace solid surfaces on piers and docks with light penetrating surfacing materials.</li> <li>5. <u>•</u> Remove over water structures that do not provide public access, or do not serve a water dependent use.</li> <li>6. <u>•</u> Remove and replace hard shoreline stabilization structures with bioengineered or softer shoreline stabilization measures.</li> </ol>                                                                             |
| <b>New Development or expansion outside of the vegetation management area,</b> where native vegetation within the                                                                                                                                                                                                                       | <b>Tree and Tier One<sup>△</sup></b> | See row two above for description of tiers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|                                                                                    |  |  |
|------------------------------------------------------------------------------------|--|--|
| vegetation management area is not sufficient to offset the impacts of development. |  |  |
|------------------------------------------------------------------------------------|--|--|

\* Requirements may vary according to the following considerations:

1. Where a property has been fully landscaped with qualifying vegetation and meets all other requirements of the SMP, no additional landscaping will be required.
2. Credit will be given for participation in weed control provided the property also practices landscaping strategies that do not contribute to weed growth (this does not include standard herbicide use). Credit will be proportionate to the investment made in weed control and the relative priority that should be given to weed control considering the existing condition of property being developed.

\*\* Vegetation used should include native varieties or approved alternatives. For trees, select from the Lacey General Tree List in Lacey's Urban Forest Management Plan or in [Green Shoreline Landscaping: Examples and GuidelinesAppendix 2](#). For shrub and ground cover types, preferred species are listed in [Appendix 2in the mentioned guidelines document above](#). Alternative varieties may be approved by the Administrator.

+ The Administrator may grant additional credit for certain activities such as weed control as outlined in the footnotes above, and reduce required landscaping. Such reductions will be dependent on the scope of the proposed expansion, site conditions, and shall be at the sole discretion of the Administrator.

<sup>^</sup> This plan can be prepared without a landscape designer, so long as it meets native plant spacing requirements and the plan is to scale (e.g. 1 inch = 10 feet)[AC80]

## 17.42 Restoration

1. Goal: Identify and take advantage of opportunities where restoration goals can be integrated into the design and planning of public or private shoreline development projects.

A. Policy: Recognize that restoration and enhancement may result from:

- 1) Mitigation of impacts from new development.
- 2) Adoption of shoreline setbacks and vegetation management areas with a protective function, which are based upon shoreline ecological functions and processes.

B. Policy: Reestablish, rehabilitate and/or otherwise improve impaired shoreline ecological functions and/or processes through voluntary and incentive-based public and private programs and actions that are consistent with this master program and other approved restoration plans.

2. Goal: Where opportunities are present, work with other state and local jurisdictions in planning and implementation of restoration projects that cross jurisdictional boundaries.

A. Policy: Encourage and facilitate cooperative restoration and enhancement programs between local, state, and federal public agencies, tribes, non-profit organizations, and landowners to address shorelines with impaired ecological functions and/or processes.

3. Goal: Implement restoration efforts consistent with the City Shoreline Restoration Plan: Appendix 3.

A. Policy: Integrate restoration and enhancement with other parallel natural resource management efforts such as the WRIA 13 Salmonid Recovery Plan, Puget Sound Salmon Recovery Plan, and the City of Lacey Comprehensive Land Use Plan and its Environmental Protection and Resource Conservation element.

B. Policy: Ensure restoration and enhancement is consistent with and, where practicable, prioritized based on the biological recovery goals for early Chinook, bull trout populations and other species and/or populations for which a recovery plan is available.

**C. Policy:** Target restoration and enhancement towards improving habitat requirements of priority and/or locally important wildlife species.

**D. Policy:** Restoration should be carried out in accordance with an approved vegetation management plan and in accordance with the policies and regulations of this SMP.

**E. Policy:** Prioritize restoration actions and stand-alone projects in the following order:

- 1) Create dynamic and sustainable ecosystems.
- 2) Restore connectivity between stream channels, floodplains and hyporheic zones.
- 3) Restore natural channel-forming geomorphologic processes.
- 4) Mitigate peak flows and associated impacts caused by high stormwater runoff volume.
- 5) Reduce sediment input to streams and associated impacts.
- 6) Improve water quality.
- 7) Restore native vegetation and natural hydrologic functions of degraded and former wetlands.
- 8) Replant native vegetation in riparian areas to restore functions.
- 9) Restore nearshore ecosystem processes, such as sediment transport and delivery and tidal currents that create and sustain habitat.
- 10) Restore pocket estuaries that support salmon life histories, including feeding and growth, refuge, osmoregulation, and migration.
- 11) Remove obsolete and no longer needed shoreline modifications.

**4. Goal: Achieve natural beach areas by restoration that meets needs of the land owner without hard armoring.**

**1. Policy:** Insure that permits for beach restoration and enhancement projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.

**2. Policy:** Give preference in permitting beach restoration and enhancement projects which use naturally regenerating systems, rather than bulkheads and other structures to prevent and control beach erosion where:

- 1) The length and configuration of the beach will accommodate such systems.
- 2) Such protection is a reasonable solution to the needs of the specific site.
- 3) Beach restoration/enhancement will accomplish one or more of the following objectives:
  1. Recreate or enhance natural shoreline conditions.
  2. Create or enhance natural habitat.
  3. Reverse otherwise erosion-prone conditions.
  4. Enhance access to the shoreline, especially to public shorelines.

**C. Policy:** Design and construct beach enhancement projects so that they will not degrade aquatic habitats, water quality and flood holding capacity.

**D. Policy:** Prefer self-maintaining designs over those which depend upon regular maintenance.

**E. Policy:** Require supplementary beach nourishment where structural stabilization works are likely to increase impoverishment of existing beach materials at or downdrift from the project site.

**F. Policy:** Limit the waterward extent of beach enhancement to that which is necessary to achieve the intended results.

**G. Policy:** Encourage the beneficial reuse of dredged materials for beach restoration and enhancement projects when it has suitable organic and physical properties.

[AC81]

## 17.42.020 General Development Standards for Restoration

1. All restoration activities utilizing landscaping materials shall meet the vegetation management standards of Section 17.41.020 according to the tier threshold schedule in Table 1 (17.41.021).
2. Projects proposed on shoreline property shall meet applicable standards for restoration identified for specific uses, activities and modifications in Sections 17.44 through 17.70.
3. If off site mitigation is used, it shall be consistent with Lacey's Restoration Plan and the plan's goals, policies and priorities. Restoration priority will generally be for no net loss of function and value on site where a proposal is planned and implemented. However, when comprehensive on site restoration is not possible, Lacey may use off site mitigation to achieve no net loss of function and value. Such determination to use off site mitigation, in association with a public or private proposal, will be at the City's option and sole discretion.
4. Beach restoration and enhancement:
  - A. Beach restoration and enhancement shall be the preferred way to protect an existing single-family residence or to maintain access to an authorized shoreline use, as opposed to hard shoreline stabilization structures such as bulkheads, landfills, levees, dikes, groins, or jetties.
  - B. Beach restoration and enhancement may be permitted to restore or enhance degraded shoreline functions.
  - C. The location and design of beach restoration and enhancement projects shall utilize the best available technology, such as the use of gravel berms, large woody debris, and sediment mixtures designed to either move within the drift cell or to resist the normal wave action of the site.
  - D. Beach restoration and enhancement project shall demonstrate that they will not:
    - 1) Cause significant change in littoral drift or river currents,
    - 2) Adversely affect adjacent properties,
    - 3) Adversely affect adjacent spawning grounds or other areas of biological significance, and
    - 4) Interfere with the normal public use of the navigable waters of the state.
5. Relief procedures- Shoreline restoration projects within an Urban Growth Area:
  - A. The City of Lacey may grant relief from shoreline master program ~~development~~ [LW82] standards and use regulations resulting from shoreline restoration projects within urban growth areas consistent with criteria and procedures in WAC 173-27-215.



## **~~PART THREE:~~**

### **~~GENERAL SECTIONS IDENTIFYING GOALS, POLICIES AND DEVELOPMENT STANDARDS FOR USES, ACTIVITIES AND MODIFICATIONS~~**





## ~~17.43.000 Organization of this Document Relating to Uses, Activities and Modifications~~

~~For the reader's convenience, this document has been organized with all of the uses, activities and modifications in alphabetical order. Each use, activity or modification has its own separate section.~~

## **Article 5. Remaining Development Standards**

~~Modifications are addressed in Table 5. In addition, Section 17.45 provides general goal and policy statements applying to all modifications. Additional policies and development standards are provided under separate sections that deal with each particular modification. These sections are integrated and organized into the alphabetized sections of uses and activities. Section 17.45 lists the separate sections dealing with each modification for easy referral.~~ [LW83]

## **17.44.000 Goals and Policies Applicable to all Uses and Activities**

**1. Goal:** Achieve appropriate use, protection and restoration of shoreline resources, by identification of their values and functions and application of criteria and standards to shoreline uses, activities and modifications.

**A. Policy:** Apply standards for proper maintenance and restoration of degraded shorelines. Where there are no regulatory opportunities, use incentives to encourage developers, property owners, community groups and others to enhance degraded shorelines and return them to an ecologically functioning condition.

**B. Policy:** Design, locate and construct residential development in a manner that will:

- 1) Maintain existing public access to the publicly owned shorelines,
- 2) Not interfere with the public use of water areas fronting such shorelines, and
- 3) Not adversely affect aquatic habitat.

**C. Policy:** Evaluate all shoreline uses and activities for their effect on the aquatic environment to ensure every proposal that is approved achieves no net loss of ecological functions and values and does not adversely impact public health.

**D. Policy:** Adopt a full range of development standards and incentive opportunities to protect and achieve no net loss of existing shoreline ecological functions and processes. Development standards may include regulations on use, density, frontage, setbacks, impervious surface, shoreline stabilization, vegetation conservation, buffers, critical areas and water quality and other elements in the public's interest for management and use of shoreline resources.

**E. Policy:** Assess project specific impacts, cumulative impacts, and a project's potential to result in a net loss of ecological functions. Require compliance with the mitigation sequence and compensatory mitigation as necessary to mitigate unavoidable impacts. If impacts cannot be mitigated, the application for use, activity or modification may be denied.

**F. Policy:** Require shoreline permits to be consistent with the Shoreline Management Act (RCW 90.58), the Washington Administrative Code (WAC 173-26), and this Master Program.

**G. Policy:** Generally prohibit activities that would degrade existing levels of ecological function. Mitigation of impacts should occur on site or on other priority shoreline sites that offset on site impacts. Activities should always be consistent with state long term goals and requirements for protection and restoration of shoreline areas.

**H. Policy:** Eliminate inappropriate shoreline uses and poor quality shoreline conditions when authorizing a new shoreline development or activity on the same property and under the same ownership.

**2. Goal:** Develop a Shoreline Master Program with an efficient customer service process, enforcement of program requirements and periodic evaluation of key objectives.

**A. Policy:** Continue Lacey's cultural customer service orientation. Listen to each customer's unique issues to understand the specific situation and needs of the owner, explain the need, purpose and intent of the SMP as it applies to the subject property and try to identify a way to help the owner

meet their objectives for use of property while meeting Lacey's objectives for use, protection and restoration of shoreline resources.

**B. Policy:** Approach work with the owner as a partnership in use and management of shoreline resources. The partnership should benefit the individual owner and be consistent with the overall intent, vision and public interest of the community.

**C. Policy:** Monitor and track developments approved within shoreline jurisdiction, to provide a baseline of data to evaluate key shoreline program elements.

**D. Policy:** Provide appropriate enforcement measures for projects approved under Lacey's shoreline program to ensure that all conditions of projects are met, and that required improvements or mitigation is accomplished.

[AC84]

## ~~117.45.000 Shoreline Modifications—Goals and Policies~~ 17.45 Shoreline Modifications

The Department of Ecology guidelines make the following statement to clarify the distinction between uses, activities and modifications: “Shoreline modifications are generally related to construction of a physical element such as a dike, breakwater, dredged basin, or fill, but they can include other actions such as clearing, grading, application of chemicals, or significant vegetation removal. Shoreline modifications usually are undertaken in support of or in preparation for a shoreline use; for example, fill (shoreline modification) required for a cargo terminal (industrial use) or dredging (shoreline modification) to allow for a marina (boating facility use).”

~~This SMP classifies the following items or activities as modifications:~~

- ~~Dredging; see Section 17.53~~
- ~~7. Fill; see Section 17.54~~
- ~~8. Buoy; see Section 17.52~~
- ~~9. Pier and Dock; see Section 17.61~~
- ~~10. Recreational Float; see Section 17.55~~
- ~~11. Shoreline Stabilization; see general goals, policies and standards in this section and:~~
  - ~~a. Beach Restoration and Enhancement; see Section 17.42~~
  - ~~b. Bioengineering; see Section 17.48~~
  - ~~c. Revetment and Gabion; see Section 17.65~~
  - ~~d. Bulkhead; see Section 17.51~~
  - ~~e. Breakwater, Jetty, Groin and Weirs; see Section 17.50~~
  - ~~f. Dike, Levee and Instream Structure; see Section 17.58~~
- ~~12. Stair Tower; not applicable, not permitted.~~

These modifications each have a section dealing with ~~policies and~~ standards for the modification. The goals and policies that apply to all modifications are provided ~~below alphabetically in Section 17.70~~ to avoid the need for duplication in each of the individual sections. ~~The policies for shoreline stabilization are presented here as well, as many activities will fall within this category.~~

~~1. Goal: Achieve protection of shoreline functions and values by implementation of Shoreline Master Program policies that foster design with nature. Use naturalized concepts and strategies that promote natural functions and processes over concepts that require structural modification.~~

~~A. Policy: Preserve shorelines which exist in their natural state free of shoreline modifications.~~

**B. Policy:** Where possible remove existing shoreline modifications and instream structures to improve ecosystem wide processes and shoreline ecological functions.

**C. Policy:** Design and locate new development to prevent the need for shoreline stabilization measures and flood protection works.

**D. Policy:** Discourage new residential development which requires shoreline stabilization.

**E. Policy:** Discourage structural shoreline modifications so that they do not individually or cumulatively result in a net loss of ecological functions.

**F. Policy:** Allow structural shoreline modifications only when it is desirable for reconfiguration of the shoreline for mitigation or enhancement purposes.

**G. Policy:** Structural shoreline modifications should:

1) Be based on a comprehensive analysis of drift cells for marine water or reach conditions for stream systems and lakes; and

2) Incorporate all feasible measures to protect ecosystem wide processes and shoreline ecological functions.

**H. Policy:** Bank stabilization measures should be designed, located and constructed only to prevent damage to existing development.

**I. Policy:** Use mitigation sequencing to support the use of nonstructural stabilization techniques over bio-engineering with structural components. If bio-engineering is necessary use mitigation sequencing to support its use over structural shoreline stabilization such as rip rap revetments or bulkheads.

**J. Policy:** Car bodies, demolition debris, concrete rubble, scrap building equipment or appliances should not be used for shoreline stabilization.

**K. Policy:** Substantial stream channel modifications and realignment and/or straightening as a means of shoreline stabilization and flood protection should be discouraged. Work within the natural shoreline processes and avoid development within flood plains, floodways or other areas that require stabilization of the natural processes with infrastructure.

**L. Policy:** Design stabilization or protection works for multiple uses with public access to public shorelines.

**M. Policy:** Retain natural features serving a stabilization function such as snags, stumps or uprooted trees that support fish and wildlife and other aquatic systems and that are not a significant navigation hazard.

**N. Policy:** Locate flood protection measures landward of the natural floodway boundary, including wetlands that are associated with the water body.

**O. Policy:** Beach restoration/enhancement using naturally regenerating systems for the prevention and control of beach erosion are preferred rather than bulkheads and other structures where:

1) The length and configuration of the beach will accommodate such systems.

- 2) Such protection is a reasonable solution to the needs of the specific site.
- 3) Beach restoration/enhancement will accomplish one or more of the following objectives:
  - a) Recreate or enhance natural shoreline conditions;
  - b) Create or enhance natural habitat;
  - c) Reverse otherwise erosion-prone conditions; and
  - d) Enhance access to the shoreline, especially to public shorelines.

[AC85]

## **17.45.010 Shoreline Modifications Policies Applying to all Shoreline Stabilization**

### **1. Policies applying to all shoreline stabilization activities:**

#### **A. Policy:** Shore stabilization should be located and designed to:

- 1) Protect and maintain shoreline ecological functions, ongoing shore processes and the integrity of shore features;
- 2) Not unnecessarily interfere with public access to public shorelines or with other appropriate shoreline uses including, but not limited to, navigation, seafood harvest or private recreation; and
- 3) Not intrude into or over critical saltwater or freshwater habitats.

**B. Policy:** Shoreline stabilization on streams should be located and designed to fit the physical character and hydraulic energy potential of a specific shoreline reach, which may differ substantially from adjacent reaches.

**C. Policy:** Public or quasi-public shoreline stabilization projects should be located and designed for multiple use, restoration, and/or public access, where feasible.

**D. Policy:** Design land divisions to assure that future development on the created lots will not require structural shore stabilization.

#### **E. Policy:** New or expanded structural shore stabilization should be limited to when:

- 1) It is conclusively demonstrated by a geotechnical analysis to be necessary to protect an existing primary structure that is in danger of loss or substantial damage caused by tidal action, currents or waves;
- 2) The erosion is not being caused by upland conditions such as vegetation loss and drainage problems;
- 3) Non-structural solutions will not be feasible or sufficient; and
- 4) Impacts can be mitigated so that they will not result in a net loss of ecosystem-wide processes and shoreline ecological functions.

**F. Policy:** Prohibit larger shoreline stabilization projects (such as jetties, breakwaters, weirs or groin systems).

**G. Policy:** Shore stabilization projects should not be allowed on publicly owned shorelines which result in a long term decrease in public use of the shoreline.

**H. Policy:** Shore stabilization should not be allowed for the purpose of filling shorelines.

**I. Policy:** Structural shoreline stabilization should not be located on or at the base of eroding bluffs, except where existing structures are threatened or non-structural methods have been determined to be infeasible.

**J. Policy:** Encourage shore stabilization efforts which coordinate affected property owners and public agencies for a whole drift sector (net shore drift cell) to address ecological and geo-hydraulic processes, sediment conveyance and beach management issues. Encourage the creation of a comprehensive management program where beach erosion threatens existing development.

**K. Policy:** Encourage removal of failing, harmful, unnecessary, or ineffective structures and restore shoreline processes and ecological functions by using more natural long term stabilization measures.

**L. Policy:** Shoreline stabilization projects should be prioritized in the following order. Applications that propose less preferred methods must demonstrate why preferred methods are not feasible:

- 1) No action (allow the shoreline to retreat naturally), increased building setbacks, and structure relocation.
- 2) Upland vegetation enhancement and drainage controls.
- 3) Flexible defense works constructed of natural materials including soft shore protection, bioengineering, including beach nourishment, protective berms or vegetative stabilization.
- 4) Rigid works constructed such as bulkheads, seawalls and bluff walls of artificial materials such as riprap or concrete. Materials used for construction of shoreline stabilization is to be selected for long term durability, ease of maintenance, compatibility with local shore features, including aesthetic values and flexibility for future uses.

## 17.45.0105 Shoreline Stabilization Standards [AC86]

### 1. Fill must meet the provisions of WAC 173-26-231(3)(c)(i).

### **X-2. New development shall be located and designed to avoid the need for future shoreline stabilization to the extent feasible.**

Subdivision of land must be regulated to assure that the lots created will not require shoreline stabilization in order for reasonable development to occur using geotechnical analysis of the site and shoreline characteristics. New development on steep slopes or bluffs shall be set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure, as demonstrated by a geotechnical analysis. New development that would require shoreline stabilization which causes significant impacts to adjacent or down-current properties and shoreline areas shall not be allowed.



**2. New structural stabilization measures shall not be allowed except when necessity is demonstrated in the following manner:**

A. To protect existing primary structures:

- 1) New or enlarged structural shoreline stabilization measures for an existing primary structure, including residences, shall not be allowed unless there is conclusive evidence documented by a geotechnical analysis that the structure is in danger from shoreline erosion caused by tidal action, currents, or waves. Normal sloughing, erosion of steep bluffs, or shoreline erosion itself, without a scientific or geotechnical analysis, is not demonstration of need. The geotechnical analysis shall evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization.
- 2) The erosion control structure will not result in a net loss of shoreline ecological functions.
- 3) The erosion is not being caused by upland conditions, such as the loss of vegetation and drainage.
- 4) Nonstructural measures, such as placing the development further from the shoreline, planting vegetation, or installing on-site drainage improvements, are not feasible or not sufficient.

B. To protect restoration projects or hazardous substance remediation projects pursuant to [Chapter 70.105D RCW](#) when all of the conditions below apply:

- 1) Nonstructural measures, planting vegetation, or installing on-site drainage improvements, are not feasible or not sufficient.
- 2) The erosion control structure will not result in a net loss of shoreline ecological functions.

**3. An existing shoreline stabilization structure may be replaced with a similar structure if there is a demonstrated need to protect principal uses or structures from erosion caused by currents, tidal action, or waves and provided there is no other more ecologically sound practice that can serve the same purpose. For purposes of this section standards on shoreline stabilization measures, "replacement" means the construction of a new structure to perform a shoreline stabilization function of an existing structure which can no longer adequately serve its purpose. Additions to or increases in size of existing shoreline stabilization measures shall be considered new structures.**

- A. The replacement structure shall be designed, located, sized, and constructed to assure no net loss of ecological functions.
- B. Replacement walls or bulkheads shall not encroach waterward of the ordinary high-water mark or existing structure unless the residence was occupied prior to January 1, 1992, and there are overriding safety or environmental concerns. In such cases, the replacement structure shall abut the existing shoreline stabilization structure.
- C. Where a net loss of ecological functions associated with critical saltwater habitats would occur by leaving the existing structure, remove it as part of the replacement measure.
- D. Soft shoreline stabilization measures that provide restoration of shoreline ecological functions may be permitted waterward of the ordinary high-water mark. State and federal permits may

be required.

**4. Geotechnical reports pursuant to this section shall include in their analysis the necessity for shoreline stabilization by estimating time frames and rates of erosion and report on the urgency associated with the specific situation.**

As a general matter, hard armoring solutions shall not be authorized except when a report confirms that there is a significant possibility that such a structure will be damaged within three years as a result of shoreline erosion in the absence of such hard armoring measures, or where waiting until the need is that immediate, would foreclose the opportunity to use measures that avoid impacts on ecological functions. Thus, where the geotechnical report confirms a need to prevent potential damage to a primary structure but the need is not as immediate as the three years that report may still be used to justify more immediate authorization to protect against erosion using soft measures.

**5. When any structural shoreline stabilization measures are demonstrated to be necessary:**

- A. Limit the size of stabilization measures to the minimum necessary. Use measures designed to assure no net loss of shoreline ecological functions. Soft approaches shall be used unless demonstrated not to be sufficient to protect primary structures, dwellings, and businesses.
- B. Publicly financed or subsidized shoreline erosion control measures shall not restrict appropriate public access to the shoreline except where such access is determined to be infeasible because of incompatible uses, safety, security, or harm to ecological functions. See public access provisions; WAC 173-26-221(4). Ecological restoration and public access improvements shall be incorporated into the project where feasible.
- C. Mitigate new erosion control measures, including replacement structures, on feeder bluffs or other actions that affect beach sediment-producing areas to avoid and, if that is not possible, to minimize adverse impacts to sediment conveyance functions. Where sediment conveyance systems cross jurisdictional boundaries, local governments shall coordinate shoreline management efforts. If beach erosion is threatening existing development, the City may adopt master program provisions for a beach management district or other institutional mechanism to provide comprehensive mitigation for the adverse impacts of erosion control measures.

**6. Other Modifications: See also policies and standards for the individual type of modification proposed as listed in 17.45.000.**

## **17.46.000 Access (Public) – Goals and Policies**

### **17.46 Public Access**

- 1. Goal: Provide a full range of shoreline access and use for the Lacey community.**
- 2. Goal: Provide public access to and along the shorelines pursuant to the requirements of state law, guidance provided in the City Public Access Plan (see Appendix 1) and the goals and policies of this SMP.**
- 3. Goal: Increase the ability of the general public to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and/or to view the water and the shoreline from adjacent locations, provided that private rights, the public safety, and shoreline ecological functions and processes are protected consistent with the U.S. and state constitutions, and state statutes.**
  - A. Policy:** Consider the type of public shoreline access that is needed for the Lacey community; passive, active, view points, beach recreation etc. Determine what access opportunities exist and what additional opportunities should be pursued based upon value to the public.
  - B. Policy:** Develop an inventory of existing public access to shorelines and potential opportunities for public access that Lacey could pursue in achieving its public access goals.
  - C. Policy:** To support implementing efforts, particularly regulatory actions of conditioning permits, include a discussion of SMP-identified public access needs and opportunities in planning documents (The Comprehensive Land Use Plan, The Comprehensive Plan for Outdoor Recreation, and The Capital Facilities Element) with justification and expectations for acquisition and development.
  - D. Policy:** Actively pursue public access opportunities with a variety of special programs;
  - E. Policy:** Where appropriate, acquire access to publicly-owned tidelands and shorelands. Encourage cooperation among the City and Thurston County, adjacent cities, landowners, developers, other agencies and organizations to enhance and increase public access to shorelines as specific opportunities arise.
  - F. Policy:** Provide and protect visual access to shorelines and tidelands.
  - G. Policy:** Shoreline development by public entities such as local governments, state agencies, and public utility districts should provide public access measures as part of each development project unless such access is shown to be incompatible due to reasons of safety or impacts to the shoreline.
  - H. Policy:** Physical or visual access to shorelines should be incorporated in all new development when the development would either generate a demand for one or more forms of such access, and/or would impair existing legal access opportunities or rights. Public health and safety concerns should also be adequately addressed and maintenance of shoreline ecological functions and/or processes should be assured.
- 4. Goal: Develop innovative program(s) that achieve Lacey's public access goals through incentives attractive to the development community.**

**A. Policy:** Incentive programs to gain public access should provide development options that are superior in balancing environmental protection with public use/interest, should meet all requirements of the Shoreline Management Act and further its spirit and intent, and should be superior from a market and business standpoint and result in a developer's independent decision to pursue the program.

**B. Policy:** Development resulting from an incentive program should be compatible with and further the intent of GMA plans and the City's community vision, and result in development that is compatible with and complementary to the neighborhood in which it is located.

**5. Goal: Ensure public access is designed and constructed so that it preserves or enhances the characteristics and natural functions and values of the shoreline.**

**A. Policy:** Public access should be located, designed, managed and maintained in a manner that protects shoreline ecological processes and functions as well as the public health and safety.

**B. Policy:** Select public access sites appropriate to the shoreline designation, the requirements for its environmental protection, and the maintenance of its natural functions and values.

**C. Policy:** Evaluation of sites for public access should include an analysis of the site's potential to accommodate the improvements necessary for the proposed form and level of intensity of public access activities.

**D. Policy:** Public access facilities such as over water fishing piers should only be authorized if ecological impacts are mitigated, if is consistent with the intent of this SMP and if it demonstrates no net loss of ecological function and value.

**E. Policy:** Design and development of public access facilities should consider view corridors. Emphasis should be placed on consideration of neighboring views and existing views from surrounding properties.

**6. Goal: Implement a shoreline access strategy that meets City of Lacey shoreline access goals while being sensitive to needs of landowners, surrounding neighborhood residents, and the general public.**

**A. Policy:** Lacey will demonstrate need for an access to provide the applicant a reason, purpose, and justification for public access as discussed in Appendix 1.

**B. Policy:** Lacey will provide the applicant with the use and intended design of the public access and assure successful integration of the access with the applicant's goals and objectives.

**C. Policy:** Lacey will increase public access to publically owned shorelines.

**D. Policy:** Lacey will consider objectives of private projects and landowners as it develops plans for public access and as much as possible, without compromising Lacey's public access goals and goals of the state, will design the access and long term management in a way that accomplishes the objectives of both parties.

**E. Policy:** Public access developed as part of a shoreline permit requirement should be designed to enhance the proposed project by adding value to the property for current and future residents of the site/ownership/development. Ideally, the relationship should be considered a

partnership between the developer and the city, where the establishment of public access tied into other public amenities (regional trail, lake trail, parks etc.) will improve a project's marketability and attractiveness, adding value to the proposed development by establishing an amenity residents of the site/ownership/development will see as added value to their home.

**F. Policy:** Physical or visual access to shorelines should be required as a condition of approval for shoreline development activities commensurate with the anticipated needs of future residents or users of the development, impacts of such development, and the corresponding benefit to the public, and consistent with constitutional limitations. Use an incentive dedication agreement program, such as Section 17.46.025, to provide economic incentives for a developer to design projects that include dedication of shoreline areas and access to the public.

**G. Policy:** Public access area and/or facility requirements should be commensurate with the scale and character of the development and should be reasonable, effective and fair to all affected parties including but not limited to the land owner and the public.

**H. Policy:** Design review standards should be applied to all projects taking place within shoreline jurisdiction. All projects should meet community expectations detailed in the Comprehensive Land Use Plan for neighborhood form and functionality and be compatible with and complementary to existing and planned development.

**I. Policy:** Public access design should provide for public safety, minimize potential impacts to private property and individual privacy, and protect shoreline ecological functions and processes.

**J. Policy:** Public access should be designed for integration with the existing built environment. In the context of a shoreline environment, successful integration will necessitate context sensitive design and will provide value to shoreline land owners, surrounding residents and the general public.

**7. Goal: Provide public access opportunities that are sensitive to the needs of water dependant uses and reflect priorities of the state for use of shorelines.**

**A. Policy:** Public access should be designed and managed in a manner that ensures compatibility with water dependent uses.

**B. Policy:** Public access should be provided for water enjoyment, water related, and non-water dependent uses and subdivisions of more than 4 lots, and for all developments that increase public use of the shorelines and public aquatic lands or that would impair existing legal access opportunities, as provided in/supported by the City's Public Access Plan.

**C. Policy:** Uses and developments that provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state are a preferred use.

**8. Goal: Achieve Lacey's identified public access goals using strategies, methodology and targets established in the Lacey Public Access Plan; see Appendix 1.**

**9. Goal: Achieve safe and respectful use of lake resources by partnering with lake residents and Thurston County and monitoring public access sites and lake use.**

**A. Policy:** Consider opportunities for a program that enables local lake residents to establish a "Lake Watch Program" based upon the same principals as a Neighborhood Watch Program.

~~Provide support as necessary to empower lake residents to help maintain a safe lake and respectful use of these resources for the benefit of all Lacey citizens.~~

~~**B. Policy:** Coordinate responsibility with Thurston County for monitoring activity on lakes within Lacey's UGA. As much as possible, within existing resources, provide support for calls reporting dangerous or abusive behavior on lakes in Lacey and Lacey's growth area.~~

~~**C. Policy:** Coordinate with the Lacey Police Department in the planning and design of public access facilities to lakes and incorporate Crime Prevention through Environmental Design (CPTED) considerations.[AC87]~~

## 17.46.010 Public Access ~~(Public)~~ - Development Standards

1. Public access shall consist of a dedication of land, recorded easement or a physical improvement in the form of a walkway, trail, bikeway, corridor, viewpoint, park, deck, observation tower, pier, boat launching ramp, dock or pier area, or other facility serving as a means of view and/or physical approach to public waters. These facilities may include interpretive centers and displays.
2. Opportunities to provide public access shall be evaluated with all applications for shoreline permits. Public access will generally not be considered for the uses listed below, except as determined on a case-by-case basis where the public access plan ~~(Appendix 1)~~ supports it. The Incentive Dedication Agreement Program detailed in 17.46.025 may be utilized with any development, except when in conflict with the provisions in subsection 3 below.
  - A. Agriculture;
  - B. Dredging;
  - C. Ecological restoration or enhancement activities not associated with development, except when undertaken by a public entity or publicly financed/subsidized;
  - D. Instream structures, except when undertaken by a public entity or publicly financed/subsidized;
  - E. Landfill and excavation, so long as they meet the provisions of WAC 173-26-231(3)(c)(i). ;
  - F. Private docks serving four (4) or fewer dwelling units;
  - G. Shoreline stabilization, except when undertaken by a public entity or publicly financed/subsidized;
  - H. Single-family residential development of four (4) or fewer lots.
3. The Administrator may waive public access requirements for any water enjoyment, water related, non-water dependent use or subdivision of more than 4 lots when one or more of the following provisions apply:
  - A. Unavoidable health or safety hazards to the public exist that cannot be prevented by any practical means;

- B. The cost of providing the access, easement, alternative amenity, or mitigating the impacts of development of the public access is unreasonably disproportionate to the total long term cost of the proposed development;
  - C. Significant impacts to shoreline ecological functions will result from the public access that cannot be mitigated; or
  - D. Provision of public access would not be consistent with ~~Appendix 1,~~ the City Public Access Plan.
4. In waiving public access per Section 17.46.00~~20~~ #3 above, the Administrator must determine that all reasonable alternatives have been exhausted, including:
- A. Regulating access by such means as maintaining a gate and/or limiting hours of use;
  - B. Designing separation of uses and activities (e.g. fences, terracing, use of one-way glazing, hedges, landscaping, etc.);
  - C. Providing for access at a site geographically separated from the proposal such as a street end, vista, tideland or trail system.
5. Parcels developing within shoreline jurisdiction, which do not front onto a lake, marine, stream, or wetland shoreline may not be required to provide shoreline public access. They may be required to provide public access to other parcels along the shoreline (e.g. water's edge), where this is needed to support connections to shoreline public access on shoreline property. The nexus, proportionality, need and support for such a connection shall be based on goals, policies, objectives and provisions identified in ~~Appendix 1~~the Public Access Plan, the City's Comprehensive Land Use Plan, Transportation Plan, and/or Comprehensive Plan for Outdoor Recreation.
6. If physical public access on shoreline parcels is demonstrated to be infeasible or inappropriate due to significant interference to operations or hazards to life and property, alternative visual access opportunities may be provided at a location not directly adjacent to the water such as a viewpoint, observation tower, or other areas serving as a means to view public waters.
7. The City shall evaluate public access opportunities against needs on a case by case basis utilizing the criteria and methodology outlined in ~~Appendix 1~~the Public Access Plan.
8. Public access shall be provided in the following order of preference, where appropriate, and incorporate the following location and design criteria:
- A. A public pedestrian path or trail shall be provided along the shoreline in a manner that will not adversely impact shoreline ecological functions and/or processes. Such path or trail shall include the following features:
    - 1) The walkway shall be buffered from sensitive ecological features and provide limited and controlled access to sensitive features and the water's edge, where appropriate.
    - 2) Fencing may be provided to control damage to plants and other sensitive ecological features, where appropriate.



- 3) Trails shall be constructed of permeable materials unless shown to be infeasible, and limited in width to reduce impacts to ecologically sensitive resources, except for a shared use trail or public access which is part of a boardwalk.
- B. Other forms of physical public access shall be located adjacent to other public areas, accesses and connecting trails, and connected to the nearest public street. If such physical access is a shared use path as defined in this SMP, the design shall comply with the classification of the trail as stated in the Public Access Plan and shall include provisions for handicapped and physically impaired persons, where feasible.
- C. Where views of the water or shoreline are available and physical access to the water's edge is not feasible or appropriate, a public viewing area shall be provided.
- D. Design of public access facilities shall minimize intrusions on the privacy of adjacent landowners, utilizing techniques and approaches outlined in Lacey's Design Review Ordinance (LMC 14.23).
- E. Public access facilities shall be designed to provide for the safety of users and neighboring landowners, including discouraging offensive conduct through public visibility of the public access area, or through provisions for oversight. The Administrator may authorize a public access facility to be temporarily closed in order to develop a program to address offensive conduct. If offensive conduct cannot be reasonably controlled, alternative facilities may be approved through a permit revision.
- F. Public amenities appropriate to the use of the public access area such as benches, picnic tables, restrooms and sufficient public parking shall be provided to serve users in accordance with the standards in this SMP.
9. Unless in conflict with the Public Access Plan or the City Comprehensive Plan for Outdoor Recreation, the minimum width of public access easements or dedications shall be ten (10) feet in width, with twenty (20) feet being the preferred width where significant public use is expected. The Administrator may reduce the width of public access easements if undue hardship would result or increase the width if necessary to serve the intended function. However, the reduction or enlargement shall only be what is necessary to achieve the intended purpose.
10. Public access sites shall be fully developed and available for public use at the time of occupancy of the use or activity or in accordance with other provisions for guaranteeing installation through a monetary performance assurance.
11. Public access facilities shall be maintained over the life of the use or development. The party responsible for maintenance shall be identified in the authorization or permit decision documents. Future actions by successors in interest or other parties shall not diminish the usefulness or value of required public access areas and associated improvements.
12. Public access provisions shall run with the land and be recorded via a legal instrument such as an easement or dedication. Such legal instruments shall be recorded with the Thurston County Auditor's Office at the time the land division is recorded and/or prior to the time of shoreline permit approval or building occupancy whichever comes first.
13. Management of public access areas including protection and preservation of sensitive areas, provision of appropriate infrastructure and facilities, security, and long term maintenance shall normally be the responsibility of the City of Lacey. However, at its option, the Administrator may approve another public or non-profit agency to assume this responsibility if appropriate given the



use. This responsibility may also be required of the owner, future home owners association, or other entity approved by the Administrator. If the Administrator approves another entity to assume this responsibility, it shall be through a formal agreement recorded with the Thurston County Auditor's Office.

14. Public access facilities shall be available to the public twenty four (24) hours per day unless other hours apply according to standards of the Comprehensive Plan for Outdoor Recreation or Parks Department Administrative criteria. Hours of operation shall be specified in the shoreline permit.
15. Appropriate signage shall be posted to inform facility users of necessary information including rules and responsible use of the resource. The City's phone number and contact information shall be included. The City's approved access sign(s) shall be installed in conspicuous locations at public access sites by the owner/developer. Once the signing of the property has been accepted by the City, it shall be maintained by the City or entity approved by the City that has the long term responsibility for maintenance and management of the access.
16. Development of new uses and expansion of existing uses shall consider existing view corridors from both designated public access/view areas and existing private development. The ability to view the water is considered a form of access to shorelines. Impacts to existing views shall be minimized utilizing techniques in Lacey's Design Review Ordinance (LMC 14.23).
17. Over-water or in-water public access facilities shall follow the mitigation sequence. Recommendations for "Building Better Docks" in Green Shoreline Landscaping: Examples and Guidelines Appendix 2 shall be utilized unless the Administrator agrees that a different design will have less environmental impact given specific site conditions.

## 17.46.025 Public Access ~~(Public)~~- Incentive Dedication Agreement

Lacey has developed an incentive program for the development community and shoreline land owners to further objectives for public access and management of shoreline resources. The project utilizes a Shoreline Access Incentive Dedication Agreement, and is designed to achieve dedication of shoreline areas for public use and protection as provided in the City's Public Access Plan ~~(Appendix 4)~~. The basis of the concept is to incentivize dedication of shoreline areas to the public in exchange for density bonuses and transfers to upland areas under the same ownership or other areas throughout the city. In the context of this program, upland means on lands not within shoreline jurisdiction. Receiving areas for the density bonus or transfer would be designated based upon a determination such sites are able to support increased density in accordance with established City or Regional TDR policies. In addition, development planned for receiving areas needs to be consistent with the objectives of the Comprehensive Land Use Plan. Project planning and development under the shoreline access incentive dedication agreement program will be reviewed to ensure that the objectives of the dedication program are satisfied. Through this incentive program the Administrator may waive or modify zoning restrictions at the receiving site for such things as setbacks, lot size, height limits, and dimensional requirements provided all of the following provisions can be satisfied:

- A. The design of the development results in a concept of superior quality and functionality as discussed in the Comprehensive Land Use Plan;

- B. Development that occurs under the incentive program is designed in a way that results in a land use configuration that is superior to or compatible and complementary to adjacent surrounding land use and the overall character of the neighborhood in which it is located; and
- C. All standards of the master program and its intent are satisfied for any development taking place within shorelines jurisdiction.



## ~~17.47.000~~ **Discussion and General Policy for Aquaculture Use in Lacey**

**Review and Discussion:** Potential locations for aquaculture are relatively restricted due to specific requirements for water quality, temperature, flows, oxygen content, adjacent land uses, wind protection, commercial navigation, and, in marine waters, salinity.

The Woodland Creek riparian area has an existing upland trout fish hatchery. The Nisqually Trout Farms, Inc. has been a successful, family owned business since 1948. This area was previously out of shoreline jurisdiction. Due to adjustments in mapping it will be within shorelines jurisdiction under the new update. The carrying capacity for this type of use in Woodland Creek is limited based upon its size, sensitivity and the scope of the existing hatchery. This area has been designated as ~~natural~~ **Natural** and should not be expected to support new fish hatchery aquacultural activity. On Woodland Creek, aquaculture activity should be limited to the existing fish hatchery operation with opportunity for limited expansion if no net loss can be achieved with the expansion.

Lacey's lakes do not have salmon runs. The residential character of the lakes is not compatible with commercial aquacultural operations. On lake properties designated ~~shoreline residential~~ **Shoreline Residential**, aquaculture should be limited to activities that can meet standards in Section 17.47.010 and address compatibility issues with existing residential uses.

### ~~17.47.010~~ **Aquaculture – Goals and Policies**

~~1. Goal: Provide opportunities for aquaculture and harvest of natural resources in a way that is compatible with the natural shoreline resource, complements specific reach designations and associated functions and values and meets requirements of the SMA.~~

~~A. Policy: Allow aquaculture consistent with the shoreline environment designation and the SMA.~~

~~B. Policy: Design, locate and operate aquaculture activities in a manner that supports long term beneficial use of the shoreline and protects and maintains shoreline ecological functions and processes.~~

~~C. Policy: Prohibit aquaculture where it would result in a net loss of shoreline ecological functions, would have a significant adverse impact on natural dynamic shoreline processes, or interfere with other water dependent uses.~~

~~D. Policy: Accommodate the existing upland fish hatchery as a “pre-existing approved use” as long as it is operated in a manner that supports long term beneficial use of the shoreline and protects and maintains shoreline ecological functions and processes.~~

~~E. Policy: Allow operation of aquaculture enterprises in a manner that allows navigational access of shoreline owners and commercial traffic.~~

~~F. Policy: Aquaculture structures and activities that are not water dependent (e.g., warehouses for storage of products, parking lots) shall be located outside shoreline jurisdiction to minimize the detrimental impact to the shoreline and other shoreline uses.~~

**~~2. Goal: Ensure long term health and viability of the marine resource through wise management of the resource and sound aquaculture practices.~~**

**~~A. Policy:~~** Design, locate and operate aquaculture activities in a manner that supports long term use of the resource.

**~~B. Policy:~~** Give preference to an aquaculture use or activity that involves little or no substrate modification over those that involve substantial modification. The applicant should demonstrate that the degree of proposed substrate modification is the minimum necessary for feasible aquaculture operations at the site.

**~~3. Goal: Achieve compatible integration of aquaculture activities with other permitted uses in areas appropriate for this use.~~**

**~~A. Policy:~~** Minimize the detrimental impact aquaculture development might have on views from upland property.

**~~B. Policy:~~** Review proposed surface installations for conflicts with other uses in areas that are utilized for moorage, recreational boating, sport fishing, commercial fishing or commercial navigation. Incorporate features to reduce use conflicts. Unlimited recreational boating should not be construed as normal public use.

**~~C. Policy:~~** Aquaculture processing plants that are not water dependant should be located outside of shoreline areas in an appropriate light industrial zone designed for manufacturing and processing activities. [AC88]

## **17.47.010 Aquaculture Standards.**

1. Aquaculture shall not be permitted in areas where it would:
  - A. Result in net loss ecological functions, particularly areas that currently support native salmon runs;
  - B. Adversely impact eelgrass and macroalgae; and
  - C. Significantly conflict with navigation and other water-dependent uses.
2. Aquaculture facilities shall be designed and located according to the following:
  - A. To not spread disease to native aquatic life;
  - B. Establish new nonnative species which cause significant ecological impacts;
  - C. Significantly impact the aesthetic qualities of the shoreline; and
  - D. Impacts to ecological functions shall be mitigated according to the mitigation sequencing.
3. The existing fish hatchery on Woodland Creek shall be given a status of “pre-existing approved use” with opportunities for limited expansion if the following standards can be satisfied:
  - A. All standards of Section 17.47.010 can be satisfied; and
  - B. Expansion will be the least physical expansion that can accommodate the objective.

- C. Expansion shall be reviewed through a conditional use permit (CUP).
4. Commercial shellfish activity shall meet requirements of Section 17.35 and shall demonstrate no net loss of function and value with emphasis on impacts to the adjacent ~~natural~~Natural designation with other critical and sensitive habitat.

## ~~17.48.000 Bioengineering Goals~~

### 17.48 Bioengineering

~~See General Goals, and Policies and Standards under Modifications, Section 17.45.~~

### ~~17.48.010 Bioengineering Policies~~

- ~~1. **Policy:** Insure that permits for bioengineering projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.~~
- ~~2. **Policy:** Give preference in permitting to bioengineering projects which incorporate self-maintaining vegetation and materials over those which require routine maintenance.~~
- ~~3. **Policy:** Design and construct bioengineering projects to:~~
- ~~A. Ensure that water quality, fish and wildlife habitats and flood holding capacity are not degraded, and projects are timed so that the survival of new plantings is optimized;~~
  - ~~B. Maximize the use of native vegetation;~~
  - ~~C. Minimize the structural soil stabilization components, including riprap, to last only until vegetation is well established; and~~
  - ~~D. Include vegetation, fencing and/or other measures to avoid disturbance of the project site by livestock and vehicles.~~
- ~~4. **Policy:** Limit the waterward extent of bioengineering projects to that which is necessary to achieve the intended results.~~

[AC89]

## ~~17.48.01~~20 Bioengineering - Development Standards

1. Bioengineering shall be used to protect an existing single-family residence or to maintain access to an authorized shoreline use, as opposed to hard shoreline stabilization structures such as bulkheads, landfills, levees, dikes, groins, or jetties.
2. Bioengineering shall be used when a geotechnical analysis confirms a need to prevent potential damage to a primary structure, but the need is not as immediate as within three (3) years.
3. Bioengineering projects shall incorporate the following:
  - A. All bioengineering projects shall use a diverse variety of native plant materials, including trees, shrubs and grasses, unless demonstrated infeasible for the particular site.

- B. All cleared areas shall be replanted following construction and irrigated (if necessary) to ensure that all vegetation is fully re-established within three years. Areas that fail to adequately reestablish vegetation shall be replanted with approved plant materials until such time as the plantings are viable.
- C. Vegetation shall be incorporated into the vegetation management area to allow bank protection plantings to become established within three years. The vegetation management area shall exclude livestock, vehicles and activities that could further disturb the site.
- D. All bioengineering projects shall be monitored and maintained as necessary. Areas damaged by pests and/or the elements shall be promptly repaired.
- E. All construction and planting activities shall be scheduled to minimize impacts to water quality, fish and wildlife aquatic and upland habitat, and to optimize survival of new vegetation.

## **~~17.49.000 Boating Facilities — Goals & Policies~~**

~~Goal: Meet demonstrated public need and demand for boating facilities for shoreline areas consistent with the City Comprehensive Plan for Outdoor Recreation, City Public Access Plan, shoreline designations and the overall emphasis on protection of shoreline natural functions and values. For Boating Facilities Goals and Policies, see Section 17.70.~~

## **~~17.49.010 Marinas and Boat Launch Facilities — Discussion and Policies~~** [AC90]

~~Goal: Meet demonstrated public need and demand for boating facilities for shoreline areas consistent with the City Comprehensive Plan for Outdoor Recreation, City Public Access Plan, shoreline designations and the overall emphasis on protection of shoreline natural functions and values.~~

~~**Discussion:** An existing small private marina for Beachcrest exists just east of the Butterball Cove area along the shoreline of Dewolfe Bight. It is the only marina on shorelines under Lacey jurisdiction. It was developed as part of the Beachcrest development in the late 1940s. Approximately half of the marina is within the City of Lacey and the rest is within Lacey's UGA and unincorporated Thurston County.~~

~~The existing private Beachcrest marina is considered a viable use and is expected to continue over the long term. At the same time, environmental impacts of the Beachcrest marina on the shoreline environment should be acknowledged.~~

~~Looking at the need for public marinas, there is little justification for location of a public marina in the Lacey area. The marine shoreline of Lacey is extremely limited and its sensitivity and designation~~

as Natural does not lend it to establishment of another marina use. The lakes under Lacey's jurisdiction are too small to have a need for or to support a marina.

#### Policies for marinas:

1. — Policy: Expansion and maintenance or repair activities at the Beachcrest marina should follow the mitigation sequence.

2. — Policy: The Beachcrest Community Association is encouraged to look for environmental restoration opportunities when performing marina maintenance or repairs. Incentives should be provided to the Beachcrest Community Association for activities that meet restoration objectives. Priority should be for restoration of degraded areas on this reach, as discussed in Lacey's Restoration Plan (Appendix 3).

3. — Policy: Because the Beachcrest marina falls under the jurisdiction of both Thurston County and the City of Lacey, permitting activities may be complex for the Beachcrest HOA. To this end, the City of Lacey will support an interlocal agreement with Thurston County to have one jurisdiction be the lead local jurisdiction for permitting activities. The SMP of the lead jurisdiction per the interlocal agreement should be the SMP used to determine permitting process and requirements.

#### Policies for boat launch facilities:

1. — Policy: The City's Comprehensive Plan for Outdoor Recreation and Public Access Plan should be used as a guide to determine public need for new boat launch facilities. Evidence of substantial demand should be given before considering approval of new facilities.

2. — Policy: Locate boat launch ramps on stable shorelines where water depths are adequate to avoid the net loss of shoreline ecological functions or processes, and eliminate or minimize the need for offshore or foreshore channel construction dredging, maintenance dredging, spoil disposal, filling, beach enhancement and other river, lake, harbor and channel maintenance activities.

3. — Policy: Where provided, require fuel handling and storage procedures that minimize accidental spillage and provide satisfactory means for handling those spills that do occur.



4. ~~Policy: Locate launch ramps to minimize the adverse effects upon fish and shellfish and their habitat(s).~~

5. ~~Policy: Locate boat launching facilities in areas where parking and access to the facility can be accommodated without causing adverse impacts to adjacent properties.~~

6. ~~Policy: Minimize off-site light and glare by using fully shielded and appropriately aimed fixtures.~~

7. ~~Policy: Design boat launch facilities to provide for as many compatible water-oriented recreational uses as possible, according to the size and extent of the facilities.~~

8. ~~Policy: All facilities should provide adequate parking and landscaping.~~

9. ~~Policy: Boat launch facilities should be designed and conditioned to avoid and mitigate impacts to adjacent properties. This includes but is not limited to impacts such as wave action, erosion, and privacy issues.~~

#### ~~17.49.015 Covered Moorage Policies~~

~~Policy: Covered moorage in Lacey is considered unnecessary and would distract from the shoreline's aesthetic and functional values. This use should be prohibited. [AC91]~~

## **17.49.0120 Boating Facilities Development Standards**

### **Marinas:**

1. New marinas shall be prohibited until such time as there is a demonstrated need shown and the activity is planned for according to goals, policies and priorities in Lacey's Comprehensive Plan for Outdoor Recreation. The existing Beachcrest marina shall not be labeled nonconforming as a result of this provisional prohibition on new marinas.
2. If Lacey is the lead local jurisdiction for permitting under an interlocal agreement ~~as described above~~ [AC92], maintenance and repair activities at the Beachcrest marina shall comply with the

provisions of Section 17.30.047. However, to facilitate and encourage restoration objectives, repair and maintenance activities to modifications that exceed the 50% threshold for normal repair and maintenance and considered replacement modifications under Section 17.30.047 shall qualify for an exemption. To qualify for exemption, such activity must:

- ~~1.A.~~ Promote Lacey's restoration objectives as discussed in ~~Appendix 3~~the SMP Restoration Plan and other applicable portions of this SMP;
- ~~2.B.~~ Result in a net gain of ecological function in this reach, as determined by the Administrator in consultation with applicable state resource agencies; and
- ~~3.C.~~ Provide adequate documentation and analysis to make an informed decision on the environmental benefits of the proposed activity, as determined by the Administrator.

#### **Boat Launch Facilities:**

- ~~31.~~ Launch facilities shall be located in areas where there is adequate water mixing and flushing and shall be designed not to retard or negatively influence flushing characteristics.
- ~~42.~~ Launch facilities shall be located on stable shorelines where water depths are adequate to eliminate or minimize the need for offshore or foreshore channel construction dredging, maintenance dredging, spoil disposal, filling, beach feeding and other lake or channel maintenance activities.
- ~~53.~~ All boating facilities shall utilize effective, environmentally friendly measures to prevent the release of oil, chemicals, or other hazardous materials onto or into the water.
- ~~64.~~ Restroom facilities shall be provided at boat launching facilities if determined necessary by the Administrator and appropriate given site classification and conditions.
- ~~75.~~ Launch facilities shall meet parking and landscaping requirements of the Lacey zoning code and the parking section (Section 17.60) of this SMP.
- ~~86.~~ A sign(s) shall be posted at boating facilities advising users of responsible conduct and care of the lake and will include the specific rules adopted by the proper authority over the lake and will generally have language similar in intent to the following: This lake provides recreation opportunities for all persons. Please respect its use and character, be kind and respectful and observe the rules adopted for this public resource: 1. Speed limited to ...; 2. Please don't litter; 3. Limit excessive noise; 4. Boating during daylight hours only; for help and assistance please phone (insert current Lacey Police phone number).

#### **Covered Moorage:**

9. New covered moorage is not permitted. Existing covered moorage may be maintained and is considered grandfathered but may not be expanded.

## **~~17.50.000 Breakwaters, Jetties, Groins and Weirs~~** **~~Goals and Policies~~**

## **17.50 Breakwaters, Jetties, Groins and Weirs**

~~See General Goals, and Policies and Standards under Modifications, Section 17.45.~~

## 17.50.010 Breakwaters, Jetties, Groins and Weirs - Development Standards

There are no identified areas under Lacey's shoreline jurisdiction where these uses and structures would be needed or appropriate. Because of no demonstrated need they are listed as prohibited in all of Lacey's environmental designations.

### ~~17.51.000 Bulkheads Goals~~

## 17.51 Bulkheads

~~See General Goals, Policies and Standards under Modifications, Section 17.45.~~

### ~~17.51.010 Bulkheads Policies~~

- ~~1. **Policy:** Insure that permits for bulkhead projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.~~
- ~~2. **Policy:** Locate and design residential development along shorelines to make shoreline stabilization projects such as filling, bulkheading, or substantial grading of the site unnecessary.~~
- ~~3. **Policy:** Where new bulkheads are necessary, applications should be processed as a shoreline conditional use permit to consider natural shoreline functions, habitat, drainage treatment and water quality.~~
- ~~4. **Policy:** Where replacement of an existing bulkhead is necessary, emphasis should be placed on developing alternative naturalized concepts (soft stabilization). [AC93]~~

## 17.51.010 Bulkheads - Development Standards

1. Normal maintenance and repairs to an existing bulkhead that is designed and located for the protection of an existing single family home or accessory structure shall be exempt from permits if such repair and maintenance value is less than 50% of the replacement value of the bulkhead.
2. Where the value of repair of an existing bulkhead designed and located for the protection of an existing single family home or accessory structure is equal to or exceeds 50% of the value of the bulkhead it shall be considered a replacement and processed as a conditional use permit pursuant to requirements of Section 17.30.047.
3. Bulkheads shall be subject to mitigation sequencing outlined in Section 17.40.015 to assure no net loss of shoreline ecological functions.
4. A bulkhead may be allowed to protect an existing single-family residence or to maintain access to an authorized shoreline use after the Administrator has determined, based on a geotechnical analysis, that other techniques such as beach restoration and enhancement or bioengineering are not feasible (see also Section 17.45.015).

5. Bulkheads are prohibited on shores where valuable geohydraulic-hydraulic or biological processes are sensitive to interference and critical to shoreline conservation, such as feeder bluffs, marshes, accretion shoreforms such as spits, hooks, bars or barrier beaches, on estuarine shores, in wetlands, on point and channel bars, and in salmon and trout spawning areas, except for the purpose of fish or wildlife habitat enhancement or restoration.
6. A bulkhead shall not be located waterward of the ordinary high-water mark except for shoreline stabilization as provided in Section 17.45.015 #3B.
7. Installation of a bulkhead to protect a platted lot where no structure presently exists is prohibited.
8. The construction of a bulkhead for the primary purpose of retaining or creating dry land is prohibited, ~~except as allowed by the fill development standards in Section 17.54~~ [AC94].
9. Bulkheads are prohibited for any purpose if they will cause significant erosion or beach starvation.
10. The design of a bulkhead shall incorporate proper consideration of:
  - A. Data on local geophysical conditions;
  - B. Data on stream flow, velocity, and flood capacity; and
  - C. Effects on adjacent properties.
11. The design and construction of bulkheads shall conform to all other applicable state agency policies and regulations including the Washington Department of Fish & Wildlife criteria governing the design of bulkheads.
12. Stairs or other permitted structures may be built into a bulkhead, but shall not extend waterward of its face.

## ~~17.52.000 Buoy Goals~~

## 17.52 Buoys

~~See General Goals, Policies and Standards under Modifications, Section 17.45.~~

## 17.52.010 Buoy Policies

- ~~1. **Policy:** Insure that permits for buoy projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.~~
- ~~2. **Policy:** Give preference in permitting to moorage buoys over piers, docks, and float structures, especially in tidal waters.~~
- ~~3. **Policy:** Locate moorage buoys so as to:
  - A. Cause minimal interference with navigable waters and the public's use of the shoreline, and~~

~~B. Avoid locations where they will adversely impact shoreline ecological functions or processes, including currents and littoral drift, water circulation and quality, and fish and wildlife habitat.~~ [AC95]

## 17.52.0120 Buoy Development Standards

1. A private mooring buoy for an individual waterfront lot is allowed only if shared moorage was not developed as a part of that subdivision or development.
2. To prevent the proliferation of moorage facilities, only one mooring buoy or recreational float will be allowed per waterfront lot unless there is a demonstration of need. Such demonstration may include a community park or residential development where lot owners both on and away from the shoreline share a shoreline open space area. Such requests will be reviewed as a shoreline variance.
3. New mooring buoys shall not be located farther waterward than existing mooring buoys or established swimming areas on an adjacent lot, and shall not significantly interfere with use of waters for navigation.
4. Moorage buoys must be discernible under normal daylight conditions at a minimum of one hundred (100) yards and must have reflectors for nighttime visibility.
5. Moorage buoys shall comply with standards of the Washington Departments of Fish and Wildlife and the aquatic lease requirements of the Washington Department of Natural Resources.



## ~~17.53.000 Dredging Goals~~

### 17.53 Dredging

See General Goals, Policies and Standards under Modifications, Section 17.45.

### ~~17.53.010 Dredging Policies~~

- ~~1. **Policy:** Allow dredging only where it is necessary for assuring safe and efficient accommodation of existing navigational uses and when significant ecological impacts are minimized and mitigation is provided.~~
- ~~2. **Policy:** Limit maintenance dredging of established navigation channels and basins to maintaining previously dredged and/or existing authorized location, depth, and width.~~
- ~~3. **Policy:** Allow dredging in locations where a comprehensive management plan has been evaluated and authorized by local and state governmental entities.~~
- ~~4. **Policy:** Design and locate new development to avoid, or if that is not possible, to minimize the need for new and maintenance dredging.~~
- ~~5. **Policy:** Conduct dredging in such a manner as to minimize damage to natural systems in both the area to be dredged and the area for deposit of dredged materials.~~
- ~~6. **Policy:** Dispose of the dredged material at an approved disposal site when chemicals are present in concentrations high enough to cause significant harm to resident biota.~~
- ~~7. **Policy:** Plan and conduct dredging to minimize interference with navigation and adverse impacts to other shoreline uses, properties and values.~~
- ~~8. **Policy:** Allow dredging of less than five hundred (500) cubic yards as part of ecological restoration or enhancement, beach nourishment, public access or public recreation as an exemption; Provided such dredging is otherwise consistent with the policies and provisions of this master program.~~
- ~~9. **Policy:** Dredging should be limited to the following activities through a conditional use permit:
  - ~~A. In conjunction with a water dependent use of water bodies or adjacent shorelands.~~
  - ~~B. In conjunction with a bridge, navigational structure or wastewater treatment facility for which there is a documented public need and where other feasible sites or routes do not exist.~~
  - ~~C. Maintenance of irrigation reservoirs, drains, canals or ditches for agricultural and stormwater purposes.~~
  - ~~D. Maintenance dredging of established navigation channels and basins is restricted to maintaining previously dredged and/or existing authorized location, depth and width.~~
  - ~~E. Expanding, relocating or reconfiguring navigation channels where necessary to assure safe and efficient accommodation of existing navigational uses.~~
  - ~~F. Removal of gravel for flood management purposes consistent with an adopted flood hazard reduction plan and only after a biological and geomorphological study demonstrates that extraction has a long term benefit to flood hazard reduction, does not result in a net loss of shoreline ecological processes and functions and is part of a comprehensive flood management solution.~~
  - ~~G. Restoration or enhancement of shoreline ecological processes and functions benefiting water quality and/or fish and wildlife habitat.~~~~

- ~~H. Minor trenching to allow the installation of necessary underground pipes or cables if no alternative, including boring, is feasible, and:~~
- ~~1) Impacts to fish and wildlife habitat are avoided to the maximum extent possible.~~
  - ~~2) The utility installation does not increase or decrease the natural rate, extent or opportunity of channel migration.~~
  - ~~3) Appropriate best management practices are employed to prevent water quality impacts or other environmental degradation. [AC96]~~

## 17.53.0120 Dredging Development Standards

1. All applications for permits which include dredging shall include a dredging plan which includes the following information:
  - A. A description of the purpose of the proposed dredging and an analysis of compliance with the policies and regulations of this master program.
  - B. A detailed description of the existing physical character, shoreline geomorphology and biological resources (including migratory, seasonal and spawning use) provided by the area proposed to be dredged, including:
    - 1) A site plan map outlining the perimeter of the proposed dredge area. The map must also include the existing bathymetry depths based on Mean Lower Low Water (MLLW) and have data points at a minimum of 2-foot depth increments.
    - 2) A habitat survey must be conducted and WDFW must be contacted to ensure the survey is conducted according to the most recent WDFW eelgrass/macroalgae survey guidelines.
    - 3) Information on stability of bedlands adjacent to proposed dredging and spoils disposal areas.
  - C. A detailed description of the physical, chemical and biological characteristics of the dredge spoils to be removed.
    - 1) Physical analysis of material to be dredged: material composition and amount, grain size, organic materials present, source of material, etc.
    - 2) Chemical analysis of material to be dredged: volatile solids, chemical oxygen demand (COD), grease and oil content, mercury, lead and zinc content, etc.
    - 3) Biological analysis of material to be dredged.
  - D. A description of the method by which materials will be removed, including facilities to address settlement and movement.
    - 1) Dredging procedure: length of time it will take to complete dredging, method of dredging and amount of materials removed.
    - 2) Frequency and quantity of maintenance dredging.
  - E. Detailed plans for dredge spoil disposal, including specific land disposal sites and relevant information on the disposal site, including but not limited to:
    - 1) Spoils disposal area, including:
      - a) Physical characteristics including location, topography, existing drainage patterns, surface and ground water;
      - b) Size and capacity of disposal site;
      - c) Means of transportation to the disposal site;
      - d) Proposed dewatering and stabilization of spoils;
      - e) Methods of controlling erosion and sedimentation; and
      - f) Future use of the site and conformance with land use policies and regulations.
    - 2) Total initial spoils volume.
    - 3) Plan for disposal of maintenance spoils for at least a fifty (50) year period.
  - F. Hydraulic modeling studies sufficient to identify existing geo-hydraulic patterns and probable effects of dredging.



2. Toxic dredge spoil deposits shall not be placed on sites from which toxic leachates could reach shorelines and/or associated wetlands.
3. Dredging and dredge disposal shall be prohibited on or in archaeological sites that are listed on the Washington State Register of Historic Places until such time that they have been released by the State Archaeologist.
4. No permit shall be issued for dredging unless it has been shown that the material to be dredged will not exceed the Environmental Protection Agency and/or Department of Ecology criteria for toxic sediments.
5. Dredging for the sole purpose of obtaining landfill material is prohibited.
6. The disposal of dredged material at a Puget Sound Dredged Disposal Analysis (PSDDA) open-water disposal site may be allowed when it is found:
  - A. To comply with Department of Natural Resources leasing practices, Ecology Water Quality Certification process, and the U.S. Army Corp of Engineers permit requirements;
  - B. To have been reviewed based upon the criteria and guidelines established in the Puget Sound Dredged Disposal Analysis (PSDDA) report;
  - C. That the disposal within the nearshore environment for the restoration or enhancement of shoreline ecological functions and processes, such as beach nourishment, feeding or beach enhancement is not feasible; and
  - D. That it protects or mitigates shoreline ecological functions and processes, such as:
    - 1) Offshore habitat will be protected, restored or enhanced;
    - 2) Adverse effects on water quality or biologic resources from contaminated materials will be mitigated;
    - 3) Shifting and dispersal of spoil will be minimal; and
    - 4) Water quality will not be adversely affected.
7. Dredging to construct canals or small basins for water ski landings or swimming holes is prohibited.
8. In-water dredge spoil disposal sites shall be prohibited in critical salt water habitats or in locations where the disposal of dredge spoil materials is likely to result in the deposition of sediments on critical salt water habitats.
9. Dredging shall be limited to in support of water dependent uses, navigation, public access, and restoration. Dredging which will damage shallow water habitat used by salmon and steelhead for migration corridors, rearing, feeding and refuge shall be prohibited, unless the proponent demonstrates all of the following conditions are met:
  - A. An alternative alignment or location is not feasible.
  - B. The project is designed to minimize its impacts on the environment.
  - C. The facility is in the public interest.
  - D. If the project will create significant unavoidable adverse impacts, the impacts are mitigated by creating in-kind replacement habitat near the project. Where in-kind replacement mitigation is not feasible, rehabilitating degraded habitat may be required as a substitute.
  - E. Dredging for flood control is performed as a temporary action and needed in the course of implementing a long-term solution for a sediment transport problem identified in a comprehensive flood hazard management plan.

10. Proposals for dredging shall include all feasible mitigating measures to protect marine habitats and to minimize adverse impacts such as: turbidity, release of nutrients, heavy metals, sulfides, organic material or toxic substances, dissolved oxygen depletion, disruption of food chains, loss of benthic productivity and disturbance of fish runs and important localized biological communities.

## ~~17.54.000 Grading and Fill Goals~~

## 17.54 Grading and Fill

~~See General Goals, Policies and Standards under Modifications, Section 17.45.~~

## ~~17.54.010 Grading and Fill Policies~~

- ~~1. **Policy:** Design and locate shoreline developments to avoid or, if that is not possible, to minimize the need for fill.~~
- ~~2. **Policy:** Use mitigation sequencing to limit the size and location of fills. Limit the size of fills and, when allowed, minimize its potential adverse impacts.~~
- ~~3. **Policy:** Design and locate shoreline fills to avoid loss of ecological values or natural resources, and to avoid creating a risk of significant injury to life or adjacent property.~~
- ~~4. **Policy:** Design the perimeter of a fill to avoid or eliminate erosion and sedimentation impacts, both during initial landfill activities and over time. Natural appearing and self-sustaining control methods are preferred over structural methods.~~
- ~~5. **Policy:** Fills should be located, designed, and constructed to protect shoreline ecological functions and ecosystem wide processes, including channel migration.~~
- ~~6. **Policy:** Fills waterward of the ordinary high water mark should be allowed only when necessary to support:
  - ~~A. A water dependent use.~~
  - ~~B. A public access.~~
  - ~~C. Cleanup and disposal of contaminated sediments as part of an interagency environmental clean-up plan.~~
  - ~~D. Disposal of dredged material considered suitable under and conducted in accordance with the dredged material management program of the Department of Natural Resources.~~
  - ~~E. Expansion or alteration of transportation facilities of statewide significance currently located on the shoreline and then only upon a demonstration that alternatives to fill are not feasible.~~
  - ~~F. Mitigation action.~~~~

~~G. Environmental restoration.~~

~~H. Beach nourishment.~~

~~I. Enhancement project.~~

~~7. Policy: Prohibit the placement of fill in floodways or wetlands, unless part of an approved ecological restoration activity. [AC97]~~

## 17.54.0~~120~~ Grading and Fill - Development Standards

1. The use of solid wastes and organic debris in a fill, such as wood and other vegetative materials, is prohibited.

2. Fill must meet the provisions of WAC 173-26-231(3)(c)(i).

32. Fills shall consist of clean materials including such earth materials as clay, sand, and gravel, and also may include oyster or clam shells. In addition, concrete may be included in fill material if it is not liable to pollute ground water and is approved by the Administrator.

43. Fills, except for beach feeding, shall be designed, constructed, and maintained to prevent, minimize and control all material movement, erosion, and sedimentation from the affected area.

54. Fill areas shall be covered with sufficient earth material to support indigenous vegetative ground cover and replanted with vegetation to blend with the surrounding environment. To facilitate this purpose, fills shall comply with the requirements of LMC Chapter 17.41 regarding provisions for development and implementation of a Vegetation Management Plan.

65. Fills shall be allowed only when it can be demonstrated that the proposed action will not:  
A. Result in significant damage to water quality, fish, shellfish and/or wildlife habitat; and  
B. Adversely alter natural drainage and circulation patterns, currents, river and tidal flows or significantly reduce flood water capacities.

76. Artificial beach maintenance (beach feeding) shall be allowed as a type of shoreline stabilization.

87. Fill which will interfere with public rights of navigation and rights corollary thereto shall not be permitted unless there is an overriding public interest.

98. Fill for the purpose of providing land to ensure the required distance for a septic tank drainfield is prohibited.

109. —Fill for the sole purpose of creating new dry land is prohibited.

110. Fill within a floodway and the 100-year floodplain are prohibited.

124. Fill located waterward of the ordinary high water mark for the purpose of ecological restoration shall be allowed subject to a shoreline substantial development permit, rather than a shoreline conditional use permit.

132. Use of beach material for backfill with any shoreline stabilization project is prohibited. Fill is prohibited where structural shoreline stabilization is necessary to maintain the fill.

## ~~17.55.000 Floats (Recreational) – Goals~~

## 17.55 Floats (Recreational)

~~–See General Goals, Policies and Standards under Modifications, Section 17.45.~~

### ~~17.55.010 Floats (Recreational) – Policies~~

- ~~1. **Policy:** Insure that permits for recreational float projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.~~
- ~~2. **Policy:** Individual shoreline residents should consider joint use or community recreational floats.~~
- ~~3. **Policy:** Give preference in permitting to community recreational floats in new subdivisions or planned residential developments over those for individual properties.~~
- ~~4. **Policy:** Apply the pier and dock policies of Section 17.61 to recreational floats.~~~~[AC98]~~

## **17.55.0120 Floats (Recreational) - Development Standards**

1. To prevent the proliferation of moorage facilities, only one mooring buoy or recreational float will be allowed per waterfront lot unless there is a demonstration of need. Such demonstration may include a community park or residential development where lot owners both on and away from the shoreline share a shoreline open space area. ~~The request will be reviewed as a shoreline variance for individual residential lots, otherwise a shoreline conditional use permit for community or public recreational floats.~~~~[AC99]~~
2. A recreational float shall not be located farther waterward than existing floats or established swimming areas.
3. Single property owner recreational floats shall not exceed sixty-four (64) square feet. Multiple property owner recreational floats shall not exceed ninety-six (96) square feet.
4. The standards for recreational floats are as follows:
  - A. Recreational floats anchored offshore and used for residential recreational uses shall comply with the following standards:
    - 1) Applicants shall contact the Washington Department of Natural Resources to inquire on the need for a aquatic lease for locating recreational floats within state aquatic areas; and
    - 2) When feasible, floats shall be removed seasonally and placed in an appropriate un-vegetated upland location.
  - B. Recreational floats shall be located as close to shore as possible without interfering with natural beach processes or negatively affecting aquatic vegetation.

- C. Recreational floats shall not rest on the tidal substrate at any time. Floats shall be located (anchored) at sufficient depth to maintain a minimum of one (1) foot of draft between the float and the beach substrate at low tide.
- D. Recreational floats shall not exceed thirty (30) feet in length.
- E. Recreational floats shall comply with the following standards:
  - 1) Floats with a width of six (6) feet or less shall incorporate a minimum of thirty percent (30%) functional grating into float surface area.
  - 2) Floats with a width greater than six (6) feet that do not exceed eight (8) feet in width shall incorporate a minimum of fifty percent (50%) functional grating into the float surface area.
  - 3) Recreational floats shall be anchored utilizing either helical screw or “duckbill” anchor; anchor lines shall not rest on or disturb the substrate.
- 5. Recreation floats must be discernible under normal daylight conditions at a minimum of one hundred (100) yards and must have reflectors for nighttime visibility.

## **17.56 Forestry/Mining**

### **17.56.010 Forestry/Mining – Development Standards**

**Standard:** Forestry and mining uses and activities are prohibited in any shoreline environment designation.

## **17.57.000\_ Historical and Archeological**

**1. ——— Goal: Preserve cultural artifacts as they are discovered and identified during the development process.**

**A. ——— Policy:** Coordinate development review within the shoreline with the Washington Department of Archaeology and Historic Preservation, Certified Local Governments, and affected Indian tribes regarding historic or archaeological interest.

**B. ——— Policy:** Report the discovery of a historic or prehistoric site during excavation or development to the Washington Department of Archeology and Historic Preservation and to the affected Indian tribes.

**2. ——— Goal: Preserve examples of structures from Lacey's history for the education and enjoyment of future citizens.**

**A. ——— Policy:** Encourage the enrollment of historic structures or sites on the federal, state or local historic registers. [AC100]

### **17.57.0120 Historical and Archeological - Development Standards**

- 1. The protection, rehabilitation, restoration, and reconstruction of historic structures shall be governed by The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines for Applying the Standards (1992), as amended.

2. The discovery of a historic or pre-historic site during excavation or development shall be reported to the Administrator, the Washington State Department of Archaeology and Historic Preservation, and the affected Indian tribes.
  3. The construction of historical replica buildings may be allowed within the boundaries of a national historic district with a shoreline conditional use permit.
  4. The City shall consult with the Washington State Department of Archaeology and Historic Preservation and the affected Indian tribes when known sites are proposed for development. Their comments and recommendations shall be given substantial weight, which may result in denying a development permit where the historic or archaeological value of the site outweighs the development value.
  5. Where the protection of a historic or archaeological site is a concern to the administrator of the City's Certificate Local Government Program, a shoreline conditional use permit shall be required for any use or development.
  6. Developers and property owners shall immediately stop work and notify the local government, the Office of Archaeology and Historic Preservation and affected Indian tribes if archaeological resources are uncovered during excavation.
- ~~4.7.~~ Permits issued in areas documented to contain archaeological resources require a site inspection or evaluation by a professional archaeologist in coordination with affected Indian tribes. A site alteration/excavation permit shall be required, per RCW 27.44 and 27.53.

## ~~17.58.000 Instream Structures, Dikes and Levees~~ ~~Goals and Policies~~

### 17.58 Instream Structures, Dikes and Levees

~~1. Goal: See General Goals, Policies and Standards under Modifications, Section 17.45.~~

~~2. Goal: Protect and preserve natural systems and functional values while providing some limited flexibility to intervene with improvements to natural systems where necessary to protect the public's health and safety.~~

~~A. Policy: When dikes, levees and instream structures are allowed, compliance with the mitigation sequence should be required to assure there will be a loss of fish and wildlife resources, natural systems including wetlands, or other critical areas and ecological functions. If compensatory mitigation is necessary, dikes, levees and instream structures should be subject to the following:~~

- ~~1) The mitigation required should be commensurate to the value and type of resource or system lost. No net loss in ecological function, value or acreage shall occur from such development.~~
- ~~2) Where mitigation for loss of ecological functions is required, a mitigation plan should be prepared by the applicant/proponent that details the objectives of the mitigation activities.~~
- ~~3) Mitigation activities should be monitored to determine the effectiveness of the mitigation plan. Monitoring should be accomplished by a third party subject to the approval of the City/County and the Department of Ecology. Results of monitoring shall be publicly available.~~
- ~~4) If mitigation is found to be ineffective, corrective action that satisfies the mitigation objectives should be required of the proponent.~~
- ~~5) If the mitigation is found to be inadequate or if adequate mitigation is determined to be impossible, the application should be denied.~~

[AC101]

### **17.58.0120 Instream Structures, Dikes and Levees - Development Standards**

1. New dikes and levees may be constructed upon obtaining a conditional use permit as part of a shoreline environmental restoration project, a state-approved comprehensive flood control management plan, an approved watershed plan, or an approved stormwater drainage basin plan.
2. Dikes and levees shall not be constructed with material dredged from the adjacent wetland or stream area unless part of a comprehensive flood and habitat plan.
3. Dikes and levees shall not be placed in the floodway except for current deflectors necessary for protection of bridges and roads.
4. Dikes and levees shall be subject to following:

- A. Such works shall be located and designed to promote no net loss of shoreline ecological processes and functions.
  - B. Such works shall be limited in size to the minimum height required to protect adjacent lands from the protected flood stage.
  - C. Such works shall be set back to the greatest extent feasible landward of the floodway and ordinary high water mark.
  - D. Such works are to be located near the tangent to outside meander bends so that the stream can maintain normal meander progression and utilize most of its natural flood water storage capacity.
  - E. Such works shall not interfere with channel migration except to protect existing structures.
  - F. Such works shall be designed and constructed to meet Natural Resources Conservation Service technical manual standards.
  - G. Such works shall be constructed in coordination with the Washington Department of Fish and Wildlife.
5. Instream structures shall be permitted only when it is demonstrated by engineering and scientific evaluations that:
- A. They are necessary to protect health/safety and/or existing development.
  - B. Non-structural flood hazard reduction measures are infeasible.
  - C. Measures are consistent with an adopted comprehensive flood hazard management plan that evaluates cumulative impacts to the watershed system.
6. Instream structures shall preserve valuable recreation resources and aesthetic values such as point and channel bars, side channels, islands and braided channels.
7. Instream structures shall be designed to avoid modifying flows and water quality in ways that may adversely affect critical fish species.
8. Instream structures shall be constructed and maintained in a manner that does not degrade the quality of affected waters.





## ~~17.60.000~~ Parking Goals and Policies

### 17.60 Parking

~~1. Goal: Achieve a proper balance in providing parking for public shoreline access points while deemphasizing use of the automobile and reducing associated impacts on shoreline areas and adjacent residential neighborhoods.~~

~~A. Policy: Management of public access sites should have an emphasis on reduction of drive alone vehicles and associated impacts. Design should mitigate impacts from automobile use and infrastructure on sensitive areas and adjacent neighborhoods.~~

~~B. Policy: Emphasize reduction in automobile parking pursuant to Chapter 16.72, Table 16T-13, of the Lacey zoning code.~~

~~C. Policy: Parking should be the least amount necessary to serve the intended use.~~

~~D. Policy: Encourage availability of alternative forms of transportation for uses located within shoreline jurisdiction. Encourage design emphasis in walking and biking consistent with the Comprehensive Land Use Plan.~~

~~E. Policy: Where public access points have limited parking facilities, measures should be taken to discourage use of adjacent residential streets for parking.~~

~~F. Policy: Allow parking within the shoreline jurisdiction only for an authorized use.~~

~~G. Policy: Design and construct parking facilities to minimize off-site light and glare.~~

~~H. Policy: Locate parking facilities as far landward of the ordinary high-water mark as possible. Where possible, parking and road infrastructure should be located outside shoreline jurisdiction in an upland area and buffered from adjacent residential neighborhoods.~~

~~I. Policy: Link parking facilities with the shoreline uses they serve with walkways. [AC102]~~

### 17.60.01~~20~~ Parking Development Standards

1. Parking facilities within the shoreline jurisdiction shall only be allowed as necessary to support an authorized use. Any other type of parking is prohibited.
2. Parking facilities shall be located landward of the principal building or use and outside of the shoreline setback and vegetation management area, except when the parking facility is within or beneath a structure and adequately screened, or in cases when an alternate orientation would have less adverse impact on the shoreline, as determined by the Administrator.
3. Over water parking facilities are prohibited.
4. Parking facilities shall be designed and landscaped to minimize adverse impacts upon adjacent shorelines and abutting properties.

5. Parking facilities shall provide safe and convenient pedestrian circulation within the parking area and to the shoreline or use.
6. Refer to Section 17.~~6770.010~~ for water quality development standards which includes on-site stormwater control measures. Also refer to Sections 17.40 (Shoreline Ecological Function) and 17.41 (Vegetation Management).
7. Parking facilities shall be designed and constructed in accordance with Chapter 16.72 (zoning chapter) of the Lacey Municipal Code.
8. Parking facilities are subject to mitigation sequencing.

## ~~17.61.000 Piers and Docks Goals~~

See General Goals and Policies for Modifications

## ~~17.61.010 Piers and Docks Policies~~

- ~~1. **Policy:** Recognize that there will be few opportunities, if any, for marine piers/docks in Lacey, unless developed, owned and managed by the City of Lacey.~~
- ~~2. **Policy:** Ensure that permits for pier and dock projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.~~
- ~~3. **Policy:** Give preference in permitting to moorage buoys and to community piers, docks and floats in new subdivisions or planned residential developments over those for individual properties.~~
- ~~4. **Policy:** Require applications for piers and docks on individual properties to provide the following:
  - A. Document why a moorage buoy or recreational float would not provide suitable access to the water; and
  - B. Describe the mitigation to be provided so that the project will not cause a net loss in shoreline ecological functions.
  - C. Consideration of shared moorage.~~
- ~~5. **Policy:** Design and locate piers and docks to minimize obstructions to scenic views and conflicts with recreational boaters and fishermen.~~
- ~~6. **Policy:** Locate piers and docks so as to:
  - A. Cause minimum interference with navigable waters and the public's use of the shoreline; and
  - B. Avoid locations where they will adversely impact shoreline ecological functions or processes, including currents and littoral drift, water circulation and quality, and fish and wildlife habitat.~~
- ~~7. **Policy:** Construct piers and docks of materials that will not adversely affect water quality or aquatic plants and animals over the long term.~~

~~8. Policy: Minimize the length and size of any dock, pier or float.~~

~~9. Policy: Use materials that will allow light to pass through the deck for walkways or gangplanks in nearshore areas.~~

~~10. Policy: Encourage the development of public fishing piers, underwater fishing reefs, and access to public waters and tidelands as part of an overall recreation plan or development.~~

[AC103]

## ~~17.612.000~~ Recreation

~~1. Goal: Integrate planning for public recreation needs and access to shoreline areas with the City's Comprehensive Plan for Outdoor Recreation and Public Access Plan and the Comprehensive Land Use Plan.~~

~~A. Policy: Acknowledge a priority for recreational development along shorelines.~~

~~B. Policy: Link shoreline parks and public access points through open spaces, public land, designated sensitive and resource areas and other areas that are pedestrian and neighborhood focus points. Such linkage can include hiking paths, public parks, designated tree tracts, open space in plats, sensitive areas and buffers, bicycle paths, and scenic drives/walks located close to the water's edge.~~

~~C. Policy: Encourage the development of public fishing piers, underwater fishing reefs, and access to public waters and tidelands as part of a city recreation plan, or private development.~~

~~D. Policy: Acquisition priority should consider need and special opportunities as well as access by public and other modes of transit.~~

~~2. Goal: Provide public access and recreation opportunities within shoreline areas appropriate for the use as identified within the City Comprehensive Plan for Outdoor Recreation, Shorelines Public Access Plan, and Shoreline Environment Designation.~~

- ~~A. Policy: Consider all recreational development projects on the basis of their compatibility with the environment.~~
- ~~B. Policy: Plan public access to recreational locations to prevent concentration of use pressures and avoid use conflicts.~~
- ~~C. Policy: Design recreational developments to preserve, enhance, or create scenic views and vistas. Ensure that the design of recreational projects complement their environment.~~
- ~~D. Policy: Locate parking areas for recreation upland, away from the immediate edge of the water and recreational beaches. Link the parking to the shoreline by walkways. See Section 17.60.020.~~
- ~~E. Policy: Allow facilities for intensive recreational activities only where sewage disposal and pest control can be accomplished to meet public health standards without having an adverse impact upon the environment.~~
- ~~F. Policy: Allow passive recreational uses in floodplains as long as ecological processes and functions are maintained and the use does not require structures or public infrastructure.~~
- ~~G. Policy: Assure that recreational development is given priority and is primarily related to access to, enjoyment of and use of the water and shorelines of the state.~~
- ~~H. Policy: Design of public access points should consider the context of the neighborhood in which it is located and the expected parking demand. Large public recreation sites for active use should have upland parking to accommodate the recreation use. However, smaller access or observation points associated with a walking trail may not require any parking.~~
- ~~I. Policy: Reduced or limited parking may be a strategy to limit automobile use and maintain existing neighborhood character. Such areas should be closely monitored to assess impact of user parking on adjacent residential streets.~~

[AC104]

## 17.612.0130 Recreation Development Standards

1. Public recreational development and public access associated with recreation facilities shall be located, designed and operated in a manner consistent with the purpose of the shoreline environment designation and that avoids then minimizes the impact on shoreline ecological functions.
2. Non-water oriented facilities or structures and non-water oriented recreation uses are to be setback one hundred (100) feet from the ordinary high water mark as described in Table 4.
3. Recreational events and temporary uses in the public interest may be approved by the Administrator when those uses will not damage the shoreline area.
4. Public or private recreation areas which cater to the use of all-terrain or off-road vehicles as the primary recreational activity are prohibited within shoreline jurisdiction.
5. Recreational developments shall be designed with consideration of public access and public view corridors.

6. Recreational developments shall provide facilities for nonmotorized access, such as pedestrian, bicycle and/or equestrian path links to the shoreline.
7. All shoreline public access associated with recreation or recreational facilities shall be marked with signs approved by the Administrator.
8. For pedestrian paths or trails to and along the water's edge, refer to Sections ~~17.46.000 and~~ 17.46.020 ~~and 17.67, Water Quality~~ AC105.
9. Refer to Section 17.~~6770~~.010 for the water quality development standards which includes on-site stormwater control measures. Also refer to Sections 17.40 (Shoreline Ecological Function) and 17.41 (Vegetation Management).

## **17.63.000 Residential Development Goals and Policies**

**1. Goal:** Achieve development of residential areas in a way that does not interfere with natural shoreline processes. Ensure new residential development, infill and redevelopment within shoreline jurisdiction is sensitive to and complements shoreline ecological functions

**A. Policy:** Residential development should be planned, designed and constructed to avoid then minimize adverse environmental and visual impacts, to be complementary to the shoreline environment and its natural processes and to promote a no net loss of ecological functions.

**B. Policy:** Residential development should be located so that future shoreline stabilization or armoring is not necessary to protect it.

**C. Policy:** Residential development should be designed to minimize impacts to views from surrounding homes and viewpoints.

**D. Policy:** The removal of non-invasive riparian vegetation for residential development should be discouraged and should follow the mitigation sequence.

**E. Policy:** Open space required through the subdivision code in new residential subdivisions should also promote shoreline goals for resource protection if the subdivision is within shoreline jurisdiction.

**F. Policy:** Shoreline access segments on residential lots should be designed and located in accordance with the mitigation sequence to avoid and minimize impacts to native vegetation and shoreline ecological functions.

**G. Policy:** Where non-native or invasive species are present along residential waterfront property, restoration of degraded areas is encouraged.

**H. Policy:** If alternatives to native species are used in accordance with Section 17.41, the alternative landscaping should provide the same functions as native vegetation.

**I. Policy:** Lacey should provide information to citizens about the need for and benefits of shoreline protection and restoration and the role of vegetation management in water quality and a healthy shoreline.

**2. Goal:** Provide the opportunity for residential development in appropriate shoreline areas and in a variety of forms that are best suited to accomplish objectives of this SMP. Land use form should promote no net loss of function or value with design complementary to and integrated with the natural processes and functions of the shoreline.

**A. Policy:** Form, density, design, layout and functionality of residential development should be compatible and sensitive to the shoreline designation, natural processes and to environmental limitations.

**B. Policy:** Clustering of residential development should be encouraged to minimize the potential for adverse impacts to shoreline ecological functions and to encourage larger, consolidated blocks of open spaces.

**C. Policy:** Clustering should be used with incentive programs that involve the transfer of density to an upland portion of the site outside of shoreline jurisdiction.

**D. Policy:** Utilize provisions in the City's subdivision code to prevent the segmentation of critical in new subdivisions, by placing critical areas in separate tracts that are deeded to the City.

**E. Policy:** New over water residential development should not be authorized.

**3. Goal:** Integrate residential development in shoreline jurisdiction with growth management planning, and provide opportunities that promote GMA strategies, quality residential neighborhoods, shoreline protection and restoration of shoreline resources.

**A. Policy:** Residential development should only be allowed when there are adequate provisions for utilities, circulation and access as provided for in the Comprehensive Land Use Plan.

**B. Policy:** The findings of the shoreline inventory and characterization should be integrated into GMA planning and buildable lands work to ensure protection of shoreline resources is given higher priority than expectations for infill when contemplating development.

**4. Goal:** Provide for Lacey's shoreline access needs through thoughtful planning, design, layout and location of new residential development and residential land divisions.



**A. Policy:** Residential development should provide for the access needs of residents of the development as well as opportunities for public access identified in Lacey's Public Access Plan. Access opportunities should depend on the nexus identified for each project.

**B. Policy:** Open space in residential subdivisions should be designed to accommodate the intended use(s) and intended uses should be appropriate to the capacity of the shoreline resource to support it. Where appropriate, reserve shoreline open space tracts in a relatively undeveloped state, balancing competing interests for open space consistent with Lacey's Urban Forest Management Plan, Public Access Plan, land division open space policies and the goals of this Shoreline Master Program.

**C. Policy:** Provide public access as a part of a residential development in locations where there has been significant historic usage by the public. Historic use is regular use by the public over a period of years rather than incidental or occasional use by one or only few members of the public. This policy is not intended to apply to construction of an individual dwelling on a single lot. [AC106]

## ~~17.63.025 Residential Development Standards~~

~~**1. Permitted Uses and Activities:** Residential uses/activities and development shall be permitted according to environment designations as outlined in Section 17.24.010, Table 3. Residential activity, use, or development shall not result in a net loss of shoreline ecological functions and values and shall follow the mitigation sequence.~~

~~**2.1. Prohibited Uses:** Prohibited residential uses are identified in Table 3. New over water residences are prohibited.~~

~~**3.1. Density:** Residential densities on authorized on lands within shoreline jurisdiction are identified in Section 17.24.015, Table 4.~~

~~**4.1. Housing Form:** Residential housing forms permitted within each shoreline environment designation are outlined in Table 3. A range of housing form options are provided to encourage projects that are compatible with shoreline resources, meet GMA goals for density and provide a quality residential environment.~~

~~**5.1. Clustering:** Compact housing forms that consolidate large areas of open space by reducing individual lot size and clustering units and/or lots shall be encouraged. This provides the opportunity for a design that can achieve a higher level of compatibility with the shoreline environment. This may include condominium, townhome, courtyard cottage or other design forms that accomplish the same objectives.~~

~~**1.6. Design:** Design of residential structures shall incorporate and follow to the extent possible existing, natural topographic contours. Residential development shall be sufficiently setback~~

~~from the OHWM or otherwise located so that future shoreline stabilization or armoring is not necessary to protect it.~~

~~**7. Bulk and Dimensional Standards:** All development within shoreline jurisdiction shall meet setback and vegetation management area requirements as outlined in Section 17.24.015, Table 4, Section 17.41, and all other applicable sections of this SMP. Any modifications to the dimension, content or vegetation within such areas shall also comply with all policies and standards in this SMP.~~

~~**8. Setbacks for Porches/Decks/Steps:** Uncovered porches, decks or steps attached to principle residential structures may project into the required setback from the OHWM provided all of the following requirements are met:~~

~~A. Uncovered porches and decks are limited to an 8 foot deep encroachment and the structure may be no higher than thirty (30) inches above average grade;~~

~~B. Material used for porches shall be pervious and approved as a low impact development material by the City;~~

~~C. Uncovered porches and decks that encroach on the OHWM setback shall follow the mitigation sequence, and provide compensatory mitigation for any unavoidable impacts to the vegetation management area by providing vegetation proportionate to the surface area covered by the encroachment elsewhere in the vegetation management area; and~~

~~D. The structure does not compromise other goals, policies or standards of this Shoreline Master Program.~~

~~**9. Front Yard and Side Yard Setback:** The following is the requirement for front and side yard setbacks:~~

~~Front yard setback: 20 feet from the fronting right of way, provided this may be reduced to 10 feet if the garage is recessed behind the front façade of the house. This applies to all urban housing forms.~~

~~Side yard setback: For detached housing forms, 5 feet or a minimum 10 foot separation. Attached or “zero lot line” developments shall observe side yard setbacks in accordance with the applicable design or development chapter of the Lacey Municipal Code.~~

~~To accommodate better preservation or protection of shoreline ecological function, an applicant may request a modified front or side yard setback. The unique setback shall be based on a particular development concept and design that is justified for the targeted urban form and shall demonstrate an ability to protect resources and fulfill other purposes of setbacks and structure separation equivalent to standard setbacks. The burden of demonstration will be on the applicant. Approval of any modification is at the discretion of the City.~~

~~**10. Size and Shape of Single Family Detached Lots:**~~

~~• A. Minimum lot area, seven thousand five hundred (7,500) square feet or as permitted under another development concept such as clustering, as provided in this section of the SMP or in LMC Section 14.23.072, particularly LMC Section 14.23.072 (L).~~

~~• A. Minimum lot width, fifty (50) feet.~~

~~**11. Size and Shape of Lots Intended for Attached Single Family Development:** Lots intended for attached single family residences shall be reviewed and approved through a subdivision, townhouse, or PRD process where the concept is identified and the project is reviewed and approved subject to design requirements of LMC Section 14.23.080.~~

~~**12. Maximum Building Area Coverage:** Fifty (50) percent.~~

~~**13. Maximum Development Coverage:** Residential lot development coverage standards for lots within shoreline jurisdiction are identified in Section 17.24.015, Table 4.~~

~~**14. Maximum Height:** For principle structures, as described in Table 4. The maximum height for a residential accessory building is sixteen (16) feet. An additional two (2) feet in height shall be permitted for any residential structure with a green roof occupying at least fifty percent of the area of the roof, as long as such additional height does not block the view of a substantial number of existing residences.~~

~~**15. Accessory buildings:** All accessory buildings shall comply with the setback, critical area buffer and vegetation management area provisions of this SMP; however, if an accessory building is less than two hundred square feet in total size, the following side and front yard setbacks are permitted provided the OHWM setback shall not be reduced:~~

~~A. Front yard, fifteen (15) feet.~~

~~B. Side yard, five (5) feet.~~

~~Accessory buildings shall be constructed in such a manner as to be complementary to the basic architectural character of the main building on the lot, or appropriate to the accessory use. Such uses shall generally meet the same design requirements of the primary structures and shall result in no net loss of shoreline ecological functions.~~

~~**1.16. Design Review:**~~

~~A. Unique Shoreline Qualities:~~

~~In shoreline areas, emphasis will be placed upon protection and long term management of shoreline resources and public use based on unique opportunities specific sites may provide.~~

~~B. Emphasis for Shoreline Areas:~~

~~1.1) Specific shoreline emphasis will be for integration of the development with a site's specific unique shoreline features and preservation and respect for the site's natural processes and functions.~~

~~2.1) Emphasis will include design for a sustainable development that will have minimal impact upon the environment and provide an opportunity for residents to enjoy the shoreline resources.~~

~~C. Residential Development within shoreline jurisdiction shall comply with all applicable standards of LMC 14.23, Design Review.~~

~~**17. Views:**~~

~~A. Development in shorelines jurisdiction shall allow views for new residents while maintaining views enjoyed by surrounding residents and the traveling public.~~

~~B. To the extent reasonable objectives of the builder can be achieved, residential development shall be arranged and designed to:~~

- ~~1) Protect views, vistas and aesthetic values of the shoreline;~~
- ~~2) Minimize impacts to the character of the shoreline environment;~~
- ~~3) Minimize impacts to the views neighboring property owners enjoy.~~

~~18. Public Access: Public access shall be considered, evaluated, required, located, planned, designed, constructed and maintained in accordance with the provisions in Section 17.46 and Appendix 1 of this SMP.~~

## ~~17.63.034 Shoreline Access Incentive Dedication Agreement – Density Credit~~

### ~~A.1. Density Bonus:~~

~~A. With a Shoreline Access Incentive Dedication project implemented under the development agreement process of RCW 36.70B, and provisions of LMC 16.58 and Section 17.46 of this SMP, density credit available for transfer to receiving sites outside of shoreline jurisdiction shall be granted for up to 20 units per gross acre in the Shoreline Residential, Urban Conservancy and Natural designations.~~

~~B. To qualify for the density credit, the shoreline project shall include dedication of the 200 foot shoreline jurisdiction area to the public and transfer of the development and density credit to lands outside of the 200 foot shoreline designation and to a receiving area approved by the City. Receiving sites may include lands within the same ownership, a contiguous ownership, or any other site reviewed and approved by the Administrator.~~

### ~~B.1. Receiving Sites Location and Criteria for Development:~~

~~Receiving site(s) shall meet criteria established in LMC 16.58.~~

### ~~C.1. Wetlands Excluded from Calculations:~~

~~Wetlands and lands below the ordinary high water mark shall not be included in calculations of lot area or allowed densities.~~

## ~~17.63.038 Environmental Performance Standards~~

### ~~1)1. Nuisance Characteristics:~~

~~Authorized residential uses shall create no noise, emissions, odors or other nuisances which are demonstrably disruptive or disturbing to other uses in the area, or which are of a quality or quantity not normally associated with such a residential use.~~

### ~~2. Dedication of Critical Areas:~~

~~Design of land divisions and location of land uses shall protect streams, wetlands, wetland buffers, floodways, channel migration zones, and geologic hazards by locating these features within a separate tract or parcels when land division is proposed. Such areas shall be dedicated to the City of Lacey or held in common by the subdivision landowners as determined by the City pursuant to LMC 14.28.030.~~

## ~~17.63.039 Off-Street Parking~~

~~Off-street parking standards shall be provided in accordance Chapter 16.72 of the Lacey Municipal Code.~~

## ~~17.63.040 Landscaping~~

### ~~Landscaping Required Generally:~~

~~Preservation, maintenance and revegetation or landscaping of residential lots or subdivisions shall be required in accordance with all applicable standards of Section 17.41 of this SMP and LMC 14.32, LMC 16.12, and LMC 16.80.~~

## ~~17.63.045 Stormwater Runoff~~

### ~~1. General Requirement:~~

~~All requirements of the Lacey Drainage Manual shall be satisfied.~~

### ~~2. Special Drainage Considerations in a Shoreline Designation:~~

~~A. An emphasis shall be placed on low impact development techniques.~~

~~B. Infrastructure associated with community stormwater systems shall not be located within shoreline jurisdiction, where feasible. In no case shall community drainage improvements, other than natural landscaping, be placed within a designated setback area and its associated vegetation management area. This does not apply to rain gardens for a single family residence on an individual lot.~~

~~C. All applicable requirements of Section 17.70 of this SMP shall be satisfied.~~

## ~~17.635.000~~ ~~Revetments and Gabions~~ ~~Goals~~

## **17.62 Revetments and Gabions**

See General Goals, Policies and Standards under Modifications, Section 17.45.

## ~~17.65.010~~ ~~Revetments and Gabions~~ ~~Policies~~

- ~~1. **Policy:** Insure that permits for revetment and gabion projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.~~
- ~~2. **Policy:** Apply the bulkhead policies listed in Section 17.51 to revetments and gabions.~~

## **17.625.0120 Revetments and Gabions - Development Standards**

Revetments or gabions shall meet all development standards applied to bulkheads; see Section 17.51.020.

## ~~17.646.000 Scientific or Education Goals, Policies and Standards~~

### 17.63 Scientific or Education

~~1. Goal: Provide opportunities for the scientific community to study shoreline processes and functions without long term impact to these resources.~~

~~A. Policy: Conduct scientific studies and educational uses of the shoreline in a way to minimize impacts in accordance with the applicable environmental designations.~~

~~B. Policy: Require a shoreline permit for scientific and educational activities which may significantly affect water quality or natural systems.~~

~~C. Policy: Scientific or educational uses and activities are limited to those which will not:~~

- ~~1) Jeopardize existing wildlife populations or organisms;~~
- ~~2) Permanently alter the character of biological habitats; and~~
- ~~3) Degrade the character of the shoreline environment in which they are located.~~

~~D. Policy: Temporary disruptions of biological systems may be permitted when a scientific activity will result in their restoration or improvement and sustain requirements for no net loss of ecological function.~~

~~E. Policy: Permits encompassing a variety of scientific or educational activities over an extended period of time may be granted provided that limits on the duration of approval are established.~~

**BAF. PolicyStandard:** Temporary facilities necessary for the conduct of a scientific project shall be removed at the conclusion of the prescribed research activity period.[AC107]

**CBG. Standard:** Proposals for shoreline development or use in or on known sites of scientific value that would adversely affect, damage, or diminish such resources shall be

prohibited unless all identified impacts can be mitigated. Such proposals shall be reviewed through a conditional use permit.





## 17.6~~45.000~~ ~~Signage~~ ~~Goals and Policies~~

~~Goal: Provide aesthetically attractive shorelines free from clutter of signage.~~

[AC108]

~~A. Policy: Prohibit billboards within all shoreline environment designations.~~

~~B. Policy: Only authorize signs consistent with the residential and public use of shorelines. Signs will generally be limited to municipal traffic, municipal pedestrian circulation, and small private signage providing circulation, location and use information to the public necessary for the use and enjoyment of shoreline facilities/area.~~

~~C. Policy: Design and locate signs to insure compatibility with the shoreline environment designation, and adjacent land and water uses.~~

[AC109]

## 17.6~~47.0120~~ Signage - Development Standards

1. Off-premise signs are prohibited within any shoreline environment designation. Traffic and “wayfinding” signs are not to be considered off-premise signs.
2. All public access shall be marked with signs approved by the Administrator.
- ~~1. 3.~~ Signs for a public or community marina or launch ramp facility shall be limited to one sign oriented to the water, not exceeding fifteen (15) feet in total height from average grade.
- ~~2. Prohibit all commercial signing within the shoreline jurisdiction, with the exception of home occupation identification signs as provided in LMC Section 16.75.090.~~[AC110]
- ~~54.~~ Additional sign regulations can be found in LMC Chapter 16.75.



## ~~17.668.000~~ Transportation – Goals and Policies

### 17.65 Transportation

~~1. Goal: Integrate the Lacey Transportation Plan into transportation planning for lands under shoreline jurisdiction.~~

~~A. Policy: Rely upon the transportation map within the Transportation Element of the City of Lacey Comprehensive Land Use Plan to identify new transportation crossings or corridors within shoreline areas.~~

~~2. Goal: Protect shoreline resources by keeping road infrastructure out of shoreline areas whenever possible.~~

~~A. Policy: Locate arterials, freeways, and railways outside of shoreline jurisdiction unless there are no feasible alternatives.~~

~~B. Policy: If necessary to locate in shoreline jurisdiction, roads, shared use paths, and railroads should be located as far landward as possible.~~

~~3. Goal: Ensure impacts are mitigated when there is no feasible alternative to locating needed transportation infrastructure in shoreline jurisdiction.~~

~~A. Policy: Use mitigation sequencing per Section 17.40.015 to locate new transportation corridors and facilities within shoreline jurisdiction.~~

~~B. Policy: Roads, shared use paths, and railroads should be designed, constructed and maintained to minimize erosion and to permit natural movement of ground water and flood waters.~~

~~C. Policy: Piers and bridges are preferred to the placement of fill within the shoreline jurisdiction for roads, shared use paths, and railroad crossings.~~

~~D. Policy: Construction debris, overburden, and other waste materials should be disposed of in such a way as to prevent their entry into any surface water body by erosion from runoff, high water, or other means. [AC111]~~

### ~~17.658.0220~~ Transportation - Development Standards

1. Roads, shared use paths, and railroads shall be designed to cross shoreline jurisdiction areas by the shortest, most direct route feasible.
2. Future transportation facilities and corridors within shoreline jurisdiction shall be prohibited unless shown/included on the City's Transportation Plan Maps/Figures.

3. Bridges for roads, shared use paths, and railroads may be located within salmon and steelhead habitat provided that the following conditions are met:
  - A. The ~~mitigation~~mitigation sequence is followed, and
  - B. Open-piling and piers required to construct the bridge may only be placed waterward of the ordinary high water mark if no alternative method is feasible.
4. The placement of fill for roads, shared use paths, and railroads may be allowed waterward of the OHWM if:
  - A. All structural and upland alternatives have been proven to be infeasible,
  - B. The transportation facilities are necessary to support uses consistent with this master program, and
  - C. The mitigation sequence is followed.
5. Appropriate design and erosion control techniques shall be used to construct or repair roads, shared use paths, and railroads to assure no net loss of shoreline ecological functions.
6. A shared use path may be allowed within the required setback from the ordinary high water mark without a variance when on an abandoned railroad corridor or waterward of the OHWM on a boardwalk without a variance if mitigation sequencing is followed.
7. Refer to Section 17.~~6870~~.020 for the water quality development standards which includes on-site stormwater control measures. Also refer to Sections 17.40 (Shoreline Ecological Function) and 17.41 (Vegetation Management).

## ~~17.679.000~~ Utilities – Goals and Policies

### 17.66 Utilities

~~1. Goal: Provide opportunity for utilities serving shoreline areas while respecting the special function of these resource areas and maintaining their natural beauty.~~

~~A. Policy: Locate utilities outside of shoreline jurisdiction unless there are no feasible alternatives. When necessary, locate them as far landward as possible and preserve the natural landscape, shoreline ecology, and minimize conflicts with present and planned land uses. Choose locations that do not obstruct or destroy scenic views whenever utilities must be placed in a shoreline area.~~

~~B. Policy: Place utilities underground and design them to do minimal damage to the aesthetic qualities of the shoreline area. Where compelling reasons exist to place utilities above ground based upon impacts to ecological functions or values, this may be permitted with full mitigation of aesthetic impacts.~~

~~2. Goal: Provide for the utility needs of authorized uses within shoreline jurisdiction while minimizing impacts to the environment and to the values and functions of the shoreline resource.~~

~~A. Policy: When utility placement occurs within shorelines, restore banks to their pre-project configuration, replant with native species, and maintain the site until the new vegetation is established.~~

~~B. Policy: Design and locate sewage treatment, water reclamation, desalinization and power plants and associated infrastructure so as to be compatible with and not to interfere with recreational, residential or other public uses of the water and shorelands.~~

~~C. Policy: Recycling or land disposal of sewage wastes is preferred to new sewage outfalls to shoreline waterbodies. Where no alternative to outfalls into water exist, the location is to be part of a management plan.~~

~~D. Policy: Use utility rights of way for public access to and along shoreline waterbodies where feasible.~~

~~E. Policy: Where utilities must cross a body of water, design and construct bridge-like structures for above water crossing of utilities or bore utilities rather than using trenching with fill.~~

~~F. Policy: Mitigation sequencing per Section 17.40.015 should apply when locating new utility corridors within shoreline areas. Co-locate new major transmission facilities along existing utility corridors where possible.~~

[AC112]

## ~~17.669.0120~~ Utilities - Development Standards

- Utility facilities and lines shall be designed and located to assure no net loss of shoreline ecological functions, preserve the natural landscape, and minimize conflicts with present and

planned land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth.

2. Utility facilities and lines shall be located outside of the shoreline area where feasible. When the utility needs to be located within shoreline jurisdiction, mitigation sequencing pursuant to Section 17.40.015 shall be used to justify the location. Existing rights of way and utility corridors shall be used, to the extent feasible.
3. In-water utility corridors may be located within salmon and steelhead habitat provided that the following conditions are met:
  - A. An alternative alignment is not feasible,
  - B. The project is located and designed to minimize its impacts on the environment,
  - C. Any adverse impacts are mitigated,
  - D. Any fill, other than required for refilling the trench where the utility is placed, is located landward of the ordinary high water mark, and
  - E. Open-piling and piers required to construct a bridge necessary for a utility crossing may be placed waterward of the ordinary high water mark if no alternative method is feasible.
4. Utility facilities and lines shall document how the size of the facility or line has been minimized within the shoreline area.
5. Utility facilities and lines shall identify methods of revegetation of the affected area to pre-development conditions where feasible, replant with native or pre-existing species, and make provisions for the maintenance and care for the newly planted vegetation.
6. Accessory utility services to primary authorized uses within shoreline jurisdiction shall not require a separate permit, but shall be regulated by the use regulations and permit requirements for the primary use or activity and the standards of this section.
7. Utilities located landward of the OHWM shall be placed underground unless shown to be infeasible or if such undergrounding would be significantly detrimental to the environment. Utilities located waterward of the OHWM shall be bridged or bored unless shown to be infeasible or if such approach would be significantly detrimental to the environment.
8. Utility facilities shall be designed for minimal environmental and aesthetic impact.
9. Underwater utilities shall be located at a depth sufficient to prevent interference between the utility and other shoreline use activities.
10. Utility facilities and lines shall identify safeguards to ensure that no long-term damage will be caused to the adjacent or downstream environment should an accident occur involving that facility or line.
11. Refer to Section 17.~~6870.010~~ for the water quality development standards which includes on-site stormwater control measures.

## ~~17.7068.000 Water Quality Goals and Policies~~

### 17.67 Water Quality

~~1. Goal: Protect water quality and aquatic habitat with all new shoreline development.~~

~~2. Goal: Achieve a high level of protection and wise management of surface and ground water resources with a variety of strategies that consider larger drainage basin issues as well as site specific techniques designed to treat runoff on site.~~

~~A. Policy: Utilize a drainage manual that meets all state requirements and provides a range of low impact development options and techniques that will help achieve water quality goals.~~

~~B. Policy: Locate, design, construct, and maintain shoreline uses and activities to avoid ecological impacts from altering water quality, quantity, or hydrology.~~

~~C. Policy: Utilize setbacks and vegetation management areas, and encourage low impact development techniques and materials where practical to lessen impacts from shoreline use and development on water quality.~~

~~D. Policy: Plan land use and put in place development standards that work with and respect natural drainage features and functions. Emphasize utilization of development techniques that do not alter natural drainage patterns or disrupt natural recharge processes. Where necessary ensure measures for controlling erosion, stream flow rates, or flood waters are located, designed, constructed and maintained to preserve and improve existing water quality.~~

~~E. Policy: The City will seek to improve water quality, quantity, and flow characteristics in order to protect and restore ecological functions and ecosystem wide processes of shorelines within Shoreline Management Act jurisdiction. This will be implemented through the regulation of development and activities, through the design of new public works, such as roads, drainage, and water treatment facilities, and through coordination with other local, state, and federal water quality regulations and programs.~~

~~F. Policy: Discourage uses and activities in shoreline or other sensitive areas that may pose a risk of contamination of ground or surface waters, such as:~~

- ~~1) Storage, disposal, or land application of waste (excluding secondary/tertiary treated effluent from municipal sewer systems), including solid waste landfills;~~
- ~~2) Operations for confinement feeding of animals;~~
- ~~3) Junk yards and auto wrecking yards;~~
- ~~4) Storage of hazardous or dangerous substances within a floodplain; and~~
- ~~5) Alterations to structures and uses served by septic systems that do not meet state septic requirements.~~

~~3. Goal: Establish lake management districts for our lakes to improve water quality and natural function and values of these resource areas.~~

~~A. Policy: Encourage and provide support to land owners surrounding our lakes to establish lake management districts.~~

~~B. Policy: Provide technical support to lake management districts to help in technical issues once lake management districts are formed [AC113].~~



## **17.~~6770.0110~~ Water Quality - Development Standards**

### **Related to sewage disposal:**

1. New development within shoreline jurisdiction shall not be allowed on septic systems. Property with an approved septic tank drainfield permit for a use otherwise authorized under the zoning designation and Master Program Designation, shall be allowed to develop such use subject to limitations and conditions as required under the approved septic tank drainfield permit; Provided, once the original approval expires it shall not be renewed.
2. When a permit or authorization under the Master Program is necessary for activities associated with existing development operating on septic systems, they shall be required to connect to municipal sewer. If municipal sewer is not available, use of the septic system may be allowed if the development installs stub-outs and any needed agreements are executed to ensure future connection to the sewer service as soon as it is available in the area.

### **Related to stormwater management and drainage:**

3. New development shall provide storm water management facilities designed, constructed, and maintained in accordance with the current storm water management standards of Lacey's Stormwater Drainage manual. Preference shall be given to low impact development concepts.
4. Best management practices (BMPs) for control of erosion and sedimentation shall be implemented for all development in shorelines through an approved temporary erosion and sediment control (TESC) plan, or through administrative conditions.

### **Related to potential contaminants:**

5. Wood treated with creosote, copper chromium arsenic or pentachlorophenol is prohibited in or above shoreline water bodies.
6. All materials that may come in contact with water, such as untreated wood, concrete, approved plastic composites or steel shall be constructed of materials that will not adversely affect water quality or aquatic plants or animals. Materials used for decking or other structural components shall be approved by applicable state agencies for contact with water to avoid discharge of pollutants from wave splash, rain, or runoff.

### **Related to vegetation management:**

7. Proper management of vegetation shall be required as a condition of all new development and permit approvals associated with existing development. At a minimum this shall include:
  - A. Shoreline use and development shall minimize, through effective education, site planning and maintenance, the need for chemical fertilizers, pesticides, herbicides or other similar chemical treatments that could contaminate surface or ground water or cause adverse effects on shoreline ecological functions and values;

- B. Compliance with the requirements of Section 17.41.020;
- C. In protective covenants and Home Owner Association documents new plats shall describe acceptable use of organic fertilizers and other green shoreline principals that will not add to the nutrient load in adjacent water bodies.

## **Article 6. Goals & Policies for Uses, and Activities and Modifications**

### **17.70.000 Organization of Goals & Policies – General****[AC114]**

This section includes SMP Goals and Policies arranged chronologically, following SMP document order from start to finish. Subheadings use following template format to reference the development regulations, where subsection 17.27.015 – Alterations and Expansions of Nonconforming or “Conforming, Expansion Limited” can be found under 17.70.250 within this section, for example.

### **17.70.250 Alterations and Expansions of Nonconforming or “Conforming, Expansion Limited” Residential Structures**

#### **1. General Policies:**

A. **Policy:** Expansion of all residential structures should meet requirements and standards of the environment designation in which they are located, including setbacks from the OHWM.

C. **Policy:** Proposals for expansion of a non-conforming structure, or a structure designated “conforming, expansion limited”, should include consideration of the potential for loss of ecological function.

D. **Policy:** Expansion of a nonconforming structure or “conforming, limited expansion” structure should meet the test of no increase in nonconformance. No increase in nonconformance means an action will not increase an aspect of the structure that resulted in it being designated nonconforming or “conforming, expansion limited” and that it does not materially interfere or jeopardize further the public interest.

### **17.70.260 Residential Development Goals and Policies**

1. **Goal:** Achieve development of residential areas in a way that does not interfere with natural shoreline processes. Ensure new residential development, infill and redevelopment within shoreline jurisdiction is sensitive to and complements shoreline ecological functions

- A. Policy:** Residential development should be planned, designed and constructed to avoid then minimize adverse environmental and visual impacts, to be complementary to the shoreline environment and its natural processes and to promote a no net loss of ecological functions.
  - B. Policy:** Residential development should be located so that future shoreline stabilization or armoring is not necessary to protect it.
  - C. Policy:** Residential development should be designed to minimize impacts to views from surrounding homes and viewpoints.
  - D. Policy:** The removal of non-invasive riparian vegetation for residential development should be discouraged and should follow the mitigation sequence.
  - E. Policy:** Open space required through the subdivision code in new residential subdivisions should also promote shoreline goals for resource protection if the subdivision is within shoreline jurisdiction.
  - F. Policy:** Shoreline access segments on residential lots should be designed and located in accordance with the mitigation sequence to avoid and minimize impacts to native vegetation and shoreline ecological functions.
  - G. Policy:** Where non-native or invasive species are present along residential waterfront property, restoration of degraded areas is encouraged.
  - H. Policy:** If alternatives to native species are used in accordance with Section 17.41, the alternative landscaping should provide the same functions as native vegetation.
  - I. Policy:** Lacey should provide information to citizens about the need for and benefits of shoreline protection and restoration and the role of vegetation management in water quality and a healthy shoreline.
- 2. Goal: Provide the opportunity for residential development in appropriate shoreline areas and in a variety of forms that are best suited to accomplish objectives of this SMP. Land use form should promote no net loss of function or value with design complementary to and integrated with the natural processes and functions of the shoreline.**
- A. Policy:** Form, density, design, layout and functionality of residential development should be compatible and sensitive to the shoreline designation, natural processes and to environmental limitations.
  - B. Policy:** Clustering of residential development should be encouraged to minimize the potential for adverse impacts to shoreline ecological functions and to encourage larger, consolidated blocks of open spaces.
  - C. Policy:** Clustering should be used with incentive programs that involve the transfer of density to an upland portion of the site outside of shoreline jurisdiction.
  - D. Policy:** Utilize provisions in the City's subdivision code to prevent the segmentation of critical in new subdivisions, by placing critical areas in separate tracts that are deeded to the City.
  - E. Policy:** New over water residential development should not be authorized.

**3. Goal: Integrate residential development in shoreline jurisdiction with growth management planning, and provide opportunities that promote GMA strategies, quality residential neighborhoods, shoreline protection and restoration of shoreline resources.**

**A. Policy:** Residential development should only be allowed when there are adequate provisions for utilities, circulation and access as provided for in the Comprehensive Land Use Plan.

**B. Policy:** The findings of the shoreline inventory and characterization should be integrated into GMA planning and buildable lands work to ensure protection of shoreline resources is given higher priority than expectations for infill when contemplating development.

**4. Goal: Provide for Lacey's shoreline access needs through thoughtful planning, design, layout and location of new residential development and residential land divisions.**

**A. Policy:** Residential development should provide for the access needs of residents of the development as well as opportunities for public access identified in Lacey's Public Access Plan. Access opportunities should depend on the nexus identified for each project.

**B. Policy:** Open space in residential subdivisions should be designed to accommodate the intended use(s) and intended uses should be appropriate to the capacity of the shoreline resource to support it. Where appropriate, reserve shoreline open space tracts in a relatively undeveloped state, balancing competing interests for open space consistent with Lacey's Urban Forest Management Plan, Public Access Plan, land division open space policies and the goals of this Shoreline Master Program.

**C. Policy:** Provide public access as a part of a residential development in locations where there has been significant historic usage by the public. Historic use is regular use by the public over a period of years rather than incidental or occasional use by one or only few members of the public. This policy is not intended to apply to construction of an individual dwelling on a single lot.

## **17.70.~~353~~ 350 Goals and Policies for Protection of Marine Riparian Habitat**

**1. Goal: Protect Lacey's marine riparian habitat areas and achieve no net loss of ecological functions or values in these areas.**

**A. Policy:** Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans, as provided for in LMC 14.33 and incorporated into this SMP, for activities in marine riparian habitat areas.

**B. Policy:** Utilize standards in Lacey's critical areas ordinances and tree and vegetation protection legislation, as appropriate, to protect marine riparian areas and achieve no net loss objectives of this SMP.

**C. Policy:** Utilize the recommendations and "general conclusions" of the white paper "Protection Of Marine Riparian Functions In Puget Sound, Washington" prepared by the State's Aquatic Habitat Guidelines (AHG) Program when considering the importance of marine riparian areas and reviewing proposed uses and activities in these areas, including:

- 1) “General conclusions” identified in Section VI of the report
- 2) “Overarching” recommendations identified in Section VI of the report
- 3) “Impact specific” recommendations identified in Section VI of the report.

**D. Policy:** Adopt the “general conclusions” in Section IV of the AHG white paper as findings in regard to the importance of marine riparian areas. These conclusions should be considered when designing projects and developing management strategies for activities proposed within marine riparian areas.

- 1) Riparian areas perform important hydrologic, geomorphic, and biological functions. These areas encompass complex above- and below-ground habitats created by the convergence of biophysical processes in the transition zone between aquatic and terrestrial ecosystems.
- 2) Riparian areas cannot be thought of in isolation from associated water bodies. The characteristic geomorphology, plant communities, and associated aquatic and wildlife species of riparian and marine systems are intrinsically linked.
- 3) Natural riparian systems have adapted to specific disturbance regimes. Managing riparian areas without regard to their dynamic patterns and influences of adjacent water bodies ignores a fundamental aspect of how these systems function.
- 4) Riparian areas, in proportion to their area within a watershed, perform more biologically productive functions than do uplands. Riparian areas provide a wide range of functions, such as microclimate modification and shade, bank stabilization and modification of sediment processes, contributions of organic matter and large wood to aquatic systems, nutrient retention and cycling, wildlife habitat, and general food web support for a wide range of aquatic and terrestrial organisms.
- 5) Riparian areas are effective in filtering and transforming materials (such as dissolved and particulate nonpoint source pollutants) from hill slope runoff.
- 6) Because riparian areas are located at the convergence of terrestrial and aquatic ecosystems, they are regional hot spots of biodiversity and often exhibit high rates of biological productivity in marked contrast to the larger landscape.
- 7) During the last decade, a patchwork of federal, state, and local laws and programs has come to acknowledge the importance of riparian areas and to require or encourage special management to restore or protect their essential functions, although the degree of protection, the focus, and the spatial coverage of these laws and programs are highly variable among federal, state, and local levels.

**E. Policy:** Adopt the “overarching recommendations” in Section IV of the AHG white paper as management strategies for marine riparian areas. These strategies should be considered in the design and management of all projects proposed within marine riparian areas.

- 1) Protect marine riparian soils and vegetation – prevent damage to native riparian soils and vegetation, including clearing and grading, compaction, covering (paving) and removal.
- 2) Restore damaged marine riparian habitat – restore vegetation, soil characteristics.
- 3) Account for scale issues (temporal and spatial) when evaluating riparian conditions, current functions and potential for future functions, and cumulative effects of alterations. The dynamic nature and connectivity of riparian areas and linkages between riparian and aquatic systems operate at multiple scales.
- 4) Exclude all major sources of contamination from the riparian buffer, including construction, impervious surfaces, mining, septic system drain fields, agricultural activity, clear cutting and application of pesticides and herbicides.
- 5) Manage riparian areas for the long-term. For many sites, substantial time, on the order of years to decades, will be required for vegetation to become fully functional.

## **17.70.355 Goals and Policies for Protection of Critical Saltwater Habitat**

### **1. Goal: Protect Lacey's critical saltwater habitat areas and achieve no net loss of ecological functions or values in these areas.**

**A. Policy:** Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans for projects intruding into or over critical saltwater habitat areas.

**B. Policy:** Because ecological functions of marine shorelands can affect the viability of critical saltwater habitat, effective protection of critical saltwater habitats should integrate the policies for management of shorelands, outlined in Section 17.35.031, with management policies for submerged areas.

**C. Policy:** Activities in, over or adjacent to critical saltwater habitat should consider the following, where applicable:

- 1) Protecting a system of fish and wildlife habitats with connections between larger habitat blocks and open spaces and restoring such habitats and connections where they are degraded;
- 2) Protecting existing and restoring degraded riparian and estuarine ecosystems, especially salt marsh habitats;
- 3) Establishing adequate buffer zones around these areas to separate incompatible uses from the habitat areas;
- 4) Protecting existing and restoring degraded near-shore habitat;
- 5) Protecting existing and restoring degraded or lost salmonid habitat;
- 6) Protecting existing and restoring degraded upland ecological functions important to critical saltwater habitats, including riparian vegetation;
- 7) Improving water quality;
- 8) Protecting existing and restoring degraded sediment inflow and transport regimens; and
- 9) Correcting activities that cause excessive sediment input where human activity has led to mass wasting.

## **17.70.360 Goal and Policies for Protection of Critical Fresh Water Habitat**

**1. Goal: Protect Lacey's critical fresh water habitats and achieve no net loss of function or value in these areas. Strive for greater levels of ecological function in vegetation management areas over the long term.**

**A. Policy:** Utilize best available science recommendations provided in literature from state resource agencies when developing standards and reviewing habitat management plans for activities proposed within or adjacent to critical freshwater habitat.

**B. Policy:** Utilize standards in Lacey's critical areas ordinances and tree and vegetation protection legislation as incorporated into this SMP, as appropriate, to protect critical freshwater habitat areas and achieve no net loss objectives of this SMP.

**C. Policy:** Accommodate existing uses while achieving no net loss of functions and values with new development and implement mitigation strategies designed to improve the functionality of vegetation management areas.

**D. Policy:** Emphasize protection and no net loss of ecological function of critical fresh water habitat in the future under GMA and when considering future land uses in shoreline areas.

**E. Policy:** Where critical areas occur along designated critical freshwater habitat, buffer requirements should be based upon standards identified in Lacey's critical area ordinances as incorporated into this SMP. Exceptions to this policy are outlined in Section 17.35.020 (1) (C).

**F. Policy:** Water dependent uses and structures or modifications supporting public access or such uses should be authorized uses within critical freshwater habitat, critical areas, critical area buffers and the OHWM setback within any shoreline designation.

## **17.70.400 General Goals and Policies for Protection of Ecological Functions**

**1. Goal: Use the comprehensive unique SMP Inventory and Characterization Report to recognize, appreciate and respect the individual nature of Lacey's shoreline reaches and the natural ecological processes important to the health and vitality of these shorelines.**

**A. Policy:** Designate shorelines based upon findings of the shoreline inventory and what designation is best suited to each individual reach considering its identified functions and values.

**B. Policy:** Require design that is sensitive to shoreline processes and the requirements necessary for protection of identified functions and values. Design and density shall promote no net loss of ecological functions. To further this intent, the City will consider incentive programs to encourage dedication of shoreline property to the City for management and protection over the long term.

**2. Goal: Plan land use around shoreline resources considering the characterization report and cumulative impacts analysis, and responsibly balance impacts from urbanization required under GMA with the necessary protection of these limited and valuable resources over the long term.**



**A. Policy:** Require a vegetation management area appropriate to each designation and expected use, to promote the natural functions of stormwater absorption and treatment and promote water quality and natural habitat functions and values.

**B. Policy:** Allow alternatives for vegetation improvements within the vegetation management area as long as the area will achieve similar results in mitigating upland development and impacts of urbanization on the shorelines natural functions and values.

**3. Goal: Achieve goals of the Shoreline Management Act for state interests, and achieve local interests for the protection of identified functions and values. This shall include enjoyment of these resources for both passive and active recreation opportunities, as appropriate given characteristics, functions and values of individual shoreline areas.**

**A. Policy:** Ensure that uses and activities address the goals and policies in Sections 17.40 through 17.70.

**B. Policy:** Public use of shoreline will be a priority pursuant to the City Public Access Plan. However, public access must be balanced with the needs of each individual reach for maintaining a healthy shoreline and its ecological functions and values.

**C. Policy:** Public access with active or intensive uses should not be planned where critical areas are present or the shoreline would be particularly sensitive to the planned use.

**D. Policy:** Access should be integrated into shoreline areas with the least amount of impact possible and impacts should be mitigated to promote no net loss of ecological function.

**E. Policy:** To balance public access and use of shoreline resources with ecological function, Lacey will consider offsite mitigation and restoration consistent with priorities in the City's Restoration Plan. Offsite mitigation can be used to achieve no net loss on a community wide basis if this cannot be achieved onsite.

**4. Goal: Promote new development only where appropriate for the shoreline designation and ensure all development is sensitive to and protects ecological processes and functions.**

**A. Policy:** Design and locate all development and structures, including residential development, to make beach stabilization measures and other shoreline modifications unnecessary, including but not limited to, protective measures such as filling, beach feeding, bulkheading, shoreline berms, construction groins or jetties, or substantial grading of the site.

**B. Policy:** Ensure that permits for shoreline modifications address the goals and policies in Sections 17.40 through 17.70.

**C. Policy:** Ensure that exemptions and permits for uses, activities and shoreline modifications use mitigation sequencing in Section 17.40.015.

**D. Policy:** Programs that enhance opportunities for the development community as well as meet City and state goals for shoreline protection should be given priority. An example is a program that would allow significant increased density credit that can be transferred to upland areas outside shoreline jurisdiction or off site in exchange for dedication of the shoreline area to the public. This can enhance development opportunities and achieve GMA goals and environmental protection of shoreline resources over the long term.

## **17.70.410 Importance of Vegetation**

Native vegetation along the shoreline provides and supports many ecological functions or processes which are critical to the health, vitality, function and value of Lacey's shorelines. These functions and values include but are not limited to:

- A. Providing shade necessary to maintain water temperatures required by salmonids, forage fish, and other aquatic biota.
- B. Regulating microclimate in riparian and nearshore areas.
- C. Providing organic inputs necessary for aquatic life, including providing food in the form of various insects and other benthic macro invertebrates.
- D. Stabilizing banks, minimizing erosion and sedimentation, and reducing the occurrence/severity of landslides.
- E. Reducing fine sediment input into the aquaticAquatic environment by minimizing erosion, aiding infiltration, and retaining runoff.
- F. Improving water quality through filtration and vegetative uptake of nutrients and pollutants;
- G. Providing a source of large woody debris to moderate flows, create hydraulic roughness, form pools, and increase aquatic diversity for salmonids and other species.
- H. Providing habitat for wildlife, including connectivity for travel and migration corridors.

Based upon identified functions and values and the role vegetation plays in maintenance of these functions and values, Lacey will promote proper restoration, landscaping and maintenance of its shoreline areas. The goals and policies in Sections 17.41.015 and general development standards in Section 17.41.020 are intended to provide the vision and general framework for this effort.

## **17.70.415 Vegetation Management - Goals and Policies**

**1. Goal: Over the long term, achieve vegetated shorelines with materials supportive of natural shoreline functions and values that will help maintain and improve water quality and habitat.**

**A. Policy:** Limit the removal of vegetation within shoreline jurisdiction to the minimum necessary to accommodate authorized shoreline development. Designate a vegetation management area corresponding to each designation's setback area as outlined in Section 17.24.010, Table 4. To be providing buffering functions, it is assumed such areas are well vegetated with native species appropriate to the eco-region. Where buffering functions are compromised by loss of, lack of, or replacement of native vegetation, vegetation management plans should focus on improving buffering function.

- B. Policy:** Native/approved vegetation is desired within designated vegetation management areas to further the City's goals of shoreline restoration and to promote no net loss of ecological function and value with new development. A Vegetation Management Plan should be developed for uses and activities proposed in shoreline jurisdiction, and should consider legitimate competing interests for shoreline areas. These interests include but are not limited to habitat, views and compatibility and integration of the full range of land use activities anticipated in the applicable shoreline environment and adjacent uplands. Example Vegetation Management Plans are provided in the Green Shoreline Landscaping: Examples and Guidelines [AC115].
- C. Policy:** The Administrator may allow selective pruning of native/approved vegetation for view corridors and limited vegetation removal for shoreline access segments, provided ecological functions are not compromised. Proposals to remove vegetation for shoreline access segments should follow the mitigation sequence. All proposals for vegetation removal or pruning should be reviewed by the City Forester/Arborist, who will provide a recommendation to the Administrator. See Sections 17.41.020 (3) and 17.41.020 (10).
- D. Policy:** Preserve existing native vegetation along the shoreline, encourage and incentivize planting when it does not exist, and avoid, minimize and mitigate for impacts to shoreline vegetation.
- E. Policy:** Provide flexibility when balancing overlapping shoreline policies and priorities in including vegetation conservation, preferences for water-dependantdependent uses, and requirements to provide public access.
- F. Policy:** When nonconforming or "conforming, expansion limited" structures are expanded within designated vegetation management areas and native/approved vegetative does not exist within the vegetation management area, the City should encourage the installation of vegetation within these areas to the level the site can reasonably accommodate and commensurate to offset the proposed level of expansion. If through review of the Vegetation Management Plan, the Administrator determines there is not adequate space onsite to accommodate vegetation that will adequately offset and mitigate impacts anticipated from the expansion, the Administrator may consider offsite mitigation or payment of fees in lieu of onsite mitigation.
- G. Policy:** Vegetation within designated vegetation management areas should be comprised of three vegetative levels including an over story of trees, an understory of shrubs, and a floor of herbs and with native plants commonly found in riparian areas of Thurston County; see example Vegetation Management Plans in the Green Shoreline Landscaping: Examples and Guidelines [AC116].
- H. Policy:** Where revegetation of vegetation management areas is anticipated, such areas should be planted to resemble native conditions. The Administrator may consider and approve use of other vegetative materials that are demonstrated through the Vegetation Management Plan to achieve protection or maintenance of shoreline ecological function equivalent to native vegetation.
- I. Policy:** Where uses or activities are proposed along shorelines that also contain critical areas, Vegetation Management Plans may be consolidated with Habitat Management Plans required under Section 17.35.

**2. Goal: Develop and implement public information efforts that put shoreline vegetation restoration and management tools in the hands of shoreline property owners.**

**A. Policy:** Because of the importance of vegetation in managing water quality, the City will promote public education on this topic.

**B. Policy:** Develop a full range of materials to share with the public ranging from how to implement shoreline revegetation requirements in accordance with this SMP to basic information regarding shoreline functions and values and how vegetation management can be involved in maintaining shoreline property.

**E. Policy:** The City will support efforts of realtors and work in partnership with the local Board of Realtors to inform new and existing shoreline property owners of protective covenants that may be applicable to shoreline properties, and on the topic of ecologically friendly vegetation management. This may include a range of strategies such as educational presentations at realtor membership meetings, presentations to home owner associations, scheduling informational meetings with lot owners or perspective buyers and helping to develop brochures for general circulation to interested groups.

## **17.70.420 Restoration - Goals and Policies**

**1. Goal: Identify and take advantage of opportunities where restoration goals can be integrated into the design and planning of public or private shoreline development projects.**

**A. Policy:** Recognize that restoration and enhancement may result from:

- 1) Mitigation of impacts from new development.
- 2) Adoption of shoreline setbacks and vegetation management areas with a protective function, which are based upon shoreline ecological functions and processes.

**B. Policy:** Reestablish, rehabilitate and/or otherwise improve impaired shoreline ecological functions and/or processes through voluntary and incentive-based public and private programs and actions that are consistent with this master program and other approved restoration plans.

**2. Goal: Where opportunities are present, work with other state and local jurisdictions in planning and implementation of restoration projects that cross jurisdictional boundaries.**

**A. Policy:** Encourage and facilitate cooperative restoration and enhancement programs between local, state, and federal public agencies, tribes, non-profit organizations, and landowners to address shorelines with impaired ecological functions and/or processes.

**3. Goal: Implement restoration efforts consistent with the City Shoreline Restoration Plan.**

**A. Policy:** Integrate restoration and enhancement with other parallel natural resource management efforts such as the WRIA 13 Salmonid Recovery Plan, Puget Sound Salmon Recovery Plan, and the City of Lacey Comprehensive Land Use Plan and its Environmental Protection and Resource Conservation element.

**B. Policy:** Ensure restoration and enhancement is consistent with and, where practicable, prioritized based on the biological recovery goals for early Chinook, bull trout populations and other species and/or populations for which a recovery plan is available.

**C. Policy:** Target restoration and enhancement towards improving habitat requirements of priority and/or locally important wildlife species.

**D. Policy:** Restoration should be carried out in accordance with an approved vegetation management plan and in accordance with the policies and regulations of this SMP.

**E. Policy:** Prioritize restoration actions and stand-alone projects in the following order:

- 1) Create dynamic and sustainable ecosystems.
- 2) Restore connectivity between stream channels, floodplains and hyporheic zones.
- 3) Restore natural channel-forming geomorphologic processes.
- 4) Mitigate peak flows and associated impacts caused by high stormwater runoff volume.
- 5) Reduce sediment input to streams and associated impacts.
- 6) Improve water quality.
- 7) Restore native vegetation and natural hydrologic functions of degraded and former wetlands.
- 8) Replant native vegetation in riparian areas to restore functions.
- 9) Restore nearshore ecosystem processes, such as sediment transport and delivery and tidal currents that create and sustain habitat.
- 10) Restore pocket estuaries that support salmon life histories, including feeding and growth, refuge, osmoregulation, and migration.
- 11) Remove obsolete and no longer needed shoreline modifications.

**4. Goal:** Achieve natural beach areas by restoration that meets needs of the land owner without hard armoring.

**A. Policy:** Insure that permits for beach restoration and enhancement projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.

**B. Policy:** Give preference in permitting beach restoration and enhancement projects which use naturally regenerating systems, rather than bulkheads and other structures to prevent and control beach erosion where:

- 1) The length and configuration of the beach will accommodate such systems.
- 2) Such protection is a reasonable solution to the needs of the specific site.
- 3) Beach restoration/enhancement will accomplish one or more of the following objectives:
  - a) Recreate or enhance natural shoreline conditions.
  - b) Create or enhance natural habitat.
  - c) Reverse otherwise erosion-prone conditions.
  - d) Enhance access to the shoreline, especially to public shorelines.

**C. Policy:** Design and construct beach enhancement projects so that they will not degrade aquatic habitats, water quality and flood holding capacity.

**D. Policy:** Prefer self-maintaining designs over those which depend upon regular maintenance.

**E. Policy:** Require supplementary beach nourishment where structural stabilization works are likely to increase impoverishment of existing beach materials at or downdrift from the project site.

**F. Policy:** Limit the waterward extent of beach enhancement to that which is necessary to achieve the intended results.

- G. Policy:** Encourage the beneficial reuse of dredged materials for beach restoration and enhancement projects when it has suitable organic and physical properties.

## **17.70.440 Goals and Policies Applicable to all Uses and Activities**

**1. Goal: Achieve appropriate use, protection and restoration of shoreline resources, by identification of their values and functions and application of criteria and standards to shoreline uses, activities and modifications.**

- A. Policy:** Apply standards for proper maintenance and restoration of degraded shorelines. Where there are no regulatory opportunities, use incentives to encourage developers, property owners, community groups and others to enhance degraded shorelines and return them to an ecologically functioning condition.
- B. Policy:** Design, locate and construct residential development in a manner that will:  
1) Maintain existing public access to the publicly-owned shorelines,  
2) Not interfere with the public use of water areas fronting such shorelines, and  
3) Not adversely affect aquatic habitat.
- C. Policy:** Evaluate all shoreline uses and activities for their effect on the aquaticAquatic environment to ensure every proposal that is approved achieves no net loss of ecological functions and values and does not adversely impact public health.
- D. Policy:** Adopt a full range of development standards and incentive opportunities to protect and achieve no net loss of existing shoreline ecological functions and processes. Development standards may include regulations on use, density, frontage, setbacks, impervious surface, shoreline stabilization, vegetation conservation, buffers, critical areas and water quality and other elements in the public's interest for management and use of shoreline resources.
- E. Policy:** Assess project-specific impacts, cumulative impacts, and a project's potential to result in a net loss of ecological functions. Require compliance with the mitigation sequence and compensatory mitigation as necessary to mitigate unavoidable impacts. If impacts cannot be mitigated, the application for use, activity or modification may be denied.
- F. Policy:** Require shoreline permits to be consistent with the Shoreline Management Act (RCW 90.58), the Washington Administrative Code (WAC 173-26), and this Master Program.
- G. Policy:** Generally prohibit activities that would degrade existing levels of ecological function. Mitigation of impacts should occur on site or on other priority shoreline sites that offset on site impacts. Activities should always be consistent with state long term goals and requirements for protection and restoration of shoreline areas.
- H. Policy:** Eliminate inappropriate shoreline uses and poor quality shoreline conditions when authorizing a new shoreline development or activity on the same property and under the same ownership.

**2. Goal: Develop a Shoreline Master Program with an efficient customer service process, enforcement of program requirements and periodic evaluation of key objectives.**

- A. Policy:** Continue Lacey's cultural customer service orientation. Listen to each customer's unique issues to understand the specific situation and needs of the owner, explain the need, purpose and intent of the SMP as it applies to the subject property and try to identify a way to help the owner meet their objectives for use of property while meeting Lacey's objectives for use, protection and restoration of shoreline resources.
- B. Policy:** Approach work with the owner as a partnership in use and management of shoreline resources. The partnership should benefit the individual owner and be consistent with the overall intent, vision and public interest of the community.
- C. Policy:** Monitor and track developments approved within shoreline jurisdiction, to provide a baseline of data to evaluate key shoreline program elements.
- D. Policy:** Provide appropriate enforcement measures for projects approved under Lacey's shoreline program to ensure that all conditions of projects are met, and that required improvements or mitigation is accomplished.

## **17.70.450 Shoreline Modifications – Goals and Policies**

**1. Goal: Achieve protection of shoreline functions and values by implementation of Shoreline Master Program policies that foster design with nature. Use naturalized concepts and strategies that promote natural functions and processes over concepts that require structural modification.**

- A. Policy:** Preserve shorelines which exist in their natural state free of shoreline modifications.
- B. Policy:** Where possible remove existing shoreline modifications and instream structures to improve ecosystem-wide processes and shoreline ecological functions.
- C. Policy:** Design and locate new development to prevent the need for shoreline stabilization measures and flood protection works.
- D. Policy:** Discourage new residential development which requires shoreline stabilization.
- E. Policy:** Discourage structural shoreline modifications so that they do not individually or cumulatively result in a net loss of ecological functions.
- F. Policy:** Allow structural shoreline modifications only when it is desirable for reconfiguration of the shoreline for mitigation or enhancement purposes.
- G. Policy:** Structural shoreline modifications should:
- 1) Be based on a comprehensive analysis of drift cells for marine water or reach conditions for stream systems and lakes; and**



- 2) Incorporate all feasible measures to protect ecosystem-wide processes and shoreline ecological functions.
- H. Policy:** Bank stabilization measures should be designed, located and constructed only to prevent damage to existing development.
- I. Policy:** Use mitigation sequencing to support the use of nonstructural stabilization techniques over bio-engineering with structural components. If bio-engineering is necessary use mitigation sequencing to support its use over structural shoreline stabilization such as rip rap revetments or bulkheads.
- J. Policy:** Car bodies, demolition debris, concrete rubble, scrap building equipment or appliances should not be used for shoreline stabilization.
- K. Policy:** Substantial stream channel modifications and realignment and/or straightening as a means of shoreline stabilization and flood protection should be discouraged. Work within the natural shoreline processes and avoid development within flood plains, floodways or other areas that require stabilization of the natural processes with infrastructure.
- L. Policy:** Design stabilization or protection works for multiple uses with public access to public shorelines.
- M. Policy:** Retain natural features serving a stabilization function such as snags, stumps or uprooted trees that support fish and wildlife and other aquatic systems and that are not a significant navigation hazard.
- N. Policy:** Locate flood protection measures landward of the natural floodway boundary, including wetlands that are associated with the water body.
- O. Policy:** Beach restoration/enhancement using naturally regenerating systems for the prevention and control of beach erosion are preferred rather than bulkheads and other structures where:
- 1) The length and configuration of the beach will accommodate such systems.
  - 2) Such protection is a reasonable solution to the needs of the specific site.
  - 3) Beach restoration/enhancement will accomplish one or more of the following objectives:
    - a) Recreate or enhance natural shoreline conditions;
    - b) Create or enhance natural habitat;
    - c) Reverse otherwise erosion-prone conditions; and
    - d) Enhance access to the shoreline, especially to public shorelines.

## **17.70.455 Shoreline Modifications – Policies** **Applying to all Shoreline Stabilization**

### **1. Policies applying to all shoreline stabilization activities:**

- A. Policy:** Shore stabilization should be located and designed to:



- 1) Protect and maintain shoreline ecological functions, ongoing shore processes and the integrity of shore features;
  - 2) Not unnecessarily interfere with public access to public shorelines or with other appropriate shoreline uses including, but not limited to, navigation, seafood harvest or private recreation; and
  - 3) Not intrude into or over critical saltwater or freshwater habitats.
- B. Policy:** Shoreline stabilization on streams should be located and designed to fit the physical character and hydraulic energy potential of a specific shoreline reach, which may differ substantially from adjacent reaches.
- C. Policy:** Public or quasi-public shoreline stabilization projects should be located and designed for multiple use, restoration, and/or public access, where feasible.
- D. Policy:** Design land divisions to assure that future development on the created lots will not require structural shore stabilization.
- E. Policy:** New or expanded structural shore stabilization should be limited to when:
- 1) It is conclusively demonstrated by a geotechnical analysis to be necessary to protect an existing primary structure that is in danger of loss or substantial damage caused by tidal action, currents or waves;
  - 2) The erosion is not being caused by upland conditions such as vegetation loss and drainage problems;
  - 3) Non-structural solutions will not be feasible or sufficient; and
  - 4) Impacts can be mitigated so that they will not result in a net loss of ecosystem-wide processes and shoreline ecological functions.
- F. Policy:** Prohibit larger shoreline stabilization projects (such as jetties, breakwaters, weirs or groin systems).
- G. Policy:** Shore stabilization projects should not be allowed on publicly owned shorelines which result in a long-term decrease in public use of the shoreline.
- H. Policy:** Shore stabilization should not be allowed for the purpose of filling shorelines.
- I. Policy:** Structural shoreline stabilization should not be located on or at the base of eroding bluffs, except where existing structures are threatened or non-structural methods have been determined to be infeasible.
- J. Policy:** Encourage shore stabilization efforts which coordinate affected property owners and public agencies for a whole drift sector (net shore-drift cell) to address ecological and geo-hydraulic processes, sediment conveyance and beach management issues. Encourage the creation of a comprehensive management program where beach erosion threatens existing development.

**K. Policy:** Encourage removal of failing, harmful, unnecessary, or ineffective structures and restore shoreline processes and ecological functions by using more natural long-term stabilization measures.

**L. Policy:** Shoreline stabilization projects should be prioritized in the following order. Applications that propose less preferred methods must demonstrate why preferred methods are not feasible:

- 1) No action (allow the shoreline to retreat naturally), increased building setbacks, and structure relocation.
- 2) Upland vegetation enhancement and drainage controls.
- 3) Flexible defense works constructed of natural materials including soft shore protection, bioengineering, including beach nourishment, protective berms or vegetative stabilization.
- 4) Rigid works constructed such as bulkheads, seawalls and bluff walls of artificial materials such as riprap or concrete. Materials used for construction of shoreline stabilization is to be selected for long-term durability, ease of maintenance, compatibility with local shore features, including aesthetic values and flexibility for future uses.

## **17.70.460 Access (Public) - Goals and Policies**

- 1. Goal:** Provide a full range of shoreline access and use for the Lacey community.
- 2. Goal:** Provide public access to and along the shorelines pursuant to the requirements of state law, guidance provided in the City Public Access Plan and the goals and policies of this SMP.
- 3. Goal:** Increase the ability of the general public to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and/or to view the water and the shoreline from adjacent locations, provided that private rights, the public safety, and shoreline ecological functions and processes are protected consistent with the U.S. and state constitutions, and state statutes.

**A. Policy:** Consider the type of public shoreline access that is needed for the Lacey community; passive, active, view points, beach recreation etc. Determine what access opportunities exist and what additional opportunities should be pursued based upon value to the public.

**B. Policy:** Develop an inventory of existing public access to shorelines and potential opportunities for public access that Lacey could pursue in achieving its public access goals.

**C. Policy:** To support implementing efforts, particularly regulatory actions of conditioning permits, include a discussion of SMP identified public access needs and opportunities in planning documents (The Comprehensive Land Use Plan, The Comprehensive Plan for Outdoor Recreation, and The Capital Facilities Element) with justification and expectations for acquisition and development.

**D. Policy:** Actively pursue public access opportunities with a variety of special programs;

**E. Policy:** Where appropriate, acquire access to publicly owned tidelands and shorelands. Encourage cooperation among the City and Thurston County, adjacent cities, landowners, developers, other agencies and organizations to enhance and increase public access to shorelines as specific opportunities arise.

**F. Policy:** Provide and protect visual access to shorelines and tidelands.

**G. Policy:** Shoreline development by public entities such as local governments, state agencies, and public utility districts should provide public access measures as part of each development project unless such access is shown to be incompatible due to reasons of safety or impacts to the shoreline.

**H. Policy:** Physical or visual access to shorelines should be incorporated in all new development when the development would either generate a demand for one or more forms of such access, and/or would impair existing legal access opportunities or rights. Public health and safety concerns should also be adequately addressed and maintenance of shoreline ecological functions and/or processes should be assured.

**4. Goal: Develop innovative program(s) that achieve Lacey's public access goals through incentives attractive to the development community.**

**A. Policy:** Incentive programs to gain public access should provide development options that are superior in balancing environmental protection with public use/interest, should meet all requirements of the Shoreline Management Act and further its spirit and intent, and should be superior from a market and business standpoint and result in a developer's independent decision to pursue the program.

**B. Policy:** Development resulting from an incentive program should be compatible with and further the intent of GMA plans and the City's community vision, and result in development that is compatible with and complementary to the neighborhood in which it is located.

**5. Goal: Ensure public access is designed and constructed so that it preserves or enhances the characteristics and natural functions and values of the shoreline.**

**A. Policy:** Public access should be located, designed, managed and maintained in a manner that protects shoreline ecological processes and functions as well as the public health and safety.

**B. Policy:** Select public access sites appropriate to the shoreline designation, the requirements for its environmental protection, and the maintenance of its natural functions and values.

**C. Policy:** Evaluation of sites for public access should include an analysis of the site's potential to accommodate the improvements necessary for the proposed form and level of intensity of public access activities.

**D. Policy:** Public access facilities such as over water fishing piers should only be authorized if ecological impacts are mitigated, if is consistent with the intent of this SMP and if it demonstrates no net loss of ecological function and value.

**E. Policy:** Design and development of public access facilities should consider view corridors. Emphasis should be placed on consideration of neighboring views and existing views from surrounding properties.

**6. Goal: Implement a shoreline access strategy that meets City of Lacey shoreline access goals while being sensitive to needs of landowners, surrounding neighborhood residents, and the general public.**

**A. Policy:** Lacey will demonstrate need for an access to provide the applicant a reason, purpose, and justification for public access as discussed in Public Access Plan.

**B. Policy:** Lacey will provide the applicant with the use and intended design of the public access and assure successful integration of the access with the applicant's goals and objectives.

**C. Policy:** Lacey will increase public access to publicly owned shorelines.

**D. Policy:** Lacey will consider objectives of private projects and landowners as it develops plans for public access and as much as possible, without compromising Lacey's public access goals and goals of the state, will design the access and long term management in a way that accomplishes the objectives of both parties.

**E. Policy:** Public access developed as part of a shoreline permit requirement should be designed to enhance the proposed project by adding value to the property for current and future residents of the site/ownership/development. Ideally, the relationship should be considered a partnership between the developer and the city, where the establishment of public access tied into other public amenities (regional trail, lake trail, parks etc.) will improve a project's marketability and attractiveness, adding value to the proposed development by establishing an amenity residents of the site/ownership/development will see as added value to their home.

**F. Policy:** Physical or visual access to shorelines should be required as a condition of approval for shoreline development activities commensurate with the anticipated needs of future residents or users of the development, impacts of such development, and the corresponding benefit to the public, and consistent with constitutional limitations. Use an incentive dedication agreement program, such as Section 17.46.025, to provide economic incentives for a developer to design projects that include dedication of shoreline areas and access to the public.

**G. Policy:** Public access area and/or facility requirements should be commensurate with the scale and character of the development and should be reasonable, effective and fair to all affected parties including but not limited to the land owner and the public.

**H. Policy:** Design review standards should be applied to all projects taking place within shoreline jurisdiction. All projects should meet community expectations detailed in the Comprehensive Land Use Plan for neighborhood form and functionality and be compatible with and complementary to existing and planned development.

**I. Policy:** Public access design should provide for public safety, minimize potential impacts to private property and individual privacy, and protect shoreline ecological functions and processes.

**J. Policy:** Public access should be designed for integration with the existing built environment. In the context of a shoreline environment, successful integration will necessitate context sensitive design and will provide value to shoreline land owners, surrounding residents and the general public.

**7. Goal: Provide public access opportunities that are sensitive to the needs of water dependantdependent uses and reflect priorities of the state for use of shorelines.**

**A. Policy:** Public access should be designed and managed in a manner that ensures compatibility with water-dependent uses.

**B. Policy:** Public access should be provided for water enjoyment, water related, and non-water dependent uses and subdivisions of more than 4 lots, and for all developments that increase public use of the shorelines and public aquatic lands or that would impair existing legal access opportunities, as provided in/supported by the City's Public Access Plan.

**C. Policy:** Uses and developments that provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state are a preferred use.

**8. Goal:** Achieve Lacey's identified public access goals using strategies, methodology and targets established in the Lacey Public Access Plan.

**9. Goal:** Achieve safe and respectful use of lake resources by partnering with lake residents and Thurston County and monitoring public access sites and lake use.

**A. Policy:** Consider opportunities for a program that enables local lake residents to establish a "Lake Watch Program" based upon the same principals as a Neighborhood Watch Program. Provide support as necessary to empower lake residents to help maintain a safe lake and respectful use of these resources for the benefit of all Lacey citizens.

**B. Policy:** Coordinate responsibility with Thurston County for monitoring activity on lakes within Lacey's UGA. As much as possible, within existing resources, provide support for calls reporting dangerous or abusive behavior on lakes in Lacey and Lacey's growth area.

**C. Policy:** Coordinate with the Lacey Police Department in the planning and design of public access facilities to lakes and incorporate Crime Prevention through Environmental Design (CPTED) considerations.<sup>[AC117]</sup>

## **17.70.470 Aquaculture - Goals and Policies**

**1. Goal:** Provide opportunities for aquaculture and harvest of natural resources in a way that is compatible with the natural shoreline resource, complements specific reach designations and associated functions and values and meets requirements of the SMA.

**A. Policy:** Allow aquaculture consistent with the shoreline environment designation and the SMA.

**B. Policy:** Design, locate and operate aquaculture activities in a manner that supports long-term beneficial use of the shoreline and protects and maintains shoreline ecological functions and processes.

**C. Policy:** Prohibit aquaculture where it would result in a net loss of shoreline ecological functions, would have a significant adverse impact on natural dynamic shoreline processes, or interfere with other water-dependent uses.

**D. Policy:** Accommodate the existing upland fish hatchery as a "pre existing approved use" as long as it is operated in a manner that supports long-term beneficial use of the shoreline and protects and maintains shoreline ecological functions and processes.

**E. Policy:** Allow operation of aquaculture enterprises in a manner that allows navigational access of shoreline owners and commercial traffic.

**F. Policy:** Aquaculture structures and activities that are not water-dependent (e.g., warehouses for storage of products, parking lots) shall be located outside shoreline jurisdiction to minimize the detrimental impact to the shoreline and other shoreline uses.

**2. Goal: Ensure long term health and viability of the marine resource through wise management of the resource and sound aquaculture practices.**

**A. Policy:** Design, locate and operate aquaculture activities in a manner that supports long-term use of the resource.

**B. Policy:** Give preference to an aquaculture use or activity that involves little or no substrate modification over those that involve substantial modification. The applicant should demonstrate that the degree of proposed substrate modification is the minimum necessary for feasible aquaculture operations at the site.

**3. Goal: Achieve compatible integration of aquaculture activities with other permitted uses in areas appropriate for this use.**

**A. Policy:** Minimize the detrimental impact aquaculture development might have on views from upland property.

**B. Policy:** Review proposed surface installations for conflicts with other uses in areas that are utilized for moorage, recreational boating, sport fishing, commercial fishing or commercial navigation. Incorporate features to reduce use conflicts. Unlimited recreational boating should not be construed as normal public use.

**C. Policy:** Aquaculture processing plants that are not water ~~dependant~~ dependent should be located outside of shoreline areas in an appropriate light industrial zone designed for manufacturing and processing activities.

## **17.70.480 Bioengineering - Policies**

**1. Policy:** Insure that permits for bioengineering projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.

**2. Policy:** Give preference in permitting to bioengineering projects which incorporate self-maintaining vegetation and materials over those which require routine maintenance.

**3. Policy:** Design and construct bioengineering projects to:

**A.** Ensure that water quality, fish and wildlife habitats and flood holding capacity are not degraded, and projects are timed so that the survival of new plantings is optimized;

**B.** Maximize the use of native vegetation;

**C.** Minimize the structural soil stabilization components, including riprap, to last only until vegetation is well established; and

**D.** Include vegetation, fencing and/or other measures to avoid disturbance of the project site by livestock and vehicles.

4. **Policy:** Limit the waterward extent of bioengineering projects to that which is necessary to achieve the intended results.

## **17.70.490 Marinas and Boat Launch Facilities – Discussion and Policies** [AC118]

**Goal:** Meet demonstrated public need and demand for boating facilities for shoreline areas consistent with the City Comprehensive Plan for Outdoor Recreation, City Public Access Plan, shoreline designations and the overall emphasis on protection of shoreline natural functions and values.

**Discussion:** An existing small private marina for Beachcrest exists just east of the Butterball Cove area along the shoreline of Dewolfe Bight. It is the only marina on shorelines under Lacey jurisdiction. It was developed as part of the Beachcrest development in the late 1940s. Approximately half of the marina is within the City of Lacey and the rest is within Lacey's UGA and unincorporated Thurston County.

The existing private Beachcrest marina is considered a viable use and is expected to continue over the long term. At the same time, environmental impacts of the Beachcrest marina on the shoreline environment should be acknowledged.

Looking at the need for public marinas, there is little justification for location of a public marina in the Lacey area. The marine shoreline of Lacey is extremely limited and its sensitivity and designation as Natural does not lend it to establishment of another marina use. The lakes under Lacey's jurisdiction are too small to have a need for or to support a marina.

### **Policies for marinas:**

1. **Policy:** Expansion and maintenance or repair activities at the Beachcrest marina should follow the mitigation sequence.
2. **Policy:** The Beachcrest Community Association is encouraged to look for environmental restoration opportunities when performing marina maintenance or repairs. Incentives should be provided to the Beachcrest Community Association for activities that meet restoration objectives. Priority should be for restoration of degraded areas on this reach, as discussed in Lacey's Restoration Plan.
3. **Policy:** Because the Beachcrest marina falls under the jurisdiction of both Thurston County and the City of Lacey, permitting activities may be complex for the Beachcrest HOA. To this end, the City of Lacey will support an interlocal agreement with Thurston County to have one jurisdiction be the lead local jurisdiction for permitting activities. The SMP of the lead jurisdiction per the interlocal agreement should be the SMP used to determine permitting process and requirements.

### **Policies for boat launch facilities:**

1. **Policy:** The City's Comprehensive Plan for Outdoor Recreation and Public Access Plan should be used as a guide to determine public need for new boat launch facilities. Evidence of substantial demand should be given before considering approval of new facilities.



2. **Policy:** Locate boat launch ramps on stable shorelines where water depths are adequate to avoid the net loss of shoreline ecological functions or processes, and eliminate or minimize the need for offshore or foreshore channel construction dredging, maintenance dredging, spoil disposal, filling, beach enhancement and other river, lake, harbor and channel maintenance activities.
3. **Policy:** Where provided, require fuel handling and storage procedures that minimize accidental spillage and provide satisfactory means for handling those spills that do occur.
4. **Policy:** Locate launch ramps to minimize the adverse effects upon fish and shellfish and their habitat(s).
5. **Policy:** Locate boat launching facilities in areas where parking and access to the facility can be accommodated without causing adverse impacts to adjacent properties.
6. **Policy:** Minimize off-site light and glare by using fully shielded and appropriately aimed fixtures.
7. **Policy:** Design boat launch facilities to provide for as many compatible water oriented recreational uses as possible, according to the size and extent of the facilities.
8. **Policy:** All facilities should provide adequate parking and landscaping.
9. **Policy:** Boat launch facilities should be designed and conditioned to avoid and mitigate impacts to adjacent properties. This includes but is not limited to impacts such as wave action, erosion, and privacy issues.

## **17.70.500 Covered Moorage - Policies**

**Policy:** Covered moorage in Lacey is considered un-necessary and would distract from the shoreline's aesthetic and functional values. This use should be prohibited.

## **17.70.510 Bulkheads - Policies**

1. **Policy:** Insure that permits for bulkhead projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.
2. **Policy:** Locate and design residential development along shorelines to make shoreline stabilization projects such as filling, bulkheading, or substantial grading of the site unnecessary.
3. **Policy:** Where new bulkheads are necessary, applications should be processed as a shoreline conditional use permit to consider natural shoreline functions, habitat, drainage treatment and water quality.
4. **Policy:** Where replacement of an existing bulkhead is necessary, emphasis should be placed on developing alternative naturalized concepts (soft stabilization).<sup>[AC119]</sup>



## **17.70.520 Buoy - Policies**

- 1. Policy:** Insure that permits for buoy projects address the goals, policies and development standards within the Shoreline Ecological Function Sections 17.40.000 and 17.70.
- 2. Policy:** Give preference in permitting to moorage buoys over piers, docks, and float structures, especially in tidal waters.
- 3. Policy:** Locate moorage buoys so as to:
  - A. Cause minimal interference with navigable waters and the public's use of the shoreline, and
  - B. Avoid locations where they will adversely impact shoreline ecological functions or processes, including currents and littoral drift, water circulation and quality, and fish and wildlife habitat.<sup>[AC120]</sup>

## **17.70.530 Dredging - Policies**

- 1. Policy:** Allow dredging only where it is necessary for assuring safe and efficient accommodation of existing navigational uses and when significant ecological impacts are minimized and mitigation is provided.
- 2. Policy:** Limit maintenance dredging of established navigation channels and basins to maintaining previously dredged and/or existing authorized location, depth, and width.
- 3. Policy:** Allow dredging in locations where a comprehensive management plan has been evaluated and authorized by local and state governmental entities.
- 4. Policy:** Design and locate new development to avoid, or if that is not possible, to minimize the need for new and maintenance dredging.
- 5. Policy:** Conduct dredging in such a manner as to minimize damage to natural systems in both the area to be dredged and the area for deposit of dredged materials.
- 6. Policy:** Dispose of the dredged material at an approved disposal site when chemicals are present in concentrations high enough to cause significant harm to resident biota.
- 7. Policy:** Plan and conduct dredging to minimize interference with navigation and adverse impacts to other shoreline uses, properties and values.
- 8. Policy:** Allow dredging of less than five hundred (500) cubic yards as part of ecological restoration or enhancement, beach nourishment, public access or public recreation as an exemption; Provided such dredging is otherwise consistent with the policies and provisions of this master program.
- 9. Policy:** Dredging should be limited to the following activities through a conditional use permit:
  - A. In conjunction with a water-dependent use of water bodies or adjacent shorelands.
  - B. In conjunction with a bridge, navigational structure or wastewater treatment facility for which there is a documented public need and where other feasible sites or routes do not exist.
  - C. Maintenance of irrigation reservoirs, drains, canals or ditches for agricultural and stormwater purposes.

- D. Maintenance dredging of established navigation channels and basins is restricted to maintaining previously dredged and/or existing authorized location, depth and width.
- E. Expanding, relocating or reconfiguring navigation channels where necessary to assure safe and efficient accommodation of existing navigational uses.
- F. Removal of gravel for flood management purposes consistent with an adopted flood hazard reduction plan and only after a biological and geomorphological study demonstrates that extraction has a long-term benefit to flood hazard reduction, does not result in a net loss of shoreline ecological processes and functions and is part of a comprehensive flood management solution.
- G. Restoration or enhancement of shoreline ecological processes and functions benefiting water quality and/or fish and wildlife habitat.
- H. Minor trenching to allow the installation of necessary underground pipes or cables if no alternative, including boring, is feasible, and:
  - 1) Impacts to fish and wildlife habitat are avoided to the maximum extent possible.
  - 2) The utility installation does not increase or decrease the natural rate, extent or opportunity of channel migration.
  - 3) Appropriate best management practices are employed to prevent water quality impacts or other environmental degradation.~~[AC121]~~

## **17.70.540 Grading and Fill - Policies**

1. **Policy:** Design and locate shoreline developments to avoid or, if that is not possible, to minimize the need for fill.
2. **Policy:** Use mitigation sequencing to limit the size and location of fills. Limit the size of fills and, when allowed, minimize its potential adverse impacts.
3. **Policy:** Design and locate shoreline fills to avoid loss of ecological values or natural resources, and to avoid creating a risk of significant injury to life or adjacent property.
4. **Policy:** Design the perimeter of a fill to avoid or eliminate erosion and sedimentation impacts, both during initial landfill activities and over time. Natural appearing and self sustaining control methods are preferred over structural methods.
5. **Policy:** Fills should be located, designed, and constructed to protect shoreline ecological functions and ecosystem-wide processes, including channel migration.
6. **Policy:** Fills waterward of the ordinary high-water mark should be allowed only when necessary to support:
  - A. A water-dependent use.
  - B. A public access.
  - C. Cleanup and disposal of contaminated sediments as part of an interagency environmental clean-up plan.
  - D. Disposal of dredged material considered suitable under and conducted in accordance with the dredged material management program of the Department of Natural Resources.

E. Expansion or alteration of transportation facilities of statewide significance currently located on the shoreline and then only upon a demonstration that alternatives to fill are not feasible,

F. Mitigation action.

G. Environmental restoration.

H. Beach nourishment.

I. Enhancement project.

**7. Policy:** Prohibit the placement of fill in floodways or wetlands, unless part of an approved ecological restoration activity.<sup>[AC122]</sup>

## **17.70.550 Floats (Recreational) - Policies**

**1. Policy:** Insure that permits for recreational float projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000 and Section 17.70.

**2. Policy:** Individual shoreline residents should consider joint-use or community recreational floats.

**3. Policy:** Give preference in permitting to community recreational floats in new subdivisions or planned residential developments over those for individual properties.

**4. Policy:** Apply the pier and dock policies of Section 17.61 to recreational floats.<sup>[AC123]</sup>

## **17.70.560 Forestry/Mining - Goals and Policies**

**Policy:** Resource areas for forestry and mining activities are designated in appropriate areas outside the UGA and outside critical areas and shoreline areas. Forestry and mining activities are incompatible with goals for Lacey's shoreline areas. Prohibit forestry and mining activities within any shoreline environment designation.

## **17.70.570 Historical and Archeological - Goals and Policies**

**1. Goal:** Preserve cultural artifacts as they are discovered and identified during the development process.

**A. Policy:** Coordinate development review within the shoreline with the Washington Department of Archaeology and Historic Preservation, Certified Local Governments, and affected Indian tribes regarding historic or archaeological interest.

**B. Policy:** Report the discovery of a historic or prehistoric site during excavation or development to the Washington Department of Archeology and Historic Preservation and to the affected Indian tribes.

**2. Goal: Preserve examples of structures from Lacey's history for the education and enjoyment of future citizens.**

**A. Policy:** Encourage the enrollment of historic structures or sites on the federal, state or local historic registers.<sup>[AC124]</sup>

## **17.70.580 Instream Structures, Dikes and Levees - Goals and Policies**

**1. Goal: Protect and preserve natural systems and functional values while providing some limited flexibility to intervene with improvements to natural systems where necessary to protect the public's health and safety.**

**A. Policy:** When dikes, levees and instream structures are allowed, compliance with the mitigation sequence should be required to assure there will be a loss of fish and wildlife resources, natural systems including wetlands, or other critical areas and ecological functions. If compensatory mitigation is necessary, dikes, levees and instream structures should be subject to the following:

- 1) The mitigation required should be commensurate to the value and type of resource or system lost. No net loss in ecological function, value or acreage shall occur from such development.
- 2) Where mitigation for loss of ecological functions is required, a mitigation plan should be prepared by the applicant/proponent that details the objectives of the mitigation activities.
- 3) Mitigation activities should be monitored to determine the effectiveness of the mitigation plan. Monitoring should be accomplished by a third party subject to the approval of the City/County and the Department of Ecology. Results of monitoring shall be publicly available.
- 4) If mitigation is found to be ineffective, corrective action that satisfies the mitigation objectives should be required of the proponent.
- 5) If the mitigation is found to be inadequate or if adequate mitigation is determined to be impossible, the application should be denied.

## **17.70.600 Parking - Goals and Policies**

For Parking Goals and Policies, see Section 17.70.

**1. Goal: Achieve a proper balance in providing parking for public shoreline access points while deemphasizing use of the automobile and reducing associated impacts on shoreline areas and adjacent residential neighborhoods.**

**A. Policy:** Management of public access sites should have an emphasis on reduction of drive alone vehicles and associated impacts. Design should mitigate impacts from automobile use and infrastructure on sensitive areas and adjacent neighborhoods.

**B. Policy:** Emphasize reduction in automobile parking pursuant to Chapter 16.72, Table 16T-13, of the Lacey zoning code.

**C. Policy:** Parking should be the least amount necessary to serve the intended use.

**D. Policy:** Encourage availability of alternative forms of transportation for uses located within shoreline jurisdiction. Encourage design emphasis in walking and biking consistent with the Comprehensive Land Use Plan.

**E. Policy:** Where public access points have limited parking facilities, measures should be taken to discourage use of adjacent residential streets for parking.

**F. Policy:** Allow parking within the shoreline jurisdiction only for an authorized use.

**G. Policy:** Design and construct parking facilities to minimize off-site light and glare.

**H. Policy:** Locate parking facilities as far landward of the ordinary high water mark as possible. Where possible, parking and road infrastructure should be located outside shoreline jurisdiction in an upland area and buffered from adjacent residential neighborhoods.

**I. Policy:** Link parking facilities with the shoreline uses they serve with walkways.[AC125]

## **17.70.610 Piers and Docks - Policies**

**1. Policy:** Recognize that there will be few opportunities, if any, for marine piers/docks in Lacey, unless developed, owned and managed by the City of Lacey.

**2. Policy:** Ensure that permits for pier and dock projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.000.

**3. Policy:** Give preference in permitting to moorage buoys and to community piers, docks and floats in new subdivisions or planned residential developments over those for individual properties.

**4. Policy:** Require applications for piers and docks on individual properties to provide the following:

**A.** Document why a moorage buoy or recreational float would not provide suitable access to the water; and

**B.** Describe the mitigation to be provided so that the project will not cause a net loss in shoreline ecological functions.

**C.** Consideration of shared moorage.

**5. Policy:** Design and locate piers and docks to minimize obstructions to scenic views and conflicts with recreational boaters and fishermen.

**6. Policy:** Locate piers and docks so as to:

- A. Cause minimum interference with navigable waters and the public's use of the shoreline; and
- B. Avoid locations where they will adversely impact shoreline ecological functions or processes, including currents and littoral drift, water circulation and quality, and fish and wildlife habitat.

- 7. **Policy:** Construct piers and docks of materials that will not adversely affect water quality or aquatic plants and animals over the long-term.
- 8. **Policy:** Minimize the length and size of any dock, pier or float.
- 9. **Policy:** Use materials that will allow light to pass through the deck for walkways or gangplanks in nearshore areas.
- 10. **Policy:** Encourage the development of public fishing piers, underwater fishing reefs, and access to public waters and tidelands as part of an overall recreation plan or development.

## **17.70.620 Recreation - Goals and Policies**

- 1. **Goal: Integrate planning for public recreation needs and access to shoreline areas with the City's Comprehensive Plan for Outdoor Recreation and Public Access Plan and the Comprehensive Land Use Plan.**

- A. **Policy:** Acknowledge a priority for recreational development along shorelines.
- B. **Policy:** Link shoreline parks and public access points through open spaces, public land, designated sensitive and resource areas and other areas that are pedestrian and neighborhood focus points. Such linkage can include hiking paths, public parks, designated tree tracts, open space in plats, sensitive areas and buffers, bicycle paths, and scenic drives/walks located close to the water's edge.
- C. **Policy:** Encourage the development of public fishing piers, underwater fishing reefs, and access to public waters and tidelands as part of a city recreation plan, or private development.
- D. **Policy:** Acquisition priority should consider need and special opportunities as well as access by public and other modes of transit.

- 2. **Goal: Provide public access and recreation opportunities within shoreline areas appropriate for the use as identified within the City Comprehensive Plan for Outdoor Recreation, Shorelines Public Access Plan, and Shoreline Environment Designation.**

- A. **Policy:** Consider all recreational development projects on the basis of their compatibility with the environment.
- B. **Policy:** Plan public access to recreational locations to prevent concentration of use pressures and avoid use conflicts.
- C. **Policy:** Design recreational developments to preserve, enhance, or create scenic views and vistas. Ensure that the design of recreational projects complement their environment.

**D. Policy:** Locate parking areas for recreation upland, away from the immediate edge of the water and recreational beaches. Link the parking to the shoreline by walkways. See Section 17.60.020.

**E. Policy:** Allow facilities for intensive recreational activities only where sewage disposal and pest control can be accomplished to meet public health standards without having an adverse impact upon the environment.

**F. Policy:** Allow passive recreational uses in floodplains as long as ecological processes and functions are maintained and the use does not require structures or public infrastructure.

**G. Policy:** Assure that recreational development is given priority and is primarily related to access to, enjoyment of and use of the water and shorelines of the state.

**H. Policy:** Design of public access points should consider the context of the neighborhood in which it is located and the expected parking demand. Large public recreation sites for active use should have upland parking to accommodate the recreation use. However, smaller access or observation points associated with a walking trail may not require any parking.

**I. Policy:** Reduced or limited parking may be a strategy to limit automobile use and maintain existing neighborhood character. Such areas should be closely monitored to assess impact of user parking on adjacent residential streets.

## **17.70.630 Revetments and Gabions - Policies**

**1. Policy:** Insure that permits for revetment and gabion projects address the goals, policies and development standards within the Shoreline Ecological Function Chapter 17.40.

**2. Policy:** Apply the bulkhead policies listed in Section 17.51 to revetments and gabions.

## **17.70.640 Scientific or Education – Goals, Policies**

**1. Goal:** Provide opportunities for the scientific community to study shoreline processes and functions without long term impact to these resources.

**A. Policy:** Conduct scientific studies and educational uses of the shoreline in a way to minimize impacts in accordance with the applicable environmental designations.

**B. Policy:** Require a shoreline permit for scientific and educational activities which may significantly affect water quality or natural systems.

**C. Policy:** Scientific or educational uses and activities are limited to those which will not:

- 1) Jeopardize existing wildlife populations or organisms;
- 2) Permanently alter the character of biological habitats; and
- 3) Degrade the character of the shoreline environment in which they are located.

**D. Policy:** Temporary disruptions of biological systems may be permitted when a scientific activity will result in their restoration or improvement and sustain requirements for no net loss of ecological function.

**E. Policy:** Permits encompassing a variety of scientific or educational activities over an extended period of time may be granted provided that limits on the duration of approval are established.<sup>[AC126]</sup>

## **17.70.650 Signage - Goals and Policies**

### **1. Goal: Provide aesthetically attractive shorelines free from clutter of signage.**

<sup>[AC127]</sup>

**A. Policy:** Prohibit billboards within all shoreline environment designations.

**B. Policy:** Only authorize signs consistent with the residential and public use of shorelines. Signs will generally be limited to municipal traffic, municipal pedestrian circulation, and small private signage providing circulation, location and use information to the public necessary for the use and enjoyment of shoreline facilities/area.

**C. Policy:** Design and locate signs to insure compatibility with the shoreline environment designation, and adjacent land and water uses.

## **17.70.660 Transportation - Goals and Policies**

### **Goal: Integrate the Lacey Transportation Plan into transportation planning for lands under shoreline jurisdiction.**

**A. Policy:** Rely upon the transportation map within the Transportation Element of the City of Lacey Comprehensive Land Use Plan to identify new transportation crossings or corridors within shoreline areas.

### **2. Goal: Protect shoreline resources by keeping road infrastructure out of shoreline areas whenever possible.**

**A. Policy:** Locate arterials, freeways, and railways outside of shoreline jurisdiction unless there are no feasible alternatives.

**B. Policy:** If necessary to locate in shoreline jurisdiction, roads, shared use paths, and railroads should be located as far landward as possible.

### **3. Goal: Ensure impacts are mitigated when there is no feasible alternative to locating needed transportation infrastructure in shoreline jurisdiction.**

**A. Policy:** Use mitigation sequencing per Section 17.40.015 to locate new transportation corridors and facilities within shoreline jurisdiction.



**B. Policy:** Roads, shared use paths, and railroads should be designed, constructed and maintained to minimize erosion and to permit natural movement of ground water and flood waters.

**C. Policy:** Piers and bridges are preferred to the placement of fill within the shoreline jurisdiction for roads, shared use paths, and railroad crossings.

**D. Policy:** Construction debris, overburden, and other waste materials should be disposed of in such a way as to prevent their entry into any surface water body by erosion from runoff, high water, or other means.

## **17.70.670 Utilities - Goals and Policies**

### **1. Goal: Provide opportunity for utilities serving shoreline areas while respecting the special function of these resource areas and maintaining their natural beauty.**

**A. Policy:** Locate utilities outside of shoreline jurisdiction unless there are no feasible alternatives. When necessary, locate them as far landward as possible and preserve the natural landscape, shoreline ecology, and minimize conflicts with present and planned land uses. Choose locations that do not obstruct or destroy scenic views whenever utilities must be placed in a shoreline area.

**B. Policy:** Place utilities underground and design them to do minimal damage to the aesthetic qualities of the shoreline area. Where compelling reasons exist to place utilities above ground based upon impacts to ecological functions or values, this may be permitted with full mitigation of aesthetic impacts.

### **2. Goal: Provide for the utility needs of authorized uses within shoreline jurisdiction while minimizing impacts to the environment and to the values and functions of the shoreline resource.**

**A. Policy:** When utility placement occurs within shorelines, restore banks to their pre-project configuration, replant with native species, and maintain the site until the new vegetation is established.

**B. Policy:** Design and locate sewage treatment, water reclamation, desalinization and power plants and associated infrastructure so as to be compatible with and not to interfere with recreational, residential or other public uses of the water and shorelands.

**C. Policy:** Recycling or land disposal of sewage wastes is preferred to new sewage outfalls to shoreline waterbodies. Where no alternative to outfalls into water exist, the location is to be part of a management plan.

**D. Policy:** Use utility rights-of-way for public access to and along shoreline waterbodies where feasible.

**E. Policy:** Where utilities must cross a body of water, design and construct bridge-like structures for above water crossing of utilities or bore utilities rather than using trenching with fill.

- G. Policy:** Mitigation sequencing per Section 17.40.015 should apply when locating new utility corridors within shoreline areas. Co-locate new major transmission facilities along existing utility corridors where possible.

## **17.70.680 Water Quality - Goals and Policies**

**1. Goal: Protect water quality and aquatic habitat with all new shoreline development.**

**2. Goal: Achieve a high level of protection and wise management of surface and ground water resources with a variety of strategies that consider larger drainage basin issues as well as site specific techniques designed to treat runoff on site.**

- A. Policy:** Utilize a drainage manual that meets all state requirements and provides a range of low impact development options and techniques that will help achieve water quality goals.

- B. Policy:** Locate, design, construct, and maintain shoreline uses and activities to avoid ecological impacts from altering water quality, quantity, or hydrology.

- C. Policy:** Utilize setbacks and vegetation management areas, and encourage low-impact development techniques and materials where practical to lessen impacts from shoreline use and development on water quality.

- D. Policy:** Plan land use and put in place development standards that work with and respect natural drainage features and functions. Emphasize utilization of development techniques that do not alter natural drainage patterns or disrupt natural recharge processes. Where necessary ensure measures for controlling erosion, stream flow rates, or flood waters are located, designed, constructed and maintained to preserve and improve existing water quality.

- E. Policy:** The City will seek to improve water quality, quantity, and flow characteristics in order to protect and restore ecological functions and ecosystem-wide processes of shorelines within Shoreline Management Act jurisdiction. This will be implemented through the regulation of development and activities, through the design of new public works, such as roads, drainage, and water treatment facilities, and through coordination with other local, state, and federal water quality regulations and programs.

- F. Policy:** Discourage uses and activities in shoreline or other sensitive areas that may pose a risk of contamination of ground or surface waters, such as:

- 1) Storage, disposal, or land application of waste (excluding secondary/tertiary treated effluent from municipal sewer systems), including solid waste landfills;**
- 2) Operations for confinement feeding of animals;**
- 3) Junk yards and auto wrecking yards;**
- 4) Storage of hazardous or dangerous substances within a floodplain; and**
- 5) Alterations to structures and uses served by septic systems that do not meet state septic requirements.**

**3. Goal: Establish lake management districts for our lakes to improve water quality and natural function and values of these resource areas.**

- F. Policy:** Encourage and provide support to land owners surrounding our lakes to establish lake management districts.

**B. Policy:** Provide technical support to lake management districts to help in technical issues once lake management districts are formed.

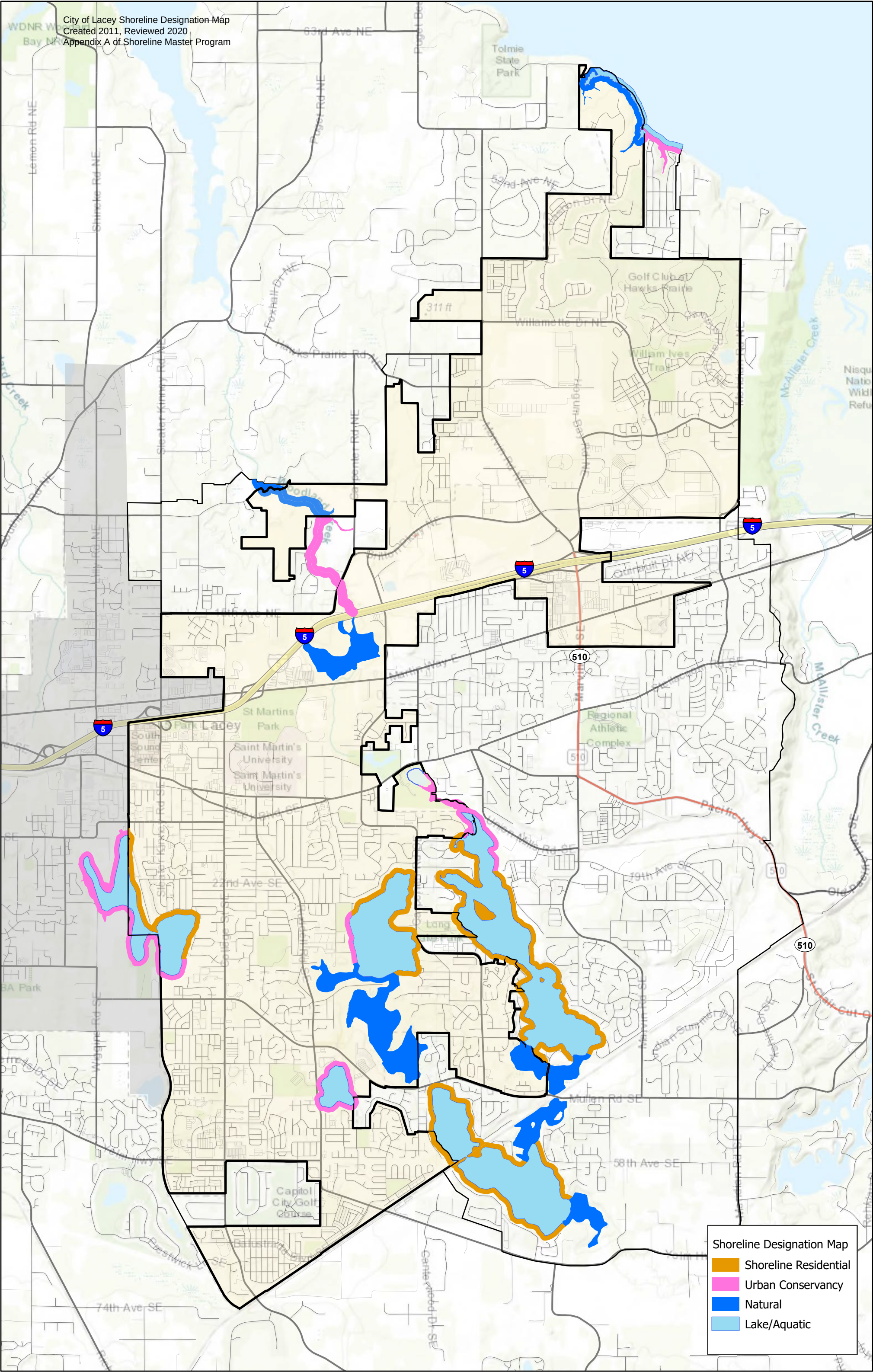
# ~~PART FOUR:~~

# ~~APPENDICES~~ [AC128]

## Appendix A: SMP Map







City of Lacey Shoreline Designation Map  
Created 2011, Reviewed 2020  
Appendix A of Shoreline Master Program

Shoreline Designation Map

- Shoreline Residential
- Urban Conservancy
- Natural
- Lake/Aquatic



ORDINANCE NO. 1585

CITY OF LACEY

AN ORDINANCE OF THE CITY OF LACEY RELATED TO UPDATES TO THE SHORELINE MASTER PROGRAM, ADOPTING THE 2021 SHORELINE MASTER PROGRAM, AMENDING SECTIONS 14.26.010, 14.28.280, 16.19.040, AND 16.19.050, ALL OF THE LACEY MUNICIPAL CODE, AND APPROVING A SUMMARY FOR PUBLICATION.

WHEREAS, The Washington State Shoreline Management Act requires the City to review and revise its Shoreline Master Program (SMP) periodically; and

WHEREAS, City of Lacey staff have conducted a review of the City's SMP; and

WHEREAS, staff have identified potential revisions to the SMP that would keep it current with changes in State law and other applicable rules; and

WHEREAS, a joint public hearing and formal comment period with the Washington State Department of Ecology was held in October 2020, and public comments were received and considered; and

WHEREAS, staff has recommended revisions to the SMP; and

WHEREAS, the Washington State Department of Ecology has determined that the City's proposed revisions are consistent with the policy and standards of RCW 90.58.020 and RCW 90.58.090 and the applicable SMP guidelines; and

WHEREAS, the City Council finds that the approval of such revisions will be in the public interest.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

Section 1. That certain document entitled City of Lacey Shoreline Master Program, March 2021 is hereby adopted as the Shoreline Master Program for the City of Lacey.

Section 2. Section 14.26.010 of the Lacey Municipal Code is hereby amended as follows:

14.26.010 Adopted.

There is adopted and by this reference made a part of this chapter as though fully set forth herein, at length, those certain plans, rules and regulations known as the "City of Lacey Shoreline Master Program, ~~September~~March, 2011~~2021~~" as the master program for the regulation and development of the shorelines within the jurisdiction of the city, subject to the supplemental local ordinance contained within this code.

Section 3. Section 14.28.280 of the Lacey Municipal Code is hereby amended as follows:

14.28.280 Wetland buffers—Standard buffer zone widths.

A. Wetland buffer zones shall be required for all regulated activities adjacent to regulated wetlands. Any wetland created, restored or enhanced as compensation for approved wetland alterations shall also include the standard buffer required for the category of the created, restored, or enhanced wetland. All buffers shall be measured from the wetland boundary as surveyed in the field pursuant to the requirements of LMC 14.28.090.

B. The width of the wetland buffer zone shall be determined according to wetland category, the proposed land use and the wetland's identified functions and values.

~~Criteria for determination of the appropriate category of wetland and functions and values shall be as identified in the publication used by the Department of Ecology for wetland protection and impact mitigation; Wetlands in Washington State Volume 2—Protecting and Managing Wetlands Appendix 8-C. The specific strategy to be applied from this section shall be the “Modified Buffer Widths in Alternative 3 Using a Graduated Scale for the Habitat Functions (Alternative 3A).”~~

This methodology shall be applied except when the community and economic development director, through consultation with the Department of Ecology, determines that another methodology better addresses best available science and/or the specific circumstances of the wetland and wetland protection needs.

C. Where an area of a wetland may be classified under more than one category, the category having the greatest buffer area shall apply. These buffer widths presume that buffer area is comprised of relatively intact native vegetation community adequate to protect the wetland functions at values at the time of the proposed activity. If the vegetation is not adequate, then the buffer width may need to be increased or planted to maintain the standard width. Buffer width required for points identified pursuant to the Department of Ecology wetland rating system. (See Table 14T-19).

1. For wetlands that score 6 or more points for habitat function, the following conditions must be maintained in order to use the standard buffers, as follows:

a. If an existing, relatively undisturbed vegetated corridor at least 100 feet wide exists between the on-site wetland and other Priority Habitats, as defined by the Washington State Department of Fish and Wildlife, and the off-site portion of the corridor is already protected via an existing conservation easement, critical areas regulations, or other legal requirement, the portion of the corridor on-site must also be protected by a similar legal protection. All other applicable criteria found in C.2 must also be met. The evaluation of presence or absence of the conditions described above must be completed as part of the critical areas report.

b. If no such corridor is present to protect, the standard buffers alone may be used with the other applicable criteria contained in this section. If an option for protection



of a corridor, as defined under (a) above, exists on the parcel, but is not provided, standard buffer widths must be increased by 33%.

2. The buffer widths in Table 14T-19 assume that the buffer is vegetated with a native plant community appropriate for the ecoregion. If the existing buffer is unvegetated, sparsely vegetated, or vegetated with invasive species that do not perform needed functions, the buffer should either be planted to create the appropriate plant community or the buffer should be widened to ensure that adequate functions of the buffer are provided.

| <b>Points for Habitat<br/>from Wetland Rating Form</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> |
|--------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| Alternative 3A High Intensity                          | 80       | 100      | 140      | 180      | 220      | 260      | 300      |
| Alternative 3A Low Intensity                           | 60       | 75       | 105      | 135      | 165      | 195      | 225      |

a. Table 14T-19. Wetland Buffer Table.

| <b>Wetland Category<br/>and Type</b>                   | <b>Buffer Width (in feet) Based on Habitat Score</b>     |                     |                   |
|--------------------------------------------------------|----------------------------------------------------------|---------------------|-------------------|
|                                                        | <b>3- 5 (Low)</b>                                        | <b>6-7 (Medium)</b> | <b>8-9 (High)</b> |
| <u>I: Estuarine and Coastal lagoons</u>                | <u>150</u><br>(buffer width not based on habitat scores) |                     |                   |
| <u>I: Bogs and Wetlands of High Conservation Value</u> | <u>190</u>                                               |                     | <u>225</u>        |
| <u>I: All others</u>                                   | <u>75</u>                                                | <u>110</u>          | <u>225</u>        |
| <u>II: Estuarine and Coastal lagoons</u>               | <u>110</u><br>(buffer width not based on habitat scores) |                     |                   |
| <u>II: All</u>                                         | <u>75</u>                                                | <u>110</u>          | <u>225</u>        |
| <u>III: All</u>                                        | <u>60</u>                                                | <u>110</u>          | <u>225</u>        |
| <u>IV: All</u>                                         | <u>40</u>                                                |                     |                   |

b. Table 14T-68. Required measures to minimize impacts to wetlands (Measures are required, where applicable to a specific proposal. If not implemented, wetland buffers as indicated in Table 14T-69 will be used.

| <b><u>Disturbance</u></b> | <b><u>Required Measures to Minimize Impacts</u></b>                                                                                                                                                                                                                                                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Lights</u>             | <ul style="list-style-type: none"> <li><u>Direct lights away from wetland</u></li> </ul>                                                                                                                                                                                                                                                                                    |
| <u>Noise</u>              | <ul style="list-style-type: none"> <li><u>Locate activity that generates noise away from wetland</u></li> <li><u>If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source</u></li> <li><u>For activities that generate relatively continuous, potentially disruptive noise, such as certain heavy industry or mining,</u></li> </ul> |

| <u>Disturbance</u>                | <u>Required Measures to Minimize Impacts</u>                                                                                                                                                                                                                                                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <u>establish an additional 10' heavily vegetated buffer strip immediately adjacent to the outer wetland buffer</u>                                                                                                                                                                                                                           |
| <u>Toxic runoff</u>               | <ul style="list-style-type: none"> <li>• <u>Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered</u></li> <li>• <u>Establish covenants limiting use of pesticides within 150 ft of wetland</u></li> <li>• <u>Apply integrated pest management</u></li> </ul>                                            |
| <u>Stormwater runoff</u>          | <ul style="list-style-type: none"> <li>• <u>Retrofit stormwater detention and treatment for roads and existing adjacent development</u></li> <li>• <u>Prevent channelized flow from lawns that directly enters the buffer</u></li> <li>• <u>Use Low Intensity Development techniques (per PSAT publication on LID techniques)</u></li> </ul> |
| <u>Change in water regime</u>     | <ul style="list-style-type: none"> <li>• <u>Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns</u></li> </ul>                                                                                                                                                                           |
| <u>Pets and human disturbance</u> | <ul style="list-style-type: none"> <li>• <u>Use privacy fencing OR plant dense vegetation to delineate buffer edge and to discourage disturbance using vegetation appropriate for the ecoregion</u></li> <li>• <u>Place wetland and its buffer in a separate tract or protect with a conservation easement</u></li> </ul>                    |
| <u>Dust</u>                       | <ul style="list-style-type: none"> <li>• <u>Use best management practices to control dust</u></li> </ul>                                                                                                                                                                                                                                     |

c. Table 14T-69. The following wetland buffer requirements if habitat corridor is not provided per LMC 14.28.280.C(1) or minimization measures per LMC 14.28.280.C.2(b) are not implemented:

| <u>Wetland Category and Type</u>                       | <u>Buffer Width (in feet) Based on Habitat Score (if minimization measures are not met)</u> |                     |                   |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------|-------------------|
|                                                        | <u>3- 5 (Low)</u>                                                                           | <u>6-7 (Medium)</u> | <u>8-9 (High)</u> |
| <u>I: Estuarine and Coastal Lagoons</u>                | <u>200</u><br><u>(buffer width not based on habitat scores)</u>                             |                     |                   |
| <u>I: Bogs and Wetlands of High Conservation Value</u> | <u>250</u>                                                                                  |                     | <u>300</u>        |
| <u>I: All others</u>                                   | <u>100</u>                                                                                  | <u>150</u>          | <u>300</u>        |
| <u>II: Estuarine and Coastal Lagoons</u>               | <u>150</u><br><u>(buffer width not based on habitat scores)</u>                             |                     |                   |
| <u>II: All</u>                                         | <u>100</u>                                                                                  | <u>150</u>          | <u>300</u>        |
| <u>III: All</u>                                        | <u>80</u>                                                                                   | <u>150</u>          | <u>300</u>        |
| <u>IV: All</u>                                         | <u>50</u>                                                                                   |                     |                   |

Section 4. Section 16.19.040 of the Lacey Municipal Code is hereby amended as follows:

#### 16.19.040 Residential Form Permitted.

##### A. Land Form Generally:

Within the 200 foot shoreline jurisdiction, the form of urban residential development shall be designed to be compatible with the shoreline environment. The ~~S~~shoreline Master Program, Chapter ~~17.63~~17.26 LMC-Residential Development provides ~~residential requirements~~standards for said development within the Shoreline Zone.

##### B. Innovative Concepts Encouraged:

Concepts that use unique or innovative designs to achieve the goals of Lacey's Shoreline Master Program are encouraged and will be allowed flexibility in meeting design standards to achieve this objective.

##### C. Housing Forms:

A range of housing options will be permitted for projects that are compatible with shoreline resources, meet GMA goals and provide a quality residential environment. To achieve urban density and environmental compatibility, this may include attached and compact housing forms and clustering concepts.

##### D. Compact Housing and Clustered Housing Forms Encouraged:

Compact housing forms that consolidate large areas of open space by reducing individual lot size and clustering units is encouraged. This provides the opportunity for a design that can achieve a higher level of compatibility with the shoreline environment and provide open space concepts for public and private use.

##### E. Clustering Housing Forms Encouraged:

Clustering of residential units may use an attached development concept or a compact detached form of housing. Housing forms that utilize compact low impact design to achieve the goals of Lacey's Shoreline Master Program for integration, compatibility with natural shoreline processes and environmental sensitivity are preferred. This can include condominium, townhome, courtyard, cottage designs and other innovative housing forms that accomplish the same objectives.

##### F. Design with Nature:

Design shall incorporate natural physical topographic profiles to work with the site's natural components, without impact to functions and values identified in the inventory, analysis and classification of the subject reach.

##### G. Least Impact:

For projects that include more than one residential unit, or a land division of property, design with least impact to the environment may require a clustering concept to minimize site

disturbance and impervious area. This will include common facilities that provide use of shoreline resources for residents and also minimize impact and physical alteration of shoreline area.

Section 5. Section 16.19.050 of the Lacey Municipal Code is hereby amended as follows:

16.19.050 Conformance with Shoreline Master Program Requirements.

All requirements of Chapter ~~17.63~~17.25 LMC Residential Development of the SMP shall be satisfied.

Section 6. SEVERABILITY. If any section, sentence, clause or phrase of this ordinance should be held to be invalid by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this ordinance.

Section 7. CORRECTIONS. The City Clerk and the codifiers of this ordinance are authorized to make corrections to this ordinance including, but not limited to, the corrections of scrivener's/clerical errors, references, ordinance numbering, section/subsection number and any references thereto.

Section 8. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, at a regularly-called meeting thereof, held this 18<sup>th</sup> day of March, 2021.

CITY COUNCIL

By: \_\_\_\_\_  
Mayor

Approved as to form:

\_\_\_\_\_  
City Attorney

Attest:

\_\_\_\_\_  
City Clerk

SUMMARY FOR PUBLIC ATION  
ORDINANCE NO 1585  
CITY OF LACEY

The City Council of Lacey, Washington passed on arch 18, 2021, Ordinance No. 1585, entitled “AN ORDINANCE OF THE CITY OF LACEY RELATED TO UPDATES TO THE SHORELINE MASTER PROGRAM, ADOPTING THE 2021 SHORELINE MASTER PROGRAM, AMENDING SECTIONS 14.26.010, 14.28.280, 16.19.040, AND 16.19.050, ALL OF THE LACEY MUNICIPAL CODE, AND APPROVING A SUMMARY FOR PUBLICATION.”

The main points of the Ordinance are described as follows:

1. The Ordinance adopts the 2021 City of Lacey Shoreline Master Program.
2. The Ordinance amends several sections of the Lacey Municipal Code as part of updates to the Shoreline Master Program.
3. The Ordinance approves this summary for Publication.

A copy of the full text of this Ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: March 22, 2021

## **SUMMARY OF HEARINGS EXAMINER REPORT TO CITY COUNCIL**

**SUBJECT:** Project #19-353 – Planned Residential Development and Site Plan Review for Griffin Multifamily

**DESCRIPTION OF PROPOSAL:** Request for approval to develop a 183-unit multi-family complex consisting of twelve (12) apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential.

**SUMMARY OF CONCLUSIONS:** The Hearing Examiner conducted a public hearing on Monday, February 8, 2021. The hearing was held as a zoom webinar that allowed for public testimony. All hearing notices provided information necessary for the public and interested parties to attend the virtual hearing. Staff and the applicant provided testimony about the project. No members of the community attended the public hearing, several neighbors submitted comments regarding tree removal, traffic and school impacts, stormwater design, and housing affordability. Topics of discussion at the hearing included: open space, stormwater management, traffic mitigation, and tree protection.

The Hearings Examiner has recommended approval of the planned residential development and site plan review applications. The conditions of approval recommended to the City Council for the project are substantially as recommended by City staff. Staff is requesting the Council approve the proposal including adoption of findings, conclusions and conditions outlined in the written recommendation of the Hearings Examiner dated February 23, 2021.

**ACTION OPTIONS FOR CITY COUNCIL:** The City Council may take one of the following actions:

1. Approve the recommendation of the Hearings Examiner.
2. Reverse the decision of the Hearings Examiner.
3. Modify the recommendation of the Hearings Examiner.

Any decision to modify or reject the Examiner's decision shall be made based on the open record hearing and supported by findings of fact and conclusions.



## HEARINGS EXAMINER RECOMMENDATION

The Hearings Examiner has made a recommendation on the following:

Project# 19-353: Griffin Multi-family - SW Olympia, LLC is proposing to develop a 183-unit multi-family complex consisting of twelve (12) apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential.

This is a recommendation to the City Council and will be considered by the Council at 7:00 p.m. on March 18, 2021 via a virtual Zoom meeting. Information on how to attend a Council meeting can be found at <http://ci.lacey.wa.us/city-government/city-council/city-council-2/city-council-home>.

A copy of the Hearings Examiner's recommendation is available at the Community & Economic Development Department at city hall.

According to the Lacey Municipal Code, Section 2.30.170, the City Council will consider the matter based upon the written record before the Hearings Examiner's decision.

The City Council may accept, modify, or reject the Hearings Examiner's recommendation.

Action of the City Council shall be final and conclusive unless a land use petition is timely filed with the Thurston County Superior Court for the purpose of review of the action taken.

Appeals from a decision to grant, deny or rescind a shoreline permit shall be governed by the provisions of RCW Chapter 90.58.

Cc: Parties of Record

**BEFORE THE HEARINGS EXAMINER  
FOR THE CITY OF LACEY**

|                                                    |   |                            |
|----------------------------------------------------|---|----------------------------|
| In the Matter of the Application of                | ) | No. 19-353                 |
|                                                    | ) |                            |
| <b>Jeff Pantier, of Hatton Godat Pantier,</b>      | ) | <b>Griffin PRD and SPR</b> |
| <b>on behalf of Scott Griffin, SW Olympia, LLC</b> | ) |                            |
|                                                    | ) |                            |
| For Approval of a Planned Residential              | ) | FINDINGS, CONCLUSIONS,     |
| <u>Development and Site Plan Review</u>            | ) | AND RECOMMENDATION         |

**SUMMARY OF RECOMMENDATION**

The Hearings Examiner recommends that the Lacey City Council **APPROVE** the proposal for a Planned Residential Development and Site Plan Review. The proposal would entail development of a 12-building, 183-unit, multi-family apartment complex, with associated improvements, on 9.54 acres at 7201, 7203, and 7235 32nd Avenue NE. Conditions are necessary to mitigate specific impacts of the proposed development.

**SUMMARY OF RECORD**

Hearing Date:

The City of Lacey Hearings Examiner held an open record hearing on the request on February 8, 2021, using remote technology due to the ongoing COVID-19 pandemic.

Testimony:

The following individuals presented testimony under oath at the open record hearing:

Jeff Pantier, Applicant Representative  
Lance Talmadge, Project Civil Engineer  
Chris Aldrich, Project Landscape Architect  
Greg Heath, Project Traffic Engineer  
Samra Seymour, City Senior Planner  
Doug Christenson, City Stormwater Engineer  
Martin Hoppe, City Transportation Manager

Exhibits:

The following exhibits were admitted into the record:

1. List of Exhibits
2. Staff Report, dated February 8, 2021
3. General Land Use Application, dated June 10, 2020
4. Site Plan Review Supplemental Application, dated June 10, 2020

*Findings, Conclusions, and Recommendation*  
*City of Lacey Hearings Examiner*  
*Griffin PRD and SPR*  
*No. 19-353*



5. Preliminary Planned Residential Development Supplemental Application, dated June 10, 2020
6. SEPA Environmental Checklist, dated May 22, 2020
7. Transportation Impact Analysis, Heath and Associates, Inc., dated June 2020
8. Preliminary Stormwater Drainage Report, Helena Gubbels, EIT, dated May 11, 2020
9. Preliminary Tree Protection Plan, Washington Forestry Consultants, Inc., dated August 21, 2020
10. Preliminary Site Plan (Sheet 1 of 14), dated May 2020
11. Preliminary Civil Plans:
  - a. Preliminary Horizontal Control Plan (Sheet 2 of 14), dated May 2020
  - b. Preliminary Demo & Erosion Control Plan (Sheet 3 of 14), dated May 2020
  - c. Preliminary Soil Profiles – ‘A’ Profile (Sheet 4 of 14), dated May 2020
  - d. Preliminary Soil Profiles – ‘B’ Profile (Sheet 5 of 14), dated May 2020
  - e. Preliminary Soil Profiles – ‘C’ Profile (Sheet 6 of 14), dated May 2020
  - f. Preliminary Soil Profiles – ‘D’ Profile (Sheet 7 of 14), dated May 2020
  - g. Preliminary Soil Profiles – ‘E’ Profile (Sheet 8 of 14), dated May 2020
  - h. Preliminary Soil Profiles – ‘F’ Profile (Sheet 9 of 14), dated May 2020
  - i. Preliminary Grading & Drainage Plan (Sheet 10 of 14), dated May 2020
  - j. Preliminary Grading & Drainage Details (Sheet 11 of 14), dated May 2020
  - k. Preliminary Water Plan (Sheet 12 of 14), dated May 2020
  - l. Preliminary Onsite Sewer Plan (Sheet 13 of 14), dated May 2020
  - m. Preliminary Offsite Sewer Plan (Sheet 14 of 14), dated May 2020
12. Preliminary Landscape Plan, dated November 2019
13. Open Space Plan, dated November 2019; Revised Open Space Plan, dated January 2021
14. Open Space Requirements Memorandum, Hatton Godat Pantier, dated October 19, 2020
15. Certification of Public Notice, dated February 4, 2021
16. Notice of Public Hearing
17. Order Confirmation (Notice of Application), *The Olympian*, for publication August 27, 2020, with ad copy
18. Order Confirmation (Notice of Public Hearing), *The Olympian*, for publication January 29, 2021, with ad copy
19. Order Confirmation (Notice of MDNS), *The Olympian*, for publication December 17, 2020, with ad copy
20. Notice of Complete Application, dated August 26, 2020
21. Notice of Application
22. Agency Routing Sheet, dated August 26, 2020
23. Comments from Marci Price, City Land Management Specialist, dated September 9, 2020
24. Comments from Terry McDaniel, City Fire Code Specialist, dated August 27, 2020
25. Comments from Tom Stiles, City Public Works Division, dated September 18, 2020
26. Comments from Doug Christenson, City Stormwater Engineer, dated September 18, 2020
27. Comments from Chris Stolberg, City Transportation Engineer, dated September 9, 2020

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*Griffin PRD and SPR*  
*No. 19-353*

28. Comments from Arthur Saint, Thurston County Public Works, dated September 17, 2020
29. Comments from Washington State Department of Ecology, dated September 9, 2020
30. Email from Chris Stolberg to Chris Aldrich, dated February 2, 2021, with email string
31. Preliminary 32nd Avenue NE Gated Entrance Plan, undated
32. Comments from North Thurston Public Schools, dated December 13, 2019
33. Comment from Leslie McClure, dated September 4, 2020
34. Comment from Kenneth Zych, dated September 4, 2020
35. Comment from “portia,” dated September 6, 2020
36. Comment from Marcie Cleaver, dated September 4, 2020
37. Comment from Jenny and Mike Gessler, dated September 8, 2020
38. Mitigated Determination of Nonsignificance, issued December 16, 2020
39. Excerpts from City of Lacey 2030 Transportation Plan
40. City of Lacey 2021 Transportation Improvement Plan

The Hearings Examiner enters the following findings and conclusions based on the testimony and exhibits admitted at the open record hearing:

## **FINDINGS**

### Application and Notice

1. Jeff Pantier of Hatton Godat Pantier, on behalf of Scott Griffin, SW Olympia, LLC (Applicant), requests approval of a Planned Residential Development and Site Plan Review to allow construction of a 12-building, 183-unit, multi-family apartment complex on three parcels totaling 9.54 acres. Associated amenities would include a central recreation complex, which would have a 3,900 square foot building containing office space, indoor lounge, fitness center and game room, and 6,600 square feet of outdoor recreational space containing a swimming pool, patio deck, covered play area, and BBQ facility. In addition, the proposal would include three tree tracts, totaling 1.33 acres, with pedestrian walking paths and seating areas, as well as a 6,600 square foot fenced dog park within one of the tracts. Associated improvements would include construction of internal driveways and parking areas, street frontage improvements, stormwater management facilities, and landscaping. The property is located at 7201, 7203, and 7235 32nd Avenue NE.<sup>1</sup> *Exhibit 2, Staff Report, pages 1, 2, and 9 through 12; Exhibits 3 through 5; Exhibits 10 through 14.*
2. The City of Lacey (City) determined that the application was complete on August 26, 2020. The same day, the City routed notice of the application to reviewing City departments and government agencies and posted notice at the subject property, with a comment deadline of September 9, 2020. On August 27, 2020, the City published notice in *The Olympian*. On January 29, 2021, the City provided notice of the open record hearing associated with the application by mailing notice to all property owners within

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<sup>1</sup> The property is identified by tax parcel numbers 1180313400, 11803130401, and 1180314300. *Exhibit 2, Staff Report, page 1.* A legal description is included with the application materials. *Exhibit 3.*

300 feet of the property, posting notice at the subject property, and publishing notice in *The Olympian*. *Exhibit 2, Staff Report, page 6; Exhibits 15 through 18; Exhibits 20 through 22.*

3. As detailed below (throughout this recommendation), the City received several comments from reviewing City departments and agencies in response to its notice materials. In addition, the City received several written comments from interested members of the public; specifically:
  - Leslie McClure wrote the City with concerns about the proposal's impacts to existing trees on the property.
  - Kenneth Zych raised concerns about the proposal's traffic and school impacts.
  - Someone identifying themselves as "Portia" submitted comments opposing the development of apartments in the area, generally, noting concerns about overcrowding and traffic.
  - Marie Cleaver submitted comments inquiring about how the project would address stormwater runoff from impervious surfaces, how the project would mitigate for traffic impacts, whether the project would include electric car charging stations, and whether the City has incentives for green building standards. She also suggested that the project include below-market-rate apartment units to serve residents with lower incomes and that the project include certain native species for landscaping improvements.
  - Jenny and Mike Gessler submitted comments inquiring about whether the apartment units would serve high-income or low-income residents. They also raised concerns about the proposal's traffic impacts, particularly to 32nd Avenue NE. In addition, the Gesslers raised concerns about the proposal's impacts to public services, including schools and police and fire services.*Exhibits 33 through 37.*

#### State Environmental Policy Act Review

4. The City Community and Economic Development Department (CEDD) acted as lead agency and analyzed the environmental impacts of the proposal, as required by the State Environmental Policy Act (SEPA), Chapter 43.21C Revised Code of Washington (RCW). The City consolidated notice of the SEPA review process and application comment periods under the optional process provided for by Washington Administrative Code (WAC) 197-11-355, with a comment deadline of September 9, 2020. The notice materials stated that CEDD expected to issue a Determination of Nonsignificance for the project. *Exhibit 2, Staff Report, page 3; Exhibit 15, Exhibit 17; Exhibit 21.*
5. The City received several comments specific to SEPA from reviewing agencies:
  - The Washington State Department of Ecology (DOE) submitted comments noting that: the project site is within an area that may have been contaminated with heavy metals due to emissions from the old Asarco smelter in Tacoma, requiring

additional soil testing and potential cleanup; clean fill must be used for all grading and filling of land; all debris removed from the site must be disposed of at an approved site; and a Construction Stormwater General Permit may be required.

- North Thurston Public Schools No. 3 commented that students residing at the proposed development would be served by South Bay Elementary School, Chinook Middle School, and North Thurston High School. The school district calculated that the Applicant would be required to pay a mitigation fee of \$241,878 to mitigate impacts from the increased demand for services.
- Thurston County Public Works commented that the Applicant would be required to pay \$143 to Thurston County to mitigate traffic impacts from the development.

*Exhibit 28; Exhibit 29; Exhibit 32.*

6. Following the SEPA comment period, CEDD reviewed the comments received in response to its notice materials, the Applicant's Environmental Checklist, and other information on file and determined that, with mitigation, the proposal would not have a significant adverse impact upon the environment. Accordingly, CEDD issued a Mitigated Determination of Nonsignificance (MDNS) on December 16, 2020, with an appeal deadline of December 30, 2020. The next day, the City published notice of the MDNS in *The Olympian*. The MDNS requires the Applicant to pay traffic impact fees to Thurston County; analyze soils on-site for arsenic, lead, and other contaminants and, if contamination of soil is found, take appropriate measures; and implement all mitigation measures volunteered by the developer in their Environmental Checklist. The MDNS was not appealed. *Exhibit 2, Staff Report, page 3; Exhibit 6; Exhibit 28; Exhibit 29; Exhibit 32; Exhibit 38.*

#### Existing Site, Comprehensive Plan, and Zoning

7. The project site consists of three parcels, each of which contains a single-family residence and multiple outbuildings that would be demolished as part of the proposed development. The large eastern parcel that comprises approximately half of the project site is heavily forested. The northwestern parcel contains existing trees along the western property line and other trees scattered throughout. The southwestern parcel also contains existing trees along the western property line but is otherwise largely devoid of trees. The project site is generally flat to gently rolling, with an approximately 3 to 4 percent slope toward the north property line abutting 32nd Avenue NE. No critical areas were identified on or near the project site. *Exhibit 2, Staff Report, page 2; Exhibit 8; Exhibit 9; Exhibit 10.*
8. The City and Thurston County prepared a joint planning document, the "City of Lacey and Lacey Urban Growth Area Comprehensive Plan" (Comprehensive Plan) under the Growth Management Act, to account for long-term growth and planning within the community. The Comprehensive Plan designates the subject property as being within the Hawks Prairie Planning Area, which is characterized as a mix of residential and light

industrial uses. The Comprehensive Plan identifies the Hawks Prairie Planning Area as the planning area with the most potential for economic development, due to extensive vacant land resources, availability of utilities, and proximity to Interstate 5. City staff identified several Comprehensive Plan goals and policies as relevant to the proposed development, which include: ensuring sustainable and wise use of land to provide an adequate amount and mix of housing types for anticipated population growth; ensuring that development regulations meet the current vision outlined in the Comprehensive Plan; enhancing the function, safety, and appearance of the City's streets; ensuring that private development projects facilitate measures to improve multimodal transportation; supporting Intercity Transit's efforts to meet the transportation needs of all segments of the community by providing a high-quality, safe, convenient, accessible, and cost-effective transit service as an attractive alternative to the single-occupancy vehicle; promoting land use policies that complement and help implement requirements of the City Comprehensive Plan for Outdoor Recreation, Regional Trail Plan, and land use regulatory requirements for the provision of open space; ensuring that existing utility customers, and future customers, are adequately served by water, sewer, and stormwater utility services that consider both growth demand projections and asset management; working to achieve a safe, active, and healthy lifestyle for Lacey citizens through community planning and design; working to achieve a community where residents have convenient access to healthy food, clean water, and affordable shelter; and improving transportation infrastructure in the planning area through improvement of existing corridors and the completion of corridors identified in the City of Lacey Transportation Element.<sup>2</sup> *Exhibit 2, Staff Report, pages 3 through 5.*

9. The property is located in the "Moderate-Density Residential" (MDR) zoning district. Under Lacey Municipal Code (LMC) 16.15.010, the intent of the MDR zoning district is to:
- A. Enhance the residential quality of the city by providing a high standard of development for residential areas of moderate density;
  - B. Permit a greater variety of housing types than are permitted in the low density residential districts;
  - C. Permit a higher density of development as a means of achieving more economical housing;
  - D. Permit moderate density development along arterials and collectors as a means of achieving more opportunity for mass transit;

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<sup>2</sup> Specific goals and policies identified by City staff as applicable include: Framework Land Use Policies E and G; Residential Goals 1 and 2, and Policy 2.B; Infill Goal 1 and Policy 1.C; Transportation and Land Use Goals 1, 4, and 5 and Policies 1A, 1.E, 1.F, and 4.C; Parks and Open Spaces Goal 1 and Policies 1.A, 1.B, and 1.D; Utilities and Capital Facilities Goal 1 and Policy 1.B; Health & Human Services Goals 1 and 2, and Policies 1.B, 1.C, 2.A, and 2.B; and Hawks Prairie Planning Area Goal 4, and Policies 4.A and 4.B. *Exhibit 2, Staff Report, pages 3 through 5.*

- E. Guide moderate density residential development to those areas where:
  - 1. Public sewers are in place prior to residential building construction, or
  - 2. Where sewers can be extended at minimal cost to the city, and
  - 3. The Regional Transportation Plan designated moderate and high density transportation corridors to enhance and promote mass transit opportunities.
- F. Guide development of residential areas in such manner as to encourage and plan for the availability of public services and community facilities such as utilities, police and fire protection, streets, schools, parks and recreation;
- G. Preserve within developments as much open space and related amenities as possible.

*Exhibit 2, Staff Report, page 2.*

- 10. Residential uses, including multi-unit apartment buildings and structures associated with the recreational needs of residents, at densities between 8 and 16 units per acres, are allowed in the MDR zone. *LMC 16.15.020*. This density requirement for the MDR zone would allow for a maximum of 153 units to be developed on the 9.54-acre property. As discussed in detail below, however, the Applicant proposes to apply the City's Planned Residential Development (PRD) standards, which allow up to a 20 percent increase in the permissible density for the MDR zone, to allow construction of a 183-unit, multi-family apartment complex. *Exhibit 2, Staff Report, pages 2, 7, and 8; Exhibit 3; Exhibit 5; Exhibits 11 through 14.*
- 11. Properties to the north of the subject property are zoned MDR and are developed with a single-family residential subdivision, Eagle Court, and an age-restricted mobile home park, Alpine Mobile Home Community. Property to the east is also zoned MDR and is developed with a multi-building apartment complex, Tolmie Cove. Property to the west is zoned MDR and has recently been developed with a 26-lot, 52-unit duplex subdivision. Property to the south is zoned MDR and High-Density Residential and is developed with a 377-lot, single-family residential subdivision, Gateway. Property to the southeast is zoned Light Industrial Commercial and contains a Washington State Department of Transportation regional maintenance facility. *Exhibit 2, Staff Report, page 2.*

### Planned Residential Development

#### *General Requirements*

- 12. The purpose of a PRD is to encourage imaginative design and creation of permanent open space by permitting greater flexibility in zoning requirements; preserve or create environmental amenities superior to conventional developments; create or preserve open

space; preserve to the greatest possible extent the natural characteristics of the land; encourage development of a variety of housing types; provide for maximum efficiency in layout of streets, utility networks, and other public improvements; and provide a guide for meeting the provisions of Chapter 16.60 LMC. *LMC 16.60.010.* PRDs are allowed in all of the City's residential zoning districts, and any development designed and intended for residential use regardless of the type of building in which such residence is located, i.e., conventional single-family dwellings, townhouses, duplexes, fourplexes, or apartment buildings, is permitted within a PRD. *LMC 16.60.020.D to .040.A.2. Exhibit 2, Staff Report, pages 7 and 8.*

13. Chapter 16.60 LMC governs the development of a PRD. The design of a PRD must take into account the relationship of the site to the surrounding areas. The PRD perimeter must minimize any undesirable impacts of the PRD on adjacent properties and, conversely, minimize any undesirable impacts of adjacent land use and development characteristics on the PRD. *LMC 16.60.070.* Setbacks from the exterior boundary of a PRD must be comparable to or compatible with those of existing development or, if undeveloped, with the type of development that may be reasonably expected on such properties in the future; in no event, however, can such setbacks be less than 20 feet. *LMC 16.60.110.* In addition, the major internal street serving the PRD must be connected to at least one major arterial, secondary arterial, or collector street, and off-street parking must be provided in the same ratios for types of buildings and uses as would normally be required for the underlying zoning district. *LMC 16.60.090 and .120. Exhibit 2, Staff Report, pages 7 through 14.*
14. The provisions of the underlying zoning district govern a PRD, but the specific setback, lot size, height limits, and other dimensional requirements in the zoning code are waived. *LMC 16.60.050.A and B.* In addition, other normal design standards may be waived if a proposed design provides a better approach to achieving quality and functional neighborhoods as promoted in the City's land use plan. A PRD is exempt from subdivision design requirements. *LMC 16.60.050.A and B.* Design standards include open space, density, and landscaping requirements. LMC 16.60.140 requires that all PRDs provide open space totaling at least 30 percent of the gross land area of the property, that the minimum density of the site meets the required density of the underlying zoning districts, and that environmental/recreational amenities are provided. *Exhibit 2, Staff Report, pages 7 through 14.*

#### *Bonus Density Requirements*

15. LMC 16.60.140.B provides that PRDs are subject to the density requirements of the underlying zone but that a density increase may be approved if certain environmental and recreational amenities would be provided within the PRD. As noted above, the Applicant proposes to develop the property as a PRD to be eligible for the 20 percent density bonus applicable to PRDs in the MDR zoning district. City staff determined that, with a density

bonus, the Applicant would be allowed to construct up to 184 dwelling units on the 9.54-acre property, one more than the 183 dwelling units proposed. To be eligible for the density bonus, the proposed PRD would be required to provide four of the following five amenities:

- A. Develop and equip significant recreational areas within the common open space with such features as, but not limited to, swimming pools, tennis courts, bike or pedestrian path systems, children's play areas;
- B. Substantial retention of natural ground cover, bushes and trees;
- C. Vegetated LID facilities are included in the design and serve as a visual amenity;
- D. Provide significant access to a lake, river, stream or other natural water body;
- E. Provide substantial and exceptional landscaping treatment either as an adjunct to or in lieu of natural landscaping beyond the minimum required.

*LMC 16.60.145.*

16. The Applicant provided a project narrative addressing the bonus density requirements under LMC 16.60.145, which suggests that the proposal would meet the requirements because:

- The PRD would provide a central recreation complex with a wide range of amenities, including a swimming pool, covered play area with climbing equipment, outdoor BBQ facility and patio deck, indoor lounge, physical fitness center, and game room. The amenities that would be provided in the PRD exceed the standard design criteria under Chapter 14.23 LMC. In addition, the PRD would include pedestrian pathways, seating, bicycle parking, lighting, and other furnishing that create a cohesive environment for the pedestrian-oriented tenant.
- The project would provide substantial retention of natural vegetation in the form of four tree tract areas. These tracts would enable the retention of existing mature trees in contiguous areas suitable for both passive and active recreation. Walking paths with seating would be incorporated to and through the tree tracts. A 6,600 fenced dog park would be incorporated within one of the tracts. The project would provide a total of 1.89 acres of tree tract, exceeding the minimum five percent of tree tract area required for the site.
- A large, vegetated Low Impact Development (LID) bio-infiltration facility would be installed in the northern portion of the site, which would provide additional buffer from the lower density housing north of 32nd Avenue NE. A similar bioretention facility would be installed south of buildings L and J at the north central portion of the site to take advantage of highly permeable soils in this area.
- The proposal would include extensive landscaping beyond the minimum requirements of Chapter 16.80 LMC.

*Exhibit 14.*



17. City staff also analyzed the proposal for compliance with the bonus density requirements and determined:
- The Applicant proposes a central recreation complex featuring a swimming pool, covered play area with climbing equipment, outdoor picnic area with patio deck, indoor lounge, fitness center, and a game room. The recreation complex would include a 3,900 square foot building and an additional 6,600 square feet of outdoor area directly adjacent to the building. Additionally, the project would include various walking paths throughout the site, as well as passive recreation opportunities within tree tract areas.
  - The project would include tree tracts in the northwest, northeast, and southeast corners of the site, as well as along the property's frontage to 32nd Avenue NE. The proposed tree tract along the frontage to 32nd Avenue NE would not meet the tree canopy coverage requirements under the City's Tree and Vegetation Protection Ordinance, Chapter 14.32 LMC. The remaining three tree tracts, however, would total 1.33 acres, exceeding the 0.48 acres of tree tract area required for the 9.54-acre site under LMC 14.32.064. In addition, the Applicant would preserve individual trees on-site to the greatest extent feasible and would likely plant trees within required perimeter setback areas.
  - The Applicant proposes to install a large, vegetated LID bio-infiltration facility along the northern end of the site adjacent to 32nd Avenue NE as part of the overall stormwater management plan. The bio-infiltration facility would also serve as a visual buffer between the proposed apartments and residential development to the north. To enhance the aesthetic and buffering properties of the facility, the Applicant proposes to incorporate shrub and tree species beyond that typically used for LID facilities. Native conifers would also be incorporated in adjacent areas to compliment the facility.
  - The Applicant does not propose to provide access to natural water bodies because there are no natural water bodies in the vicinity of the property.
  - The Applicant would provide extensive landscaping beyond the minimum requirements of Chapter 16.80 LMC, which would include decorative fencing, as well as artwork within landscaped areas in and around the site. The Applicant's final landscape plan should include a detailed analysis of the areas where landscaping is being added in excess of the minimum requirements of Chapter 16.80 LMC. The final landscape plan should also include the location of trees to be saved, as identified by the City's forester.

*Exhibit 2, Staff Report, pages 8 through 10.*

#### *Tree, Landscaping, and Open Space*

18. As part of PRD development, "natural characteristics of the land, including topography, natural vegetation, waterways, [and] views" should be preserved to the "greatest possible extent." *LMC 16.60.010.D*. In addition, the City's Tree and Vegetation Protection Ordinance (Chapter 14.32 LMC) seeks to preserve and enhance the city's physical and

aesthetic character by preventing indiscriminate removal and destruction of trees and ground cover. *LMC 14.32.020.E*. Under LMC 14.32.064, all multi-family projects over an acre in size, and every land division over two acres, must designate a tree tract or tracts equaling no less than five percent of the gross project area. Up to 100 percent of this requirement may be satisfied through set-asides of open space and sensitive areas. Here, 0.48 acres would be required to be set aside. The Applicant proposes to set aside four tree tracts totaling 1.89 acres. City staff reviewed the proposal and determined that proposed Tree Tract 2 along the frontage to 32nd Avenue NE would not meet the tree canopy coverage requirements to qualify as a tree tract under Chapter 14.32 LMC but that the three remaining proposed tree tracts would total 1.33 acres, exceeding the 0.48 acres of tree tracts required. *Exhibit 2, Staff Report, page 9; Exhibits 10 through 14.*

19. Washington Forestry Consultants, Inc. (WFCI), submitted a Preliminary Tree Protection Plan, dated August 21, 2020, assessing significant trees on-site and providing recommendations regarding tree retention, tree protection, and the planting of replacement trees during site development. The Tree Protection Plan determined that, with the planting of replacement trees within proposed Tree Tract 3, the Applicant would exceed the minimum requirements for the dedication of tree tracts on-site. The Plan also notes that tree protection fencing should be installed and that a final copy of the grading plan with proposed site improvements should be submitted to WFCI so that it can prepare a final tree protection plan for the project. *Exhibit 9.*
20. LMC 16.60.140 requires that all PRDs provide open space totaling at least 30 percent of the gross land area of the property. Here, the proposed PRD would be required to provide 2.86 acres of open space for the 9.54-acre site. Up to 50 percent of the open space requirement may be satisfied by the preservation of tree stands if development is configured to take advantage of these areas as significant site amenities. *LMC 16.60.140.A.3*. The remaining common space areas must meet certain design criteria to ensure that the areas would be useable, accessible, inviting, and safe; would provide for uses and activities to serve anticipated residents of the development; and would be designed and placed in consideration of existing and potential open space on adjacent parcels to provide consolidation opportunities for neighborhood open space areas. The proposed PRD would meet the open space requirements by providing 1.33 acres of tree tracts with pedestrian walking paths, seating areas, and a 6,600 square foot fenced dog park within proposed Tree Tract 4, and by providing an additional 1.53 acres of common open space in the form of various site amenities, including a central recreation complex, open space areas around the proposed apartment buildings, and a 0.56-acre vegetated LID facility along the frontage to 32nd Avenue NE (described above as proposed Tree Tract 2) that would include a walking path, sitting area, and enhanced landscaping. The Applicant would submit for approval a final open space plan demonstrating compliance with open space requirements prior to grading permit issuance. *Exhibit 2, Staff Report, pages 10 through 12, and 15; Exhibits 8 through 14.*

21. To minimize visual impacts to adjoining properties in accord with PRD design requirements, the Applicant proposes to install landscape features within the 20-foot setback around the perimeter of the property that would exceed the requirements typically applicable to residential development projects. *LMC 16.60.070; LMC 16.60.110; LMC 16.60.140.C; LMC 16.80.050*. The Applicant would also install a continuous wrought-iron style fence with stone-clad columns along the perimeter of the property. In addition, as noted above, visual impacts to adjoining properties would also be mitigated by the vegetated LID facility with enhanced landscaping along the frontage to 32nd Avenue NE, as well as tree tracts at the northwest, northeast, and southeast corners of the property. Building design would be reviewed as part of the design review application process. *Exhibit 2, Staff Report, page 14; Exhibits 12 through 14*.
22. LMC 16.60.140.A.6 requires PRDs to provide a minimum of 300 square feet of private, usable open space for each ground-level dwelling unit. City staff determined that this private open space requirement is geared toward single-family housing types and that its application to the proposed multi-family apartment complex would create equity issues for unit locations by providing private open space amenities for ground floor units, while requiring no private open space for upper story units. City staff therefore determined it would be appropriate to modify the private open space requirement, as permitted under LMC 16.60.050.A, to allow the Applicant to provide 52 feet of private open space for each dwelling unit in the form of a patio/deck. *Exhibit 2, Staff Report, page 11*.

#### *Stormwater*

23. Helena Gubbels, EIT, prepared a Preliminary Drainage Control Plan for the proposal, dated May 11, 2020. Stormwater would be managed on-site through a combination of permeable paved surfaces, roof drain infiltration trenches, piped conveyance, two bioretention cells, and a parking lot gravel trench. Portions of the low-traffic parking areas would consist of permeable pavements with underlying treatment soil layers, and all on-site sidewalks would consist of permeable pavement. Runoff from roof areas would be collected in roof downspouts and fully infiltrated through gravel trenches. Runoff from remaining surfaces on-site would sheet flow into the parking aisle to be collected in catch basins and routed to one of two bioretention swales for water quality treatment and infiltration. The northern bioretention swale would receive all runoff north of proposed buildings J and L, as well as runoff from the southern half street portion of 32nd Avenue NE, and would fully infiltrate on-site. The southern bioretention swale would receive all runoff from remaining surfaces on-site in the southwest and southeast basins. The southern bioretention swale would infiltrate 98 percent of runoff, with excess runoff connecting to a large gravel trench at the center of the site. The gravel trench would also receive runoff directly from buildings J and L and would fully infiltrate on-site. Stormwater facilities for the project would meet the requirements of the 2016 City of Lacey Stormwater Design Manual, including Core Requirements 1 through 9 and the

implementation of Low Impact Development (LID) techniques throughout the project site. *Exhibit 8.*

24. City Stormwater Engineer Doug Christenson reviewed the Preliminary Drainage Control Plan and determined that stormwater treatment, as proposed, would be feasible. Mr. Christenson noted, however, that the proposed six-inch sand layer underlying permeable pavement for some parking areas would not automatically meet the enhanced treatment standards of the 2016 City Stormwater Design Manual. He therefore recommended a condition that soil underlying permeable pavement meet the soil suitability criteria of the manual or that an alternative treatment course be included in the pavement section if supporting information is provided to verify that the enhanced treatment standard would be met. *Exhibit 26.*

#### *Utilities*

25. Utility improvements associated with the project would include installation of a new looped 8-inch water main and 8-inch gravity sewer, as well as installation of a 6-inch forcemain line that would connect the existing lift station north of the site to a new forcemain line that would be installed at the southern entry of the site. The City of Lacey would provide water and sewer service to the project site. Puget Sound Energy would provide power/natural gas. Lacey Fire District 3 would provide fire protection. *Exhibit 2, Staff Report, page 2; Exhibits 8 through 11.*

#### *Access and Traffic*

26. Heath and Associates, Inc., prepared a Traffic Impact Analysis (TIA) for the proposal, dated June 2020. The TIA determined that the proposed development would generate 81 new PM peak-hour trips. The TIA further determined that the intersection of 32nd Avenue NE and Marvin Road NE would operate a level of service (LOS) F with the project and previously approved development proposals. City Transportation Engineer Christopher Stolberg reviewed the TIA and determined that the proposed secondary access point from recently constructed 31st Avenue NE would be an acceptable mitigation strategy for addressing impacts to the failing intersection. The project would also be required to make frontage improvements along 32nd Avenue NE in accordance with the City of Lacey's 2017 Development Guidelines and Public Works Standards (DGPWS), which would include construction of sidewalks, planter strips, curbs, gutters, and street lighting. In addition, the Applicant would pay an estimated \$102,274.26 in traffic impact fees to the City as required by LMC 14.21.040.B. City staff notes that the required traffic impact fees would support several projects identified in the City's Transportation Improvement Program designed to improve the City's transportation network in this area, including the Marvin Road improvement project, the Marvin Road/Britton Parkway Intersection improvement project, and the 31st Avenue Extension – Hogum Bay to Marvin Road improvement project. City staff also notes that the City's 2030 Transportation Plan identifies several regional traffic improvement projects that

would help disperse traffic off of the Marvin Road corridor. *Exhibit 2, Staff Report, pages 12 and 13; Exhibit 7; Exhibit 27; Exhibit 39; Exhibit 40.*

27. Vehicle access to the site would be provided to the north from 32nd Avenue NE, which is classified as a major local residential street, and to the south from the recently constructed 31st Avenue NE, which is classified as a minor collector. The Applicant has proposed to gate the two access points. City Development Guidelines and Public Works Standards (DGPWS) Section 4B.075 DGPWS generally requires that gates to neighborhood or gated communities are allowed only on private streets; a turnaround must be provided on the public right-of-way side of the gate; and mailboxes must be located on the public side of the gate. In addition, DGPWS 4B.075.A provides that the minimum required “stacking distance” should be measured at 1 foot per PM peak-hour trip for projects accessing from major and minor local residential public streets and at half a foot per PM peak-hour trip for projects accessing from major and minor collectors. Applying 50 percent of the PM peak-hour trips generated from the project to each of the access points, the Applicant would be required to provide a minimum stacking distance of 21 feet at the 32nd Avenue NE access gate and a minimum stacking distance of 41 feet at the 31st Avenue NE access gate. The Applicant’s site plans show that the southern access on 31st Avenue NE would have over 46 feet of stacking distance, in accord with this requirement. The site plans, however, show that the northern access on 32nd Avenue NE would fall just short of the minimum stacking distance required. The Applicant submitted a revised diagram of the proposed 32nd Avenue NE access gate, which City Transportation Engineer Christopher Stolberg reviewed and determined would comply minimum entrance lengths. City staff recommends a condition ensuring that the gated access on 32nd Avenue NE would be designed with a minimum stacking distance of 21 feet, consistent with the Applicant’s revised diagram. *Exhibit 2, Staff Report, pages 13, 14, and 19; Exhibit 7; Exhibit 10; Exhibit 11; Exhibit 30; Exhibit 31.*

#### *Additional City Review*

28. City Land Management Specialist Marci Price reviewed the proposal and provided a list of addresses to assign to the future apartment buildings. Ms. Price also requested that the Applicant submit proposed unit numbers for her review to ensure compliance with the City’s addressing ordinance. *Exhibit 2, Staff Report, page 18; Exhibit 23.*
29. Terry McDaniel, City Fire Code Specialist, reviewed site plans for the proposed project and recommended several conditions if the development is approved. The recommended conditions include construction of fire apparatus access roads, hydrant installation and testing requirements, hydrant flow requirements, fire sprinkler system requirements, fire alarm system requirements, fire inspection requirements, and general fire code requirements related to address number sizing and location, signage, fire and police access, fire lane markings, and fire extinguisher installation. *Exhibit 2, Staff Report, pages 21 and 22; Exhibit 24.*

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30. Development Review Engineer Tom Stiles also reviewed the proposal and provided detailed notes about requirements related to water, sewer, stormwater, and transportation improvements; requirements related to surveying and bonding; and additional submittal requirements. Mr. Stiles' comments have been incorporated in the recommended conditions of approval. *Exhibit 2, Staff Report, pages 22 through 28; Exhibit 25.*

Testimony

31. Applicant Representative Jeff Pantier testified that the proposed development of a 12-building, 183-unit apartment complex would provide needed multi-family housing in an area of the City identified for growth and would be compatible with other residential development projects in the area. He noted that City sewer and water would be extended to serve the property. Mr. Pantier described how the project would manage stormwater on-site through low-impact development techniques that would include impervious pavement, individual roof drywalls, and bioretention filtration systems. He explained that the project has been designed to meet PRD bonus density requirements by providing several amenities and enhanced landscape features. Mr. Pantier noted that the Applicant would pay school and traffic impact fees at the building permit stage. He explained that Thurston County had originally requested the Applicant to pay \$47,145 in traffic mitigation fees based on a calculation error, but that it later corrected the calculation to require \$143 in traffic mitigation fees. *Testimony of Mr. Pantier.*
32. Lance Talmadge, Project Civil Engineer, provided additional details about how the project would manage stormwater on the property. He noted that the site drains from the south to north, with an approximate 20-foot elevation change across the site, and that the proposed stormwater management system is designed to fully infiltrate stormwater on-site. Mr. Talmadge explained that roof runoff would be routed to individual dry wells, with any overflow resulting from a system failure or unanticipated weather event directed to a bioretention facility at the north of the site. He further explained that any emergency overflow from the bioretention facility would enter the City's existing stormwater system. Mr. Talmadge stated that the project would include permeable pavement areas with underlying sand layers designed for water quality treatment. He noted that all stormwater on-site would undergo water quality treatment in accord with all applicable requirements. *Testimony of Mr. Talmadge.*
33. Chris Aldrich, Project Landscape Architect, described how the project would meet the open space requirements applicable to a PRD. He explained that the proposed development would provide 3.15 acres of common open space areas, exceeding the 2.86 acres of open space required for the 9.54-acre property. Mr. Aldrich stated that the proposed tree tracks would provide 39 percent of the common open space and that the remaining common open space areas would include a recreational complex, a vegetated LID facility along the frontage to 32nd Avenue NE, and areas around the apartment

buildings. Mr. Aldrich noted that the 2.86 acres of open space does not include the additional perimeter landscaping within the 20-foot setback around the site. He explained that the project would include tree retention and protection measures as recommended in the Preliminary Tree Protection Plan prepared by Washington Forestry Consultants, Inc. *Testimony of Mr. Aldrich.*

34. Greg Heath, Project Traffic Engineer, testified about the Traffic Impact Analysis (TIA) that was prepared for the project. He noted that the intersections at 32nd Avenue NE and Marvin Road NE and at Willamette Drive NE and Marvin Road NE are shown to be heavily impacted by unrealized pipeline traffic that would add approximately 1,000 trips to the 32nd Avenue NE and Marvin Road NE intersection and approximately 1,800 trips to the Willamette Drive NE and Marvin Road NE intersection. Mr. Heath noted that the TIA accounts for the cumulative traffic impacts of other development projects and suggests that the proposal would not create a major impact to the studied intersections. *Testimony of Mr. Heath.*
35. City Senior Planner Samra Seymour testified that the City originally adopted its PRD ordinance in the early 1990s and that the ordinance was generally intended to address single-family residential development, which was the most prevalent type of development in the city at that time. She noted that the City strives to meet the intent of the original PRD ordinance but that, with the trend toward increased multi-family residential development, some reasonable modifications to the requirements of the ordinance may be necessary. Ms. Seymour explained that, although the proposal would meet common open space requirements applicable to a PRD, a reasonable modification to the private open space requirement should be applied to allow the project to provide 52 feet of private open space for each dwelling unit in the form of a patio/deck. She noted that the bioretention facility at the north of the property would not qualify as a tree track but that it would qualify as an open space amenity with the proposed inclusion of enhanced landscaping, a walking trail, and a seating area. Ms. Seymour stated that the proposal would meet the City's concurrency requirements and that stormwater management for the site would be required to comply with the City of Lacey 2016 Stormwater Design Manual. *Testimony of Ms. Seymour.*
36. City Stormwater Engineer Doug Christenson testified that the Applicant has a good stormwater plan that adequately addresses all core requirements. He noted that the bioretention areas, as proposed, would meet all requirements for enhanced water quality treatment. *Testimony of Mr. Christenson.*
37. City Transportation Manager Martin Hoppe testified that the City agrees with the analysis provided in the Applicant's TIA. He noted that the project's impacts to the intersection of 32nd Avenue NE and Marvin Road NE would be mitigated by providing an additional access point to the property from 31st Avenue NE, which would divert some traffic from

the 32nd Avenue NE and Marvin Road NE intersection. Mr. Hoppe explained that the City's long-term plan is to install a roundabout at 31st Avenue NE and Marvin Road NE and that the City does not want traffic control at the 32nd Avenue NE and Marvin Road NE intersection because it would create a neighborhood cut through. *Testimony of Mr. Hoppe.*

#### Staff Recommendation & Applicant Response

38. Ms. Seymour testified that City staff determined that, with conditions, the proposal would be consistent with the City Comprehensive Plan, zoning code, and the specific requirements for a PRD and Site Plan Review. Mr. Pantier testified that the Applicant has reviewed and would comply with all recommended conditions. *Exhibit 2, Staff Report, pages 15 through 28; Testimony of Ms. Seymour; Testimony of Mr. Pantier.*

### **CONCLUSIONS**

#### Jurisdiction

The Hearings Examiner has the authority to hear requests for Planned Residential Developments and to issue a recommendation on the requests to the City Council. *LMC 2.30.090.B; LMC 16.60.050.C; City Development Guidelines and Public Works Standards (DGPWS) Section 1C.050.* The City's Site Plan Review Committee normally performs Site Plan Review under LMC 16.84.020. When more than one application for a proposed development is required, however, an applicant may elect to have the applications consolidated under one review process in accordance with Section 1B.030 of the City of Lacey Development Guidelines and Public Works Standards. *LMC 2.30.110.* Here, the Applicant requested consolidated review and, accordingly, the Hearings Examiner has authority to issue a recommendation on the Site Plan Review concurrent with the recommendation being issued on the Planned Residential Development application. *LMC 2.30.110.*

#### Criteria for Review

##### *Planned Residential Development*

DGPWS Section 1C.050 requires the Hearings Examiner to recommend approval, approval with conditions, or denial of the PRD application based on the Hearings Examiner's findings and conclusions of compliance with applicable approval criteria and standards. *DGPWS 1C.050.H.*

PRD requirements are enumerated throughout Chapter 16.60 LMC. In a PRD, the specific setback, lot size, height limits, and other dimensional requirements of the underlying zoning district are waived, and other normal design standards may be waived if the proposed design provides a better approach to achieving quality and functional neighborhoods as promoted in Lacey's land use plan. *LMC 16.60.050.A.* In addition, the design of a planned residential development must take into account the relationship of the site to the surrounding areas. The perimeter of the PRD must be so designed as to minimize undesirable impact of the PRD on adjacent properties and, conversely, to minimize undesirable impact of adjacent land use and development characteristics on the PRD. *LMC 16.60.070.* The major internal street serving the



PRD must be connected to at least one major arterial, secondary arterial, or collector street.  
*LMC 16.60.090.*

#### *Site Plan Review*

Under LMC 16.84.020, the site plan must be approved or approved with conditions to conform to the standards, provisions and policies of the City as expressed in its various adopted plans and ordinances. Whenever a site plan is disapproved, it must be set forth in written findings that specify the particular standards, provisions, and policies to which the site plan fails to conform and the reasons why it fails to conform. *LMC 16.84.020.*

The criteria for review adopted by the Lacey City Council are designed to implement the requirement of Chapter 36.70B RCW to enact the Growth Management Act. In particular, RCW 36.70B.040 mandates that local jurisdictions review proposed development to ensure consistency with City development regulations, considering the type of land use, the level of development, infrastructure, and the characteristics of development. *RCW 36.70B.040.*

#### Conclusions Based on Findings *Planned Residential Development*

- 1. With conditions, the proposed Planned Residential Development would conform to the City of Lacey Comprehensive Land Use Plan and applicable development standards and meet the requirements for a PRD under Chapter 16.60 LMC.** The proposed development would allow for the development of 183 multi-family units, consistent with the Comprehensive Plan goals of providing a mix of housing types to meet the City's anticipated population growth in the Hawks Prairie planning area. The intent of a PRD, to create or preserve open space and preserve the natural characteristics of the land to the greatest possible extent while also providing for a variety of housing types, mirrors the intent of the underlying MDR zoning district to enhance the residential quality of the city by providing a high standard of development for moderate density residential areas while preserving open space and related amenities. The proposed PRD would meet common open space requirements and would provide both active and passive outdoor recreational amenities. The City determined that the requirement for private open space should be modified to allow the Applicant to provide 52 feet of private open space for each dwelling unit in the form of a patio/deck, in consideration of the multi-family nature of the proposed development. Absent this modification, the PRD would create equity issues for future tenants by requiring ground floor units to have 300 square feet of private open space with no requirement to provide private open space for the upper story units. The proposal would qualify for the 20 percent density bonus allowed for PRDs in the MDR zone by providing amenities that would include: a recreational complex with a swimming pool, covered play area, outdoor picnic area with patio deck, indoor lounge, fitness center, and game room; tree tracts that would retain existing trees and that would include walking paths and seating areas; a large vegetated bio-infiltration facility with enhanced landscaping, a walking path, and a seating area; and extensive

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landscaping throughout the site.

The City of Lacey would provide water and sewer service to the project site. Puget Sound Energy would provide power/natural gas, and Lacey Fire District 3 would provide fire protection. All stormwater would be infiltrated on-site. Runoff from roofs would be collected in roof downspouts and fully infiltrated through gravel trenches. Runoff from remaining surface areas would be collected and conveyed to one of two bioretention facilities for water quality treatment before infiltrating on-site. Any emergency overflow would enter the City's existing stormwater system. In addition, the project would include permeable pavement areas with underlying soils designed for water quality treatment. Stormwater facilities for the project would meet the requirements of the 2016 City of Lacey Stormwater Design Manual, including Core Requirements 1 through 9 and the implementation of Low Impact Development (LID) techniques throughout the project site.

The PRD was designed to ensure that impacts on surrounding areas would be minimized by providing perimeter landscaping within the 20-foot setback surrounding the site, installing a continuous wrought-iron style fence with stone-clad columns along the perimeter of the property, providing enhanced landscaping within the bioretention facility along the property's frontage to 32nd Avenue NE, and preserving existing trees within three tree tracts located at the northwest, northeast, and southeast corners of the property. The public interest would benefit from additional housing within the City, consistent with the City Zoning Code and Comprehensive Plan goals. All residents of the development would have access to recreational opportunities on-site.

The City provided reasonable notice and opportunity to comment on the PRD application. Public comments on the proposal generally raised concerns with the project's impacts to schools, traffic, and existing trees on the property. The proposal would exceed tree tract requirements by preserving existing trees on the property within three tree tracts totaling 1.33 acres. The proposal would mitigate school impacts through the payment of school impact fees. The Applicant submitted a Traffic Impact Analysis (TIA) assessing the impacts to traffic in the area. The TIA determined that development of the proposal, together with other development projects in the area, would cause the level of service at the intersection of 32nd Avenue NE and Marvin Road NE to drop below acceptable levels. The City reviewed the Applicant's TIA and determined that the proposed secondary access point from 31st Avenue NE would be an acceptable mitigation strategy for addressing impacts to the failing intersection. The Applicant would also be required to pay traffic impact fees, which would support projects identified in the City's Transportation Improvement Program that are designed to improve the transportation network in this area. In addition, the Applicant would make frontage improvements along 32nd Avenue NE that would include construction of sidewalks, planter strips, curbs, gutters, and street lighting. The Applicant has proposed to gate the

two access points to the property. The City reviewed the Applicant's site plans and revised diagram for the proposed 32nd Avenue NE access gate and determined that, with a condition requiring a minimum stacking distance of 21 feet at the gated access on 32nd Avenue NE, adequate stacking distance would be provided for vehicles entering property. The City Community and Economic Development Department acted as lead agency and analyzed the environmental impacts of the proposal, as required by SEPA, and determined that, with mitigation, the proposed PRD would not have a probable significant adverse environmental impact. The MDNS was not appealed.

Conditions unique to the proposal and those required of all PRDs are necessary to ensure development meets all requirements of the municipal code and the City's other development standards, and to ensure that all concerns raised by reviewing departments and agencies have been adequately addressed. *Findings 1 – 38.*

#### *Site Plan Review*

2. **The proposal would meet the requirements for Site Plan Review approval under LMC 16.84.020.** The Site Plan conforms to the standards, provisions, and policies of the City as expressed in its various adopted plans and ordinances. The Applicant has not requested any variances or deviations from the requirements of the adopted plans or ordinances. *Findings 1, 7 – 38.*

#### **RECOMMENDATION**

The Hearings Examiner recommends that the proposal for a Planned Residential Development and associated Site Plan Review related to the development of a 12-building, 183-unit, multi-family apartment complex, with associated improvements, on 9.54 acres at 7201, 7203, and 7235 32nd Avenue NE be **APPROVED**, with the following conditions.<sup>3</sup>

#### Conditions Unique to this Application:

*The conditions below are those that the reviewing departments and agencies have determined are necessary to address unique aspects of this application.*

1. The project shall proceed in substantial conformance with the plans submitted on June 18, 2020 and October 19, 2020, except as modified by the conditions below.
2. Prior to any site disturbing activity, the Applicant shall receive Forest Practice permit approval from the City of Lacey.
3. Prior to building permit issuance, the Applicant shall process a Boundary Line Adjustment/Lot Consolidation with the City of Lacey Community & Economic Development Department.

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<sup>3</sup> Conditions include both legal requirements applicable to all developments and requirements to mitigate the specific impacts of this development.

4. Prior to grading permit issuance, a revised, final open space plan shall be submitted to the Community & Economic Development Department for review and approval. The open space plan shall identify all open space amenities and provide size verification of required open space classification including common open space, natural areas, and private open space. Additionally, details of proposed amenities such as benches, trash cans, and play equipment shall be included in the open space plan.
5. Prior to grading permit issuance, a final, revised landscaping plan shall be submitted to the Community & Economic Development Department for review and approval. The landscaping plan shall also show the location of all individual trees identified for retention by the City's contract forester, outside of the designated tree tracts.
6. Prior to building permit issuance, the developer shall receive multifamily design review approval. All buildings shall meet the applicable criteria of LMC 14.23 and LMC 14.23.080.
7. Prior to grading permit approval, the Applicant shall contact Washington Forestry Consultants, Inc to identify individual trees for retention along the perimeter, and within the interior of the site.
8. Removal of existing ground cover and shrubs within designated tree tracts shall be minimal, except when necessary for the construction of the pedestrian walkways identified on the final, approved open space plan.
9. Tree protection and preservation shall be coordinated with Washington Forestry Consultants, Inc and tree protection shall follow the recommendations of Preliminary Tree Protection report dated August 21, 2020.
10. No trees shall be removed prior to issuance of a grading permit.
11. Trees to be saved shall be protected throughout all phases of construction by temporary orange, plastic mesh fencing on driven posts located at the edge of the critical root zone, as recommended in the Timeline for Tree Protection Activity. The location of the protective fencing shall be identified on the grading and civil plans and a detail of the fencing shall also be included on the plans.
12. Prior to any site construction activities taking place, a preconstruction meeting shall be held with Washington Forestry Consultants to review the location of the tree protection fencing. A note stating that a preconstruction meeting shall be held with Sound Urban Forestry shall be shown on the grading plans for the project. Confirmation from the

Forester that the meeting has been held shall be provided to the Community Development Department prior to the start of site construction or grading activity.

13. Prior to site construction activity, the contractor completing any tree removal or logging work shall sign and submit the “Acknowledgement of Responsibilities for Professionals Doing Tree Removal in the City of Lacey.” The form shall be submitted to the Planning Department prior to issuance of the grading permit.
14. One fire hydrant shall be installed, tested, and approved prior to building permit issuance. (LMC 14.07.501.4.) Fire hydrants shall be provided every 330 feet unless the fire flow is greater than 1,500 gpm then it shall be every 300 feet in accordance with IFC table (C102.1) and (Chapter 14.07 LMC) for the building. Fire hydrants shall be placed no closer than 40 feet from the building or structure protected.
15. The required fire-flow for the building shall be not less than 1,500 gpm for 2 hours in accordance with IFC Appendix B. Said fire-flow is based on square footage/building construction type, including a 50 percent credit for the installation of automatic fire sprinkler systems. (IFC section 507.1 and LMC 14.07.015). The initial calculation is always based on type 5b wood framed construction as a worst-case scenario for fire flow. Please be advised the square footage of the building shall be provided for an accurate fire-flow calculation.
16. The proposed buildings shall require a sprinkler system and shall be equipped with an approved automatic sprinkler system. The sprinkler system shall be installed in accordance with NFPA 13 (2016 Edition) standards. In addition, a fire department connection shall be installed in accordance with (Chapter 14.07 LMC) a fire department connection shall be located within 40 feet of a fire hydrant. The building shall have its own FDC line with KNOX locking caps or plugs.
17. A separate building permit shall be required for the installation of fire sprinkler system underground piping. The design shall be in accordance with NFPA 24 Standards (2010 Edition) and City of Lacey Public Works Design Standards. Underground sprinkler piping shall be designed only by a Washington State Level III Certified contractor. Plans and specifications shall be submitted to the City of Lacey Building Department for review and approval prior to installation. Fire sprinkler system underground lead-in piping shall be installed only by a Washington State Level “U” Certified contractor. The submitted plans shall be accompanied by the level “U” certification of the installing contractor installing the underground piping. (LMC 14.07.015; WAC 212-80-030)
18. An approved addressable fire alarm system with supervised monitoring shall be provided throughout the buildings in accordance with the Chapter 14.07 LMC and NFPA 72

Standards (2016 Edition). One monitoring system is permissible but each building needs its own fire alarm panel that reports to the monitored panel.

19. An approved 20-foot-wide all-weather surface fire apparatus access roads shall be provided to within 150-feet of all exterior portions of the buildings at ground level. Said fire apparatus access road shall be located not less than 10-feet from the building (IFC Section 503.1).
20. An approved aerial fire apparatus access roadway shall be provided along one entire side of the building when any portion of the building is in excess of 30-feet in height from the grading median of the building to the roofing eaves. Said aerial fire-apparatus access road shall be not less than 26-feet in width and be not less than 15-feet away or further than 30-feet away from the building. Aerial fire apparatus access roadways shall be constructed in accordance with AASHTO HB-17 Standards for a single axle weight load of 46,000 lbs. and a gross weight load of 75,000 lbs. (IFC Section D105).
21. The addressing for the proposed buildings shall be as noted below:

| BLDG#  | ST. # | NAME | SUFFIX | DIR | Zip   |
|--------|-------|------|--------|-----|-------|
| A      | 7107  | 32ND | AVE    | NE  | 98516 |
| B      | 7111  | 32ND | AVE    | NE  | 98516 |
| C      | 7115  | 32ND | AVE    | NE  | 98516 |
| D      | 7119  | 32ND | AVE    | NE  | 98516 |
| E      | 7123  | 32ND | AVE    | NE  | 98516 |
| F      | 7143  | 32ND | AVE    | NE  | 98516 |
| G      | 7147  | 32ND | AVE    | NE  | 98516 |
| H      | 7151  | 32ND | AVE    | NE  | 98516 |
| I      | 7155  | 32ND | AVE    | NE  | 98516 |
| J      | 7135  | 32ND | AVE    | NE  | 98516 |
| K      | 7139  | 32ND | AVE    | NE  | 98516 |
| L      | 7131  | 32ND | AVE    | NE  | 98516 |
| OFFICE | 7127  | 32ND | AVE    | NE  | 98516 |
22. Prior to building permit submittal, the Applicant shall submit a revised site plan showing the above assigned addresses as well as a list of the proposed unit numbers in accordance with standards described in LMC 12.04.050(C)(3).
23. School impact fees shall be collected from the Applicant by the City of Lacey prior to issuance of the building permit for each residential building. Fees shall be forwarded to the North Thurston School District and shall be as generated by the formula for calculating impacts fees as set forth in the Capital Facility Plan for the North Thurston School District which has been incorporate by reference into the Lacey Municipal Code.

24. A 12-inch water main shall be extended from 32nd Avenue NE to the water main recently installed in 31st Avenue/Gateway Boulevard. With the proposed layout, the 12-inch main will be on one side of the loop and appropriately sized water mains will be extended on the other side of the loop to provide domestic, water quality and fire protection needs.
25. Domestic water meters along with Reduced Pressure Backflow Assembly units shall be provided for each building. (DG&PWS 6.120 F) and (City of Lacey 2017 DG & PWS, Appendix P)
26. An irrigation meter with a Double Check Valve Assembly backflow prevention device is suggested for all landscaped areas. (DG&PWS 6.120 F)
27. Eight-inch sewer mains shall be extended throughout the site.
28. Building locations shall be designed to allow maintenance vehicles to access the site (the design vehicle is a 38-feet long, with an inside turning radius of 45-feet). Covered parking may be restricted to assure maintenance vehicles are accommodated.
29. The existing lift station this project discharges to is at capacity. A 6-inch force main shall be extended from the existing lift station to the existing sewer main in Gateway Boulevard. Additionally, the wet well, pumps and panel at the existing lift station may need to be upsized. In order to determine final design requirements, the project engineer will need to work with the City of Lacey Utility Engineer, Brandon McAllister, to determine design elements.
30. Treatment and infiltration facilities shall be constructed for stormwater associated with the site, adjacent properties currently discharging to the site as well as the half street stormwater associated with the frontage along 32nd Avenue NE.
31. Enhanced treatment of stormwater is required for all pollution-generating surfaces.
32. For permeable pavement, the underlying soil shall meet the Soil Suitability Criteria in Section 8.6.3 of the 2016 Stormwater Design Manual. Alternatively, a treatment course may be included in the pavement section if supporting information is provided to verify that the enhanced treatment standard is met.
33. Frontage improvements for 32nd Avenue NE shall be constructed to Major Local Residential roadway standards. See Detail 4-4.0 dated 12/15/14 from the City of Lacey 2017 Development Guidelines & Public Works Standards Manual. This section of roadway requires 27-feet of half-street Right-of-Way.
34. The proposed project shall also provide access to 31st Avenue NE.

35. A 20-foot buffer is required for all residential projects that abut a collector roadway. The buffer must be 20-feet in width and maintained by the property owner. This buffer will apply to the 31st Avenue side of the project (DG&PWS, Transportation 4B.065).
36. The gated access on 32nd Avenue NE shall be designed with a minimum stacking distance of 21-feet. The gated access on 31st Avenue NE shall be designed with a minimum stacking distance of 41 feet.
37. The traffic mitigation identified as of September 8, 2020 is \$102,274.26 and will mitigate off-site traffic impacts for this project. The actual fee will be determined at the date of payment for issuance of building permits, water meters or other approval process. The fees increase annually in an amount equal to the increase in the Engineering News Record Construction Cost Index over a date one year earlier (Chapter 14.21 LMC).

#### General Conditions

*The conditions below are summaries of ordinances and standards that apply to approval of this application regardless of any specific impacts of this proposed development. The list is intended as a courtesy notice and not as an exhaustive list of legal requirements that may apply to an approval of the application. The list is also a summary of the legal requirement; if there is a conflict between the summary and the ordinance, the language of the ordinance controls.*

38. A detailed landscaping plan shall be prepared by a licensed landscape architect, nursery person, or landscaper and submitted to the Planning Department for review and approval. The plan shall include the type, number, and location of the vegetative improvements as well as a specific timeline for completion of the improvements. A separate irrigation plan must also be submitted showing the location of all irrigation lines, location of sprinkler heads, and approximate coverage areas. The plans must include a note stating that the property owner is responsible for maintaining all plants in a healthy growing condition for the life of the project. All requirements of Chapter 16.80 of the Zoning Code shall be satisfied (Chapter 16.80 LMC).
39. A detailed estimate from a landscape installer must be submitted to the Planning Department. The estimate should include all costs associated with installing landscaping and irrigation as called out on the approved plans, including labor (Chapter 16.80 LMC).
40. A letter of credit or assignment of savings must be provided to the Planning Department in the amount of 150 percent of the above mentioned landscape estimate. The City shall release this financial security once the landscaping for the project is installed and approved by the Planning Department and a financial security is in order to ensure that all plant materials are properly maintained. This security device shall be in the amount of 20



percent of the value of the vegetative improvements and shall be held for a period of one year (Chapter 16.80 LMC).

41. A note shall be placed on the face of the landscaping and irrigation plans stating that any irrigation lines placed within tree protection zones established for the project must be installed in such a manner as to not cause damage to the root protection zone, such as by cutting roots, digging trenches, operation of machinery, etc. Special care must be taken (hand digging trenches, designing lines to stay out of these areas where possible, etc.) to ensure damage to the trees does not occur. In the event damage to these areas does occur, the City may require, at their discretion, replacement of the comparable landscape value of the trees damaged or other means to make up that loss (Chapter 16.80 LMC).
42. A sign permit shall be issued by the City of Lacey prior to the installation of any signs on the subject site (Chapter 16.75 LMC).
43. All applicable requirements of the City Zoning Code shall be satisfied (LMC Title 16).
44. The Applicant/developer shall be responsible for obtaining all applicable permits required for the project, including National Pollutant Discharge Elimination System Permit (NPDES), Forest Practices Application, and any others. These permits will require additional review time from the appropriate agencies.
45. Approved 12-inch minimum address numbers shall be provided on the building in a location facing the fire apparatus access roadway. The address numbers shall contrast the buildings color (IFC Section 505.1; LMC 14.07.015).
46. An approved Fire Department and Police Department key-box shall be provided on the building in accordance with (IFC Section 506) and (Chapter 14.07 LMC). Said fire department key-box shall be installed in a location approved by the City of Lacey Fire Code Official. Said key-box shall contain keys necessary for fire department and police department access to the interior of the building and any other location necessary for fire department or police department operations. Go to [knoxbox.com](http://knoxbox.com) for City of Lacey key boxes for Lacey Fire District #3 and Lacey Police Department. Upon completion of the key-box installation, the City of Lacey Fire C Specialist shall install the necessary keys and cover. (IFC Section 506). The Police Department Knox shall be on the clubhouse building not each individual building.
47. Approved fire lane marking shall be provided where necessary to discourage obstructions by the parking of private vehicles. Upon completion of final road surfaces and curbing construction, the City of Lacey Fire Code Official shall perform a site inspection to determine locations where fire lane marking will be necessary to discourage the parking

of private vehicles. Said fire lane marking, where applicable, shall be provided and approved prior to final occupancy approval (IFC Section D-103.6; LMC 14.07.015).

48. One sign shall be located at an approved location at the entrance of to the property shall be provided for a map of the entire complex. This site map shall include the roadway layout, building locations, building addresses.
49. Fire extinguishers shall be provided every 75 feet in accordance with (Chapter 14.07 LMC) fire extinguishers shall be the 2a10bc type.
50. Access gates shall be in accordance with section 103.5 of the IFC all access gates shall require a KNOX box backup key switch in addition to a strobe activated gate.
51. The City of Lacey is under the International Fire Code 2015 Edition and all NFPA code requirements of the most recent year published.
52. The City of Lacey fire code official shall conduct the necessary inspections or witness required tests to ascertain compliance with applicable fire codes. The Applicant shall contact the City of Lacey Building Department, at (360) 491-5642, to schedule the required inspection or to request witness of required tests. At least 24 hours shall be allowed for scheduling (IFC Section 106.2).
53. When connection to the public water system is desired by a customer (or required by the City) connected to a well exempt from the provisions of Revised Code of Washington 90.44.050, the "exempt" well must be properly decommissioned per Department of Ecology (DOE) standards prior to making the connection. When connection to the public water system is desired by a customer connected to an existing well that has a water right issued by the DOE, a physical disconnect between the well and the public water system must be made and maintained. This is necessary to assure that an unapproved auxiliary water supply (the customer's well) will not contaminate the City's water supply. Provided it is in compliance with DOE setback standards and purpose of use restriction on the customers water right for said well, the customer's "permitted" well may be kept serviceable for irrigation purposes only. In addition, if a well is to be used for irrigation, a Reduced Pressure Backflow Assembly (RPBA) is required and shall be installed as premise isolation at the public water supply service connection. If an existing well is not to be used for irrigation purposes, it must be decommissioned per DOE standards. No water meter will be installed until the RPBA is installed and cross connection inspection has been completed to the satisfaction of the City (DG&PWS, Water, 6.120 E).
54. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: "The property owner adjacent to the

public Right-of-Way will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way” (DG&PWS, Water, Irrigation 6.210).

55. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of Lacey Water System Plan, AWWA, Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official’s standards. Actual main size, loop closures, and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site (DG&PWS, Water 6.010).
56. Show all adjacent wells within 100-feet of the proposed project with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).
57. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time (DG&PWS General Notes Water Main Installation).
58. Extend water mains throughout the project to satisfy City of Lacey Water Comprehensive Plan requirements. Also, water mains shall be extended throughout the site to assure fire, water quality and domestic requirements can be satisfied. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline (DG&PWS, Water 6.020).
59. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (360.413.4386) to coordinate the fire flow modeling.
60. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be “cut,” a disruption fee will be charged in accordance with LMC 12.16.055.
61. The builder/Applicant/owner is required to purchase each water meter prior to the issuance of each building permit (DG&PWS Water 6.121).
62. All existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.
63. All proposed structures shall be connected to sanitary sewer. (DG&PWS, Sewer 7A.010) Public mains with associated appurtenances shall be installed to serve the proposed project with sewer.

64. Sewer main extensions shall be located 6 feet off the centerline of the street/drive area on the South or West side. Sewer stubs shall be provided to each building connecting to the public main. Side sewers for each building shall be connected to a manhole, pipes shall not connect to manholes with an angle less than 90 degrees in relation to the outlet pipe (DG&PWS, Sewer 7A.010).
65. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21).
66. This project shall comply with the City of Lacey 2016 Stormwater Design Manual (Chapter 14.27 LMC). Stormwater drainage and erosion control submittals shall be in conformance with the formatting and content requirements described in Chapter 3 of the 2016 Stormwater Design Manual.
67. A final Stormwater Site Plan, including a drainage report and drainage plans in conformance with current Stormwater Design Manual standards, shall be provided prior to final Public Works civil approval. Some key elements to be included within the report are: the project engineer's certification; descriptions of how each of the Core Requirements is being addressed; construction SWPPP; basin map and plan drawings; hydrologic modeling inputs and results (including the WWHM 2012 Data files produced with the model); summary data of sub-basin areas, design calculations, and facility sizing; soils report and infiltration analysis; soil management plan; maintenance agreement/covenant; and a stormwater facilities maintenance manual (SDM 2.2.1).
68. This project shall retain, disperse, and infiltrate stormwater on-site to the maximum extent feasible. Design of infiltration facilities requires site infiltration analysis, to determine wet-season soil and groundwater conditions and to establish a long-term design infiltration rate (SDM 2.2.5 & 7.2).
69. Stormwater shall be dispersed throughout the site to simulate pre-development infiltration to the maximum extent possible. Preferably, each building will have an individual roof drain infiltration system.
70. The maximum depth of an infiltration facility is 20 feet below the surrounding finished (developed) ground elevation, in order to provide for long-term maintenance access to the facility.
71. A Construction Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning site work or construction of the project. A

complete SWPPP consists of both a narrative report and a temporary erosion and sediment control plan drawing. Each of the 13 SWPPP Elements as identified in Chapter 5 of the City of Lacey 2016 Stormwater Design Manual shall be addressed and included in the construction SWPPP. If site conditions render any SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative report.

72. A Stormwater Facility Maintenance Manual per chapter 3 of the City of Lacey 2016 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance manual shall be included in the drainage report as part of the stormwater site plan. The maintenance manual shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to civil drawing approval.
73. From October 1 through April 30, clearing, grading, and other soil disturbing activities shall be prohibited unless shown to the satisfaction of the City of Lacey that sediment-laden runoff will be prevented from leaving the site (SDM 5.2.3).
74. Street lighting levels (LED lighting) shall satisfy City of Lacey requirements for roadways and intersections. If they do not currently meet these requirements, additional street lighting shall be installed for all streets fronting this project (Street lighting per City of Lacey spacing Standards). All street light designs shall be prepared by an engineering firm capable of performing such work (DG&PWS, Transportation, Illumination 4E.010).
75. As condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the Applicant/owner must provide a copy of a billing statement to the City. If service has not been established, the Applicant/owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. Without the information outlined above or a copy of a previous billing statement, the service will remain in the Applicant/owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.
76. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).
77. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight

distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards (DG & PWS, Transportation 4B.025).

78. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.
79. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located in the Development Guidelines shall be required in or along the public Right-of-Way, including medians (DG&PWS, Transportation 4G.100).
80. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as "utility" easements on the civil drawings and in the easement document. Specific requirements will be determined at the of plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).
81. The City of Lacey Coordinate System is a ground scale coordinate system derived from the Washington Coordinate System, NAD 83/91. Units are expressed in feet. Data can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing this coordinate system (DG&PWS 3.025).
82. City of Lacey Vertical Datum has elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD29). Units are expressed in feet. A benchmark listing can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing the City of Lacey Vertical Datum (DG&PWS 3.025).
83. Right-of-way shall be dedicated for a project that requires Site Plan Review approval. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).
84. Immediately adjacent to all public rights-of-way a 10-foot joint utility easement area shall be dedicated to accommodate the installation of private and public utilities (2017 Development Guidelines and Public Works Standards Roadway details).

85. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time complete application is obtained (complete application is determined by the City of Lacey Community Development Department).
86. If any part of these comments as established by existing plans, guidelines, codes and the like as established by ordinances shall be found invalid, all other parts shall remain in effect (DG&PWS 3.035).
87. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval (DGPWS 3.040).
88. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).
89. Prior to civil drawing approval, one paper set of drawings along with a PDF copy of the drainage report and civil drawings shall be submitted for all approved final plans (DG&PWS Chapter 3.040,B).
90. Prior to final Public Works Construction approval, “as-built” bonded paper drawings along with the revised civil drawings in AutoCAD and PDF formats shall be submitted for all approved final plans (DG&PWS Chapter 3.040, J).
91. Certificate of Occupancy for any building will not be issued until all improvements shown on the approved civil drawings are installed by the Applicant and approved by the City (DG&PWS 4B.080).
92. A 20 percent maintenance bond or financial guarantee of the engineer’s estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).
93. Along with the civil review application and the completed, signed and stamped checklist from Chapter 3 of the Development Guidelines, please provide three sets of civil drawings, two drainage reports and one electronic copy of the civil drawings (PDF format). These drawings shall be submitted directly to the City of Lacey Public Works Department. Drawings submitted to other City departments will not satisfy this requirement (DG&PWS 3.040, B).

94. The property owner(s) adjacent to the public Right-of-Way shall be responsible for maintaining the planter strip and street trees (weeding, pruning, irrigating, mowing, etc.) in the public Right-of-Way in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review (Development Guidelines & Public Works Standards, Transportation 4G.100D).
95. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon occurs, causing valve boxes, sewer manholes or other appurtenances to protrude above or settle below the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30-day time period, the City will fix the problem and bill the property owner. This language shall be included on the face of any binding site plan or easement documents submitted to the City.
96. A Bill of Sale for water, sewer and street lighting improvements being installed with this project is a requirement for approval. Prior to Final Public Works approval of the project, Bill of Sale documents shall be submitted to and approved by the City.

Decided this 23<sup>rd</sup> day of February 2021.

A rectangular box containing a handwritten signature in black ink. The signature appears to be "Andrew M. Reeves" written in a cursive, stylized script.

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ANDREW M. REEVES  
City of Lacey Hearings Examiner  
Sound Law Center



**LIST OF EXHIBITS**

Project #19-353: Griffin Multi-family

| <u>Exhibit #</u> | <u>Description</u>                                                                                        |
|------------------|-----------------------------------------------------------------------------------------------------------|
| 1                | List of Exhibits                                                                                          |
| 2                | Staff Report                                                                                              |
| 3                | General Land Use Application                                                                              |
| 4                | Site Plan Review Application                                                                              |
| 5                | Preliminary Planned Residential Development Application                                                   |
| 6                | Environmental Checklist                                                                                   |
| 7                | Transportation Impact Analysis, prepared by Heath Associates, dated June 2020                             |
| 8                | Stormwater/Drainage report, prepared by Hatton Godat Pantier, dated May, 11, 2020                         |
| 9                | Preliminary Tree Protection Plan, prepared by Washington Forestry Consultants, Inc, dated August 21, 2020 |
| 10               | Preliminary Site Plan                                                                                     |
| 11               | Preliminary Civil Plans                                                                                   |
| 12               | Preliminary Landscape Plan                                                                                |
| 13               | Preliminary Open Space Plan                                                                               |
| 14               | Open space letter, prepared by Chris Aldrich of Hatton Godat Pantier, dated October 19, 2020              |
| 15               | Certification of Public Notice                                                                            |
| 16               | Notice of Hearing sent to property owners                                                                 |
| 17               | Notice of Application published in The Olympian on August 27, 2020                                        |
| 18               | Notice of Hearing published in The Olympian on January 29, 2021                                           |
| 19               | Notice of MDNS published in The Olympian on December 17, 2020                                             |
| 20               | Notice of complete application                                                                            |
| 21               | Notice of Application                                                                                     |
| 22               | Agency Routing sheet                                                                                      |
| 23               | Comments from Marci Price, City of Lacey Land Management Specialist, dated September 9, 2020              |
| 24               | Comments from Terry McDaniel, City of Lacey Fire Code Specialist, dated August 27, 2020                   |
| 25               | Comments from Tom Stiles, City of Lacey Public Works, dated September 18, 2020                            |
| 26               | Comments from Doug Christenson, City of Lacey Stormwater Engineer, dated September 18, 2020               |
| 27               | Comments from Chris Stolberg, City of Lacey Traffic Engineer, dated September 9, 2020                     |
| 28               | Comments from Arthur Saint, Thurston County Public Works, dated September 17, 2020                        |
| 29               | Comments from WA State Department of Ecology, dated September 9, 2020                                     |
| 30               | a. Email between Chris Aldrich (Hatton Godat Pantier) and Chris Stolberg (Lacey PW Traffic)               |
| 31               | Preliminary 32 <sup>nd</sup> Avenue gate access plan                                                      |
| 32               | Comments from Jeff Goheen, North Thurston Public Schools, dated December 13, 2020                         |
| 33               | Email from Leslie McClure, received September 4, 2020                                                     |
| 34               | Email from Kenneth Zych, received September 4, 2020                                                       |

|    |                                                                      |
|----|----------------------------------------------------------------------|
| 35 | Email, anonymous, received September 6, 2020                         |
| 36 | Email from Marcie Cleaver, received September 4, 2020                |
| 37 | Email from Jenny and Mike Gessler, received September 8, 2020        |
| 38 | Mitigated Determination of Nonsignificance, issued December 16, 2020 |
| 39 | Excerpts from City of Lacey's 2030 Transportation Plan               |
| 40 | City of Lacey 2021 Transportation Improvement Plan                   |

# STAFF REPORT

Date: February 8, 2021  
To: City of Lacey Hearings Examiner  
From: City of Lacey Community & Economic Development Department  
Subject: City of Lacey Project# 19-353: Griffin Multi-family Site Plan Review and Planned Residential Development

## I. GENERAL INFORMATION

- A. Applicant/Property Owner:  
SW Olympia LLC, Scott Griffin  
6820 20<sup>th</sup> Street  
Fife, WA 98424
- B. Authorized Representative:  
Hatton Godat Pantier, Chris Aldrich, RLA  
3910 Martin Way E, Ste B  
Olympia, WA 98506

## II. DESCRIPTION OF PROPOSAL

SW Olympia LLC is proposing to develop a 12-building, 183 unit multifamily apartment complex on 9.54 acres under the City of Lacey's Site Plan Review and Planned Residential Development (PRD) regulations. The proposal also includes street, utility, landscaping, and open space improvements – as well as retention of existing trees and vegetation.

## III. LOCATION OF SUBJECT PARCEL

7203 32<sup>nd</sup> Ave NE, Assessor's parcel 11803130401 - Section 03 Township 18 Range 1W Quarter NE SE SW NE LESS N30F FOR RD

7201 32<sup>nd</sup> Ave NE, Assessor's parcel 11803130400 - Section 03 Township 18 Range 1W SE SE SW NE

7235 32<sup>nd</sup> Ave NE, Assessor's parcel 11803140300 - Section 03 Township 18 Range 1W Quarter W2 SW SE NE LESS N 30F OF 32ND AVE

#### IV. **SITE PLAN INFORMATION**

Project Size: 9.54 acres  
Number of units: 183 units (apartments)

Water: City of Lacey  
Sewer: City of Lacey  
Power/Natural Gas: Puget Sound Energy  
Fire Protection: Lacey Fire District #3

##### Site Characteristics:

The project site is located on the south side of 32<sup>nd</sup> Avenue Northeast. Each parcel contains a single family residence and multiple outbuildings. All existing structures are proposed to be demolished.

The site has an approximate 3-4% slope towards the north property line. According to the Soil Conservation Service soil survey for the area, the soil on site is predominantly Everett very gravelly sandy loam. This soil is a very deep, somewhat excessively drained soil with rapid permeability. The two western parcels contain existing trees along their western edges. The southwest parcel is largely devoid of other trees. The larger eastern parcel is heavily forested.

##### Zoning:

The site is zoned Moderate Density Residential (MDR) which permits residential development at a density between eight (8) and sixteen (16) units per acre. Multiple forms of residential development are permitted in the moderate density residential zone, including single-family homes, duplex and triplex construction, as well as multi-unit apartment buildings. Based on the underlying zoning, the project would be allowed to develop between 76 and 153 units. However, the applicant is proposing to apply the Planned Residential Development (PRD) standards that allow for bonus density to be used if certain criteria are met. This will be discussed further in Section IX below.

##### Surrounding Land Uses:

North of the property, across 32<sup>nd</sup> Ave, is the Eagle Court subdivision. This subdivision is also zoned MDR. Adjacent to Eagle Court, to the east is the age restricted, Alpine Mobile Home Community. Directly east of the property is another apartment complex, Tolmie Cove, also zoned MDR. To the southeast of the property is the WSDOT Regional Maintenance Facility; the parcel is zoned Light Industrial Commercial. Directly south, is the Gateway subdivision. Gateway is a 377 lot single-family subdivision, zoned both High Density Residential and MDR. On the project's western side is a recently developed 26-lot duplex subdivision – 52 total units – also zoned MDR.

##### Access:

Access to the site will be from both 32<sup>nd</sup> Avenue along the north, and 31<sup>st</sup> Avenue along the south.

## V. ENVIRONMENTAL EVALUATION

The environmental checklist for this project has been reviewed and a Mitigated Determination of Nonsignificance (MDNS) was issued on December 16, 2020 in accordance with WAC 197-11-355 and RCW 43.21C. (Exhibit 38) The DNS had a 15-day comment period, which ended on September 9, 2020. The Optional DNS process was used and the comment period was noticed by publishing a notice in The Olympian. The City received comments on the environmental checklist and the application materials from the Department of Ecology, Thurston County Public Works, Intercity Transit, a number of surrounding neighbors, as well as internal City departments. These comments are included as exhibits with this staff report.

## VI. APPLICABLE COMPREHENSIVE GOALS AND POLICIES

The City of Lacey and Lacey Urban Growth Area Land Use Element of the Comprehensive Plan: This document, known as the comprehensive land use plan, was prepared as a joint planning document by the City of Lacey and Thurston County for Lacey and the Lacey Urban Growth Area. There are other general policies in the Comprehensive Land Use Plan, which could apply, but the issues they cover are specifically detailed in the Lacey Zoning Ordinance, which is reviewed in the next section VIII. The following sections of the Comprehensive Plan apply to this proposal:

### A. Chapter III. Community Vision

#### a. Section A: Framework Policies

- i. **POLICY E:** *Diverse, affordable, attractive, and stable residential neighborhoods should be encouraged while providing for a variety of housing opportunities.*
- ii. **POLICY G:** Plan to accommodate a projected 2035 City population of 53,090 and potential annexation areas within the UGA.

#### a. Section B: Residential

- i. **GOAL 1:** *Ensure sustainable and wise use of land resources to provide an adequate amount and mix of housing types for the anticipated increase in population.*
- ii. **GOAL 2:** *Ensure that development regulations meet the current vision outlined in the Comprehensive Plan.*
1. **POLICY B:** *Achieve a level of design with innovative, creative, and efficient concepts for integration of different land use types that will facilitate development of great places that provide increased opportunities to live, work, and play.*
- iii. **INFILL GOAL 1:** *Adopt zoning strategies that will promote the intensification, densification, and evolution of Lacey's Land Use distribution and form into a sustainable pattern of high quality urban development.*

1. **POLICY C:** Where compatibility issues can be adequately addressed, allow for a range of land use types within the same zone to provide opportunities to enhance the character, functionality, and desirability of areas and promote multi-modal transportation options.

**b. Section F: Transportation and Land Use**

- i. **GOAL 1:** Enhance the function, safety and appearance of Lacey's streets.
  1. **POLICY A:** Ensure coordination with the Transportation Element of the Comprehensive Plan, the Thurston County transportation Plan, and the Thurston Regional Transportation Plan.
  2. **POLICY E:** Right-of-way and pavement width shall be the minimum necessary to provide for the safe use of vehicles, public transit, bicycles and pedestrians.
  3. **POLICY F:** Ensure coordination with Thurston County regarding transportation in the Urban Growth Area. Ensure that development standards and road/street level of service standards within the UGA conform to the standards of the City of Lacey.
- ii. **GOAL 4:** Ensure that private development projects, including subdivision and commercial/retail project design, facilitate measures to improve multimodal transportation.
  1. **POLICY C:** Private development projects shall provide bicycle parking and a site design that will accommodate transit.
- iii. **GOAL 5:** Support Intercity Transit's efforts to meet the transportation needs of all segments of the community by providing a high quality, safe, convenient, accessible, and cost effective transit service as an attractive alternative to the single-occupancy vehicle.

**c. Section G: Parks and Open Spaces Goals and Policies**

- i. **GOAL 1:** The land use policies should complement and help implement requirements of the City of Lacey Comprehensive Plan for Outdoor Recreation, Regional Trail Plan, and land use regulatory requirements for the provision of open space.
  1. **POLICY A:** Continue to require open space for residential and commercial development.
  2. **POLICY B:** Link pedestrian and bicycle pathways with greenways, priority habitat sites, wetlands, and open space between neighborhoods. Open space shall be designed into a project from the outset, with sizable and meaningful pieces set aside. It shall not be left to the end, using only those restricted and small spaces that are left over. It should be designed in conjunction with school and community sites whenever possible and should provide a focus for neighborhood activity.

3. **POLICY D:** *Open space shall be designed to define our community, create outdoor spaces, protect wildlife habitat and the natural environment, and create public and civic spaces.*

**d. Section H: Utilities and Capital Facilities**

- i. **GOAL 1:** *Ensure that existing utility customers, and future customers, are adequately served by water, sewer, and stormwater utility services that consider both growth demand projections and asset management.*
  1. **POLICY B:** *All proposed development should be analyzed for anticipated impact on utilities and services, either as an element of the site plan review, subdivision review, or as part of the environmental impact assessment.*

**e. Section J: Health & Human Services**

- i. **GOAL 1:** *Work to achieve a safe, active, and healthy lifestyle for Lacey citizens through community planning and design.*
  1. **POLICY B:** *Design neighborhoods to promote bicycling and walking, encouraging these activities and healthy lifestyle choices.*
  2. **POLICY C:** *Prioritize safe routes for capital improvements such as sidewalks, planter strips, street trees, traffic calming, and other pedestrian improvements. Consider incentives for infill development to add off site traffic calming and other pedestrian amenities for designated safe routes.*
- ii. **GOAL 2:** *Work to achieve a community where residents have convenient access to healthy food, clean water, and affordable shelter.*
  1. **POLICY A:** *Provide opportunities for housing development to serve Lacey's full demographic spectrum, including a full range of housing choices designed to meet life stage needs of those demographics.*
  2. **POLICY B:** *Provide opportunities to integrate housing into core areas and arterial corridors where services and transportation options can be provided.*

**B. Chapter III. Planning Areas**

**a. Land Use Hawks Prairie**

- i. **GOAL 4:** *Improve transportation infrastructure in the planning area through improvement of existing corridors and the completion of corridors identified in the City of Lacey Transportation Element.*
  1. **POLICY A:** *Ensure consistency between the Land Use Element and both the City of Lacey Transportation Element.*
  2. **POLICY B:** *Support the improvement of transportation corridors, particularly emphasizing multi-modal transportation opportunities.*

## **VII. APPLICABLE MUNICIPAL CODE STANDARDS**

The following list identifies the applicable sections of the Lacey Municipal Code that Planning staff relied upon when evaluating this proposal for land use approval:

- Title 14 – Buildings and Construction – all applicable code sections including:
  - 14.21 Traffic Mitigation and Concurrency
  - 14.23 Design Review
  - 14.24 Environmental Policy
  - 14.27 Stormwater Management
  - 14.32 Tree and Vegetation Protection and Preservation
- Title 16 – Zoning
  - 16.15 Moderate Density Residential
  - 16.60 Planned Residential Development
  - 16.72 Off-street parking
  - 16.80 Landscaping Requirements

## **VIII. NOTIFICATION**

The applications for Site Plan Review and Planned Residential Development were received on June 18, 2020, and was deemed complete pursuant to RCW 36.70B.070 on August 26, 2020. The comment period for the Notice of Complete Application had a 14-day comment period that ended on September 9, 2020. A notice was published in The Olympian and the site was posted with the notice of complete application. These notices are attached to this report as exhibits.

Written notice of the public hearing was sent to all property owners within 300 feet of the site on January 29, 2021, and notice was published in The Olympian on January 29, 2021, at least 10 days prior to the public hearing. Notice was posted on-site on January 29, 2021.

## **IX. COMMUNITY & ECONOMIC DEVELOPMENT DEPARTMENT ANALYSIS**

In review of this proposal it is important to consider the goals and policies of the comprehensive plan, the required findings and general provisions of the Zoning ordinance of the Lacey Municipal Code (LMC). Staff has reviewed this project in light of the code requirements and in light of public concerns and there are few items that warrant additional discussion.

### **Level of Review**

Development projects that require multiple permit applications to proceed, may opt for the consolidated review process - meaning all necessary permits are reviewed simultaneously as one package, rather than one permit review after another. When a project does require more than one permit type and is using the consolidated review process, the project is required to use the most stringent level of review procedure that is required by any one of the necessary permits.



Although multifamily projects proposed in residential zones typically require Site Plan Review approval, Griffin Multi-family requires the quasi-judicial approval process due to Planned Residential Development permit application associated with the project.

### **Growth and Development in the Hawks Prairie Planning Area**

In review of this proposal it is important to recognize that this area of northeast Lacey, the Hawks Prairie Planning Area, is growing and continued growth is anticipated. The Comprehensive Plan for the Hawks Prairie Area of Lacey identifies the planning area as the one with the most potential for new development in the City because of its vacant land resources, availability of utilities, and its proximity to Interstate 5. The type of residential project proposed with this development, as well as much more intensive projects are anticipated for the Hawks Prairie area. There have been significant planning efforts and public investment in road and utility infrastructure in this area and because of the growth potential, this area will continue to be a focus for both public and private investment moving forward.

This project is proposed in a location that has historically been more rural, and in an area that has only recently annexed to the City of Lacey. In fact, the parcels located at the western terminus of 32<sup>nd</sup> Avenue are still within the jurisdiction of Thurston County, but within the Urban Growth Boundary, and have enjoyed a more rural way of life until about the last fifteen years. Within just the last five years, this localized area around 32<sup>nd</sup> Avenue has seen significant growth with multi- and single-family residential projects, as well as industrial projects to the south and east along Marvin Road. Recent development and annexations of properties to the City of Lacey have introduced significant changes for the existing, long-term residents. As such, during the project application comment period the City received comments from various members of the public with concerns regarding the proposed development. The concerns are generally centered on traffic impacts, impacts to public services, tree removal, and stormwater impacts. Staff has recommended conditions to mitigate these impacts in this report.

### **Planned Residential Development (PRD)**

#### **Density**

A Planned Residential Development is a zoning tool – an overlay designation. PRD is not a zoning district with its own district standards. It is a tool applicants and the City can use to achieve more flexibility in design in exchange for more open space and more thoughtful design based on a particular site's characteristics. PRD's are permitted in all of Lacey's residential zoning districts – Low Density 0-4, Low Density 3-6, Moderate Density, and High Density.

The City of Lacey's PRD regulations are intended to incentivize development that preserves natural characteristics of the land, and to encourage a mix of housing types. PRD developments prioritize preservation and enhancement of natural open spaces as

well as increasing the amount of active open space in residential projects. To achieve the above goals, PRD regulations allow for significant flexibility in the underlying zoning requirements. Dimensional and design requirements such as – but not limited to - lot size, height limits, subdivision design standards may be waived or modified if it results in a more thoughtful neighborhood design. (LMC 16.60.050)

The applicant is seeking PRD approval in order to utilize the density increase provisions allowed for in LMC 16.60.140(B). This increase allows applicants up to a twenty (20) percent increase in allowed density in the MDR zone. Conventional development procedures would allow for 153 units to be constructed on the 9.54 acre subject site – based on the maximum 16 units per acre allowed in MDR. (9.54 acres x 16 units per acre = 153 units) A 20% increase would allow for an additional 31 units to be developed. (153 units x .2 = 31 units) The applicant is proposing to construct 183 units. The final density, after 20% increase, would result in a 19 units/acre gross density – three more units per acre than would be allowed without the density increase.

It is worth noting that while multi-family apartment developments are allowed via the PRD process (LMC 16.60.040) the development formula used to determine the allowed density increase references both street area and minimum lot size – two development features not typically seen in multi-family developments. The formula is shown below:

$$DU = N/M \times (\text{incentive factor})$$

DU = # of dwelling units  
N = net buildable site (gross land area – street area)  
M = minimum land area per dwelling unit (i.e. lot size)  
Incentive factor is .2 in MDR (.15 in LDR zones and .25 in HDR)  
*LMC 16.60.140(B)(4)*

This formula is based on determining density increases for single-family detached developments. Since multi-family apartments lack both public, dedicated right-of-way and individual lots, staff recommends that the density increase be calculated on simple gross site area, as described in the paragraph above.

#### Design Criteria for Density Increase

The PRD provisions are intended to provide both the City and applicant with greater flexibility in achieving more efficient site layout, a mix of housing types, preserving existing vegetation, and more permanent open space. Therefore, in order to take advantage of the density bonus described above, a project must include four of the following five amenities (LMC 16.60.145):

- *Develop and equip significant recreational activities within the common open space such features as, but not limited to, swimming pools, tennis courts, bike or pedestrian path systems, children's play areas;*

- o In order to meet this requirement the applicant is proposing a central recreation complex featuring a swimming pool, covered play area with climbing equipment, outdoor picnic area with patio deck, indoor lounge, fitness center, and a game room. The recreation complex includes a 3,900 s.f. building and an additional 6,600 s.f. of outdoor area directly adjacent. Additionally, the project will install various walking paths throughout the site and passive recreation opportunities within tree tract areas.
- *Substantial retention of natural ground cover, bushes and trees;*
  - o The site is required to provide tree tract(s) equaling a minimum of five (5) percent of the gross site area. (LMC 14.32.064) For this project that equates to a minimum of 0.48 acres of tree tract area. The project is proposing tree tracts in the NW, NE, SE corners of the site, as well as along the properties frontage on 32<sup>nd</sup> Avenue. The total acreage of proposed tree tracts totals 1.33 acres, exceeding the required size. Tree Tract 2 however, will not meet the requirements for canopy coverage to be considered a tree tract. Tree tracts are intended to ultimately have a 100% canopy coverage. Where canopy coverage is less than 100%, tree replacement is required that will achieve a ninety (90) percent canopy coverage within fifteen years (LMC 14.32.065). This type of replanting is not feasible in this area, due to its function as a bioswale for on-site stormwater treatment. However, even without Tree Tract #2, the site exceeds its requirement for tree tracts.

Beyond the tree tracts, the site will incorporate individual save-trees to the greatest extent feasible. The project is required to have a minimum twenty (20) foot perimeter setback around the entire site. There will likely be trees located in these areas that can be incorporated into the project design, to enhance the landscaping plan. And although it can be more difficult to save trees within the interior of higher density residential sites, there may be opportunity to identify individual or very small pockets of trees to be saved in these areas due to the site's generally rolling topography. Prior to site disturbing activity, the City's forester visits the site and will identify these trees for retention.

Retention of vegetation includes ground cover, shrubs and bushes in addition to trees. Therefore it is important that the ground beneath retained trees be maintained in a largely undisturbed state as well. The exception to this would be the low-impact walking paths proposed throughout the tree tract areas. Staff is recommending several conditions of approval to ensure trees and other vegetation are preserved during the development process.

- *Vegetated LID (low impact development) facilities are included in the design and serve as a visual amenity;*
  - As mentioned above, a large vegetated LID (low impact development) bio-infiltration facility (or bioswale) is proposed along the northern end of the site adjacent to 32<sup>nd</sup> Avenue. The main function of the bioswale is to work as part of the site's overall stormwater management plan. However, it will also function as a visual buffer between the residential on the north side of 32<sup>nd</sup> Avenue and the higher density apartments being proposed. To enhance the aesthetic and buffering properties of the facility the applicant has proposed to incorporate additional shrub and tree species, to provide a more natural aesthetic, versus what might otherwise be achieved using only typical plantings for LID facilities. Native conifers will also be incorporated will also be added in the area – adjacent to the LID – to complement this facility. Similar facilities are planned directly south of Building L and J in order to take advantage of the permeable soils in that location.
- *Provide significant access to a lake river, stream or other natural water body;*
  - There is no natural water body in the vicinity, therefore, this requirement will not be applied.
- *Provide substantial and exceptional landscaping treatment either as an adjunct to or in lieu of natural landscaping beyond the minimum required.*
  - The applicant's submittal documents indicate that the site landscaping will be extensively landscaped beyond the minimum requirements of LMC 16.80 and will include decorative fencing, as well as artwork within landscaped areas in and around the site. Enhanced landscaping should include additional trees, shrubs, and to some extent, groundcover. Beyond the number of plants, the size of required landscaped areas should be enlarged in areas as well. For example, typically all multi-family projects require 5 feet of Type II landscaping around the perimeter of buildings. Enlarging these areas to create a more lush and abundant area around buildings will add to the development's character and set it apart from standard multi-family projects.

The final landscape plan should include a detailed analysis of the areas where landscaping is being added that exceeds the minimum requirements of LMC 16.80. The final landscape plan should also include the location of trees to be saved, as identified the City's forester.

### Open Space

Planned Residential Development projects are required to provide thirty (30) percent common open space. This is in excess of the ten (10) percent open space required for subdivisions and twenty (20) percent required for typical multi-family projects. Up to fifty (50) percent of the common open space requirement may be satisfied by the

preservation of stands of trees (LMC 16.60.140). Griffin Multi-family is required to provide 2.86 acres of common open space. As discussed in the section above, tree tracts will account for 1.33 acres of the common open space requirement. Another 1.53 acres of common open space will be in the form of other site amenities.

LMC 16.60.140(A)(4) outlines the requirements for this remaining common open space design. Briefly, these are, open space must be useable and accessible, must be inviting, must be safe, provide for uses/activities that appropriately serve the anticipated residents and users, consider existing or potential open space uses on adjacent sites, and retention of existing trees and significant vegetation. This project is proposing various 'active' open space amenities including a clubhouse building with pool, gym, and shared facilities. Other amenities include a covered play area, outdoor BBQ area and patio, a dog park/run, and a number of walking paths throughout the site. The vegetated LID facility along the north portion of the site that is described earlier in this report, will incorporate a walking path, sitting area, and enhanced landscaping, making this utilitarian stormwater facility, also an attractive open space amenity. It should also be noted that the project proposes to incorporate a low-impact, active component throughout the tree tracts by way of walking paths and seating areas.

The second type of open space required in the PRD standards is private open space. While common open space is intended to be accessible to all users of the development, private open space is intended for the use by individual units exclusively. The private open space standards in the PRD ordinance are geared towards single-family housing types predominant in Lacey during in the two decades following enactment of the Growth Management Act. The PRD standards for private open space require a minimum of three hundred (300) square feet of private, usable open space for each ground level unit. When considered in context of an exclusively detached single-family, townhouse, or cottage housing project, this requirement is sound and reasonable. However, in the context of a multifamily project, this requirement loses some of its effectiveness and creates issues of equity in terms of unit locations. Applied to a multi-story apartment complex this requirement would provide a very generous private open space amenity to ground floor units, while requiring no private open space for upper story units.

Staff is recommending that the private open space standards found in LMC 14.23.080(C)(7) be slightly modified and applied to the units in Griffin Multi-family. The above referenced regulations are from the City of Lacey's multifamily design review regulations pertaining to private open space. The private open space standards from 14.23.080 cannot be applied *exactly* the same to this proposal because they, in part, reference typical open space ratios for multifamily (20%) that differ from a PRD. However, staff believes that the *types* of private open space referenced in 14.23.080 – private balconies, porches, decks, or patios - are a more practical, and useful guideline for private open space in the multifamily units of this proposal. Griffin Multi-family is proposing 52 square feet of patio/deck per unit.

The application materials submitted with the project indicate that 3.07 acres of open space is being provided. The site plan shows a significant amount of amenities, including those described above. Because open space amenities are essential components of PRD projects, it is important to ensure that the appropriate types of open space are being met. Prior to building permit issuance the applicant should submit a final open space plan detailing all of the open space improvements and set asides and their respective acreage.

#### **Compatibility Issues:**

The site proposes to convert underdeveloped low density lots to a more urban, higher density, residential use. The western parcels were annexed by the City in 2018 and the eastern parcel was annexed in 2015. However, all three parcels have been located in the Urban Growth Area with a Moderate Density zoning designation. The site is located in the Hawks Prairie Planning Area as designated by the Lacey Comprehensive Plan. This planning area has experienced tremendous growth over the past 15 years; transitioning from lower density suburban and rural development to higher density and more urban residential, as well as commercial and industrial uses. The type of development that is ongoing in the Northeast area of Lacey is anticipated based on zoning classification and goals and policies of the City of Lacey Comprehensive Plan. This does not mean that there will not be impacts to existing residents who are accustomed to a more rural and suburban lifestyle.

#### **Traffic Impacts**

Several comments were received related to traffic impacts associated with this development and the addition of these new trips to the road network. The development of this apartment complex will increase traffic, to some degree, in the area particularly on 32nd Avenue and Eagle Drive. However, the recent construction of 31<sup>st</sup> Avenue should divert some of the trips from 32<sup>nd</sup> Avenue to the site's southern entrance.

The applicant submitted a residential Traffic Impact Analysis with the application materials that identified 81 new trips to the road network during the PM peak. The City uses trips generated during the PM Peak Hour (between 4:00pm and 6:00pm) to determine how the project proponent will mitigate impacts to the transportation network. Project proponents are required to mitigate project impacts by paying traffic mitigation fees. These fees are put towards existing projects identified in the Transportation Improvement Program to improve capacity on the road network. To mitigate project impacts the developer will be required to pay \$102,274.26 in traffic mitigation fees. Some of the projects which the funds will support include the Marvin Road improvement project, the Marvin Road/Britton Parkway Intersection improvement project, and the 31st Avenue Extension – Hogum Bay to Marvin Road improvement project, among others. (Exhibit 27)

In addition to paying traffic mitigation fees, the applicant will be required to construct frontage improvements and dedicate public right-of-way along the parcel frontage associated with the project. Improvements will include sidewalks, planter strips, curb and gutter and street lighting constructed to City standards. The applicant will be required to construct these improvements on 32nd Avenue Northeast. The Gateway North duplex subdivision to the west recently completed frontage improvements along its portion of 32<sup>nd</sup> Avenue. WSDOT will be installing frontage improvements along its two parcels near Marvin Road with the future phase of its development. This leaves just the portion of 32<sup>nd</sup> Avenue to this project's east as the undeveloped portion of 32<sup>nd</sup> Avenue along the south side.

As has been previously mentioned, the northeast area of the City has seen a tremendous amount of residential, commercial and industrial development over the last 15 years. The City has anticipated and planned for this growth as is described in the Comprehensive Plan for the City of Lacey. Additional development in northeast Lacey is expected to continue. This growth does increase traffic and can strain existing infrastructure, however the City of Lacey does plan for road and road network improvements to address capacity issues. The Transportation Element of the Comprehensive Plan addresses the road network and identifies future road corridors and networks to accommodate growth. In the northeast area there are several road networks planned that will help disperse traffic off of the Marvin Road Corridor, the main north/south route for traffic in the northeast Lacey area. Exhibit #39 is from the Transportation Plan and includes the City of Lacey Project Map, and pages 62 – 70 of the plan. This document identifies and describes planned transportation improvements. Those projects with impacts related to transportation network improvements directly impacting the northeast Lacey area include: Project #4 – Marvin Road Widening from Britton Parkway to Columbia Way Northeast; Project #13 – Marvin Road/I5 Urban Interchange Improvements; Project #20 – 26th Avenue Northeast Extension from Hogum Bay Road to Sleater-Kinney Road; and Project #30 – NE Lacey (Hawks Prairie) Interconnecting Roadways. Exhibit #40 is the 2021 Transportation Improvement Program summary showing planned road projects for the next 6 years.

#### Access

This project is proposing two gated access points – one on 32<sup>nd</sup> Avenue and one on 31<sup>st</sup> Avenue. 32<sup>nd</sup> Avenue is classified as a Major Local Residential street and 31<sup>st</sup> Avenue is classified as a Minor Collector Type II. Stacking distance is based on the intersecting public street classification. Projects accessing from a major Local Residential streets are required to provide 0.5 foot per PM peak hour trip. Projects accessing from Collectors are required to provide 1 foot per PM peak hour trip. While the project will generate 81 new PM peak hour trips the TIA assigned 50 percent of the trips to each access point – other words, 40.5 trips on 32<sup>nd</sup> Avenue and 40.5 trips on 31<sup>st</sup> Avenue. The stacking distances were calculated using this 50/50 split. This results in a minimum stacking distance of 21-feet at the 32<sup>nd</sup> Avenue gate, and a minimum stacking distance of 41-feet at the 31<sup>st</sup> Avenue gate. The southern access on 31<sup>st</sup> Avenue has over 46-feet on the

submitted plans. However, the access of 32<sup>nd</sup> Avenue is a little short of the required 21-feet. The final plans will need to be revised to meet the 21-foot minimum stacking distance. The applicant has submitted a conceptual revised drawing (Exhibit 31) showing how they can meet this requirement.

#### Visual Impacts

There will also be visual impacts to adjoining neighbors as the trees are removed and replaced with residential units. Project conditions can help to mitigate some of these impacts as is discussed throughout this report. The PRD regulations do require a 20 foot setback around the entire perimeter of the site. A setback of this size will likely provide opportunities for the forester to identify individual trees for retention that can act as natural and more mature screening than typical site landscaping would provide when first planted. In addition to retained trees, perimeter landscaping will be installed around the site, exceeding Type I standards (Exhibit 14). Additionally, the applicant is locating a large bio-retention swale at the north end of the site, as described earlier in this report. The plantings used in this facility will be chosen, not just for functionality, but also for aesthetic enhancement of the streetscape along 32<sup>nd</sup> Avenue. Two of the site's three tree tracts will be located on either end of the project site along 32<sup>nd</sup> Avenue as well, to provide some visual relief from the north.

The applicant is also proposing continuous wrought-iron style fencing with stone clad columns on the perimeter of the site. From the open space plan letter dated October, 19, 2020, "Entrance landscaping will be robust, detailed, and will incorporate artwork in the form of plasma cut ornamental steel at each entry as part of the entry signage. This artwork will provide project identity as amenity."

City staff will use the design review application process to ensure that the proposed buildings meet the requirements of LMC 14.23 – Design Review. Specifically, the development must meet the standards as described in 14.23.080 – Design Criteria for Multi-Family Projects, Condominiums and Townhouses, with the modifications to open space standards as described above.

With conditions included below, that identify minimum ordinance requirements, and additional specific conditions intended to address compatibility concerns, staff believes the proposal is consistent with the goals and policies of the 2016 Lacey Comprehensive Plan. Care should be taken, however, to ensure that the minimum provisions of the ordinance requirements are satisfied or exceeded.

#### **X. HEARING EXAMINER AUTHORITY**

The Hearings Examiner has the responsibility and authority to recommend action to the City Council on Site Plan Review and Planned Residential Development permits. Pursuant to section 2.30.140 of the Lacey Municipal Code, the Examiner has the authority to render a decision on the application which may be to grant, deny, or grant



with such conditions, limitations, modifications and restrictions as the Examiner finds necessary to make the application compatible with its environment, the comprehensive plan, other official policies and objectives and land use regulatory enactments.

**XI. SUMMARY OF STAFF ANALYSIS**

Staff finds that the proposed Site Plan Review and Planned Residential Development permits are consistent with the City Comprehensive Development Plan, the City Zoning Code, and other applicable codes and regulations provided that the conditions recommended below, under Section XII, are implemented.

**XII. STAFF RECOMMENDATIONS CONCERNING ACTION ON THE PROPOSED SITE PLAN REVIEW AND PLANNED RESIDENTIAL DEVELOPMENT**

Based upon the above analysis, city staff recommends approval of the Site Plan Review and Planned Residential Development permits. The project shall proceed in substantial conformance with the plans on file, except as modified below:

**RECOMMENDED CONDITIONS OF PROJECT APPROVAL**

**CONDITIONS UNIQUE TO THIS APPLICATION:**

**Community & Economic Development Department:**

**Planning**

1. The project shall proceed in substantial conformance with the plans submitted on June 18, 2020 and October 19, 2020, except as modified by the conditions below.
2. Prior to any site disturbing activity the applicant shall receive Forest Practice permit approval from the City of Lacey.
3. Prior to building permit issuance the applicant shall process a Boundary Line Adjustment/Lot Consolidation with the City of Lacey Community & Economic Development Department.
4. Prior to grading permit issuance a revised, final open space plan shall be submitted to the Community & Economic Development Department for review and approval. The open space plan shall identify all open space amenities and provide size verification of required open space classification including common open space, natural areas, and private open space. Additionally, details of proposed amenities such as benches, trash cans, and play equipment shall be included in the open space plan.
5. Prior to grading permit issuance, a final, revised landscaping plan shall be submitted to the Community & Economic Development Department for review and approval. The

landscaping plan shall also show the location of all individual trees identified for retention by the City's contract forester, outside of the designated tree tracts.

6. Prior to building permit issuance, the developer shall receive multifamily design review approval. All buildings shall meet the applicable criteria of LMC 14.23 and LMC 14.23.080.

#### Tree Protection

7. Prior to grading permit approval the applicant shall contact Washington Forestry Consultants, Inc to identify individual trees for retention along the perimeter, and within the interior of the site.
8. Removal of existing ground cover and shrubs within designated tree tracts shall be minimal, except when necessary for the construction of the pedestrian walkways identified on the final, approved open space plan.
9. Tree protection and preservation shall be coordinated with Washington Forestry Consultants, Inc and tree protection shall follow the recommendations of Preliminary Tree Protection report dated August 21, 2020.
10. No trees shall be removed prior to issuance of a grading permit.
11. Trees to be saved shall be protected throughout all phases of construction by temporary orange, plastic mesh fencing on driven posts located at the edge of the critical root zone, as recommended in the Timeline for Tree Protection Activity. The location of the protective fencing shall be identified on the grading and civil plans and a detail of the fencing shall also be included on the plans.
12. Prior to any site construction activities taking place a preconstruction meeting shall be held with Washington Forestry Consultants to review the location of the tree protection fencing. A note stating that a preconstruction meeting shall be held with Sound Urban Forestry shall be shown on the grading plans for the project. Confirmation from the Forester that the meeting has been held shall be provided to the Community Development Department prior to the start of site construction or grading activity.
13. Prior to site construction activity the contractor completing any tree removal or logging work shall sign and submit the "Acknowledgement of Responsibilities for Professionals Doing Tree Removal in the City of Lacey". The form shall be submitted to the Planning Department prior to issuance of the grading permit.

#### Fire Code Review

14. One fire hydrant shall be installed, tested and approved prior to building permit issuance. (LMC 14.07.501.4.) Fire hydrants shall be provided every 330 feet unless the fire flow is greater than 1,500 gpm then it shall be every 300 feet in accordance with IFC

table (C102.1) and (LMC 14.07) for the building. Fire hydrants shall be placed no closer than 40 feet from the building or structure protected.

15. The required fire-flow for the building shall be not less than 1,500 gpm for 2 hours in accordance with IFC Appendix B. Said fire-flow is based on square footage/ building construction type, including a 50% credit for the installation of automatic fire sprinkler systems. (IFC section 507.1 LMC 14.07.015). The initial calculation is always based on type 5b wood framed construction as a worst case scenario for fire flow. Please be advised the square footage of the building shall be provided for an accurate fire-flow calculation.
16. The proposed buildings shall require a sprinkler system and shall be equipped with an approved automatic sprinkler system. The sprinkler system shall be installed in accordance with NFPA 13 (2016 Edition) standards. In addition a fire department connection shall be installed in accordance with (LMC 14.07) a fire department connection shall be located within 40 feet of a fire hydrant. The building shall have its own FDC line with KNOX locking caps or plugs.
17. A separate building permit shall be required for the installation of fire sprinkler system underground piping. The design shall be in accordance with NFPA 24 Standards (2010 Edition) and City of Lacey Public Works Design Standards. Underground sprinkler piping shall be designed only by a Washington State Level III Certified contractor. Plans and specifications shall be submitted to the City of Lacey Building Department for review and approval prior to installation. Fire sprinkler system underground lead-in piping shall be installed only by a Washington State Level "U" Certified contractor. The submitted plans shall be accompanied by the level "U" certification of the installing contractor installing the underground piping. (LMC 14.07.015; WAC 212-80-030)
18. An approved addressable fire alarm system with supervised monitoring shall be provided throughout the buildings in accordance with the LMC 17.07) and NFPA 72 Standards (2016 Edition). One monitoring system is permissible but each building needs its own fire alarm panel that reports to the monitored panel.
19. An approved 20-foot wide all-weather surface fire apparatus access roads shall be provided to within 150-feet of all exterior portions of the buildings at ground level. Said fire apparatus access road shall be located not less than 10-feet from the building. (IFC Section 503.1)
20. An approved aerial fire apparatus access roadway shall be provided along one entire side of the building when any portion of the building is in excess of 30-feet in height from the grading median of the building to the roofing eaves. Said aerial fire-apparatus access road shall be not less than 26-feet in width and be not less than 15-feet away or further than 30-feet away from the building. Aerial fire apparatus access roadways shall be

constructed in accordance with AASHTO HB-17 Standards for a single axle weight load of 46,000 lbs. and a gross weight load of 75,000 lbs. (IFC Section D105)

**Addressing**

21. The addressing for the proposed buildings shall be as noted below:

| BLDG#  | ST. # | NAME | SUFFIX | DIR | Zip   |
|--------|-------|------|--------|-----|-------|
| A      | 7107  | 32ND | AVE    | NE  | 98516 |
| B      | 7111  | 32ND | AVE    | NE  | 98516 |
| C      | 7115  | 32ND | AVE    | NE  | 98516 |
| D      | 7119  | 32ND | AVE    | NE  | 98516 |
| E      | 7123  | 32ND | AVE    | NE  | 98516 |
| F      | 7143  | 32ND | AVE    | NE  | 98516 |
| G      | 7147  | 32ND | AVE    | NE  | 98516 |
| H      | 7151  | 32ND | AVE    | NE  | 98516 |
| I      | 7155  | 32ND | AVE    | NE  | 98516 |
| J      | 7135  | 32ND | AVE    | NE  | 98516 |
| K      | 7139  | 32ND | AVE    | NE  | 98516 |
| L      | 7131  | 32ND | AVE    | NE  | 98516 |
| OFFICE | 7127  | 32ND | AVE    | NE  | 98516 |

22. Prior to building permit submittal the applicant shall submit a revised site plan showing the above assigned addresses as well as a list of the proposed unit numbers in accordance with standards described in LMC 12.04.050(C)(3).

**North Thurston Public Schools**

23. School impact fees shall be collected from the applicant by the City of Lacey prior to issuance of the building permit for each residential building. Fees shall be forwarded to the North Thurston School District and shall be as generated by the formula for calculating impacts fees as set forth in the Capital Facility Plan for the North Thurston School District which has been incorporate by reference into the Lacey Municipal Code.

**Public Works Department**

**Water Improvements**

24. A 12-inch water main shall be extended from 32nd Avenue to the water main recently installed in 31st Avenue/Gateway Boulevard. With the proposed layout, the 12-inch main will be on one side of the loop and appropriately sized water mains will be extended on the other side of the loop to provide domestic, water quality and fire protection needs.
25. Domestic water meters along with Reduced Pressure Backflow Assembly units shall be provided for each building. (DG&PWS 6.120 F) and (City of Lacey 2017 DG & PWS, Appendix P)

26. An irrigation meter with a Double Check Valve Assembly backflow prevention device is suggested for all landscaped areas. (DG&PWS 6.120 F)

#### Sewer Improvements

27. Eight-inch sewer mains shall be extended throughout the site.
28. Building locations shall be designed to allow maintenance vehicles to access the site (the design vehicle is a 38-foot long, with an inside turning radius of 45-feet). Covered parking may be restricted to assure maintenance vehicles are accommodated.
29. The existing lift station this project discharges to is at capacity. A 6-inch force main shall be extended from the existing lift station to the existing sewer main in Gateway Boulevard. Additionally, the wet well, pumps and panel at the existing lift station may need to be upsized. In order to determine final design requirements, the project engineer will need to work with the City of Lacey Utility Engineer, Brandon McAllister, to determine design elements.

#### Stormwater Improvements

30. Treatment and infiltration facilities shall be constructed for stormwater associated with the site, adjacent properties currently discharging to the site as well as the half street stormwater associated with the frontage along 32nd Avenue.
31. Enhanced treatment of stormwater is required for all pollution-generating surfaces.
32. For permeable pavement, the underlying soil shall meet the Soil Suitability Criteria in Section 8.6.3 of the 2016 Stormwater Design Manual. Alternatively, a treatment course may be included in the pavement section if supporting information is provided to verify that the enhanced treatment standard is met.

#### Transportation Improvements

33. Frontage improvements for 32<sup>nd</sup> Avenue Northeast shall be constructed to Major Local Residential roadway standards. See Detail 4-4.0 dated 12/15/14 from the City of Lacey 2017 Development Guidelines & Public Works Standards Manual. This section of roadway requires 27-feet of half-street Right-of-Way.
34. The proposed project shall also provide access to 31<sup>st</sup> Avenue Northeast.
35. A twenty-foot buffer is required for all residential projects that abut a collector roadway. The buffer must be 20-feet in width and maintained by the property owner. This buffer will apply to the 31st Avenue side of the project. (DG&PWS, Transportation 4B.065)
36. The gated access on 32<sup>nd</sup> Avenue shall be designed with a minimum stacking distance of 21-feet. The gated access on 31<sup>st</sup> Avenue shall be designed with a minimum stacking distance of 41-feet.

37. The traffic mitigation identified as of September 8, 2020 is \$102,274.26 and will mitigate off site traffic impacts for this project. The actual fee will be determined at the date of payment for issuance of building permits, water meters or other approval process. The fees increase annually in an amount equal to the increase in the Engineering News Record Construction Cost Index over a date one year earlier (LMC 14.21).

### **General Conditions**

*The conditions below are summaries of ordinances and standards that apply to approval of this application regardless of any specific impacts of this proposed development. The list is intended as a courtesy notice and not as an exhaustive list of legal requirements that may apply to an approval of the application. The list is also a summary of the legal requirement; if there is a conflict between the summary and the ordinance, the language of the ordinance controls.*

### **Community & Economic Development Department:**

#### **Planning**

38. A detailed landscaping plan shall be prepared by a licensed landscape architect, nursery person, or landscaper and submitted to the Planning Department for review and approval. The plan shall include the type, number, and location of the vegetative improvements as well as a specific time line for completion of the improvements. A separate irrigation plan must also be submitted showing the location of all irrigation lines, location of sprinkler heads, and approximate coverage areas. The plans must include a note stating that the property owner is responsible for maintaining all plants in a healthy growing condition for the life of the project. All requirements of Chapter 16.80 of the Zoning Code shall be satisfied. (LMC 16.80)
39. A detailed estimate from a landscape installer must be submitted to the Planning Department. The estimate should include all costs associated with installing landscaping and irrigation as called out on the approved plans, including labor. (LMC 16.80)
40. A letter of credit or assignment of savings must be provided to the Planning Department in the amount of 150 percent of the above mentioned landscape estimate. The City shall release this financial security once the landscaping for the project is installed and approved by the Planning Department and a financial security is in order to ensure that all plant materials are properly maintained. This security device shall be in the amount of 20 percent of the value of the vegetative improvements and shall be held for a period of one year. (LMC 16.80)
41. A note shall be placed on the face of the landscaping and irrigation plans stating that any irrigation lines placed within tree protection zones established for the project must be installed in such a manner as to not cause damage to the root protection zone, such as by cutting roots, digging trenches, operation of machinery, etc. Special care must be

taken (hand digging trenches, designing lines to stay out of these areas where possible, etc.) to ensure damage to the trees does not occur. In the event damage to these areas does occur, the city may require, at their discretion, replacement of the comparable landscape value of the trees damaged or other means to make up that loss. (LMC 16.80)

42. A sign permit shall be issued by the City of Lacey prior to the installation of any signs on the subject site. (LMC 16.75)
43. All applicable requirements of the City Zoning Code shall be satisfied (LMC Title 16).
44. The applicant/developer shall be responsible for obtaining all applicable permits required for the project, including National Pollutant Discharge Elimination System Permit (NPDES), Forest Practices Application, and any others. These permits will require additional review time from the appropriate agencies.

#### Fire Code

45. Approved 12" minimum address numbers shall be provided on the building in a location facing the fire apparatus access roadway. The address numbers shall contrast the buildings color. (IFC Section 505.1; LMC 14.07.015)
46. An approved Fire Department and Police Department key-box shall be provided on the building in accordance with (IFC Section 506) and (LMC 14.07). Said fire department key-box shall be installed in a location approved by the City of Lacey Fire Code Official. Said key-box shall contain keys necessary for fire department and police department access to the interior of the building and any other location necessary for fire department or police department operations. Go to [knoxbox.com](http://knoxbox.com) for City of Lacey key boxes for Lacey Fire District #3 and Lacey Police Department. Upon completion of the key-box installation, the City of Lacey Fire C Specialist shall install the necessary keys and cover. (IFC Section 506). The Police Department Knox shall be on the clubhouse building not each individual building.
47. Approved fire lane marking shall be provided where necessary to discourage obstructions by the parking of private vehicles. Upon completion of final road surfaces and curbing construction, the City of Lacey Fire Code Official shall perform a site inspection to determine locations where fire lane marking will be necessary to discourage the parking of private vehicles. Said fire lane marking, where applicable, shall be provided and approved prior to final occupancy approval. IFC Section D-103.6; LMC 14.07.015
48. One sign shall be located at an approved location at the entrance of to the property shall be provided for a map of the entire complex. This site map shall include the roadway layout, building locations, building addresses.

49. Fire extinguishers shall be provided every 75 feet in accordance with (LMC 14.07) fire extinguishers shall be the 2a10bc type.
50. Access gates shall be in accordance with section 103.5 of the IFC all access gates shall require a KNOX box backup key switch in addition to a strobe activated gate.
51. The City of Lacey is under the International Fire Code 2015 Edition and all NFPA code requirements of the most recent year published.
52. The City of Lacey fire code official shall conduct the necessary inspections or witness required tests to ascertain compliance with applicable fire codes. The applicant shall contact the City of Lacey Building Department, at (360) 491-5642, to schedule the required inspection or to request witness of required tests. At least 24 hours shall be allowed for scheduling. (IFC Section 106.2)

### **Public Works Department**

#### **Water Improvements**

53. When connection to the public water system is desired by a customer (or required by the City) connected to a well exempt from the provisions of Revised Code of Washington 90.44.050, the “exempt” well must be properly decommissioned per Department of Ecology (DOE) standards prior to making the connection. When connection to the public water system is desired by a customer connected to an existing well that has a water right issued by the DOE, a physical disconnect between the well and the public water system must be made and maintained. This is necessary to assure that an unapproved auxiliary water supply (the customer’s well) will not contaminate the City’s water supply. Provided it is in compliance with DOE setback standards and purpose of use restriction on the customers water right for said well, the customer’s “permitted” well may be kept serviceable for irrigation purposes only. In addition, if a well is to be used for irrigation, a Reduced Pressure Backflow Assembly (RPBA) is required and shall be installed as premise isolation at the public water supply service connection. If an existing well is not to be used for irrigation purposes, it must be decommissioned per DOE standards. No water meter will be installed until the RPBA is installed and cross connection inspection has been completed to the satisfaction of the City. (DG&PWS, Water, 6.120 E.)
54. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: “The property owner adjacent to the public Right-of-Way will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way”. (DG&PWS, Water, Irrigation 6.210)
55. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of Lacey Water System Plan, AWWA, Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official’s standards. Actual main size, loop closures,



and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site. (DG&PWS, Water 6.010)

56. Show all adjacent wells within 100-feet of the proposed project with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).
57. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time. (DG&PWS General Notes Water Main Installation)
58. Extend water mains throughout the project to satisfy City of Lacey Water Comprehensive Plan requirements. Also, water mains shall be extended throughout the site to assure fire, water quality and domestic requirements can be satisfied. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline. (DG&PWS, Water 6.020)
59. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (360.413.4386) to coordinate the fire flow modeling.
60. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be “cut”, a disruption fee will be charged in accordance with Lacey Municipal Code 12.16.055.
61. The builder/applicant/owner is required to purchase each water meter prior to the issuance of each building permit. (DG&PWS Water 6.121)

#### Sewer Improvements

62. All existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.
63. All proposed structures shall be connected to sanitary sewer. (DG&PWS, Sewer 7A.010) Public mains with associated appurtenances shall be installed to serve the proposed project with sewer.
64. Sewer main extensions shall be located 6-feet off the centerline of the street/drive area on the South or West side. Sewer stubs shall be provided to each building connecting to the public main. Side sewers for each building shall be connected to a manhole, pipes shall not connect to manholes with an angle less than 90 degrees in relation to the outlet pipe.(DG&PWS, Sewer 7A.010)
65. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health

Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology. (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21)

#### Stormwater Improvements

66. This project shall comply with the City of Lacey 2016 Stormwater Design Manual (LMC 14.27). Stormwater drainage and erosion control submittals shall be in conformance with the formatting and content requirements described in Chapter 3 of the 2016 Stormwater Design Manual.
67. A final Stormwater Site Plan, including a drainage report and drainage plans in conformance with current Stormwater Design Manual standards, shall be provided prior to final Public Works civil approval. Some key elements to be included within the report are: the project engineer's certification; descriptions of how each of the Core Requirements is being addressed; construction SWPPP; basin map and plan drawings; hydrologic modeling inputs and results (including the WWHM 2012 Data files produced with the model); summary data of sub-basin areas, design calculations, and facility sizing; soils report and infiltration analysis; soil management plan; maintenance agreement/covenant; and a stormwater facilities maintenance manual (SDM 2.2.1).
68. This project shall retain, disperse, and infiltrate stormwater on-site to the maximum extent feasible. Design of infiltration facilities requires site infiltration analysis, to determine wet-season soil and groundwater conditions and to establish a long-term design infiltration rate. (SDM 2.2.5 & 7.2)
69. Stormwater shall be dispersed throughout the site to simulate pre-development infiltration to the maximum extent possible. Preferably, each building will have an individual roof drain infiltration system.
70. The maximum depth of an infiltration facility is 20 feet below the surrounding finished (developed) ground elevation, in order to provide for long-term maintenance access to the facility.
71. A Construction Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning site work or construction of the project. A complete SWPPP consists of both a narrative report and a temporary erosion and sediment control plan drawing. Each of the 13 SWPPP Elements as identified in Chapter 5 of the City of Lacey 2016 Stormwater Design Manual shall be addressed and included in the construction SWPPP. If site conditions render any SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative report.
72. A Stormwater Facility Maintenance Manual per chapter 3 of the City of Lacey 2016 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance manual shall be included in the drainage report as part of the

stormwater site plan. The maintenance manual shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to civil drawing approval.

73. From October 1 through April 30, clearing, grading, and other soil disturbing activities shall be prohibited unless shown to the satisfaction of the City of Lacey that sediment-laden runoff will be prevented from leaving the site. (SDM 5.2.3)

#### Transportation Improvements

74. Street lighting levels (LED lighting) shall satisfy City of Lacey requirements for roadways and intersections. If they don't current meet these requirements, additional street lighting shall be installed for all streets fronting this project (Street lighting per City of Lacey spacing Standards). All street light designs shall be prepared by an engineering firm capable of performing such work. (DG&PWS, Transportation, Illumination 4E.010)
75. As condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the applicant/owner must provide a copy of a billing statement to the City. If service has not been established, the applicant/owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. Without the information outlined above or a copy of a previous billing statement, the service will remain in the applicant/owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.
76. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).
77. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards. (DG & PWS, Transportation 4B.025)
78. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.
79. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located

in the Development Guidelines shall be required in or along the public Right-of-Way, including medians. (DG&PWS, Transportation 4G.100)

#### General Surveying Requirements

80. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as “utility” easements on the civil drawings and in the easement document. Specific requirements will be determined at the of plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).
81. The City of Lacey Coordinate System is a ground scale coordinate system derived from the Washington Coordinate System, NAD 83/91. Units are expressed in feet. Data can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing this coordinate system.(DG&PWS 3.025)
82. City of Lacey Vertical Datum has elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD29). Units are expressed in feet. A benchmark listing can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing the City of Lacey Vertical Datum. (DG&PWS 3.025)
83. Right-of-way shall be dedicated for a project that requires Site Plan Review approval. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).
84. Immediately adjacent to all public Right of Way a 10-foot joint utility easement area shall be dedicated to accommodate the installation of private and public utilities (2017 Development Guidelines and Public Works Standards Roadway details).

#### Other Requirements

85. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time complete application is obtained (complete application is determined by the City of Lacey Community Development Department).
86. If any part of these comments as established by existing plans, guidelines, codes and the like as established by ordinances shall be found invalid, all other parts shall remain in effect. (DG&PWS 3.035)

87. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval. (DGPWS 3.040)
88. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).
89. Prior to civil drawing approval, one paper set of drawings along with a PDF copy of the drainage report and civil drawings shall be submitted for all approved final plans. (DG&PWS Chapter 3.040,B)
90. Prior to final Public Works Construction approval, “as-built” bonded paper drawings along with the revised civil drawings in AutoCAD and PDF formats shall be submitted for all approved final plans. (DG&PWS Chapter 3.040, J)
91. Certificate of Occupancy for any building will not be issued until all improvements shown on the approved civil drawings are installed by the applicant and approved by the City. (DG&PWS 4B.080)
92. A 20 percent maintenance bond or financial guarantee of the engineer’s estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).
93. Along with the civil review application and the completed, signed and stamped checklist from Chapter 3 of the Development Guidelines, please provide three sets of civil drawings, two drainage reports and one electronic copy of the civil drawings (PDF format). These drawings shall be submitted directly to the City of Lacey Public Works Department. Drawings submitted to other City departments will not satisfy this requirement. (DG&PWS 3.040, B)
94. The property owner(s) adjacent to the public Right-of-Way shall be responsible for maintaining the planter strip and street trees (weeding, pruning, irrigating, mowing, etc.) in the public Right-of-Way in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review. (Development Guidelines & Public Works Standards, Transportation 4G.100D).
95. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon

occurs causing valve boxes, sewer manholes or other appurtenances to protrude above or settle below the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30 day time period, the City will fix the problem and bill the property owner. This language shall be included on the face of any binding site plan or easement documents submitted to the City.

96. A Bill of Sale for water, sewer and street lighting improvements being installed with this project is a requirement for approval. Prior to Final Public Works approval of the project, Bill of Sale documents shall be submitted to and approved by the City.



Shaping  
our community  
together

CITY  
OF **LACEY**

DEPARTMENT OF COMMUNITY & ECONOMIC DEVELOPMENT  
420 College Street SE, Lacey, WA 98503 (360) 491-5642

OFFICIAL USE ONLY

Date: \_\_\_\_\_

Case #: \_\_\_\_\_

Received By: \_\_\_\_\_

Planner: \_\_\_\_\_

Related Cases: \_\_\_\_\_

## GENERAL LAND USE APPLICATION

### Please Identify Supplemental Forms Accompanying This Application:

- ☐ Binding Site Plan (Preliminary)
- ☐ Binding Site Plan (Final)
- ☐ Boundary Line Adjustment
- ☐ Conditional Use Permit
- ☒ **Environmental Checklist (SEPA) (must include 2 CD's containing .pdf copies of all submittal materials, including applications)**
- ☐ Joint Aquatic Resources Permit Application (JARPA)
- ☐ Landclearing Permit/Class IV Forest Practices
- ☐ Limited Administrative Review (separate application form is not required)

- ☒ **Planned Residential Development (Preliminary)**
- ☐ Planned Residential Development (Final)
- ☐ Short Subdivision (Preliminary)
- ☐ Short Subdivision (Final)
- ☒ **Site Plan Review**
- ☐ Street Merchant Supplemental
- ☐ Subdivision (Preliminary)
- ☐ Subdivision (Final)
- ☐ Townhouse Development Permit
- ☐ Wetland Development Permit
- ☐ Woodland District Supplemental

### \*Applicant/Property Owner Information

Owner: Same as applicant

Mailing Address: \_\_\_\_\_

Phone Number(s): \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Signature: [Signature]

*\* For projects with multiple owners, attach a separate sheet with above owner information and signatures.*

Applicant: SW Olympia LLC (Scott Griffin)

Mailing Address: 6820 20th Street, Fife, WA 98424

Phone Number(s): (253) 896-1300

E-mail Address: scott@freestonecompanies.com

\*Authorized Representative: Hatton Godat Pantier (Chris Aldrich, RLA)

Mailing Address: 3910 Martin Way E, Ste B, Olympia, WA 98506

Phone Number(s): (360) 943-1599

E-mail Address: chrisa@hattonpantier.com

*\*The authorized representative will be the primary staff contact for all project related questions and correspondence.*



**Project Information**Project Name: Gateway Multi-family ComplexProject Description: This project proposes to construct a 183-unit multi-family apartment complex consisting of 12 apartment buildings, an office building and associated parking and utilities. The project will also include frontage improvements along 32nd Ave NE and will retain approximately 88,250 sf of native area in designated tree tracts.**Property Description**Site Address: 7235, 7201, 7203 NE 32nd AveFull Legal Description of Subject Property (attached ☒):  
  
  
Section: 03 Township: 18N Range: 1WAssessor Tax Parcel Number(s): 11803140300, 11803130400, 11803130401Zoning District: LD - Light DensityShoreline Designation (if applicable): N/AArea of Project Site (in square feet if less than 1 acre; in acres if greater): 9.54 acres

Critical Areas on or near Site (show areas on site plan):

- |                                                                                        |                                                                                           |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None                                               | <input type="checkbox"/> Wetland                                                          |
| <input type="checkbox"/> Creek or stream (name): _____                                 | <input type="checkbox"/> Steep slopes/draw/gully/ravine                                   |
| <input type="checkbox"/> Lake or pond (name): _____                                    | <input type="checkbox"/> Historic site or structure                                       |
| <input type="checkbox"/> Endangered or threatened species (identify): _____            | <input type="checkbox"/> Flood hazard area, provide FEMA flood zone and map number: _____ |
| <input type="checkbox"/> Encumbrances, such as wells with radius, and easements: _____ |                                                                                           |

**Utilities (Existing and Proposed)**Water: Existing \_\_\_\_\_ Proposed City of LaceySewer: Existing \_\_\_\_\_ Proposed City of LaceyAccess (name of street(s) from which access will be gained): Gateway Blvd & 32nd Ave

I affirm, under penalty of perjury, that all answers, statements, and information submitted with this application are correct and accurate to the best of my knowledge. I also affirm that I am the owner of the subject site or am duly authorized by the owner to act with respect to this application. Further, I grant permission from the owner to any and all employees and representatives of the City of Lacey and other governmental agencies to enter upon and inspect said property as reasonably necessary to process this application. I agree to pay all fees of the City that apply to this application.

Chris Aldrich

Print Name

[Signature]

Signature

6/10/20

Date

Please attach all applicable supplemental forms



## DESCRIPTIONS

### PARCEL "A":

THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON.

EXCEPTING THEREFROM THE NORTH 30 FEET FOR EXISTING ROADWAY.

### PARCEL "B":

THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON.

### PARCEL "C":

THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON.

EXCEPT THAT PORTION CONVEYED TO THURSTON COUNTY BY DEED RECORDED SEPTEMBER 2, 1976 UNDER RECORDING NO. 975992.



DEPARTMENT OF COMMUNITY & ECONOMIC DEVELOPMENT  
420 College Street S.E., Lacey, WA 98503 (360) 491-5642

OFFICIAL USE  
ONLY

Date: \_\_\_\_\_

Case #: \_\_\_\_\_

Received By: \_\_\_\_\_

Planner: \_\_\_\_\_

Related Cases: \_\_\_\_\_

## SITE PLAN REVIEW SUPPLEMENTAL

(This form to be accompanied by the General Land Use Application Form)

**Project Name:** Gateway Multi-family Complex

**Address of Project:** 7235, 7201, 7203 NE 32nd Avenue

**Applicant:** SW Olympia, LLC

**Project Description:** This project proposes to construct a 183-unit multi-family apartment complex consisting of 12 apartment buildings, an office building and associated parking and utilities. The project will also include frontage improvements along 32nd Ave NE and will retain approximately 88,250 sf of native area in designated tree tracts.

**List Types of Use:** Multi-family Apartment units

**Present Use of the Property:** Single-family residential

**Total Gross Square Footage of Proposed Commercial Buildings:** \_\_\_\_\_

**Total Gross Square Footage of Proposed Industrial Buildings:** \_\_\_\_\_

### Development Standards

Proposed Building Coverage: 64,489 s.f. (15.5%)

Proposed Development Coverage: 5.32 ac (55.8%)

Percentage of Landscaped Area: 2.42 ac (25.3%)

Area of Open Space: 2.87 ac total OS incl LS/tree (30%)

Area of Tree Tract: 1.57 ac

### Multi-Family Housing Proposal

Zoning: MD - Medium Density

Total Units: 183

Total Density: 19.18 du/ac

Permitted Density: 16 du/ac plus 20%(PRD) = 183 du

### To apply for Site Plan Review approval, the following shall be submitted:

- ☐ 15 copies of the General Land Use Application
- ☐ 15 copies of the Site Plan Review Supplemental Application
- ☒ Environmental Checklist (SEPA) (must include 2 CD's containing .pdf copies of all submittal materials, including applications)
- ☒ Vicinity map at a scale of 1" = 200, 600, or 1,000 feet showing the following information: existing streets (with names), intersections and driveways within 200 feet of the proposed site, fire hydrants within 660 feet of the site, street lighting within 300 feet of the project site (330 feet for commercial projects)
- ☒ 15 copies of the site plan
- ☒ One 11" x 17" copy of the site plan
- ☐ All other items requested at the presubmission conference
- ☒ All application fees

**The site plan shall be at a scale of 1"= 20, 40 or 60 feet and shall show specifically and clearly, all of the following features on one or more sheets:**

1. The location of existing and proposed structures
2. Location of fences
3. Sidewalks, curbs, and gutters
4. Parking lots, marked spaces, proposed ingress and egress showing width, including curb cuts
5. Storm drains and stormwater retention ponds and drainage pattern shown by arrows
6. Landscape and buffers
7. Existing and proposed easements
8. Existing and proposed utilities including: sanitary sewer with sizing information, water lines with size, storm sewer, fire hydrants and street lights
9. Loading spaces, including loading platforms/docks
10. Proposed location of refuse areas, and mechanical equipment
11. Handicapped facilities, including parking spaces, ramps, walks, and landings
12. Land clearing (inventory of existing trees with those to be removed identified)
13. Grading and relocation of top soil if over 50 yards of excavation is proposed
14. Location of any abandoned structures, septic tanks, fuel tanks, etc



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CITY OF **LACEY**

DEPARTMENT OF COMMUNITY & ECONOMIC DEVELOPMENT  
420 College Street SE Lacey, WA 98503 (360) 491-5642

OFFICIAL USE ONLY

Date: \_\_\_\_\_

Case #: \_\_\_\_\_

Received By: \_\_\_\_\_

Planner: \_\_\_\_\_

Related Cases: \_\_\_\_\_

## PRELIMINARY PLANNED RESIDENTIAL DEVELOPMENT SUPPLEMENTAL

(This form to be accompanied by the General Land Use Application form and all other applicable land use forms i.e. preliminary subdivision, or preliminary short subdivision)

Applicant or Authorized Representative: Hatton Godat Pantier (Chris Aldrich, RLA)

Telephone Number: (360) 943-1599

I certify that the information furnished by me is true and correct, and that the applicable requirements of the City will be met.

Signed: \_\_\_\_\_

Date: 6/10/20

Proposed Lot Count: 1

Proposed Average Lot Size: 9.54 ac

Proposed Open Space Area: 2.87 ac

Proposed Open Space Elements: Tree tract (1.57ac),  
private balconies, central recreation area w/ pool, play equip,  
dog park area, seating and pedestrian trails.

Proposed Setbacks:

Front: 10'

Rear: 15'

Side: 5'

Proposed Commercial Uses: Apartment complex

### An Application for PRD Shall Include the Following:

- ☒ 25 copies of the Preliminary PRD supplemental application;
- ☒ 25 copies of the General Land Use application;
- ☒ Additional supplemental applications as required i.e. Preliminary Subdivision or Preliminary Short Subdivision supplemental forms, quantities as required by the specific form;
- ☒ 25 copies of a vicinity sketch showing the location of the site and its relationship to surrounding areas, including existing streets, driveways, major physiographic features such as railroads, lakes, streams, shorelines, schools, parks, and other prominent features;
- ☒ 25 copies of a map or maps of the site at a scale not smaller than one hundred feet to the inch, showing all the information required for a preliminary plat plus the following:
  1. Site boundaries,
  2. Streets bounding or abutting the site,
  3. Proposed building including dimensions, setbacks, identification of types and the number of dwelling units in each residential type,
  4. Location and dimension of open spaces,
  5. Existing and proposed contours including natural features,
  6. Parking facilities, their design, size and capacity,
  7. Circulation plan – vehicular and pedestrian, and points of ingress and egress from the site, and their relationship

to ingress and egress of neighborhood properties,

8. Existing buildings and indication of future use or disposition,

9. Landscaping Plan,

10. Typical front and side elevations and exterior architectural treatments of the proposed units, and

11. Conceptual utility plan, including water, sewer, storm drainage and lighting;

☐ In addition to the graphic materials, the developer shall submit 25 copies of a written statement providing the following information:

1. Program for development including estimated staging or timing of development, including build-out data to be submitted to the City and to North Thurston School District for each year during the construction period,

2. Proposed ownership pattern upon completion of development,

3. Basic content of restrictive covenants,

4. Provisions to assure permanence and maintenance of common open space through homeowners association formation, condominium development or other means acceptable to the City,

5. Statement or tabulation of dwelling unit densities proposed,

6. Statement describing the relationship of the proposed PRD to the Lacey Comprehensive Plan;

☐ Any other information requested at the presubmission conference; and

☒ All applicable fees.



## **SEPA ENVIRONMENTAL CHECKLIST**

### ***Purpose of checklist:***

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

### ***Instructions for applicants:***

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

### ***Instructions for Lead Agencies:***

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

### ***Use of checklist for nonproject proposals:***

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

### ***A. Background*** [\[HELP\]](#)

1. Name of proposed project, if applicable:  
Gateway Multifamily Complex

2. Name of applicant:  
Freestone Companies

3. Address and phone number of applicant and contact person:

Scott Griffin, 6820 20th Street, Fife WA 98424

4. Date checklist prepared:

May 14, 2020

5. Agency requesting checklist:

City of Lacey

6. Proposed timing or schedule (including phasing, if applicable):

Demolition, clearing and grading will begin approximately Spring of 2021. Construction activities are anticipated to last through the Summer of 2021 with final site stabilization in Fall of 2021.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Yes, this project includes the installation of a 6" sewer forcemain. This forcemain will provide an outlet for a lift station that is exceeding capacity. The lift station is located in the subdivision due north of the project. The forcemain will route through the project area to connect to a stubbed forcemain at the south end of the project.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Geotechnical and Stormwater Evaluation dated 07/25/2017

Geotechnical and Stormwater Evaluation dated 07/07/2016

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No approvals or proposals are known at this time.

10. List any government approvals or permits that will be needed for your proposal, if known.

Preliminary Plat, Construction Permits, Final Plat

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The proposal is to develop an apartment complex with 12 multifamily buildings and an office on a 9.54-acre parcel, with the associated roadway, private and public utilities, and stormwater facilities. Construction activities will include demolition of existing structures, land-clearing, and grading. 8 of the buildings have an average footprint of 4,500 sf, and 4 of the buildings have an average footprint of 9,000 sf. 2.03 acres will remain as Soil and Vegetation Protection Area. The proposal includes approximately 2.62 acres of impervious parking and 0.60 acres of permeable parking. Approximately 2000 lineal feet of 8-inch water, 1300 lineal feet of 8-inch gravity sewer, and 1700 lineal feet of 2-inch force main.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Site Address: 7235 32nd Ave NE - Lacey 98516

Closest Intersection: 32<sup>nd</sup> Ave NE and Marvin Rd NE

Section 03 Township 18 Range 1 West Willamette Meridian

Tax Parcel #11803140300, #11803130400, #11803130401

Legal Description: Section 03 Township 18 Range 1W Quarter W2 SW SE NE LESS N 30F OF 32ND AVE INCLUDES COMMODORE 82 52/24

Lat/Long to parcel center: 47.076701, -122.785784

## **B. Environmental Elements** [\[HELP\]](#)

### **1. Earth** [\[help\]](#)

#### **a. General description of the site:**

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other shallow slope

#### **b. What is the steepest slope on the site (approximate percent slope)?**

Approximately 4%

#### **c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.**

Soils onsite are consistent with Everett very gravelly sandy loam. Soil conditions vary across the site, with a patch of Kapowsin silt loam in the northeast corner of the site. General conditions are: Forest duff (0.5'), well and poorly graded sands and gravels with varying quantities of silt (0.5' to 6'), well-graded gravels with sand (6-9'), and very dense glacial till. The height of the till layer varies across the site, becoming as shallow as 3' at the north end of the site.

#### **d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

No history of soil instability was observed in the immediate vicinity per site visits by the engineer. No signs of soil instability were observed by the Geotech per the Insight Geologic, Inc. dated July 25, 2017 and July 7, 2016



- e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Approximately 200,000 cubic yards of fill grading will be required for the project. Approximately 5500 cubic yards of existing material will be cut for the purpose of the stormwater system grading and will be redistributed across the project area as 5500 cubic yards of fill material.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. Erosion can occur during clearing, mass grading and construction of the proposed improvements.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 43% of the site will be impervious surface (roadway, sidewalk, roofs and driveways).

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: An erosion control and demolition plan and Construction Stormwater Pollution Prevention Plan (CSWPPP) will be prepared to the City of Lacey and Department of Ecology standards. Specific measures include: marking clearing limits, preserving natural vegetation, installation of a stabilized construction entrance/exit, installation of tree protection fencing, installation of catch basin inlet sediment protection devices and the use of the proposed stormwater pond as a temporary sediment pond/trap.

## **2. Air** [\[help\]](#)

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Emissions from typical construction equipment and dust during construction; emissions from vehicles after the project has been completed. Quantities are unknown.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

Properties within 500 feet of the project area include residential subdivisions, an apartment complex, a packaging plant and a church. Potential odors are assumed to be normal residential odors (cooking and vehicular). No other sources are known.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Dust control of areas subject to surface and air movement of dust where on-site and off-site impacts may occur. Plaster covering or temporary seeding of exposed soils for periods of more than 30 days.

### 3. Water [\[help\]](#)

#### a. Surface Water: [\[help\]](#)

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

One existing stormwater pond is located within the project vicinity. A detention pond is located at the intersection of 32<sup>nd</sup> ave NE and Bonanza Court NE. This pond releases to an unnamed creek to the west of the project.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

The proposed project will work within 200 feet of both water bodies described above. Activities will include the full construction project (clearing, grading, etc.).

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill or dredge material will be placed in or removed from surface waters or wetlands.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No surface water withdrawals are proposed.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.  
No

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No discharge to surface waters are proposed.

#### b. Ground Water: [\[help\]](#)

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No groundwater will be withdrawn. Water will be supplied by the City of Lacey water system.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the

number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material will be discharged into the ground.

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater runoff from the proposed impervious parking will be conveyed to either bioretention swale located on the site plan. Stormwater from the proposed permeable sidewalks and parking will infiltrate through treatment soils, where treatment is necessary. Stormwater from the roof areas will be conveyed to infiltrated trenches as noted on the site plan. A portion of the runoff from 32<sup>nd</sup> Ave NE will bypass the project's onsite stormwater system and be caught by grated catch basin on the east side of the north property line. This matches the current condition for this runoff.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

No significant amount of waste materials are anticipated to enter the ground or surface waters. The bioretention swales are designed to meet enhanced treatment requirements before discharging stormwater.

A pollution source control plan will be part of a stormwater maintenance agreement on the title of each lot. This plan will outline the Best Management Practices to help reduce the potential for common residential waste materials.

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

Existing drainage patterns will be altered. Currently, roof runoff is handled in downspout infiltration facilities for each single-family home. Runoff from other surfaces onsite currently infiltrates through the underlying gravel or collects in a low spot on 32<sup>nd</sup> Ave NE and then on to an existing storm pond northwest of the site. The project proposes two bioretention swales and permeable pavement to collect, treat, and infiltrate runoff generated within the new property boundaries.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Upstream frontage runoff will bypass the project in the existing condition. Facilities are sized and located to best utilize the underlying gravels for infiltration onsite.

#### 4. **Plants** [\[help\]](#)

a. Check the types of vegetation found on the site:

- ☒ deciduous tree: alder, maple, aspen, other
- ☒ evergreen tree: fir, cedar, pine, other
- ☒ shrubs
- ☒ grass
- ☐ pasture
- ☐ crop or grain
- ☐ Orchards, vineyards or other permanent crops.
- ☐ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- ☐ water plants: water lily, eelgrass, milfoil, other
- ☐ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

The site is 9.54 acres of primarily undeveloped forest. The proposal is to clear and mass grade the site. The project will retain 2.03 acres of Soil and Vegetation Protection area which will retain native trees. Per the Preliminary Tree Protection Plan by Washington Forestry Consultants, Inc. the project will retain or replant 154 trees. The majority of the trees retained are Douglas Fir. Per this same report, onsite vegetation includes the forementioned trees as well as Salal, Ocean Spray, Bracken Fern, Sword Fern, Himalayan Blackberry, Oregon Grape, and American Holly.

c. List threatened and endangered species known to be on or near the site.

There are no threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Landscaping will be placed within the planter strip along the proposed roadway and around the proposed stormwater pond. Vegetation to be planted include: Red Oak, Katsura Tree, Bosnian Pine, and Western Hemlock. Native trees and vegetation to be retained will be protected by tree protection fencing throughout the construction project.

e. List all noxious weeds and invasive species known to be on or near the site.

No noxious weeds or invasive species are known to be on or near the site.

#### 5. **Animals** [\[help\]](#)



- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:  
mammals: deer, bear, elk, beaver, other:  
fish: bass, salmon, trout, herring, shellfish, other \_\_\_\_\_

- b. List any threatened and endangered species known to be on or near the site.

There are no threatened and endangered species known to be on or near the site.

- c. Is the site part of a migration route? If so, explain.

The site is not part of a migration route.

- d. Proposed measures to preserve or enhance wildlife, if any:

The project proposes to retain portions of the project area as protected vegetation area which will allow for wildlife habitat. Stormwater runoff will be treated to enhanced treatment requirements before entering the groundwater provide clean water recharge to the aquifer.

- e. List any invasive animal species known to be on or near the site.

No invasive species are known to be on or near the site.

## **6. Energy and Natural Resources** [\[help\]](#)

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity and/or natural gas will be used for heating and general electrical needs. Homeowner's may elect to have alternative energy sources installed in the future. Homes will be constructed to the current building and energy codes.

- b. Would your project affect the potential use of solar energy by adjacent properties?  
If so, generally describe.

The reduction of the existing forest canopy will likely increase the solar energy potential of adjacent properties by reducing the amount of shade that is currently in place.

- c. What kinds of energy conservation features are included in the plans of this proposal?  
List other proposed measures to reduce or control energy impacts, if any:

The proposed home construction will meet the General Requirements of Chapter 3 of the Washington State Energy Code, Residential Provisions.

## **7. Environmental Health** [\[help\]](#)

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

There is a potential for exposure to toxic chemicals during the construction process such as; painting, insulation, concrete mixing and other standard construction materials. Hazardous material post-construction will be restricted to: bleach, gasoline, oil, chemical cleaners and other standard residential substances.

- 1) Describe any known or possible contamination at the site from present or past uses.

The site is primarily undeveloped forest. There is no evidence of past or present contamination.

- 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Underground utilities including, sewer, water and gas existing within the right of way along 32<sup>nd</sup> Avenue NE. No other hazardous conditions are known to exist onsite.

- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Hazardous chemicals such as paint, oil, gasoline, concrete mixing and other standard construction items will be present during the construction phase. Hazardous chemicals such as bleach, paint, oil and gas and other toxic residential materials will be present post construction.

- 4) Describe special emergency services that might be required.

No special emergency services will be required. In the event of any large spills that could threaten state waters call 1-800-SPILL-911.

- 5) Proposed measures to reduce or control environmental health hazards, if any:

Prevention, proper use, cleanup and proper disposal of hazardous materials will be implemented during the construction process. Source control of pollution will be described in a pollution source control manual to be adopted by the home owners association.



**b. Noise**

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Onsite noise will be primarily vehicular from the adjacent 32<sup>nd</sup> Avenue NE and residential noise from the Eagle Loop subdivision and Tolmie Cove Apartments. Noise from vehicles and religious activities will be generated during worship hours from the church within the vicinity.

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short-term noise will be generated from construction activities. Noise sources include chainsaws, vehicles, heavy equipment, sawing, hammering and other typical construction activities. Long-term noise will be those typical of a multifamily complex.

- 3) Proposed measures to reduce or control noise impacts, if any:

Proposed measures include the retention of natural vegetative areas and installation of landscaping and screening. Construction activities will be restricted to daylight hours.

**8. Land and Shoreline Use** [\[help\]](#)

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

The property has three single family residences and is primarily undeveloped forest. The properties in the surrounding areas are subdivisions, apartments, and religious facilities. The project will have minimal affect on the surrounding land uses. The property is a 182-unit plat, increase in vehicular traffic will be moderate.

- b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The project area has not been used as working farmlands or working forest lands. No evidence of recent tree cutting activities is located onsite.

- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No working farmland or forest land is located in the immediate vicinity of the project area.

- c. Describe any structures on the site.

Three single family residences exists on the property.

- d. Will any structures be demolished? If so, what?

The existing single family residences will be removed.

- e. What is the current zoning classification of the site?

Current zoning for the property is MD (Moderate-Density Residential)

- f. What is the current comprehensive plan designation of the site?

The current comprehensive plan designation for the site is Moderate Density Neighborhood.

- g. If applicable, what is the current shoreline master program designation of the site?

Not Applicable

- h. Has any part of the site been classified as a critical area by the city or county? If so, specify.  
No critical areas have been identified by the city or county per Thurston County Geodata.

- i. Approximately how many people would reside or work in the completed project?

Using the occupancy rate of 2 persons per unit, the project will have 364 residents in the subdivision. (2 x 182 units = 364 residents)

- j. Approximately how many people would the completed project displace?

Using the occupancy rate of 2.8 persons per single family residence, the project will displace 9 residents. (2.8 x 3 single family home = 8.4 = 9 residents)

- k. Proposed measures to avoid or reduce displacement impacts, if any:

No measures are proposed to reduce displacement.

- L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:



The project will be completed to the City of Lacey standards. The project will retain 2.03 acres of native vegetation. The project will follow the required building setbacks of 20 feet in the front, side, street-flanking, and rear.

- m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

No forest or agricultural lands are within the project vicinity.

## **9. Housing** [\[help\]](#)

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

The project will construct 182 middle to low income units

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Three single middle lower income homes would be eliminated.

- c. Proposed measures to reduce or control housing impacts, if any:

The project will be completed to the City of Lacey standards. The project is in an area zoned for 8 to 16 units, but the project is applying as a Planned Residential Development which grants bonus density. The project therefore proposes 19 units per acre.

## **10. Aesthetics** [\[help\]](#)

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The maximum building height will be 35 feet. Exterior building materials may be fiber cement, vinyl or other appropriate siding materials. Roofs will be asphalt shingles.

- b. What views in the immediate vicinity would be altered or obstructed?

The portions of the existing forested condition will be removed and replaced with the lawn or paving. Neighboring homes will lose some forested views.

- b. Proposed measures to reduce or control aesthetic impacts, if any:  
2.03 acres of native vegetation will be retained. Buildings and storm facilities will be constructed within the required setbacks. Landscaping will be provided in planter strips per City of Lacey standards.

## **11. Light and Glare** [\[help\]](#)

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

The proposal will produce street lighting, home lighting and vehicular lighting primarily from dusk until dawn.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

The proposal will produce lighting that is a safety hazard or interfere with views. Street lighting will be shielded with the required distribution patterns. Home lighting and vehicle lighting will be typical of the existing light conditions.

- c. What existing off-site sources of light or glare may affect your proposal?

The largest existing light sources in the vicinity of the proposal are from the adjacent apartment complex and the existing street lights. These lights are not anticipated to affect the proposed project.

- d. Proposed measures to reduce or control light and glare impacts, if any:

Street lights will be shielded and directed to the street surface per City of Lacey standards.

## **12. Recreation** [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity?

No designated or informal recreational opportunities found in the immediate vicinity

- b. Would the proposed project displace any existing recreational uses? If so, describe.

The project will not displace any existing recreation uses.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

The project proposes a dog park and open tree preserve area in the southeast corner of the site. There will also be an open green space available for recreational opportunities in the center of the site, adjacent to the property's private pool.

## **13. Historic and cultural preservation** [\[help\]](#)

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

A search of the Washington Information System for Architectural & Archaeological Records Data (WISAARD) has not revealed any residence -eligible for preservation registers.

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation?

This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.



No evidence of Indian or historic use occupation is evident onsite. The predictive model from WISAARD places the site in a Moderately Low Risk category for Archaeological Resources.

- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

The WISSARD webmap provide online was reviewed as well as Thruston County Geodata.

- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

No measures are proposed for the project.

#### **14. Transportation [\[help\]](#)**

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The project area is served by 32<sup>nd</sup> Avenue NE and Gateway Boulevard. Access to 32<sup>nd</sup> Avenue is from Marvin Road.

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

The site is not currently served by public transit. The nearest transit stops are 1.8 miles away.

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

344 parking spaces will be created by the project per city of Lacey requirements. The proposal would eliminate the parking spaces associated with the existing single-family homes.

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

The project proposes the construction of approximately 680 feet of frontage improvements to 32<sup>nd</sup> Avenue NE with associated planter and sidewalk. Lighting facilities will be included in the new road construction.

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The project is not in the vicinity of water, rail or air transportation.

- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would

be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

The average number of trips per day is 344 vehicle trips per day. Peak hours would be between 7am to 9 am (18 trips per hour) and 4pm to 6pm (24 trips per hour) during normal commuting hours. Vehicles would be standard personal vehicles. Truck traffic would be assumed to be less than 10% of the total volume. Vehicle trips were estimated with the assumption that all parking stalls will be filled with commuters taking trips during rush hour.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No agricultural or forest products are moved routinely within the project area.

h. Proposed measures to reduce or control transportation impacts, if any:

The project does not propose to reduce or control transportation.

## **15. Public Services** [\[help\]](#)

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

The proposal would include approximately 364 new residents which will require additional fire, police, EMS and school services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Impact fees for Schools, Parks, and Transportation will be collected on each new building.

## **16. Utilities** [\[help\]](#)

a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other \_\_\_\_\_

c. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

City of Lacey water and sanitary sewer; Comcast and CenturyLink communications, City of Lacey refuse and recycling; Puget Sound Energy electricity and natural gas.



### **C. Signature** [\[HELP\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee: **Steve D. Hatton, PE, Principal**

Position and Agency/Organization: **Hatton Godat Pantier**

Date Submitted: 05/22/2020

### **D. Supplemental sheet for nonproject actions** [\[HELP\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks,

wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.



GRIFFIN MULTI-FAMILY  
TRAFFIC IMPACT ANALYSIS

*City of Lacey, WA*



Prepared for: c/o Mr. Jeff Pantier  
Hatton Godat Pantier  
3910 Martin Way E, Suite B  
Olympia, WA 98506

June 2020

GRIFFIN MULTI-FAMILY  
TRAFFIC IMPACT ANALYSIS

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# GRIFFIN MULTI-FAMILY TRAFFIC IMPACT ANALYSIS

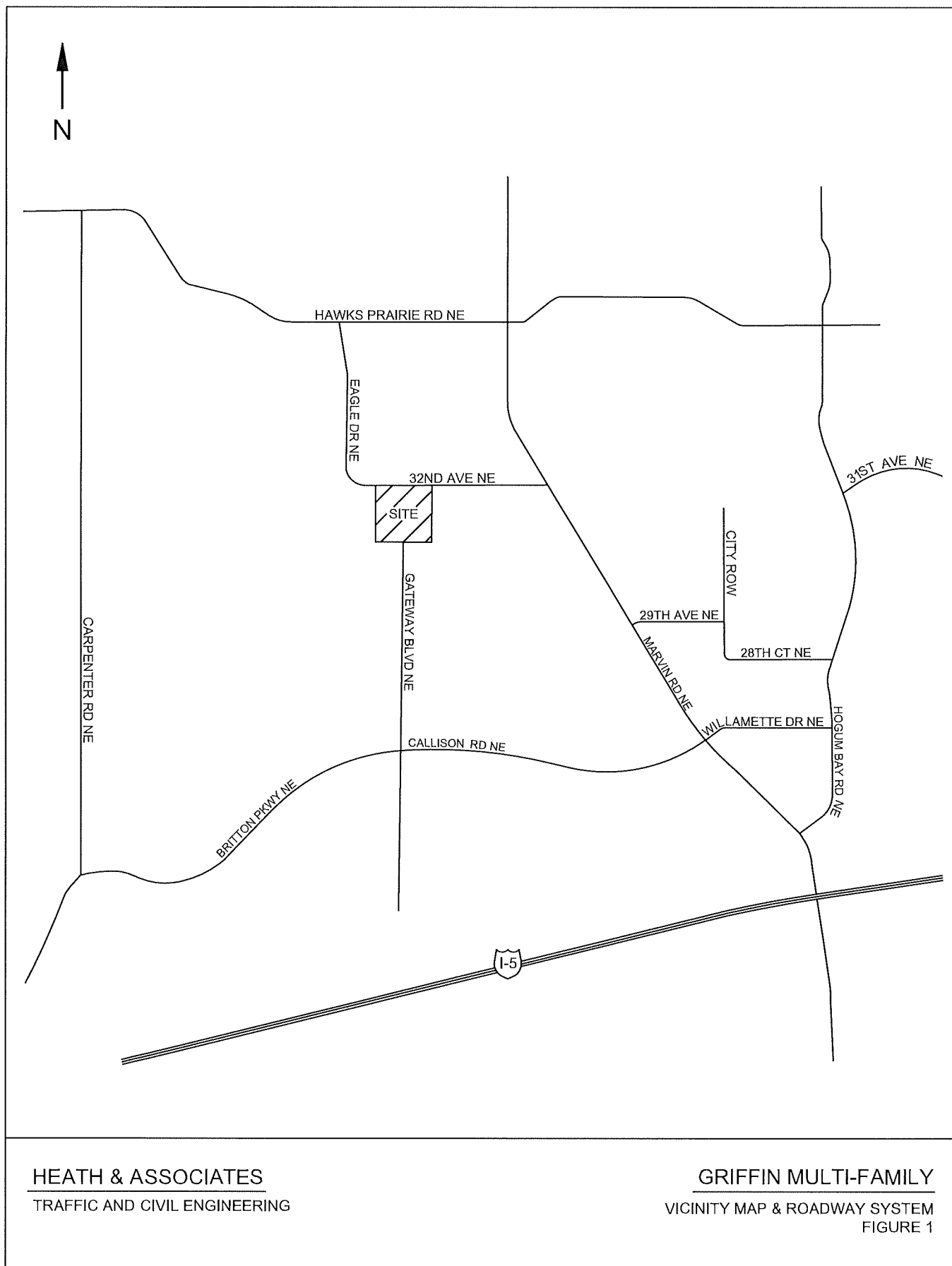
## 1. INTRODUCTION

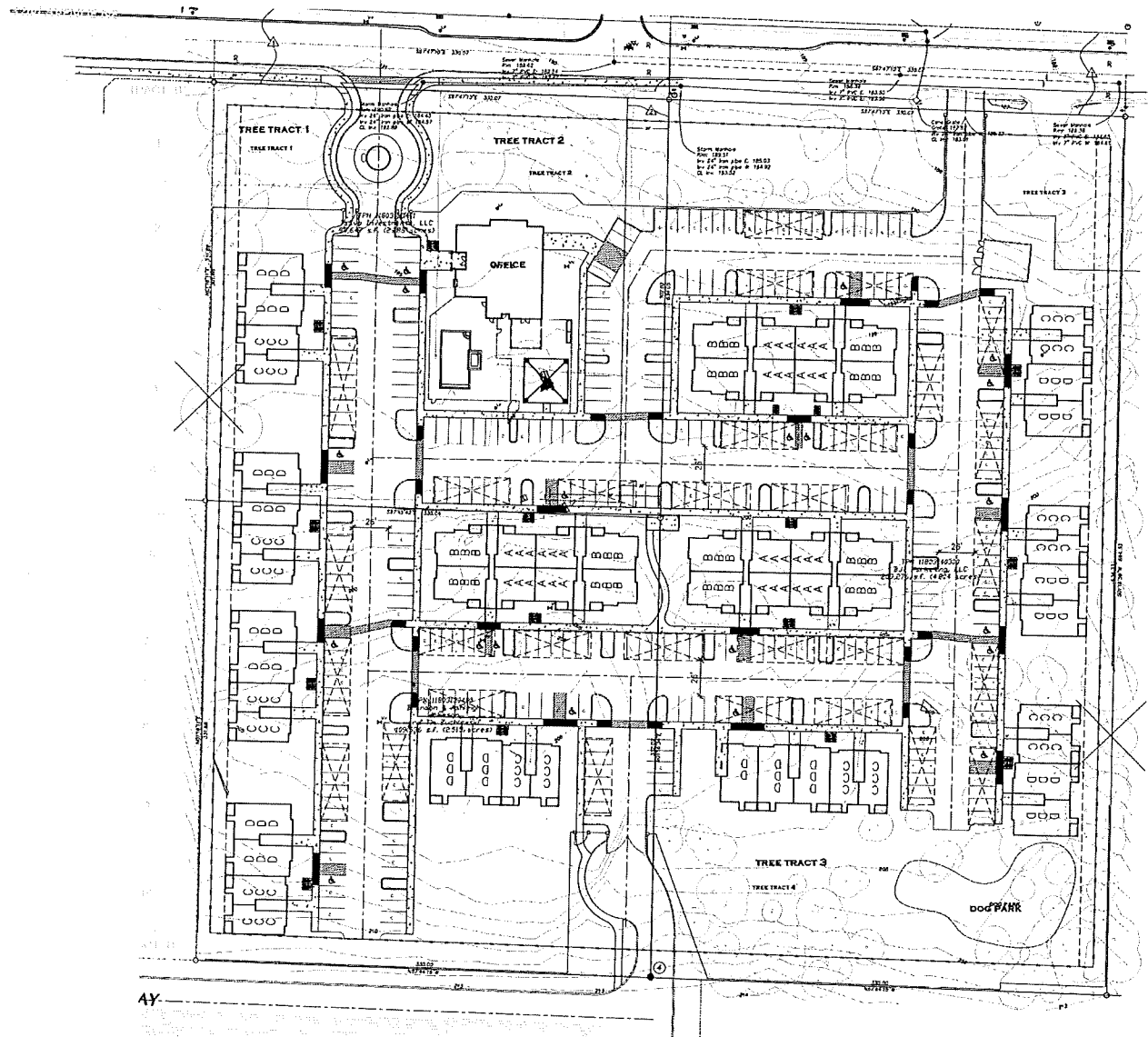
The main goals of this study focus on the analysis of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the adjacent street system, baseline vehicular volumes, and entering sight distance data. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined.

## 2. PROJECT DESCRIPTION

Griffin Multi-Family is a proposed 183-unit multi-family apartment development located in the city of Lacey. The subject site is bordered to the north by 32nd Avenue NE on a cumulative 9.54-acres within tax parcel #'s: 1180314-0300; -0400; and -0401. Access to the subject site is proposed via a connection to Gateway Boulevard to the south and via two driveways extending south from 32nd Avenue NE. All existing structures on-site are to be demolished prior to new construction, which includes several single-family residences. A vicinity map is illustrated in Figure 1. The overall project configuration and site plan is presented in Figure 2. Illustrated below is a site aerial image of the property boundaries.







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GRIFFIN MULTI-FAMILY  
SITE PLAN  
FIGURE 2

### 3. EXISTING CONDITIONS

#### 3.1 Existing Roadway Characteristics

The street network serving the proposed project consists of a variety of roadways. The major roadways and arterials defined in the study area are listed and described below.

**Table 1: Roadway Network**

| Functional Classification <sup>1</sup> | Roadway                              | Speed Limit  | Lanes | Street Parking | Sidewalk | Bike Facilities |
|----------------------------------------|--------------------------------------|--------------|-------|----------------|----------|-----------------|
| <b>Boulevard</b>                       | Willamette Dr NE/<br>Britton Pkwy NE | 35-40<br>Mph | Multi | No             | Yes      | Yes             |
| <b>Arterial</b>                        | Marvin Rd NE                         | 35 mph       | Multi | No             | Yes      | Yes             |
| <b>Planned Corridor/<br/>Collector</b> | Gateway Blvd NE                      | 30 mph       | 2     | No             | Yes      | No              |
| <b>Local</b>                           | 32nd Ave NE                          | 25 mph       | 2     | No             | Segments | No              |

#### 3.2 Non-Motorist Traffic

Non-motorist traffic volumes were reviewed at the 32nd Avenue NE & Marvin Road NE intersection from field count observations. During the PM peak hour, a total of 2 pedestrians were noted along both 32nd Avenue NE and Marvin Road NE. The surrounding area (with the exception of 32nd Avenue NE) offers a robust network of multi-modal infrastructure in the form of continuous sidewalk paths and dedicated bike lanes, which encourage alternative modes of transport. Once traversing 32nd Avenue NE (which has discontinuous sidewalk segments), pedestrians would have connectivity via continuous walking paths and bike lanes to nearby amenities. Additionally, site development would include construction of frontage improvements along 32nd Avenue NE and sidewalk internal to the development.

#### 3.3 Transit Service

A review of the Intercity Transit regional bus schedule indicates that the nearest available transit is via Route 62A and Route 65. The nearest scheduled stop for Route 62a is located at Providence Medical Group on Marvin Road, approximately 0.80 miles south of the subject site. Route 62A provides weekday service from the Olympia Transit Center to Willamette Drive NE & 31st Avenue NE from approximately 5:22 AM to 11:37 PM with 30-minute headways. Weekend service is provided from 7:22 AM to 11:37 PM with 30-minute headways. Major destinations served by Route 62A include the Lacey Transit Center,

<sup>1</sup> Functional classification was derived from the *2030 Lacey Transportation Plan*

Lacey Walmart and Martin Way. The nearest scheduled stop for Route 65 is located at Marvin Road & Spencer Road, approximately 0.60 miles northeast of the subject site. Route 65 begins weekday service at the Olympia Transit Center and traverses through northeast Lacey from approximately 5:54 AM to 11:05 PM with 30-minute headways. Weekend service is provided from 7:26 AM to 10:56 PM with 30-minute headways.

### 3.4 Existing Peak Hour Volumes and Travel Patterns

Intersections targeted for analysis were discussed with the city of Lacey during the initial project scoping. Field data was obtained from the City on various dates noted below at the study intersections of:

- 32nd Avenue NE & Marvin Road NE (9/12/2018)
- Willamette Drive NE/Britton Parkway NE & Marvin Road NE (9/12/2018)
- Britton Parkway NE & Gateway Boulevard NE (11/28/2017)

All turning movement counts were administered during the PM (4:00-6:00) peak period, which generally translates to highest overall roadway volumes in a given 24-hour period. The PM peak hour volumes at the intersections of study are presented on the following page in Figure 3. Through-volumes at the project frontage were extrapolated from the 32nd Avenue NE & Marvin Road NE count. Full-count sheets are included in the appendix.

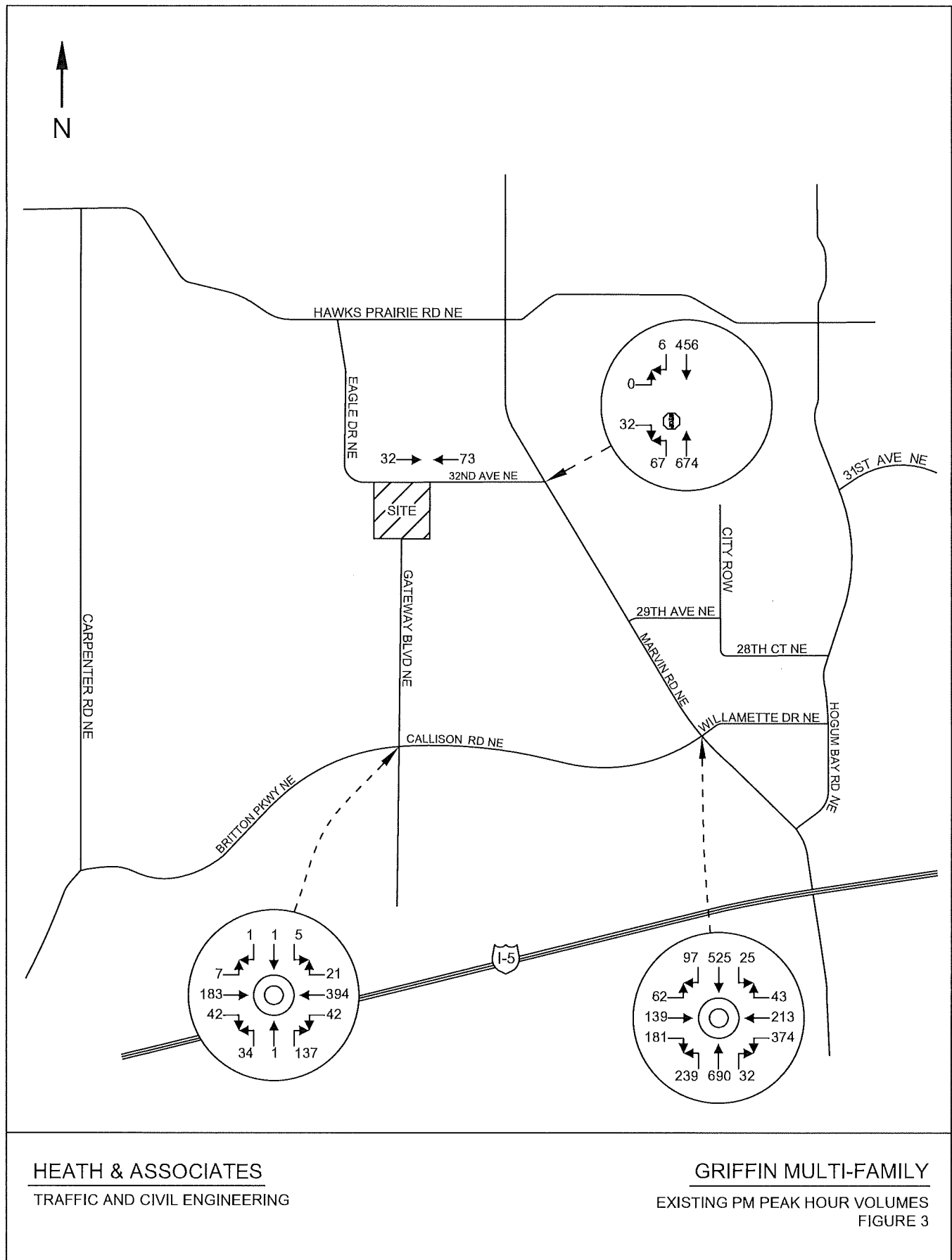
### 3.5 Roadway Improvements

A review of the 2020-2025 City of Lacey Six-Year Transportation Improvement Plan indicates that capacity-related projects are planned in the vicinity of the project site. The total cost per trip breakdown can be found in Table 14T-15 of the 2019/2020 Transportation Improvement Mitigation List, attached in the appendix.

**Table 2: Nearby Transportation Improvement Projects**

| Name                        | Project No.        | Location                    | Improvement Type  |
|-----------------------------|--------------------|-----------------------------|-------------------|
| Carpenter Road              | 102-0000-224.50-38 | Martin Way to Britton Pkwy  | Roadway           |
| Marvin Road                 | 102-0000-224.50-39 | Britton to Columbia Dr NE   | Roadway           |
| Hogum Bay Road              | 102-0000-224.50-46 | Hogum Bay Road              | Roadway           |
| 31st Avenue Extension       | 102-0000-224.50-51 | Hogum Bay to Marvin Rd      | Roadway extension |
| Britton Pkwy & Carpenter Rd | 102-0000-224.50-52 | Britton Pkwy & Carpenter Rd | Intersection      |





### 3.6 Level of Service

Peak hour delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine Level of Service (LOS) which is an established measure of congestion for transportation facilities. The range<sup>2</sup> for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were evaluated utilizing *Synchro 10<sup>3</sup>* analysis software for stop-controlled intersection and *SIDRA* for roundabout analysis. Delays presented represent overall weighted average delays for roundabout control. Two-way stop-controlled intersections are broken down by average delay critical movement. Table 3 below summarizes existing LOS for the key intersections of study.

**Table 3: Existing PM Peak Hour Level of Service**

*Delays given in seconds per vehicle*

| Intersection                      | Control | Critical Movement | LOS | Delay |
|-----------------------------------|---------|-------------------|-----|-------|
| 32nd Ave NE & Marvin Rd NE        | TWSC    | EB                | B   | 11.7  |
|                                   |         | NBL               | A   | 8.6   |
| Willamette Dr NE & Marvin Rd NE   | RAB     | Overall           | B   | 12.3  |
| Britton Pkwy NE & Gateway Blvd NE | RAB     | Overall           | A   | 4.3   |

TWSC: Two-Way Stop Control; RAB: Roundabout

Based on Table 3, existing peak hour service levels are shown to operate up to LOS B or better for the PM peak hour of travel. The study intersections are shown to currently meet the city of Lacey's LOS D standard.

#### <sup>2</sup> Signalized Intersections - Level of Service

| Level of Service | Control Delay per Vehicle (sec) |
|------------------|---------------------------------|
| A                | ≤ 10                            |
| B                | > 10 and ≤ 20                   |
| C                | > 20 and ≤ 35                   |
| D                | > 35 and ≤ 55                   |
| E                | > 55 and ≤ 80                   |
| F                | > 80                            |

Highway Capacity Manual, 6th Edition

#### Stop Controlled Intersections - Level of Service

| Level of Service | Control Delay per Vehicle (sec) |
|------------------|---------------------------------|
| A                | ≤ 10                            |
| B                | > 10 and ≤ 15                   |
| C                | > 15 and ≤ 25                   |
| D                | > 25 and ≤ 35                   |
| E                | > 35 and ≤ 50                   |
| F                | > 50                            |

<sup>3</sup> As HCM 2000 analysis does not support the intersection sign configuration at 32nd Avenue NE & Marvin Road NE, HCM 6th was utilized for analysis

### 3.7 Access Driveway

Access to the site is proposed via two driveways extending south from 32nd Avenue NE and a northerly roadway extension of Gateway Boulevard NE extending into the southern side of the subject site. Any new driveway shall be designed so as to allow for sufficient entering sight distance as prescribed in AASHTO's Green Book (2018). AASHTO standards<sup>4</sup> would require unobstructed sight lines measuring 240 feet and 280 feet for right- and left turn movements based on the 25-mph speed limit found on 32nd Avenue NE. Based on the provided site design, no sight distance deficiencies are identified at either proposed access. Looking west, project traffic at the proposed driveways would have clear sight lines to 32nd Avenue NE's intersections with the Bonanza Drive NE and Eagle Drive NE roadways.

## 4. FUTURE TRAFFIC CONDITIONS

### 4.1 Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is usually denoted by the quantity or specific number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. Data presented in this report was taken from the Institute of Transportation Engineer's publication *Trip Generation*, 10th Edition. The designated land use for this project is defined as Multi-Family Housing Mid-Rise (LUC 221). Table 4 below summarizes the estimated project trip generation using ITE average rates. Included are the average daily traffic (ADT) and the AM and PM peak hours. Refer to the appendix for trip generation output.

**Table 4: Project Trip Generation**

| Land Use     | Size      | ADT | AM Peak-Hour Trips |     |       | PM Peak-Hour Trips |     |       |
|--------------|-----------|-----|--------------------|-----|-------|--------------------|-----|-------|
|              |           |     | In                 | Out | Total | In                 | Out | Total |
| Multi-family | 183 units | 996 | 17                 | 49  | 66    | 49                 | 32  | 81    |

As shown in the table above, the project can be estimated to generate 66 new AM peak hour trips (17 inbound / 49 outbound) and 81 new PM peak hour trips (49 inbound / 32 outbound).

<sup>4</sup> American Association of State Highway and Transportation Officials (AASHTO).



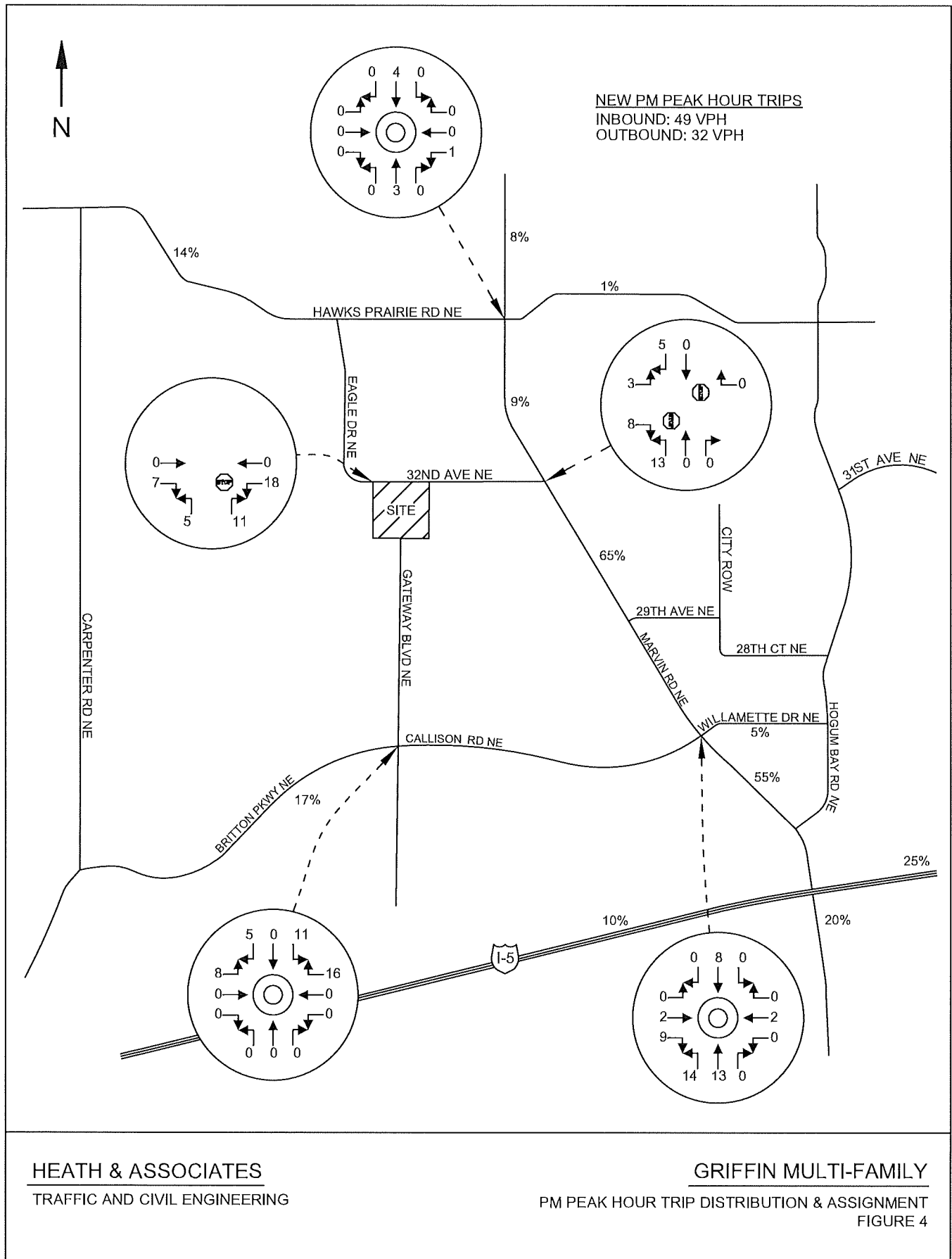
## 4.2 Distribution & Assignment

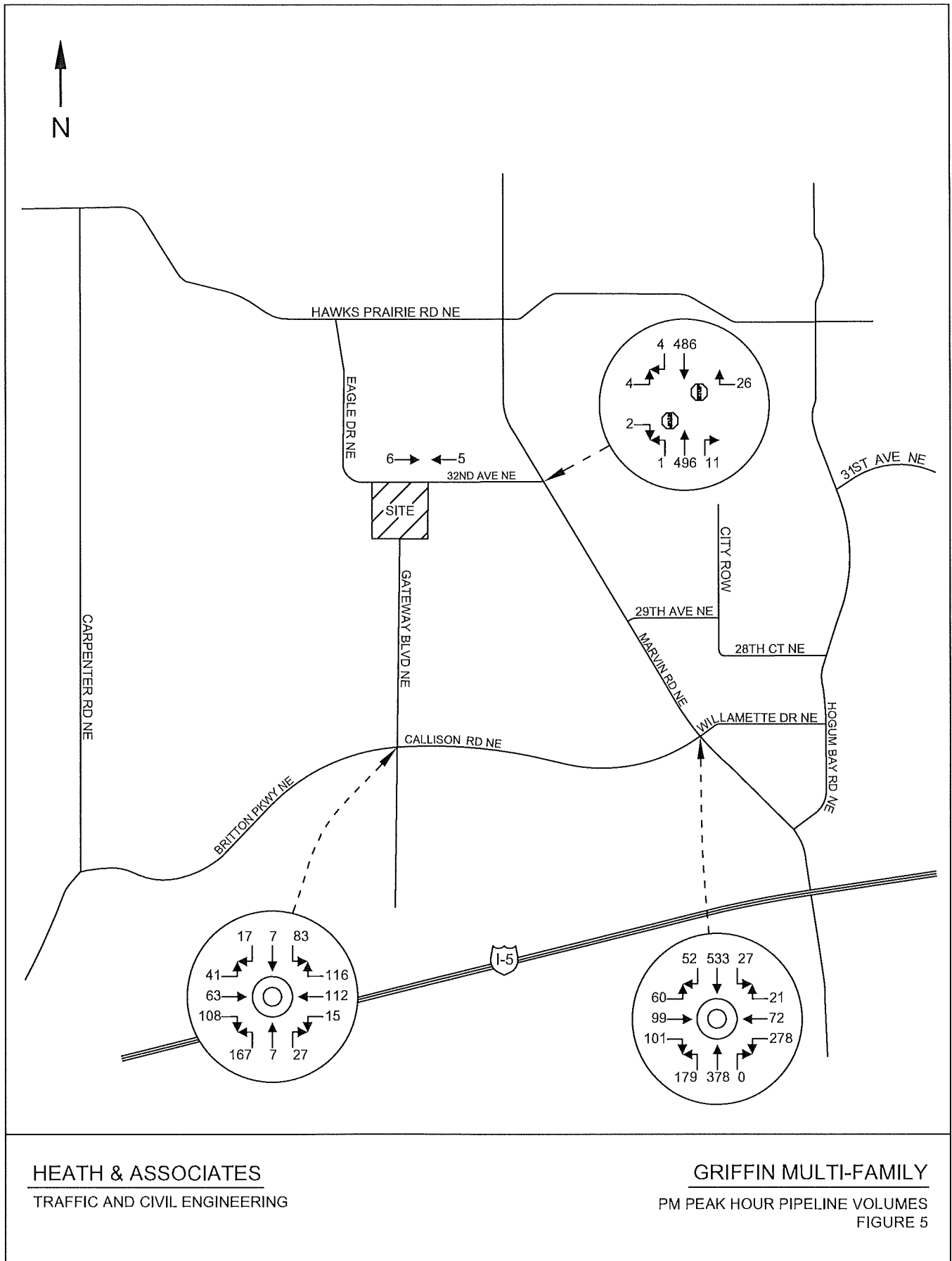
Trip distribution describes the process by which project generated trips are dispersed on the roadway network surrounding the site. Applicable SZA 508 modeling provided by the city of Lacey was utilized to derive trip distribution percentages. As illustrated in Figure 4, project-generated traffic is split evenly between the 32nd Avenue NE and Gateway Boulevard NE accesses.

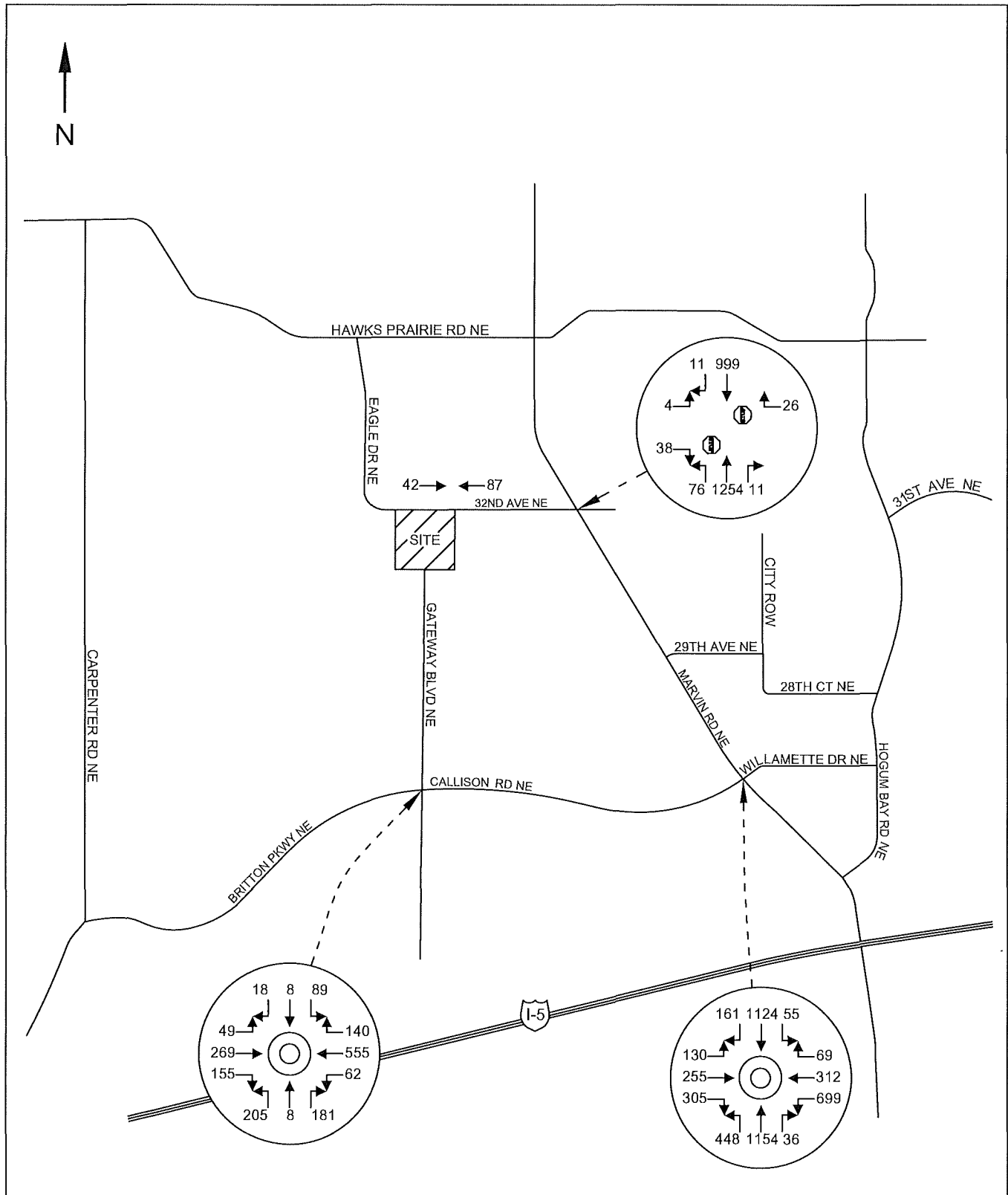
A separate modeling distribution was requested through Thurston Region Planning Council (TRPC) for project traffic distribution outside city limits. The County distribution identifies zero PM peak hour trips heading to or from the Marvin Road Concurrency Corridor (Marvin Road at and south of Union Mills Road SE). This separate distribution has been requested given the interlocal agreements between city of Lacey and Thurston County and is intended to establish appropriate mitigation measures for County review.

## 4.3 Future Peak Hour Volumes

A 3-year horizon of 2023 was used for future traffic delay analysis. Forecast 2023 background traffic volumes were derived by applying a four percent compound annual growth rate to the existing volumes shown in Figure 3 as discussed with City of Lacey in the project scoping process. In addition, generated traffic from several nearby planned developments were accounted for as pipeline. Pipeline volumes were provided by the City and are shown in Figure 5. Forecast 2023 background (growth rate and pipeline volumes added) peak hour volumes are illustrated in Figure 6. Forecast 2023 PM peak hour volumes with the addition of Griffin Multi-Family traffic are illustrated in Figure 7.

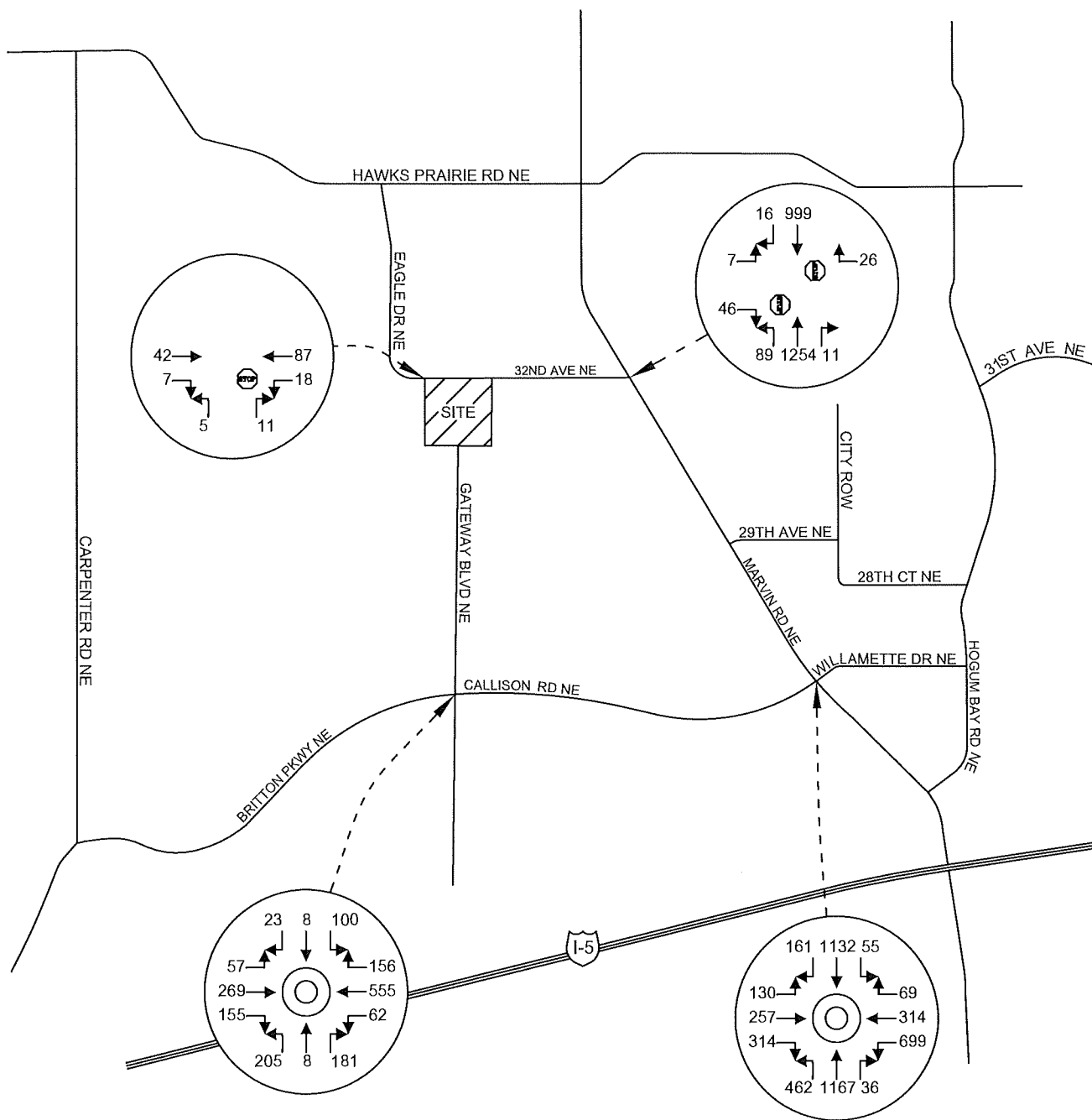






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**GRIFFIN MULTI-FAMILY**  
FORECAST 2023 PM PEAK HOUR BACKGROUND VOLUMES  
FIGURE 6



**HEATH & ASSOCIATES**  
TRAFFIC AND CIVIL ENGINEERING

**GRIFFIN MULTI-FAMILY**  
FORECAST 2023 PM PEAK HOUR VOLUMES WITH PROJECT  
FIGURE 7

#### 4.4 Future Level of Service

Level of service analyses were made of the PM peak hour volumes without (background) and with project related trips added to the key roadways and intersections. This analysis once again involved the use of the *Synchro 10* and *SIDRA* analysis programs. Delays for the study intersections under future conditions are shown below in Table 5.

**Table 5: Forecast 2023 PM Peak Hour Level of Service**

*Delays given in seconds per vehicle*

| Intersection                      | Control | Critical Movement | <u>2023 Without</u> |       | <u>2023 With</u> |       |
|-----------------------------------|---------|-------------------|---------------------|-------|------------------|-------|
|                                   |         |                   | LOS                 | Delay | LOS              | Delay |
| 32nd Ave NE & Project Access      | TWSC    | NB                | -                   | -     | A                | 8.9   |
|                                   |         | WBL               | -                   | -     | A                | 7.4   |
| 32nd Ave NE & Marvin Rd NE        | TWSC    | EB                | E                   | 46.5  | F                | 76.0  |
|                                   |         | NBL               | B                   | 11.5  | B                | 11.7  |
| Willamette Dr NE & Marvin Rd NE   | RAB     | Overall           | F                   | 190.1 | F                | 192.1 |
| Britton Pkwy NE & Gateway Blvd NE | RAB     | Overall           | A                   | 7.0   | A                | 7.2   |

TWSC: Two-Way Stop Control; RAB: Roundabout

Forecast 2023 PM peak hour delays are shown to operate up to LOS F without or with the proposed development. Pipeline generated traffic in conjunction with the proposed development are shown to degrade LOS to unsatisfactorily levels. The following intersections are estimated to operate with substandard service levels.

**32nd Avenue NE & Marvin Road NE:** is shown to operate at LOS F with the project. It should be taken into consideration that 1030 PM peak hour pipeline trips have been accounted for which may not be realized at the time of project buildout. The substandard delays are anticipated to be primarily experienced from the eastbound left-turn movement. With no center two-way left-turn lane north of the intersection, drivers are unable to perform a two-step maneuver to enter the roadway and therefore must wait for an appropriate gap from both north/south directions. It should be noted that the 95th percentile queue (i.e.: the queue length in vehicles that has only a 5% probability of being exceeded during the PM peak hour) is calculated at less than 3 vehicles.

**Willamette Drive NE & Marvin Road NE:** is shown to operate at LOS F without or with project generated traffic. It should be taken into consideration that 1800 PM peak hour pipeline trips have been accounted for which may not be realized at the time of project buildout.

In accordance with Lacey Municipal Code (LMC) 14.21, Marvin Road NE is considered as a Strategy Corridor given its location and where city growth is encouraged and anticipated. Section "M" of the code further states "Peak hour vehicular congestion in these corridors is likely to exceed levels of service which would otherwise be acceptable within the transportation system" and "Such Strategy Corridors shall be exempt from the level of service standards set forth in Subsection H of this Section." The City generally has a level of service standard of LOS E in the Lacey Core Area and LOS D in all other areas.

To mitigate potential delays drivers may experience, alternative routes would be available. More distribution may occur via Gateway Blvd NE which is shown to have acceptable forecast LOS. Similarly, traffic may bypass the 32nd Avenue NE & Marvin Road NE intersection by routing via Hawks Prairie Road NE by way of Eagle Drive NE. Given the "Strategy Corridor" classification and other alternative routes available, no off-site mitigation is identified.

#### 4.5 Turn Lane Warrants

A left turn warrant was analyzed at 32nd Avenue NE at the project access to determine if storage capacity is needed for left turning vehicles. Procedures prescribed in WSDOT's Design Manual (Figure 1310-7a) were used to ascertain left turn requirements under forecast 2023 PM peak hour conditions with full project build-out. Based on the low volumes travelling on 32nd Avenue NE and the assessment criteria, a left turn lane *would not be warranted*. The applicable warrant sheet has been included in the appendix.

## 5. SUMMARY

Griffin Multi-Family proposes to construct 183 multi-family apartment units in the city of Lacey. The subject property is bordered to the north by 32nd Avenue NE on a cumulative 19.54-acres within tax parcel #'s: 1180314-0300; -0400; and -0401. Access to the site is proposed via two driveways extending south from 32nd Avenue NE and a connection via Gateway Boulevard NE south of the subject site. A conceptual site plan illustrating the overall configuration and proposed accesses is presented in Figure 2.

Based on ITE data, the project can be anticipated to generate 66 new AM peak hour trips (17 inbound / 49 outbound) and 81 new PM peak hour trips (49 inbound / 32 outbound). Forecast 2023 PM peak hour conditions are shown to operate with up to LOS F conditions; however, project-generated traffic represents a small portion of intersection volumes. The intersections of 32nd Avenue NE & Marvin Road NE and Willamette Drive NE & Marvin Road NE are shown to operate with substandard service levels when accounting for ambient growth in addition to a number of pipeline projects. As described, Marvin Road NE is classified as a Strategy Corridor and is therefore exempt from LOS standards. Additionally, alternate routes would be available to project residents that would bypass delays along the Marvin Road NE Strategy Corridor. The project's entrance on 32nd Avenue NE is shown to operate acceptably, and a left-turn lane would not be warranted under future conditions.

Based on the analysis above, the following mitigation is recommended:

1. Pay Traffic Impact Fees (TIF) as required by LMC 14.21 concurrency requirements. Credit may be discussed for the removal of any existing on-site structures. Final fees and calculations will be determined by the City upon final review of the Traffic Study.
2. Pursuant to the Interlocal Agreement between City of Lacey and Thurston County, additional TIF would be required to be paid to the County. A separate customized trip distribution (Zone 1099) was requested through TRPC in order to establish appropriate County fees and is included in the appendix. No PM peak hour trips were identified accessing to or from the Marvin Road Concurrency Corridor.

No other mitigation is identified at this time.



GRIFFIN MULTI-FAMILY  
TRAFFIC IMPACT ANALYSIS

*APPENDIX*

INTERSECTION COUNT SHEETS



Prepared for:

**SKILLINGS CONNOLLY****Traffic Count Consultants, Inc.**

Phone (253) 926-6009 FAX (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Gateway Blvd NE &amp; Britton Pkwy NE

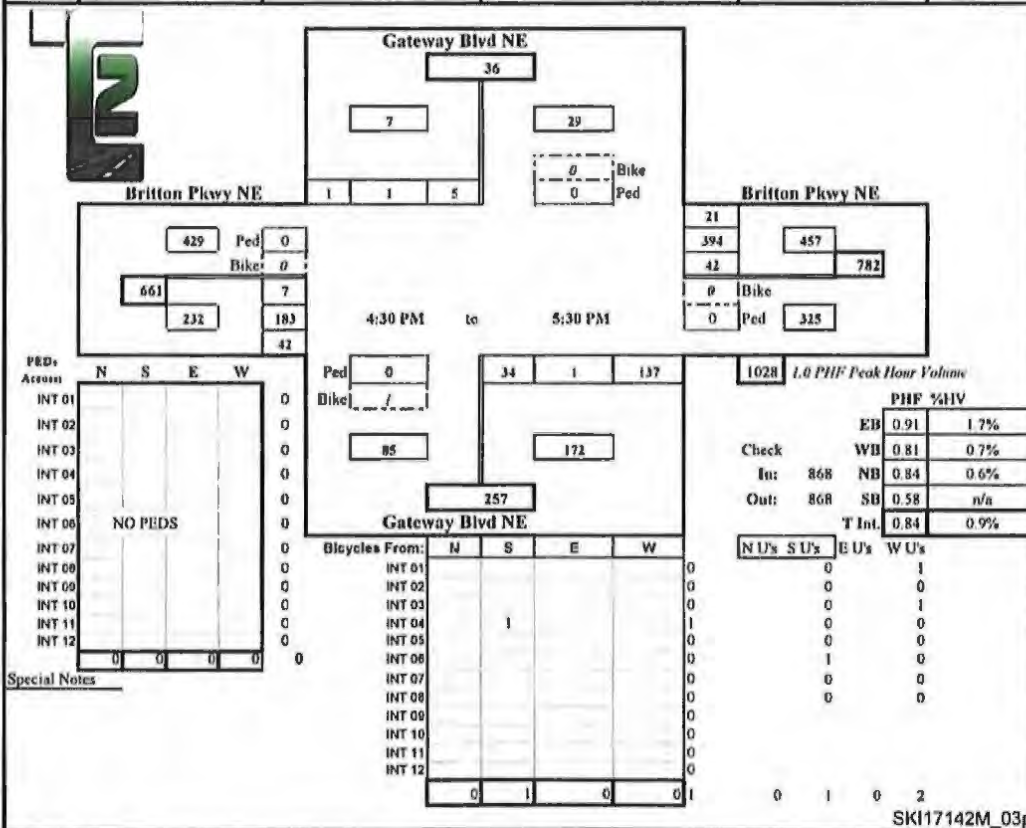
Date of Count: Tues 11/28/2017

Location: Lacey, Washington

Checked By: Jess

| Time Interval | From North on (SB)<br>Gateway Blvd NE |   |   |   | From South on (NB)<br>Gateway Blvd NE |    |   |    | From East on (WB)<br>Britton Pkwy NE |    |     |   | From West on (EB)<br>Britton Pkwy NE |   |    |    | Interval<br>Total |
|---------------|---------------------------------------|---|---|---|---------------------------------------|----|---|----|--------------------------------------|----|-----|---|--------------------------------------|---|----|----|-------------------|
| Ending at     | T                                     | L | S | R | T                                     | L  | S | R  | T                                    | L  | S   | R | T                                    | L | S  | R  |                   |
| 4:15 P        | 0                                     | 0 | 0 | 0 | 0                                     | 7  | 0 | 28 | 5                                    | 14 | 73  | 1 | 2                                    | 2 | 49 | 3  | 177               |
| 4:30 P        | 0                                     | 0 | 0 | 0 | 0                                     | 5  | 0 | 34 | 4                                    | 10 | 81  | 7 | 2                                    | 0 | 35 | 8  | 180               |
| 4:45 P        | 0                                     | 1 | 0 | 0 | 0                                     | 10 | 0 | 33 | 1                                    | 14 | 81  | 5 | 0                                    | 0 | 41 | 10 | 195               |
| 5:00 P        | 0                                     | 2 | 0 | 1 | 1                                     | 9  | 0 | 24 | 2                                    | 6  | 98  | 5 | 2                                    | 1 | 46 | 8  | 200               |
| 5:15 P        | 0                                     | 1 | 0 | 0 | 0                                     | 8  | 0 | 43 | 0                                    | 10 | 126 | 5 | 2                                    | 3 | 48 | 13 | 257               |
| 5:30 P        | 0                                     | 1 | 1 | 0 | 0                                     | 7  | 1 | 37 | 0                                    | 12 | 89  | 6 | 0                                    | 3 | 48 | 11 | 216               |
| 5:45 P        | 0                                     | 0 | 0 | 0 | 0                                     | 8  | 0 | 31 | 0                                    | 11 | 86  | 4 | 0                                    | 1 | 43 | 9  | 193               |
| 6:00 P        | 0                                     | 4 | 0 | 0 | 1                                     | 3  | 0 | 17 | 0                                    | 9  | 88  | 6 | 0                                    | 0 | 41 | 3  | 171               |
| 6:15 P        | 0                                     | 0 | 0 | 0 | 0                                     | 0  | 0 | 0  | 0                                    | 0  | 0   | 0 | 0                                    | 0 | 0  | 0  | 0                 |
| 6:30 P        | 0                                     | 0 | 0 | 0 | 0                                     | 0  | 0 | 0  | 0                                    | 0  | 0   | 0 | 0                                    | 0 | 0  | 0  | 0                 |
| 6:45 P        | 0                                     | 0 | 0 | 0 | 0                                     | 0  | 0 | 0  | 0                                    | 0  | 0   | 0 | 0                                    | 0 | 0  | 0  | 0                 |
| 7:00 P        | 0                                     | 0 | 0 | 0 | 0                                     | 0  | 0 | 0  | 0                                    | 0  | 0   | 0 | 0                                    | 0 | 0  | 0  | 0                 |

|                               |      |   |   |   |      |    |   |     |      |    |     |    |      |    |     |    |      |
|-------------------------------|------|---|---|---|------|----|---|-----|------|----|-----|----|------|----|-----|----|------|
| Total Survey                  | 0    | 9 | 1 | 1 | 2    | 57 | 1 | 247 | 12   | 86 | 722 | 39 | 8    | 10 | 351 | 65 | 1589 |
| Peak Hour: 4:30 PM to 5:30 PM |      |   |   |   |      |    |   |     |      |    |     |    |      |    |     |    |      |
| Total                         | 0    | 5 | 1 | 1 | 1    | 34 | 1 | 137 | 3    | 42 | 394 | 21 | 4    | 7  | 183 | 42 | 868  |
| Approach                      | 7    |   |   |   | 172  |    |   |     | 457  |    |     |    | 232  |    |     |    | 868  |
| %HV                           | n/a  |   |   |   | 0.6% |    |   |     | 0.7% |    |     |    | 1.7% |    |     |    | 0.9% |
| PHF                           | 0.58 |   |   |   | 0.64 |    |   |     | 0.81 |    |     |    | 0.91 |    |     |    | 0.84 |





# City of Lacey

## Transportation Engineering

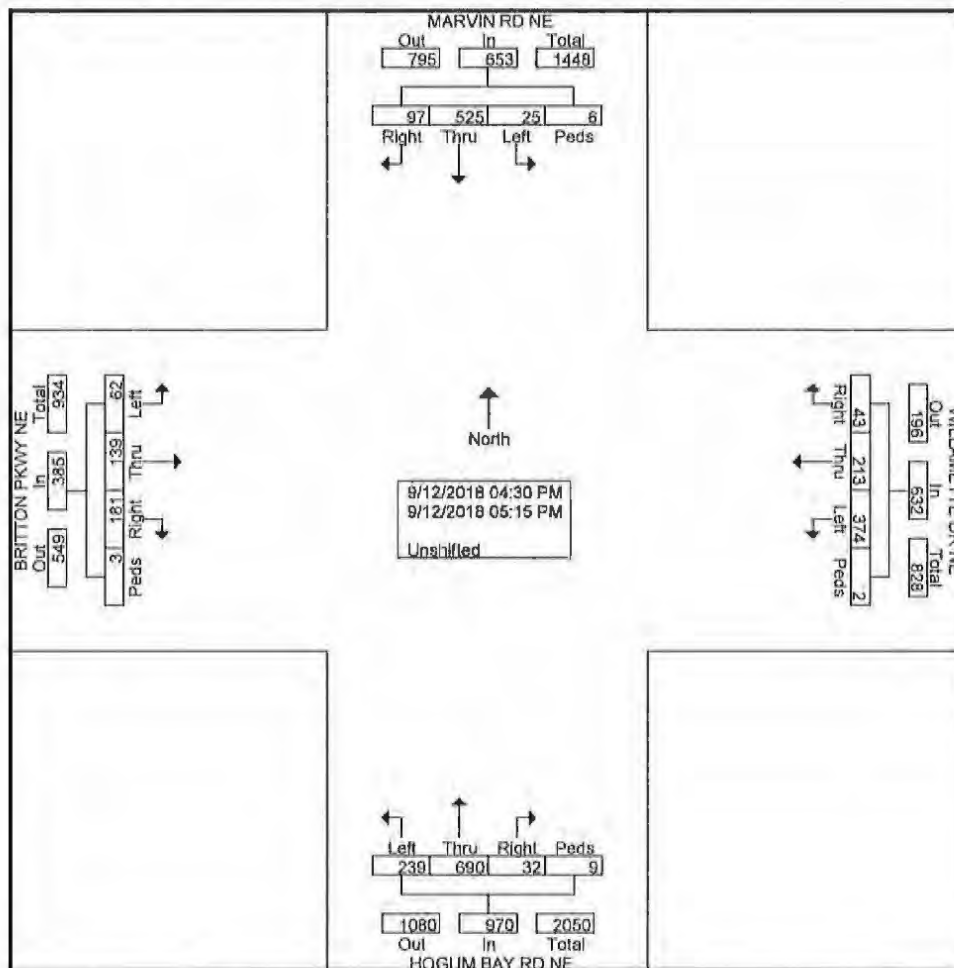
### Turning Movement Report

Counter:  
Counted by: MS (IDAX)  
Weather:

File Name : Marvin and Britton 2018 PM  
Site Code : 130  
Start Date : 9/12/2018  
Page No : 1

#### Groups Printed- Unshifted

|             | MARVIN RD NE<br>From North |      |      |        |      |            | WILLAMETTE DR NE<br>From East |      |      |        |      |            | HOGUM BAY RD NE<br>From South |      |      |        |      |            | BRITTON PKWY NE<br>From West |      |      |        |      |            |            |
|-------------|----------------------------|------|------|--------|------|------------|-------------------------------|------|------|--------|------|------------|-------------------------------|------|------|--------|------|------------|------------------------------|------|------|--------|------|------------|------------|
| Start Time  | Right                      | Thru | Left | U-Turn | Peds | App. Total | Right                         | Thru | Left | U-Turn | Peds | App. Total | Right                         | Thru | Left | U-Turn | Peds | App. Total | Right                        | Thru | Left | U-Turn | Peds | App. Total | Int. Total |
| 04:30 PM    | 31                         | 164  | 2    | 0      | 0    | 197        | 14                            | 54   | 106  | 0      | 0    | 174        | 9                             | 164  | 52   | 4      | 0    | 229        | 54                           | 33   | 18   | 0      | 0    | 105        | 705        |
| 04:45 PM    | 18                         | 128  | 9    | 2      | 1    | 158        | 7                             | 43   | 98   | 0      | 0    | 148        | 9                             | 189  | 62   | 1      | 1    | 262        | 45                           | 32   | 14   | 0      | 3    | 94         | 662        |
| Total       | 49                         | 292  | 11   | 2      | 1    | 355        | 21                            | 97   | 204  | 0      | 0    | 322        | 18                            | 353  | 114  | 5      | 1    | 491        | 99                           | 65   | 32   | 0      | 3    | 199        | 1367       |
| 05:00 PM    | 24                         | 116  | 7    | 0      | 2    | 149        | 11                            | 81   | 91   | 0      | 2    | 165        | 5                             | 163  | 68   | 1      | 0    | 237        | 38                           | 33   | 16   | 0      | 0    | 87         | 638        |
| 05:15 PM    | 24                         | 117  | 7    | 1      | 0    | 149        | 11                            | 55   | 79   | 0      | 0    | 145        | 9                             | 174  | 57   | 2      | 0    | 242        | 44                           | 41   | 14   | 0      | 0    | 99         | 635        |
| Grand Total | 97                         | 525  | 25   | 3      | 3    | 653        | 43                            | 213  | 374  | 0      | 2    | 632        | 32                            | 690  | 239  | 8      | 1    | 970        | 181                          | 139  | 62   | 0      | 3    | 385        | 2640       |
| Approch %   | 14.9                       | 80.4 | 3.8  | 0.5    | 0.5  |            | 6.8                           | 33.7 | 59.2 | 0      | 0.3  |            | 3.3                           | 71.1 | 24.6 | 0.8    | 0.1  |            | 47                           | 36.1 | 15.1 | 0      | 0.8  |            |            |
| Total %     | 3.7                        | 19.9 | 0.9  | 0.1    | 0.1  | 24.7       | 1.6                           | 8.1  | 14.2 | 0      | 0.1  | 23.9       | 1.2                           | 28.1 | 9.1  | 0.3    | 0    | 36.7       | 6.9                          | 5.3  | 2.3  | 0      | 0.1  | 14.6       |            |





# City of Lacey

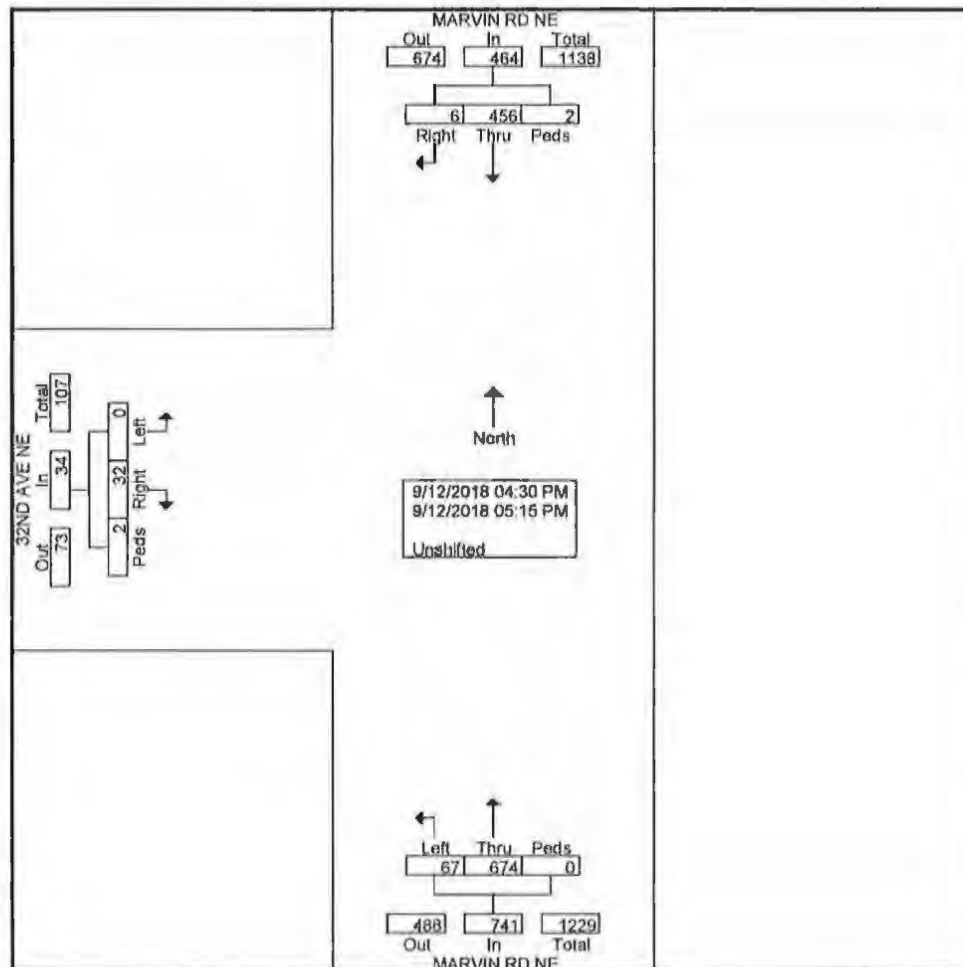
Transportation Engineering  
Turning Movement Report

Counter:  
Counted by: MS (IDAX)  
Weather:

File Name : Marvin and 32nd 2018 PM  
Site Code : 741  
Start Date : 9/12/2018  
Page No : 1

## Groups Printed- Unshifted

| Start Time  | MARVIN RD NE<br>From North |      |      |            | MARVIN RD NE<br>From South |      |      |            | 32ND AVE NE<br>From West |      |      |            | Int. Total |
|-------------|----------------------------|------|------|------------|----------------------------|------|------|------------|--------------------------|------|------|------------|------------|
|             | Right                      | Thru | Peds | App. Total | Thru                       | Left | Peds | App. Total | Right                    | Left | Peds | App. Total |            |
| 04:30 PM    | 1                          | 172  | 0    | 173        | 139                        | 16   | 0    | 155        | 6                        | 0    | 0    | 6          | 334        |
| 04:45 PM    | 1                          | 91   | 0    | 92         | 178                        | 16   | 0    | 194        | 8                        | 0    | 0    | 8          | 294        |
| Total       | 2                          | 263  | 0    | 265        | 317                        | 32   | 0    | 349        | 14                       | 0    | 0    | 14         | 628        |
| 05:00 PM    | 1                          | 93   | 2    | 96         | 171                        | 17   | 0    | 188        | 10                       | 0    | 2    | 12         | 296        |
| 05:15 PM    | 3                          | 100  | 0    | 103        | 186                        | 18   | 0    | 204        | 8                        | 0    | 0    | 8          | 315        |
| Grand Total | 6                          | 456  | 2    | 464        | 674                        | 67   | 0    | 741        | 32                       | 0    | 2    | 34         | 1239       |
| Apprch %    | 1.3                        | 98.3 | 0.4  |            | 91                         | 9    | 0    |            | 94.1                     | 0    | 5.9  |            |            |
| Total %     | 0.5                        | 36.8 | 0.2  | 37.4       | 54.4                       | 5.4  | 0    | 59.8       | 2.6                      | 0    | 0.2  | 2.7        |            |



*APPENDIX*

TRANSPORTATION IMPROVEMENT PROJECT TABLE



|                                 |                                                                   | a                      | b                      | c                      | d             | e = (b-d)       | f = (0.80*a)     | Values by Type       |            |                   |
|---------------------------------|-------------------------------------------------------------------|------------------------|------------------------|------------------------|---------------|-----------------|------------------|----------------------|------------|-------------------|
| Account Number                  | Project                                                           | 2018-2019 Project Cost | 2019-2020 Project Cost | Consistent Denominator | Cost per Trip | Existing Volume | Remaining Volume | Mitigated Volume 80% | Collection | % of Total        |
| <b>COMPLETED PROJECTS</b>       |                                                                   |                        |                        |                        |               |                 |                  |                      |            |                   |
| 102-0000-224-80-03              | 45th Avenue and College Street Improvements                       | \$ 1,292,317           | \$ 1,312,884           | 3500                   | \$            | 389.33          | 1,648            | 1,665                | 1,878      | \$ 616,433 48%    |
| 102-0000-224-80-80              | Marvin Road and Britton Parkway Intersection Improvements         | \$ 403,807             | \$ 410,360             | 4000                   | \$            | 100.95          | 595              | 3,400                | 3,080      | \$ 308,443 77%    |
| 102-0000-224-80-43              | Golf Club Road Extension                                          | \$ 800,368             | \$ 809,992             | 3500                   | \$            | 171.54          | -                | 5,500                | 3,180      | \$ 840,348 99%    |
| 102-0000-224-80-44              | Marlin Way / Noh Street Intersection Improvements                 | \$ 800,618             | \$ 813,324             | 3500                   | \$            | 228.72          | 1,352            | 2,148                | 1,833      | \$ 442,189 86%    |
| 102-0000-224-80-45              | Willemette Drive / 31st Ave Intersection Improvements             | \$ 1,000,644           | \$ 1,016,855           | 3500                   | \$            | 288.80          | 1,034            | 2,488                | 2,219      | \$ 634,803 83%    |
| <b>FIXED-COMPLETED PROJECTS</b> |                                                                   |                        |                        |                        |               |                 |                  |                      |            |                   |
| 102-0000-224-80-29              | Mullen Road Capacity/Safety Improvements East of Ruddled          | \$ 8,860,182           | \$ 8,869,045           | 4000                   | \$            | 1,260.33        | 1,138            | 2,863                | 2,978      | \$ 4,417,814 84%  |
| 102-0000-224-80-42              | 8th Avenue / Sleater-Kinney Improvements                          | \$ 4,828,182           | \$ 4,858,871           | 3500                   | \$            | 1,350.33        | 2,318            | 1,181                | 1,083      | \$ 1,374,928 90%  |
| <b>FIXED PROJECTS</b>           |                                                                   |                        |                        |                        |               |                 |                  |                      |            |                   |
| 102-0000-224-80-38              | Carpenter Rd from Marlin Way to Britton Parkway                   | \$ 18,886,083          | \$ 20,173,780          | 4000                   | \$            | 1,280.33        | 205              | 3,705                | 3,315      | \$ 10,557,811 83% |
| 102-0000-224-80-46              | College Street Reconstruction - Levee Blvd to 37th Ave            | \$ 59,100,331          | \$ 59,725,836          | 8000                   | \$            | 1,280.33        | 2,000            | 3,000                | 2,700      | \$ 21,114,170 84% |
| 102-0000-224-80-39              | Marvin Road - Britton to Columbia Drive RT                        | \$ 15,158,256          | \$ 16,414,766          | 5000                   | \$            | 1,280.33        | 580              | 4,420                | 3,978      | \$ 12,883,817 86% |
| 102-0000-224-80-41              | Yelm Highway Improvements Ruddled Road to East City Limits        | \$ 5,145,138           | \$ 5,237,489           | 4000                   | \$            | 1,280.33        | 1,277            | 2,723                | 2,481      | \$ 3,182,286 81%  |
| 102-0000-224-80-48              | Hogum Bay Road Improvements                                       | \$ 6,787,054           | \$ 6,807,840           | 3500                   | \$            | 1,280.33        | 530              | 2,870                | 2,673      | \$ 6,710,788 76%  |
| 102-0000-224-80-51              | 31st Avenue Extension Hogum Bay to Marlin Road                    | \$ 5,385,418           | \$ 5,471,505           | 4000                   | \$            | 1,280.33        | 560              | 3,420                | 3,078      | \$ 4,144,078 77%  |
| 102-0000-224-80-33              | Marlin Way & I-5 Interchange Improvements                         | \$ 44,304,822          | \$ 45,819,708          | 8000                   | \$            | 1,280.33        | 3,518            | 2,485                | 2,237      | \$ 16,814,628 37% |
| <b>ACTIVE PROJECTS</b>          |                                                                   |                        |                        |                        |               |                 |                  |                      |            |                   |
| 102-0000-224-80-23              | Sleater-Kinney at 14th Ave Improvements                           | \$ 909,533             | \$ 924,085             | 3500                   | \$            | 259.87          | 1,448            | 2,052                | 1,847      | \$ 478,822 53%    |
| 102-0000-224-80-25              | College Street Extension RE                                       | \$ 3,430,092           | \$ 3,494,873           | 3500                   | \$            | 969.03          | 1,017            | 2,483                | 2,235      | \$ 2,180,005 64%  |
| 102-0000-224-80-28              | Carpenter Road Capacity/Safety Improvements Pacific to Shady Lane | \$ 4,873,450           | \$ 4,846,830           | 4000                   | \$            | 1,143.36        | 1,521            | 2,478                | 2,231      | \$ 2,550,950 86%  |
| 102-0000-224-80-40              | Rainier Road from Yelm Hwy to City Limits (near Beckenridge)      | \$ 2,872,748           | \$ 3,020,310           | 4000                   | \$            | 743.10          | 774              | 3,228                | 2,803      | \$ 2,157,786 73%  |
| 102-0000-224-80-47              | Carpenter Rd/Hogum Rd Intersection Improvements                   | \$ 1,184,855           | \$ 1,183,493           | 3500                   | \$            | 332.82          | 1,212            | 2,288                | 2,058      | \$ 685,334 56%    |
| 102-0000-224-80-52              | Britton Parkway and Carpenter Road Intersection Improvements      | \$ 873,177             | \$ 1,500,000           | 4000                   | \$            | 168.28          | 412              | 3,588                | 3,228      | \$ 543,456 81%    |
| 102-0000-224-80-58              | Willemette Drive / Campus Glen Drive Roundabout                   | \$ 1,898,321           | \$ 1,723,462           | 3500                   | \$            | 484.88          | 366              | 3,114                | 2,803      | \$ 1,358,317 80%  |

| Year      | ENR Construction Index | Residential Cap | Resolution                       |
|-----------|------------------------|-----------------|----------------------------------|
| 2017-2018 | 4.0%                   | \$ 1,824        | Resolution 1048 Passed 7-13-2017 |
| 2018-2019 | 3.0%                   | \$ 1,862        | Resolution 1061 Passed 7-12-2018 |
| 2019-2020 | 1.6%                   | \$ 2,013        | Resolution 1077 Passed 7-11-2019 |

2214 Tacoma Road Puyallup WA 98371 (253) 770 1401 Fax (253) 770 1473 hwealth@co.wa.us

*APPENDIX*

ITE TRIP GENERATION SHEETS

## Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 27

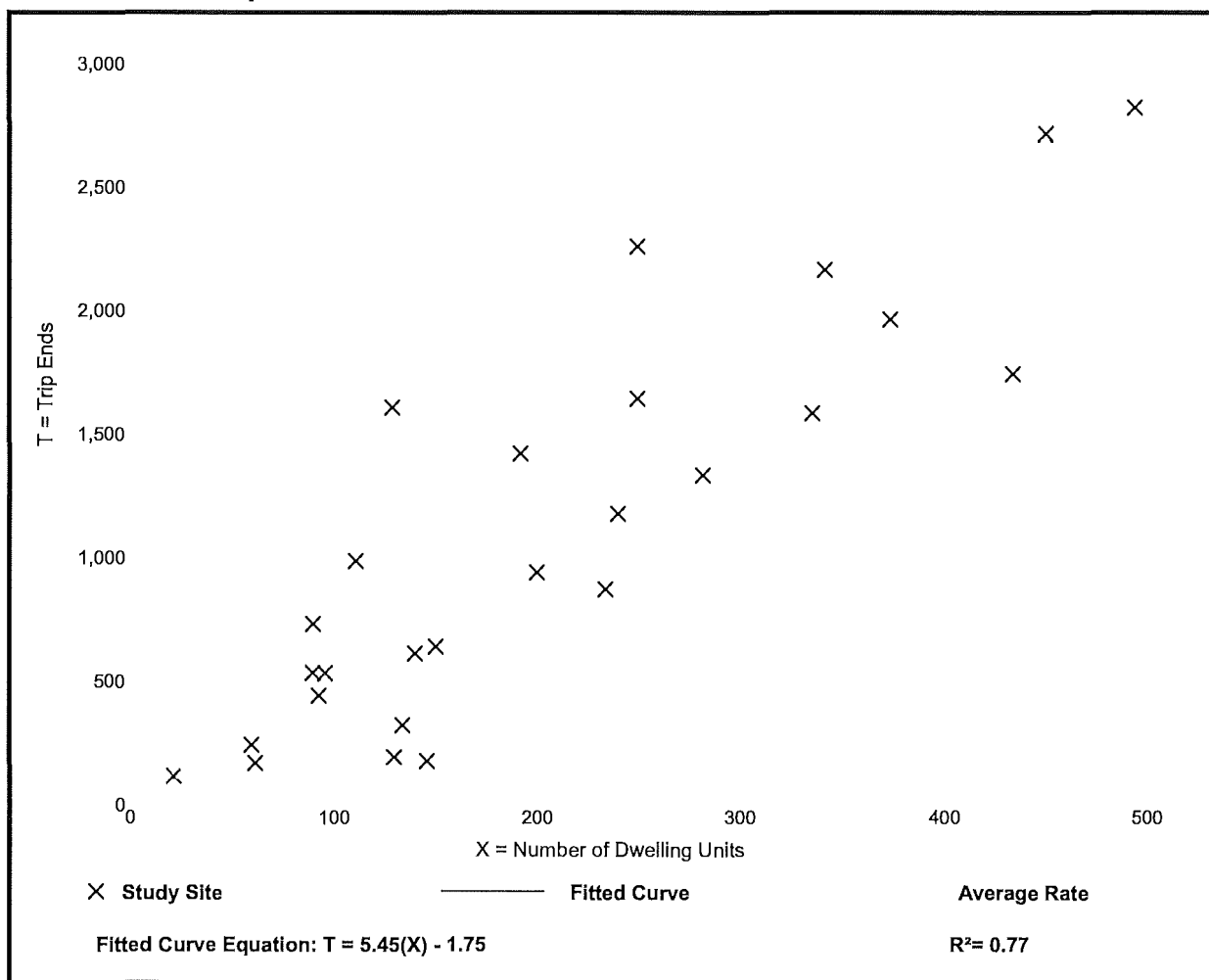
Avg. Num. of Dwelling Units: 205

Directional Distribution: 50% entering, 50% exiting

### Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|--------------|----------------|--------------------|
| 5.44         | 1.27 - 12.50   | 2.03               |

### Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers



## Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,  
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 53

Avg. Num. of Dwelling Units: 207

Directional Distribution: 26% entering, 74% exiting

### Vehicle Trip Generation per Dwelling Unit

Average Rate

0.36

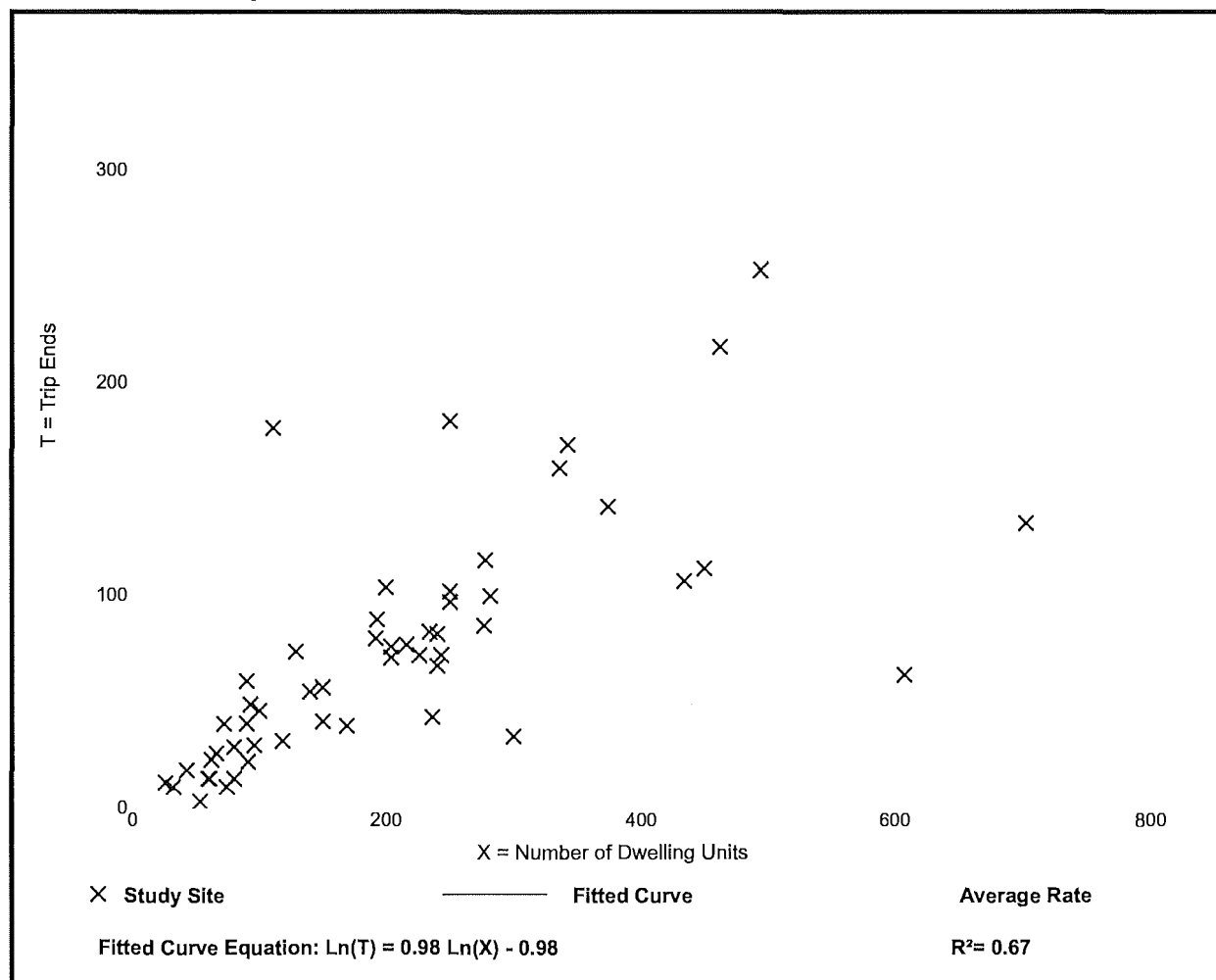
Range of Rates

0.06 - 1.61

Standard Deviation

0.19

### Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

## Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 60

Avg. Num. of Dwelling Units: 208

Directional Distribution: 61% entering, 39% exiting

### Vehicle Trip Generation per Dwelling Unit

Average Rate

0.44

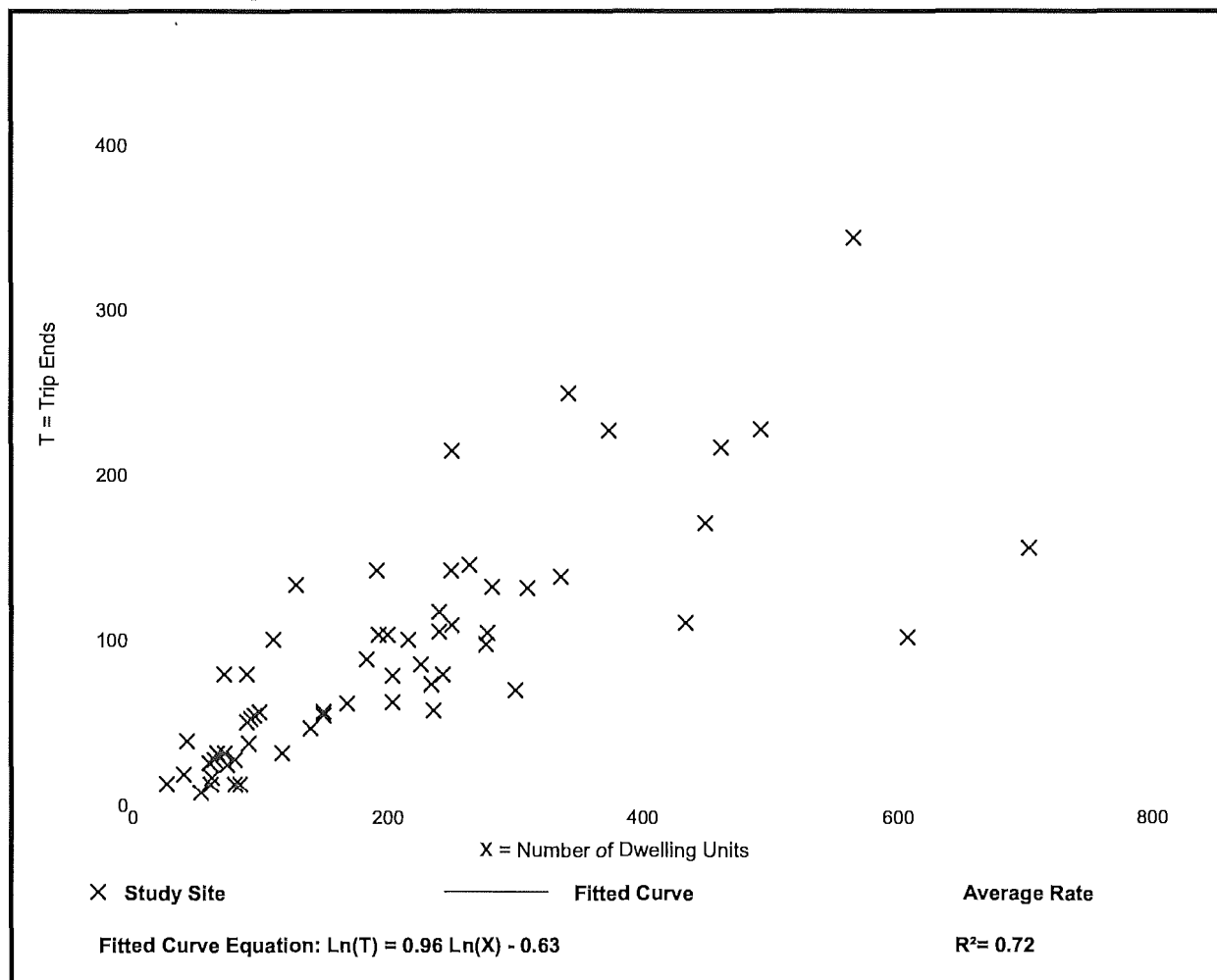
Range of Rates

0.15 - 1.11

Standard Deviation

0.19

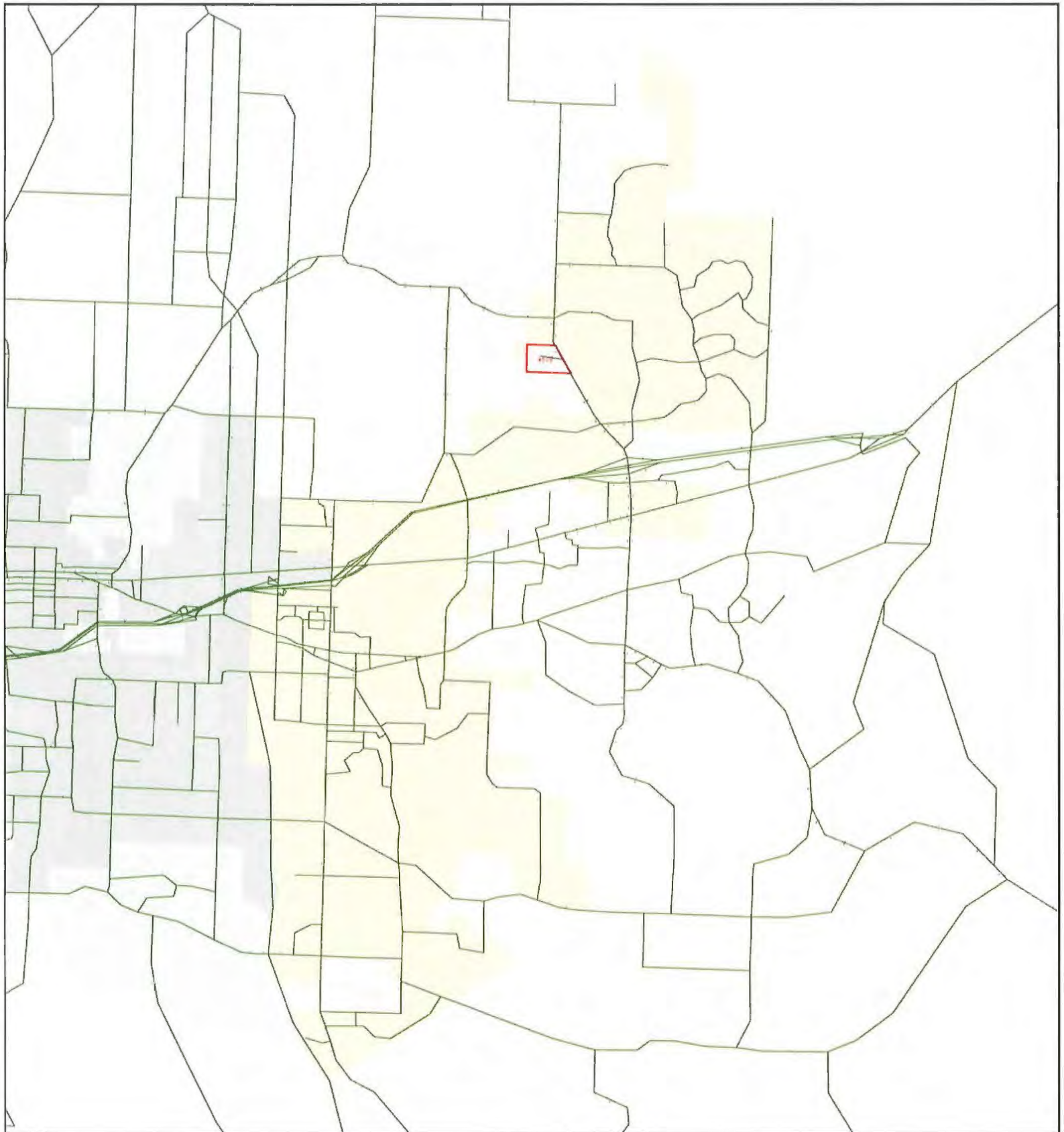
### Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

*APPENDIX*

TRIP DISTRIBUTION MODEL:  
CITY OF LACEY SZA 508 MAP

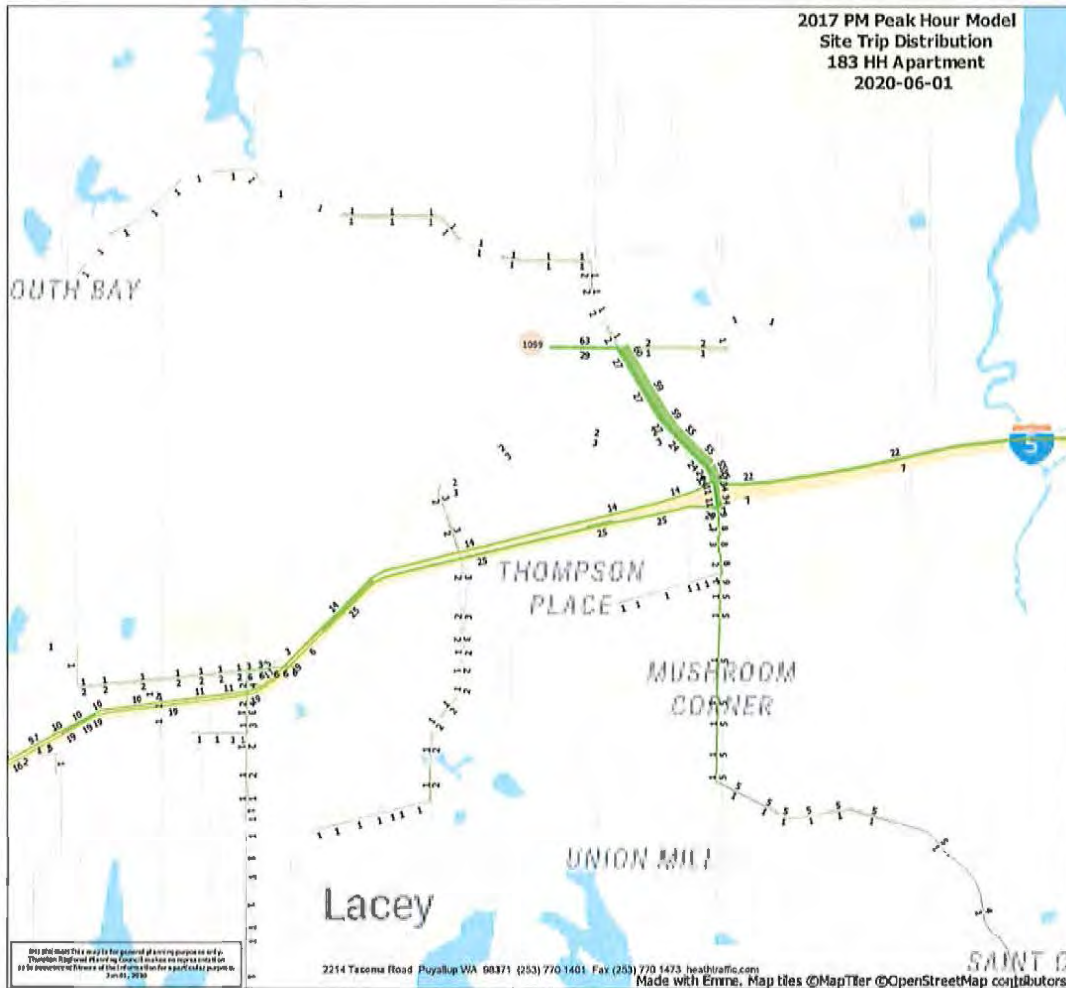


*APPENDIX*

TRIP DISTRIBUTION MODEL:  
THURSTON REGION PLANNING COUNCIL 1099 MAPS



2017 PM Peak Hour Model  
 Site Trip Distribution  
 183 HH Apartment  
 2020-06-01



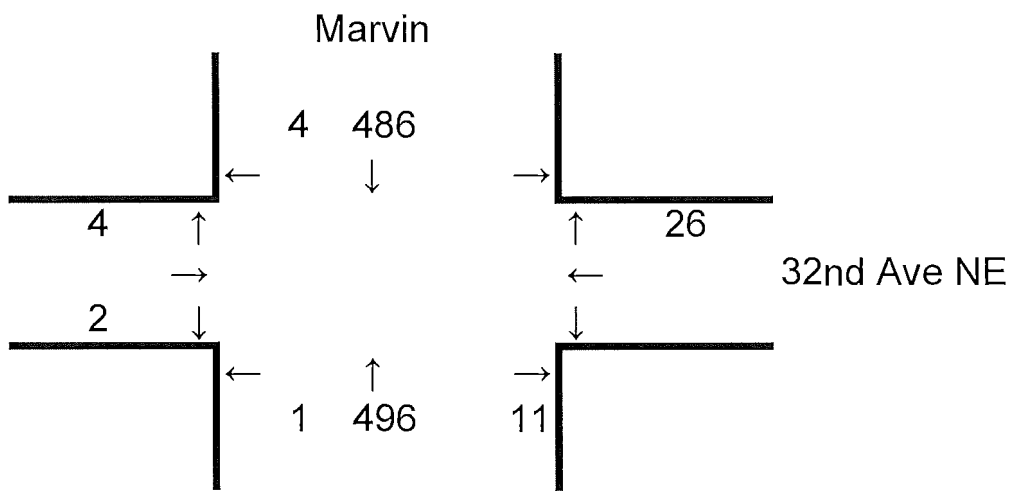
2214 Tacoma Road Puyallup WA 98371 (253) 770-1401 Fax (253) 770-1473 heathtraffic.com

Made with Emme. Map tiles ©MapTiler ©OpenStreetMap contributors

*APPENDIX*

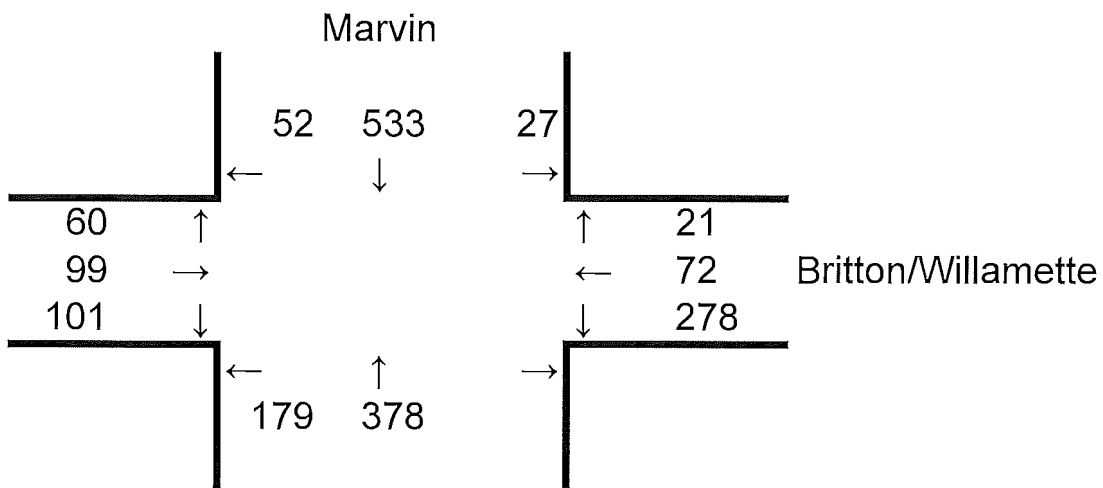
PIPELINE VOLUMES

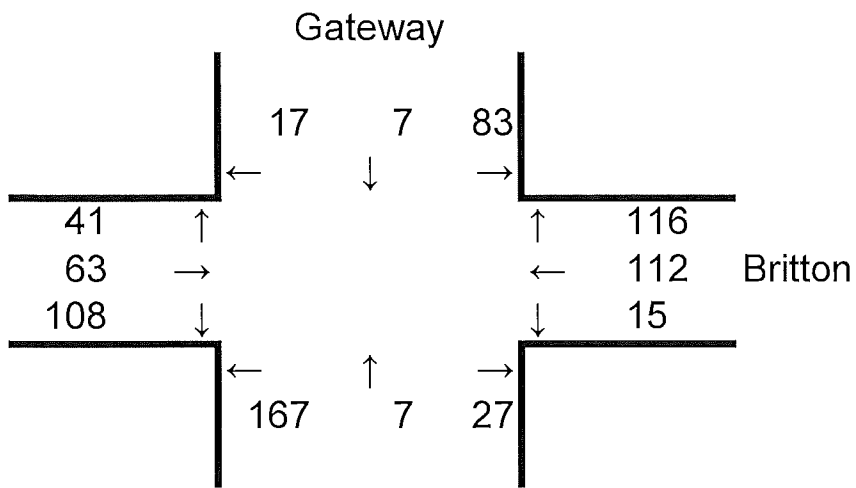




K:\TIA\PROJECTS\Mitigation, Generation, Distribution, signals\Pipeline Distributions\Master Pipeline List 2020-05-22 CRS.xls

1





*APPENDIX*

ANALYSIS CALCULATIONS

### PM Peak Hour Forecast Intersection Volumes

Annual Growth Rate: 4 %

2023

# of Years to Horizon: 3

#### 32nd Ave NE & Project Access

|               | SBR | SBT | SBL | WBR | WBT | WBL | NBR | NBT | NBL | EBR | EBT | EBL |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Existing      | 0   | 0   | 0   | 0   | 73  | 0   | 0   | 0   | 0   | 0   | 32  | 0   |
| Project Trips | 0   | 0   | 0   | 0   | 0   | 18  | 11  | 0   | 5   | 7   | 0   | 0   |
| Pipeline      | 0   | 0   | 0   | 0   | 5   | 0   | 0   | 0   | 0   | 0   | 6   | 0   |
| Without       | 0   | 0   | 0   | 0   | 87  | 0   | 0   | 0   | 0   | 0   | 42  | 0   |
| With          | 0   | 0   | 0   | 0   | 87  | 18  | 11  | 0   | 5   | 7   | 42  | 0   |

#### 32nd Ave NE & Marvin Rd NE

|               | SBR | SBT | SBL | WBR | WBT | WBL | NBR | NBT   | NBL | EBR | EBT | EBL |
|---------------|-----|-----|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|
| Existing      | 6   | 456 | 0   | 0   | 0   | 0   | 0   | 674   | 67  | 32  | 0   | 0   |
| Project Trips | 5   | 0   | 0   | 0   | 0   | 0   | 0   | 0     | 13  | 8   | 0   | 3   |
| Pipeline      | 4   | 486 | 0   | 26  | 0   | 0   | 11  | 496   | 1   | 2   | 0   | 4   |
| Without       | 11  | 999 | 0   | 26  | 0   | 0   | 11  | 1,254 | 76  | 38  | 0   | 4   |
| With          | 16  | 999 | 0   | 26  | 0   | 0   | 11  | 1,254 | 89  | 46  | 0   | 7   |

#### Willamette Dr NE/Britton Pkwy NE & Marvin Rd NE

|               | SBR | SBT   | SBL | WBR | WBT | WBL | NBR | NBT   | NBL | EBR | EBT | EBL |
|---------------|-----|-------|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|
| Existing      | 97  | 525   | 25  | 43  | 213 | 374 | 32  | 690   | 239 | 181 | 139 | 62  |
| Project Trips | 0   | 8     | 0   | 0   | 2   | 0   | 0   | 13    | 14  | 9   | 2   | 0   |
| Pipeline      | 52  | 533   | 27  | 21  | 72  | 278 | 0   | 378   | 179 | 101 | 99  | 60  |
| Without       | 161 | 1,124 | 55  | 69  | 312 | 699 | 36  | 1,154 | 448 | 305 | 255 | 130 |
| With          | 161 | 1,132 | 55  | 69  | 314 | 699 | 36  | 1,167 | 462 | 314 | 257 | 130 |

#### Britton Pkwy NE & Gateway Blvd NE

|               | SBR | SBT | SBL | WBR | WBT | WBL | NBR | NBT | NBL | EBR | EBT | EBL |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Existing      | 1   | 1   | 5   | 21  | 394 | 42  | 137 | 1   | 34  | 42  | 183 | 7   |
| Project Trips | 5   | 0   | 11  | 16  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 8   |
| Pipeline      | 17  | 7   | 83  | 116 | 112 | 15  | 27  | 7   | 167 | 108 | 63  | 41  |
| Without       | 18  | 8   | 89  | 140 | 555 | 62  | 181 | 8   | 205 | 155 | 269 | 49  |
| With          | 23  | 8   | 100 | 156 | 555 | 62  | 181 | 8   | 205 | 155 | 269 | 57  |

*APPENDIX*

LEVEL OF SERVICE

| Intersection             |      |      |      |      |       |       |      |      |      |      |      |      |
|--------------------------|------|------|------|------|-------|-------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.8  |      |      |      |       |       |      |      |      |      |      |      |
| Movement                 | EBL  | EBT  | EBR  | WBL  | WBT   | WBR   | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |      | ↔    |      |      |       | ↗     | ↘    | ↑    | ↗    |      | ↘    |      |
| Traffic Vol, veh/h       | 0    | 0    | 32   | 0    | 0     | 0     | 67   | 674  | 0    | 0    | 456  | 6    |
| Future Vol, veh/h        | 0    | 0    | 32   | 0    | 0     | 0     | 67   | 674  | 0    | 0    | 456  | 6    |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Stop | Stop | Stop | Free | Free  | Free  | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -    | -    | None | -    | -     | Yield | -    | -    | None | -    | -    | None |
| Storage Length           | -    | -    | -    | -    | -     | 0     | 75   | -    | 275  | -    | -    | -    |
| Veh In Median Storage, # | -    | 0    | -    | -    | 16979 | -     | -    | 0    | -    | -    | 0    | -    |
| Grade, %                 | -    | 0    | -    | -    | 0     | -     | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92    | 92    | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2    | 2     | 2     | 2    | 2    | 2    | 2    | 2    | 2    |
| Mvmt Flow                | 0    | 0    | 35   | 0    | 0     | 0     | 73   | 733  | 0    | 0    | 496  | 7    |

| Major/Minor          | Minor2 |       |       | Major1 |   |   | Major2 |   |   |
|----------------------|--------|-------|-------|--------|---|---|--------|---|---|
| Conflicting Flow All | 1379   | 1379  | 500   | 503    | 0 | 0 | -      | - | 0 |
| Stage 1              | 500    | 500   | -     | -      | - | - | -      | - | - |
| Stage 2              | 879    | 879   | -     | -      | - | - | -      | - | - |
| Critical Hdwy        | 6.42   | 6.52  | 6.22  | 4.12   | - | - | -      | - | - |
| Critical Hdwy Stg 1  | 5.42   | 5.52  | -     | -      | - | - | -      | - | - |
| Critical Hdwy Stg 2  | 5.42   | 5.52  | -     | -      | - | - | -      | - | - |
| Follow-up Hdwy       | 3.518  | 4.018 | 3.318 | 2.218  | - | - | -      | - | - |
| Pot Cap-1 Maneuver   | 159    | 144   | 571   | 1061   | - | - | 0      | - | - |
| Stage 1              | 609    | 543   | -     | -      | - | - | 0      | - | - |
| Stage 2              | 406    | 365   | -     | -      | - | - | 0      | - | - |
| Platoon blocked, %   |        |       |       |        | - | - | -      | - | - |
| Mov Cap-1 Maneuver   | 148    | 0     | 571   | 1061   | - | - | -      | - | - |
| Mov Cap-2 Maneuver   | 148    | 0     | -     | -      | - | - | -      | - | - |
| Stage 1              | 567    | 0     | -     | -      | - | - | -      | - | - |
| Stage 2              | 406    | 0     | -     | -      | - | - | -      | - | - |

| Approach             | EB   | NB  | SB |
|----------------------|------|-----|----|
| HCM Control Delay, s | 11.7 | 0.8 | 0  |
| HCM LOS              | B    |     |    |

| Minor Lane/Major Mvmt | NBL   | NBT | NBR | EBLn1 | SBT | SBR |
|-----------------------|-------|-----|-----|-------|-----|-----|
| Capacity (veh/h)      | 1061  | -   | -   | 571   | -   | -   |
| HCM Lane V/C Ratio    | 0.069 | -   | -   | 0.061 | -   | -   |
| HCM Control Delay (s) | 8.6   | -   | -   | 11.7  | -   | -   |
| HCM Lane LOS          | A     | -   | -   | B     | -   | -   |
| HCM 95th %tile Q(veh) | 0.2   | -   | -   | 0.2   | -   | -   |



## MOVEMENT SUMMARY

**Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family  
Site Category: Existing Design  
Roundabout

| Vehicle Movement Performance |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------|------|-----------|-------------|------------------|-------------------|--------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |      | DEMAND FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |        | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total       | HV ] | [ Total      | HV ] |           |             |                  | [ Veh.            | Dist ] |           |                     |                  |             |
|                              |      | veh/h         | %    | veh/h        | %    |           |             |                  | v/c               | sec    |           |                     |                  | veh         |
| South: Marvin Road NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 3                            | L2   | 239           | 2.0  | 252          | 2.0  | 0.511     | 9.9         | LOS A            | 3.2               | 81.4   | 0.54      | 0.42                | 0.54             | 31.7        |
| 8                            | T1   | 690           | 2.0  | 726          | 2.0  | 0.511     | 9.9         | LOS A            | 3.2               | 81.4   | 0.54      | 0.42                | 0.54             | 32.4        |
| 18                           | R2   | 32            | 2.0  | 34           | 2.0  | 0.511     | 9.9         | LOS A            | 3.2               | 81.4   | 0.54      | 0.42                | 0.54             | 31.8        |
| Approach                     |      | 961           | 2.0  | 1012         | 2.0  | 0.511     | 9.9         | LOS A            | 3.2               | 81.4   | 0.54      | 0.42                | 0.54             | 32.2        |
| East: Willamette Drive NE    |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 1                            | L2   | 374           | 2.0  | 394          | 2.0  | 0.625     | 17.9        | LOS B            | 4.9               | 124.7  | 0.81      | 1.00                | 1.40             | 27.7        |
| 6                            | T1   | 213           | 2.0  | 224          | 2.0  | 0.500     | 15.7        | LOS B            | 3.0               | 76.8   | 0.77      | 0.88                | 1.13             | 30.2        |
| 16                           | R2   | 43            | 2.0  | 45           | 2.0  | 0.500     | 15.7        | LOS B            | 3.0               | 76.8   | 0.77      | 0.88                | 1.13             | 29.4        |
| Approach                     |      | 630           | 2.0  | 663          | 2.0  | 0.625     | 17.0        | LOS B            | 4.9               | 124.7  | 0.79      | 0.95                | 1.29             | 28.6        |
| North: Marvin Road NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 7                            | L2   | 25            | 2.0  | 26           | 2.0  | 0.531     | 14.7        | LOS B            | 3.9               | 98.4   | 0.79      | 0.92                | 1.16             | 30.6        |
| 4                            | T1   | 525           | 2.0  | 553          | 2.0  | 0.531     | 14.5        | LOS B            | 3.9               | 99.5   | 0.79      | 0.92                | 1.16             | 30.7        |
| 14                           | R2   | 97            | 2.0  | 102          | 2.0  | 0.531     | 14.3        | LOS B            | 3.9               | 99.5   | 0.79      | 0.92                | 1.15             | 29.9        |
| Approach                     |      | 647           | 2.0  | 681          | 2.0  | 0.531     | 14.5        | LOS B            | 3.9               | 99.5   | 0.79      | 0.92                | 1.16             | 30.5        |
| West: Britton Pkwy NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 5                            | L2   | 62            | 2.0  | 65           | 2.0  | 0.174     | 7.4         | LOS A            | 0.8               | 21.1   | 0.69      | 0.67                | 0.69             | 32.7        |
| 2                            | T1   | 139           | 2.0  | 146          | 2.0  | 0.174     | 6.6         | LOS A            | 0.9               | 22.6   | 0.69      | 0.65                | 0.69             | 33.9        |
| 12                           | R2   | 181           | 2.0  | 191          | 2.0  | 0.174     | 6.2         | LOS A            | 0.9               | 22.6   | 0.68      | 0.64                | 0.68             | 33.5        |
| Approach                     |      | 382           | 2.0  | 402          | 2.0  | 0.174     | 6.5         | LOS A            | 0.9               | 22.6   | 0.68      | 0.65                | 0.68             | 33.5        |
| All Vehicles                 |      | 2620          | 2.0  | 2758         | 2.0  | 0.625     | 12.3        | LOS B            | 4.9               | 124.7  | 0.69      | 0.70                | 0.90             | 31.0        |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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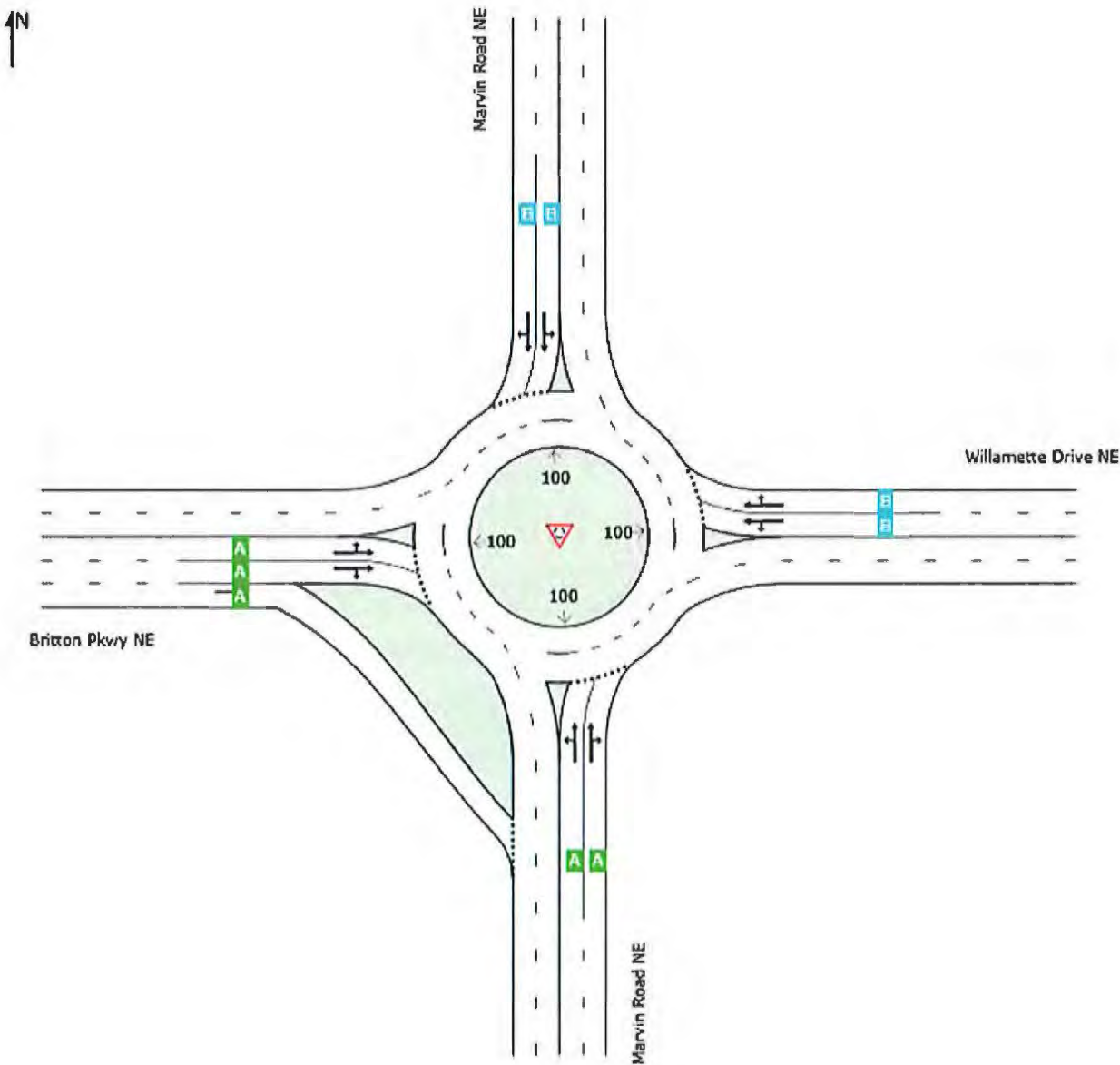
# LANE LEVEL OF SERVICE

## Lane Level of Service

 Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]

Griffin Multi-Family  
Site Category: Existing Design  
Roundabout

|     | Approaches |      |       |      | Intersection |
|-----|------------|------|-------|------|--------------|
|     | South      | East | North | West |              |
| LOS | A          | B    | B     | A    | B            |



## MOVEMENT SUMMARY

**Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family  
Site Category: Existing Design  
Roundabout

| Vehicle Movement Performance |      |                 |          |                 |          |           |             |                  |                   |             |           |                     |                  |             |
|------------------------------|------|-----------------|----------|-----------------|----------|-----------|-------------|------------------|-------------------|-------------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES   |          | DEMAND FLOWS    |          | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |             | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h ] | [ HV % ] | [ Total veh/h ] | [ HV % ] | v/c       | sec         |                  | [ Veh veh ]       | [ Dist ft ] |           |                     |                  | mph         |
| South: Gateway Blvd NE       |      |                 |          |                 |          |           |             |                  |                   |             |           |                     |                  |             |
| 3                            | L2   | 34              | 2.0      | 38              | 2.0      | 0.066     | 2.9         | LOS A            | 0.4               | 9.0         | 0.06      | 0.01                | 0.06             | 35.8        |
| 8                            | T1   | 1               | 2.0      | 1               | 2.0      | 0.066     | 2.9         | LOS A            | 0.4               | 9.0         | 0.06      | 0.01                | 0.06             | 35.5        |
| 18                           | R2   | 137             | 2.0      | 152             | 2.0      | 0.066     | 3.0         | LOS A            | 0.4               | 9.0         | 0.14      | 0.05                | 0.14             | 35.1        |
| Approach                     |      | 172             | 2.0      | 191             | 2.0      | 0.066     | 3.0         | LOS A            | 0.4               | 9.0         | 0.12      | 0.04                | 0.12             | 35.2        |
| East: Britton Pkwy NE        |      |                 |          |                 |          |           |             |                  |                   |             |           |                     |                  |             |
| 1                            | L2   | 42              | 2.0      | 47              | 2.0      | 0.208     | 4.8         | LOS A            | 0.9               | 23.7        | 0.14      | 0.05                | 0.14             | 35.5        |
| 6                            | T1   | 394             | 2.0      | 438             | 2.0      | 0.208     | 4.8         | LOS A            | 0.9               | 23.7        | 0.14      | 0.05                | 0.14             | 35.5        |
| 16                           | R2   | 21              | 2.0      | 23              | 2.0      | 0.208     | 4.8         | LOS A            | 0.9               | 23.7        | 0.14      | 0.05                | 0.14             | 34.6        |
| Approach                     |      | 457             | 2.0      | 508             | 2.0      | 0.208     | 4.8         | LOS A            | 0.9               | 23.7        | 0.14      | 0.05                | 0.14             | 35.5        |
| North: Gateway Blvd NE       |      |                 |          |                 |          |           |             |                  |                   |             |           |                     |                  |             |
| 7                            | L2   | 5               | 2.0      | 6               | 2.0      | 0.010     | 4.6         | LOS A            | 0.0               | 1.2         | 0.56      | 0.35                | 0.56             | 33.9        |
| 4                            | T1   | 1               | 2.0      | 1               | 2.0      | 0.010     | 4.6         | LOS A            | 0.0               | 1.2         | 0.56      | 0.35                | 0.56             | 33.7        |
| 14                           | R2   | 1               | 2.0      | 1               | 2.0      | 0.010     | 4.6         | LOS A            | 0.0               | 1.2         | 0.56      | 0.35                | 0.56             | 32.7        |
| Approach                     |      | 7               | 2.0      | 8               | 2.0      | 0.010     | 4.6         | LOS A            | 0.0               | 1.2         | 0.56      | 0.35                | 0.56             | 33.7        |
| West: Britton Pkwy NE        |      |                 |          |                 |          |           |             |                  |                   |             |           |                     |                  |             |
| 5                            | L2   | 1               | 2.0      | 1               | 2.0      | 0.001     | 3.0         | LOS A            | 0.0               | 0.1         | 0.14      | 0.04                | 0.14             | 34.9        |
| 2                            | T1   | 1               | 2.0      | 1               | 2.0      | 0.001     | 3.0         | LOS A            | 0.0               | 0.1         | 0.14      | 0.04                | 0.14             | 35.7        |
| 12                           | R2   | 1               | 2.0      | 1               | 2.0      | 0.001     | 3.0         | LOS A            | 0.0               | 0.1         | 0.14      | 0.04                | 0.14             | 35.4        |
| Approach                     |      | 3               | 2.0      | 3               | 2.0      | 0.001     | 3.0         | LOS A            | 0.0               | 0.1         | 0.14      | 0.04                | 0.14             | 35.3        |
| All Vehicles                 |      | 639             | 2.0      | 710             | 2.0      | 0.208     | 4.3         | LOS A            | 0.9               | 23.7        | 0.14      | 0.05                | 0.14             | 35.4        |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## LANE LEVEL OF SERVICE

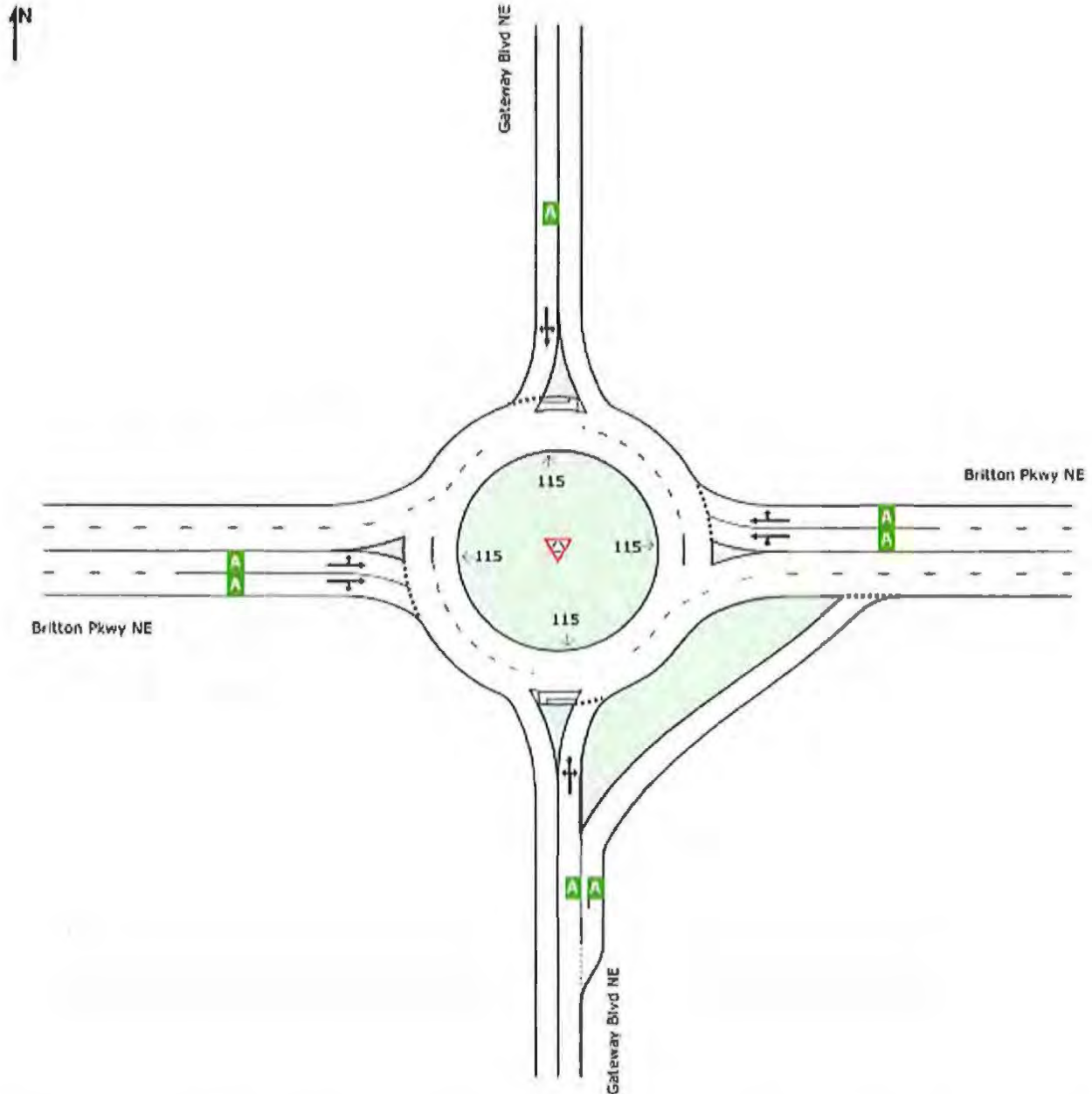
### Lane Level of Service

 **Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

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Griffin Multi-Family  
Site Category: Existing Design  
Roundabout

|     | South | Approaches |       |      | West | Intersection |
|-----|-------|------------|-------|------|------|--------------|
|     |       | East       | North | West |      |              |
| LOS | A     | A          | A     | A    | A    | A            |



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Roundabout LOS Method: SIDRA Roundabout LOS.  
 Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.  
 LOS F will result if  $v/c > 1$  irrespective of lane delay value (does not apply for approaches and intersection).  
 Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).  
 Delay Model: HCM Delay Formula (Geometric Delay is not included).

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Intersection

Int Delay, s/veh 1.2

| Movement                 | EBL  | EBT  | EBR  | WBL  | WBT   | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|--------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations      |      | ↕    |      |      |       | ↗    | ↗    | ↗    | ↗    |      | ↗    |      |
| Traffic Vol, veh/h       | 4    | 0    | 38   | 0    | 0     | 26   | 76   | 1254 | 11   | 0    | 999  | 11   |
| Future Vol, veh/h        | 4    | 0    | 38   | 0    | 0     | 26   | 76   | 1254 | 11   | 0    | 999  | 11   |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Stop | Stop | Stop | Free | Free  | Free | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -    | -    | None | -    | -     | Free | -    | -    | None | -    | -    | None |
| Storage Length           | -    | -    | -    | -    | -     | 0    | 75   | -    | 275  | -    | -    | -    |
| Veh in Median Storage, # | -    | 0    | -    | -    | 16979 | -    | -    | 0    | -    | -    | 0    | -    |
| Grade, %                 | -    | 0    | -    | -    | 0     | -    | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92    | 92   | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2    | 2     | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Mvmt Flow                | 4    | 0    | 41   | 0    | 0     | 28   | 83   | 1363 | 12   | 0    | 1086 | 12   |

| Major/Minor          | Minor2 |       |       | Major1 | Major2 |   |   |   |   |
|----------------------|--------|-------|-------|--------|--------|---|---|---|---|
| Conflicting Flow All | 2627   | 2633  | 1092  | 1098   | 0      | 0 | - | - | 0 |
| Stage 1              | 1092   | 1092  | -     | -      | -      | - | - | - | - |
| Stage 2              | 1535   | 1541  | -     | -      | -      | - | - | - | - |
| Critical Hdwy        | 6.42   | 6.52  | 6.22  | 4.12   | -      | - | - | - | - |
| Critical Hdwy Stg 1  | 5.42   | 5.52  | -     | -      | -      | - | - | - | - |
| Critical Hdwy Stg 2  | 5.42   | 5.52  | -     | -      | -      | - | - | - | - |
| Follow-up Hdwy       | 3.518  | 4.018 | 3.318 | 2.218  | -      | - | - | - | - |
| Pot Cap-1 Maneuver   | 26     | 24    | 261   | 636    | -      | - | 0 | - | - |
| Stage 1              | 322    | 291   | -     | -      | -      | - | 0 | - | - |
| Stage 2              | 196    | 177   | -     | -      | -      | - | 0 | - | - |
| Platoon blocked, %   |        |       |       |        | 0      | - |   | - | - |
| Mov Cap-1 Maneuver   | 23     | 0     | 261   | 636    | -      | - | - | - | - |
| Mov Cap-2 Maneuver   | 23     | 0     | -     | -      | -      | - | - | - | - |
| Stage 1              | 280    | 0     | -     | -      | -      | - | - | - | - |
| Stage 2              | 196    | 0     | -     | -      | -      | - | - | - | - |

| Approach             | EB   | NB  | SB |
|----------------------|------|-----|----|
| HCM Control Delay, s | 46.5 | 0.7 | 0  |
| HCM LOS              | E    |     |    |

| Minor Lane/Major Mvmt | NBL  | NBT | NBR | EBLn1 | SBT | SBR |
|-----------------------|------|-----|-----|-------|-----|-----|
| Capacity (veh/h)      | 636  | -   | -   | 131   | -   | -   |
| HCM Lane V/C Ratio    | 0.13 | -   | -   | 0.348 | -   | -   |
| HCM Control Delay (s) | 11.5 | -   | -   | 46.5  | -   | -   |
| HCM Lane LOS          | B    | -   | -   | E     | -   | -   |
| HCM 95th %tile Q(veh) | 0.4  | -   | -   | 1.4   | -   | -   |

## MOVEMENT SUMMARY

**Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family - Forecast 2023 PM Peak Hour Background Volumes  
Site Category: Future Conditions 1  
Roundabout

| Vehicle Movement Performance |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------|------|-----------|-------------|------------------|-------------------|--------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |      | DEMAND FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |        | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total       | HV ] | [ Total      | HV ] |           |             |                  | [ Veh.            | Dist ] |           |                     |                  |             |
|                              |      | veh/h         | %    | veh/h        | %    |           |             |                  | veh               | ft     |           |                     |                  |             |
| South: Marvin Road NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 3                            | L2   | 448           | 2.0  | 472          | 2.0  | 1.025     | 59.7        | LOS F            | 41.6              | 1057.8 | 1.00      | 2.21                | 4.01             | 18.8        |
| 8                            | T1   | 1154          | 2.0  | 1215         | 2.0  | 1.025     | 59.7        | LOS F            | 41.6              | 1057.8 | 1.00      | 2.21                | 4.01             | 19.0        |
| 18                           | R2   | 36            | 2.0  | 38           | 2.0  | 1.025     | 59.7        | LOS F            | 41.6              | 1057.8 | 1.00      | 2.21                | 4.01             | 18.8        |
| Approach                     |      | 1638          | 2.0  | 1724         | 2.0  | 1.025     | 59.7        | LOS E            | 41.6              | 1057.8 | 1.00      | 2.21                | 4.01             | 19.0        |
| East: Willamette Drive NE    |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 1                            | L2   | 699           | 2.0  | 736          | 2.0  | 2.404     | 668.3       | LOS F            | 149.7             | 3803.1 | 1.00      | 4.50                | 12.61            | 3.2         |
| 6                            | T1   | 312           | 2.0  | 328          | 2.0  | 1.775     | 402.9       | LOS F            | 65.7              | 1669.6 | 1.00      | 3.16                | 8.56             | 4.9         |
| 16                           | R2   | 69            | 2.0  | 73           | 2.0  | 1.775     | 402.9       | LOS F            | 65.7              | 1669.6 | 1.00      | 3.16                | 8.56             | 4.9         |
| Approach                     |      | 1080          | 2.0  | 1137         | 2.0  | 2.404     | 574.7       | LOS F            | 149.7             | 3803.1 | 1.00      | 4.03                | 11.18            | 3.6         |
| North: Marvin Road NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 7                            | L2   | 55            | 2.0  | 58           | 2.0  | 1.203     | 131.1       | LOS F            | 53.6              | 1361.4 | 1.00      | 3.01                | 6.94             | 12.0        |
| 4                            | T1   | 1124          | 2.0  | 1183         | 2.0  | 1.203     | 130.5       | LOS F            | 55.9              | 1419.8 | 1.00      | 3.03                | 6.99             | 12.0        |
| 14                           | R2   | 161           | 2.0  | 169          | 2.0  | 1.203     | 129.7       | LOS F            | 55.9              | 1419.8 | 1.00      | 3.06                | 7.04             | 11.9        |
| Approach                     |      | 1340          | 2.0  | 1411         | 2.0  | 1.203     | 130.4       | LOS F            | 55.9              | 1419.8 | 1.00      | 3.04                | 6.99             | 12.0        |
| West: Britton Pkwy NE        |      |               |      |              |      |           |             |                  |                   |        |           |                     |                  |             |
| 5                            | L2   | 130           | 2.0  | 137          | 2.0  | 0.431     | 15.8        | LOS B            | 2.7               | 67.7   | 0.86      | 0.93                | 1.10             | 29.0        |
| 2                            | T1   | 255           | 2.0  | 268          | 2.0  | 0.431     | 13.3        | LOS B            | 2.9               | 74.7   | 0.87      | 0.94                | 1.08             | 30.9        |
| 12                           | R2   | 305           | 2.0  | 321          | 2.0  | 0.431     | 12.3        | LOS B            | 2.9               | 74.7   | 0.87      | 0.94                | 1.07             | 30.7        |
| Approach                     |      | 690           | 2.0  | 726          | 2.0  | 0.431     | 13.3        | LOS B            | 2.9               | 74.7   | 0.87      | 0.94                | 1.08             | 30.4        |
| All Vehicles                 |      | 4748          | 2.0  | 4998         | 2.0  | 2.404     | 190.1       | LOS F            | 149.7             | 3803.1 | 0.98      | 2.67                | 6.06             | 9.1         |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Sidra\4439\2023 without project.sip9



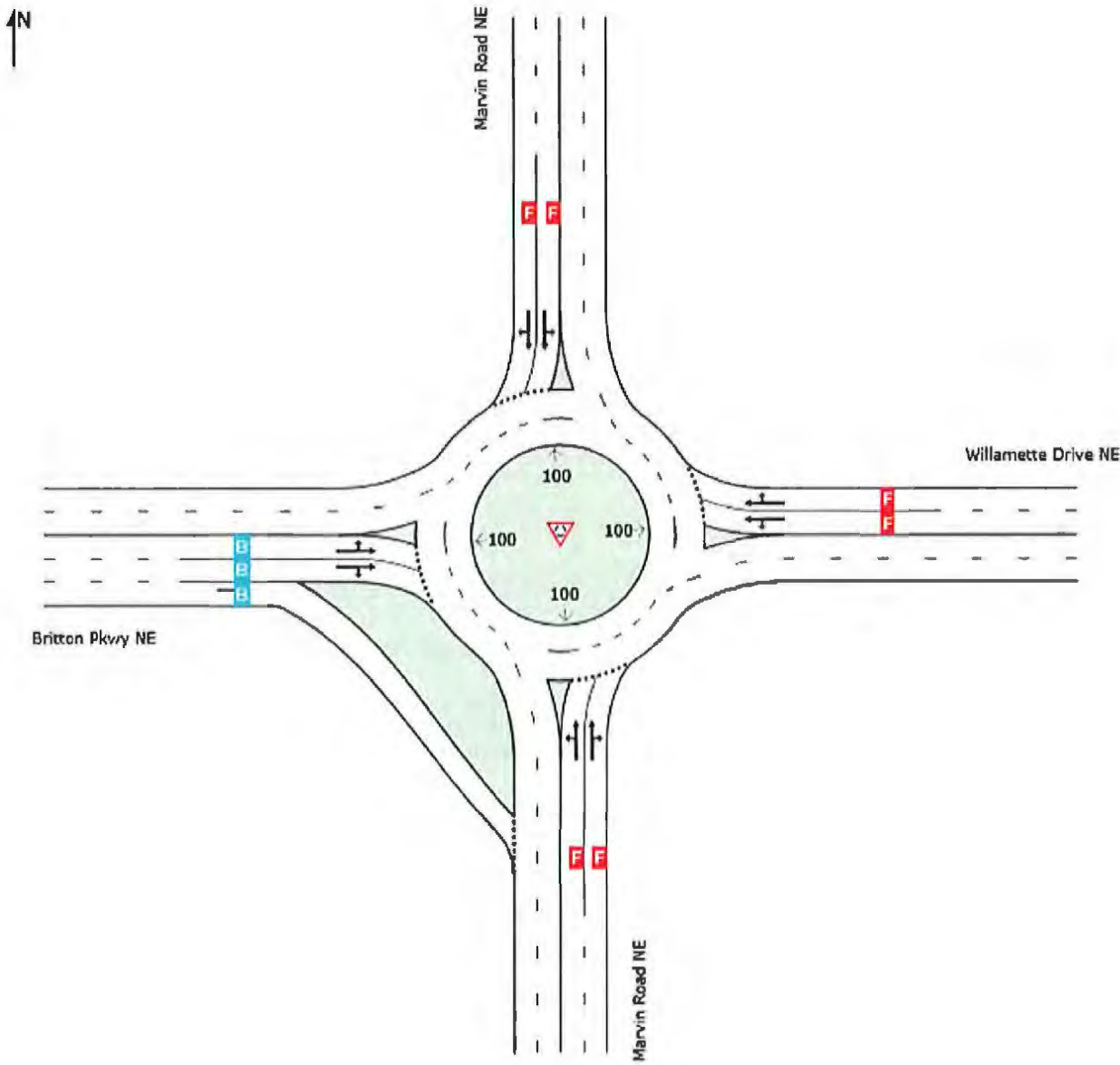
# LANE LEVEL OF SERVICE

## Lane Level of Service

 Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]

Griffin Multi-Family - Forecast 2023 PM Peak Hour Background Volumes  
Site Category: Future Conditions 1  
Roundabout

|     | Approaches |      |       |      | Intersection |
|-----|------------|------|-------|------|--------------|
|     | South      | East | North | West |              |
| LOS | F          | F    | F     | B    | F            |



## MOVEMENT SUMMARY

**Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family - Forecast 2023 PM Peak Hour Background Volumes  
Site Category: Future Conditions 1  
Roundabout

| Vehicle Movement Performance |      |               |      |               |      |           |             |                  |                   |         |           |                     |                  |                 |
|------------------------------|------|---------------|------|---------------|------|-----------|-------------|------------------|-------------------|---------|-----------|---------------------|------------------|-----------------|
| Mov ID                       | Turn | INPUT VOLUMES |      | DEMAND FLOWS  |      | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |         | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed mph |
|                              |      | [ Total veh/h | HV % | [ Total veh/h | HV % | v/c       | sec         |                  | [ Veh. veh        | Dist ft |           |                     |                  |                 |
| South: Gateway Blvd NE       |      |               |      |               |      |           |             |                  |                   |         |           |                     |                  |                 |
| 3                            | L2   | 205           | 2.0  | 223           | 2.0  | 0.220     | 5.5         | LOS A            | 1.3               | 33.4    | 0.58      | 0.45                | 0.58             | 32.8            |
| 8                            | T1   | 8             | 2.0  | 9             | 2.0  | 0.220     | 5.5         | LOS A            | 1.3               | 33.4    | 0.58      | 0.45                | 0.58             | 32.6            |
| 18                           | R2   | 181           | 2.0  | 197           | 2.0  | 0.180     | 4.9         | LOS A            | 1.0               | 26.3    | 0.54      | 0.39                | 0.54             | 34.5            |
| Approach                     |      | 394           | 2.0  | 428           | 2.0  | 0.220     | 5.2         | LOS A            | 1.3               | 33.4    | 0.56      | 0.42                | 0.56             | 33.5            |
| East: Britton Pkwy NE        |      |               |      |               |      |           |             |                  |                   |         |           |                     |                  |                 |
| 1                            | L2   | 62            | 2.0  | 67            | 2.0  | 0.415     | 8.3         | LOS A            | 2.5               | 63.9    | 0.54      | 0.42                | 0.54             | 33.7            |
| 6                            | T1   | 555           | 2.0  | 603           | 2.0  | 0.415     | 8.3         | LOS A            | 2.5               | 63.9    | 0.54      | 0.42                | 0.54             | 33.7            |
| 16                           | R2   | 140           | 2.0  | 152           | 2.0  | 0.415     | 8.3         | LOS A            | 2.5               | 63.9    | 0.54      | 0.42                | 0.54             | 32.8            |
| Approach                     |      | 757           | 2.0  | 823           | 2.0  | 0.415     | 8.3         | LOS A            | 2.5               | 63.9    | 0.54      | 0.42                | 0.54             | 33.5            |
| North: Gateway Blvd NE       |      |               |      |               |      |           |             |                  |                   |         |           |                     |                  |                 |
| 7                            | L2   | 89            | 2.0  | 97            | 2.0  | 0.237     | 10.2        | LOS B            | 1.5               | 37.4    | 0.83      | 0.80                | 0.83             | 31.2            |
| 4                            | T1   | 8             | 2.0  | 9             | 2.0  | 0.237     | 10.2        | LOS B            | 1.5               | 37.4    | 0.83      | 0.80                | 0.83             | 31.0            |
| 14                           | R2   | 18            | 2.0  | 20            | 2.0  | 0.237     | 10.2        | LOS B            | 1.5               | 37.4    | 0.83      | 0.80                | 0.83             | 30.2            |
| Approach                     |      | 115           | 2.0  | 125           | 2.0  | 0.237     | 10.2        | LOS B            | 1.5               | 37.4    | 0.83      | 0.80                | 0.83             | 31.0            |
| West: Britton Pkwy NE        |      |               |      |               |      |           |             |                  |                   |         |           |                     |                  |                 |
| 5                            | L2   | 49            | 2.0  | 53            | 2.0  | 0.238     | 5.6         | LOS A            | 1.2               | 31.4    | 0.37      | 0.23                | 0.37             | 35.0            |
| 2                            | T1   | 269           | 2.0  | 292           | 2.0  | 0.238     | 5.6         | LOS A            | 1.2               | 31.4    | 0.37      | 0.23                | 0.37             | 34.9            |
| 12                           | R2   | 155           | 2.0  | 168           | 2.0  | 0.238     | 5.6         | LOS A            | 1.2               | 31.4    | 0.37      | 0.23                | 0.37             | 34.1            |
| Approach                     |      | 473           | 2.0  | 514           | 2.0  | 0.238     | 5.6         | LOS A            | 1.2               | 31.4    | 0.37      | 0.23                | 0.37             | 34.6            |
| All Vehicles                 |      | 1739          | 2.0  | 1890          | 2.0  | 0.415     | 7.0         | LOS A            | 2.5               | 63.9    | 0.52      | 0.39                | 0.52             | 33.6            |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## LANE LEVEL OF SERVICE

### Lane Level of Service

 **Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

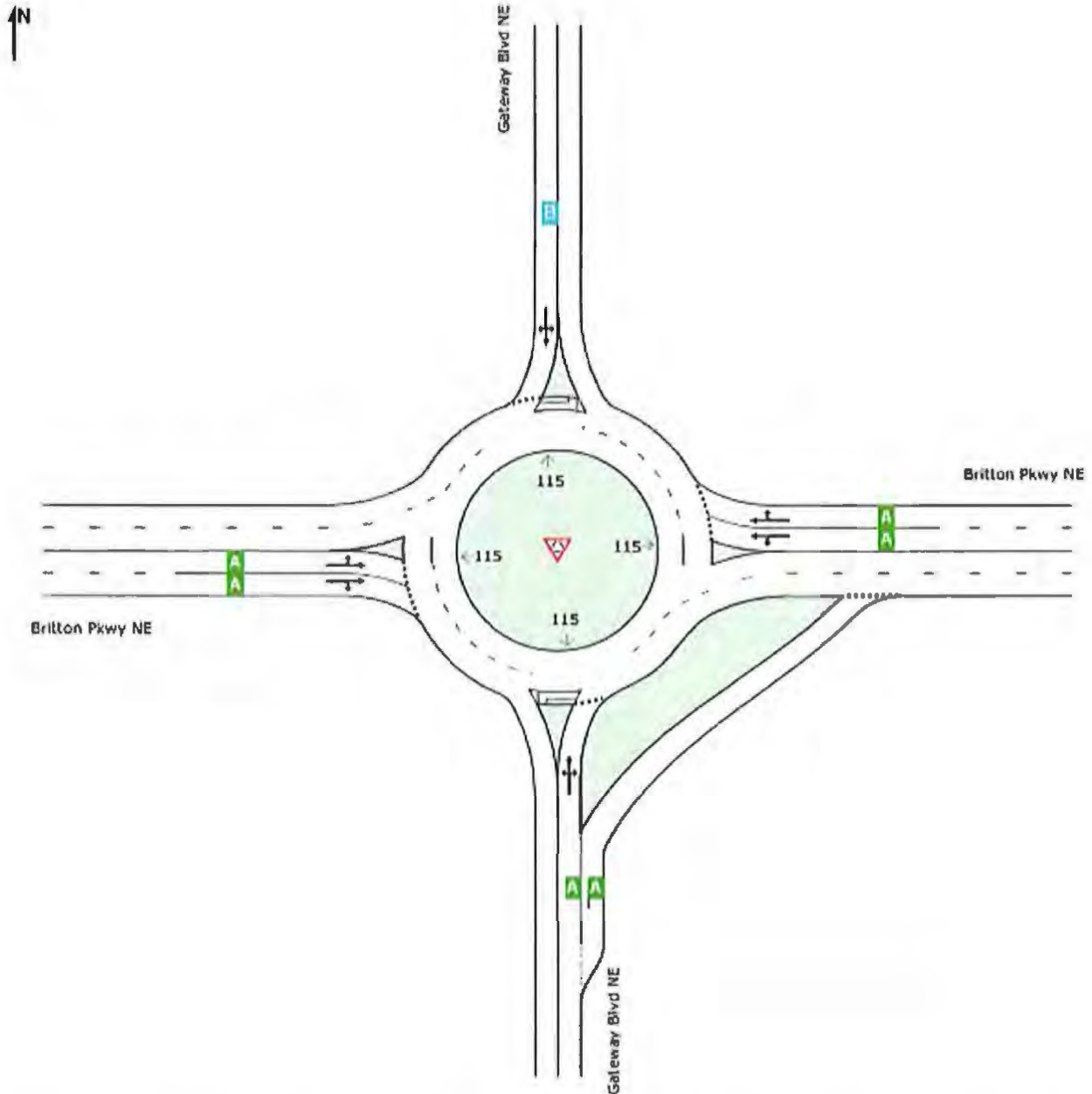
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Griffin Multi-Family - Forecast 2023 PM Peak Hour Background Volumes

Site Category: Future Conditions 1

Roundabout

|     | South | Approaches |       |      | Intersection |
|-----|-------|------------|-------|------|--------------|
|     |       | East       | North | West |              |
| LOS | A     | A          | B     | A    | A            |



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Roundabout LOS Method: SIDRA Roundabout LOS.  
 Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.  
 LOS F will result if  $v/c > 1$  irrespective of lane delay value (does not apply for approaches and intersection).  
 Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).  
 Delay Model: HCM Delay Formula (Geometric Delay is not included).

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| Intersection             |      |      |      |      |       |      |      |      |      |      |      |      |
|--------------------------|------|------|------|------|-------|------|------|------|------|------|------|------|
| Int Delay, s/veh         | 2.1  |      |      |      |       |      |      |      |      |      |      |      |
| Movement                 | EBL  | EBT  | EBR  | WBL  | WBT   | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |      | ↕    |      |      |       |      | ↗    | ↗    | ↗    |      | ↗    |      |
| Traffic Vol, veh/h       | 7    | 0    | 46   | 0    | 0     | 26   | 89   | 1254 | 11   | 0    | 999  | 16   |
| Future Vol, veh/h        | 7    | 0    | 46   | 0    | 0     | 26   | 89   | 1254 | 11   | 0    | 999  | 16   |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Stop | Stop | Stop | Free | Free  | Free | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -    | -    | None | -    | -     | Free | -    | -    | None | -    | -    | None |
| Storage Length           | -    | -    | -    | -    | -     | 0    | 75   | -    | 275  | -    | -    | -    |
| Veh in Median Storage, # | -    | 0    | -    | -    | 16979 | -    | -    | 0    | -    | -    | 0    | -    |
| Grade, %                 | -    | 0    | -    | -    | 0     | -    | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92    | 92   | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2    | 2     | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Mvmt Flow                | 8    | 0    | 50   | 0    | 0     | 28   | 97   | 1363 | 12   | 0    | 1086 | 17   |

| Major/Minor          | Minor2 |       |       | Major1 | Major2 |   |   |   |   |
|----------------------|--------|-------|-------|--------|--------|---|---|---|---|
| Conflicting Flow All | 2658   | 2664  | 1095  | 1103   | 0      | 0 | - | - | 0 |
| Stage 1              | 1095   | 1095  | -     | -      | -      | - | - | - | - |
| Stage 2              | 1563   | 1569  | -     | -      | -      | - | - | - | - |
| Critical Hdwy        | 6.42   | 6.52  | 6.22  | 4.12   | -      | - | - | - | - |
| Critical Hdwy Stg 1  | 5.42   | 5.52  | -     | -      | -      | - | - | - | - |
| Critical Hdwy Stg 2  | 5.42   | 5.52  | -     | -      | -      | - | - | - | - |
| Follow-up Hdwy       | 3.518  | 4.018 | 3.318 | 2.218  | -      | - | - | - | - |
| Pot Cap-1 Maneuver   | 25     | 23    | 260   | 633    | -      | - | 0 | - | - |
| Stage 1              | 321    | 290   | -     | -      | -      | - | 0 | - | - |
| Stage 2              | 190    | 171   | -     | -      | -      | - | 0 | - | - |
| Platoon blocked, %   |        |       |       |        | -      | - |   | - | - |
| Mov Cap-1 Maneuver   | 21     | 0     | 260   | 633    | -      | - | - | - | - |
| Mov Cap-2 Maneuver   | 21     | 0     | -     | -      | -      | - | - | - | - |
| Stage 1              | 272    | 0     | -     | -      | -      | - | - | - | - |
| Stage 2              | 190    | 0     | -     | -      | -      | - | - | - | - |

| Approach             | EB | NB  | SB |
|----------------------|----|-----|----|
| HCM Control Delay, s | 76 | 0.8 | 0  |
| HCM LOS              | F  |     |    |

| Minor Lane/Major Mvmt | NBL   | NBT | NBR | EBLn1 | SBT | SBR |
|-----------------------|-------|-----|-----|-------|-----|-----|
| Capacity (veh/h)      | 633   | -   | -   | 104   | -   | -   |
| HCM Lane V/C Ratio    | 0.153 | -   | -   | 0.554 | -   | -   |
| HCM Control Delay (s) | 11.7  | -   | -   | 76    | -   | -   |
| HCM Lane LOS          | B     | -   | -   | F     | -   | -   |
| HCM 95th %tile Q(veh) | 0.5   | -   | -   | 2.6   | -   | -   |



| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 1.6  |      |      |      |      |      |
| Movement                 | EBT  | EBR  | WBL  | WBT  | NBL  | NBR  |
| Lane Configurations      | ↑    |      |      | ↑    | ↑    |      |
| Traffic Vol, veh/h       | 42   | 7    | 18   | 87   | 5    | 11   |
| Future Vol, veh/h        | 42   | 7    | 18   | 87   | 5    | 11   |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Free | Free | Free | Free | Stop | Stop |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | -    | -    | -    | -    | 0    | -    |
| Veh in Median Storage, # | 0    | -    | -    | 0    | 0    | -    |
| Grade, %                 | 0    | -    | -    | 0    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2    | 2    | 2    |
| Mvmt Flow                | 46   | 8    | 20   | 95   | 5    | 12   |

| Major/Minor          | Major1 | Major2 | Minor1 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 0      | 0      | 54     |
| Stage 1              | -      | -      | -      |
| Stage 2              | -      | -      | -      |
| Critical Hdwy        | -      | -      | 4.12   |
| Critical Hdwy Stg 1  | -      | -      | -      |
| Critical Hdwy Stg 2  | -      | -      | -      |
| Follow-up Hdwy       | -      | -      | 2.218  |
| Pot Cap-1 Maneuver   | -      | -      | 1551   |
| Stage 1              | -      | -      | -      |
| Stage 2              | -      | -      | -      |
| Platoon blocked, %   | -      | -      | -      |
| Mov Cap-1 Maneuver   | -      | -      | 1551   |
| Mov Cap-2 Maneuver   | -      | -      | -      |
| Stage 1              | -      | -      | -      |
| Stage 2              | -      | -      | -      |

| Approach             | EB | WB  | NB  |
|----------------------|----|-----|-----|
| HCM Control Delay, s | 0  | 1.3 | 8.9 |
| HCM LOS              |    |     | A   |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL   | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h)      | 935   | -   | -   | 1551  | -   |
| HCM Lane V/C Ratio    | 0.019 | -   | -   | 0.013 | -   |
| HCM Control Delay (s) | 8.9   | -   | -   | 7.4   | 0   |
| HCM Lane LOS          | A     | -   | -   | A     | A   |
| HCM 95th %tile Q(veh) | 0.1   | -   | -   | 0     | -   |

## MOVEMENT SUMMARY

 Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]

Griffin Multi-Family - Forecast 2023 PM Peak Hour with Project  
Site Category: Future Conditions 2  
Roundabout

### Vehicle Movement Performance

| Mov ID                    | Turn | INPUT VOLUMES |      | DEMAND FLOWS  |      | Deg Satn | Ave Delay | Level of Service | 95% BACK OF QUEUE |         | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|---------------------------|------|---------------|------|---------------|------|----------|-----------|------------------|-------------------|---------|-----------|---------------------|------------------|-------------|
|                           |      | [ Total veh/h | HV % | [ Total veh/h | HV % |          |           |                  | [ Veh. veh        | Dist ft |           |                     |                  |             |
| South: Marvin Road NE     |      |               |      |               |      |          |           |                  |                   |         |           |                     |                  |             |
| 3                         | L2   | 462           | 2.0  | 486           | 2.0  | 1.043    | 65.0      | LOS F            | 45.0              | 1142.3  | 1.00      | 2.31                | 4.28             | 18.0        |
| 8                         | T1   | 1167          | 2.0  | 1228          | 2.0  | 1.043    | 65.0      | LOS F            | 45.0              | 1142.3  | 1.00      | 2.31                | 4.28             | 18.2        |
| 18                        | R2   | 36            | 2.0  | 38            | 2.0  | 1.043    | 65.0      | LOS F            | 45.0              | 1142.3  | 1.00      | 2.31                | 4.28             | 18.0        |
| Approach                  |      | 1665          | 2.0  | 1753          | 2.0  | 1.043    | 65.0      | LOS E            | 45.0              | 1142.3  | 1.00      | 2.31                | 4.28             | 18.2        |
| East: Willamette Drive NE |      |               |      |               |      |          |           |                  |                   |         |           |                     |                  |             |
| 1                         | L2   | 699           | 2.0  | 736           | 2.0  | 2.401    | 666.9     | LOS F            | 149.6             | 3799.7  | 1.00      | 4.50                | 12.61            | 3.2         |
| 6                         | T1   | 314           | 2.0  | 331           | 2.0  | 1.779    | 404.5     | LOS F            | 66.2              | 1681.5  | 1.00      | 3.17                | 8.60             | 4.9         |
| 16                        | R2   | 69            | 2.0  | 73            | 2.0  | 1.779    | 404.5     | LOS F            | 66.2              | 1681.5  | 1.00      | 3.17                | 8.60             | 4.9         |
| Approach                  |      | 1082          | 2.0  | 1139          | 2.0  | 2.401    | 574.0     | LOS F            | 149.6             | 3799.7  | 1.00      | 4.03                | 11.19            | 3.6         |
| North: Marvin Road NE     |      |               |      |               |      |          |           |                  |                   |         |           |                     |                  |             |
| 7                         | L2   | 55            | 2.0  | 58            | 2.0  | 1.216    | 136.3     | LOS F            | 55.5              | 1409.8  | 1.00      | 3.07                | 7.13             | 11.7        |
| 4                         | T1   | 1132          | 2.0  | 1192          | 2.0  | 1.216    | 135.7     | LOS F            | 57.9              | 1471.8  | 1.00      | 3.10                | 7.18             | 11.7        |
| 14                        | R2   | 161           | 2.0  | 169           | 2.0  | 1.216    | 134.9     | LOS F            | 57.9              | 1471.8  | 1.00      | 3.13                | 7.24             | 11.6        |
| Approach                  |      | 1348          | 2.0  | 1419          | 2.0  | 1.216    | 135.6     | LOS F            | 57.9              | 1471.8  | 1.00      | 3.10                | 7.19             | 11.7        |
| West: Britton Pkwy NE     |      |               |      |               |      |          |           |                  |                   |         |           |                     |                  |             |
| 5                         | L2   | 130           | 2.0  | 137           | 2.0  | 0.437    | 15.9      | LOS B            | 2.7               | 69.1    | 0.86      | 0.94                | 1.11             | 28.9        |
| 2                         | T1   | 257           | 2.0  | 271           | 2.0  | 0.437    | 13.5      | LOS B            | 3.0               | 76.3    | 0.87      | 0.95                | 1.09             | 30.8        |
| 12                        | R2   | 314           | 2.0  | 331           | 2.0  | 0.437    | 12.4      | LOS B            | 3.0               | 76.3    | 0.87      | 0.94                | 1.08             | 30.6        |
| Approach                  |      | 701           | 2.0  | 738           | 2.0  | 0.437    | 13.5      | LOS B            | 3.0               | 76.3    | 0.87      | 0.94                | 1.09             | 30.4        |
| All Vehicles              |      | 4796          | 2.0  | 5048          | 2.0  | 2.401    | 192.1     | LOS F            | 149.6             | 3799.7  | 0.98      | 2.72                | 6.19             | 9.0         |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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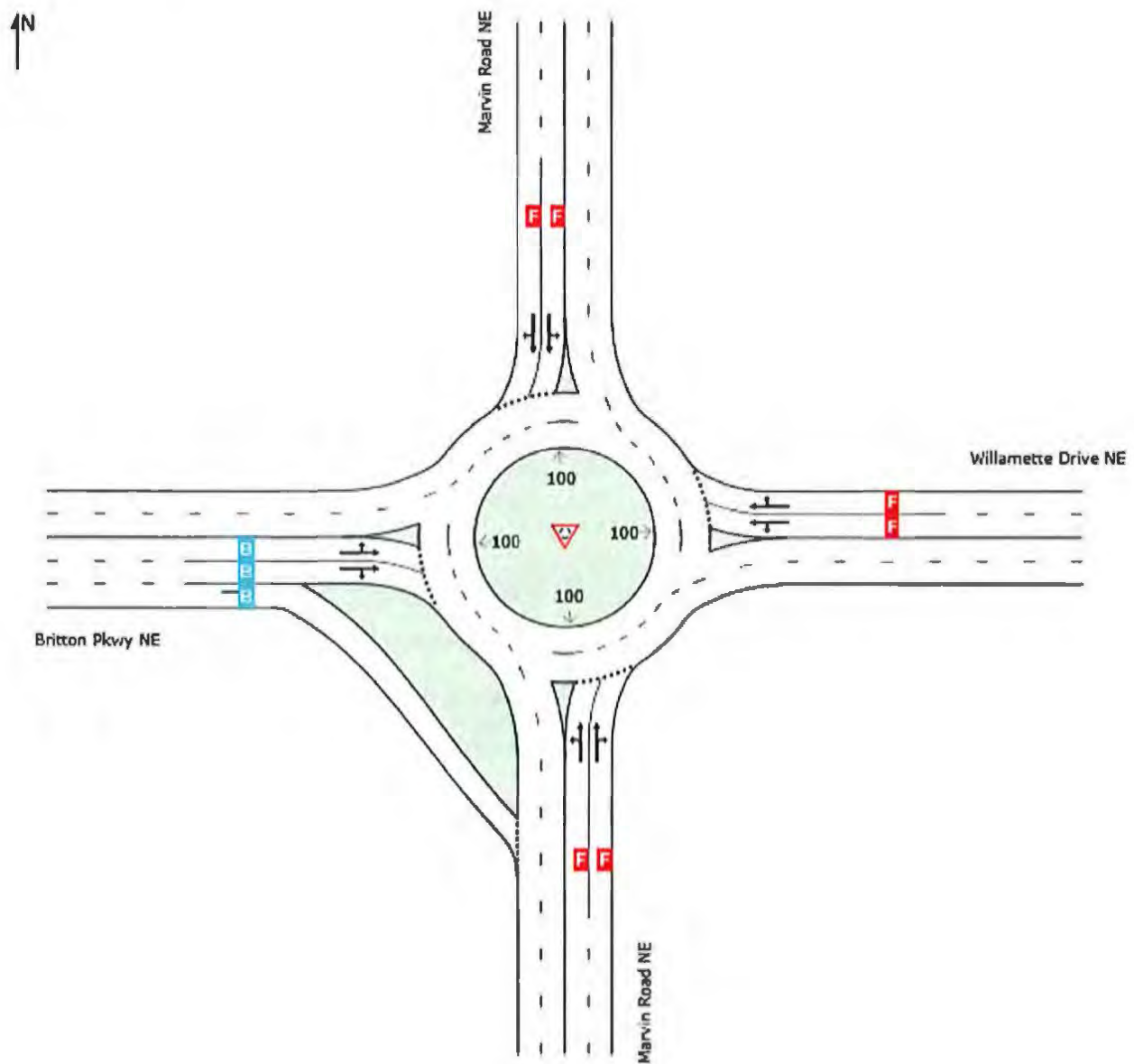
## LANE LEVEL OF SERVICE

### Lane Level of Service

 **Site: 101 [Marvin Road NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family - Forecast 2023 PM Peak Hour with Project  
 Site Category: Future Conditions 2  
 Roundabout

|     | Approaches |      |       |      | Intersection |
|-----|------------|------|-------|------|--------------|
|     | South      | East | North | West |              |
| LOS | F          | F    | F     | B    | F            |



## MOVEMENT SUMMARY

 **Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

Griffin Multi-Family - Forecast 2023 PM Peak Hour with Project  
Site Category: Future Conditions 2  
Roundabout

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |           |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|-----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |           | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh veh         | Dist ] ft |           |                     |                  |             |
| South: Gateway Blvd NE       |      |               |        |               |        |           |             |                  |                   |           |           |                     |                  |             |
| 3                            | L2   | 205           | 2.0    | 223           | 2.0    | 0.224     | 5.6         | LOS A            | 1.3               | 34.2      | 0.60      | 0.47                | 0.60             | 32.8        |
| 8                            | T1   | 8             | 2.0    | 9             | 2.0    | 0.224     | 5.6         | LOS A            | 1.3               | 34.2      | 0.60      | 0.47                | 0.60             | 32.6        |
| 18                           | R2   | 181           | 2.0    | 197           | 2.0    | 0.181     | 5.0         | LOS A            | 1.0               | 26.6      | 0.54      | 0.40                | 0.54             | 34.5        |
| Approach                     |      | 394           | 2.0    | 428           | 2.0    | 0.224     | 5.3         | LOS A            | 1.3               | 34.2      | 0.57      | 0.44                | 0.57             | 33.5        |
| East: Britton Pkwy NE        |      |               |        |               |        |           |             |                  |                   |           |           |                     |                  |             |
| 1                            | L2   | 62            | 2.0    | 67            | 2.0    | 0.427     | 8.5         | LOS A            | 2.6               | 66.4      | 0.55      | 0.43                | 0.55             | 33.6        |
| 6                            | T1   | 555           | 2.0    | 603           | 2.0    | 0.427     | 8.5         | LOS A            | 2.6               | 66.4      | 0.55      | 0.43                | 0.55             | 33.6        |
| 16                           | R2   | 156           | 2.0    | 170           | 2.0    | 0.427     | 8.5         | LOS A            | 2.6               | 66.4      | 0.55      | 0.43                | 0.55             | 32.7        |
| Approach                     |      | 773           | 2.0    | 840           | 2.0    | 0.427     | 8.5         | LOS A            | 2.6               | 66.4      | 0.55      | 0.43                | 0.55             | 33.4        |
| North: Gateway Blvd NE       |      |               |        |               |        |           |             |                  |                   |           |           |                     |                  |             |
| 7                            | L2   | 100           | 2.0    | 109           | 2.0    | 0.271     | 10.8        | LOS B            | 1.7               | 43.3      | 0.84      | 0.82                | 0.84             | 31.0        |
| 4                            | T1   | 8             | 2.0    | 9             | 2.0    | 0.271     | 10.8        | LOS B            | 1.7               | 43.3      | 0.84      | 0.82                | 0.84             | 30.8        |
| 14                           | R2   | 23            | 2.0    | 25            | 2.0    | 0.271     | 10.8        | LOS B            | 1.7               | 43.3      | 0.84      | 0.82                | 0.84             | 30.0        |
| Approach                     |      | 131           | 2.0    | 142           | 2.0    | 0.271     | 10.8        | LOS B            | 1.7               | 43.3      | 0.84      | 0.82                | 0.84             | 30.8        |
| West: Britton Pkwy NE        |      |               |        |               |        |           |             |                  |                   |           |           |                     |                  |             |
| 5                            | L2   | 57            | 2.0    | 62            | 2.0    | 0.245     | 5.7         | LOS A            | 1.3               | 32.7      | 0.39      | 0.25                | 0.39             | 34.8        |
| 2                            | T1   | 269           | 2.0    | 292           | 2.0    | 0.245     | 5.7         | LOS A            | 1.3               | 32.7      | 0.39      | 0.25                | 0.39             | 34.8        |
| 12                           | R2   | 155           | 2.0    | 168           | 2.0    | 0.245     | 5.7         | LOS A            | 1.3               | 32.7      | 0.39      | 0.25                | 0.39             | 34.0        |
| Approach                     |      | 481           | 2.0    | 523           | 2.0    | 0.245     | 5.7         | LOS A            | 1.3               | 32.7      | 0.39      | 0.25                | 0.39             | 34.5        |
| All Vehicles                 |      | 1779          | 2.0    | 1934          | 2.0    | 0.427     | 7.2         | LOS A            | 2.6               | 66.4      | 0.53      | 0.41                | 0.53             | 33.5        |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: SIDRA Standard.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## LANE LEVEL OF SERVICE

### Lane Level of Service

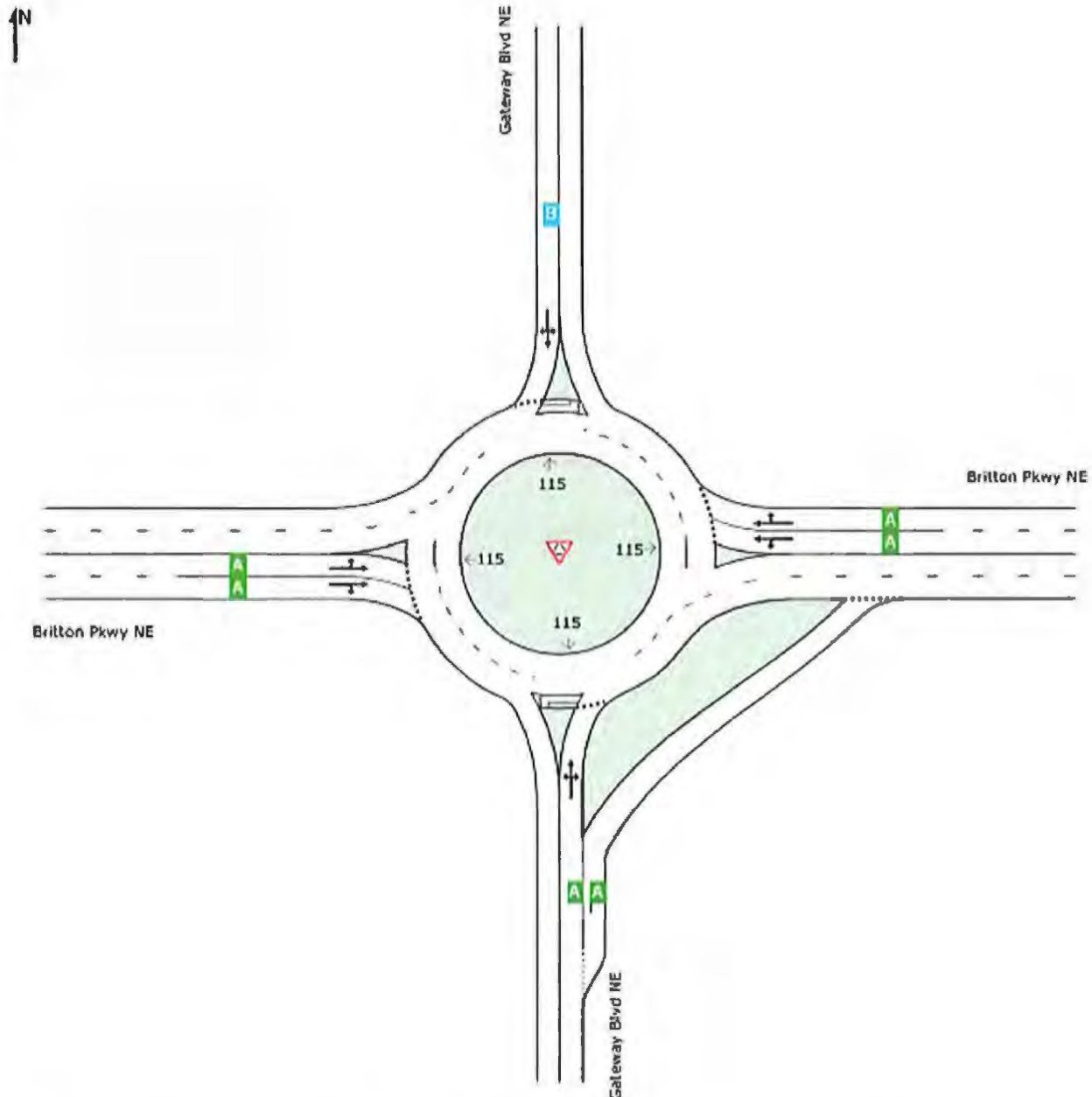
 **Site: 101 [Gateway Blvd NE & Britton Pkwy NE (Site Folder: General)]**

---

Griffin Multi-Family - Forecast 2023 PM Peak Hour with Project  
Site Category: Future Conditions 2  
Roundabout

|     | Approaches |      |       |      | Intersection |
|-----|------------|------|-------|------|--------------|
|     | South      | East | North | West |              |
| LOS | A          | A    | B     | A    | A            |





Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if  $v/c > 1$  irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

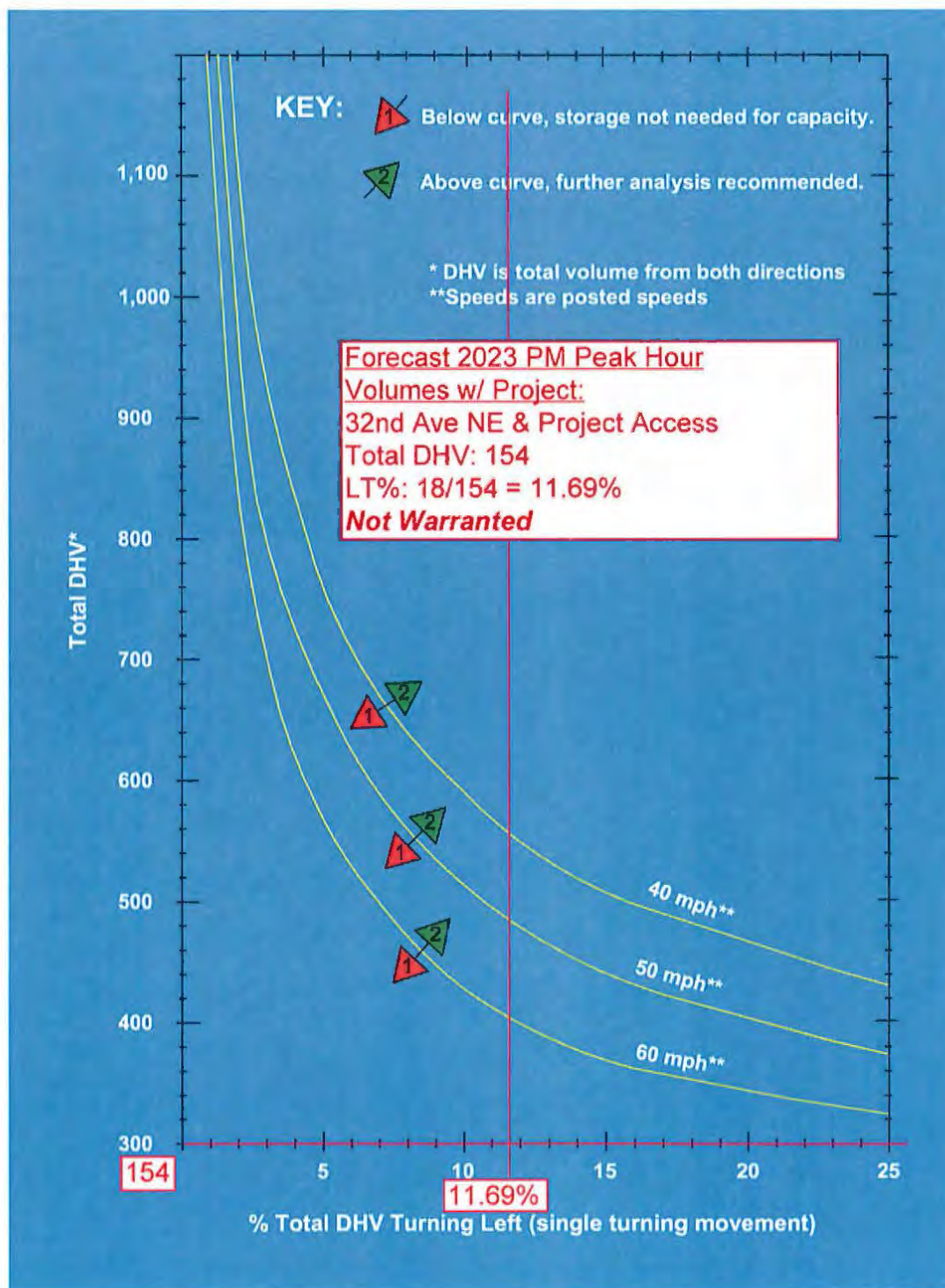
Delay Model: HCM Delay Formula (Geometric Delay is not included).

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*APPENDIX*

LEFT TURN WARRANT

## Exhibit 1310-7a Left-Turn Storage Guidelines: Two-Lane, Unsignalized





**Gateway Multi-Family Complex  
Preliminary Drainage Control Plan**

**Prepared for:** Freestone Companies  
6820 20<sup>th</sup> St  
Fife, WA 98424  
(253) 896-1300  
scott@freestonecompanies.com

**Report Date:** May 11, 2020

**Prepared by:** Helena Gubbels, EIT

**Reviewed by:** Steve Hatton, PE  
HATTON GODAT PANTIER  
3910 Martin Way E., Suite B  
Olympia, WA 98506  
(360) 943-1599

**Project No:** 19-085

**Project Name:** GATEWAY MULTI-FAMILY COMPLEX

H:\Office\JOBS\2019\19-085 Griffin MF Lacey\LAND USE\Drainage\RPT-Preliminary Drainage Report 19-085.docx

I hereby state that this Preliminary Drainage Control Plan for, Gateway Multi-Family Complex located at 7235 32nd Ave NE, Lacey WA, has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the CITY OF LACEY does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.



Signature



Date



Seal

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# DRAINAGE CONTROL PLAN

## Section 1 – Project Description

The Gateway Multi-Family Complex project is located west of the intersection of Marvin Rd NE and 32<sup>nd</sup> Ave NE in the City of Lacey in Section 3, Township 18, Range 1 West, W.M. on tax parcel numbers 11803140300, 11803130400, and 11803130401. The project proposes to construct a 183-unit multifamily apartment complex consisting of 12 apartment buildings, an office building and associated parking and utilities. The project will also include frontage improvements along 32<sup>nd</sup> Ave NE and will retain approximately 88,250 square feet of native area in designated tree tracts.

Required utility improvements the installation of a new looped 8" water main and 8" gravity sewer. The project also includes the installation of a 6-inch forcemain that will connect the existing lift station north of the project area to a new forcemain line installed at the southern entry to the project area. The proposed project will require grading, building, and public works permits. Water and sewer will be provided via connections to the City of Lacey's utilities. Zoning for the property is MD, Moderate Density Residential.

The stormwater mitigation measures proposed for the project included grading, permeable paved surfaces, roof drain infiltration trenches, piped conveyance, two bioretention swales, and a parking lot gravel trench. Portions of the low-traffic parking areas will be permeable pavements with underlying treatment soil layers, and all onsite sidewalks will be permeable pavement. Roof area runoff will be collected in roof downspouts and infiltrated via gravel trenches sized to infiltrate 100% of the runoff. Onsite runoff will be collected and conveyed to two bioretention swales for treatment and infiltration.

| <b>Table 1.1 Proposed Onsite Development Areas (acres)</b> |                   |
|------------------------------------------------------------|-------------------|
| <b>Developed</b>                                           | <b>Total Site</b> |
| Roof                                                       | 1.58              |
| Sidewalk (Porous)                                          | 0.46              |
| Sidewalk (Impervious)                                      | 0.15              |
| Parking (Impervious)                                       | 2.63              |
| Parking (Porous)                                           | 0.60              |
| Lawn/Landscape                                             | 2.42              |
| Native                                                     | 1.57              |
| Swales                                                     | 0.13              |
| Total                                                      | 9.54              |



The City of Lacey 2016 Stormwater Design Manual (SDM) summarizes the thresholds which determine the applicability of the core requirements for each project. All new development projects are required to comply with Core Requirement #2; Construction Stormwater Pollution Prevention. Table 1.3 summarizes the thresholds which trigger compliance with the remaining core requirements.

| <b>Table 1.3 – Thresholds for Core Requirement Applicability</b>              |                                                                        |                                                                        |
|-------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                                                               | <b>Required to comply with<br/>Core Requirements<br/>#1 through #5</b> | <b>Required to comply with<br/>Core Requirements<br/>#1 through #9</b> |
| ≥ 2,000 ft <sup>2</sup> of new, replaced, or new + replaced hard surface area | X                                                                      |                                                                        |
| ≥ 7,000 ft <sup>2</sup> land disturbing activity                              | X                                                                      |                                                                        |
| ≥ 5,000 ft <sup>2</sup> new + replaced hard surface area                      |                                                                        | X                                                                      |
| Converts ≥ 0.75 acre of vegetation to lawn or landscape                       |                                                                        | X                                                                      |
| Coverts ≥ 2.5 acres of native vegetation to pasture                           |                                                                        | X                                                                      |

This project adds 183,266 square feet of impervious area; therefore, core requirements #1 through # 9 apply.

The applicable core requirements are:

- Core Requirement #1: Preparation of Stormwater Site Plans
- Core Requirement #2: Construction Stormwater Pollution Prevention
- Core Requirement #3: Source Control of Pollution
- Core Requirement #4: Preservation of Natural Drainage Systems and Outfalls
- Core Requirement #5: On-Site Stormwater Management
- Core Requirement #6: Runoff Treatment
- Core Requirement #7: Flow Control
- Core Requirement #8: Wetlands Protection
- Core Requirement #9: Operation and Maintenance

Addressing these applicable core requirements, it is anticipated that the proposed project will have no significant adverse effect on downstream or surrounding hydrology. Each of the applicable core requirements is discussed below.

### **Core Requirement #1: Preparation of Stormwater Site Plans**

The main components of Stormwater Site Planning are Construction Stormwater Pollution Prevention Planning and Permanent Stormwater Control Planning. This Drainage Report, a Construction Stormwater Pollution Prevention Plan, Soils Report, Maintenance and Source Control Manual, and copy of the proposed Maintenance Covenant for stormwater facilities are submitted as part of the Gateway Multi-Family Complex Drainage Control Plan to meet this requirement.

### **Core Requirement #2: Construction Stormwater Pollution Prevention**

A Construction Stormwater Pollution Prevention Plan (C-SWPPP) has been developed to address erosion and sediment control anticipated during construction. A Construction NPDES permit will be obtained prior to construction. The C-SWPPP will address all thirteen elements as required by the Department of Ecology.

### **Core Requirement #3: Source Control of Pollution**

Source control BMPs are used to prevent stormwater from coming in contact with pollutants and are used as a cost-effective means of reducing pollutants in stormwater. The selection of permanent source control BMPs is based on the activities likely to occur on the site and the pollutants associated with those activities.

The Stormwater Pollution Source Control Checklist and Worksheet found in Appendix 9A of Chapter 9 of 2016 SDM has been completed to determine the applicable post-construction activities with required Source Control BMPs on this site. Methods to address source control of pollution from these activities are provided in the Maintenance and Source Control Manual submitted as part of the Drainage Control Plan for this project. Construction source control BMPs are addressed in the C-SWPPP. A copy of the Stormwater Pollution Source Control Checklist and Worksheet can be found in Appendix C of the Maintenance and Source Control Manual.

### **Core Requirement #4: Preservation of Natural Drainage Systems and Outfalls**

Low-impact development techniques will be used to preserve existing site runoff patterns to the maximum extent feasible. In the existing condition, stormwater runoff from the site sheet flows from the south property line to the north, concentrating in the low spots adjacent to 32<sup>nd</sup> Ave NE. The low spots along 32<sup>nd</sup> Ave NE are concentrated around a large beehive grated catch basin located in the ditch line. The catch basin connects to a 24-inch pipe that flows to the west. This large catch basin also receives excess runoff from the northern ditch via a series of lidded catch basins connected to a northern beehive catch basin.

The project proposes to install a new beehive grated catch basin, within right-of-way and at the edge of the property line, to continue to receive the west flowing ditch runoff. This catch basin will connect to the existing 24-inch storm system to maintain the flow patterns along 32<sup>nd</sup> Avenue. The onsite runoff will be infiltrated onsite in a series of trenches of swales. Emergency overflows will connect these systems to flow downhill to collect in a proposed bioretention swale along 32<sup>nd</sup> Avenue. The site is sized infiltration 100% of the onsite runoff as well as the southern half street portion of 32<sup>nd</sup> Avenue adjacent to the property line.

### **Core Requirement #5: On-Site Stormwater Management**

The 2016 SDM summarizes the requirements for employing on-site stormwater management BMPs, providing treatment, and flow control in decision charts. This project proposes to satisfy Core Requirement #5 by meeting the LID Performance Standard by infiltrating 100% of the runoff and implementing Postconstruction Soil Quality and Depth (Ecology BMP T5.13) in all new and disturbed lawn/landscape areas. Furthermore, the project will implement the following; Permeable pavement (Ecology BMP T5.15) will be employed for all onsite sidewalks and for some low-traffic parking areas. Bioretention swales (Ecology BMP T9.10) will be used to treat and infiltrate stormwater runoff. Infiltration trenches (Ecology BMP T7.20) will be used to infiltrate 100% of roof runoff and portions of excess runoff from the southern bioretention swale.

### **Core Requirement #6: Runoff Treatment**

| <b>Table 1.4 – Thresholds for Core Requirement #6: Runoff Treatment</b>                                                                                           |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                                                                                                                                   | <b>Required to Comply</b> |
| < 5,000 sf of total effective pollution-generating hard surface (PGHS)                                                                                            |                           |
| ≥ 5,000 sf of total effective pollution-generating hard surface (PGHS)                                                                                            | X                         |
| < ¾ acres of pollution-generating pervious surface (PGPS) from which there will be a surface discharge in a natural or artificial conveyance system from the site |                           |
| ≥ ¾ acres of pollution-generating pervious surface (PGPS) from which there will be a surface discharge in a natural or artificial conveyance system from the site | X                         |

Table 1.4 above summarizes the thresholds for construction of stormwater treatment facilities. This project will add 114,266 sf of pollution generating hard surface and 152,231 square feet of pollution generating pervious surface therefore, treatment is required. The project does not require oil treatment facilities because it is not defined as a high-use site. Phosphorus treatment is not required because the project does not discharge to a fresh waterbody or infiltrate within one-quarter mile of a fresh waterbody. The enhanced treatment menu applies because the project is a commercial, multi-family project. See Section 4.

## Core Requirement #7: Flow Control

| Table 1.5 – Thresholds for Core Requirement #7: Flow Control                                                                                                                                         |                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                                                                                                                                                                                                      | Required to Comply |
| < ¼ acres of native vegetation converted to lawn/landscape or<br>< 2.5 acres converted to pasture from which there is a surface discharge in a natural or artificial conveyance system from the site |                    |
| ≥ ¼ acres of native vegetation converted to lawn/landscape or<br>≥ 2.5 acres converted to pasture from which there is a surface discharge in a natural or artificial conveyance system from the site | X                  |
| < 10,000 sf of effective impervious area                                                                                                                                                             |                    |
| ≥ 10,000 sf of effective impervious area                                                                                                                                                             | X                  |
| ≥ 0.10 cfs increase in the 100-year storm flow frequency using 1-hour time steps or<br>≥ 0.15 cfs increase in the 100-year storm flow frequency using 15-minute time steps                           | X                  |

Table 1.5 above summarizes the thresholds for achievement of the standard flow control requirement for Western Washington. This project will add 183,266 sf of effective impervious surface. Flow control is required. This project proposes to meet the flow control requirement by infiltrating 100% of the runoff onsite. See Section 4.

## Core Requirement #8: Wetlands Protection

The project does not propose to discharge to a wetland and there are no wetlands within the project boundaries.

## Core Requirement #9: Operation and Maintenance

Proper operation and maintenance of proposed stormwater facilities is a vital component to the success of stormwater mitigation. A Maintenance and Source Control Manual and Operation and Maintenance Agreement have been prepared and are included as part of the Drainage Control Plan for the Gateway Multi-Family Complex project.

## Section 2 – Existing Conditions Description

### Section 2.1 Topography

The site in existing condition has a high of 212 along the south property line with an approximate 3-4% slope towards the north property line which has an average low of 192.

### Section 2.2 Ground Cover

The site is made up of three separate parcels with a single-family home on each. The existing ground cover is mostly forested, with some previously cleared shrubs and lawn on each parcel. The southwest parcel is mostly cleared of native trees. Tree retention areas have been designated along the northwest, northeast and southeast property lines. All trees within these areas will be retained.

### Section 2.3 Drainage

There is a low point and a drain adjacent to the northeast property line where the street runoff from 32<sup>nd</sup> Ave NE up to its intersection with Marvin Rd NE drains to. This low point drain is an exposed beehive grate that routes runoff via a 24-inch pipe to the west. This low point drain is connected to the northern side of 32<sup>nd</sup> as an apparent overflow.

Existing drainage within the property is infiltrated through roof drains or via sheet flow dispersion and onsite infiltration. Excess flows to the low point to the north on the street as well. The north part of the site can become saturated and pond during large storm events.

### Section 2.4 Soils

The USDA Web Soil Survey maps most of the existing soil type as Everett very gravelly sandy loam, which is consistent with the glacial outwash deposits described by the two Geotechnical and Stormwater Evaluation Reports performed by Insight Geologic dated July 25, 2017 and on July 7, 2016. Groundwater on the west side of the site was encountered in three test pits at 7, 10, and 11 feet deep. Groundwater was not encountered on the east side of the site. Using gradation analysis and the depths to restrictive layers, the long-term design infiltration rate was calculated to be 0.5 in/hr in the northern third of the site and 9 in/hr in the remainder of the site. For the purposes of modeling, 0.5 in/hr was used for the northern swale in the north, and 3.5 in/hr was used for the southern swale in the south. See the USDA Soil Resource Report and the two Geotechnical and Stormwater Evaluation Reports in Appendix 3.

A soil profile was generated for the site and can be found in the site development drawings. This profile shows an approximate soil profile based on the boring and test pit information obtained in the Insight Geologic Geotechnical reports.

### Section 2.5 Critical Areas

There are no critical areas on or near the project site. The project is located within a Category II critical aquifer recharge area. The project is within a 5-year wellhead protection area.

### Section 2.6 Adjacent Areas

The site is bounded by 32<sup>nd</sup> Ave NE to the north, subdivisions to the west and south, and an apartment complex to the east.

## **Section 2.8 Reports and Studies**

There are no additional reports or studies at this time.

## **Section 2.9 – Wells and Septic Systems**

Records at Thurston County and the Department of Ecology were searched in order to locate the presence of wells and septic systems that may be located within the setback distances from the bioretention swales or infiltration trenches. In addition, the Project Engineer, or someone under his/her direct supervision, has visited the site to verify the presence or absence of wells and septic systems as best can be done visually without trespassing onto other properties. All wells and septic systems found to be located within the setback distances from the bioretention swales or infiltration trenches have been shown on the plans.

## **Section 2.10 – Fuel Tanks**

Records at Thurston County and the Department of Ecology were searched in order to locate the presence of above and below ground fuel storage tanks that may be located within the setback distances from the bioretention swales or infiltration trenches. In addition, the Project Engineer, or someone under his/her direct supervision, has visited the site to verify the presence or absence of fuel tanks as best can be done visually without trespassing onto other properties. All fuel tanks found to be located within the setback distances from the bioretention swales or infiltration trenches have been shown on the plans.

## **Section 2.11 – Analysis of 100-Year Flood**

The Federal Emergency Management Agency prepares maps for all areas within Thurston County, including the incorporated cities therein. Panel # **53067C0185F** depicts the areas, if any, subjected to flooding in the vicinity of this proposal. By inspection of this map, this proposal appears to be located in Zone **X**, an area of minimal flooding. This area, therefore, is not located within the 100-year flood plain.

## Section 3 – Vicinity Analysis and Sub-Basin Description

The Threshold Discharge Area for the project includes the following four basins: North Basin Offsite, North Basin Onsite, Southwest Basin and the Southeast Basin. The North Offsite basin includes the half street frontage along 32<sup>nd</sup> Ave NE. The North Onsite basin includes all areas north of Buildings J and L to the northern property line. The Southwest Basin includes all areas southwest of Buildings J and L and portions of offsite areas southwest of the project area. The Southeast Basin includes all areas southeast of Buildings J and L and portions of offsite areas southeast of the project area. See Table 3.1 and the Basin Map.

| <b>Table 3.1 – Threshold Area Summary</b> |                            |                           |                        |                        |                   |
|-------------------------------------------|----------------------------|---------------------------|------------------------|------------------------|-------------------|
| All areas measured in acres               |                            |                           |                        |                        |                   |
| <b>Pre-Developed</b>                      | <b>North Basin Offsite</b> | <b>North Basin Onsite</b> | <b>Southwest Basin</b> | <b>Southeast Basin</b> | <b>Total Site</b> |
| Forest (A/B Flat)                         | 0.45                       | 3.78                      | 3.52                   | 3.25                   | 10.55             |
| Forest (A/B Moderate)                     |                            | -                         | -                      | -                      | -                 |
| Forest (A/B Steep)                        |                            | -                         | -                      | -                      | -                 |
| Total                                     | 0.45                       | 3.78                      | 3.52                   | 3.25                   | 10.55             |
| <b>Developed</b>                          | <b>North Basin Offsite</b> | <b>North Basin Onsite</b> | <b>Southwest Basin</b> | <b>Southeast Basin</b> | <b>Total Site</b> |
| Roof                                      | -                          | 0.57                      | 0.52                   | 0.49                   | 1.58              |
| Roads                                     | 0.45                       | 0.23                      | -                      | -                      | 0.23              |
| Sidewalk (Impervious)                     | -                          | 0.08                      | -                      | -                      | 0.08              |
| Parking                                   | -                          | 0.68                      | 1.04                   | 0.91                   | 2.63              |
| Pond                                      | -                          | 0.27                      | 0.09                   | -                      | 0.36              |
| Lawn/Landscape (A/B)                      | -                          | 0.49                      | 0.43                   | 0.14                   | 1.06              |
| Forest (A/B Flat)                         | -                          | 0.67                      | 0.24                   | 1.12                   | 2.03              |
| Pasture (A/B)                             | -                          | 0.79                      | 1.20                   | 0.59                   | 2.58              |
| Total                                     | 0.45                       | 3.78                      | 3.52                   | 3.25                   | 10.55             |

## Section 4 – Flow Control and Water Quality Facility Sizing

### Water Quality Treatment Facility Sizing

This project proposes to provide enhanced treatment for all pollution generating surfaces using bioretention swales and by providing a water quality treatment layer in those areas of porous pavement. The bioretention swales will receive runoff from all areas except roofs. Runoff from surfaces will sheet flow into the parking aisle where they will be collected in catch basins and routed to one of two bioretention swales. Runoff will enter the swales and will receive treatment through 18-inches of bioretention soil media before infiltrating through gravel bedding placed below the swales. Treatment volumes for both swales are in excess of the minimum 92% treatment threshold. Water quality treatment for porous asphalt will be provided using a 6-inch sand layer.

### Flow Control Facility Sizing

This project generates more than 10,000 square feet of effective hard surfaces and is therefore required to provide flow control. To meet the flow control requirement for this project, 100% onsite infiltration is proposed through the following:

Roof areas will be routed via tightlined conveyance connections from downspouts to a series of infiltration trenches. The west roof drainage system includes 2 infiltration trenches. The trenches are linked via piping from the south to the north, flowing downhill. The east drainage system include 2 infiltration trenches are linked with piping flowing south to north downhill. The roofs within the east and west basins will connect to the nearest trench. The most downhill trench will connect have an emergency overflow connection to the main parking drain line to continue to overflow downhill.

Two bioretention swales are proposed for the project. The northern bioretention swale is sized to receive all runoff north of Buildings J and L as well as the southern half street portion of 32<sup>nd</sup> Avenue and is sized to infiltrate 100% of the runoff. The southern bioretention swale will receive all runoff, less the roof area from all surfaces in the southwest and southeast basins. Runoff will be conveyed via catch basins and piping to outfall into the east and west side of the swale. Approximately 98% of the runoff will infiltrate through the swale with the excess runoff connecting to a large gravel trench placed in the center of the site. This trench will receive runoff directly from Buildings J and L as well as excess runoff from the southern bioretention swale, the trench is sized to infiltrate 100% of the runoff. Emergency overflows are placed on the catch basins upstream from the outfall to convey emergency runoff south.

Porous pavement is proposed for all sidewalk areas onsite. Porous pavement is proposed for portions of the parking area, with the largest portion in the northern drive aisle. Porous pavement areas are included in the contributing area to both bioretention swales. Per the flow credits prescribed in the SDM, the porous pavement areas are modeled as lawn area. All lawn and landscape areas are included in the contributing areas to both bioretention swales. All lawn and landscape areas will be treated with post-construction quality and depth, Per the flow credits prescribed in the SDM, all lawn and landscape areas are modeled as pasture. Tree retention areas are modeled as native and are included in the bioretention sizing areas. See the WWHM and Surface Summary in Appendix 2.

The site contains a hard pan till layer throughout the site. The project proposes to maintain 5 feet of clearance above the restrictive layer per the requirements of the 2016 SDM. Table 4.1 highlights the approximate finish grades, depths of the infiltrative systems and the approximate depth to restrictive layers.



| <b>Table 4.1 Proposed Infiltration System Elevations</b> |                   |            |             |                            |
|----------------------------------------------------------|-------------------|------------|-------------|----------------------------|
| Facility                                                 | Finish Grade      | Gravel Top | Gravel Base | Depth to Restrictive Layer |
| West Drywell #1                                          | 205+/-            | 203+/-     | 201+/-      | 197+/-                     |
| West Drywell #2                                          | 201+/-            | 199+/-     | 194+/-      | 189+/-                     |
| Central Drywell                                          | 205+/-            | 203+/-     | 199+/-      | 192+/-                     |
| East Drywell #1                                          | 204+/-            | 203+/-     | 199+/-      | 194+/-                     |
| East Drywell #2                                          | 201+/-            | 200+/-     | 196+/-      | 191+/-                     |
| Infiltration Trench                                      | 201+/-            | 198.5+/-   | 195.5+/-    | 190+/-                     |
| Bioretention South                                       | 198.5 (Swale Top) | 197.5+/-   | 194+/-      | 188+/-                     |
| Bioretention North                                       | 190.5 (Swale Top) | 188.5+/-   | 187+/-      | 185+/-                     |

## Section 5 – Aesthetic Considerations for Facilities

All above ground stormwater facilities will be hydroseeded upon completion. Additional landscaping shall also be provided throughout the project in conformance with the approved landscaping and tree restoration plan, as applicable, and as otherwise required by the approving authority.

## Section 6 – Conveyance System Analysis and Design

The conveyance system was sized using Manning's Equation for the 25-year recurrence interval event.

## Section 7 – Covenants, Dedications and Easement

All stormwater facilities located on private property shall be owned, operated and maintained by the property owners, their heirs, successors and assigns. The property owners shall enter into an agreement with the governing body, a copy of which agreement is included in the Maintenance and Source Control Manual of the Drainage Control Plan. The agreement requires maintenance of the stormwater facilities in accordance with the maintenance plan provided and shall grant easement for access to the governing body to inspect the stormwater facilities. The agreement also makes provisions for the governing body to make repairs, after due notice is given to the owners, if repairs are necessary to ensure proper performance of the stormwater system and if the owners fail to make the necessary repairs. The cost of said repairs shall be borne by the property owners, their heirs, successors and assigns.

Proposed utilities for the project are shown on the site plan and have been designed to accommodate the drainage design.

## Section 8 – Agreements and Guarantees

The property owner is required to enter into a Stormwater Maintenance Agreement to maintain stormwater facilities and implement a Pollution Source Control Plan. A copy of the maintenance agreement is included in the Maintenance and Source Control Manual.

The owner is required to provide a Performance Guarantee to the City of Lacey in the amount of 150% of the estimated cost of onsite drainage systems and public utilities (sidewalk, planter strip, sewer, and watermain) construction. A Stormwater Maintenance Guarantee in the amount of 20% of the estimated cost of stormwater improvements for two years is required for maintenance and repair of drainage facilities.

## Section 9 – Other Permits or Conditions Place on the Project

This section should provide the title of any other necessary permits, the agencies requiring the other permits, and identify the permit requirements that affect the project. Additional agencies that may require permits for projects include but are not limited to:

## APPENDIX 1 Site Development Drawings

# GATEWAY MULTIFAMILY

7235 32ND NE, LACEY, WA 98516



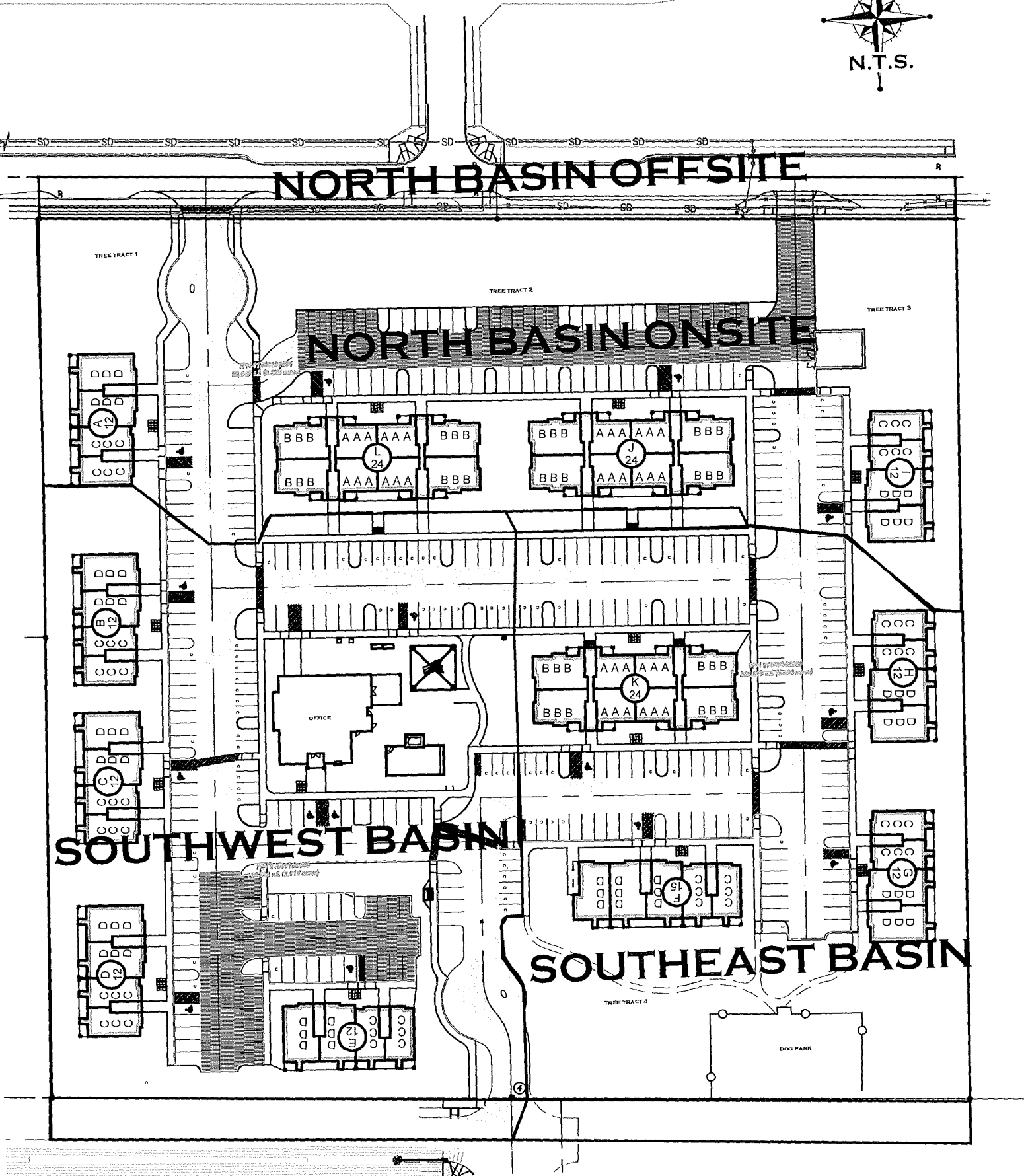
**NORTH BASIN OFFSITE**

**NORTH BASIN ONSITE**

**SOUTHWEST BASIN**

**SOUTHEAST BASIN**

**BASIN MAP**



# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

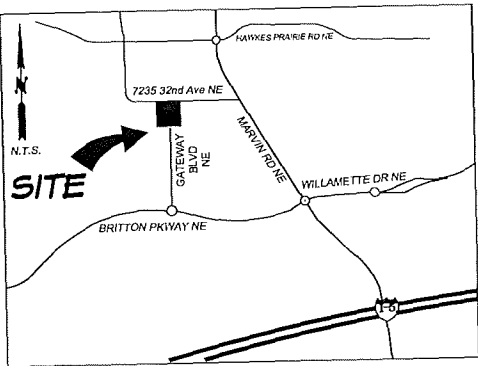
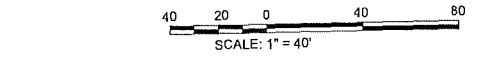
PROJECT PROPONENT  
FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.



VICINITY MAP  
SITE DEVELOPMENT

SITE ADDRESS: 7235 32ND AVE NE, LACEY, WA 98516

PARCEL NO: 11803140300, 11803130400, 1180310401  
S/T/R: SEC. 03, T. 18N., RGE. 1W.,  
JURISDICTION: THURSTON

SITE AREA: 9.54 AC  
ZONING: LD - LIGHT DENSITY  
SETBACKS:  
FRONT: 20'  
SIDE: 20'  
REAR: 20'  
WATER: CITY OF LACEY  
SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY

PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 183 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32

MAXIMUM BLDG COVERAGE: 50%  
(8) C, C, D, D = 2,8227.2  
(3) B, A, B = 20,013.39  
(1) C, C, D, D = 4,556  
OFFICE = 3,944.75

TOTAL: 56,741.34 / 415,562 SQ FT (9.54 ACRES)  
TOTAL COVERAGE: 13.6%

OPEN AREA:  
30% OPEN SPACE REQ:  
2.87 OPEN SPACE / 9.54 AC  
TOTAL OPEN SPACE: 30%

TREE RETAIN OR TRACTS TO EQUAL 5% OF GROSS SITE.

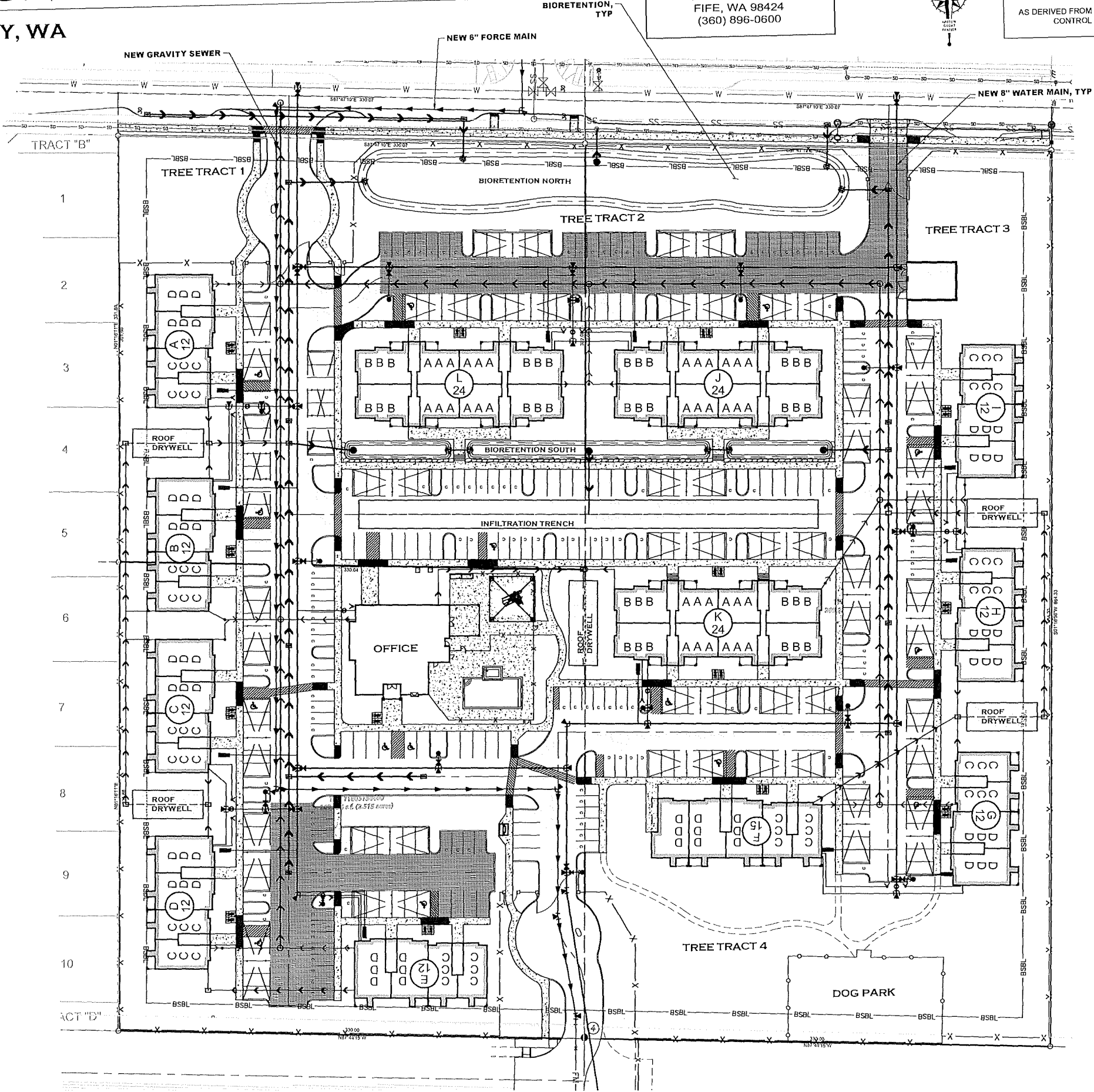
PRESERVED TREES ON SITE: 39%  
TREE RETAIN AREAS: 1.57 / 9.54  
TOTAL RETENTION: 15.3%

SHEET INDEX

|    |                                         |
|----|-----------------------------------------|
| 1  | PRELIMINARY SITE PLAN                   |
| 2  | PRELIMINARY HORIZONTAL CONTROL PLAN     |
| 3  | PRELIMINARY DEMO & EROSION CONTROL PLAN |
| 4  | PRELIMINARY SOIL PROFILES - 'A' PROFILE |
| 5  | PRELIMINARY SOIL PROFILES - 'B' PROFILE |
| 6  | PRELIMINARY SOIL PROFILES - 'C' PROFILE |
| 7  | PRELIMINARY SOIL PROFILES - 'D' PROFILE |
| 8  | PRELIMINARY SOIL PROFILES - 'E' PROFILE |
| 9  | PRELIMINARY SOIL PROFILES - 'F' PROFILE |
| 10 | PRELIMINARY GRADING & DRAINAGE PLAN     |
| 11 | PRELIMINARY DRAINAGE DETAILS            |
| 12 | PRELIMINARY WATER PLAN                  |
| 13 | PRELIMINARY ONSITE SEWER PLAN           |
| 14 | PRELIMINARY OFFSITE SEWER PLAN          |

LEGEND

|   |                              |
|---|------------------------------|
| • | EX BLOW OFF                  |
| • | EX FIRE HYDRANT              |
| • | EX WATER METER               |
| • | EX WATER VALVE               |
| • | EX SANITARY SEWER CLEAN OUT  |
| • | EX SANITARY SEWER MANHOLE    |
| • | EX CB TYPE 2 w/ SOLID LID    |
| • | EX CB TYPE 2                 |
| • | EX CATCH BASIN TYPE 1        |
| • | EX POWER POLE                |
| • | EX TELEPHONE MANHOLE         |
| • | EX POWER TRANSFORMER         |
| • | EX JUNCTION BOX              |
| • | EX LUMINAIRE                 |
| • | EX SIGN                      |
| • | EX STRIPING                  |
| • | EX OVERHEAD UTILITIES        |
| • | EX OVERHEAD POWER            |
| • | EX FIBER OPTIC               |
| • | EX FORCEMAIN                 |
| • | EX SANITARY SEWER            |
| • | EX DRAINAGE LINE             |
| • | EX WATER LINE                |
| • | EX EDGE OF PAVEMENT          |
| • | EX MAJOR CONTOUR             |
| • | EX MINOR CONTOUR             |
| • | FINISH MAJOR CONTOUR         |
| • | FINISH MINOR CONTOUR         |
| • | NEW FENCE                    |
| • | NEW WATER LINE               |
| • | NEW STORM LINE               |
| • | NEW ROOF DRAIN LINE          |
| • | NEW SEWER LINE               |
| • | NEW FIRE HYDRANT             |
| • | NEW WATER METER              |
| • | NEW RPBA                     |
| • | NEW FDC                      |
| • | NEW PIV                      |
| • | NEW GATE VALVE               |
| • | NEW 2" BLOW OFF ASSEMBLY     |
| • | NEW SEWER CLEAN OUT          |
| • | NEW SEWER MANHOLE            |
| • | NEW CATCH BASIN              |
| • | NEW CATCH BASIN w/ SOLID LID |
| • | NEW DOWN SPOUT               |
| • | NEW CLEAN OUT                |
| • | NEW OBSERVATION PORT         |
| • | WETLAND AREA                 |
| • | NEW INFILTRATION TRENCH      |
| • | NEW ASPHALT                  |
| • | NEW CONCRETE                 |
| • | NEW POROUS PAVEMENT          |



DESIGNED BY: HGL/DT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

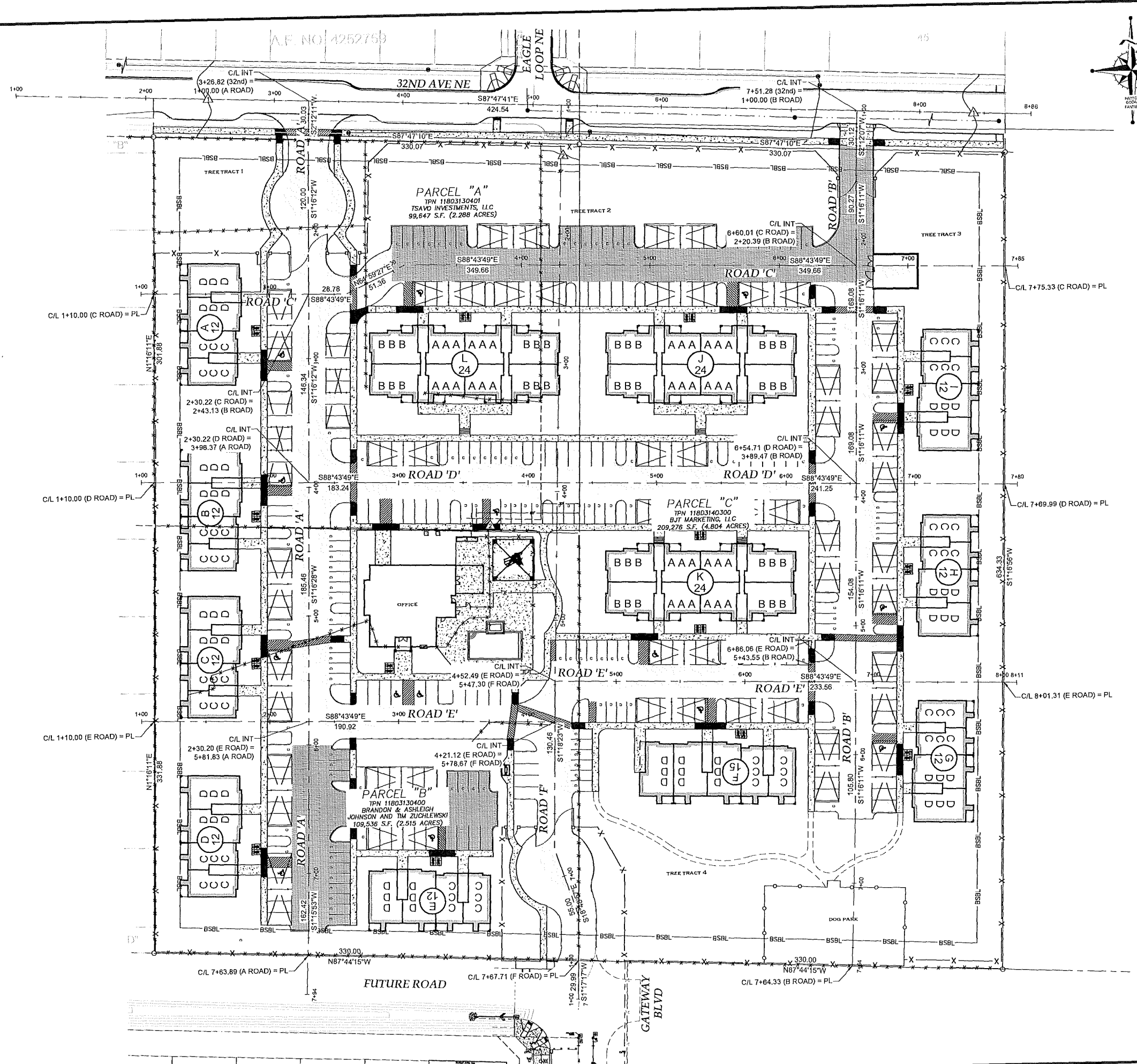
STEVEN D. HATTON  
REGISTERED PROFESSIONAL ENGINEER  
NO. 24193  
STATE OF WASHINGTON

HATTON GODAT PANTIER  
AND  
ENGINEERS SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

TPH 11803140300, 11803130400, 1180310401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND AVE NE LACEY, WA 98516

PRELIMINARY SITE PLAN

AGENCY NO.  
SHEET: 1 OF 14  
INDEX: 19-085 PRELIMINARY  
JOB: 19-085



**CITY OF LACEY**

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105

SCALE: 1" = 40'

**DESCRIPTIONS**

**PARCEL "A":**  
THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON, EXCEPTING THEREFROM THE NORTH 30 FEET FOR EXISTING ROADWAY.

**PARCEL "B":**  
THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON.

**PARCEL "C":**  
THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON, EXCEPTING THAT PORTION CONVEYED TO THURSTON COUNTY BY DEED RECORDED SEPTEMBER 2, 1978 UNDER RECORDING NO. 975922.

**LEGEND**

- 60' RIGHT OF WAY DESCRIBED IN DEED TO THURSTON COUNTY RECORDED UNDER AUDITOR'S FILE NO. 975992
- EASEMENT GRANTED TO PUSSET SOUND POWER & LIGHT COMPANY RECORDED UNDER AUDITOR'S FILE NO. 883219\*
- \* EASEMENT TO BE ABANDONED

**NOTES**

THIS DRAWING IS BASED ON BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BUTLER SURVEYING. HATTON GODAT PANTIER HAS NOT PERFORMED AN INDEPENDENT SURVEY OF THE SITE. THE FOLLOWING ITEMS WERE ADDED TO THE BUTLER SURVEY BY HGP:

- ADJACENT PLATS
- EASEMENT AF#083219
- RIGHT OF WAY REFERENCE AF#975992
- UTILITY INFORMATION IN PLAT OF GATEWAY DIVISION 2B

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: HGLD  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpan.com

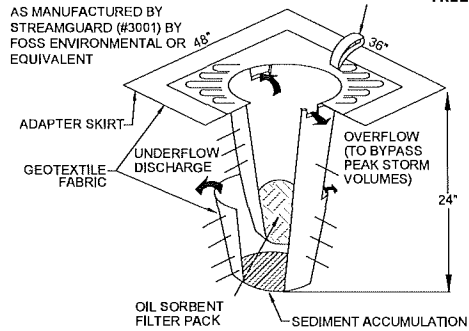
REVISIONS: DATE: \_\_\_\_\_

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY HORIZONTAL CONTROL PLAN**

AGENCY NO. \_\_\_\_\_  
SHEET: 2 OF 14  
INDEX: 19-085 pre-hcp.dwg  
JOB: 19-085





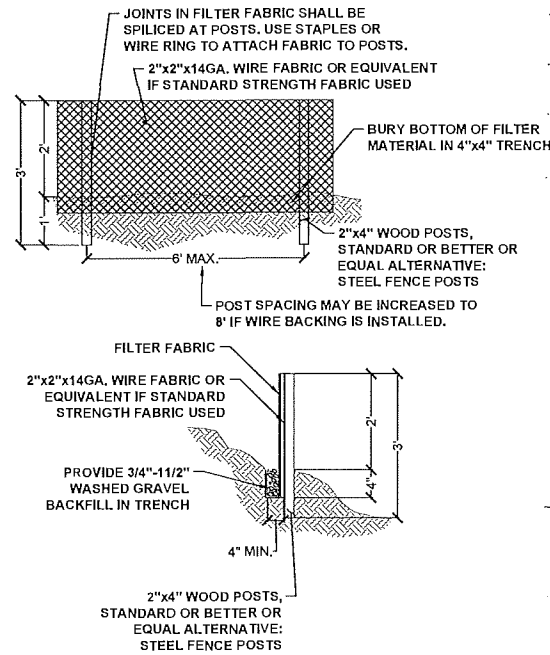
### INLET SEDIMENT PROTECTION

N.T.S.

- INLET SEDIMENT PROTECTION NOTES:**
1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
  2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

### FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 4 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

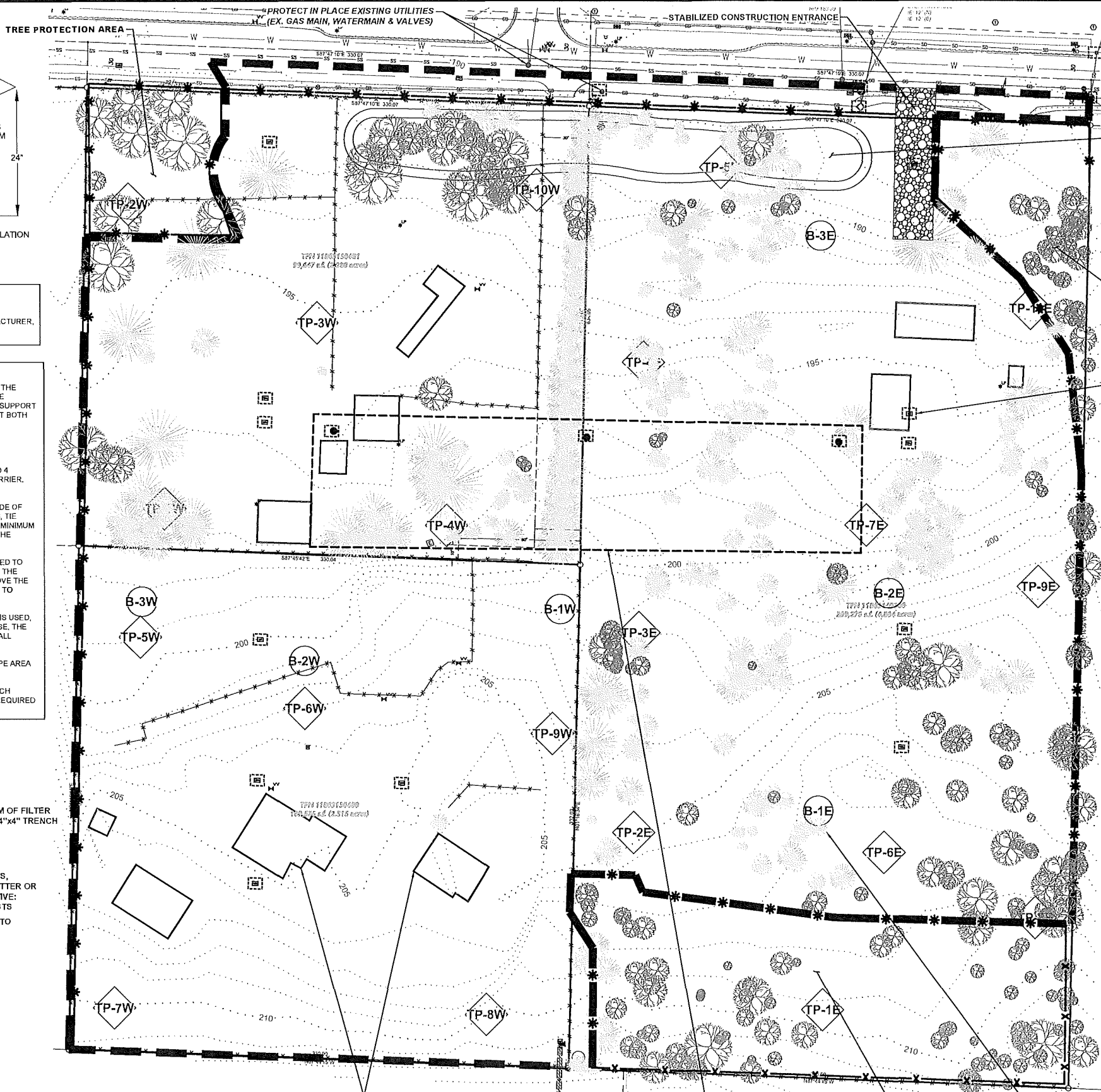


### FILTER FABRIC FENCE DETAIL

N.T.S.

**TOPOGRAPHIC NOTE:**  
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

**NOTE:** THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

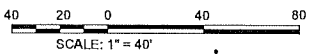


**CITY OF LACEY**

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIE TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.



**PROPOSED BIORETENTION SWALE TO SERVE AS A TEMPORARY SEDIMENT POND, EXCAVATE TO 2' ABOVE THE FINAL GRADE MEASURED TO THE BOTTOM OF THE GRAVEL TRENCH. REMOVE ALL CONSTRUCTION SEDIMENT PRIOR TO EXCAVATION TO FINAL DEPTH.**

**TREE PROTECTION AREA**

**INSTALL INLET SEDIMENT PROTECTION, ALL INLETS WITHIN 500' OF THE PROJECT AREA, TYP.**

**LEGEND**

- CLEARING LIMITS
- \* FILTER FABRIC FENCING/TREE PROTECTION
- INLET SEDIMENT PROTECTION
- E-B-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- ◇ TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- W-B-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- ◇ W-TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.

- GENERAL EROSION CONTROL NOTES:**
1. A CERTIFIED EROSION AND SEDIMENT CONTROL PLAN (CESCP) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS: TBD AND THEIR OFFICE TELEPHONE NUMBER IS: TBD
  2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
  3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
  4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
  5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LOADED WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER, OR DISCHARGE STANDARDS.
  6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LOADED WATER DO NOT LEAVE THE SITE.
  7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
  8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR RAINFALL EVENT, BY THE APPLICANT/CONTRACTOR AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
  9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LOADED WATER OFF-SITE WITHOUT TREATMENT.
  10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
  11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
  12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHETHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION/RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
  13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
  14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
  15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
  16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
  17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

**PROPOSED INFILTRATION FACILITIES IN THIS REGION. AVOID EXCESSIVE CONSTRUCTION ACTIVITIES THAT WOULD RESULT IN HEAVY COMPACTION**

**TREES NOT MARKED BY TREE PROTECTION FENCING WILL BE REMOVED**

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2022  
SCALE: 1" = 40'

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpan.com

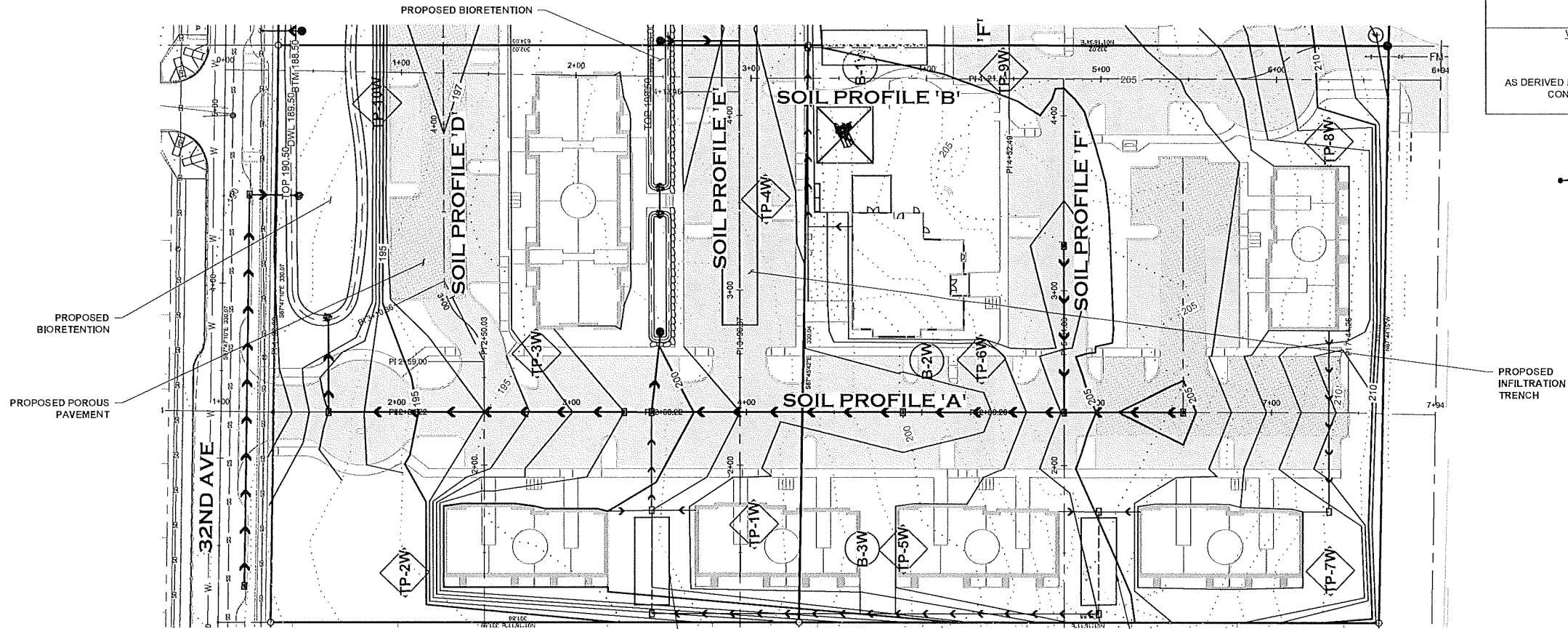
TP# 11803140300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NELACEY, WA 98516

**PRELIMINARY DEMO & EROSION CONTROL PLAN**

AGENCY NO.:  
SHEET: 3 OF 14  
INDEX: 19-085 pre-ec.dwg  
JOB: 19-085

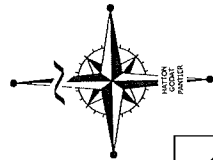
SECTION 03. TOWNSHIP 18 NORTH, RANGE 7 WEST



CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

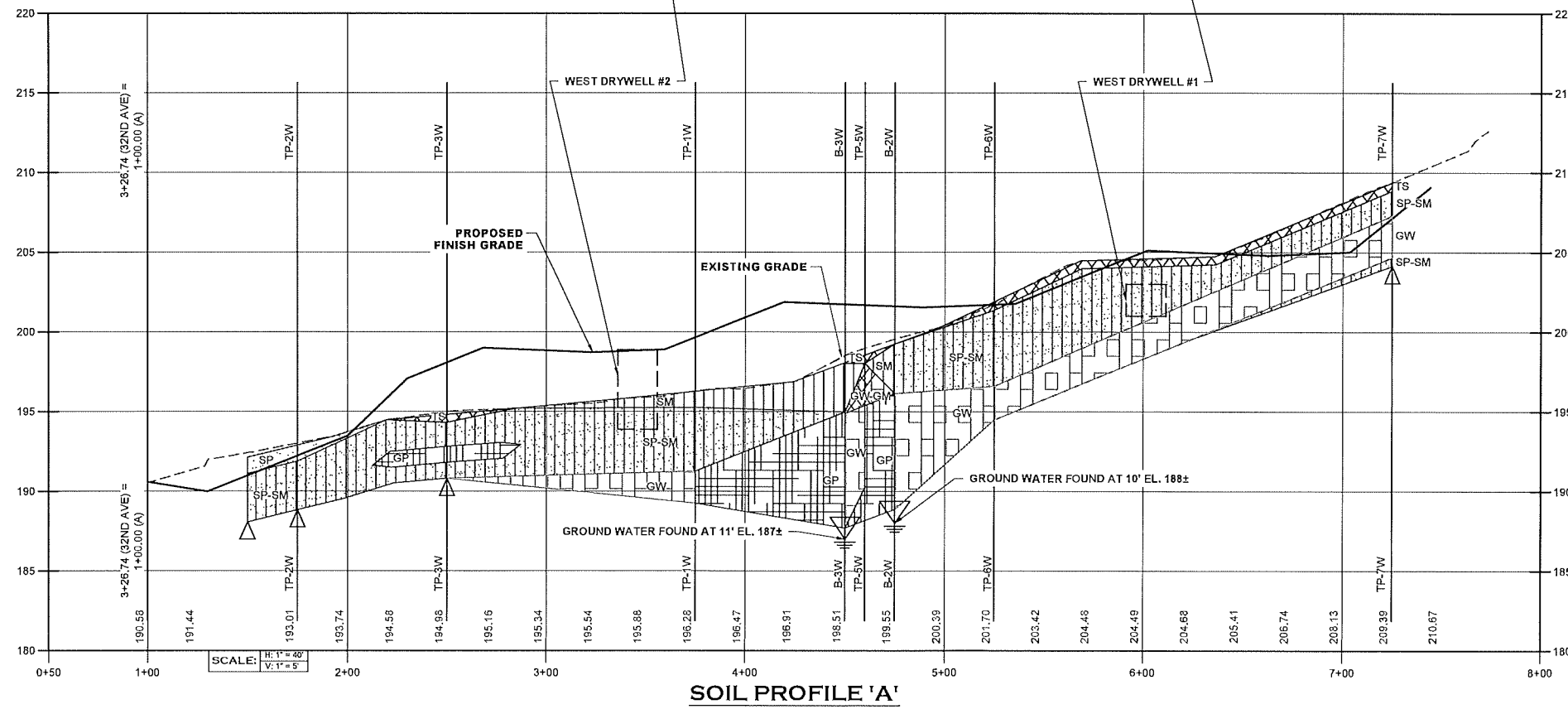
MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.



40 20 0 40 80  
SCALE: 1" = 40'

LEGEND

- B-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- TP-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- B-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- TP-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

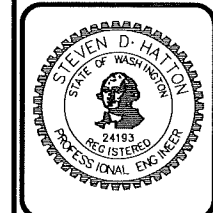


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NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



HATTON GODAT PANTIER  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

| REVISIONS: | DATE: |
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TP# 11803140300, 11803130400, 11803130401

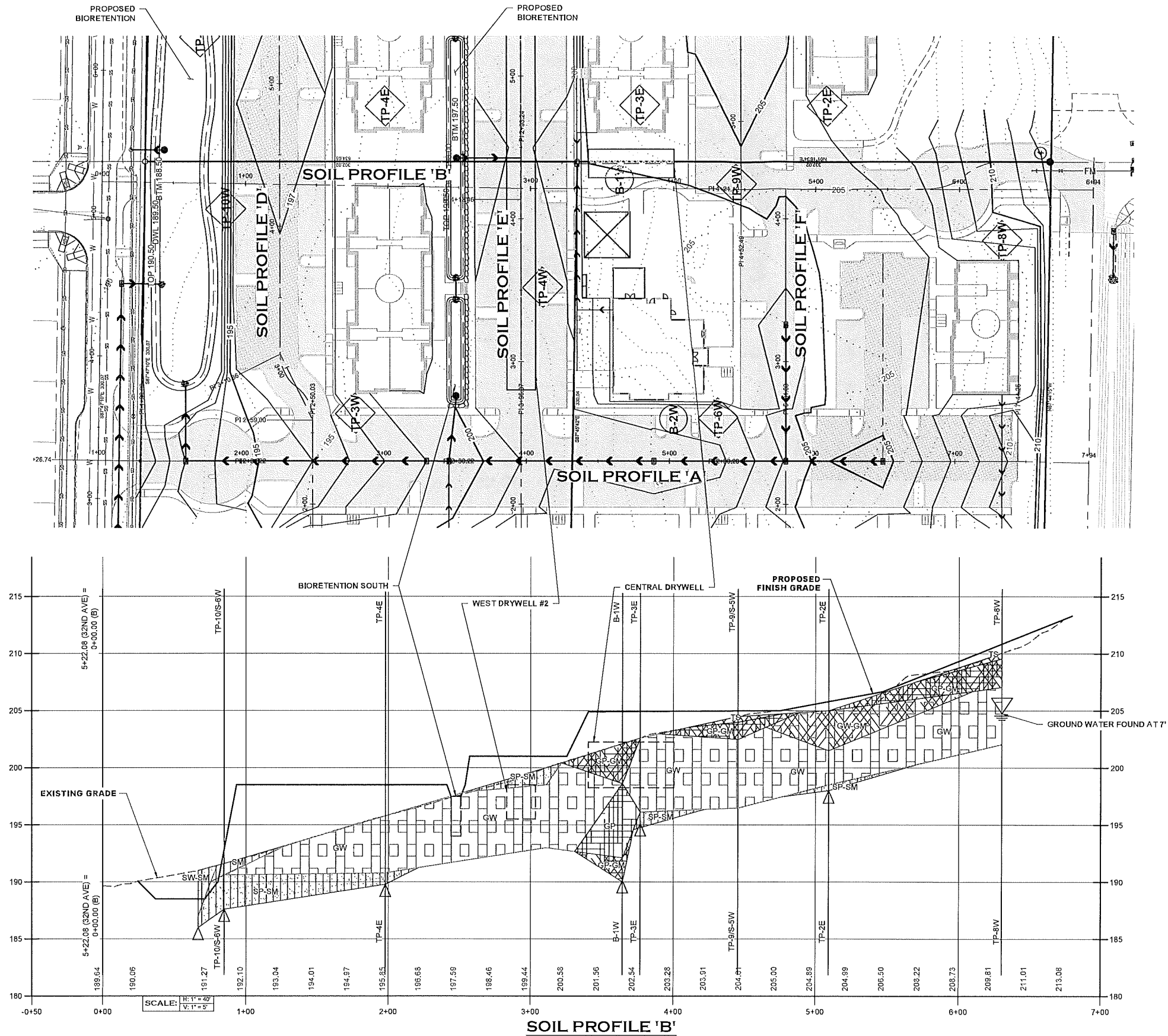
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516

PRELIMINARY SOIL  
PROFILES - 'A' PROFILE

SECTION 02, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO. \_\_\_\_\_  
SHEET: 4 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085



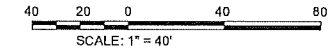
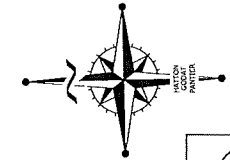


**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.



**LEGEND**

|  |                                                                                         |
|--|-----------------------------------------------------------------------------------------|
|  | APPROXIMATE LOCATION BORINGS /<br>TEST PITS PER JULY 7, 2016 INSIGHT<br>GEOLOGIC, INC.  |
|  | APPROXIMATE LOCATION BORINGS /<br>TEST PITS PER JULY 25, 2016 INSIGHT<br>GEOLOGIC, INC. |
|  | APPROXIMATE LOCATION BORINGS /<br>TEST PITS PER JULY 25, 2016 INSIGHT<br>GEOLOGIC, INC. |
|  | GM - SILTY GRAVEL                                                                       |
|  | GP - POORLY GRADED GRAVEL                                                               |
|  | GW - WELL-GRADED GRAVEL<br>FINE TO COARSE GRAVEL                                        |
|  | SM - SILTY SAND                                                                         |
|  | SP - POORLY GRADED SAND                                                                 |
|  | SW - WELL-GRADED SAND<br>FINE TO COARSE SAND                                            |
|  | TS - TOPSOIL / SOD / DUFF                                                               |
|  | GROUND WATER LOCATION                                                                   |
|  | SIGNIFIES THAT THE PIT<br>ENDED IN A TILL LAYER                                         |

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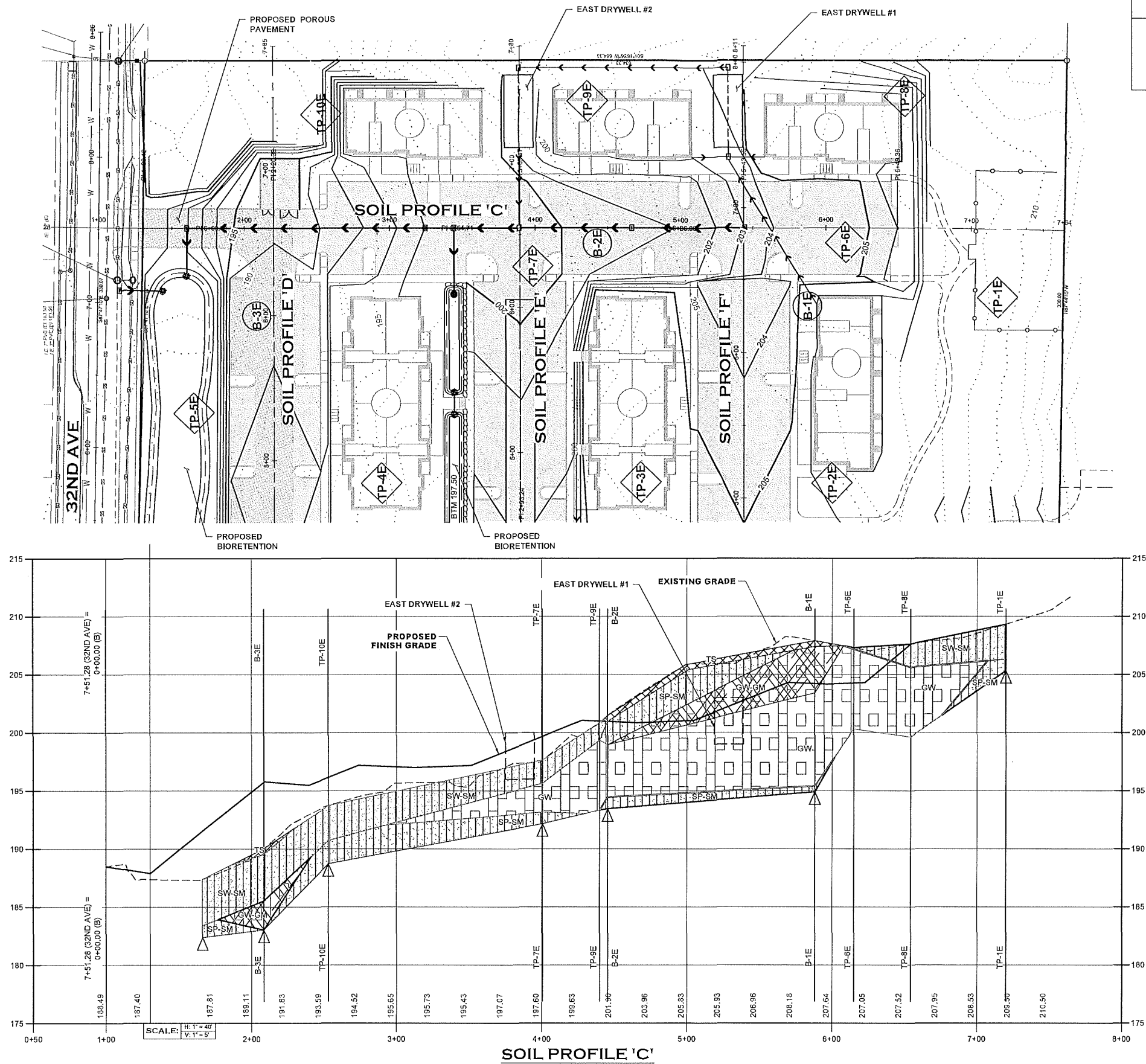
DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: \_\_\_\_\_ DATE: \_\_\_\_\_

TP# 11803130400, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES - 'B' PROFILE**

AGENCY NO. \_\_\_\_\_  
SHEET: 5 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085



CITY OF LACEY

VERTICAL DATUM

NGVD 29

CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY

CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM

CITY OF LACEY COORDINATE SYSTEM DERIVED

FROM TIES TO CITY OF LACEY CONTROL

MONUMENT TC 105 FOR BASIS OF

COORDINATES USED HEREON AND CITY OF

LACEY CONTROL MONUMENT 149 FOR

ROTATION OF BEARINGS.

40

20

0

40

80

SCALE: 1" = 40'

40

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0

40

80

SCALE: 1" = 40'

LEGEND

B-#E

APPROXIMATE LOCATION BORINGS /

TEST PITS PER JULY 7, 2016 INSIGHT

GEOLOGIC, INC.

TP-#E

APPROXIMATE LOCATION BORINGS /

TEST PITS PER JULY 7, 2016 INSIGHT

GEOLOGIC, INC.

B-#W

APPROXIMATE LOCATION BORINGS /

TEST PITS PER JULY 25, 2016 INSIGHT

GEOLOGIC, INC.

TP-#W

APPROXIMATE LOCATION BORINGS /

TEST PITS PER JULY 25, 2016 INSIGHT

GEOLOGIC, INC.

GM - SILTY GRAVEL

GP - POORLY GRADED GRAVEL

GW - WELL-GRADED GRAVEL

FINE TO COARSE GRAVEL

SM - SILTY SAND

SP - POORLY GRADED SAND

SW - WELL-GRADED SAND

FINE TO COARSE SAND

TS - TOPSOIL / SOD / DUFF

GROUND WATER LOCATION

SIGNIFIES THAT THE PIT

ENDED IN A TILL LAYER

THIS DRAWING DOES NOT REPRESENT A RECORD

DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT

PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON

MUST BE REVIEWED AND APPROVED BY HATTON

GODAT PANTIER.

DESIGNED BY: HG/LDT

DRAWN BY: JCH

CHECKED BY: SDH

DATE: MAY 2020

SCALE: 1" = 40'

STEVEN D. HATTON

STATE OF WASHINGTON

24193

REGISTERED

PROFESSIONAL ENGINEER

HATTON GODAT PANTIER

AND SURVEYORS

ENGINEERS

3910 MARTIN WAY E, SUITE B

OLYMPIA, WA 98506

TEL: 360.943.1599 FAX: 360.357.6299

hattonpantier.com

REVISIONS:

DATE:

TP# 11803140300\_11803130400\_11803130401

GATEWAY MULTI-FAMILY COMPLEX

7235 32ND N LACEY, WA 98516

PRELIMINARY SOIL

PROFILES - 'C' PROFILE

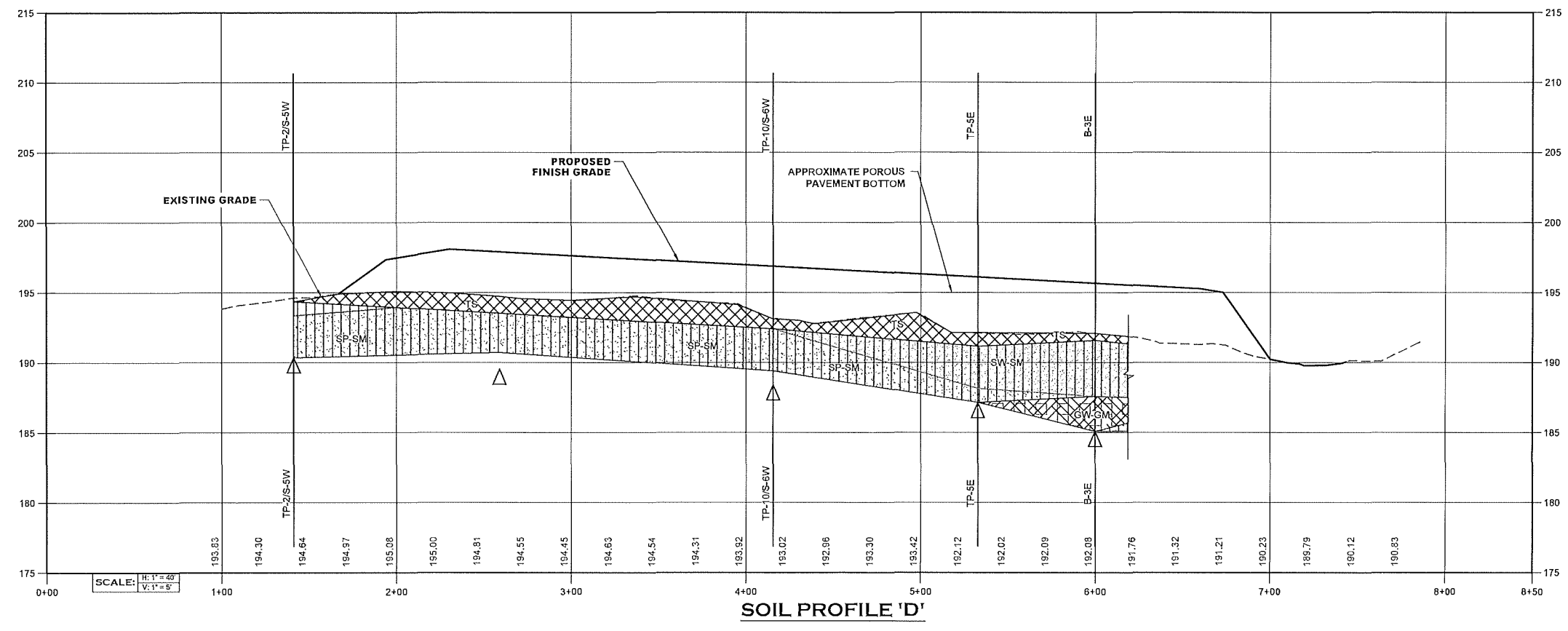
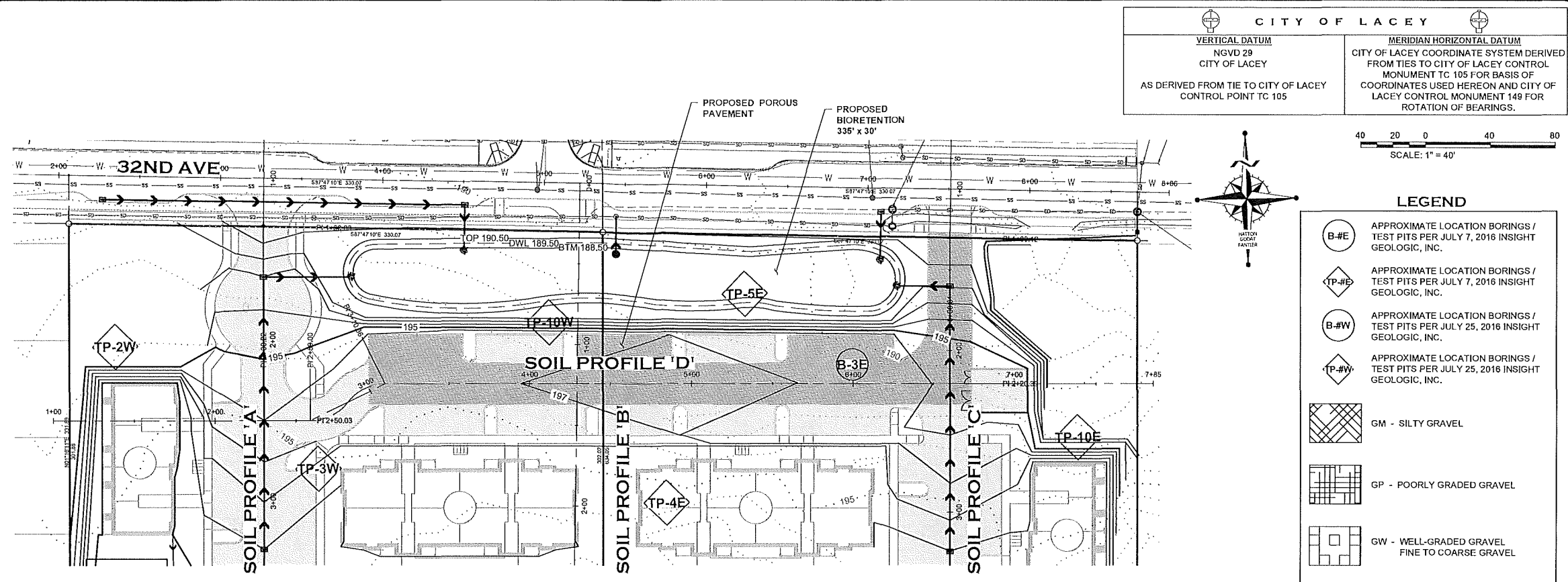
SECTION 03, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO.

SHEET: 6 OF 14

INDEX: 19-085 pre-soil profiles.dwg

JOB: 19-085



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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

HATTON GODAT PANTIER  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE:

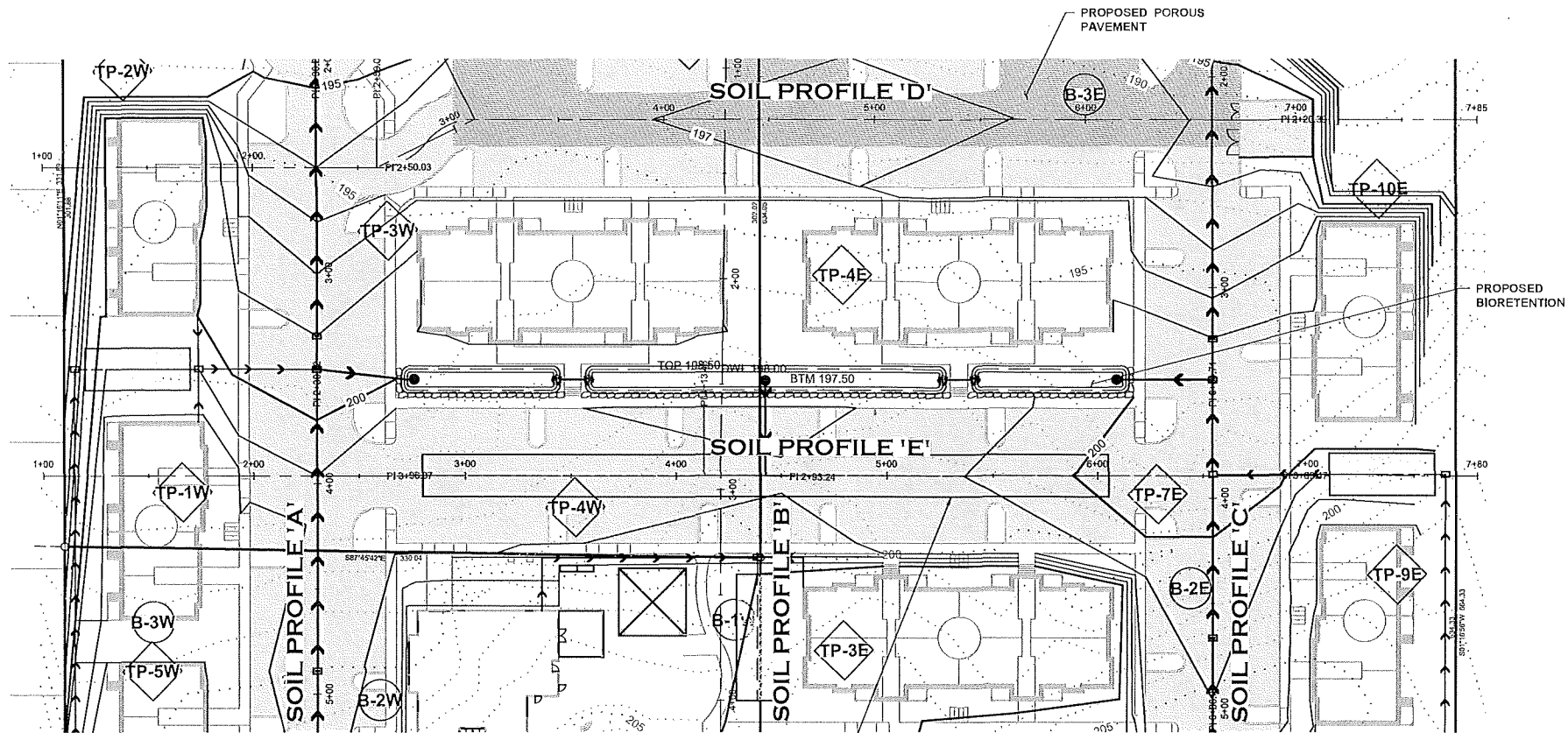
TP# 11803140300, 11803130400, 11803130401

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND N LACEY, WA 98516

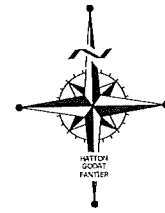
PRELIMINARY SOIL  
PROFILES - 'D' PROFILE

SECTION 02, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO.  
SHEET: 7 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085



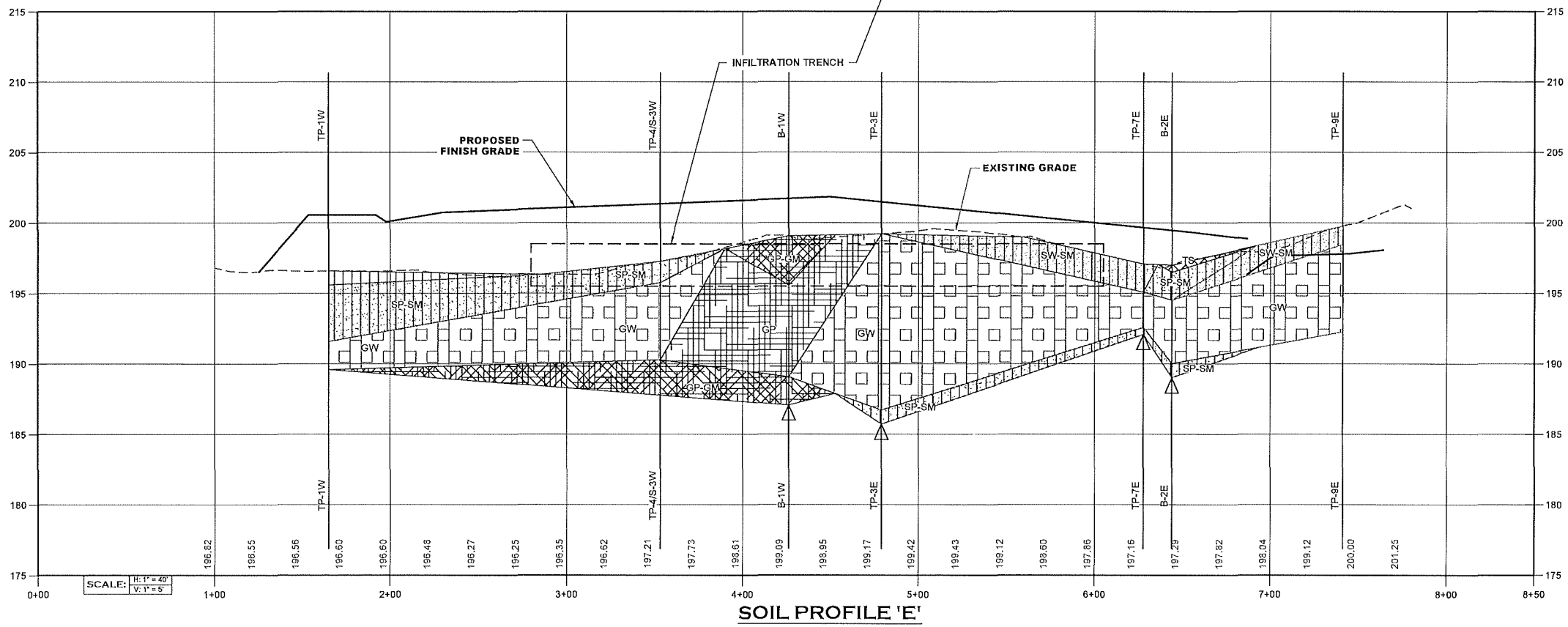
| CITY OF LACEY                                                                                              |                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TO 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 148 FOR<br>ROTATION OF BEARINGS. |



SCALE: 1" = 40'

#### LEGEND

- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

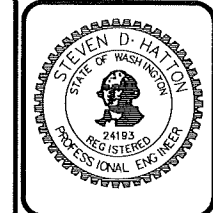


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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



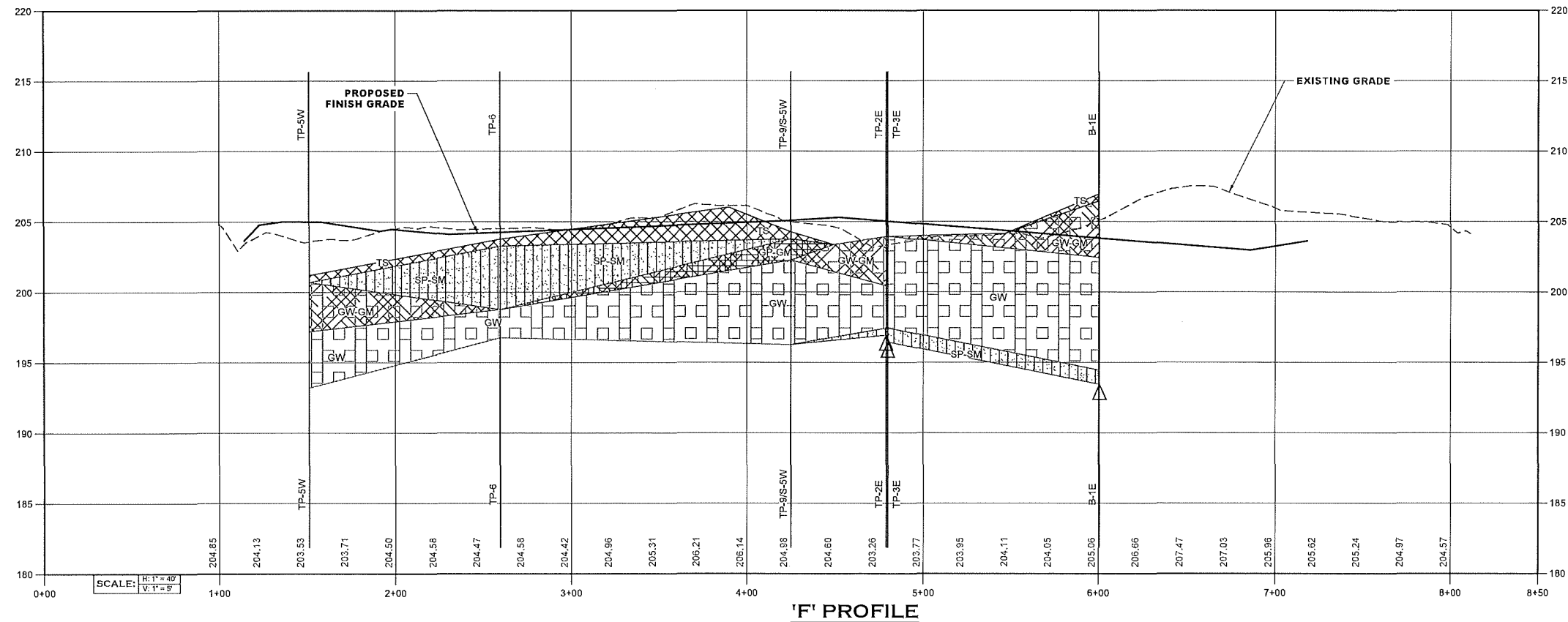
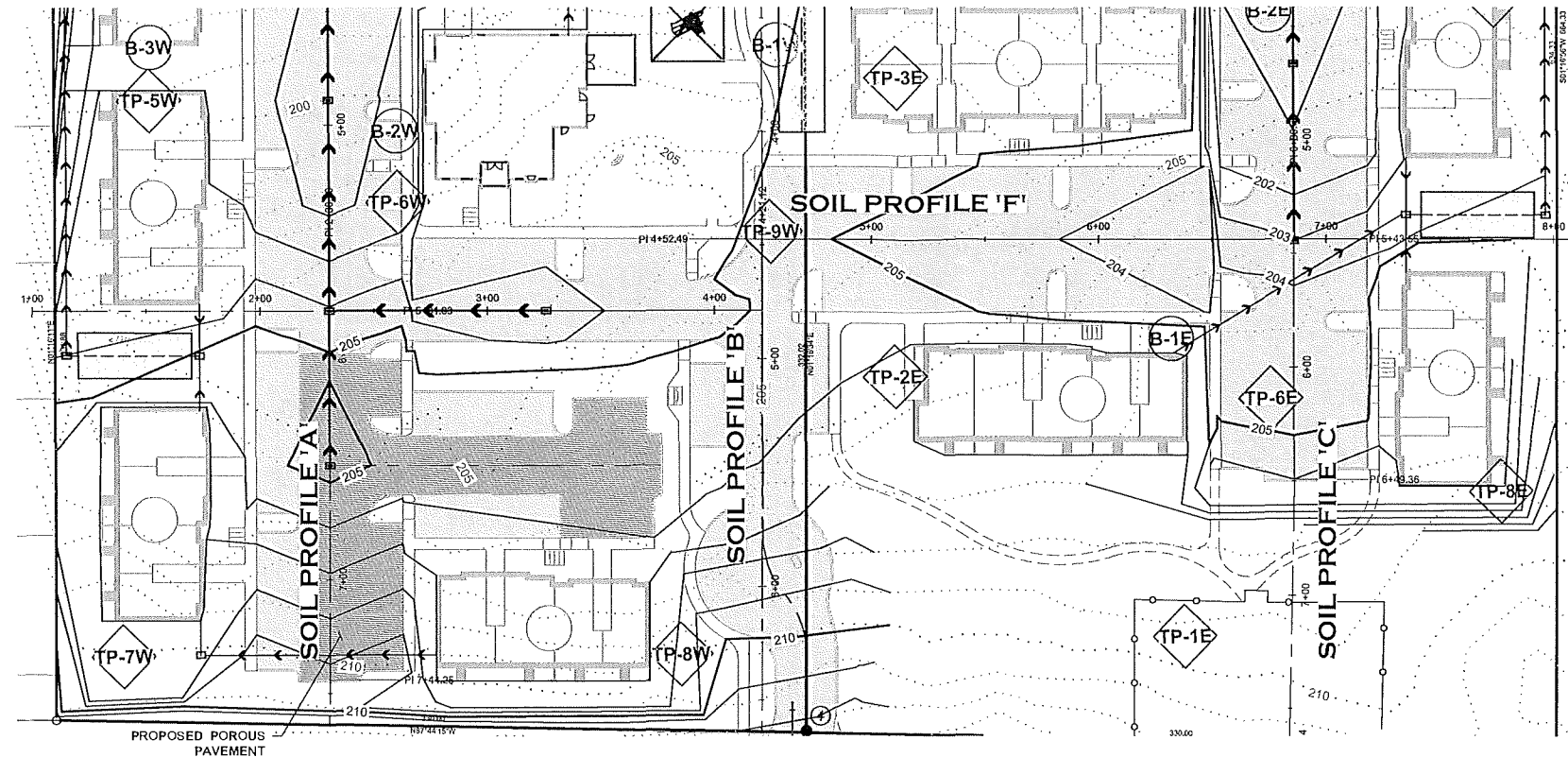
**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

| REVISIONS: | DATE: |
|------------|-------|
|            |       |
|            |       |
|            |       |
|            |       |

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES - 'E' PROFILE**

AGENCY NO. \_\_\_\_\_  
SHEET: 8 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085





| CITY OF LACEY                                             |                                                                                                                                                                                                                               |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY                | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS. |
| AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105 |                                                                                                                                                                                                                               |



40 20 0 40 80  
SCALE: 1" = 40'

#### LEGEND

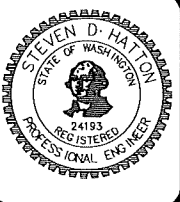
- B-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- TP-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- B-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- TP-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
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- GROUND WATER LOCATION
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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
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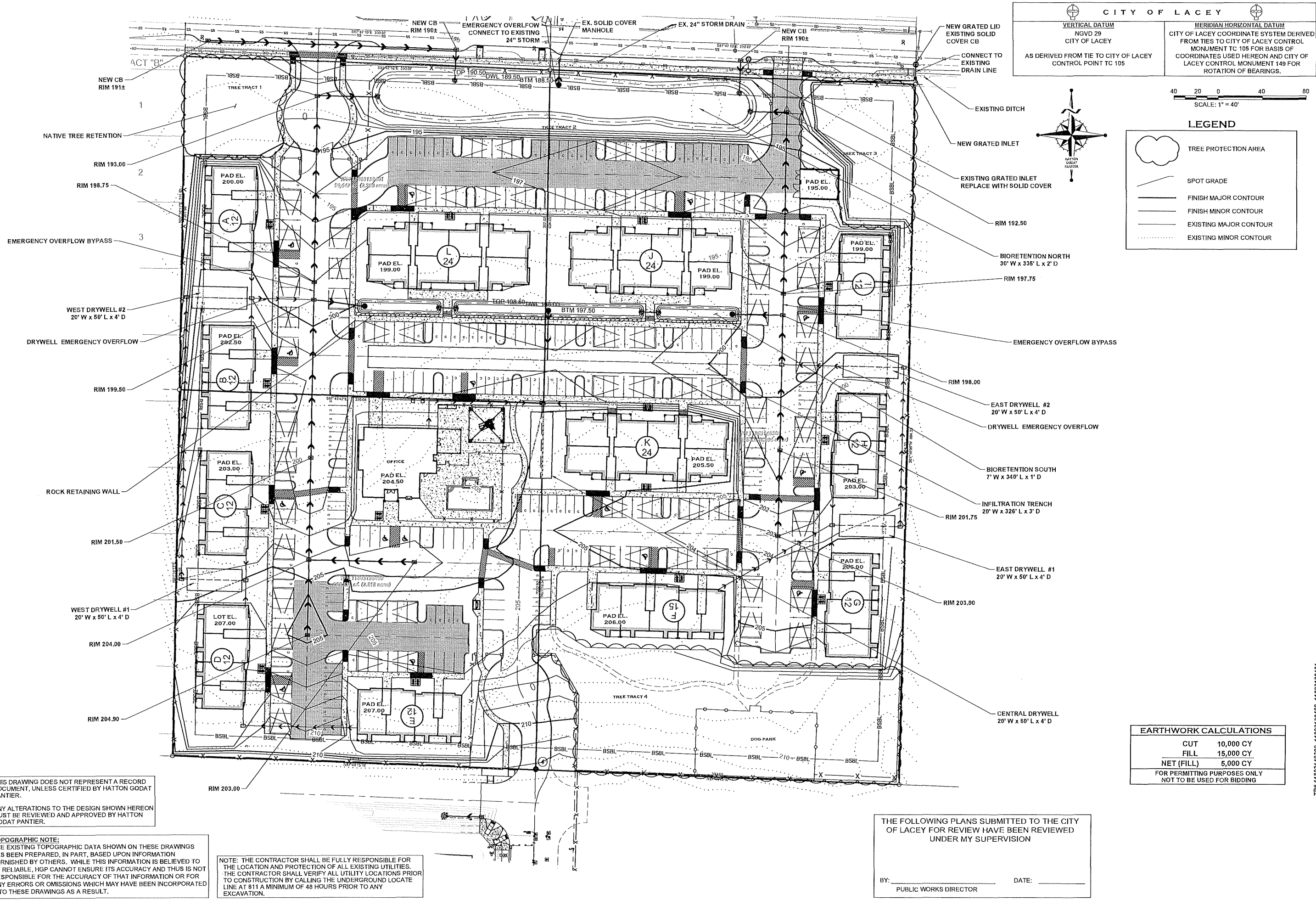


**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE:

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
723532ND N LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES**  
- 'F' PROFILE

AGENCY NO.:  
SHEET: 9 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085



CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

Y

LEGEND

TREE PROTECTION AREA

SPOT GRADE

FINISH MAJOR CONTOUR

FINISH MINOR CONTOUR

EXISTING MAJOR CONTOUR

EXISTING MINOR CONTOUR

| EARTHWORK CALCULATIONS                                     |           |
|------------------------------------------------------------|-----------|
| CUT                                                        | 10,000 CY |
| FILL                                                       | 15,000 CY |
| NET (FILL)                                                 | 5,000 CY  |
| FOR PERMITTING PURPOSES ONLY<br>NOT TO BE USED FOR BIDDING |           |

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THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
PUBLIC WORKS DIRECTOR

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

Y

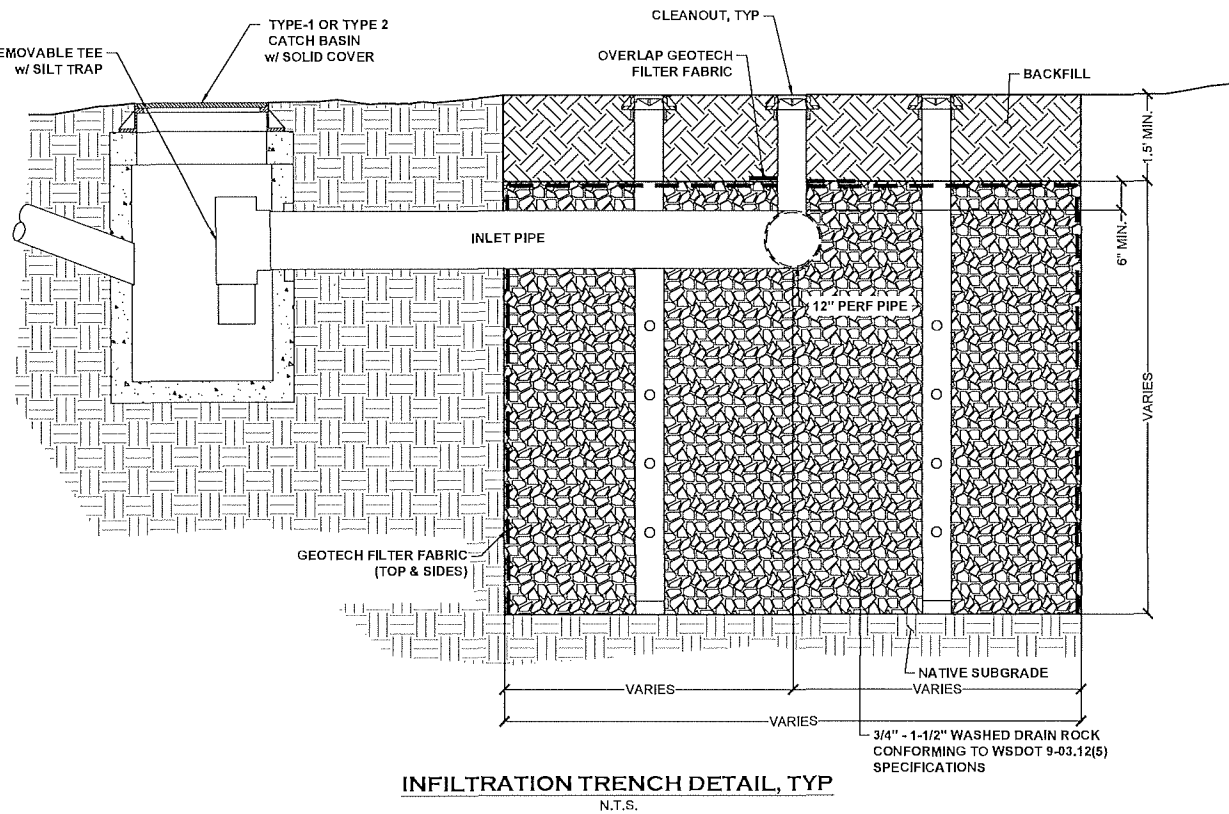
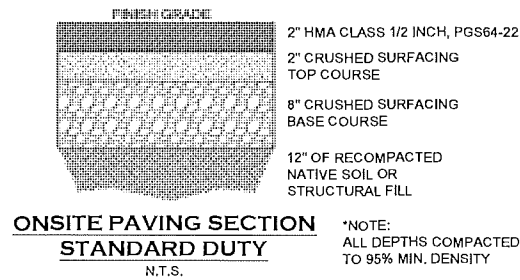
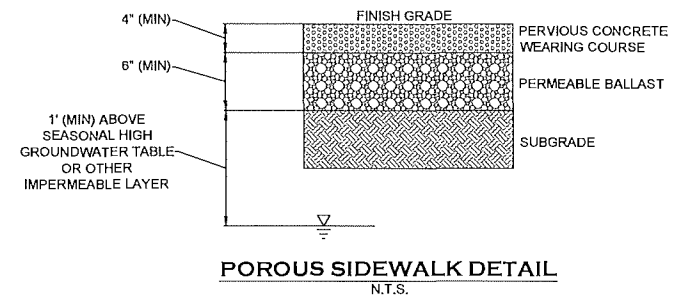
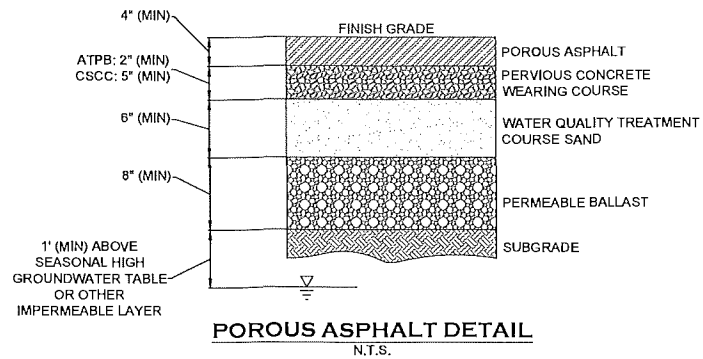
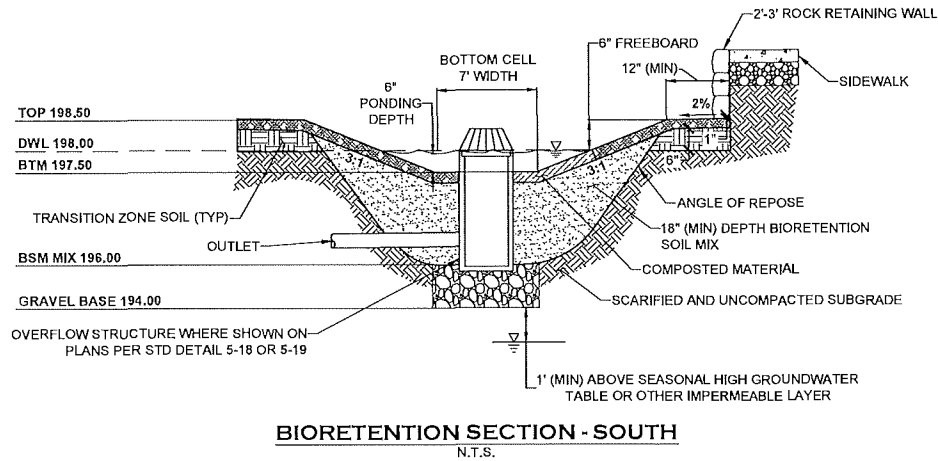
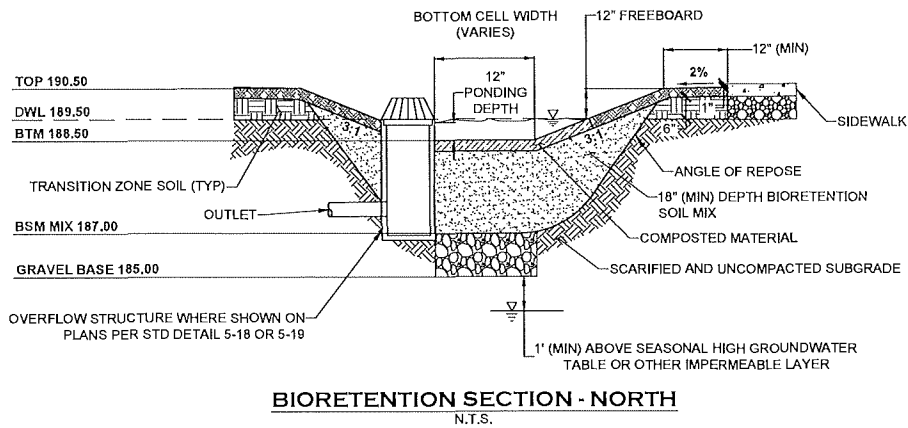
SEVEN D. HATTON  
STATE OF WASHINGTON  
24193  
REGISTERED  
PROFESSIONAL ENGINEER

HATTON GODAT PANTIER  
AND SURVEYORS  
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REVISIONS: \_\_\_\_\_  
DATE: \_\_\_\_\_

TP# 11803140300, 11803136400, 11803130401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY GRADING &  
DRAINAGE PLAN  
SECTION 12, TOWNSHIP 18 NORTH, RANGE 4 WEST

AGENCY NO. \_\_\_\_\_  
SHEET: 10 OF 14  
H:\dgn\19-000\19-085\PRELIMINARY  
INDEX: 19-085 pre-grd & drn.dwg  
JOB: 19-085



**STORMWATER FACILITY ELEVATIONS**

| FACILITY            | FG                | GRAVEL TOP | GRAVEL BASE | HARDPAN |
|---------------------|-------------------|------------|-------------|---------|
| WEST DRYWELL #1     | 205±              | 203±       | 201±        | 197±    |
| WEST DRYWELL #2     | 201±              | 199±       | 194±        | 189±    |
| CENTRAL DRYWELL     | 205±              | 203±       | 199±        | 192±    |
| EAST DRYWELL #1     | 204±              | 203±       | 199±        | 194±    |
| EAST DRYWELL #2     | 201±              | 200±       | 196±        | 191±    |
| INFILTRATION TRENCH | 201±              | 198.5±     | 195.5±      | 190±    |
| BIORETENTION SOUTH  | 198.5 (SWALE TOP) | 195±       | 194±        | 188±    |
| BIORETENTION NORTH  | 190.5 (SWALE TOP) | 187±       | 185±        | 180±    |

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: V



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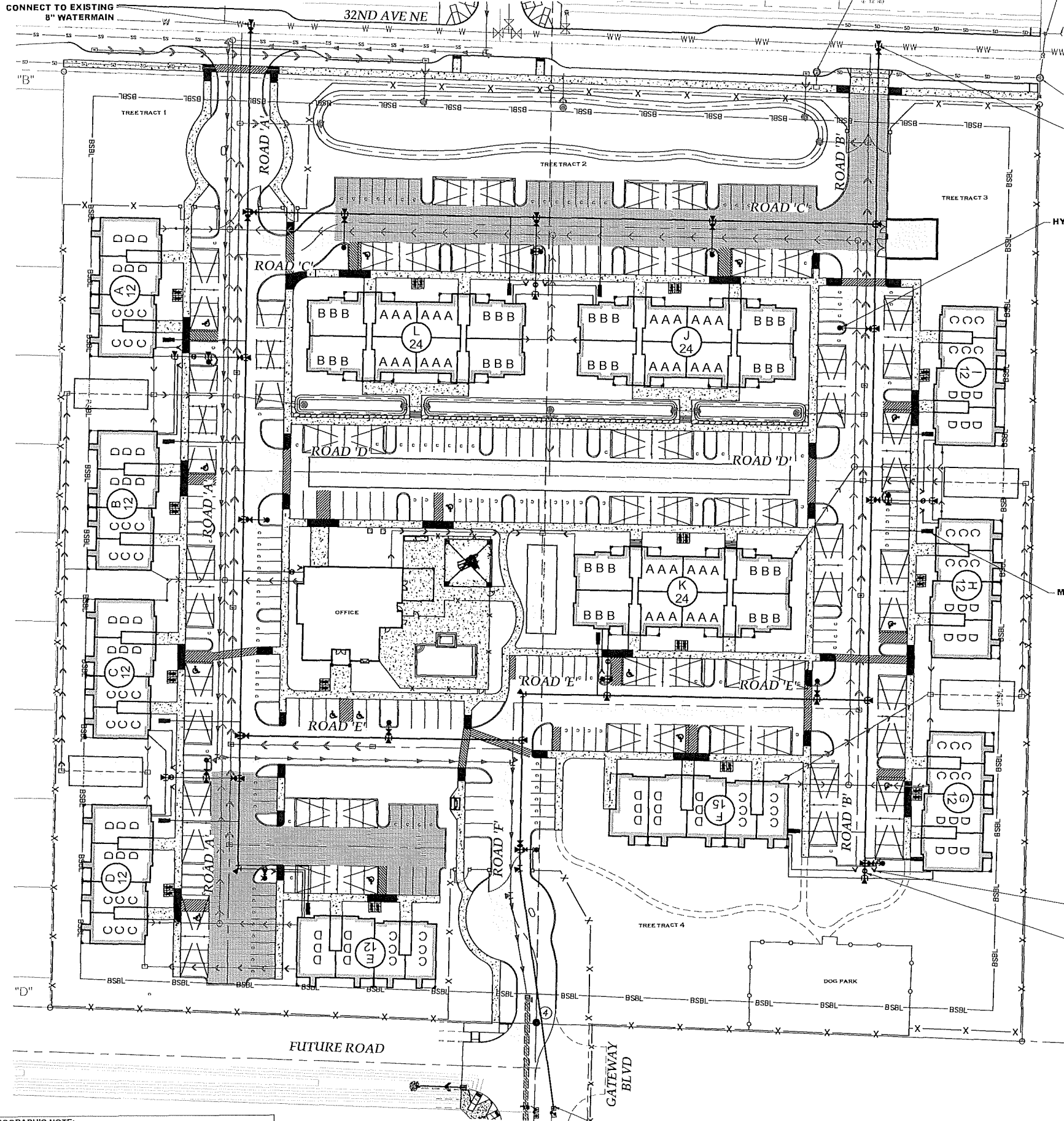
REVISIONS:  
DATE:

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NELACEY, WA 98516  
**PRELIMINARY GRADING & DRAINAGE DETAILS**

AGENCY NO.:  
SHEET: 11 OF 14  
INDEX: 19-085 pre-del.dwg  
JOB: 19-085

TP#: 11803140300, 11803130400, 11803130401

SECTION 02, TOWNSHIP 18 NORTH, RANGE 7 WEST



THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
PUBLIC WORKS DIRECTOR



CITY OF LACEY

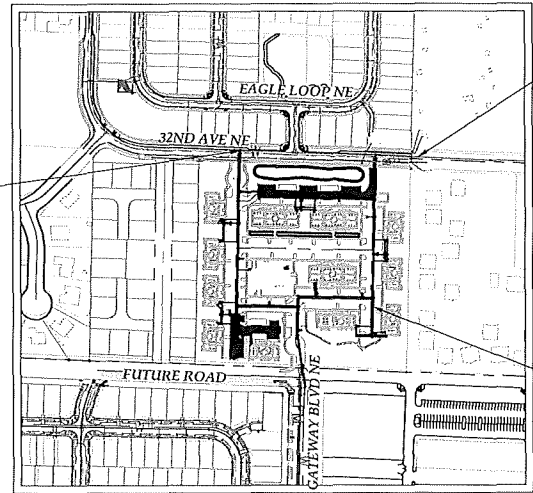
VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TC 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'



WATER SYSTEM MAP  
1" = 300'

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TP# 11803140300, 11803130400, 11803130401

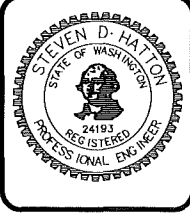
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516

PRELIMINARY WATER PLAN

AGENCY NO. \_\_\_\_\_  
SHEET: 12 OF 14  
INDEX: 19-085-pre-wtr.dwg  
JOB: 19-085

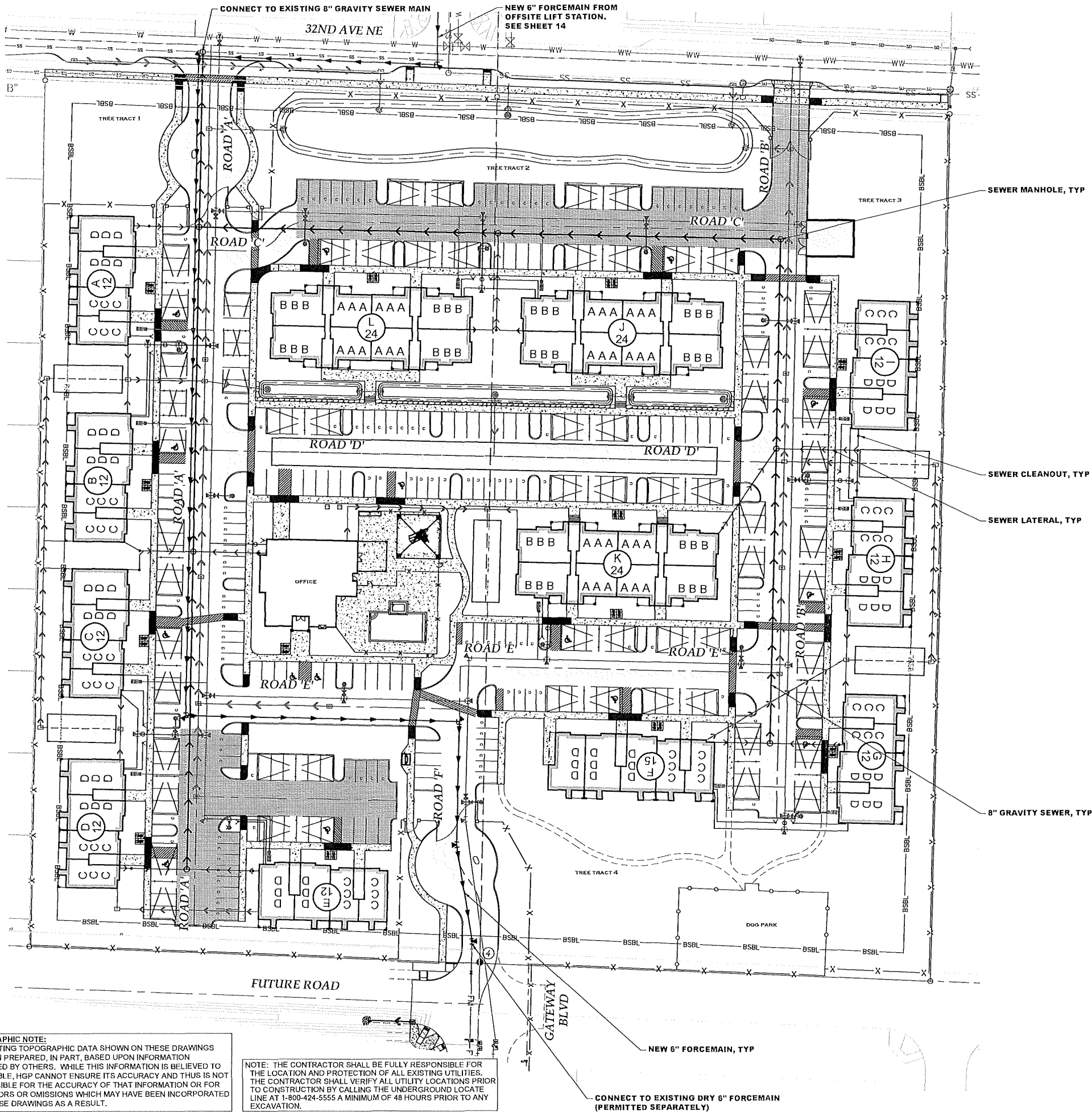
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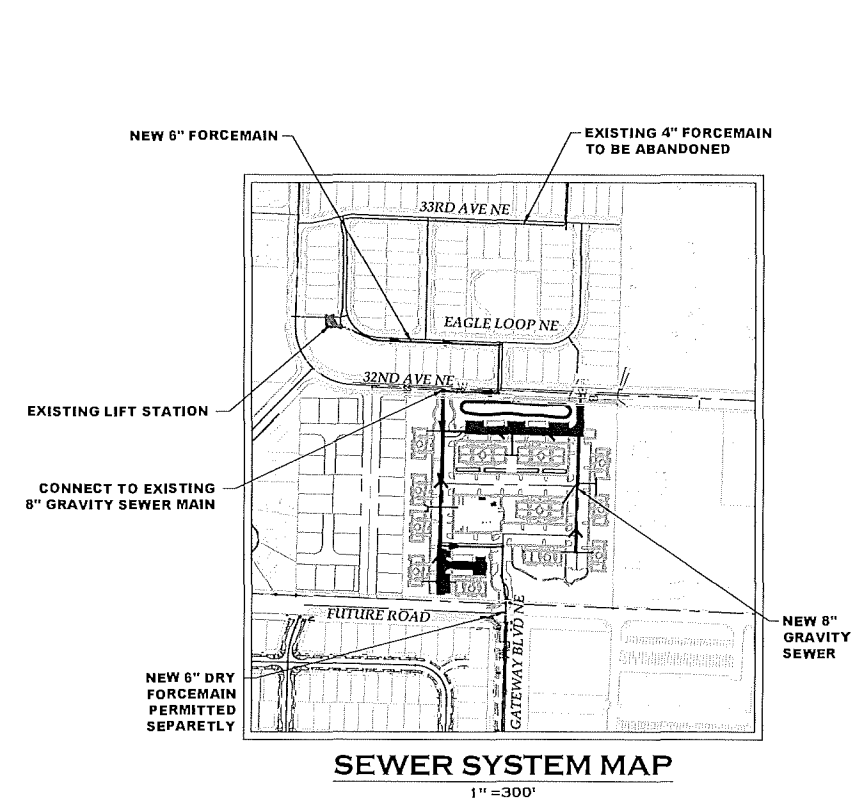
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DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'





| CITY OF LACEY                                                                                                     |                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VERTICAL DATUM</b><br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | <b>MERIDIAN HORIZONTAL DATUM</b><br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |

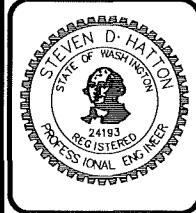
40 20 0 40 80  
SCALE: 1" = 40'



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| REVISIONS: | DATE: |
|------------|-------|
|            |       |
|            |       |
|            |       |
|            |       |

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
 7235 32ND NE LACEY, WA 98516  
**PRELIMINARY ONSITE SEWER PLAN**

AGENCY NO. \_\_\_\_\_  
 SHEET: 13 OF 14  
 H:\gdm\19-000\19-085\PRELIMINARY  
 INDEX: 19-085 pre-swr.dwg  
 JOB: 19-085

SECTION 02, TOWNSHIP 16 NORTH, RANGE 1 WEST

EXISTING FORCEMAIN TO BE ABANDONED IN PLACE

REMOVE EXISTING 4" FORCEMAIN & PIGG LAUNCH

32ND AVE NE

EAGLE LOOP NE

33RD AVE NE

HARRIER ST NE

EAGLE LOOP NE

EXISTING LIFT STATION IS AT CAPACITY. INSTALL NEW FORCEMAIN FROM LIFT STATION THROUGH PROPOSED PROJECT AREA TO CONNECT TO THE 6" FORCEMAIN ON GATEWAY BOULEVARD.

NEW 6" FORCEMAIN, TYP

INSTALL NEW PIGG LAUNCH

CONNECT TO EXISTING FM OUTSIDE EXISTING VALVE VAULT

BONANZA DRIVE NE

NEW GRAVITY SEWER CONNECTION

EXISTING GRAVITY

6" FORCEMAIN THROUGH PROJECT AREA SEE SHEET 13

32ND AVE NE

EXISTING 8" GRAVITY SEWER, TYP

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TRAC 1

TRAC 2

TRAC 3

TRAC 4

TRAC 5

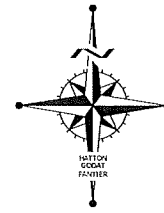
TRAC 6

TRAC 7

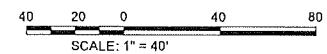
TRAC 8

TRAC 9

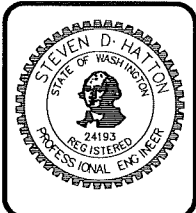
TRAC 10



| CITY OF LACEY                                             |                                                                                                                                                                                                                               |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY                | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TC 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS. |
| AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105 |                                                                                                                                                                                                                               |



|              |          |
|--------------|----------|
| DESIGNED BY: | HG/LDT   |
| DRAWN BY:    | JCH      |
| CHECKED BY:  | SDH      |
| DATE:        | MAY 2020 |
| SCALE:       | 1" = 40' |



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|            |       |
|------------|-------|
| REVISIONS: | DATE: |
|            |       |
|            |       |
|            |       |
|            |       |

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY OFFSITE SEWER PLAN**

|            |                    |
|------------|--------------------|
| AGENCY NO. |                    |
| SHEET:     | 14 OF 14           |
| INDEX:     | 19-085_pre-swr.dwg |
| JOB:       | 19-085             |

TP# 11803140300\_11803130400\_11803130401

SECTION 03 TOWNSHIP 18 NORTH RANGE 1 WEST

## APPENDIX 2 – Design Calculations



North Bioretention

**WWHM2012**  
**PROJECT REPORT**

## *General Model Information*

Project Name: North Bioretention  
Site Name:  
Site Address:  
City:  
Report Date: 5/21/2020  
Gage: Fairgrounds (Kaiser)  
Data Start: 1955/10/01  
Data End: 2011/09/30  
Timestep: 15 Minute  
Precip Scale: 1.000  
Version Date: 2019/09/13  
Version: 4.2.17

## *POC Thresholds*

Low Flow Threshold for POC1: 50 Percent of the 2 Year  
High Flow Threshold for POC1: 50 Year

*Landuse Basin Data*  
*Predeveloped Land Use*

**DOWNHILL OFFSITE**

Bypass: No

GroundWater: No

Pervious Land Use      acre  
A B, Forest, Flat      0.45

Pervious Total      0.45

Impervious Land Use      acre

Impervious Total      0

Basin Total      0.45

Element Flows To:  
Surface      Interflow      Groundwater



## DOWNHILL ONSITE

Bypass: No

GroundWater: No

Pervious Land Use      acre  
A B, Forest, Flat      2.47

Pervious Total      2.47

Impervious Land Use      acre

Impervious Total      0

Basin Total      2.47

Element Flows To:  
Surface

Interflow

Groundwater

## Mitigated Land Use

### DOWNHILL OFFSITE

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| A B, Pasture, Flat  | 0.15 |
| Pervious Total      | 0.15 |
| Impervious Land Use | acre |
| ROADS FLAT          | 0.23 |
| SIDEWALKS FLAT      | 0.08 |
| Impervious Total    | 0.31 |
| Basin Total         | 0.46 |

### Element Flows To:

|                      |                      |             |
|----------------------|----------------------|-------------|
| Surface              | Interflow            | Groundwater |
| Surface WNHILL SWALE | Surface WNHILL SWALE |             |

## DOWNHILL ONSITE

Bypass: No

GroundWater: No

|                    |      |
|--------------------|------|
| Pervious Land Use  | acre |
| A B, Forest, Flat  | 0.67 |
| A B, Pasture, Flat | 0.64 |
| A B, Lawn, Flat    | 0.49 |

Pervious Total 1.8

|                     |      |
|---------------------|------|
| Impervious Land Use | acre |
| PARKING FLAT        | 0.68 |

Impervious Total 0.68

Basin Total 2.48

Element Flows To:

| Surface              | Interflow            | Groundwater |
|----------------------|----------------------|-------------|
| Surface WNHILL SWALE | Surface WNHILL SWALE |             |

*Routing Elements*  
*Predeveloped Routing*

## Mitigated Routing

### DOWNHILL SWALE

Bottom Length: 350.00 ft.  
 Bottom Width: 25.00 ft.  
 Material thickness of first layer: 1.5  
 Material type for first layer: SMMWW 12 in/hr  
 Material thickness of second layer: 2.5  
 Material type for second layer: GRAVEL  
 Material thickness of third layer: 0  
 Material type for third layer: GRAVEL  
 Infiltration On  
 Infiltration rate: 0.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 227.584  
 Total Volume Through Riser (ac-ft.): 0  
 Total Volume Through Facility (ac-ft.): 227.584  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 46.469  
 Total Evap From Facility: 20.8  
 Underdrain not used  
 Discharge Structure  
 Riser Height: 1 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1                      Outlet 2

Bioretention Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.4207    | 0.0000         | 0.0000         | 0.0000      |
| 0.0659      | 0.4181    | 0.0061         | 0.0000         | 0.0000      |
| 0.1319      | 0.4143    | 0.0123         | 0.0000         | 0.0000      |
| 0.1978      | 0.4105    | 0.0186         | 0.0000         | 0.0111      |
| 0.2637      | 0.4067    | 0.0251         | 0.0000         | 0.0198      |
| 0.3297      | 0.4029    | 0.0316         | 0.0000         | 0.0233      |
| 0.3956      | 0.3991    | 0.0382         | 0.0000         | 0.0418      |
| 0.4615      | 0.3953    | 0.0449         | 0.0000         | 0.0676      |
| 0.5275      | 0.3915    | 0.0518         | 0.0000         | 0.0863      |
| 0.5934      | 0.3877    | 0.0587         | 0.0000         | 0.1013      |
| 0.6593      | 0.3839    | 0.0657         | 0.0000         | 0.1013      |
| 0.7253      | 0.3801    | 0.0729         | 0.0000         | 0.1013      |
| 0.7912      | 0.3764    | 0.0801         | 0.0000         | 0.1013      |
| 0.8571      | 0.3726    | 0.0875         | 0.0000         | 0.1013      |
| 0.9231      | 0.3689    | 0.0950         | 0.0000         | 0.1013      |
| 0.9890      | 0.3651    | 0.1025         | 0.0000         | 0.1013      |
| 1.0549      | 0.3614    | 0.1102         | 0.0000         | 0.1013      |
| 1.1209      | 0.3577    | 0.1180         | 0.0000         | 0.1013      |
| 1.1868      | 0.3540    | 0.1259         | 0.0000         | 0.1013      |
| 1.2527      | 0.3502    | 0.1339         | 0.0000         | 0.1013      |
| 1.3187      | 0.3465    | 0.1420         | 0.0000         | 0.1013      |
| 1.3846      | 0.3428    | 0.1502         | 0.0000         | 0.1013      |
| 1.4505      | 0.3392    | 0.1585         | 0.0000         | 0.1013      |
| 1.5165      | 0.3355    | 0.1661         | 0.0000         | 0.1013      |
| 1.5824      | 0.3318    | 0.1739         | 0.0000         | 0.1013      |
| 1.6484      | 0.3281    | 0.1817         | 0.0000         | 0.1013      |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1.7143 | 0.3245 | 0.1896 | 0.0000 | 0.1013 |
| 1.7802 | 0.3208 | 0.1977 | 0.0000 | 0.1013 |
| 1.8462 | 0.3172 | 0.2058 | 0.0000 | 0.1013 |
| 1.9121 | 0.3135 | 0.2140 | 0.0000 | 0.1013 |
| 1.9780 | 0.3099 | 0.2224 | 0.0000 | 0.1013 |
| 2.0440 | 0.3063 | 0.2308 | 0.0000 | 0.1013 |
| 2.1099 | 0.3027 | 0.2393 | 0.0000 | 0.1013 |
| 2.1758 | 0.2990 | 0.2480 | 0.0000 | 0.1013 |
| 2.2418 | 0.2954 | 0.2567 | 0.0000 | 0.1013 |
| 2.3077 | 0.2918 | 0.2655 | 0.0000 | 0.1013 |
| 2.3736 | 0.2883 | 0.2744 | 0.0000 | 0.1013 |
| 2.4396 | 0.2847 | 0.2835 | 0.0000 | 0.1013 |
| 2.5055 | 0.2811 | 0.2926 | 0.0000 | 0.1013 |
| 2.5714 | 0.2775 | 0.3018 | 0.0000 | 0.1013 |
| 2.6374 | 0.2740 | 0.3112 | 0.0000 | 0.1013 |
| 2.7033 | 0.2704 | 0.3206 | 0.0000 | 0.1013 |
| 2.7692 | 0.2669 | 0.3301 | 0.0000 | 0.1013 |
| 2.8352 | 0.2633 | 0.3398 | 0.0000 | 0.1013 |
| 2.9011 | 0.2598 | 0.3495 | 0.0000 | 0.1013 |
| 2.9670 | 0.2563 | 0.3593 | 0.0000 | 0.1013 |
| 3.0330 | 0.2528 | 0.3693 | 0.0000 | 0.1013 |
| 3.0989 | 0.2493 | 0.3793 | 0.0000 | 0.1013 |
| 3.1648 | 0.2458 | 0.3895 | 0.0000 | 0.1013 |
| 3.2308 | 0.2423 | 0.3997 | 0.0000 | 0.1013 |
| 3.2967 | 0.2388 | 0.4101 | 0.0000 | 0.1013 |
| 3.3626 | 0.2353 | 0.4205 | 0.0000 | 0.1013 |
| 3.4286 | 0.2318 | 0.4311 | 0.0000 | 0.1013 |
| 3.4945 | 0.2283 | 0.4417 | 0.0000 | 0.1013 |
| 3.5604 | 0.2249 | 0.4525 | 0.0000 | 0.1013 |
| 3.6264 | 0.2214 | 0.4634 | 0.0000 | 0.1013 |
| 3.6923 | 0.2180 | 0.4743 | 0.0000 | 0.1013 |
| 3.7582 | 0.2146 | 0.4854 | 0.0000 | 0.1013 |
| 3.8242 | 0.2111 | 0.4966 | 0.0000 | 0.1013 |
| 3.8901 | 0.2077 | 0.5079 | 0.0000 | 0.1013 |
| 3.9560 | 0.2043 | 0.5193 | 0.0000 | 0.1013 |
| 4.0000 | 0.2009 | 0.5269 | 0.0000 | 0.1013 |

Bioretention Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac.-ft.) | Discharge(cfs) | To Amended(cfs) | Infiltr(cfs) |
|-------------|-----------|-----------------|----------------|-----------------|--------------|
| 4.0000      | 0.4207    | 0.5269          | 0.0000         | 2.4306          | 0.0000       |
| 4.0659      | 0.4246    | 0.5548          | 0.0000         | 2.4306          | 0.0000       |
| 4.1319      | 0.4284    | 0.5829          | 0.0000         | 2.6442          | 0.0000       |
| 4.1978      | 0.4323    | 0.6113          | 0.0000         | 2.7511          | 0.0000       |
| 4.2637      | 0.4361    | 0.6399          | 0.0000         | 2.8579          | 0.0000       |
| 4.3297      | 0.4400    | 0.6688          | 0.0000         | 2.9647          | 0.0000       |
| 4.3956      | 0.4439    | 0.6979          | 0.0000         | 3.0716          | 0.0000       |
| 4.4615      | 0.4478    | 0.7273          | 0.0000         | 3.1784          | 0.0000       |
| 4.5275      | 0.4517    | 0.7570          | 0.0000         | 3.2853          | 0.0000       |
| 4.5934      | 0.4556    | 0.7869          | 0.0000         | 3.3921          | 0.0000       |
| 4.6593      | 0.4595    | 0.8170          | 0.0000         | 3.4989          | 0.0000       |
| 4.7253      | 0.4634    | 0.8475          | 0.0000         | 3.6058          | 0.0000       |
| 4.7912      | 0.4673    | 0.8782          | 0.0000         | 3.7126          | 0.0000       |
| 4.8571      | 0.4713    | 0.9091          | 0.0000         | 3.8194          | 0.0000       |
| 4.9231      | 0.4752    | 0.9403          | 0.0000         | 3.9263          | 0.0000       |
| 4.9890      | 0.4791    | 0.9718          | 0.0000         | 4.0331          | 0.0000       |
| 5.0549      | 0.4831    | 1.0035          | 0.1136         | 4.1400          | 0.0000       |
| 5.1209      | 0.4871    | 1.0355          | 0.3652         | 4.2468          | 0.0000       |
| 5.1868      | 0.4910    | 1.0677          | 0.6708         | 4.3536          | 0.0000       |

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 5.2527 | 0.4950 | 1.1002 | 0.9685 | 4.4605 | 0.0000 |
| 5.3187 | 0.4990 | 1.1330 | 1.2026 | 4.5673 | 0.0000 |
| 5.3846 | 0.5030 | 1.1660 | 1.3487 | 4.6741 | 0.0000 |
| 5.4505 | 0.5070 | 1.1993 | 1.4681 | 4.7810 | 0.0000 |
| 5.5165 | 0.5110 | 1.2329 | 1.5719 | 4.8878 | 0.0000 |
| 5.5824 | 0.5150 | 1.2667 | 1.6692 | 4.9947 | 0.0000 |
| 5.6484 | 0.5190 | 1.3008 | 1.7612 | 5.1015 | 0.0000 |
| 5.7143 | 0.5230 | 1.3351 | 1.8486 | 5.2083 | 0.0000 |
| 5.7802 | 0.5270 | 1.3697 | 1.9320 | 5.3152 | 0.0000 |
| 5.8462 | 0.5311 | 1.4046 | 2.0120 | 5.4220 | 0.0000 |
| 5.9121 | 0.5351 | 1.4398 | 2.0889 | 5.5289 | 0.0000 |
| 5.9780 | 0.5392 | 1.4752 | 2.1631 | 5.6357 | 0.0000 |
| 6.0000 | 0.5405 | 1.4871 | 2.2348 | 5.6713 | 0.0000 |



## Surface WNHILL SWALE

Element Flows To:

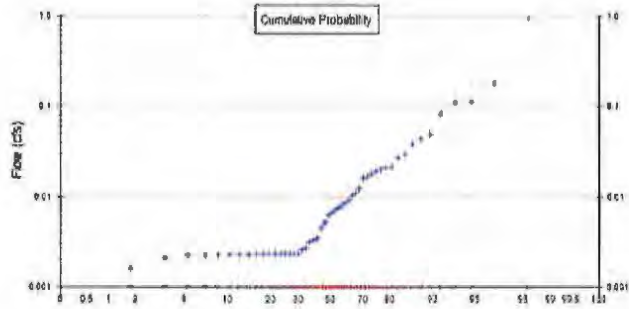
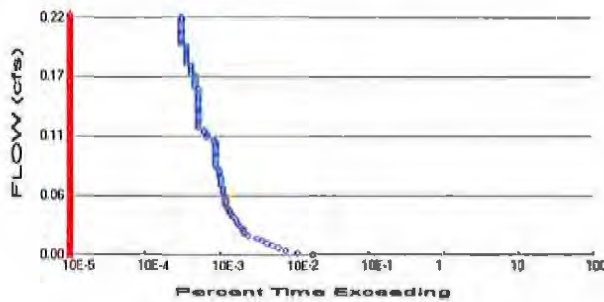
Outlet 1

Outlet 2

DOWNHILL SWALE

# Analysis Results

## POC 1



+ Predeveloped x Mitigated

### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 2.92  
Total Impervious Area: 0

### Mitigated Landuse Totals for POC #1

Total Pervious Area: 1.95  
Total Impervious Area: 0.99

Flow Frequency Method: Log Pearson Type III 17B

### Flow Frequency Return Periods for Predeveloped, POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0.006698  |
| 5 year        | 0.023533  |
| 10 year       | 0.049979  |
| 25 year       | 0.120384  |
| 50 year       | 0.221681  |
| 100 year      | 0.395282  |

### Flow Frequency Return Periods for Mitigated, POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0         |
| 5 year        | 0         |
| 10 year       | 0         |
| 25 year       | 0         |
| 50 year       | 0         |
| 100 year      | 0         |

## Annual Peaks

### Annual Peaks for Predeveloped and Mitigated, POC #1

| Year | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1956 | 0.020        | 0.000     |
| 1957 | 0.005        | 0.000     |
| 1958 | 0.003        | 0.000     |
| 1959 | 0.007        | 0.000     |
| 1960 | 0.007        | 0.000     |
| 1961 | 0.009        | 0.000     |
| 1962 | 0.002        | 0.000     |
| 1963 | 0.115        | 0.000     |
| 1964 | 0.029        | 0.000     |
| 1965 | 0.010        | 0.000     |

|      |       |       |
|------|-------|-------|
| 1966 | 0.002 | 0.000 |
| 1967 | 0.009 | 0.000 |
| 1968 | 0.003 | 0.000 |
| 1969 | 0.003 | 0.000 |
| 1970 | 0.007 | 0.000 |
| 1971 | 0.043 | 0.000 |
| 1972 | 0.038 | 0.000 |
| 1973 | 0.002 | 0.000 |
| 1974 | 0.016 | 0.000 |
| 1975 | 0.003 | 0.000 |
| 1976 | 0.019 | 0.000 |
| 1977 | 0.002 | 0.000 |
| 1978 | 0.016 | 0.000 |
| 1979 | 0.002 | 0.000 |
| 1980 | 0.002 | 0.000 |
| 1981 | 0.049 | 0.000 |
| 1982 | 0.083 | 0.000 |
| 1983 | 0.004 | 0.000 |
| 1984 | 0.006 | 0.000 |
| 1985 | 0.002 | 0.000 |
| 1986 | 0.008 | 0.000 |
| 1987 | 0.018 | 0.000 |
| 1988 | 0.002 | 0.000 |
| 1989 | 0.002 | 0.000 |
| 1990 | 0.003 | 0.000 |
| 1991 | 0.180 | 0.000 |
| 1992 | 0.966 | 0.000 |
| 1993 | 0.110 | 0.000 |
| 1994 | 0.002 | 0.000 |
| 1995 | 0.007 | 0.000 |
| 1996 | 0.021 | 0.000 |
| 1997 | 0.012 | 0.000 |
| 1998 | 0.002 | 0.000 |
| 1999 | 0.002 | 0.000 |
| 2000 | 0.002 | 0.000 |
| 2001 | 0.002 | 0.000 |
| 2002 | 0.003 | 0.000 |
| 2003 | 0.021 | 0.000 |
| 2004 | 0.027 | 0.000 |
| 2005 | 0.002 | 0.000 |
| 2006 | 0.002 | 0.000 |
| 2007 | 0.002 | 0.000 |
| 2008 | 0.002 | 0.000 |
| 2009 | 0.005 | 0.000 |
| 2010 | 0.008 | 0.000 |
| 2011 | 0.011 | 0.000 |

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

| Rank | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1    | 0.9655       | 0.0000    |
| 2    | 0.1796       | 0.0000    |
| 3    | 0.1153       | 0.0000    |
| 4    | 0.1097       | 0.0000    |
| 5    | 0.0835       | 0.0000    |
| 6    | 0.0486       | 0.0000    |
| 7    | 0.0433       | 0.0000    |
| 8    | 0.0381       | 0.0000    |

|    |        |        |
|----|--------|--------|
| 9  | 0.0291 | 0.0000 |
| 10 | 0.0269 | 0.0000 |
| 11 | 0.0214 | 0.0000 |
| 12 | 0.0209 | 0.0000 |
| 13 | 0.0202 | 0.0000 |
| 14 | 0.0191 | 0.0000 |
| 15 | 0.0177 | 0.0000 |
| 16 | 0.0165 | 0.0000 |
| 17 | 0.0157 | 0.0000 |
| 18 | 0.0122 | 0.0000 |
| 19 | 0.0111 | 0.0000 |
| 20 | 0.0103 | 0.0000 |
| 21 | 0.0091 | 0.0000 |
| 22 | 0.0086 | 0.0000 |
| 23 | 0.0083 | 0.0000 |
| 24 | 0.0077 | 0.0000 |
| 25 | 0.0075 | 0.0000 |
| 26 | 0.0073 | 0.0000 |
| 27 | 0.0068 | 0.0000 |
| 28 | 0.0065 | 0.0000 |
| 29 | 0.0063 | 0.0000 |
| 30 | 0.0053 | 0.0000 |
| 31 | 0.0050 | 0.0000 |
| 32 | 0.0045 | 0.0000 |
| 33 | 0.0035 | 0.0000 |
| 34 | 0.0034 | 0.0000 |
| 35 | 0.0033 | 0.0000 |
| 36 | 0.0031 | 0.0000 |
| 37 | 0.0027 | 0.0000 |
| 38 | 0.0026 | 0.0000 |
| 39 | 0.0024 | 0.0000 |
| 40 | 0.0023 | 0.0000 |
| 41 | 0.0023 | 0.0000 |
| 42 | 0.0023 | 0.0000 |
| 43 | 0.0023 | 0.0000 |
| 44 | 0.0023 | 0.0000 |
| 45 | 0.0023 | 0.0000 |
| 46 | 0.0023 | 0.0000 |
| 47 | 0.0023 | 0.0000 |
| 48 | 0.0023 | 0.0000 |
| 49 | 0.0023 | 0.0000 |
| 50 | 0.0023 | 0.0000 |
| 51 | 0.0023 | 0.0000 |
| 52 | 0.0023 | 0.0000 |
| 53 | 0.0022 | 0.0000 |
| 54 | 0.0021 | 0.0000 |
| 55 | 0.0016 | 0.0000 |
| 56 | 0.0016 | 0.0000 |

# Duration Flows

The Facility PASSED

| Flow(cfs) | Predev | Mit | Percentage | Pass/Fail |
|-----------|--------|-----|------------|-----------|
| 0.0033    | 347    | 0   | 0          | Pass      |
| 0.0056    | 210    | 0   | 0          | Pass      |
| 0.0078    | 146    | 0   | 0          | Pass      |
| 0.0100    | 115    | 0   | 0          | Pass      |
| 0.0122    | 97     | 0   | 0          | Pass      |
| 0.0144    | 83     | 0   | 0          | Pass      |
| 0.0166    | 72     | 0   | 0          | Pass      |
| 0.0188    | 60     | 0   | 0          | Pass      |
| 0.0210    | 46     | 0   | 0          | Pass      |
| 0.0232    | 41     | 0   | 0          | Pass      |
| 0.0254    | 40     | 0   | 0          | Pass      |
| 0.0276    | 39     | 0   | 0          | Pass      |
| 0.0298    | 36     | 0   | 0          | Pass      |
| 0.0320    | 33     | 0   | 0          | Pass      |
| 0.0342    | 32     | 0   | 0          | Pass      |
| 0.0364    | 31     | 0   | 0          | Pass      |
| 0.0386    | 28     | 0   | 0          | Pass      |
| 0.0408    | 27     | 0   | 0          | Pass      |
| 0.0430    | 26     | 0   | 0          | Pass      |
| 0.0453    | 25     | 0   | 0          | Pass      |
| 0.0475    | 24     | 0   | 0          | Pass      |
| 0.0497    | 23     | 0   | 0          | Pass      |
| 0.0519    | 23     | 0   | 0          | Pass      |
| 0.0541    | 23     | 0   | 0          | Pass      |
| 0.0563    | 22     | 0   | 0          | Pass      |
| 0.0585    | 22     | 0   | 0          | Pass      |
| 0.0607    | 21     | 0   | 0          | Pass      |
| 0.0629    | 21     | 0   | 0          | Pass      |
| 0.0651    | 21     | 0   | 0          | Pass      |
| 0.0673    | 20     | 0   | 0          | Pass      |
| 0.0695    | 20     | 0   | 0          | Pass      |
| 0.0717    | 20     | 0   | 0          | Pass      |
| 0.0739    | 20     | 0   | 0          | Pass      |
| 0.0761    | 19     | 0   | 0          | Pass      |
| 0.0783    | 19     | 0   | 0          | Pass      |
| 0.0805    | 19     | 0   | 0          | Pass      |
| 0.0827    | 18     | 0   | 0          | Pass      |
| 0.0849    | 17     | 0   | 0          | Pass      |
| 0.0872    | 17     | 0   | 0          | Pass      |
| 0.0894    | 17     | 0   | 0          | Pass      |
| 0.0916    | 17     | 0   | 0          | Pass      |
| 0.0938    | 17     | 0   | 0          | Pass      |
| 0.0960    | 17     | 0   | 0          | Pass      |
| 0.0982    | 17     | 0   | 0          | Pass      |
| 0.1004    | 17     | 0   | 0          | Pass      |
| 0.1026    | 17     | 0   | 0          | Pass      |
| 0.1048    | 17     | 0   | 0          | Pass      |
| 0.1070    | 17     | 0   | 0          | Pass      |
| 0.1092    | 16     | 0   | 0          | Pass      |
| 0.1114    | 13     | 0   | 0          | Pass      |
| 0.1136    | 13     | 0   | 0          | Pass      |
| 0.1158    | 12     | 0   | 0          | Pass      |
| 0.1180    | 12     | 0   | 0          | Pass      |

|        |    |   |   |      |
|--------|----|---|---|------|
| 0.1202 | 10 | 0 | 0 | Pass |
| 0.1224 | 10 | 0 | 0 | Pass |
| 0.1246 | 10 | 0 | 0 | Pass |
| 0.1268 | 10 | 0 | 0 | Pass |
| 0.1291 | 10 | 0 | 0 | Pass |
| 0.1313 | 10 | 0 | 0 | Pass |
| 0.1335 | 10 | 0 | 0 | Pass |
| 0.1357 | 10 | 0 | 0 | Pass |
| 0.1379 | 10 | 0 | 0 | Pass |
| 0.1401 | 10 | 0 | 0 | Pass |
| 0.1423 | 10 | 0 | 0 | Pass |
| 0.1445 | 10 | 0 | 0 | Pass |
| 0.1467 | 10 | 0 | 0 | Pass |
| 0.1489 | 10 | 0 | 0 | Pass |
| 0.1511 | 10 | 0 | 0 | Pass |
| 0.1533 | 10 | 0 | 0 | Pass |
| 0.1555 | 10 | 0 | 0 | Pass |
| 0.1577 | 9  | 0 | 0 | Pass |
| 0.1599 | 9  | 0 | 0 | Pass |
| 0.1621 | 9  | 0 | 0 | Pass |
| 0.1643 | 9  | 0 | 0 | Pass |
| 0.1665 | 9  | 0 | 0 | Pass |
| 0.1688 | 9  | 0 | 0 | Pass |
| 0.1710 | 8  | 0 | 0 | Pass |
| 0.1732 | 8  | 0 | 0 | Pass |
| 0.1754 | 8  | 0 | 0 | Pass |
| 0.1776 | 8  | 0 | 0 | Pass |
| 0.1798 | 7  | 0 | 0 | Pass |
| 0.1820 | 7  | 0 | 0 | Pass |
| 0.1842 | 7  | 0 | 0 | Pass |
| 0.1864 | 7  | 0 | 0 | Pass |
| 0.1886 | 7  | 0 | 0 | Pass |
| 0.1908 | 7  | 0 | 0 | Pass |
| 0.1930 | 7  | 0 | 0 | Pass |
| 0.1952 | 7  | 0 | 0 | Pass |
| 0.1974 | 6  | 0 | 0 | Pass |
| 0.1996 | 6  | 0 | 0 | Pass |
| 0.2018 | 6  | 0 | 0 | Pass |
| 0.2040 | 6  | 0 | 0 | Pass |
| 0.2062 | 6  | 0 | 0 | Pass |
| 0.2084 | 6  | 0 | 0 | Pass |
| 0.2107 | 6  | 0 | 0 | Pass |
| 0.2129 | 6  | 0 | 0 | Pass |
| 0.2151 | 6  | 0 | 0 | Pass |
| 0.2173 | 6  | 0 | 0 | Pass |
| 0.2195 | 6  | 0 | 0 | Pass |
| 0.2217 | 6  | 0 | 0 | Pass |

## Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

## LID Report

| LID Technique                                          | Used for Treatment ?     | Total Volume Needs Treatment (ac-ft) | Volume Through Facility (ac-ft) | Infiltration Volume (ac-ft) | Cumulative Volume Infiltration Credit | Percent Volume Infiltrated | Water Quality | Percent Water Quality Treated | Comment                           |
|--------------------------------------------------------|--------------------------|--------------------------------------|---------------------------------|-----------------------------|---------------------------------------|----------------------------|---------------|-------------------------------|-----------------------------------|
| WNHILL SWALE POC                                       | <input type="checkbox"/> | 207.10                               |                                 |                             | <input type="checkbox"/>              | 100.00                     |               |                               |                                   |
| Total Volume Infiltrated                               |                          | 207.10                               | 0.00                            | 0.00                        |                                       | 100.00                     | 0.00          | 0%                            | No Treat. Credit                  |
| Compliance with LID Standard 8% of 2-yr to 50% of 2-yr |                          |                                      |                                 |                             |                                       |                            |               |                               | Duration Analysis Result = Passed |
|                                                        |                          |                                      |                                 |                             |                                       |                            |               |                               |                                   |



| GRIFFIN APARTMENTS SURFACE SUMMARY |                     |           |           |           |           |         |             |               |              |            |                    |                    |               |                             |                           |                            |                          |                |               |                    |              |               |              |              |            |
|------------------------------------|---------------------|-----------|-----------|-----------|-----------|---------|-------------|---------------|--------------|------------|--------------------|--------------------|---------------|-----------------------------|---------------------------|----------------------------|--------------------------|----------------|---------------|--------------------|--------------|---------------|--------------|--------------|------------|
|                                    |                     | Onsite    | Offsite   | Total     | Total     | Total   | Roof        | Off Site Road | On Site Road | Total Road | Impervious Parking | Pervious Parking   | Total Parking | Offsite Impervious Sidewalk | Offsite Pervious Sidewalk | Onsite Impervious Sidewalk | Onsite Pervious Sidewalk | Total Sidewalk | Onsite Native | Offsite Native     | Total Native | Pond (BioRet) | Onsite Lawn  | Offsite Lawn | Total Lawn |
| Basin                              | Description         | Area (sf) | Area (sf) | Area (sf) | Area (ac) | Roofs   | Area (sf)   | Area (sf)     | Area (sf)    | Area (sf)  | Area (sf)          | Area (sf)          | Area (sf)     | Area (sf)                   | Area (sf)                 | Area (sf)                  | Area (sf)                | Area (sf)      | Area (sf)     | Area (sf)          | Area (sf)    | Area (sf)     | Area (sf)    | Area (sf)    | Area (sf)  |
| 1                                  | North Basin Offsite | 0         | 19780     | 0.45      | 0         | 0       | 0           | 9962          | 0            | 9962       | 0                  | 0                  | 0             | 3461                        | 0                         | 0                          | 0                        | 3461           | 0             | 0                  | 0            | 0             | 0            | 6357         | 6357       |
| 2                                  | North Basin Onsite  | 144356    | 0         | 144356    | 3.31      | 4       | 25000       | 0             | 0            | 0          | 29485              | 15758              | 45243         | 0                           | 0                         | 0                          | 5625                     | 5625           | 29230         | 0                  | 29230        | 11551         | 27707        | 0            | 27707      |
| 3                                  | Southwest Basin     | 142710    | 10242     | 152952    | 3.51      | 5       | 22500       | 0             | 0            | 0          | 45320              | 10570              | 55890         | 0                           | 0                         | 0                          | 8268                     | 8268           | 0             | 10242              | 10242        | 3787          | 52265        | 0            | 52265      |
| 4                                  | Southeast Basin     | 132342    | 9450      | 141792    | 3.26      | 4       | 21500       | 0             | 0            | 0          | 39461              | 0                  | 39461         | 0                           | 0                         | 0                          | 6253                     | 6253           | 39343         | 9450               | 48793        | 0             | 25785        | 0            | 25785      |
|                                    | Total TDA           | 419408    | 39472     | 458880    | 10.53     | 13      | 69000       | 9962          | 0            | 9962       | 114266             | 26328              | 140594        | 3461                        | 0                         | 0                          | 20146                    | 23607          | 68573         | 19692              | 88265        | 15338         | 105757       | 6357         | 112114     |
|                                    |                     |           |           |           |           |         |             |               |              |            |                    |                    |               |                             |                           |                            |                          |                |               |                    |              |               |              |              |            |
| BASIN 1 WWHM INPUT                 |                     |           |           |           |           |         |             |               |              |            |                    | BASIN 2 WWHM INPUT |               |                             |                           | BASIN 3 WWHM INPUT         |                          |                |               | BASIN 4 WWHM INPUT |              |               |              |              |            |
|                                    |                     |           |           |           |           |         |             |               |              |            | Predeveloped       | Mitigated          |               | Predeveloped                | Mitigated                 |                            | Predeveloped             | Mitigated      |               | Predeveloped       | Mitigated    |               | Predeveloped | Mitigated    |            |
|                                    |                     |           |           |           |           |         |             |               |              |            | Pervious           |                    |               | Pervious                    |                           |                            | Pervious                 |                |               | Pervious           |              | Pervious      |              |              |            |
| Multifamily Buildings              | SF*                 | AC        |           |           |           | Geodata |             | Ac            |              |            |                    |                    |               |                             |                           |                            |                          |                |               |                    |              |               |              |              |            |
| A                                  | 4500                | 0.10      |           |           |           | Parcel  | 11803130300 | 4.77          |              | Native     | 0.45               | 0.00               | Native        | 2.47                        | 0.67                      |                            | Native                   | 2.91           | 0.24          |                    | Native       | 2.76          | 1.12         |              |            |
| B                                  | 4500                | 0.10      |           |           |           |         | 11803130400 | 2.5           |              | Pasture    | 0.15               | 0.64               | Pasture       |                             | 0.64                      |                            | Pasture                  |                | 1.20          |                    | Pasture      |               | 0.59         |              |            |
| C                                  | 4500                | 0.10      |           |           |           |         | 11803130401 | 2.27          |              | Lawn       |                    |                    | Lawn          |                             | 0.48                      |                            | Lawn                     |                | 0.43          |                    | Lawn         |               | 0.14         |              |            |
| D                                  | 4500                | 0.10      |           |           |           |         | Total =     | 9.54          |              |            |                    |                    |               |                             |                           |                            |                          |                |               |                    |              |               |              |              |            |
| E                                  | 4500                | 0.10      |           |           |           |         |             |               |              | Roads      | Impervious         | 0.23               | Roads         | Impervious                  | 0.00                      |                            | Roads                    | Impervious     | 0.00          |                    | Roads        | Impervious    | 0.00         |              |            |
| F                                  | 4500                | 0.10      |           |           |           |         |             |               |              | Roof       |                    | 0.00               | Roof          |                             | 0.00                      |                            | Roof                     |                | 0.00          |                    | Roof         |               | 0.00         |              |            |
| G                                  | 4500                | 0.10      |           |           |           |         |             |               |              | Sidewalk   |                    | 0.08               | Sidewalk      |                             | 0.00                      |                            | Sidewalk                 |                | 0.00          |                    | Sidewalk     |               | 0.00         |              |            |
| H                                  | 4500                | 0.10      |           |           |           |         |             |               |              | Parking    |                    | 0.00               | Parking       |                             | 0.68                      |                            | Parking                  |                | 1.04          |                    | Parking      |               | 0.91         |              |            |
| I                                  | 4500                | 0.10      |           |           |           |         |             |               |              | Pond       |                    |                    | Pond          |                             |                           |                            | Pond                     |                |               |                    | Pond         |               |              |              |            |
| J                                  | 8000                | 0.18      |           |           |           |         |             |               |              | Total      | 0.45               | 0.45               | Total         | 2.47                        | 2.47                      |                            | Total                    | 2.91           | 2.91          |                    | Total        | 2.76          | 2.76         |              |            |
| K                                  |                     |           |           |           |           |         |             |               |              |            |                    |                    |               |                             |                           |                            |                          |                |               |                    |              |               |              |              |            |

\*Areas rounded up to nearest 500th



## *Model Default Modifications*

Total of 0 changes have been made.

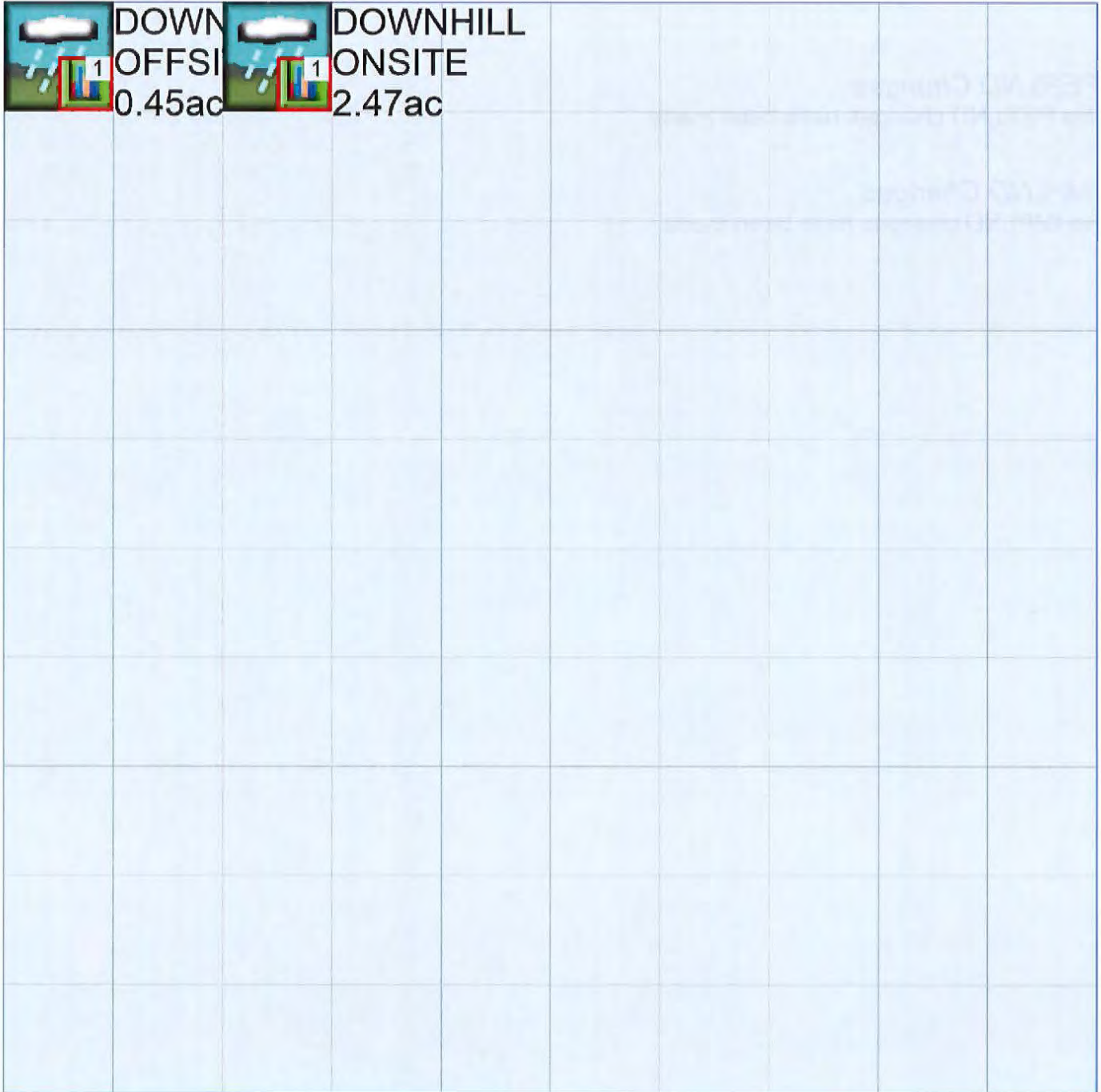
### *PERLND Changes*

No PERLND changes have been made.

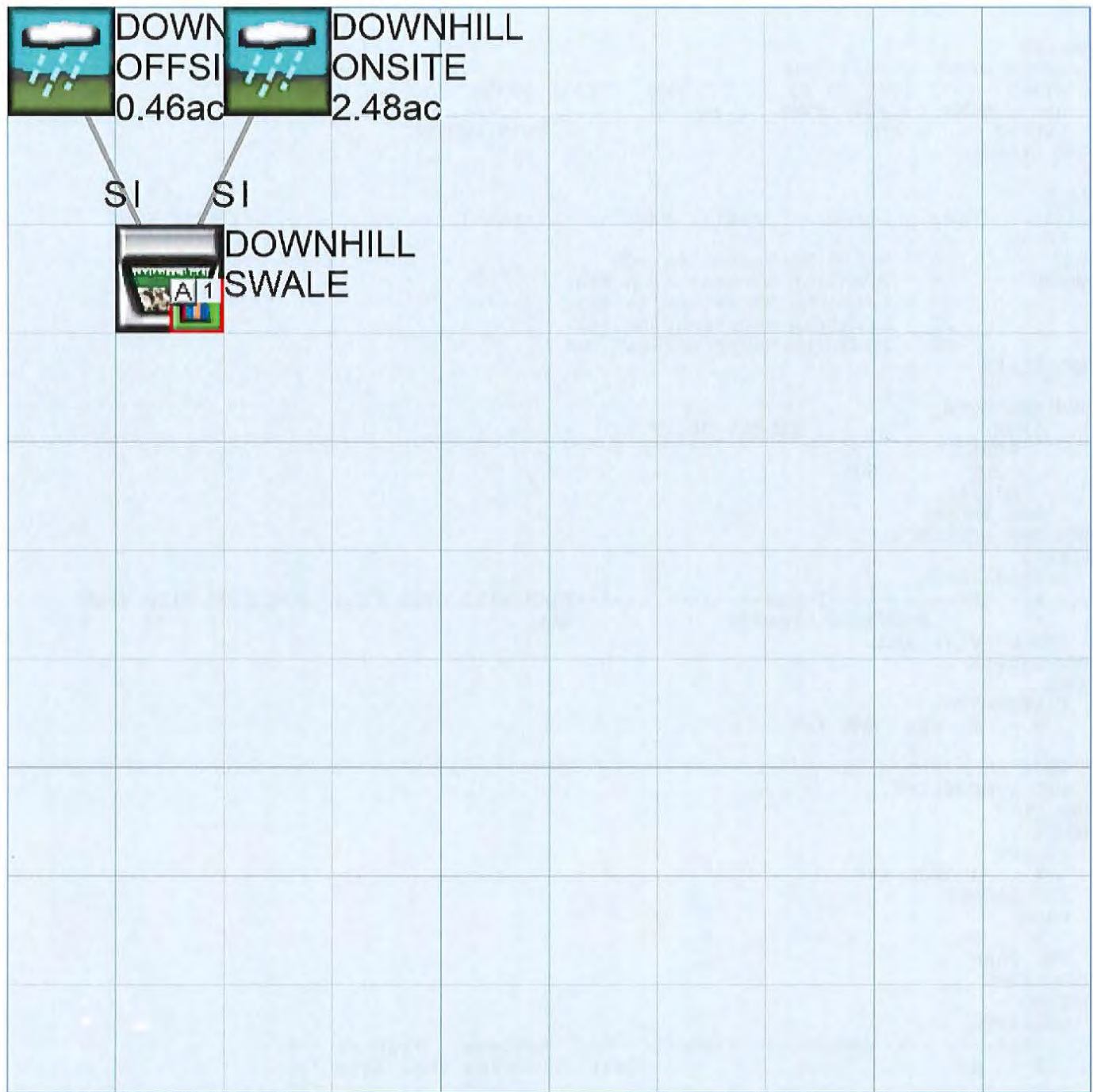
### *IMPLND Changes*

No IMPLND changes have been made.

Appendix  
Predeveloped Schematic



Mitigated Schematic



## Predeveloped UCI File

RUN

### GLOBAL

```
WVHM4 model simulation
START'      1955 10 01      END      2011 09 30
RUN INTERP OUTPUT LEVEL      3      0
RESUME      0 RUN      1      UNIT SYSTEM      1
END GLOBAL
```

### FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26     North Bioretention.wdm
MESSU    25     PreNorth Bioretention.MES
          27     PreNorth Bioretention.L61
          28     PreNorth Bioretention.L62
          30     POCNorth Bioretention1.dat
END FILES
```

### OPN SEQUENCE

```
INGRP      INDELT 00:15
  PERLND      1
  COPY      501
  DISPLY      1
END INGRP
END OPN SEQUENCE
```

### DISPLY

```
DISPLY-INFO1
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      DOWNHILL OFFSITE      MAX      1      2      30      9
END DISPLY-INFO1
```

### END DISPLY

### COPY

```
TIMESERIES
# - #  NPT  NMN ***
1      1      1
501     1      1
END TIMESERIES
```

### END COPY

### GENER

```
OPCODE
#      #  OPCD ***
END OPCODE
PARM
#      #      K ***
END PARM
```

### END GENER

### PERLND

```
GEN-INFO
<PLS ><-----Name----->NBLKS      Unit-systems      Printer ***
# - #      User      t-series      Engl Metr ***
          in out      ***
1      A/B, Forest, Flat      1      1      1      1      2'      0
END GEN-INFO
*** Section PWATER***
```

### ACTIVITY

```
<PLS > ***** Active Sections *****
# - #  ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
1      0      0      1      0      0      0      0      0      0      0      0
END ACTIVITY
```

### PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - #  ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *****
1      0      0      4      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO
```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
1 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
1 0 5 2 400 0.05 0.3 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
1 0 0 2 2 0 0 0
END PWAT-PARM3
PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
1 0.2 0.5 0.35 0 0.7 0.7
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
1 0 0 0 0 3 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***

END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```

END IMPLND

# SCHEMATIC

| <-Source-> |            | <--Area--> |  | <-Target-> | MBLK | ***  |
|------------|------------|------------|--|------------|------|------|
| <Name>     | #          | <-factor-> |  | <Name>     | #    | Tbl# |
| DOWNHILL   | OFFSITE*** |            |  |            |      |      |
| PERLND     | 1          | 0.45       |  | COPY       | 501  | 12   |
| PERLND     | 1          | 0.45       |  | COPY       | 501  | 13   |
| DOWNHILL   | ONSITE***  |            |  |            |      |      |
| PERLND     | 1          | 2.47       |  | COPY       | 501  | 12   |
| PERLND     | 1          | 2.47       |  | COPY       | 501  | 13   |

\*\*\*\*\*Routing\*\*\*\*\*

END SCHEMATIC

# NETWORK

| <-Volume-> | <-Grp> | <-Member-> | <--Mult--> | Tran        | <-Target vols> | <-Grp> | <-Member-> | ***      |
|------------|--------|------------|------------|-------------|----------------|--------|------------|----------|
| <Name>     | #      | <Name>     | #          | #<-factor-> | strg           | <Name> | #          | #        |
| COPY       | 501    | OUTPUT     | MEAN       | 1           | 1              | 48.4   | DISPLY     | 1        |
|            |        |            |            |             |                |        | INPUT      | TIMSER 1 |

| <-Volume-> | <-Grp> | <-Member-> | <--Mult--> | Tran        | <-Target vols> | <-Grp> | <-Member-> | *** |
|------------|--------|------------|------------|-------------|----------------|--------|------------|-----|
| <Name>     | #      | <Name>     | #          | #<-factor-> | strg           | <Name> | #          | #   |
|            |        |            |            |             |                |        |            |     |

END NETWORK

# RCHRES

## GEN-INFO

| RCHRES | Name    | Nexits | Unit Systems  | Printer        | *** |
|--------|---------|--------|---------------|----------------|-----|
| # - #  | <-----> | <----> | User T-series | Engl Metr LKFG | *** |
|        |         |        | in out        |                | *** |

END GEN-INFO

\*\*\* Section RCHRES\*\*\*

## ACTIVITY

<PLS > \*\*\*\*\* Active Sections \*\*\*\*\*

|       |      |      |      |      |      |      |      |      |      |      |     |
|-------|------|------|------|------|------|------|------|------|------|------|-----|
| # - # | HYFG | ADFG | CNFG | HTFG | SDFG | GQFG | OXFG | NUFG | PKFG | PHFG | *** |
|-------|------|------|------|------|------|------|------|------|------|------|-----|

END ACTIVITY

## PRINT-INFO

<PLS > \*\*\*\*\* Print-flags \*\*\*\*\*

|       |      |      |      |      |     |     |      |      |      |      |      |     |       |
|-------|------|------|------|------|-----|-----|------|------|------|------|------|-----|-------|
| # - # | HYDR | ADCA | CONS | HEAT | SED | GQL | OXRX | NUTR | PLNK | PHCB | PIVL | PYR | ***** |
|-------|------|------|------|------|-----|-----|------|------|------|------|------|-----|-------|

END PRINT-INFO

## HYDR-PARM1

| RCHRES | Flags for each HYDR Section | ***             |
|--------|-----------------------------|-----------------|
| # - #  | VC A1 A2 A3                 | ODFVFG for each |
|        | FG FG FG FG                 | possible exit   |
|        | * * * *                     | * * * *         |

END HYDR-PARM1

## HYDR-PARM2

| # - #   | FTABNO  | LEN     | DELTH   | STCOR   | KS      | DB50    | *** |
|---------|---------|---------|---------|---------|---------|---------|-----|
| <-----> | <-----> | <-----> | <-----> | <-----> | <-----> | <-----> | *** |

END HYDR-PARM2

## HYDR-INIT

| RCHRES  | Initial conditions for each HYDR section | ***                     |
|---------|------------------------------------------|-------------------------|
| # - #   | *** VOL                                  | Initial value of COLIND |
|         | *** ac-ft                                | for each possible exit  |
| <-----> | <----->                                  | <----->                 |

END HYDR-INIT

END RCHRES

## SPEC-ACTIONS

END SPEC-ACTIONS

## FTABLES

END FTABLES

## EXT SOURCES

| <-Volume-> | <Member> | SsysSgap | <--Mult--> | Tran | <-Target vols> | <-Grp> | <-Member-> | *** |
|------------|----------|----------|------------|------|----------------|--------|------------|-----|
|------------|----------|----------|------------|------|----------------|--------|------------|-----|



| <Name> | # | <Name> | # | tem  | strg<-factor->strg | <Name> | # | #   | <Name> | #      | # | *** |
|--------|---|--------|---|------|--------------------|--------|---|-----|--------|--------|---|-----|
| WDM    | 2 | PREC   |   | ENGL | 1                  | PERLND | 1 | 999 | EXTNL  | PREC   |   |     |
| WDM    | 2 | PREC   |   | ENGL | 1                  | IMPLND | 1 | 999 | EXTNL  | PREC   |   |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | PERLND | 1 | 999 | EXTNL  | PETINP |   |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | IMPLND | 1 | 999 | EXTNL  | PETINP |   |     |

END EXT SOURCES

EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-><--Mult--> | Tran | <-Volume->      | <Member> | Tsys | Tgap   | Amd | ***            |
|------------|--------|----------------------|------|-----------------|----------|------|--------|-----|----------------|
| <Name>     | #      | <Name>               | #    | #<-factor->strg | <Name>   | #    | <Name> | tem | strg strg***   |
| COPY       | 501    | OUTPUT               | MEAN | 1               | 1        | 48.4 | WDM    | 501 | FLOW ENGL REPL |

END EXT TARGETS

MASS-LINK

| <Volume>      | <-Grp> | <-Member-><--Mult--> | <Target> | <-Grp>      | <-Member->*** |
|---------------|--------|----------------------|----------|-------------|---------------|
| <Name>        | #      | <Name>               | #        | #<-factor-> | <Name>        |
| MASS-LINK     |        | 12                   |          |             |               |
| PERLND        | PWATER | SURO                 | 0.083333 | COPY        | INPUT MEAN    |
| END MASS-LINK |        | 12                   |          |             |               |
| MASS-LINK     |        | 13                   |          |             |               |
| PERLND        | PWATER | IFWO                 | 0.083333 | COPY        | INPUT MEAN    |
| END MASS-LINK |        | 13                   |          |             |               |

END MASS-LINK

END RUN

## Mitigated UCI File

RUN

### GLOBAL

WWM4 model simulation  
START 1955 10 01 END 2011 09 30  
RUN INTERP OUTPUT LEVEL 3 0  
RESUME 0 RUN 1 UNIT SYSTEM 1  
END GLOBAL

### FILES

<File> <Un#> <-----File Name----->\*\*\*  
<-ID-> \*\*\*  
WDM 26 North Bioretention.wdm  
MESSU 25 MitNorth Bioretention.MES  
27 MitNorth Bioretention.L61  
28 MitNorth Bioretention.L62  
30 POCNorth Bioretention1.dat

END FILES

### OPN SEQUENCE

INGRP INDELT 00:15

PERLND 4  
IMPLND 1  
IMPLND 8  
PERLND 1  
PERLND 7  
IMPLND 11  
GENER 2  
RCHRES 1  
RCHRES 2  
COPY 1  
COPY 501  
DISPLY 1

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

# - #<-----Title----->\*\*\*TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND  
1 Surface WNHILL SWALE MAX 1 2 30 9

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

# - # NPT NMN \*\*\*  
1 1 1  
501 1 1

END TIMESERIES

END COPY

GENER

OPCODE

# # OPCODE \*\*\*  
2 24

END OPCODE

PARM

# # K \*\*\*  
2 0.

END PARM

END GENER

PERLND

GEN-INFO

<PLS ><-----Name----->NBLKS Unit-systems Printer \*\*\*  
# - # User t-series Engl Metr \*\*\*  
in out \*\*\*  
4 A/B, Pasture, Flat 1 1 1 1 27 0  
1 A/B, Forest, Flat 1 1 1 1 27 0  
7 A/B, Lawn, Flat 1 1 1 1 27 0

END GEN-INFO

\*\*\* Section PWATER\*\*\*

## ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
4      0      0      1      0      0      0      0      0      0      0      0
1      0      0      1      0      0      0      0      0      0      0      0
7      0      0      1      0      0      0      0      0      0      0      0

```

END ACTIVITY

## PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
4      0      0      4      0      0      0      0      0      0      0      0      1      9
1      0      0      4      0      0      0      0      0      0      0      0      1      9
7      0      0      4      0      0      0      0      0      0      0      0      1      9

```

END PRINT-INFO

## PWAT-PARM1

```

<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
4      0      0      0      0      0      0      0      0      0      0      0
1      0      0      0      0      0      0      0      0      0      0      0
7      0      0      0      0      0      0      0      0      0      0      0

```

END PWAT-PARM1

## PWAT-PARM2

```

<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
4      0      5      1.5      400      0.05      0.3      0.996
1      0      5      2      400      0.05      0.3      0.996
7      0      5      0.8      400      0.05      0.3      0.996

```

END PWAT-PARM2

## PWAT-PARM3

```

<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
4      0      0      2      2      0      0      0
1      0      0      2      2      0      0      0
7      0      0      2      2      0      0      0

```

END PWAT-PARM3

## PWAT-PARM4

```

<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
4      0.15      0.5      0.3      0      0.7      0.4
1      0.2      0.5      0.35      0      0.7      0.7
7      0.1      0.5      0.25      0      0.7      0.25

```

END PWAT-PARM4

## PWAT-STATE1

```

<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
4      0      0      0      0      3      1      0
1      0      0      0      0      3      1      0
7      0      0      0      0      3      1      0

```

END PWAT-STATE1

END PERLND

## IMPLND

## GEN-INFO

```

<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***
1      ROADS/FLAT      1      1      1      27      0
8      SIDEWALKS/FLAT  1      1      1      27      0
11     PARKING/FLAT    1      1      1      27      0

```

END GEN-INFO

\*\*\* Section IWATER\*\*\*

ACTIVITY  
 <PLS > \*\*\*\*\* Active Sections \*\*\*\*\*  
 # - # ATMP SNOW IWAT SLD IWG IQAL \*\*\*  
 1 0 0 1 0 0 0  
 8 0 0 1 0 0 0  
 11 0 0 1 0 0 0  
 END ACTIVITY

PRINT-INFO  
 <ILS > \*\*\*\*\* Print-flags \*\*\*\*\* PIVL PYR  
 # - # ATMP SNOW IWAT SLD IWG IQAL \*\*\*\*\*  
 1 0 0 4 0 0 0 1 9  
 8 0 0 4 0 0 0 1 9  
 11 0 0 4 0 0 0 1 9  
 END PRINT-INFO

IWAT-PARM1  
 <PLS > IWATER variable monthly parameter value flags \*\*\*  
 # - # CSNO RTOP VRS VNN RTLI \*\*\*  
 1 0 0 0 0 0  
 8 0 0 0 0 0  
 11 0 0 0 0 0  
 END IWAT-PARM1

IWAT-PARM2  
 <PLS > IWATER input info: Part 2 \*\*\*  
 # - # \*\*\* LSUR SLSUR NSUR RETSC  
 1 400 0.01 0.1 0.1  
 8 400 0.01 0.1 0.1  
 11 400 0.01 0.1 0.1  
 END IWAT-PARM2

IWAT-PARM3  
 <PLS > IWATER input info: Part 3 \*\*\*  
 # - # \*\*\* PETMAX PETMIN  
 1 0 0  
 8 0 0  
 11 0 0  
 END IWAT-PARM3

IWAT-STATE1  
 <PLS > \*\*\* Initial conditions at start of simulation  
 # - # \*\*\* RETS SURS  
 1 0 0  
 8 0 0  
 11 0 0  
 END IWAT-STATE1

END IMPLND

SCHEMATIC  
 <-Source-> <--Area--> <-Target-> MBLK \*\*\*  
 <Name> # <-factor-> <Name> # Tbl# \*\*\*  
 DOWNHILL OFFSITE\*\*\*  
 PERLND 4 0.15 RCHRES 1 2  
 PERLND 4 0.15 RCHRES 1 3  
 IMPLND 1 0.23 RCHRES 1 5  
 IMPLND 8 0.08 RCHRES 1 5  
 DOWNHILL ONSITE\*\*\*  
 PERLND 1 0.67 RCHRES 1 2  
 PERLND 1 0.67 RCHRES 1 3  
 PERLND 4 0.64 RCHRES 1 2  
 PERLND 4 0.64 RCHRES 1 3  
 PERLND 7 0.49 RCHRES 1 2  
 PERLND 7 0.49 RCHRES 1 3  
 IMPLND 11 0.68 RCHRES 1 5  
 \*\*\*\*\*Routing\*\*\*\*\*  
 PERLND 4 0.15 COPY 1 12  
 IMPLND 1 0.23 COPY 1 15

```

IMPLND 8 0.08 COPY 1 15
PERLND 4 0.15 COPY 1 13
PERLND 1 0.67 COPY 1 12
PERLND 4 0.64 COPY 1 12
PERLND 7 0.49 COPY 1 12
IMPLND 11 0.68 COPY 1 15
PERLND 1 0.67 COPY 1 13
PERLND 4 0.64 COPY 1 13
PERLND 7 0.49 COPY 1 13
RCHRES 1 1 RCHRES 2 8
RCHRES 2 1 COPY 501 17
RCHRES 1 1 COPY 501 17
END SCHEMATIC

```

#### NETWORK

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 48.4 DISPLY 1 INPUT TIMSER 1
GENER 2 OUTPUT TIMSER .0011111 RCHRES 1 EXTNL OUTDGT 1

```

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

```

#### RCHRES

##### GEN-INFO

```

RCHRES Name Nexits Unit Systems Printer ***
# - #<-----><----> User T-series Engl Metr LKFG ***
in out ***
1 Surface WNHILL S-010 2 1 1 1 28 0 1
2 DOWNHILL SWALE 2 1 1 1 28 0 1

```

##### END GEN-INFO

\*\*\* Section RCHRES\*\*\*

#### ACTIVITY

```

<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1 1 0 0 0 0 0 0 0 0
2 1 0 0 0 0 0 0 0 0

```

##### END ACTIVITY

#### PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1 4 0 0 0 0 0 0 0 0 0 1 9
2 4 0 0 0 0 0 0 0 0 0 1 9

```

##### END PRINT-INFO

#### HYDR-PARM1

```

RCHRES Flags for each HYDR Section ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each FUNCT for each
FG FG FG FG possible exit *** possible exit possible exit
* * * * * * * * * * * * * * * *
1 0 1 0 0 4 5 0 0 0 0 1 0 0 0 2 1 2 2 2
2 0 1 0 0 4 5 0 0 0 0 0 0 0 0 2 2 2 2 2

```

##### END HYDR-PARM1

#### HYDR-PARM2

```

# - # F'TABNO LEN DELTH STCOR KS DB50 ***
<-----><-----><-----><-----><-----><-----><-----> ***
1 1 0.01 0.0 0.0 0.0 0.0
2 2 0.07 0.0 0.0 0.0 0.0

```

##### END HYDR-PARM2

#### HYDR-INIT

```

RCHRES Initial conditions for each HYDR section ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->

```

```

      1          0          4.0  5.0  0.0  0.0  0.0          0.0  0.0  0.0  0.0  0.0
      2          0          4.0  5.0  0.0  0.0  0.0          0.0  0.0  0.0  0.0  0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***
***          addr
***          <----->
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
<****> <-----> <-----> <--> <-----><--><--><--><-----> <--> <--> <--> ***
UVQUAN vol2  RCHRES  2 VOL          4
UVQUAN v2m2  GLOBAL  WORKSP  1          3
UVQUAN vpo2  GLOBAL  WORKSP  2          3
UVQUAN v2d2  GENER  2 K          1          3
*** User-Defined Target Variable Names
***          addr or
***          <----->
*** kwd  varnam ct  vari  s1 s2 s3  frac oper          addr or
<****> <-----><--> <-----><--><--><--> <-----> <--> <-----><--><--><--> <-----> <-->
UVNAME v2m2  1 WORKSP  1          1.0 QUAN
UVNAME vpo2  1 WORKSP  2          1.0 QUAN
UVNAME v2d2  1 K          1          1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t  vnam  s1 s2 s3 ac quantity  tc  ts rp
<****><--><--><--><--><--> <--> <--> <--> <--><--><--><--><-----> <--> <--><-->
GENER  2          v2m2          = 23043.47
*** Compute remaining available pore space
GENER  2          vpo2          = v2m2
GENER  2          vpo2          -= vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
GENER  2          vpo2          = 0.0
END IF
*** Infiltration volume
GENER  2          v2d2          = vpo2
END SPEC-ACTIONS
FTABLES
FTABLE  2
62  5
Depth  Area  Volume  Outflow1  Outflow2  Velocity  Travel Time***
(ft)  (acres) (acre-ft) (cfs)  (cfs)  (ft/sec)  (Minutes)***
0.000000  0.420707  0.000000  0.000000  0.000000
0.065934  0.418148  0.006108  0.000000  0.000000
0.131868  0.414314  0.012319  0.000000  0.000000
0.197802  0.410488  0.018633  0.000000  0.011085
0.263736  0.406669  0.025050  0.000000  0.019793
0.329670  0.402858  0.031571  0.000000  0.023326
0.395604  0.399053  0.038196  0.000000  0.041833
0.461538  0.395256  0.044925  0.000000  0.067608
0.527473  0.391466  0.051758  0.000000  0.086269
0.593407  0.387683  0.058695  0.000000  0.101273
0.659341  0.383907  0.065737  0.000000  0.101273
0.725275  0.380139  0.072884  0.000000  0.101273
0.791209  0.376377  0.080136  0.000000  0.101273
0.857143  0.372623  0.087493  0.000000  0.101273
0.923077  0.368876  0.094956  0.000000  0.101273
0.989011  0.365136  0.102524  0.000000  0.101273
1.054945  0.361404  0.110198  0.000000  0.101273
1.120879  0.357678  0.117979  0.000000  0.101273
1.186813  0.353960  0.125866  0.000000  0.101273
1.252747  0.350249  0.133859  0.000000  0.101273
1.318681  0.346545  0.141959  0.000000  0.101273
1.384615  0.342848  0.150167  0.000000  0.101273
1.450549  0.339159  0.158481  0.000000  0.101273
1.516484  0.335476  0.166124  0.000000  0.101273
1.582418  0.331801  0.173865  0.000000  0.101273
1.648352  0.328133  0.181703  0.000000  0.101273
1.714286  0.324473  0.189640  0.000000  0.101273
1.780220  0.320819  0.197675  0.000000  0.101273
1.846154  0.317173  0.205808  0.000000  0.101273

```

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1.912088 | 0.313533 | 0.214040 | 0.000000 | 0.101273 |
| 1.978022 | 0.309901 | 0.222371 | 0.000000 | 0.101273 |
| 2.043956 | 0.306276 | 0.230802 | 0.000000 | 0.101273 |
| 2.109890 | 0.302659 | 0.239331 | 0.000000 | 0.101273 |
| 2.175824 | 0.299048 | 0.247960 | 0.000000 | 0.101273 |
| 2.241758 | 0.295445 | 0.256688 | 0.000000 | 0.101273 |
| 2.307692 | 0.291849 | 0.265517 | 0.000000 | 0.101273 |
| 2.373626 | 0.288260 | 0.274445 | 0.000000 | 0.101273 |
| 2.439560 | 0.284678 | 0.283474 | 0.000000 | 0.101273 |
| 2.505495 | 0.281104 | 0.292603 | 0.000000 | 0.101273 |
| 2.571429 | 0.277536 | 0.301833 | 0.000000 | 0.101273 |
| 2.637363 | 0.273976 | 0.311164 | 0.000000 | 0.101273 |
| 2.703297 | 0.270423 | 0.320596 | 0.000000 | 0.101273 |
| 2.769231 | 0.266877 | 0.330129 | 0.000000 | 0.101273 |
| 2.835165 | 0.263339 | 0.339763 | 0.000000 | 0.101273 |
| 2.901099 | 0.259807 | 0.349500 | 0.000000 | 0.101273 |
| 2.967033 | 0.256283 | 0.359338 | 0.000000 | 0.101273 |
| 3.032967 | 0.252766 | 0.369278 | 0.000000 | 0.101273 |
| 3.098901 | 0.249256 | 0.379320 | 0.000000 | 0.101273 |
| 3.164835 | 0.245753 | 0.389465 | 0.000000 | 0.101273 |
| 3.230769 | 0.242258 | 0.399712 | 0.000000 | 0.101273 |
| 3.296703 | 0.238770 | 0.410062 | 0.000000 | 0.101273 |
| 3.362637 | 0.235288 | 0.420515 | 0.000000 | 0.101273 |
| 3.428571 | 0.231815 | 0.431071 | 0.000000 | 0.101273 |
| 3.494505 | 0.228348 | 0.441731 | 0.000000 | 0.101273 |
| 3.560440 | 0.224888 | 0.452495 | 0.000000 | 0.101273 |
| 3.626374 | 0.221436 | 0.463362 | 0.000000 | 0.101273 |
| 3.692308 | 0.217991 | 0.474333 | 0.000000 | 0.101273 |
| 3.758242 | 0.214553 | 0.485408 | 0.000000 | 0.101273 |
| 3.824176 | 0.211122 | 0.496588 | 0.000000 | 0.101273 |
| 3.890110 | 0.207698 | 0.507873 | 0.000000 | 0.101273 |
| 3.956044 | 0.204282 | 0.519262 | 0.000000 | 0.101273 |
| 4.000000 | 0.200872 | 0.529005 | 0.000000 | 0.101273 |

END FTABLE 2

FTABLE 1

32 5

| Depth<br>(ft) | Area<br>(acres) | Volume<br>(acre-ft) | Outflow1<br>(cfs) | Outflow2<br>(cfs) | Velocity<br>(ft/sec) | Travel Time***<br>(Minutes)*** |
|---------------|-----------------|---------------------|-------------------|-------------------|----------------------|--------------------------------|
| 0.000000      | 0.200872        | 0.000000            | 0.000000          | 0.000000          |                      |                                |
| 0.065934      | 0.424552        | 0.027866            | 0.000000          | 2.430558          |                      |                                |
| 0.131868      | 0.428405        | 0.055985            | 0.000000          | 2.644233          |                      |                                |
| 0.197802      | 0.432264        | 0.084359            | 0.000000          | 2.751071          |                      |                                |
| 0.263736      | 0.436131        | 0.112987            | 0.000000          | 2.857908          |                      |                                |
| 0.329670      | 0.440005        | 0.141871            | 0.000000          | 2.964746          |                      |                                |
| 0.395604      | 0.443886        | 0.171010            | 0.000000          | 3.071584          |                      |                                |
| 0.461538      | 0.447774        | 0.200406            | 0.000000          | 3.178421          |                      |                                |
| 0.527473      | 0.451670        | 0.230058            | 0.000000          | 3.285259          |                      |                                |
| 0.593407      | 0.455573        | 0.259967            | 0.000000          | 3.392097          |                      |                                |
| 0.659341      | 0.459482        | 0.290133            | 0.000000          | 3.498934          |                      |                                |
| 0.725275      | 0.463400        | 0.320558            | 0.000000          | 3.605772          |                      |                                |
| 0.791209      | 0.467324        | 0.351241            | 0.000000          | 3.712610          |                      |                                |
| 0.857143      | 0.471255        | 0.382183            | 0.000000          | 3.819448          |                      |                                |
| 0.923077      | 0.475194        | 0.413385            | 0.000000          | 3.926285          |                      |                                |
| 0.989011      | 0.479140        | 0.444846            | 0.000000          | 4.033123          |                      |                                |
| 1.054945      | 0.483093        | 0.476568            | 0.113632          | 4.139961          |                      |                                |
| 1.120879      | 0.487053        | 0.508551            | 0.365247          | 4.246798          |                      |                                |
| 1.186813      | 0.491020        | 0.540795            | 0.670824          | 4.353636          |                      |                                |
| 1.252747      | 0.494995        | 0.573301            | 0.968497          | 4.460474          |                      |                                |
| 1.318681      | 0.498976        | 0.606070            | 1.202640          | 4.567311          |                      |                                |
| 1.384615      | 0.502965        | 0.639101            | 1.348651          | 4.674149          |                      |                                |
| 1.450549      | 0.506961        | 0.672395            | 1.468143          | 4.780987          |                      |                                |
| 1.516484      | 0.510965        | 0.705953            | 1.571901          | 4.887824          |                      |                                |
| 1.582418      | 0.514975        | 0.739775            | 1.669223          | 4.994662          |                      |                                |
| 1.648352      | 0.518993        | 0.773862            | 1.761174          | 5.101500          |                      |                                |
| 1.714286      | 0.523018        | 0.808214            | 1.848558          | 5.208337          |                      |                                |
| 1.780220      | 0.527050        | 0.842832            | 1.931993          | 5.315175          |                      |                                |
| 1.846154      | 0.531089        | 0.877715            | 2.011971          | 5.422013          |                      |                                |
| 1.912088      | 0.535135        | 0.912866            | 2.088889          | 5.528851          |                      |                                |
| 1.978022      | 0.539189        | 0.948283            | 2.163074          | 5.635688          |                      |                                |
| 2.000000      | 0.540542        | 0.960148            | 2.234797          | 5.671301          |                      |                                |

END FTABLE 1  
END FTABLES

# EXT SOURCES

| <-Volume-> | <Member> | SsysSgap<--Mult--> | Tran | <-Target           | vols> | <-Grp> | <-Member-> | *** |
|------------|----------|--------------------|------|--------------------|-------|--------|------------|-----|
| <Name>     | #        | <Name>             | #    | tem strg<-factor-> | strg  | <Name> | #          | #   |
| WDM        | 2        | PREC               | ENGL | 1                  |       | PERLND | 1          | 999 |
| WDM        | 2        | PREC               | ENGL | 1                  |       | IMPLND | 1          | 999 |
| WDM        | 1        | EVAP               | ENGL | 0.76               |       | PERLND | 1          | 999 |
| WDM        | 1        | EVAP               | ENGL | 0.76               |       | IMPLND | 1          | 999 |
| WDM        | 2        | PREC               | ENGL | 1                  |       | RCHRES | 1          |     |
| WDM        | 1        | EVAP               | ENGL | 0.5                |       | RCHRES | 1          |     |
| WDM        | 1        | EVAP               | ENGL | 0.76               |       | RCHRES | 2          |     |

END EXT SOURCES

# EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-> | <--Mult--> | Tran        | <-Volume-> | <Member> | Tsys | Tgap   | Amd  | ***  |
|------------|--------|------------|------------|-------------|------------|----------|------|--------|------|------|
| <Name>     | #      | <Name>     | #          | #<-factor-> | strg       | <Name>   | #    | <Name> | tem  | strg |
| RCHRES     | 2      | HYDR       | RO         | 1           | 1          | WDM      | 1000 | FLOW   | ENGL | REPL |
| RCHRES     | 2      | HYDR       | O          | 1           | 1          | WDM      | 1001 | FLOW   | ENGL | REPL |
| RCHRES     | 2      | HYDR       | O          | 2           | 1          | WDM      | 1002 | FLOW   | ENGL | REPL |
| RCHRES     | 2      | HYDR       | STAGE      | 1           | 1          | WDM      | 1003 | STAG   | ENGL | REPL |
| RCHRES     | 1      | HYDR       | STAGE      | 1           | 1          | WDM      | 1004 | STAG   | ENGL | REPL |
| RCHRES     | 1      | HYDR       | O          | 1           | 1          | WDM      | 1005 | FLOW   | ENGL | REPL |
| COPY       | 1      | OUTPUT     | MEAN       | 1           | 1          | WDM      | 701  | FLOW   | ENGL | REPL |
| COPY       | 501    | OUTPUT     | MEAN       | 1           | 1          | WDM      | 801  | FLOW   | ENGL | REPL |

END EXT TARGETS

# MASS-LINK

| <Volume>      | <-Grp> | <-Member-> | <--Mult--> | <Target>   | <-Grp> | <-Member-> | ***  |
|---------------|--------|------------|------------|------------|--------|------------|------|
| <Name>        | #      | <Name>     | #          | <-factor-> | <Name> | #          | #    |
| MASS-LINK     | 2      |            |            |            |        |            |      |
| PERLND        | PWATER | SURO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 2      |            |            |            |        |            |      |
| MASS-LINK     | 3      |            |            |            |        |            |      |
| PERLND        | PWATER | IFWO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 3      |            |            |            |        |            |      |
| MASS-LINK     | 5      |            |            |            |        |            |      |
| IMPLND        | IWATER | SURO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 5      |            |            |            |        |            |      |
| MASS-LINK     | 8      |            |            |            |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 2          |            | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 8      |            |            |            |        |            |      |
| MASS-LINK     | 12     |            |            |            |        |            |      |
| PERLND        | PWATER | SURO       |            | 0.083333   | COPY   | INPUT      | MEAN |
| END MASS-LINK | 12     |            |            |            |        |            |      |
| MASS-LINK     | 13     |            |            |            |        |            |      |
| PERLND        | PWATER | IFWO       |            | 0.083333   | COPY   | INPUT      | MEAN |
| END MASS-LINK | 13     |            |            |            |        |            |      |
| MASS-LINK     | 15     |            |            |            |        |            |      |
| IMPLND        | IWATER | SURO       |            | 0.083333   | COPY   | INPUT      | MEAN |
| END MASS-LINK | 15     |            |            |            |        |            |      |
| MASS-LINK     | 17     |            |            |            |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 1          |            | COPY   | INPUT      | MEAN |
| END MASS-LINK | 17     |            |            |            |        |            |      |

END MASS-LINK

END RUN







## *Disclaimer*

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*South BioRetention / Trench*

**WWHM2012**  
**PROJECT REPORT**

## *General Model Information*

Project Name: South Bioretention and Trench 05212020  
Site Name:  
Site Address:  
City:  
Report Date: 5/21/2020  
Gage: Fairgrounds (Kaiser)  
Data Start: 1955/10/01  
Data End: 2011/09/30  
Timestep: 15 Minute  
Precip Scale: 1.000  
Version Date: 2019/09/13  
Version: 4.2.17

## *POC Thresholds*

Low Flow Threshold for POC1: 50 Percent of the 2 Year  
High Flow Threshold for POC1: 50 Year

*Landuse Basin Data*  
*Predeveloped Land Use*

**SOUTHWEST BASIN**

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| A B, Forest, Flat   | 2.91 |
| Pervious Total      | 2.91 |
| Impervious Land Use | acre |
| Impervious Total    | 0    |
| Basin Total         | 2.91 |

|                   |           |             |
|-------------------|-----------|-------------|
| Element Flows To: |           |             |
| Surface           | Interflow | Groundwater |

## SOUTHEAST BASIN

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| A B, Forest, Flat   | 2.76 |
| Pervious Total      | 2.76 |
| Impervious Land Use | acre |
| Impervious Total    | 0    |
| Basin Total         | 2.76 |

|                   |           |             |
|-------------------|-----------|-------------|
| Element Flows To: |           |             |
| Surface           | Interflow | Groundwater |



## BUILDINGS L AND J

Bypass: No

GroundWater: No

Pervious Land Use acre  
A B, Forest, Flat 0.36

Pervious Total 0.36

Impervious Land Use acre

Impervious Total 0

Basin Total 0.36

|                   |           |             |
|-------------------|-----------|-------------|
| Element Flows To: |           |             |
| Surface           | Interflow | Groundwater |

## Mitigated Land Use

### SOUTHWEST BASIN

Bypass: No

GroundWater: No

Pervious Land Use acre

A B, Forest, Flat 0.24

A B, Pasture, Flat 1.2

A B, Lawn, Flat 0.43

Pervious Total 1.87

Impervious Land Use acre

PARKING FLAT 1.04

Impervious Total 1.04

Basin Total 2.91

Element Flows To:

Surface Interflow Groundwater

Surface retention 1 Surface retention 1

## SOUTHEAST BASIN

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| A B, Forest, Flat   | 2.76 |
| Pervious Total      | 2.76 |
| Impervious Land Use | acre |
| Impervious Total    | 0    |
| Basin Total         | 2.76 |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Surface retention 1 | Surface retention 1 |             |

## BULDINGS L AND J

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.36 |
| Impervious Total    | 0.36 |
| Basin Total         | 0.36 |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 1 | Gravel Trench Bed 1 |             |

*Routing Elements*  
*Predeveloped Routing*

## Mitigated Routing

### Bioretention 1

Bottom Length: 325.00 ft.  
 Bottom Width: 7.00 ft.  
 Material thickness of first layer: 1.5  
 Material type for first layer: SMMWW 12 in/hr  
 Material thickness of second layer: 2  
 Material type for second layer: GRAVEL  
 Material thickness of third layer: 0  
 Material type for third layer: GRAVEL  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 222.33  
 Total Volume Through Riser (ac-ft.): 0.437  
 Total Volume Through Facility (ac-ft.): 222.767  
 Percent Infiltrated: 99.8  
 Total Precip Applied to Facility: 19.086  
 Total Evap From Facility: 9.27  
 Underdrain not used  
 Discharge Structure  
 Riser Height: 0.5 ft.  
 Riser Diameter: 12 in.  
 Element Flows To:  
 Outlet 1      Outlet 2  
 Gravel Trench Bed 1

Bioretention Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.2224    | 0.0000         | 0.0000         | 0.0000      |
| 0.0495      | 0.2204    | 0.0012         | 0.0000         | 0.0000      |
| 0.0989      | 0.2179    | 0.0025         | 0.0000         | 0.0000      |
| 0.1484      | 0.2153    | 0.0038         | 0.0000         | 0.0000      |
| 0.1978      | 0.2128    | 0.0051         | 0.0000         | 0.0035      |
| 0.2473      | 0.2103    | 0.0065         | 0.0000         | 0.0050      |
| 0.2967      | 0.2078    | 0.0080         | 0.0000         | 0.0061      |
| 0.3462      | 0.2052    | 0.0095         | 0.0000         | 0.0095      |
| 0.3956      | 0.2027    | 0.0111         | 0.0000         | 0.0140      |
| 0.4451      | 0.2002    | 0.0127         | 0.0000         | 0.0196      |
| 0.4945      | 0.1977    | 0.0144         | 0.0000         | 0.0208      |
| 0.5440      | 0.1952    | 0.0161         | 0.0000         | 0.0264      |
| 0.5934      | 0.1927    | 0.0179         | 0.0000         | 0.0345      |
| 0.6429      | 0.1902    | 0.0197         | 0.0000         | 0.0440      |
| 0.6923      | 0.1877    | 0.0216         | 0.0000         | 0.0506      |
| 0.7418      | 0.1852    | 0.0235         | 0.0000         | 0.0550      |
| 0.7912      | 0.1827    | 0.0255         | 0.0000         | 0.0675      |
| 0.8407      | 0.1802    | 0.0275         | 0.0000         | 0.0816      |
| 0.8901      | 0.1778    | 0.0296         | 0.0000         | 0.0974      |
| 0.9396      | 0.1753    | 0.0318         | 0.0000         | 0.0975      |
| 0.9890      | 0.1728    | 0.0340         | 0.0000         | 0.1149      |
| 1.0385      | 0.1703    | 0.0362         | 0.0000         | 0.1342      |
| 1.0879      | 0.1679    | 0.0385         | 0.0000         | 0.1553      |
| 1.1374      | 0.1654    | 0.0409         | 0.0000         | 0.1636      |
| 1.1868      | 0.1630    | 0.0433         | 0.0000         | 0.1783      |
| 1.2363      | 0.1605    | 0.0457         | 0.0000         | 0.1843      |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 1.2857 | 0.1581 | 0.0483 | 0.0000 | 0.1843 |
| 1.3352 | 0.1556 | 0.0508 | 0.0000 | 0.1843 |
| 1.3846 | 0.1532 | 0.0534 | 0.0000 | 0.1843 |
| 1.4341 | 0.1508 | 0.0561 | 0.0000 | 0.1843 |
| 1.4835 | 0.1483 | 0.0589 | 0.0000 | 0.1843 |
| 1.5330 | 0.1459 | 0.0614 | 0.0000 | 0.1843 |
| 1.5824 | 0.1435 | 0.0640 | 0.0000 | 0.1843 |
| 1.6319 | 0.1411 | 0.0666 | 0.0000 | 0.1843 |
| 1.6813 | 0.1387 | 0.0693 | 0.0000 | 0.1843 |
| 1.7308 | 0.1363 | 0.0720 | 0.0000 | 0.1843 |
| 1.7802 | 0.1339 | 0.0747 | 0.0000 | 0.1843 |
| 1.8297 | 0.1314 | 0.0776 | 0.0000 | 0.1843 |
| 1.8791 | 0.1291 | 0.0804 | 0.0000 | 0.1843 |
| 1.9286 | 0.1267 | 0.0834 | 0.0000 | 0.1843 |
| 1.9780 | 0.1243 | 0.0863 | 0.0000 | 0.1843 |
| 2.0275 | 0.1219 | 0.0893 | 0.0000 | 0.1843 |
| 2.0769 | 0.1195 | 0.0924 | 0.0000 | 0.1843 |
| 2.1264 | 0.1171 | 0.0955 | 0.0000 | 0.1843 |
| 2.1758 | 0.1148 | 0.0987 | 0.0000 | 0.1843 |
| 2.2253 | 0.1124 | 0.1019 | 0.0000 | 0.1843 |
| 2.2747 | 0.1100 | 0.1052 | 0.0000 | 0.1843 |
| 2.3242 | 0.1077 | 0.1085 | 0.0000 | 0.1843 |
| 2.3736 | 0.1053 | 0.1119 | 0.0000 | 0.1843 |
| 2.4231 | 0.1030 | 0.1153 | 0.0000 | 0.1843 |
| 2.4725 | 0.1006 | 0.1188 | 0.0000 | 0.1843 |
| 2.5220 | 0.0983 | 0.1223 | 0.0000 | 0.1843 |
| 2.5714 | 0.0959 | 0.1259 | 0.0000 | 0.1843 |
| 2.6209 | 0.0936 | 0.1295 | 0.0000 | 0.1843 |
| 2.6703 | 0.0913 | 0.1332 | 0.0000 | 0.1843 |
| 2.7198 | 0.0889 | 0.1369 | 0.0000 | 0.1843 |
| 2.7692 | 0.0866 | 0.1407 | 0.0000 | 0.1843 |
| 2.8187 | 0.0843 | 0.1445 | 0.0000 | 0.1843 |
| 2.8681 | 0.0820 | 0.1484 | 0.0000 | 0.1843 |
| 2.9176 | 0.0797 | 0.1523 | 0.0000 | 0.1843 |
| 2.9670 | 0.0773 | 0.1563 | 0.0000 | 0.1843 |
| 3.0165 | 0.0750 | 0.1603 | 0.0000 | 0.1843 |
| 3.0659 | 0.0727 | 0.1644 | 0.0000 | 0.1843 |
| 3.1154 | 0.0704 | 0.1685 | 0.0000 | 0.1843 |
| 3.1648 | 0.0682 | 0.1727 | 0.0000 | 0.1843 |
| 3.2143 | 0.0659 | 0.1769 | 0.0000 | 0.1843 |
| 3.2637 | 0.0636 | 0.1812 | 0.0000 | 0.1843 |
| 3.3132 | 0.0613 | 0.1856 | 0.0000 | 0.1843 |
| 3.3626 | 0.0590 | 0.1900 | 0.0000 | 0.1843 |
| 3.4121 | 0.0568 | 0.1944 | 0.0000 | 0.1843 |
| 3.4615 | 0.0545 | 0.1989 | 0.0000 | 0.1843 |
| 3.5000 | 0.0522 | 0.2024 | 0.0000 | 0.1843 |

Bioretention Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac.-ft.) | Discharge(cfs) | To Amended(cfs) | Infiltr(cfs) |
|-------------|-----------|-----------------|----------------|-----------------|--------------|
| 3.5000      | 0.2224    | 0.2024          | 0.0000         | 0.6319          | 0.0000       |
| 3.5495      | 0.2250    | 0.2135          | 0.0000         | 0.6319          | 0.0000       |
| 3.5989      | 0.2275    | 0.2247          | 0.0000         | 0.6736          | 0.0000       |
| 3.6484      | 0.2301    | 0.2360          | 0.0000         | 0.6944          | 0.0000       |
| 3.6978      | 0.2326    | 0.2474          | 0.0000         | 0.7153          | 0.0000       |
| 3.7473      | 0.2352    | 0.2590          | 0.0000         | 0.7361          | 0.0000       |
| 3.7967      | 0.2378    | 0.2707          | 0.0000         | 0.7569          | 0.0000       |
| 3.8462      | 0.2403    | 0.2825          | 0.0000         | 0.7778          | 0.0000       |
| 3.8956      | 0.2429    | 0.2945          | 0.0000         | 0.7986          | 0.0000       |

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 3.9451 | 0.2455 | 0.3066 | 0.0000 | 0.8194 | 0.0000 |
| 3.9945 | 0.2481 | 0.3188 | 0.0000 | 0.8403 | 0.0000 |
| 4.0440 | 0.2507 | 0.3311 | 0.0977 | 0.8611 | 0.0000 |
| 4.0934 | 0.2533 | 0.3436 | 0.3014 | 0.8819 | 0.0000 |
| 4.1429 | 0.2559 | 0.3561 | 0.5635 | 0.9028 | 0.0000 |
| 4.1923 | 0.2585 | 0.3689 | 0.8600 | 0.9236 | 0.0000 |
| 4.2418 | 0.2611 | 0.3817 | 1.1671 | 0.9444 | 0.0000 |
| 4.2912 | 0.2637 | 0.3947 | 1.4606 | 0.9653 | 0.0000 |
| 4.3407 | 0.2663 | 0.4078 | 1.7188 | 0.9861 | 0.0000 |
| 4.3901 | 0.2689 | 0.4210 | 1.9255 | 1.0069 | 0.0000 |
| 4.4396 | 0.2715 | 0.4344 | 2.0761 | 1.0278 | 0.0000 |
| 4.4890 | 0.2742 | 0.4479 | 2.1826 | 1.0486 | 0.0000 |
| 4.5000 | 0.2747 | 0.4509 | 2.3112 | 1.0532 | 0.0000 |



Surface retention 1

Element Flows To:

|                     |                |
|---------------------|----------------|
| Outlet 1            | Outlet 2       |
| Gravel Trench Bed 1 | Bioretention 1 |

## Gravel Trench Bed 1

Bottom Length: 325.00 ft.  
 Bottom Width: 20.00 ft.  
 Trench bottom slope 1: 0.001 To 1  
 Trench Left side slope 0: 0.001 To 1  
 Trench right side slope 2: 0.001 To 1  
 Material thickness of first layer: 3  
 Pour Space of material for first layer: 0.4  
 Material thickness of second layer: 0  
 Pour Space of material for second layer: 0  
 Material thickness of third layer: 0  
 Pour Space of material for third layer: 0  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 73.218  
 Total Volume Through Riser (ac-ft.): 0  
 Total Volume Through Facility (ac-ft.): 73.218  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Discharge Structure  
 Riser Height: 3 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1                      Outlet 2

Gravel Trench Bed Hydraulic Table

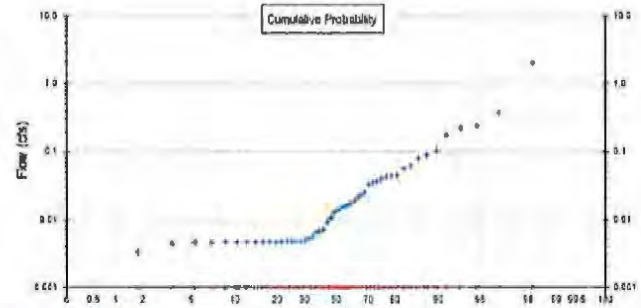
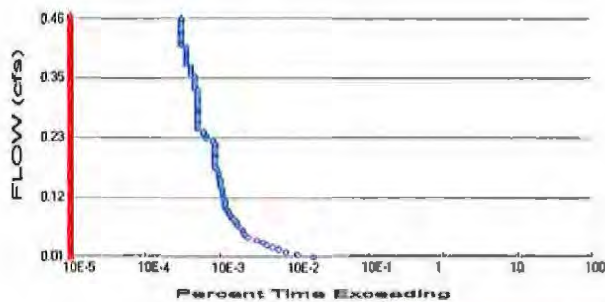
| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.149     | 0.000          | 0.000          | 0.000       |
| 0.0444      | 0.149     | 0.002          | 0.000          | 0.526       |
| 0.0889      | 0.149     | 0.005          | 0.000          | 0.526       |
| 0.1333      | 0.149     | 0.008          | 0.000          | 0.526       |
| 0.1778      | 0.149     | 0.010          | 0.000          | 0.526       |
| 0.2222      | 0.149     | 0.013          | 0.000          | 0.526       |
| 0.2667      | 0.149     | 0.015          | 0.000          | 0.526       |
| 0.3111      | 0.149     | 0.018          | 0.000          | 0.526       |
| 0.3556      | 0.149     | 0.021          | 0.000          | 0.526       |
| 0.4000      | 0.149     | 0.023          | 0.000          | 0.526       |
| 0.4444      | 0.149     | 0.026          | 0.000          | 0.526       |
| 0.4889      | 0.149     | 0.029          | 0.000          | 0.526       |
| 0.5333      | 0.149     | 0.031          | 0.000          | 0.526       |
| 0.5778      | 0.149     | 0.034          | 0.000          | 0.526       |
| 0.6222      | 0.149     | 0.037          | 0.000          | 0.526       |
| 0.6667      | 0.149     | 0.039          | 0.000          | 0.526       |
| 0.7111      | 0.149     | 0.042          | 0.000          | 0.526       |
| 0.7556      | 0.149     | 0.045          | 0.000          | 0.526       |
| 0.8000      | 0.149     | 0.047          | 0.000          | 0.526       |
| 0.8444      | 0.149     | 0.050          | 0.000          | 0.526       |
| 0.8889      | 0.149     | 0.053          | 0.000          | 0.526       |
| 0.9333      | 0.149     | 0.055          | 0.000          | 0.526       |
| 0.9778      | 0.149     | 0.058          | 0.000          | 0.526       |
| 1.0222      | 0.149     | 0.061          | 0.000          | 0.526       |
| 1.0667      | 0.149     | 0.063          | 0.000          | 0.526       |
| 1.1111      | 0.149     | 0.066          | 0.000          | 0.526       |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 1.1556 | 0.149 | 0.069 | 0.000 | 0.526 |
| 1.2000 | 0.149 | 0.071 | 0.000 | 0.526 |
| 1.2444 | 0.149 | 0.074 | 0.000 | 0.526 |
| 1.2889 | 0.149 | 0.076 | 0.000 | 0.526 |
| 1.3333 | 0.149 | 0.079 | 0.000 | 0.526 |
| 1.3778 | 0.149 | 0.082 | 0.000 | 0.526 |
| 1.4222 | 0.149 | 0.084 | 0.000 | 0.526 |
| 1.4667 | 0.149 | 0.087 | 0.000 | 0.526 |
| 1.5111 | 0.149 | 0.090 | 0.000 | 0.526 |
| 1.5556 | 0.149 | 0.092 | 0.000 | 0.526 |
| 1.6000 | 0.149 | 0.095 | 0.000 | 0.526 |
| 1.6444 | 0.149 | 0.098 | 0.000 | 0.526 |
| 1.6889 | 0.149 | 0.100 | 0.000 | 0.526 |
| 1.7333 | 0.149 | 0.103 | 0.000 | 0.526 |
| 1.7778 | 0.149 | 0.106 | 0.000 | 0.526 |
| 1.8222 | 0.149 | 0.108 | 0.000 | 0.526 |
| 1.8667 | 0.149 | 0.111 | 0.000 | 0.526 |
| 1.9111 | 0.149 | 0.114 | 0.000 | 0.526 |
| 1.9556 | 0.149 | 0.116 | 0.000 | 0.526 |
| 2.0000 | 0.149 | 0.119 | 0.000 | 0.526 |
| 2.0444 | 0.149 | 0.122 | 0.000 | 0.526 |
| 2.0889 | 0.149 | 0.124 | 0.000 | 0.526 |
| 2.1333 | 0.149 | 0.127 | 0.000 | 0.526 |
| 2.1778 | 0.149 | 0.130 | 0.000 | 0.526 |
| 2.2222 | 0.149 | 0.132 | 0.000 | 0.526 |
| 2.2667 | 0.149 | 0.135 | 0.000 | 0.526 |
| 2.3111 | 0.149 | 0.138 | 0.000 | 0.526 |
| 2.3556 | 0.149 | 0.140 | 0.000 | 0.526 |
| 2.4000 | 0.149 | 0.143 | 0.000 | 0.526 |
| 2.4444 | 0.149 | 0.145 | 0.000 | 0.526 |
| 2.4889 | 0.149 | 0.148 | 0.000 | 0.526 |
| 2.5333 | 0.149 | 0.151 | 0.000 | 0.526 |
| 2.5778 | 0.149 | 0.153 | 0.000 | 0.526 |
| 2.6222 | 0.149 | 0.156 | 0.000 | 0.526 |
| 2.6667 | 0.149 | 0.159 | 0.000 | 0.526 |
| 2.7111 | 0.149 | 0.161 | 0.000 | 0.526 |
| 2.7556 | 0.149 | 0.164 | 0.000 | 0.526 |
| 2.8000 | 0.149 | 0.167 | 0.000 | 0.526 |
| 2.8444 | 0.149 | 0.169 | 0.000 | 0.526 |
| 2.8889 | 0.149 | 0.172 | 0.000 | 0.526 |
| 2.9333 | 0.149 | 0.175 | 0.000 | 0.526 |
| 2.9778 | 0.149 | 0.177 | 0.000 | 0.526 |
| 3.0222 | 0.149 | 0.184 | 0.029 | 0.526 |
| 3.0667 | 0.149 | 0.191 | 0.151 | 0.526 |
| 3.1111 | 0.149 | 0.197 | 0.323 | 0.526 |
| 3.1556 | 0.149 | 0.204 | 0.523 | 0.526 |
| 3.2000 | 0.149 | 0.210 | 0.733 | 0.526 |
| 3.2444 | 0.149 | 0.217 | 0.933 | 0.526 |
| 3.2889 | 0.149 | 0.224 | 1.107 | 0.526 |
| 3.3333 | 0.149 | 0.230 | 1.242 | 0.526 |
| 3.3778 | 0.149 | 0.237 | 1.337 | 0.526 |
| 3.4222 | 0.149 | 0.244 | 1.421 | 0.526 |
| 3.4667 | 0.149 | 0.250 | 1.494 | 0.526 |
| 3.5111 | 0.149 | 0.257 | 1.563 | 0.526 |
| 3.5556 | 0.149 | 0.264 | 1.630 | 0.526 |
| 3.6000 | 0.149 | 0.270 | 1.694 | 0.526 |
| 3.6444 | 0.149 | 0.277 | 1.755 | 0.526 |
| 3.6889 | 0.149 | 0.283 | 1.815 | 0.526 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 3.7333 | 0.149 | 0.290 | 1.873 | 0.526 |
| 3.7778 | 0.149 | 0.297 | 1.929 | 0.526 |
| 3.8222 | 0.149 | 0.303 | 1.983 | 0.526 |
| 3.8667 | 0.149 | 0.310 | 2.036 | 0.526 |
| 3.9111 | 0.149 | 0.317 | 2.087 | 0.526 |
| 3.9556 | 0.149 | 0.323 | 2.138 | 0.526 |
| 4.0000 | 0.149 | 0.330 | 2.187 | 0.526 |

# Analysis Results

## POC 1



+ Predeveloped x Mitigated

### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 6.03  
Total Impervious Area: 0

### Mitigated Landuse Totals for POC #1

Total Pervious Area: 4.63  
Total Impervious Area: 1.4

Flow Frequency Method: Log Pearson Type III 17B

### Flow Frequency Return Periods for Predeveloped. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0.013831  |
| 5 year        | 0.048597  |
| 10 year       | 0.103209  |
| 25 year       | 0.2486    |
| 50 year       | 0.457788  |
| 100 year      | 0.816285  |

### Flow Frequency Return Periods for Mitigated. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0         |
| 5 year        | 0         |
| 10 year       | 0         |
| 25 year       | 0         |
| 50 year       | 0         |
| 100 year      | 0         |

## Annual Peaks

### Annual Peaks for Predeveloped and Mitigated. POC #1

| Year | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1956 | 0.042        | 0.000     |
| 1957 | 0.010        | 0.000     |
| 1958 | 0.007        | 0.000     |
| 1959 | 0.015        | 0.000     |
| 1960 | 0.014        | 0.000     |
| 1961 | 0.019        | 0.000     |
| 1962 | 0.005        | 0.000     |
| 1963 | 0.238        | 0.000     |
| 1964 | 0.060        | 0.000     |
| 1965 | 0.021        | 0.000     |

|      |       |       |
|------|-------|-------|
| 1966 | 0.005 | 0.000 |
| 1967 | 0.018 | 0.000 |
| 1968 | 0.006 | 0.000 |
| 1969 | 0.007 | 0.000 |
| 1970 | 0.013 | 0.000 |
| 1971 | 0.089 | 0.000 |
| 1972 | 0.079 | 0.000 |
| 1973 | 0.005 | 0.000 |
| 1974 | 0.034 | 0.000 |
| 1975 | 0.007 | 0.000 |
| 1976 | 0.039 | 0.000 |
| 1977 | 0.005 | 0.000 |
| 1978 | 0.032 | 0.000 |
| 1979 | 0.005 | 0.000 |
| 1980 | 0.005 | 0.000 |
| 1981 | 0.100 | 0.000 |
| 1982 | 0.172 | 0.000 |
| 1983 | 0.009 | 0.000 |
| 1984 | 0.013 | 0.000 |
| 1985 | 0.005 | 0.000 |
| 1986 | 0.017 | 0.000 |
| 1987 | 0.037 | 0.000 |
| 1988 | 0.005 | 0.000 |
| 1989 | 0.005 | 0.000 |
| 1990 | 0.006 | 0.000 |
| 1991 | 0.371 | 0.000 |
| 1992 | 1.994 | 0.000 |
| 1993 | 0.227 | 0.000 |
| 1994 | 0.005 | 0.000 |
| 1995 | 0.015 | 0.000 |
| 1996 | 0.043 | 0.000 |
| 1997 | 0.025 | 0.000 |
| 1998 | 0.005 | 0.000 |
| 1999 | 0.005 | 0.000 |
| 2000 | 0.003 | 0.000 |
| 2001 | 0.003 | 0.000 |
| 2002 | 0.005 | 0.000 |
| 2003 | 0.044 | 0.000 |
| 2004 | 0.055 | 0.000 |
| 2005 | 0.005 | 0.000 |
| 2006 | 0.005 | 0.000 |
| 2007 | 0.005 | 0.000 |
| 2008 | 0.004 | 0.000 |
| 2009 | 0.011 | 0.000 |
| 2010 | 0.016 | 0.000 |
| 2011 | 0.023 | 0.000 |

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

| Rank | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1    | 1.9939       | 0.0000    |
| 2    | 0.3709       | 0.0000    |
| 3    | 0.2381       | 0.0000    |
| 4    | 0.2265       | 0.0000    |
| 5    | 0.1724       | 0.0000    |
| 6    | 0.1003       | 0.0000    |
| 7    | 0.0893       | 0.0000    |
| 8    | 0.0786       | 0.0000    |

|    |        |        |
|----|--------|--------|
| 9  | 0.0601 | 0.0000 |
| 10 | 0.0555 | 0.0000 |
| 11 | 0.0441 | 0.0000 |
| 12 | 0.0431 | 0.0000 |
| 13 | 0.0417 | 0.0000 |
| 14 | 0.0394 | 0.0000 |
| 15 | 0.0365 | 0.0000 |
| 16 | 0.0341 | 0.0000 |
| 17 | 0.0324 | 0.0000 |
| 18 | 0.0252 | 0.0000 |
| 19 | 0.0228 | 0.0000 |
| 20 | 0.0212 | 0.0000 |
| 21 | 0.0188 | 0.0000 |
| 22 | 0.0177 | 0.0000 |
| 23 | 0.0172 | 0.0000 |
| 24 | 0.0159 | 0.0000 |
| 25 | 0.0155 | 0.0000 |
| 26 | 0.0150 | 0.0000 |
| 27 | 0.0140 | 0.0000 |
| 28 | 0.0135 | 0.0000 |
| 29 | 0.0130 | 0.0000 |
| 30 | 0.0109 | 0.0000 |
| 31 | 0.0104 | 0.0000 |
| 32 | 0.0092 | 0.0000 |
| 33 | 0.0072 | 0.0000 |
| 34 | 0.0069 | 0.0000 |
| 35 | 0.0068 | 0.0000 |
| 36 | 0.0065 | 0.0000 |
| 37 | 0.0055 | 0.0000 |
| 38 | 0.0053 | 0.0000 |
| 39 | 0.0049 | 0.0000 |
| 40 | 0.0049 | 0.0000 |
| 41 | 0.0048 | 0.0000 |
| 42 | 0.0048 | 0.0000 |
| 43 | 0.0048 | 0.0000 |
| 44 | 0.0048 | 0.0000 |
| 45 | 0.0048 | 0.0000 |
| 46 | 0.0048 | 0.0000 |
| 47 | 0.0048 | 0.0000 |
| 48 | 0.0048 | 0.0000 |
| 49 | 0.0048 | 0.0000 |
| 50 | 0.0048 | 0.0000 |
| 51 | 0.0048 | 0.0000 |
| 52 | 0.0047 | 0.0000 |
| 53 | 0.0046 | 0.0000 |
| 54 | 0.0043 | 0.0000 |
| 55 | 0.0033 | 0.0000 |
| 56 | 0.0032 | 0.0000 |

## Duration Flows

The Facility PASSED

| Flow(cfs) | Predev | Mit | Percentage | Pass/Fail |
|-----------|--------|-----|------------|-----------|
| 0.0069    | 347    | 0   | 0          | Pass      |
| 0.0115    | 210    | 0   | 0          | Pass      |
| 0.0160    | 146    | 0   | 0          | Pass      |
| 0.0206    | 115    | 0   | 0          | Pass      |
| 0.0251    | 97     | 0   | 0          | Pass      |
| 0.0297    | 83     | 0   | 0          | Pass      |
| 0.0342    | 72     | 0   | 0          | Pass      |
| 0.0388    | 60     | 0   | 0          | Pass      |
| 0.0433    | 46     | 0   | 0          | Pass      |
| 0.0479    | 41     | 0   | 0          | Pass      |
| 0.0525    | 40     | 0   | 0          | Pass      |
| 0.0570    | 39     | 0   | 0          | Pass      |
| 0.0616    | 36     | 0   | 0          | Pass      |
| 0.0661    | 33     | 0   | 0          | Pass      |
| 0.0707    | 32     | 0   | 0          | Pass      |
| 0.0752    | 31     | 0   | 0          | Pass      |
| 0.0798    | 28     | 0   | 0          | Pass      |
| 0.0843    | 27     | 0   | 0          | Pass      |
| 0.0889    | 26     | 0   | 0          | Pass      |
| 0.0934    | 25     | 0   | 0          | Pass      |
| 0.0980    | 24     | 0   | 0          | Pass      |
| 0.1026    | 23     | 0   | 0          | Pass      |
| 0.1071    | 23     | 0   | 0          | Pass      |
| 0.1117    | 23     | 0   | 0          | Pass      |
| 0.1162    | 22     | 0   | 0          | Pass      |
| 0.1208    | 22     | 0   | 0          | Pass      |
| 0.1253    | 21     | 0   | 0          | Pass      |
| 0.1299    | 21     | 0   | 0          | Pass      |
| 0.1344    | 21     | 0   | 0          | Pass      |
| 0.1390    | 20     | 0   | 0          | Pass      |
| 0.1435    | 20     | 0   | 0          | Pass      |
| 0.1481    | 20     | 0   | 0          | Pass      |
| 0.1527    | 20     | 0   | 0          | Pass      |
| 0.1572    | 19     | 0   | 0          | Pass      |
| 0.1618    | 19     | 0   | 0          | Pass      |
| 0.1663    | 19     | 0   | 0          | Pass      |
| 0.1709    | 18     | 0   | 0          | Pass      |
| 0.1754    | 17     | 0   | 0          | Pass      |
| 0.1800    | 17     | 0   | 0          | Pass      |
| 0.1845    | 17     | 0   | 0          | Pass      |
| 0.1891    | 17     | 0   | 0          | Pass      |
| 0.1936    | 17     | 0   | 0          | Pass      |
| 0.1982    | 17     | 0   | 0          | Pass      |
| 0.2027    | 17     | 0   | 0          | Pass      |
| 0.2073    | 17     | 0   | 0          | Pass      |
| 0.2119    | 17     | 0   | 0          | Pass      |
| 0.2164    | 17     | 0   | 0          | Pass      |
| 0.2210    | 17     | 0   | 0          | Pass      |
| 0.2255    | 16     | 0   | 0          | Pass      |
| 0.2301    | 13     | 0   | 0          | Pass      |
| 0.2346    | 13     | 0   | 0          | Pass      |
| 0.2392    | 12     | 0   | 0          | Pass      |
| 0.2437    | 12     | 0   | 0          | Pass      |



|        |    |   |   |      |
|--------|----|---|---|------|
| 0.2483 | 10 | 0 | 0 | Pass |
| 0.2528 | 10 | 0 | 0 | Pass |
| 0.2574 | 10 | 0 | 0 | Pass |
| 0.2620 | 10 | 0 | 0 | Pass |
| 0.2665 | 10 | 0 | 0 | Pass |
| 0.2711 | 10 | 0 | 0 | Pass |
| 0.2756 | 10 | 0 | 0 | Pass |
| 0.2802 | 10 | 0 | 0 | Pass |
| 0.2847 | 10 | 0 | 0 | Pass |
| 0.2893 | 10 | 0 | 0 | Pass |
| 0.2938 | 10 | 0 | 0 | Pass |
| 0.2984 | 10 | 0 | 0 | Pass |
| 0.3029 | 10 | 0 | 0 | Pass |
| 0.3075 | 10 | 0 | 0 | Pass |
| 0.3121 | 10 | 0 | 0 | Pass |
| 0.3166 | 10 | 0 | 0 | Pass |
| 0.3212 | 10 | 0 | 0 | Pass |
| 0.3257 | 9  | 0 | 0 | Pass |
| 0.3303 | 9  | 0 | 0 | Pass |
| 0.3348 | 9  | 0 | 0 | Pass |
| 0.3394 | 9  | 0 | 0 | Pass |
| 0.3439 | 9  | 0 | 0 | Pass |
| 0.3485 | 9  | 0 | 0 | Pass |
| 0.3530 | 8  | 0 | 0 | Pass |
| 0.3576 | 8  | 0 | 0 | Pass |
| 0.3621 | 8  | 0 | 0 | Pass |
| 0.3667 | 8  | 0 | 0 | Pass |
| 0.3713 | 7  | 0 | 0 | Pass |
| 0.3758 | 7  | 0 | 0 | Pass |
| 0.3804 | 7  | 0 | 0 | Pass |
| 0.3849 | 7  | 0 | 0 | Pass |
| 0.3895 | 7  | 0 | 0 | Pass |
| 0.3940 | 7  | 0 | 0 | Pass |
| 0.3986 | 7  | 0 | 0 | Pass |
| 0.4031 | 7  | 0 | 0 | Pass |
| 0.4077 | 6  | 0 | 0 | Pass |
| 0.4122 | 6  | 0 | 0 | Pass |
| 0.4168 | 6  | 0 | 0 | Pass |
| 0.4214 | 6  | 0 | 0 | Pass |
| 0.4259 | 6  | 0 | 0 | Pass |
| 0.4305 | 6  | 0 | 0 | Pass |
| 0.4350 | 6  | 0 | 0 | Pass |
| 0.4396 | 6  | 0 | 0 | Pass |
| 0.4441 | 6  | 0 | 0 | Pass |
| 0.4487 | 6  | 0 | 0 | Pass |
| 0.4532 | 6  | 0 | 0 | Pass |
| 0.4578 | 6  | 0 | 0 | Pass |

## Water Quality

### Water Quality BMP Flow and Volume for POC #1

|                                |             |
|--------------------------------|-------------|
| On-line facility volume:       | 0 acre-feet |
| On-line facility target flow:  | 0 cfs.      |
| Adjusted for 15 min:           | 0 cfs.      |
| Off-line facility target flow: | 0 cfs.      |
| Adjusted for 15 min:           | 0 cfs.      |

## LID Report

| LID Technique                                          | Used for Treatment ?     | Total Volume Needs Treatment (ac-ft) | Volume Through Facility (ac-ft) | Infiltration Volume (ac-ft) | Cumulative Volume Infiltration Credit | Percent Volume Infiltrated | Water Quality | Percent Water Quality Treated | Comment                           |
|--------------------------------------------------------|--------------------------|--------------------------------------|---------------------------------|-----------------------------|---------------------------------------|----------------------------|---------------|-------------------------------|-----------------------------------|
| Gravel Trench Bed 1 POC                                | <input type="checkbox"/> | 66.63                                |                                 |                             | <input type="checkbox"/>              | 100.00                     |               |                               |                                   |
| retention 1                                            | <input type="checkbox"/> | 202.72                               |                                 |                             | <input type="checkbox"/>              | 99.80                      |               |                               |                                   |
| Total Volume Infiltrated                               |                          | 269.35                               | 0.00                            | 0.00                        |                                       | 99.85                      | 0.00          | 0%                            | No Treat. Credit                  |
| Compliance with LID Standard 8% of 2-yr to 50% of 2-yr |                          |                                      |                                 |                             |                                       |                            |               |                               | Duration Analysis Result = Passed |
|                                                        |                          |                                      |                                 |                             |                                       |                            |               |                               |                                   |

## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.



**SOUTH  
BASIN  
2.91ac**

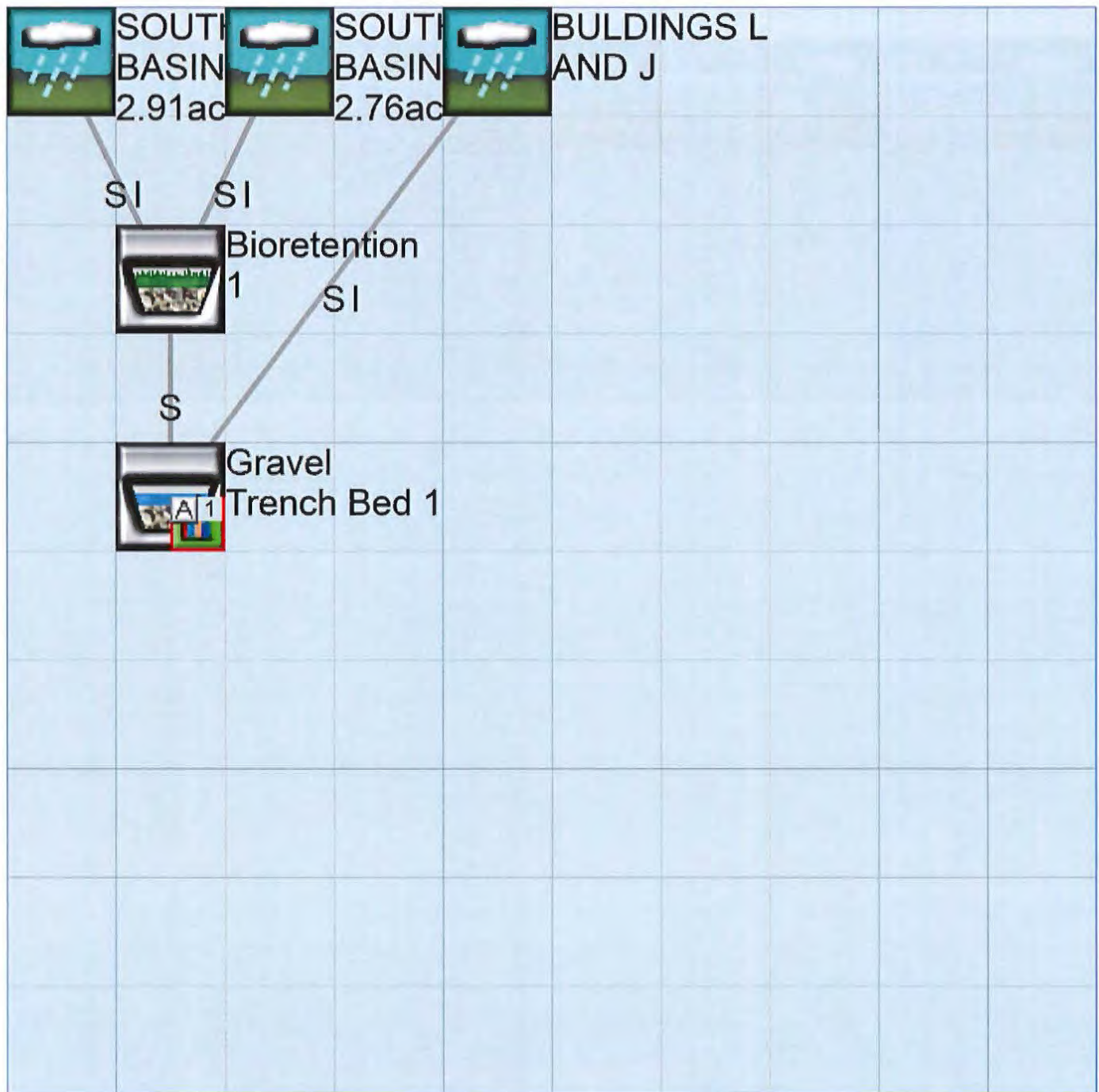


**SOUTH  
BASIN  
2.76ac**



BUILDINGS  
LAND J  
0.36ac

## Mitigated Schematic





## Predeveloped UCI File

RUN

GLOBAL

```
WWM4 model simulation
START      1955 10 01      END      2011 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME      0 RUN      1      UNIT SYSTEM      1
END GLOBAL
```

FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26      South Bioretention and Trench 05212020.wdm
MESSU    25      PreSouth Bioretention and Trench 05212020.MES
          27      PreSouth Bioretention and Trench 05212020.L61
          28      PreSouth Bioretention and Trench 05212020.L62
          30      POCSouth Bioretention and Trench 052120201.dat
END FILES
```

OPN SEQUENCE

```
INGRP      INDELT 00:15
  PERLND      1
  COPY      501
  DISPLY      1
END INGRP
```

END OPN SEQUENCE

DISPLY

```
DISPLY-INFO1
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      SOUTHWEST BASIN      MAX      1      2      30      9
END DISPLY-INFO1
```

END DISPLY

COPY

```
TIMESERIES
# - # NPT NMN ***
1      1      1
501      1      1
END TIMESERIES
```

END COPY

GENER

```
OPCODE
#      # OPCODE ***
END OPCODE
PARM
#      #      K ***
END PARM
```

END GENER

PERLND

```
GEN-INFO
<PLS ><-----Name----->NBLKS      Unit-systems      Printer ***
# - #      User t-series Engr Metr ***
          in out      ***
1      A/B, Forest, Flat      1      1      1      1      27      0
END GEN-INFO
*** Section PWATER***
```

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
1      0      0      1      0      0      0      0      0      0      0      0      0
END ACTIVITY
```

PRINT- INFO

```
<PLS > ***** Print-flags ***** PIVL FYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
1      0      0      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO
```

```

PWAT-PARM1
  <PLS > PWATER variable monthly parameter value flags ***
  # - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
  1      0      0      0      0      0      0      0      0      0      0
END PWAT-PARM1

PWAT-PARM2
  <PLS > PWATER input info: Part 2 ***
  # - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
  1      0      5      2      400      0.05      0.3      0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS > PWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
  1      0      0      2      2      0      0      0
END PWAT-PARM3

PWAT-PARM4
  <PLS > PWATER input info: Part 4 ***
  # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
  1      0.2      0.5      0.35      0      0.7      0.7
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
  1      0      0      0      0      3      1      0
END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
  <PLS ><-----Name-----> Unit-systems Printer ***
  # - # User t-series Engl Metr ***
  in out ***
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
  <ILS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
  <PLS > IWATER variable monthly parameter value flags ***
  # - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
  <PLS > IWATER input info: Part 2 ***
  # - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
  <PLS > IWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  # - # *** RETS SURS
END IWAT-STATE1

```



```

SCHEMATIC
<-Source->                <--Area-->      <-Target->      MBLK      ***
<Name>   #                <-factor->      <Name>   #      Tbl#      ***
SOUTHWEST BASIN***
PERLND   1                2.91            COPY    501      12
PERLND   1                2.91            COPY    501      13
SOUTHEAST BASIN***
PERLND   1                2.76            COPY    501      12
PERLND   1                2.76            COPY    501      13
BUILDINGS L AND J***
PERLND   1                0.36            COPY    501      12
PERLND   1                0.36            COPY    501      13

*****Routing*****
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #   #   <Name> # #   ***
COPY    501 OUTPUT MEAN   1 1   48.4      DISPLY   1     INPUT  TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #   #   <Name> # #   ***
END NETWORK

RCHRES
GEN-INFO
RCHRES      Name      Nexits   Unit Systems   Printer      ***
# - #<-----><----> User T-series   Engl Metr LKFG      ***
                        in out      ***
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL   PYR
# - # HYDR ADCA CONS HEAT SED  GQL OXRX NUTR PLNK PHCB PIVL   PYR *****
END PRINT-INFO

HYDR-PARM1
RCHRES  Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each  FUNCT for each
      FG FG FG FG possible exit *** possible exit    possible exit
      * * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
END HYDR-PARM2
HYDR-INIT
RCHRES  Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

```

## EXT SOURCES

| <-Volume-> | <Member> | SsysSgap<--Mult--> | Tran | <-Target           | vols> | <-Grp> | <-Member-> | *** |
|------------|----------|--------------------|------|--------------------|-------|--------|------------|-----|
| <Name>     | #        | <Name>             | #    | tem strg<-factor-> | strg  | <Name> | #          | #   |
| WDM        | 2        | PREC               | ENGL | 1                  |       | PERLND | 1          | 999 |
| WDM        | 2        | PREC               | ENGL | 1                  |       | IMPLND | 1          | 999 |
| WDM        | 1        | EVAP               | ENGL | 0.76               |       | PERLND | 1          | 999 |
| WDM        | 1        | EVAP               | ENGL | 0.76               |       | IMPLND | 1          | 999 |

END EXT SOURCES

## EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-><--Mult--> | Tran | <-Volume-> | <Member> | Tsys     | Tgap | Amd  | *** |
|------------|--------|----------------------|------|------------|----------|----------|------|------|-----|
| <Name>     | #      | <Name>               | #    | <Name>     | #        | tem strg | strg | strg | *** |
| COPY       | 501    | OUTPUT               | MEAN | 1          | 1        | 48.4     |      |      |     |
| WDM        | 501    | FLOW                 | ENGL |            |          |          |      |      |     |

END EXT TARGETS

## MASS-LINK

| <Volume>      | <-Grp> | <-Member-><--Mult--> | <Target> | <-Grp> | <-Member->*** |
|---------------|--------|----------------------|----------|--------|---------------|
| <Name>        | #      | <Name>               | #        | <Name> | #             |
| MASS-LINK     | 12     |                      |          |        |               |
| PERLND        | PWATER | SURO                 | 0.083333 | COPY   | INPUT         |
| END MASS-LINK | 12     |                      |          |        |               |
| MASS-LINK     | 13     |                      |          |        |               |
| PERLND        | PWATER | IFWO                 | 0.083333 | COPY   | INPUT         |
| END MASS-LINK | 13     |                      |          |        |               |

END MASS-LINK

END RUN

## Mitigated UCI File

RUN

### GLOBAL

```
WWM4 model simulation
START 1955 10 01      END 2011 09 30
RUN INTERP OUTPUT LEVEL 3 0
RESUME 0 RUN 1      UNIT SYSTEM 1
END GLOBAL
```

### FILES

```
<File> <Un#> <-----File Name----->***
<-ID-> ***
WDM 26 South Bioretention and Trench 05212020.wdm
MESSU 25 MitSouth Bioretention and Trench 05212020.MES
      27 MitSouth Bioretention and Trench 05212020.L61
      28 MitSouth Bioretention and Trench 05212020.L62
      30 POCSouth Bioretention and Trench 052120201.dat
END FILES
```

### OPN SEQUENCE

INGRP INDELT 00:15

```
PERLND 1
PERLND 4
PERLND 7
IMPLND 11
IMPLND 4
GENER 2
RCHRES 1
RCHRES 2
RCHRES 3
COPY 1
COPY 501
DISPLY 1
```

END INGRP

### END OPN SEQUENCE

### DISPLY

#### DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
1 Gravel Trench Bed 1 MAX 1 2 30 9
```

END DISPLY-INFO1

### END DISPLY

### COPY

#### TIMESERIES

```
# - # NPT NMN ***
1 1 1
501 1 1
```

END TIMESERIES

### END COPY

### GENER

#### OPCODE

```
# # OPCODE ***
2 24
```

END OPCODE

#### PARM

```
# # K ***
2 0.
```

END PARM

### END GENER

### PERLND

#### GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
# - # User t-series Engr Metr ***
          in out ***
1 A/B, Forest, Flat 1 1 1 1 27 0
4 A/B, Pasture, Flat 1 1 1 1 27 0
7 A/B, Lawn, Flat 1 1 1 1 27 0
```

END GEN-INFO

\*\*\* Section PWATER\*\*\*

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
1      0      0      1      0      0      0      0      0      0      0      0      0
4      0      0      1      0      0      0      0      0      0      0      0      0
7      0      0      1      0      0      0      0      0      0      0      0      0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
1      0      0      4      0      0      0      0      0      0      0      0      1      9
4      0      0      4      0      0      0      0      0      0      0      0      1      9
7      0      0      4      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
1      0      0      0      0      0      0      0      0      0      0      0
4      0      0      0      0      0      0      0      0      0      0      0
7      0      0      0      0      0      0      0      0      0      0      0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
1      0      5      2      400      0.05      0.3      0.996
4      0      5      1.5      400      0.05      0.3      0.996
7      0      5      0.8      400      0.05      0.3      0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
1      0      0      2      2      0      0      0
4      0      0      2      2      0      0      0
7      0      0      2      2      0      0      0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
1      0.2      0.5      0.35      0      0.7      0.7
4      0.15      0.5      0.3      0      0.7      0.4
7      0.1      0.5      0.25      0      0.7      0.25
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
1      0      0      0      0      3      1      0
4      0      0      0      0      3      1      0
7      0      0      0      0      3      1      0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***
11      PARKING/FLAT      1      1      1      27      0
4      ROOF TOPS/FLAT      1      1      1      27      0
END GEN-INFO
*** Section IWATER***

ACTIVITY

```

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
11      0      0      1      0      0      0
4        0      0      1      0      0      0
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
11      0      0      4      0      0      0      1      9
4        0      0      4      0      0      0      1      9
END PRINT-INFO

IWAT-PARM1
<PLS > I WATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
11      0      0      0      0      0
4        0      0      0      0      0
END IWAT-PARM1

IWAT-PARM2
<PLS > I WATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
11      400      0.01      0.1      0.1
4        400      0.01      0.1      0.1
END IWAT-PARM2

IWAT-PARM3
<PLS > I WATER input info: Part 3 ***
# - # ***PETMAX PETMIN
11      0      0
4        0      0
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
11      0      0
4        0      0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->
<Name> #
SOUTHWEST BASIN***
PERLND 1 0.24 RCHRES 1 2
PERLND 1 0.24 RCHRES 1 3
PERLND 4 1.2 RCHRES 1 2
PERLND 4 1.2 RCHRES 1 3
PERLND 7 0.43 RCHRES 1 2
PERLND 7 0.43 RCHRES 1 3
IMPLND 11 1.04 RCHRES 1 5
SOUTHEAST BASIN***
PERLND 1 2.76 RCHRES 1 2
PERLND 1 2.76 RCHRES 1 3
BUILDINGS L AND J***
IMPLND 4 0.36 RCHRES 3 5

*****Routing*****
RCHRES 2 1 RCHRES 3 7
RCHRES 2 COPY 1 17
RCHRES 1 1 RCHRES 3 7
RCHRES 1 COPY 1 17
RCHRES 1 1 RCHRES 2 8
IMPLND 4 0.36 COPY 1 15
RCHRES 3 1 COPY 501 17
END SCHEMATIC

```

```

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 48.4 DISPLY 1 INPUT TIMSER 1
GENER 2 OUTPUT TIMSER .0011111 RCHRES 1 EXTNL OUTDGT 1

```

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

```

# RCHRES

## GEN-INFO

```

RCHRES      Name      Nexits      Unit Systems      Printer      ***
# - #<-----><----> User T-series Engl Metr LKFG      ***
              in out
1      Surface retentio-010      2      1      1      1      28      0      1
2      Bioretention 1      2      1      1      1      28      0      1
3      Gravel Trench Be-011      2      1      1      1      28      0      1

```

END GEN-INFO

\*\*\* Section RCHRES\*\*\*

## ACTIVITY

```

<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1      1      0      0      0      0      0      0      0      0      0
2      1      0      0      0      0      0      0      0      0      0
3      1      0      0      0      0      0      0      0      0      0

```

END ACTIVITY

## PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1      4      0      0      0      0      0      0      0      0      0      1      9
2      4      0      0      0      0      0      0      0      0      0      1      9
3      4      0      0      0      0      0      0      0      0      0      1      9

```

END PRINT-INFO

## HYDR-PARM1

```

RCHRES      Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each      FUNCT for each
      FG FG FG FG possible exit *** possible exit      possible exit
      * * * * * * * * * * * * * * * * * * * * * *
1      0 1 0 0      4 5 0 0 0      0 1 0 0 0      2 1 2 2 2
2      0 1 0 0      4 5 0 0 0      0 0 0 0 0      2 2 2 2 2
3      0 1 0 0      4 5 0 0 0      0 0 0 0 0      2 2 2 2 2

```

END HYDR-PARM1

## HYDR-PARM2

```

# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
1      1      0.01      0.0      0.0      0.0      0.0
2      2      0.06      0.0      0.0      0.0      0.0
3      3      0.06      0.0      0.0      0.5      0.0

```

END HYDR-PARM2

## HYDR-INIT

```

RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><----->      <-----><-----><-----><-----> *** <-----><-----><-----><----->
1      0      4.0 5.0 0.0 0.0 0.0      0.0 0.0 0.0 0.0 0.0
2      0      4.0 5.0 0.0 0.0 0.0      0.0 0.0 0.0 0.0 0.0
3      0      4.0 5.0 0.0 0.0 0.0      0.0 0.0 0.0 0.0 0.0

```

END HYDR-INIT

END RCHRES

## SPEC-ACTIONS

```

*** User-Defined Variable Quantity Lines
***      addr

```

```

***
*** kwd varnam optyp opn vari s1 s2 s3 tp multiply lc ls ac as agfn ***
<****> <-----> <-----> <-> <-----><-><-><-><-><-----> <><-> <><-> <---> ***
UVQUAN vol2 RCHRES 2 VOL 4
UVQUAN v2m2 GLOBAL WORKSP 1 3
UVQUAN vpo2 GLOBAL WORKSP 2 3
UVQUAN v2d2 GENER 2 K 1 3
*** User-Defined Target Variable Names
*** addr or addr or
*** <-----> <----->
*** kwd varnam ct vari s1 s2 s3 frac oper vari s1 s2 s3 frac oper
<****> <-----><-> <-----><-><-><-> <-----> <---> <-----><-><-><-> <-----> <--->
UVNAME v2m2 1 WORKSP 1 1.0 QUAN
UVNAME vpo2 1 WORKSP 2 1.0 QUAN
UVNAME v2d2 1 K 1 1.0 QUAN
*** opt foplop dcdts yr mo dy hr mn d t vnam s1 s2 s3 ac quantity tc ts rp
<****><-><-><-><-><-><-> <> <> <> <><><> <-----><-><-><-><-><-><-> <> <-><->
GENER 2 v2m2 = 8984.42
*** Compute remaining available pore space
GENER 2 vpo2 = v2m2
GENER 2 vpo2 -= vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
GENER 2 vpo2 = 0.0
END IF
*** Infiltration volume
GENER 2 v2d2 = vpo2
END SPEC-ACTIONS
FTABLES
FTABLE 2
72 5
Depth Area Volume Outflow1 Outflow2 Velocity Travel Time***
(ft) (acres) (acre-ft) (cfs) (cfs) (ft/sec) (Minutes)***
0.000000 0.222406 0.000000 0.000000 0.000000
0.049451 0.220426 0.001207 0.000000 0.000000
0.098901 0.217883 0.002465 0.000000 0.000000
0.148352 0.215345 0.003774 0.000000 0.000000
0.197802 0.212811 0.005134 0.000000 0.003541
0.247253 0.210281 0.006546 0.000000 0.005020
0.296703 0.207755 0.008010 0.000000 0.006065
0.346154 0.205233 0.009525 0.000000 0.009506
0.395604 0.202715 0.011093 0.000000 0.013976
0.445055 0.200201 0.012712 0.000000 0.019576
0.494505 0.197691 0.014383 0.000000 0.020764
0.543956 0.195185 0.016106 0.000000 0.026396
0.593407 0.192683 0.017881 0.000000 0.034522
0.642857 0.190185 0.019708 0.000000 0.044034
0.692308 0.187691 0.021588 0.000000 0.050639
0.741758 0.185202 0.023520 0.000000 0.055007
0.791209 0.182716 0.025505 0.000000 0.067512
0.840659 0.180234 0.027542 0.000000 0.081616
0.890110 0.177757 0.029632 0.000000 0.097385
0.939560 0.175283 0.031775 0.000000 0.097459
0.989011 0.172813 0.033971 0.000000 0.114881
1.038462 0.170348 0.036219 0.000000 0.134163
1.087912 0.167887 0.038521 0.000000 0.155288
1.137363 0.165429 0.040876 0.000000 0.163639
1.186813 0.162976 0.043284 0.000000 0.178313
1.236264 0.160526 0.045745 0.000000 0.184317
1.285714 0.158081 0.048260 0.000000 0.184317
1.335165 0.155640 0.050828 0.000000 0.184317
1.384615 0.153203 0.053450 0.000000 0.184317
1.434066 0.150770 0.056126 0.000000 0.184317
1.483516 0.148340 0.058855 0.000000 0.184317
1.532967 0.145915 0.061381 0.000000 0.184317
1.582418 0.143494 0.063956 0.000000 0.184317
1.631868 0.141077 0.066580 0.000000 0.184317
1.681319 0.138664 0.069253 0.000000 0.184317
1.730769 0.136255 0.071975 0.000000 0.184317
1.780220 0.133851 0.074746 0.000000 0.184317

```

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1.829670 | 0.131450 | 0.077567 | 0.000000 | 0.184317 |
| 1.879121 | 0.129053 | 0.080438 | 0.000000 | 0.184317 |
| 1.928571 | 0.126660 | 0.083358 | 0.000000 | 0.184317 |
| 1.978022 | 0.124272 | 0.086327 | 0.000000 | 0.184317 |
| 2.027473 | 0.121887 | 0.089347 | 0.000000 | 0.184317 |
| 2.076923 | 0.119506 | 0.092416 | 0.000000 | 0.184317 |
| 2.126374 | 0.117130 | 0.095535 | 0.000000 | 0.184317 |
| 2.175824 | 0.114757 | 0.098704 | 0.000000 | 0.184317 |
| 2.225275 | 0.112389 | 0.101923 | 0.000000 | 0.184317 |
| 2.274725 | 0.110024 | 0.105192 | 0.000000 | 0.184317 |
| 2.324176 | 0.107664 | 0.108512 | 0.000000 | 0.184317 |
| 2.373626 | 0.105308 | 0.111881 | 0.000000 | 0.184317 |
| 2.423077 | 0.102955 | 0.115302 | 0.000000 | 0.184317 |
| 2.472527 | 0.100607 | 0.118772 | 0.000000 | 0.184317 |
| 2.521978 | 0.098263 | 0.122293 | 0.000000 | 0.184317 |
| 2.571429 | 0.095923 | 0.125865 | 0.000000 | 0.184317 |
| 2.620879 | 0.093586 | 0.129488 | 0.000000 | 0.184317 |
| 2.670330 | 0.091254 | 0.133161 | 0.000000 | 0.184317 |
| 2.719780 | 0.088926 | 0.136885 | 0.000000 | 0.184317 |
| 2.769231 | 0.086602 | 0.140661 | 0.000000 | 0.184317 |
| 2.818681 | 0.084282 | 0.144487 | 0.000000 | 0.184317 |
| 2.868132 | 0.081966 | 0.148364 | 0.000000 | 0.184317 |
| 2.917582 | 0.079654 | 0.152293 | 0.000000 | 0.184317 |
| 2.967033 | 0.077346 | 0.156273 | 0.000000 | 0.184317 |
| 3.016484 | 0.075043 | 0.160304 | 0.000000 | 0.184317 |
| 3.065934 | 0.072743 | 0.164387 | 0.000000 | 0.184317 |
| 3.115385 | 0.070447 | 0.168521 | 0.000000 | 0.184317 |
| 3.164835 | 0.068155 | 0.172707 | 0.000000 | 0.184317 |
| 3.214286 | 0.065868 | 0.176945 | 0.000000 | 0.184317 |
| 3.263736 | 0.063584 | 0.181234 | 0.000000 | 0.184317 |
| 3.313187 | 0.061305 | 0.185575 | 0.000000 | 0.184317 |
| 3.362637 | 0.059029 | 0.189969 | 0.000000 | 0.184317 |
| 3.412088 | 0.056758 | 0.194414 | 0.000000 | 0.184317 |
| 3.461538 | 0.054490 | 0.198912 | 0.000000 | 0.184317 |
| 3.500000 | 0.052227 | 0.206254 | 0.000000 | 0.184317 |

END FTABLE 2

FTABLE 1

22 5

| Depth<br>(ft) | Area<br>(acres) | Volume<br>(acre-ft) | Outflow1<br>(cfs) | Outflow2<br>(cfs) | Velocity<br>(ft/sec) | Travel Time***<br>(Minutes)*** |
|---------------|-----------------|---------------------|-------------------|-------------------|----------------------|--------------------------------|
| 0.000000      | 0.052227        | 0.000000            | 0.000000          | 0.000000          |                      |                                |
| 0.049451      | 0.224955        | 0.011061            | 0.000000          | 0.631945          |                      |                                |
| 0.098901      | 0.227509        | 0.022248            | 0.000000          | 0.673612          |                      |                                |
| 0.148352      | 0.230066        | 0.033562            | 0.000000          | 0.694445          |                      |                                |
| 0.197802      | 0.232628        | 0.045002            | 0.000000          | 0.715278          |                      |                                |
| 0.247253      | 0.235194        | 0.056569            | 0.000000          | 0.736112          |                      |                                |
| 0.296703      | 0.237763        | 0.068263            | 0.000000          | 0.756945          |                      |                                |
| 0.346154      | 0.240337        | 0.080085            | 0.000000          | 0.777778          |                      |                                |
| 0.395604      | 0.242915        | 0.092033            | 0.000000          | 0.798612          |                      |                                |
| 0.445055      | 0.245497        | 0.104109            | 0.000000          | 0.819445          |                      |                                |
| 0.494505      | 0.248082        | 0.116313            | 0.000000          | 0.840278          |                      |                                |
| 0.543956      | 0.250672        | 0.128645            | 0.097690          | 0.861112          |                      |                                |
| 0.593407      | 0.253266        | 0.141105            | 0.301385          | 0.881945          |                      |                                |
| 0.642857      | 0.255864        | 0.153693            | 0.563536          | 0.902778          |                      |                                |
| 0.692308      | 0.258466        | 0.166410            | 0.859995          | 0.923612          |                      |                                |
| 0.741758      | 0.261072        | 0.179256            | 1.167052          | 0.944445          |                      |                                |
| 0.791209      | 0.263682        | 0.192231            | 1.460630          | 0.965279          |                      |                                |
| 0.840659      | 0.266297        | 0.205335            | 1.718754          | 0.986112          |                      |                                |
| 0.890110      | 0.268915        | 0.218568            | 1.925525          | 1.006945          |                      |                                |
| 0.939560      | 0.271537        | 0.231931            | 2.076126          | 1.027779          |                      |                                |
| 0.989011      | 0.274163        | 0.245423            | 2.182633          | 1.048612          |                      |                                |
| 1.000000      | 0.274747        | 0.248439            | 2.311197          | 1.053242          |                      |                                |

END FTABLE 1

FTABLE 3

92 5

| Depth<br>(ft) | Area<br>(acres) | Volume<br>(acre-ft) | Outflow1<br>(cfs) | Outflow2<br>(cfs) | Velocity<br>(ft/sec) | Travel Time***<br>(Minutes)*** |
|---------------|-----------------|---------------------|-------------------|-------------------|----------------------|--------------------------------|
| 0.000000      | 0.149219        | 0.000000            | 0.000000          | 0.000000          |                      |                                |
| 0.044444      | 0.149220        | 0.002653            | 0.000000          | 0.526620          |                      |                                |
| 0.088889      | 0.149221        | 0.005306            | 0.000000          | 0.526620          |                      |                                |



|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 0.133333 | 0.149222 | 0.007958 | 0.000000 | 0.526620 |
| 0.177778 | 0.149222 | 0.010611 | 0.000000 | 0.526620 |
| 0.222222 | 0.149223 | 0.013264 | 0.000000 | 0.526620 |
| 0.266667 | 0.149224 | 0.015917 | 0.000000 | 0.526620 |
| 0.311111 | 0.149224 | 0.018570 | 0.000000 | 0.526620 |
| 0.355556 | 0.149225 | 0.021223 | 0.000000 | 0.526620 |
| 0.400000 | 0.149226 | 0.023876 | 0.000000 | 0.526620 |
| 0.444444 | 0.149227 | 0.026529 | 0.000000 | 0.526620 |
| 0.488889 | 0.149227 | 0.029181 | 0.000000 | 0.526620 |
| 0.533333 | 0.149228 | 0.031834 | 0.000000 | 0.526620 |
| 0.577778 | 0.149229 | 0.034487 | 0.000000 | 0.526620 |
| 0.622222 | 0.149229 | 0.037140 | 0.000000 | 0.526620 |
| 0.666667 | 0.149230 | 0.039793 | 0.000000 | 0.526620 |
| 0.711111 | 0.149231 | 0.042446 | 0.000000 | 0.526620 |
| 0.755556 | 0.149231 | 0.045099 | 0.000000 | 0.526620 |
| 0.800000 | 0.149232 | 0.047752 | 0.000000 | 0.526620 |
| 0.844444 | 0.149233 | 0.050405 | 0.000000 | 0.526620 |
| 0.888889 | 0.149234 | 0.053058 | 0.000000 | 0.526620 |
| 0.933333 | 0.149234 | 0.055711 | 0.000000 | 0.526620 |
| 0.977778 | 0.149235 | 0.058364 | 0.000000 | 0.526620 |
| 1.022222 | 0.149236 | 0.061017 | 0.000000 | 0.526620 |
| 1.066667 | 0.149236 | 0.063671 | 0.000000 | 0.526620 |
| 1.111111 | 0.149237 | 0.066324 | 0.000000 | 0.526620 |
| 1.155556 | 0.149238 | 0.068977 | 0.000000 | 0.526620 |
| 1.200000 | 0.149238 | 0.071630 | 0.000000 | 0.526620 |
| 1.244444 | 0.149239 | 0.074283 | 0.000000 | 0.526620 |
| 1.288889 | 0.149240 | 0.076936 | 0.000000 | 0.526620 |
| 1.333333 | 0.149241 | 0.079589 | 0.000000 | 0.526620 |
| 1.377778 | 0.149241 | 0.082243 | 0.000000 | 0.526620 |
| 1.422222 | 0.149242 | 0.084896 | 0.000000 | 0.526620 |
| 1.466667 | 0.149243 | 0.087549 | 0.000000 | 0.526620 |
| 1.511111 | 0.149243 | 0.090202 | 0.000000 | 0.526620 |
| 1.555556 | 0.149244 | 0.092855 | 0.000000 | 0.526620 |
| 1.600000 | 0.149245 | 0.095509 | 0.000000 | 0.526620 |
| 1.644444 | 0.149246 | 0.098162 | 0.000000 | 0.526620 |
| 1.688889 | 0.149246 | 0.100815 | 0.000000 | 0.526620 |
| 1.733333 | 0.149247 | 0.103468 | 0.000000 | 0.526620 |
| 1.777778 | 0.149248 | 0.106122 | 0.000000 | 0.526620 |
| 1.822222 | 0.149248 | 0.108775 | 0.000000 | 0.526620 |
| 1.866667 | 0.149249 | 0.111428 | 0.000000 | 0.526620 |
| 1.911111 | 0.149250 | 0.114082 | 0.000000 | 0.526620 |
| 1.955556 | 0.149250 | 0.116735 | 0.000000 | 0.526620 |
| 2.000000 | 0.149251 | 0.119388 | 0.000000 | 0.526620 |
| 2.044444 | 0.149252 | 0.122042 | 0.000000 | 0.526620 |
| 2.088889 | 0.149253 | 0.124695 | 0.000000 | 0.526620 |
| 2.133333 | 0.149253 | 0.127348 | 0.000000 | 0.526620 |
| 2.177778 | 0.149254 | 0.130002 | 0.000000 | 0.526620 |
| 2.222222 | 0.149255 | 0.132655 | 0.000000 | 0.526620 |
| 2.266667 | 0.149255 | 0.135309 | 0.000000 | 0.526620 |
| 2.311111 | 0.149256 | 0.137962 | 0.000000 | 0.526620 |
| 2.355556 | 0.149257 | 0.140615 | 0.000000 | 0.526620 |
| 2.400000 | 0.149257 | 0.143269 | 0.000000 | 0.526620 |
| 2.444444 | 0.149258 | 0.145922 | 0.000000 | 0.526620 |
| 2.488889 | 0.149259 | 0.148576 | 0.000000 | 0.526620 |
| 2.533333 | 0.149260 | 0.151229 | 0.000000 | 0.526620 |
| 2.577778 | 0.149260 | 0.153883 | 0.000000 | 0.526620 |
| 2.622222 | 0.149261 | 0.156536 | 0.000000 | 0.526620 |
| 2.666667 | 0.149262 | 0.159190 | 0.000000 | 0.526620 |
| 2.711111 | 0.149262 | 0.161844 | 0.000000 | 0.526620 |
| 2.755556 | 0.149263 | 0.164497 | 0.000000 | 0.526620 |
| 2.800000 | 0.149264 | 0.167151 | 0.000000 | 0.526620 |
| 2.844444 | 0.149265 | 0.169804 | 0.000000 | 0.526620 |
| 2.888889 | 0.149265 | 0.172458 | 0.000000 | 0.526620 |
| 2.933333 | 0.149266 | 0.175111 | 0.000000 | 0.526620 |
| 2.977778 | 0.149267 | 0.177765 | 0.000000 | 0.526620 |
| 3.022222 | 0.149267 | 0.184399 | 0.029284 | 0.526620 |
| 3.066667 | 0.149268 | 0.191033 | 0.151685 | 0.526620 |
| 3.111111 | 0.149269 | 0.197667 | 0.323094 | 0.526620 |
| 3.155556 | 0.149269 | 0.204302 | 0.523118 | 0.526620 |
| 3.200000 | 0.149270 | 0.210936 | 0.732975 | 0.526620 |

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 3.244444 | 0.149271 | 0.217570 | 0.933531 | 0.526620 |
| 3.288889 | 0.149272 | 0.224204 | 1.107385 | 0.526620 |
| 3.333333 | 0.149272 | 0.230839 | 1.242541 | 0.526620 |
| 3.377778 | 0.149273 | 0.237473 | 1.337097 | 0.526620 |
| 3.422222 | 0.149274 | 0.244107 | 1.421241 | 0.526620 |
| 3.466667 | 0.149274 | 0.250742 | 1.494171 | 0.526620 |
| 3.511111 | 0.149275 | 0.257376 | 1.563705 | 0.526620 |
| 3.555556 | 0.149276 | 0.264011 | 1.630275 | 0.526620 |
| 3.600000 | 0.149276 | 0.270645 | 1.694231 | 0.526620 |
| 3.644444 | 0.149277 | 0.277280 | 1.755860 | 0.526620 |
| 3.688889 | 0.149278 | 0.283914 | 1.815397 | 0.526620 |
| 3.733333 | 0.149279 | 0.290549 | 1.873043 | 0.526620 |
| 3.777778 | 0.149279 | 0.297183 | 1.928967 | 0.526620 |
| 3.822222 | 0.149280 | 0.303818 | 1.983315 | 0.526620 |
| 3.866667 | 0.149281 | 0.310453 | 2.036212 | 0.526620 |
| 3.911111 | 0.149281 | 0.317087 | 2.087770 | 0.526620 |
| 3.955556 | 0.149282 | 0.323722 | 2.138085 | 0.526620 |
| 4.000000 | 0.149283 | 0.330357 | 2.187243 | 0.526620 |
| 4.044444 | 0.149284 | 0.336992 | 2.235320 | 0.526620 |

END FTABLE 3  
END FTABLES

#### EXT SOURCES

| <-Volume-> | <Member> | SsysSgap<--Mult--> | Tran | <-Target           | vols>  | <-Grp> | <-Member-> | ***    |
|------------|----------|--------------------|------|--------------------|--------|--------|------------|--------|
| <Name>     | #        | <Name>             | #    | tem strg<-factor-> | strg   | <Name> | #          | #      |
| WDM        | 2        | PREC               | ENGL | 1                  | PERLND | 1 999  | EXTNL      | PREC   |
| WDM        | 2        | PREC               | ENGL | 1                  | IMPLND | 1 999  | EXTNL      | PREC   |
| WDM        | 1        | EVAP               | ENGL | 0.76               | PERLND | 1 999  | EXTNL      | PETINP |
| WDM        | 1        | EVAP               | ENGL | 0.76               | IMPLND | 1 999  | EXTNL      | PETINP |
| WDM        | 2        | PREC               | ENGL | 1                  | RCHRES | 1      | EXTNL      | PREC   |
| WDM        | 1        | EVAP               | ENGL | 0.5                | RCHRES | 1      | EXTNL      | POTEV  |
| WDM        | 1        | EVAP               | ENGL | 0.76               | RCHRES | 2      | EXTNL      | POTEV  |

END EXT SOURCES

#### EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-> | <--Mult--> | Tran        | <-Volume-> | <Member> | Tsys | Tgap   | Amd  | ***  |
|------------|--------|------------|------------|-------------|------------|----------|------|--------|------|------|
| <Name>     | #      | <Name>     | #          | #<-factor-> | strg       | <Name>   | #    | <Name> | tem  | strg |
| RCHRES     | 3      | HYDR       | RO         | 1 1         | 1          | WDM      | 1000 | FLOW   | ENGL | REPL |
| RCHRES     | 3      | HYDR       | O          | 1 1         | 1          | WDM      | 1001 | FLOW   | ENGL | REPL |
| RCHRES     | 3      | HYDR       | O          | 2 1         | 1          | WDM      | 1002 | FLOW   | ENGL | REPL |
| RCHRES     | 3      | HYDR       | STAGE      | 1 1         | 1          | WDM      | 1003 | STAG   | ENGL | REPL |
| COPY       | 1      | OUTPUT     | MEAN       | 1 1         | 48.4       | WDM      | 701  | FLOW   | ENGL | REPL |
| COPY       | 501    | OUTPUT     | MEAN       | 1 1         | 48.4       | WDM      | 801  | FLOW   | ENGL | REPL |

END EXT TARGETS

#### MASS-LINK

| <Volume>      | <-Grp> | <-Member-> | <--Mult--> | <Target>   | <-Grp> | <-Member-> | ***  |
|---------------|--------|------------|------------|------------|--------|------------|------|
| <Name>        | #      | <Name>     | #          | <-factor-> | <Name> | #          | #    |
| MASS-LINK     | 2      |            |            |            |        |            |      |
| PERLND        | PWATER | SURO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 2      |            |            |            |        |            |      |
| MASS-LINK     | 3      |            |            |            |        |            |      |
| PERLND        | PWATER | IFWO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 3      |            |            |            |        |            |      |
| MASS-LINK     | 5      |            |            |            |        |            |      |
| IMPLND        | IWATER | SURO       |            | 0.083333   | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 5      |            |            |            |        |            |      |
| MASS-LINK     | 7      |            |            |            |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 1          |            | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 7      |            |            |            |        |            |      |
| MASS-LINK     | 8      |            |            |            |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 2          |            | RCHRES | INFLOW     | IVOL |
| END MASS-LINK | 8      |            |            |            |        |            |      |
| MASS-LINK     | 15     |            |            |            |        |            |      |

|               |        |      |          |      |       |      |
|---------------|--------|------|----------|------|-------|------|
| IMPLND        | IWATER | SURO | 0.083333 | COPY | INPUT | MEAN |
| END MASS-LINK |        | 15   |          |      |       |      |
| MASS-LINK     |        | 17   |          |      |       |      |
| RCHRES        | OFLOW  | OVOL | 1        | COPY | INPUT | MEAN |
| END MASS-LINK |        | 17   |          |      |       |      |
| END MASS-LINK |        |      |          |      |       |      |
| END RUN       |        |      |          |      |       |      |





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*East Roof Damage*

**WWHM2012**  
**PROJECT REPORT**

## *General Model Information*

Project Name: East Roof Drainage  
Site Name: Giffin MF 5000 sf  
Site Address:  
City:  
Report Date: 5/21/2020  
Gage: Fairgrounds (Kaiser)  
Data Start: 1955/10/01  
Data End: 2011/09/30  
Timestep: 15 Minute  
Precip Scale: 1.000  
Version Date: 2019/09/13  
Version: 4.2.17

## *POC Thresholds*

Low Flow Threshold for POC1: 50 Percent of the 2 Year  
High Flow Threshold for POC1: 50 Year



## Landuse Basin Data

### Predeveloped Land Use

#### Bldg H and I

Bypass: No

GroundWater: No

Pervious Land Use      acre  
A B, Forest, Flat      0.2

Pervious Total      0.2

Impervious Land Use      acre

Impervious Total      0

Basin Total      0.2

Element Flows To:  
Surface      Interflow      Groundwater

## Building F and G

Bypass: No

GroundWater: No

Pervious Land Use acre  
A B, Forest, Flat 0.2

Pervious Total 0.2

Impervious Land Use acre

Impervious Total 0

Basin Total 0.2

Element Flows To:  
Surface

Interflow

Groundwater

## Mitigated Land Use

### Bldg F and G

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.2  |
| Impervious Total    | 0.2  |
| Basin Total         | 0.2  |

### Element Flows To:

|                     |                     |             |
|---------------------|---------------------|-------------|
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 1 | Gravel Trench Bed 1 |             |

## Building H and I

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.2  |
| Impervious Total    | 0.2  |
| Basin Total         | 0.2  |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 2 | Gravel Trench Bed 2 |             |

# *Routing Elements*

## *Predeveloped Routing*

## Mitigated Routing

### Gravel Trench Bed 1

Bottom Length: 40.00 ft.  
 Bottom Width: 20.00 ft.  
 Trench bottom slope 1: 0.001 To 1  
 Trench Left side slope 0: 0.001 To 1  
 Trench right side slope 2: 0.001 To 1  
 Material thickness of first layer: 4  
 Pour Space of material for first layer: 0.35  
 Material thickness of second layer: 0  
 Pour Space of material for second layer: 0  
 Material thickness of third layer: 0  
 Pour Space of material for third layer: 0  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 40.384  
 Total Volume Through Riser (ac-ft.): 0  
 Total Volume Through Facility (ac-ft.): 40.384  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Discharge Structure  
 Riser Height: 4 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1      Outlet 2  
 Gravel Trench Bed 2

Gravel Trench Bed Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.018     | 0.000          | 0.000          | 0.000       |
| 0.0472      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.0944      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.1417      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.1889      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.2361      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.2833      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.3306      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.3778      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.4250      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.4722      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.5194      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.5667      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.6139      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.6611      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.7083      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.7556      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.8028      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.8500      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.8972      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.9444      | 0.018     | 0.006          | 0.000          | 0.064       |
| 0.9917      | 0.018     | 0.006          | 0.000          | 0.064       |
| 1.0389      | 0.018     | 0.006          | 0.000          | 0.064       |
| 1.0861      | 0.018     | 0.007          | 0.000          | 0.064       |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 1.1333 | 0.018 | 0.007 | 0.000 | 0.064 |
| 1.1806 | 0.018 | 0.007 | 0.000 | 0.064 |
| 1.2278 | 0.018 | 0.007 | 0.000 | 0.064 |
| 1.2750 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.3222 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.3694 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.4167 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.4639 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.5111 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.5583 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.6056 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.6528 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.7000 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.7472 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.7944 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.8417 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.8889 | 0.018 | 0.012 | 0.000 | 0.064 |
| 1.9361 | 0.018 | 0.012 | 0.000 | 0.064 |
| 1.9833 | 0.018 | 0.012 | 0.000 | 0.064 |
| 2.0306 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.0778 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.1250 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.1722 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.2194 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.2667 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.3139 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.3611 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.4083 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.4556 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.5028 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.5500 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.5972 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.6444 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.6917 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.7389 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.7861 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.8333 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.8806 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.9278 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.9750 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.0222 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.0694 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.1167 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.1639 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.2111 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.2583 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.3056 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.3528 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.4000 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.4472 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.4944 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.5417 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.5889 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.6361 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.6833 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.7306 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.7778 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.8250 | 0.018 | 0.024 | 0.000 | 0.064 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 3.8722 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.9194 | 0.018 | 0.025 | 0.000 | 0.064 |
| 3.9667 | 0.018 | 0.025 | 0.000 | 0.064 |
| 4.0139 | 0.018 | 0.026 | 0.014 | 0.064 |
| 4.0611 | 0.018 | 0.027 | 0.133 | 0.064 |
| 4.1083 | 0.018 | 0.028 | 0.311 | 0.064 |
| 4.1556 | 0.018 | 0.029 | 0.523 | 0.064 |
| 4.2028 | 0.018 | 0.029 | 0.746 | 0.064 |
| 4.2500 | 0.018 | 0.030 | 0.957 | 0.064 |



## Gravel Trench Bed 2

Bottom Length: 40.00 ft.  
 Bottom Width: 20.00 ft.  
 Trench bottom slope 1: 0.001 To 1  
 Trench Left side slope 0: 0.001 To 1  
 Trench right side slope 2: 0.001 To 1  
 Material thickness of first layer: 4  
 Pour Space of material for first layer: 0.35  
 Material thickness of second layer: 0  
 Pour Space of material for second layer: 0  
 Material thickness of third layer: 0  
 Pour Space of material for third layer: 0  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 40.384  
 Total Volume Through Riser (ac-ft.): 0  
 Total Volume Through Facility (ac-ft.): 40.384  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Discharge Structure  
 Riser Height: 4 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1                      Outlet 2

Gravel Trench Bed Hydraulic Table

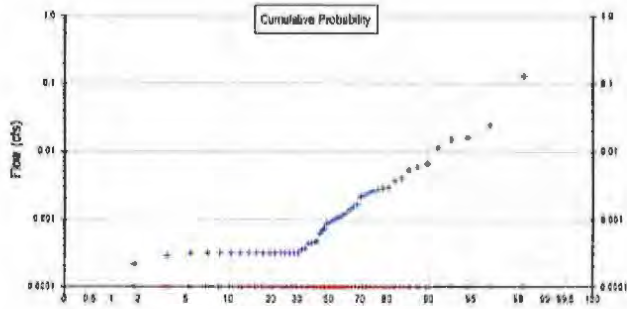
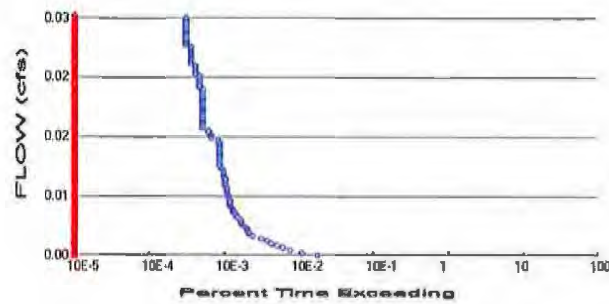
| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.018     | 0.000          | 0.000          | 0.000       |
| 0.0472      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.0944      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.1417      | 0.018     | 0.000          | 0.000          | 0.064       |
| 0.1889      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.2361      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.2833      | 0.018     | 0.001          | 0.000          | 0.064       |
| 0.3306      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.3778      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.4250      | 0.018     | 0.002          | 0.000          | 0.064       |
| 0.4722      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.5194      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.5667      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.6139      | 0.018     | 0.003          | 0.000          | 0.064       |
| 0.6611      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.7083      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.7556      | 0.018     | 0.004          | 0.000          | 0.064       |
| 0.8028      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.8500      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.8972      | 0.018     | 0.005          | 0.000          | 0.064       |
| 0.9444      | 0.018     | 0.006          | 0.000          | 0.064       |
| 0.9917      | 0.018     | 0.006          | 0.000          | 0.064       |
| 1.0389      | 0.018     | 0.006          | 0.000          | 0.064       |
| 1.0861      | 0.018     | 0.007          | 0.000          | 0.064       |
| 1.1333      | 0.018     | 0.007          | 0.000          | 0.064       |
| 1.1806      | 0.018     | 0.007          | 0.000          | 0.064       |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 1.2278 | 0.018 | 0.007 | 0.000 | 0.064 |
| 1.2750 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.3222 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.3694 | 0.018 | 0.008 | 0.000 | 0.064 |
| 1.4167 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.4639 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.5111 | 0.018 | 0.009 | 0.000 | 0.064 |
| 1.5583 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.6056 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.6528 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.7000 | 0.018 | 0.010 | 0.000 | 0.064 |
| 1.7472 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.7944 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.8417 | 0.018 | 0.011 | 0.000 | 0.064 |
| 1.8889 | 0.018 | 0.012 | 0.000 | 0.064 |
| 1.9361 | 0.018 | 0.012 | 0.000 | 0.064 |
| 1.9833 | 0.018 | 0.012 | 0.000 | 0.064 |
| 2.0306 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.0778 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.1250 | 0.018 | 0.013 | 0.000 | 0.064 |
| 2.1722 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.2194 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.2667 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.3139 | 0.018 | 0.014 | 0.000 | 0.064 |
| 2.3611 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.4083 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.4556 | 0.018 | 0.015 | 0.000 | 0.064 |
| 2.5028 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.5500 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.5972 | 0.018 | 0.016 | 0.000 | 0.064 |
| 2.6444 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.6917 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.7389 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.7861 | 0.018 | 0.017 | 0.000 | 0.064 |
| 2.8333 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.8806 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.9278 | 0.018 | 0.018 | 0.000 | 0.064 |
| 2.9750 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.0222 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.0694 | 0.018 | 0.019 | 0.000 | 0.064 |
| 3.1167 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.1639 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.2111 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.2583 | 0.018 | 0.020 | 0.000 | 0.064 |
| 3.3056 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.3528 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.4000 | 0.018 | 0.021 | 0.000 | 0.064 |
| 3.4472 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.4944 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.5417 | 0.018 | 0.022 | 0.000 | 0.064 |
| 3.5889 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.6361 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.6833 | 0.018 | 0.023 | 0.000 | 0.064 |
| 3.7306 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.7778 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.8250 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.8722 | 0.018 | 0.024 | 0.000 | 0.064 |
| 3.9194 | 0.018 | 0.025 | 0.000 | 0.064 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 3.9667 | 0.018 | 0.025 | 0.000 | 0.064 |
| 4.0139 | 0.018 | 0.026 | 0.014 | 0.064 |
| 4.0611 | 0.018 | 0.027 | 0.133 | 0.064 |
| 4.1083 | 0.018 | 0.028 | 0.311 | 0.064 |
| 4.1556 | 0.018 | 0.029 | 0.523 | 0.064 |
| 4.2028 | 0.018 | 0.029 | 0.746 | 0.064 |
| 4.2500 | 0.018 | 0.030 | 0.957 | 0.064 |

# Analysis Results

## POC 1



+ Predeveloped x Mitigated

### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0.4  
Total Impervious Area: 0

### Mitigated Landuse Totals for POC #1

Total Pervious Area: 0  
Total Impervious Area: 0.4

Flow Frequency Method: Log Pearson Type III 17B

### Flow Frequency Return Periods for Predeveloped. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0.000917  |
| 5 year        | 0.003224  |
| 10 year       | 0.006846  |
| 25 year       | 0.016491  |
| 50 year       | 0.030367  |
| 100 year      | 0.054148  |

### Flow Frequency Return Periods for Mitigated. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0         |
| 5 year        | 0         |
| 10 year       | 0         |
| 25 year       | 0         |
| 50 year       | 0         |
| 100 year      | 0         |

## Annual Peaks

### Annual Peaks for Predeveloped and Mitigated. POC #1

| Year | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1956 | 0.003        | 0.000     |
| 1957 | 0.001        | 0.000     |
| 1958 | 0.000        | 0.000     |
| 1959 | 0.001        | 0.000     |
| 1960 | 0.001        | 0.000     |
| 1961 | 0.001        | 0.000     |
| 1962 | 0.000        | 0.000     |
| 1963 | 0.016        | 0.000     |
| 1964 | 0.004        | 0.000     |
| 1965 | 0.001        | 0.000     |

|      |       |       |
|------|-------|-------|
| 1966 | 0.000 | 0.000 |
| 1967 | 0.001 | 0.000 |
| 1968 | 0.000 | 0.000 |
| 1969 | 0.000 | 0.000 |
| 1970 | 0.001 | 0.000 |
| 1971 | 0.006 | 0.000 |
| 1972 | 0.005 | 0.000 |
| 1973 | 0.000 | 0.000 |
| 1974 | 0.002 | 0.000 |
| 1975 | 0.000 | 0.000 |
| 1976 | 0.003 | 0.000 |
| 1977 | 0.000 | 0.000 |
| 1978 | 0.002 | 0.000 |
| 1979 | 0.000 | 0.000 |
| 1980 | 0.000 | 0.000 |
| 1981 | 0.007 | 0.000 |
| 1982 | 0.011 | 0.000 |
| 1983 | 0.001 | 0.000 |
| 1984 | 0.001 | 0.000 |
| 1985 | 0.000 | 0.000 |
| 1986 | 0.001 | 0.000 |
| 1987 | 0.002 | 0.000 |
| 1988 | 0.000 | 0.000 |
| 1989 | 0.000 | 0.000 |
| 1990 | 0.000 | 0.000 |
| 1991 | 0.025 | 0.000 |
| 1992 | 0.132 | 0.000 |
| 1993 | 0.015 | 0.000 |
| 1994 | 0.000 | 0.000 |
| 1995 | 0.001 | 0.000 |
| 1996 | 0.003 | 0.000 |
| 1997 | 0.002 | 0.000 |
| 1998 | 0.000 | 0.000 |
| 1999 | 0.000 | 0.000 |
| 2000 | 0.000 | 0.000 |
| 2001 | 0.000 | 0.000 |
| 2002 | 0.000 | 0.000 |
| 2003 | 0.003 | 0.000 |
| 2004 | 0.004 | 0.000 |
| 2005 | 0.000 | 0.000 |
| 2006 | 0.000 | 0.000 |
| 2007 | 0.000 | 0.000 |
| 2008 | 0.000 | 0.000 |
| 2009 | 0.001 | 0.000 |
| 2010 | 0.001 | 0.000 |
| 2011 | 0.002 | 0.000 |

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

| Rank | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1    | 0.1323       | 0.0000    |
| 2    | 0.0246       | 0.0000    |
| 3    | 0.0158       | 0.0000    |
| 4    | 0.0150       | 0.0000    |
| 5    | 0.0114       | 0.0000    |
| 6    | 0.0067       | 0.0000    |
| 7    | 0.0059       | 0.0000    |
| 8    | 0.0052       | 0.0000    |

|    |        |        |
|----|--------|--------|
| 9  | 0.0040 | 0.0000 |
| 10 | 0.0037 | 0.0000 |
| 11 | 0.0029 | 0.0000 |
| 12 | 0.0029 | 0.0000 |
| 13 | 0.0028 | 0.0000 |
| 14 | 0.0026 | 0.0000 |
| 15 | 0.0024 | 0.0000 |
| 16 | 0.0023 | 0.0000 |
| 17 | 0.0022 | 0.0000 |
| 18 | 0.0017 | 0.0000 |
| 19 | 0.0015 | 0.0000 |
| 20 | 0.0014 | 0.0000 |
| 21 | 0.0012 | 0.0000 |
| 22 | 0.0012 | 0.0000 |
| 23 | 0.0011 | 0.0000 |
| 24 | 0.0011 | 0.0000 |
| 25 | 0.0010 | 0.0000 |
| 26 | 0.0010 | 0.0000 |
| 27 | 0.0009 | 0.0000 |
| 28 | 0.0009 | 0.0000 |
| 29 | 0.0009 | 0.0000 |
| 30 | 0.0007 | 0.0000 |
| 31 | 0.0007 | 0.0000 |
| 32 | 0.0006 | 0.0000 |
| 33 | 0.0005 | 0.0000 |
| 34 | 0.0005 | 0.0000 |
| 35 | 0.0005 | 0.0000 |
| 36 | 0.0004 | 0.0000 |
| 37 | 0.0004 | 0.0000 |
| 38 | 0.0004 | 0.0000 |
| 39 | 0.0003 | 0.0000 |
| 40 | 0.0003 | 0.0000 |
| 41 | 0.0003 | 0.0000 |
| 42 | 0.0003 | 0.0000 |
| 43 | 0.0003 | 0.0000 |
| 44 | 0.0003 | 0.0000 |
| 45 | 0.0003 | 0.0000 |
| 46 | 0.0003 | 0.0000 |
| 47 | 0.0003 | 0.0000 |
| 48 | 0.0003 | 0.0000 |
| 49 | 0.0003 | 0.0000 |
| 50 | 0.0003 | 0.0000 |
| 51 | 0.0003 | 0.0000 |
| 52 | 0.0003 | 0.0000 |
| 53 | 0.0003 | 0.0000 |
| 54 | 0.0003 | 0.0000 |
| 55 | 0.0002 | 0.0000 |
| 56 | 0.0002 | 0.0000 |

## Duration Flows

The Facility PASSED

| Flow(cfs) | Predev | Mit | Percentage | Pass/Fail |
|-----------|--------|-----|------------|-----------|
| 0.0005    | 347    | 0   | 0          | Pass      |
| 0.0008    | 210    | 0   | 0          | Pass      |
| 0.0011    | 146    | 0   | 0          | Pass      |
| 0.0014    | 115    | 0   | 0          | Pass      |
| 0.0017    | 97     | 0   | 0          | Pass      |
| 0.0020    | 83     | 0   | 0          | Pass      |
| 0.0023    | 72     | 0   | 0          | Pass      |
| 0.0026    | 60     | 0   | 0          | Pass      |
| 0.0029    | 46     | 0   | 0          | Pass      |
| 0.0032    | 41     | 0   | 0          | Pass      |
| 0.0035    | 40     | 0   | 0          | Pass      |
| 0.0038    | 39     | 0   | 0          | Pass      |
| 0.0041    | 36     | 0   | 0          | Pass      |
| 0.0044    | 33     | 0   | 0          | Pass      |
| 0.0047    | 32     | 0   | 0          | Pass      |
| 0.0050    | 31     | 0   | 0          | Pass      |
| 0.0053    | 28     | 0   | 0          | Pass      |
| 0.0056    | 27     | 0   | 0          | Pass      |
| 0.0059    | 26     | 0   | 0          | Pass      |
| 0.0062    | 25     | 0   | 0          | Pass      |
| 0.0065    | 24     | 0   | 0          | Pass      |
| 0.0068    | 23     | 0   | 0          | Pass      |
| 0.0071    | 23     | 0   | 0          | Pass      |
| 0.0074    | 23     | 0   | 0          | Pass      |
| 0.0077    | 22     | 0   | 0          | Pass      |
| 0.0080    | 22     | 0   | 0          | Pass      |
| 0.0083    | 21     | 0   | 0          | Pass      |
| 0.0086    | 21     | 0   | 0          | Pass      |
| 0.0089    | 21     | 0   | 0          | Pass      |
| 0.0092    | 20     | 0   | 0          | Pass      |
| 0.0095    | 20     | 0   | 0          | Pass      |
| 0.0098    | 20     | 0   | 0          | Pass      |
| 0.0101    | 20     | 0   | 0          | Pass      |
| 0.0104    | 19     | 0   | 0          | Pass      |
| 0.0107    | 19     | 0   | 0          | Pass      |
| 0.0110    | 19     | 0   | 0          | Pass      |
| 0.0113    | 18     | 0   | 0          | Pass      |
| 0.0116    | 17     | 0   | 0          | Pass      |
| 0.0119    | 17     | 0   | 0          | Pass      |
| 0.0122    | 17     | 0   | 0          | Pass      |
| 0.0125    | 17     | 0   | 0          | Pass      |
| 0.0128    | 17     | 0   | 0          | Pass      |
| 0.0131    | 17     | 0   | 0          | Pass      |
| 0.0134    | 17     | 0   | 0          | Pass      |
| 0.0138    | 17     | 0   | 0          | Pass      |
| 0.0141    | 17     | 0   | 0          | Pass      |
| 0.0144    | 17     | 0   | 0          | Pass      |
| 0.0147    | 17     | 0   | 0          | Pass      |
| 0.0150    | 16     | 0   | 0          | Pass      |
| 0.0153    | 13     | 0   | 0          | Pass      |
| 0.0156    | 13     | 0   | 0          | Pass      |
| 0.0159    | 12     | 0   | 0          | Pass      |
| 0.0162    | 12     | 0   | 0          | Pass      |

|        |    |   |   |      |
|--------|----|---|---|------|
| 0.0165 | 10 | 0 | 0 | Pass |
| 0.0168 | 10 | 0 | 0 | Pass |
| 0.0171 | 10 | 0 | 0 | Pass |
| 0.0174 | 10 | 0 | 0 | Pass |
| 0.0177 | 10 | 0 | 0 | Pass |
| 0.0180 | 10 | 0 | 0 | Pass |
| 0.0183 | 10 | 0 | 0 | Pass |
| 0.0186 | 10 | 0 | 0 | Pass |
| 0.0189 | 10 | 0 | 0 | Pass |
| 0.0192 | 10 | 0 | 0 | Pass |
| 0.0195 | 10 | 0 | 0 | Pass |
| 0.0198 | 10 | 0 | 0 | Pass |
| 0.0201 | 10 | 0 | 0 | Pass |
| 0.0204 | 10 | 0 | 0 | Pass |
| 0.0207 | 10 | 0 | 0 | Pass |
| 0.0210 | 10 | 0 | 0 | Pass |
| 0.0213 | 10 | 0 | 0 | Pass |
| 0.0216 | 9  | 0 | 0 | Pass |
| 0.0219 | 9  | 0 | 0 | Pass |
| 0.0222 | 9  | 0 | 0 | Pass |
| 0.0225 | 9  | 0 | 0 | Pass |
| 0.0228 | 9  | 0 | 0 | Pass |
| 0.0231 | 9  | 0 | 0 | Pass |
| 0.0234 | 8  | 0 | 0 | Pass |
| 0.0237 | 8  | 0 | 0 | Pass |
| 0.0240 | 8  | 0 | 0 | Pass |
| 0.0243 | 8  | 0 | 0 | Pass |
| 0.0246 | 7  | 0 | 0 | Pass |
| 0.0249 | 7  | 0 | 0 | Pass |
| 0.0252 | 7  | 0 | 0 | Pass |
| 0.0255 | 7  | 0 | 0 | Pass |
| 0.0258 | 7  | 0 | 0 | Pass |
| 0.0261 | 7  | 0 | 0 | Pass |
| 0.0264 | 7  | 0 | 0 | Pass |
| 0.0267 | 7  | 0 | 0 | Pass |
| 0.0270 | 6  | 0 | 0 | Pass |
| 0.0273 | 6  | 0 | 0 | Pass |
| 0.0276 | 6  | 0 | 0 | Pass |
| 0.0280 | 6  | 0 | 0 | Pass |
| 0.0283 | 6  | 0 | 0 | Pass |
| 0.0286 | 6  | 0 | 0 | Pass |
| 0.0289 | 6  | 0 | 0 | Pass |
| 0.0292 | 6  | 0 | 0 | Pass |
| 0.0295 | 6  | 0 | 0 | Pass |
| 0.0298 | 6  | 0 | 0 | Pass |
| 0.0301 | 6  | 0 | 0 | Pass |
| 0.0304 | 6  | 0 | 0 | Pass |



## Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

## LID Report

| LID Technique                                          | Used for Treatment ?     | Total Volume Needs Treatment (ac-ft) | Volume Through Facility (ac-ft) | Infiltration Volume (ac-ft) | Cumulative Volume Infiltration Credit | Percent Volume Infiltrated | Water Quality | Percent Water Quality Treated | Comment                           |
|--------------------------------------------------------|--------------------------|--------------------------------------|---------------------------------|-----------------------------|---------------------------------------|----------------------------|---------------|-------------------------------|-----------------------------------|
| Gravel Trench Bed 2 POC                                | <input type="checkbox"/> | 36.75                                |                                 |                             | <input type="checkbox"/>              | 100.00                     |               |                               |                                   |
| Gravel Trench Bed 1                                    | <input type="checkbox"/> | 36.75                                |                                 |                             | <input type="checkbox"/>              | 100.00                     |               |                               |                                   |
| Total Volume Infiltrated                               |                          | 73.50                                | 0.00                            | 0.00                        |                                       | 100.00                     | 0.00          | 0%                            | No Treat Credit                   |
| Compliance with LID Standard 8% of 2-yr to 50% of 2-yr |                          |                                      |                                 |                             |                                       |                            |               |                               | Duration Analysis Result = Passed |
|                                                        |                          |                                      |                                 |                             |                                       |                            |               |                               |                                   |

## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.

# Appendix

## Predeveloped Schematic



## Mitigated Schematic





## Predeveloped UCI File

RUN

### GLOBAL

```
WVHM4 model simulation
START      1955 10 01      END      2011 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1      UNIT SYSTEM    1
END GLOBAL
```

### FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26      East Roof Drainage.wdm
MESSU    25      PreEast Roof Drainage.MES
          27      PreEast Roof Drainage.L61
          28      PreEast Roof Drainage.L62
          30      POCEast Roof Drainage1.dat
```

END FILES

### OPN SEQUENCE

```
INGRP      INDELT 00:15
  PERLND    1
  COPY      501
  DISPLY    1
END INGRP
```

END OPN SEQUENCE

### DISPLY

```
DISPLY-INFO1
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Bldg H and I      MAX      1      2      30      9
END DISPLY-INFO1
```

END DISPLY

### COPY

```
TIMESERIES
# - #  NPT  NMN ***
1      1      1
501     1      1
END TIMESERIES
```

END COPY

### GENER

```
OPCODE
#      # OPCD ***
END OPCODE
PARM
#      #      K ***
END PARM
```

END GENER

### PERLND

```
GEN-INFO
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #      User  t-series  Engl Metr ***
          in  out      ***
1      A/B, Forest, Flat      1      1      1      1      27      0
END GEN-INFO
*** Section PWATER***
```

### ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC ***
1      0      0      1      0      0      0      0      0      0      0      0      0
END ACTIVITY
```

### PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC *****
1      0      0      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO
```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
1 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
1 0 5 2 400 0.05 0.3 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
1 0 0 2 2 0 0 0
END PWAT-PARM3
PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
1 0.2 0.5 0.35 0 0.7 0.7
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
1 0 0 0 0 3 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***

END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```

```

END IMPLND

SCHEMATIC
<-Source->          <--Area-->      <-Target->      MBLK      ***
<Name>   #          <-factor->      <Name>   #      Tbl#      ***
Bldg H and I***
PERLND   1          0.2      COPY   501      12
PERLND   1          0.2      COPY   501      13
Building F and G***
PERLND   1          0.2      COPY   501      12
PERLND   1          0.2      COPY   501      13

*****Routing*****
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #      #      <Name> # #      ***
COPY   501 OUTPUT MEAN   1 1   48.4      DISPLY   1      INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #      #      <Name> # #      ***
END NETWORK

RCHRES
GEN-INFO
  RCHRES      Name      Nexits      Unit Systems      Printer      ***
  # - #<-----><----> User T-series Engl Metr LKFG      ***
                                in out      ***
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL  PYR
# - # HYDR ADCA CONS HEAT SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR *****
END PRINT-INFO

HYDR-PARM1
  RCHRES      Flags for each HYDR Section      ***
  # - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each FUNCT for each
          FG FG FG FG possible exit *** possible exit possible exit
          * * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
  # - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><----->      ***
END HYDR-PARM2
HYDR-INIT
  RCHRES      Initial conditions for each HYDR section      ***
  # - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
          *** ac-ft      for each possible exit      for each possible exit
  <-----><----->      <----><----><----><----><----> *** <----><----><----><----><---->
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***

```



| <Name> | # | <Name> | # | tem  | strg<-factor->strg | <Name> | # | #   | <Name> | #      | # | *** |
|--------|---|--------|---|------|--------------------|--------|---|-----|--------|--------|---|-----|
| WDM    | 2 | PREC   |   | ENGL | 1                  | PERLND | 1 | 999 | EXTNL  | PREC   |   |     |
| WDM    | 2 | PREC   |   | ENGL | 1                  | IMPLND | 1 | 999 | EXTNL  | PREC   |   |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | PERLND | 1 | 999 | EXTNL  | PETINP |   |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | IMPLND | 1 | 999 | EXTNL  | PETINP |   |     |

END EXT SOURCES

EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-><--Mult--> | Tran | <-Volume->      | <Member> | Tsys | Tgap   | Amd | ***            |
|------------|--------|----------------------|------|-----------------|----------|------|--------|-----|----------------|
| <Name>     | #      | <Name>               | #    | #<-factor->strg | <Name>   | #    | <Name> | tem | strg strg***   |
| COPY       | 501    | OUTPUT               | MEAN | 1               | 1        | 48.4 | WDM    | 501 | FLOW ENGL REPL |

END EXT TARGETS

MASS-LINK

| <Volume>      | <-Grp> | <-Member-><--Mult--> | <Target> | <-Grp>      | <-Member->*** |      |      |
|---------------|--------|----------------------|----------|-------------|---------------|------|------|
| <Name>        | #      | <Name>               | #        | #<-factor-> | <Name>        | #    | #*** |
| MASS-LINK     |        | 12                   |          |             |               |      |      |
| PERLND        | PWATER | SURO                 | 0.083333 | COPY        | INPUT         | MEAN |      |
| END MASS-LINK |        | 12                   |          |             |               |      |      |
| MASS-LINK     |        | 13                   |          |             |               |      |      |
| PERLND        | PWATER | IFWO                 | 0.083333 | COPY        | INPUT         | MEAN |      |
| END MASS-LINK |        | 13                   |          |             |               |      |      |

END MASS-LINK

END RUN

## Mitigated UCI File

RUN

### GLOBAL

```
WWM4 model simulation
START      1955 10 01      END      2011 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1      UNIT SYSTEM      1
END GLOBAL
```

### FILES

```
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26     East Roof Drainage.wdm
MESSU    25     MitEast Roof Drainage.MES
          27     MitEast Roof Drainage.L61
          28     MitEast Roof Drainage.L62
          30     POCEast Roof Drainage1.dat
```

END FILES

### OPN SEQUENCE

```
INGRP      INDELT 00:15
  IMPLND      4
  RCHRES      1
  RCHRES      2
  COPY        1
  COPY      501
  DISPLY      1
```

END INGRP

END OPN SEQUENCE

### DISPLY

#### DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Gravel Trench Bed 2      MAX      1      2      30      9
```

END DISPLY-INFO1

END DISPLY

### COPY

#### TIMESERIES

```
# - # NPT NMN ***
1      1      1
501     1      1
```

END TIMESERIES

END COPY

### GENER

#### OPCODE

```
#      # OPCD ***
END OPCODE
```

#### PARM

```
#      #      K ***
END PARM
```

END GENER

### PERLND

#### GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #      User  t-series Engl Metr ***
                                in  out      ***
```

END GEN-INFO

\*\*\* Section PWATER\*\*\*

### ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
END ACTIVITY
```

### PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *****
END PRINT-INFO
```

```

PWAT-PARM1
  <PLS > PWATER variable monthly parameter value flags ***
  # - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
END PWAT-PARM1

PWAT-PARM2
  <PLS > PWATER input info: Part 2 ***
  # - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
END PWAT-PARM2

PWAT-PARM3
  <PLS > PWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
END PWAT-PARM3

PWAT-PARM4
  <PLS > PWATER input info: Part 4 ***
  # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
  <PLS ><-----Name-----> Unit-systems Printer ***
  # - # User t-series Engl Metr ***
  in out ***
  4 ROOF TOPS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW IWAT SLD IWG IQAL ***
  4 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO
  <ILS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW IWAT SLD IWG IQAL *****
  4 0 0 4 0 0 0 1 9
END PRINT-INFO

IWAT-PARM1
  <PLS > IWATER variable monthly parameter value flags ***
  # - # CSNO RTOP VRS VNN RTLI ***
  4 0 0 0 0 0
END IWAT-PARM1

IWAT-PARM2
  <PLS > IWATER input info: Part 2 ***
  # - # *** LSUR SLSUR NSUR RETSC
  4 400 0.01 0.1 0.1
END IWAT-PARM2

IWAT-PARM3
  <PLS > IWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN
  4 0 0
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  # - # *** RETS SURS
  4 0 0

```



```

RCHRES Initial conditions for each HYDR section ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->
1 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
2 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

```

```

FTABLE 1
92 5
Depth Area Volume Outflow1 Outflow2 Velocity Travel Time***
(ft) (acres) (acre-ft) (cfs) (cfs) (ft/sec) (Minutes)***
0.000000 0.018365 0.000000 0.000000 0.000000
0.047222 0.018366 0.000304 0.000000 0.064815
0.094444 0.018366 0.000607 0.000000 0.064815
0.141667 0.018366 0.000911 0.000000 0.064815
0.188889 0.018366 0.001214 0.000000 0.064815
0.236111 0.018366 0.001518 0.000000 0.064815
0.283333 0.018366 0.001821 0.000000 0.064815
0.330556 0.018366 0.002125 0.000000 0.064815
0.377778 0.018367 0.002428 0.000000 0.064815
0.425000 0.018367 0.002732 0.000000 0.064815
0.472222 0.018367 0.003036 0.000000 0.064815
0.519444 0.018367 0.003339 0.000000 0.064815
0.566667 0.018367 0.003643 0.000000 0.064815
0.613889 0.018367 0.003946 0.000000 0.064815
0.661111 0.018367 0.004250 0.000000 0.064815
0.708333 0.018367 0.004553 0.000000 0.064815
0.755556 0.018368 0.004857 0.000000 0.064815
0.802778 0.018368 0.005160 0.000000 0.064815
0.850000 0.018368 0.005464 0.000000 0.064815
0.897222 0.018368 0.005768 0.000000 0.064815
0.944444 0.018368 0.006071 0.000000 0.064815
0.991667 0.018368 0.006375 0.000000 0.064815
1.038889 0.018368 0.006678 0.000000 0.064815
1.086111 0.018368 0.006982 0.000000 0.064815
1.133333 0.018369 0.007286 0.000000 0.064815
1.180556 0.018369 0.007589 0.000000 0.064815
1.227778 0.018369 0.007893 0.000000 0.064815
1.275000 0.018369 0.008196 0.000000 0.064815
1.322222 0.018369 0.008500 0.000000 0.064815
1.369444 0.018369 0.008804 0.000000 0.064815
1.416667 0.018369 0.009107 0.000000 0.064815
1.463889 0.018370 0.009411 0.000000 0.064815
1.511111 0.018370 0.009714 0.000000 0.064815
1.558333 0.018370 0.010018 0.000000 0.064815
1.605556 0.018370 0.010322 0.000000 0.064815
1.652778 0.018370 0.010625 0.000000 0.064815
1.700000 0.018370 0.010929 0.000000 0.064815
1.747222 0.018370 0.011232 0.000000 0.064815
1.794444 0.018370 0.011536 0.000000 0.064815
1.841667 0.018371 0.011840 0.000000 0.064815
1.888889 0.018371 0.012143 0.000000 0.064815
1.936111 0.018371 0.012447 0.000000 0.064815
1.983333 0.018371 0.012751 0.000000 0.064815
2.030556 0.018371 0.013054 0.000000 0.064815
2.077778 0.018371 0.013358 0.000000 0.064815
2.125000 0.018371 0.013661 0.000000 0.064815
2.172222 0.018371 0.013965 0.000000 0.064815
2.219444 0.018372 0.014269 0.000000 0.064815
2.266667 0.018372 0.014572 0.000000 0.064815
2.313889 0.018372 0.014876 0.000000 0.064815
2.361111 0.018372 0.015180 0.000000 0.064815
2.408333 0.018372 0.015483 0.000000 0.064815
2.455556 0.018372 0.015787 0.000000 0.064815
2.502778 0.018372 0.016091 0.000000 0.064815

```

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 2.550000 | 0.018372 | 0.016394 | 0.000000 | 0.064815 |
| 2.597222 | 0.018373 | 0.016698 | 0.000000 | 0.064815 |
| 2.644444 | 0.018373 | 0.017002 | 0.000000 | 0.064815 |
| 2.691667 | 0.018373 | 0.017305 | 0.000000 | 0.064815 |
| 2.738889 | 0.018373 | 0.017609 | 0.000000 | 0.064815 |
| 2.786111 | 0.018373 | 0.017913 | 0.000000 | 0.064815 |
| 2.833333 | 0.018373 | 0.018216 | 0.000000 | 0.064815 |
| 2.880556 | 0.018373 | 0.018520 | 0.000000 | 0.064815 |
| 2.927778 | 0.018374 | 0.018824 | 0.000000 | 0.064815 |
| 2.975000 | 0.018374 | 0.019127 | 0.000000 | 0.064815 |
| 3.022222 | 0.018374 | 0.019431 | 0.000000 | 0.064815 |
| 3.069444 | 0.018374 | 0.019735 | 0.000000 | 0.064815 |
| 3.116667 | 0.018374 | 0.020038 | 0.000000 | 0.064815 |
| 3.163889 | 0.018374 | 0.020342 | 0.000000 | 0.064815 |
| 3.211111 | 0.018374 | 0.020646 | 0.000000 | 0.064815 |
| 3.258333 | 0.018374 | 0.020949 | 0.000000 | 0.064815 |
| 3.305556 | 0.018375 | 0.021253 | 0.000000 | 0.064815 |
| 3.352778 | 0.018375 | 0.021557 | 0.000000 | 0.064815 |
| 3.400000 | 0.018375 | 0.021860 | 0.000000 | 0.064815 |
| 3.447222 | 0.018375 | 0.022164 | 0.000000 | 0.064815 |
| 3.494444 | 0.018375 | 0.022468 | 0.000000 | 0.064815 |
| 3.541667 | 0.018375 | 0.022772 | 0.000000 | 0.064815 |
| 3.588889 | 0.018375 | 0.023075 | 0.000000 | 0.064815 |
| 3.636111 | 0.018375 | 0.023379 | 0.000000 | 0.064815 |
| 3.683333 | 0.018376 | 0.023683 | 0.000000 | 0.064815 |
| 3.730556 | 0.018376 | 0.023986 | 0.000000 | 0.064815 |
| 3.777778 | 0.018376 | 0.024290 | 0.000000 | 0.064815 |
| 3.825000 | 0.018376 | 0.024594 | 0.000000 | 0.064815 |
| 3.872222 | 0.018376 | 0.024898 | 0.000000 | 0.064815 |
| 3.919444 | 0.018376 | 0.025201 | 0.000000 | 0.064815 |
| 3.966667 | 0.018376 | 0.025505 | 0.000000 | 0.064815 |
| 4.013889 | 0.018377 | 0.026373 | 0.014475 | 0.064815 |
| 4.061111 | 0.018377 | 0.027241 | 0.133209 | 0.064815 |
| 4.108333 | 0.018377 | 0.028108 | 0.311351 | 0.064815 |
| 4.155556 | 0.018377 | 0.028976 | 0.523118 | 0.064815 |
| 4.202778 | 0.018377 | 0.029844 | 0.745978 | 0.064815 |
| 4.250000 | 0.018377 | 0.030712 | 0.957039 | 0.064815 |
| 4.297222 | 0.018377 | 0.031580 | 1.135901 | 0.064815 |

END FTABLE 1

FTABLE 2

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| Depth<br>(ft) | Area<br>(acres) | Volume<br>(acre-ft) | Outflow1<br>(cfs) | Outflow2<br>(cfs) | Velocity<br>(ft/sec) | Travel Time***<br>(Minutes)*** |
|---------------|-----------------|---------------------|-------------------|-------------------|----------------------|--------------------------------|
| 0.000000      | 0.018365        | 0.000000            | 0.000000          | 0.000000          |                      |                                |
| 0.047222      | 0.018366        | 0.000304            | 0.000000          | 0.064815          |                      |                                |
| 0.094444      | 0.018366        | 0.000607            | 0.000000          | 0.064815          |                      |                                |
| 0.141667      | 0.018366        | 0.000911            | 0.000000          | 0.064815          |                      |                                |
| 0.188889      | 0.018366        | 0.001214            | 0.000000          | 0.064815          |                      |                                |
| 0.236111      | 0.018366        | 0.001518            | 0.000000          | 0.064815          |                      |                                |
| 0.283333      | 0.018366        | 0.001821            | 0.000000          | 0.064815          |                      |                                |
| 0.330556      | 0.018366        | 0.002125            | 0.000000          | 0.064815          |                      |                                |
| 0.377778      | 0.018367        | 0.002428            | 0.000000          | 0.064815          |                      |                                |
| 0.425000      | 0.018367        | 0.002732            | 0.000000          | 0.064815          |                      |                                |
| 0.472222      | 0.018367        | 0.003036            | 0.000000          | 0.064815          |                      |                                |
| 0.519444      | 0.018367        | 0.003339            | 0.000000          | 0.064815          |                      |                                |
| 0.566667      | 0.018367        | 0.003643            | 0.000000          | 0.064815          |                      |                                |
| 0.613889      | 0.018367        | 0.003946            | 0.000000          | 0.064815          |                      |                                |
| 0.661111      | 0.018367        | 0.004250            | 0.000000          | 0.064815          |                      |                                |
| 0.708333      | 0.018367        | 0.004553            | 0.000000          | 0.064815          |                      |                                |
| 0.755556      | 0.018368        | 0.004857            | 0.000000          | 0.064815          |                      |                                |
| 0.802778      | 0.018368        | 0.005160            | 0.000000          | 0.064815          |                      |                                |
| 0.850000      | 0.018368        | 0.005464            | 0.000000          | 0.064815          |                      |                                |
| 0.897222      | 0.018368        | 0.005768            | 0.000000          | 0.064815          |                      |                                |
| 0.944444      | 0.018368        | 0.006071            | 0.000000          | 0.064815          |                      |                                |
| 0.991667      | 0.018368        | 0.006375            | 0.000000          | 0.064815          |                      |                                |
| 1.038889      | 0.018368        | 0.006678            | 0.000000          | 0.064815          |                      |                                |
| 1.086111      | 0.018368        | 0.006982            | 0.000000          | 0.064815          |                      |                                |
| 1.133333      | 0.018369        | 0.007286            | 0.000000          | 0.064815          |                      |                                |
| 1.180556      | 0.018369        | 0.007589            | 0.000000          | 0.064815          |                      |                                |
| 1.227778      | 0.018369        | 0.007893            | 0.000000          | 0.064815          |                      |                                |

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1.275000 | 0.018369 | 0.008196 | 0.000000 | 0.064815 |
| 1.322222 | 0.018369 | 0.008500 | 0.000000 | 0.064815 |
| 1.369444 | 0.018369 | 0.008804 | 0.000000 | 0.064815 |
| 1.416667 | 0.018369 | 0.009107 | 0.000000 | 0.064815 |
| 1.463889 | 0.018370 | 0.009411 | 0.000000 | 0.064815 |
| 1.511111 | 0.018370 | 0.009714 | 0.000000 | 0.064815 |
| 1.558333 | 0.018370 | 0.010018 | 0.000000 | 0.064815 |
| 1.605556 | 0.018370 | 0.010322 | 0.000000 | 0.064815 |
| 1.652778 | 0.018370 | 0.010625 | 0.000000 | 0.064815 |
| 1.700000 | 0.018370 | 0.010929 | 0.000000 | 0.064815 |
| 1.747222 | 0.018370 | 0.011232 | 0.000000 | 0.064815 |
| 1.794444 | 0.018370 | 0.011536 | 0.000000 | 0.064815 |
| 1.841667 | 0.018371 | 0.011840 | 0.000000 | 0.064815 |
| 1.888889 | 0.018371 | 0.012143 | 0.000000 | 0.064815 |
| 1.936111 | 0.018371 | 0.012447 | 0.000000 | 0.064815 |
| 1.983333 | 0.018371 | 0.012751 | 0.000000 | 0.064815 |
| 2.030556 | 0.018371 | 0.013054 | 0.000000 | 0.064815 |
| 2.077778 | 0.018371 | 0.013358 | 0.000000 | 0.064815 |
| 2.125000 | 0.018371 | 0.013661 | 0.000000 | 0.064815 |
| 2.172222 | 0.018371 | 0.013965 | 0.000000 | 0.064815 |
| 2.219444 | 0.018372 | 0.014269 | 0.000000 | 0.064815 |
| 2.266667 | 0.018372 | 0.014572 | 0.000000 | 0.064815 |
| 2.313889 | 0.018372 | 0.014876 | 0.000000 | 0.064815 |
| 2.361111 | 0.018372 | 0.015180 | 0.000000 | 0.064815 |
| 2.408333 | 0.018372 | 0.015483 | 0.000000 | 0.064815 |
| 2.455556 | 0.018372 | 0.015787 | 0.000000 | 0.064815 |
| 2.502778 | 0.018372 | 0.016091 | 0.000000 | 0.064815 |
| 2.550000 | 0.018372 | 0.016394 | 0.000000 | 0.064815 |
| 2.597222 | 0.018373 | 0.016698 | 0.000000 | 0.064815 |
| 2.644444 | 0.018373 | 0.017002 | 0.000000 | 0.064815 |
| 2.691667 | 0.018373 | 0.017305 | 0.000000 | 0.064815 |
| 2.738889 | 0.018373 | 0.017609 | 0.000000 | 0.064815 |
| 2.786111 | 0.018373 | 0.017913 | 0.000000 | 0.064815 |
| 2.833333 | 0.018373 | 0.018216 | 0.000000 | 0.064815 |
| 2.880556 | 0.018373 | 0.018520 | 0.000000 | 0.064815 |
| 2.927778 | 0.018374 | 0.018824 | 0.000000 | 0.064815 |
| 2.975000 | 0.018374 | 0.019127 | 0.000000 | 0.064815 |
| 3.022222 | 0.018374 | 0.019431 | 0.000000 | 0.064815 |
| 3.069444 | 0.018374 | 0.019735 | 0.000000 | 0.064815 |
| 3.116667 | 0.018374 | 0.020038 | 0.000000 | 0.064815 |
| 3.163889 | 0.018374 | 0.020342 | 0.000000 | 0.064815 |
| 3.211111 | 0.018374 | 0.020646 | 0.000000 | 0.064815 |
| 3.258333 | 0.018374 | 0.020949 | 0.000000 | 0.064815 |
| 3.305556 | 0.018375 | 0.021253 | 0.000000 | 0.064815 |
| 3.352778 | 0.018375 | 0.021557 | 0.000000 | 0.064815 |
| 3.400000 | 0.018375 | 0.021860 | 0.000000 | 0.064815 |
| 3.447222 | 0.018375 | 0.022164 | 0.000000 | 0.064815 |
| 3.494444 | 0.018375 | 0.022468 | 0.000000 | 0.064815 |
| 3.541667 | 0.018375 | 0.022772 | 0.000000 | 0.064815 |
| 3.588889 | 0.018375 | 0.023075 | 0.000000 | 0.064815 |
| 3.636111 | 0.018375 | 0.023379 | 0.000000 | 0.064815 |
| 3.683333 | 0.018376 | 0.023683 | 0.000000 | 0.064815 |
| 3.730556 | 0.018376 | 0.023986 | 0.000000 | 0.064815 |
| 3.777778 | 0.018376 | 0.024290 | 0.000000 | 0.064815 |
| 3.825000 | 0.018376 | 0.024594 | 0.000000 | 0.064815 |
| 3.872222 | 0.018376 | 0.024898 | 0.000000 | 0.064815 |
| 3.919444 | 0.018376 | 0.025201 | 0.000000 | 0.064815 |
| 3.966667 | 0.018376 | 0.025505 | 0.000000 | 0.064815 |
| 4.013889 | 0.018377 | 0.026373 | 0.014475 | 0.064815 |
| 4.061111 | 0.018377 | 0.027241 | 0.133209 | 0.064815 |
| 4.108333 | 0.018377 | 0.028108 | 0.311351 | 0.064815 |
| 4.155556 | 0.018377 | 0.028976 | 0.523118 | 0.064815 |
| 4.202778 | 0.018377 | 0.029844 | 0.745978 | 0.064815 |
| 4.250000 | 0.018377 | 0.030712 | 0.957039 | 0.064815 |
| 4.297222 | 0.018377 | 0.031580 | 1.135901 | 0.064815 |

END F'TABLE 2  
END F'TABLES

EXT SOURCES

<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> \*\*\*

| <Name> | # | <Name> | # | tem  | strg<-factor->strg | <Name> | # | #   | <Name> | # | #      | *** |
|--------|---|--------|---|------|--------------------|--------|---|-----|--------|---|--------|-----|
| WDM    | 2 | PREC   |   | ENGL | 1                  | PERLND | 1 | 999 | EXTNL  |   | PREC   |     |
| WDM    | 2 | PREC   |   | ENGL | 1                  | IMPLND | 1 | 999 | EXTNL  |   | PREC   |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | PERLND | 1 | 999 | EXTNL  |   | PETINP |     |
| WDM    | 1 | EVAP   |   | ENGL | 0.76               | IMPLND | 1 | 999 | EXTNL  |   | PETINP |     |

END EXT SOURCES

EXT TARGETS

| <-Volume-> | <-Grp> | <-Member-> | <--Mult--> | Tran            | <-Volume-> | <Member> | Tsys   | Tgap | Amd  | ***     |
|------------|--------|------------|------------|-----------------|------------|----------|--------|------|------|---------|
| <Name>     | #      | <Name>     | #          | #<-factor->strg | <Name>     | #        | <Name> | tem  | strg | strg*** |
| RCHRES     | 2      | HYDR       | RO         | 1 1             | 1          | WDM      | 1004   | FLOW | ENGL | REPL    |
| RCHRES     | 2      | HYDR       | O          | 1 1             | 1          | WDM      | 1005   | FLOW | ENGL | REPL    |
| RCHRES     | 2      | HYDR       | O          | 2 1             | 1          | WDM      | 1006   | FLOW | ENGL | REPL    |
| RCHRES     | 2      | HYDR       | STAGE      | 1 1             | 1          | WDM      | 1007   | STAG | ENGL | REPL    |
| COPY       | 1      | OUTPUT     | MEAN       | 1 1             | 48.4       | WDM      | 701    | FLOW | ENGL | REPL    |
| COPY       | 501    | OUTPUT     | MEAN       | 1 1             | 48.4       | WDM      | 801    | FLOW | ENGL | REPL    |

END EXT TARGETS

MASS-LINK

| <Volume>      | <-Grp> | <-Member-> | <--Mult--> | <Target>    | <-Grp> | <-Member-> | ***  |
|---------------|--------|------------|------------|-------------|--------|------------|------|
| <Name>        | #      | <Name>     | #          | #<-factor-> | <Name> | #          | #*** |
| MASS-LINK     |        | 5          |            |             |        |            |      |
| IMPLND        | IWATER | SURO       |            | 0.083333    | RCHRES | INFLOW     | IVOL |
| END MASS-LINK |        | 5          |            |             |        |            |      |
| MASS-LINK     |        | 7          |            |             |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 1          |             | RCHRES | INFLOW     | IVOL |
| END MASS-LINK |        | 7          |            |             |        |            |      |
| MASS-LINK     |        | 15         |            |             |        |            |      |
| IMPLND        | IWATER | SURO       |            | 0.083333    | COPY   | INPUT      | MEAN |
| END MASS-LINK |        | 15         |            |             |        |            |      |
| MASS-LINK     |        | 17         |            |             |        |            |      |
| RCHRES        | OFLOW  | OVOL       | 1          |             | COPY   | INPUT      | MEAN |
| END MASS-LINK |        | 17         |            |             |        |            |      |

END MASS-LINK

END RUN







## *Disclaimer*

### *Legal Notice*

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*West Roof Drainage*

**WWHM2012  
PROJECT REPORT**

## *General Model Information*

Project Name: West Roof Drainage  
Site Name: Giffin MF 5000 sf  
Site Address:  
City:  
Report Date: 5/28/2020  
Gage: Fairgrounds (Kaiser)  
Data Start: 1955/10/01  
Data End: 2011/09/30  
Timestep: 15 Minute  
Precip Scale: 1,000  
Version Date: 2019/09/13  
Version: 4.2.17

## *POC Thresholds*

Low Flow Threshold for POC1: 50 Percent of the 2 Year  
High Flow Threshold for POC1: 50 Year

## *Landuse Basin Data*

### *Predeveloped Land Use*

#### **Bldg D and C**

Bypass: No

GroundWater: No

Pervious Land Use acre  
A B, Forest, Flat 0.2

Pervious Total 0.2

Impervious Land Use acre

Impervious Total 0

Basin Total 0.2

Element Flows To:

Surface

Interflow

Groundwater

## Building A and B

Bypass: No

GroundWater: No

Pervious Land Use acre  
A B, Forest, Flat 0.2

Pervious Total 0.2

Impervious Land Use acre

Impervious Total 0

Basin Total 0.2

Element Flows To:  
Surface Interflow Groundwater



## Building E

Bypass: No

GroundWater: No

Pervious Land Use      acre  
A B, Forest, Flat      0.1

Pervious Total      0.1

Impervious Land Use      acre

Impervious Total      0

Basin Total      0.1

|                   |           |             |
|-------------------|-----------|-------------|
| Element Flows To: |           |             |
| Surface           | Interflow | Groundwater |

### *Mitigated Land Use*

#### **Bldg D and C**

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.2  |
| Impervious Total    | 0.2  |
| Basin Total         | 0.2  |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 2 | Gravel Trench Bed 2 |             |

## Building A and B

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.2  |
| Impervious Total    | 0.2  |
| Basin Total         | 0.2  |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 3 | Gravel Trench Bed 3 |             |

## Building E

|                     |      |
|---------------------|------|
| Bypass:             | No   |
| GroundWater:        | No   |
| Pervious Land Use   | acre |
| Pervious Total      | 0    |
| Impervious Land Use | acre |
| ROOF TOPS FLAT      | 0.1  |
| Impervious Total    | 0.1  |
| Basin Total         | 0.1  |

|                     |                     |             |
|---------------------|---------------------|-------------|
| Element Flows To:   |                     |             |
| Surface             | Interflow           | Groundwater |
| Gravel Trench Bed 2 | Gravel Trench Bed 2 |             |

## *Routing Elements*

### *Predeveloped Routing*

## Mitigated Routing

### Gravel Trench Bed 2

Bottom Length: 50.00 ft.  
 Bottom Width: 20.00 ft.  
 Trench bottom slope 1: 0.001 To 1  
 Trench Left side slope 0: 0.001 To 1  
 Trench right side slope 2: 0.001 To 1  
 Material thickness of first layer: 2  
 Pour Space of material for first layer: 0.35  
 Material thickness of second layer: 0  
 Pour Space of material for second layer: 0  
 Material thickness of third layer: 0  
 Pour Space of material for third layer: 0  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 60.509  
 Total Volume Through Riser (ac-ft.): 0.045  
 Total Volume Through Facility (ac-ft.): 60.554  
 Percent Infiltrated: 99.93  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Discharge Structure  
 Riser Height: 2 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1                      Outlet 2  
 Gravel Trench Bed 3

Gravel Trench Bed Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.023     | 0.000          | 0.000          | 0.000       |
| 0.0278      | 0.023     | 0.000          | 0.000          | 0.081       |
| 0.0556      | 0.023     | 0.000          | 0.000          | 0.081       |
| 0.0833      | 0.023     | 0.000          | 0.000          | 0.081       |
| 0.1111      | 0.023     | 0.000          | 0.000          | 0.081       |
| 0.1389      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.1667      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.1944      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.2222      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.2500      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.2778      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3056      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3333      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3611      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3889      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.4167      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.4444      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.4722      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.5000      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.5278      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.5556      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.5833      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.6111      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.6389      | 0.023     | 0.005          | 0.000          | 0.081       |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 0.6667 | 0.023 | 0.005 | 0.000 | 0.081 |
| 0.6944 | 0.023 | 0.005 | 0.000 | 0.081 |
| 0.7222 | 0.023 | 0.005 | 0.000 | 0.081 |
| 0.7500 | 0.023 | 0.006 | 0.000 | 0.081 |
| 0.7778 | 0.023 | 0.006 | 0.000 | 0.081 |
| 0.8056 | 0.023 | 0.006 | 0.000 | 0.081 |
| 0.8333 | 0.023 | 0.006 | 0.000 | 0.081 |
| 0.8611 | 0.023 | 0.006 | 0.000 | 0.081 |
| 0.8889 | 0.023 | 0.007 | 0.000 | 0.081 |
| 0.9167 | 0.023 | 0.007 | 0.000 | 0.081 |
| 0.9444 | 0.023 | 0.007 | 0.000 | 0.081 |
| 0.9722 | 0.023 | 0.007 | 0.000 | 0.081 |
| 1.0000 | 0.023 | 0.008 | 0.000 | 0.081 |
| 1.0278 | 0.023 | 0.008 | 0.000 | 0.081 |
| 1.0556 | 0.023 | 0.008 | 0.000 | 0.081 |
| 1.0833 | 0.023 | 0.008 | 0.000 | 0.081 |
| 1.1111 | 0.023 | 0.008 | 0.000 | 0.081 |
| 1.1389 | 0.023 | 0.009 | 0.000 | 0.081 |
| 1.1667 | 0.023 | 0.009 | 0.000 | 0.081 |
| 1.1944 | 0.023 | 0.009 | 0.000 | 0.081 |
| 1.2222 | 0.023 | 0.009 | 0.000 | 0.081 |
| 1.2500 | 0.023 | 0.010 | 0.000 | 0.081 |
| 1.2778 | 0.023 | 0.010 | 0.000 | 0.081 |
| 1.3056 | 0.023 | 0.010 | 0.000 | 0.081 |
| 1.3333 | 0.023 | 0.010 | 0.000 | 0.081 |
| 1.3611 | 0.023 | 0.010 | 0.000 | 0.081 |
| 1.3889 | 0.023 | 0.011 | 0.000 | 0.081 |
| 1.4167 | 0.023 | 0.011 | 0.000 | 0.081 |
| 1.4444 | 0.023 | 0.011 | 0.000 | 0.081 |
| 1.4722 | 0.023 | 0.011 | 0.000 | 0.081 |
| 1.5000 | 0.023 | 0.012 | 0.000 | 0.081 |
| 1.5278 | 0.023 | 0.012 | 0.000 | 0.081 |
| 1.5556 | 0.023 | 0.012 | 0.000 | 0.081 |
| 1.5833 | 0.023 | 0.012 | 0.000 | 0.081 |
| 1.6111 | 0.023 | 0.012 | 0.000 | 0.081 |
| 1.6389 | 0.023 | 0.013 | 0.000 | 0.081 |
| 1.6667 | 0.023 | 0.013 | 0.000 | 0.081 |
| 1.6944 | 0.023 | 0.013 | 0.000 | 0.081 |
| 1.7222 | 0.023 | 0.013 | 0.000 | 0.081 |
| 1.7500 | 0.023 | 0.014 | 0.000 | 0.081 |
| 1.7778 | 0.023 | 0.014 | 0.000 | 0.081 |
| 1.8056 | 0.023 | 0.014 | 0.000 | 0.081 |
| 1.8333 | 0.023 | 0.014 | 0.000 | 0.081 |
| 1.8611 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.8889 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.9167 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.9444 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.9722 | 0.023 | 0.015 | 0.000 | 0.081 |
| 2.0000 | 0.023 | 0.016 | 0.000 | 0.081 |
| 2.0278 | 0.023 | 0.016 | 0.040 | 0.081 |
| 2.0556 | 0.023 | 0.017 | 0.115 | 0.081 |
| 2.0833 | 0.023 | 0.018 | 0.211 | 0.081 |
| 2.1111 | 0.023 | 0.018 | 0.323 | 0.081 |
| 2.1389 | 0.023 | 0.019 | 0.445 | 0.081 |
| 2.1667 | 0.023 | 0.019 | 0.575 | 0.081 |
| 2.1944 | 0.023 | 0.020 | 0.706 | 0.081 |
| 2.2222 | 0.023 | 0.021 | 0.835 | 0.081 |
| 2.2500 | 0.023 | 0.021 | 0.957 | 0.081 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 2.2778 | 0.023 | 0.022 | 1.067 | 0.081 |
| 2.3056 | 0.023 | 0.023 | 1.163 | 0.081 |
| 2.3333 | 0.023 | 0.023 | 1.242 | 0.081 |
| 2.3611 | 0.023 | 0.024 | 1.305 | 0.081 |
| 2.3889 | 0.023 | 0.025 | 1.355 | 0.081 |
| 2.4167 | 0.023 | 0.025 | 1.396 | 0.081 |
| 2.4444 | 0.023 | 0.026 | 1.458 | 0.081 |
| 2.4722 | 0.023 | 0.026 | 1.503 | 0.081 |
| 2.5000 | 0.023 | 0.027 | 1.546 | 0.081 |



### Gravel Trench Bed 3

Bottom Length: 50.00 ft.  
 Bottom Width: 20.00 ft.  
 Trench bottom slope 1: 0.001 To 1  
 Trench Left side slope 0: 0.001 To 1  
 Trench right side slope 2: 0.001 To 1  
 Material thickness of first layer: 5  
 Pour Space of material for first layer: 0.4  
 Material thickness of second layer: 0  
 Pour Space of material for second layer: 0  
 Material thickness of third layer: 0  
 Pour Space of material for third layer: 0  
 Infiltration On  
 Infiltration rate: 3.5  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft.): 40.461  
 Total Volume Through Riser (ac-ft.): 0  
 Total Volume Through Facility (ac-ft.): 40.461  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Discharge Structure  
 Riser Height: 5 ft.  
 Riser Diameter: 10 in.  
 Element Flows To:  
 Outlet 1                      Outlet 2

Gravel Trench Bed Hydraulic Table

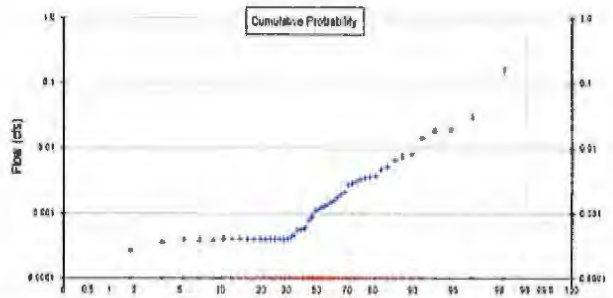
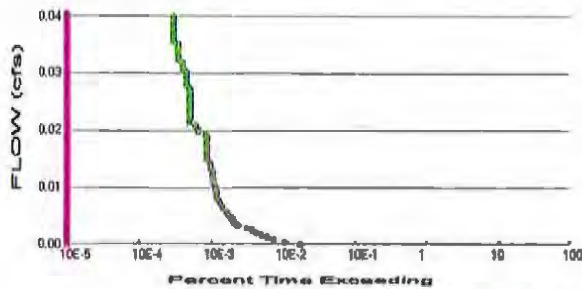
| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|-------------|-----------|----------------|----------------|-------------|
| 0.0000      | 0.023     | 0.000          | 0.000          | 0.000       |
| 0.0611      | 0.023     | 0.000          | 0.000          | 0.081       |
| 0.1222      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.1833      | 0.023     | 0.001          | 0.000          | 0.081       |
| 0.2444      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3056      | 0.023     | 0.002          | 0.000          | 0.081       |
| 0.3667      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.4278      | 0.023     | 0.003          | 0.000          | 0.081       |
| 0.4889      | 0.023     | 0.004          | 0.000          | 0.081       |
| 0.5500      | 0.023     | 0.005          | 0.000          | 0.081       |
| 0.6111      | 0.023     | 0.005          | 0.000          | 0.081       |
| 0.6722      | 0.023     | 0.006          | 0.000          | 0.081       |
| 0.7333      | 0.023     | 0.006          | 0.000          | 0.081       |
| 0.7944      | 0.023     | 0.007          | 0.000          | 0.081       |
| 0.8556      | 0.023     | 0.007          | 0.000          | 0.081       |
| 0.9167      | 0.023     | 0.008          | 0.000          | 0.081       |
| 0.9778      | 0.023     | 0.009          | 0.000          | 0.081       |
| 1.0389      | 0.023     | 0.009          | 0.000          | 0.081       |
| 1.1000      | 0.023     | 0.010          | 0.000          | 0.081       |
| 1.1611      | 0.023     | 0.010          | 0.000          | 0.081       |
| 1.2222      | 0.023     | 0.011          | 0.000          | 0.081       |
| 1.2833      | 0.023     | 0.011          | 0.000          | 0.081       |
| 1.3444      | 0.023     | 0.012          | 0.000          | 0.081       |
| 1.4056      | 0.023     | 0.012          | 0.000          | 0.081       |
| 1.4667      | 0.023     | 0.013          | 0.000          | 0.081       |
| 1.5278      | 0.023     | 0.014          | 0.000          | 0.081       |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 1.5889 | 0.023 | 0.014 | 0.000 | 0.081 |
| 1.6500 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.7111 | 0.023 | 0.015 | 0.000 | 0.081 |
| 1.7722 | 0.023 | 0.016 | 0.000 | 0.081 |
| 1.8333 | 0.023 | 0.016 | 0.000 | 0.081 |
| 1.8944 | 0.023 | 0.017 | 0.000 | 0.081 |
| 1.9556 | 0.023 | 0.018 | 0.000 | 0.081 |
| 2.0167 | 0.023 | 0.018 | 0.000 | 0.081 |
| 2.0778 | 0.023 | 0.019 | 0.000 | 0.081 |
| 2.1389 | 0.023 | 0.019 | 0.000 | 0.081 |
| 2.2000 | 0.023 | 0.020 | 0.000 | 0.081 |
| 2.2611 | 0.023 | 0.020 | 0.000 | 0.081 |
| 2.3222 | 0.023 | 0.021 | 0.000 | 0.081 |
| 2.3833 | 0.023 | 0.021 | 0.000 | 0.081 |
| 2.4444 | 0.023 | 0.022 | 0.000 | 0.081 |
| 2.5056 | 0.023 | 0.023 | 0.000 | 0.081 |
| 2.5667 | 0.023 | 0.023 | 0.000 | 0.081 |
| 2.6278 | 0.023 | 0.024 | 0.000 | 0.081 |
| 2.6889 | 0.023 | 0.024 | 0.000 | 0.081 |
| 2.7500 | 0.023 | 0.025 | 0.000 | 0.081 |
| 2.8111 | 0.023 | 0.025 | 0.000 | 0.081 |
| 2.8722 | 0.023 | 0.026 | 0.000 | 0.081 |
| 2.9333 | 0.023 | 0.026 | 0.000 | 0.081 |
| 2.9944 | 0.023 | 0.027 | 0.000 | 0.081 |
| 3.0556 | 0.023 | 0.028 | 0.000 | 0.081 |
| 3.1167 | 0.023 | 0.028 | 0.000 | 0.081 |
| 3.1778 | 0.023 | 0.029 | 0.000 | 0.081 |
| 3.2389 | 0.023 | 0.029 | 0.000 | 0.081 |
| 3.3000 | 0.023 | 0.030 | 0.000 | 0.081 |
| 3.3611 | 0.023 | 0.030 | 0.000 | 0.081 |
| 3.4222 | 0.023 | 0.031 | 0.000 | 0.081 |
| 3.4833 | 0.023 | 0.032 | 0.000 | 0.081 |
| 3.5444 | 0.023 | 0.032 | 0.000 | 0.081 |
| 3.6056 | 0.023 | 0.033 | 0.000 | 0.081 |
| 3.6667 | 0.023 | 0.033 | 0.000 | 0.081 |
| 3.7278 | 0.023 | 0.034 | 0.000 | 0.081 |
| 3.7889 | 0.023 | 0.034 | 0.000 | 0.081 |
| 3.8500 | 0.023 | 0.035 | 0.000 | 0.081 |
| 3.9111 | 0.023 | 0.035 | 0.000 | 0.081 |
| 3.9722 | 0.023 | 0.036 | 0.000 | 0.081 |
| 4.0333 | 0.023 | 0.037 | 0.000 | 0.081 |
| 4.0944 | 0.023 | 0.037 | 0.000 | 0.081 |
| 4.1556 | 0.023 | 0.038 | 0.000 | 0.081 |
| 4.2167 | 0.023 | 0.038 | 0.000 | 0.081 |
| 4.2778 | 0.023 | 0.039 | 0.000 | 0.081 |
| 4.3389 | 0.023 | 0.039 | 0.000 | 0.081 |
| 4.4000 | 0.023 | 0.040 | 0.000 | 0.081 |
| 4.4611 | 0.023 | 0.041 | 0.000 | 0.081 |
| 4.5222 | 0.023 | 0.041 | 0.000 | 0.081 |
| 4.5833 | 0.023 | 0.042 | 0.000 | 0.081 |
| 4.6444 | 0.023 | 0.042 | 0.000 | 0.081 |
| 4.7056 | 0.023 | 0.043 | 0.000 | 0.081 |
| 4.7667 | 0.023 | 0.043 | 0.000 | 0.081 |
| 4.8278 | 0.023 | 0.044 | 0.000 | 0.081 |
| 4.8889 | 0.023 | 0.044 | 0.000 | 0.081 |
| 4.9500 | 0.023 | 0.045 | 0.000 | 0.081 |
| 5.0111 | 0.023 | 0.046 | 0.010 | 0.081 |
| 5.0722 | 0.023 | 0.048 | 0.170 | 0.081 |

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| 5.1333 | 0.023 | 0.049 | 0.420 | 0.081 |
| 5.1944 | 0.023 | 0.051 | 0.706 | 0.081 |
| 5.2556 | 0.023 | 0.052 | 0.980 | 0.081 |
| 5.3167 | 0.023 | 0.053 | 1.196 | 0.081 |
| 5.3778 | 0.023 | 0.055 | 1.337 | 0.081 |
| 5.4389 | 0.023 | 0.056 | 1.449 | 0.081 |
| 5.5000 | 0.023 | 0.058 | 1.546 | 0.081 |

## Analysis Results

### POC 1



+ Predeveloped x Mitigated

#### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0.5  
Total Impervious Area: 0

#### Mitigated Landuse Totals for POC #1

Total Pervious Area: 0  
Total Impervious Area: 0.5

Flow Frequency Method: Log Pearson Type III 17B

#### Flow Frequency Return Periods for Predeveloped. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0.001147  |
| 5 year        | 0.00403   |
| 10 year       | 0.008558  |
| 25 year       | 0.020614  |
| 50 year       | 0.037959  |
| 100 year      | 0.067685  |

#### Flow Frequency Return Periods for Mitigated. POC #1

| Return Period | Flow(cfs) |
|---------------|-----------|
| 2 year        | 0         |
| 5 year        | 0         |
| 10 year       | 0         |
| 25 year       | 0         |
| 50 year       | 0         |
| 100 year      | 0         |

### Annual Peaks

#### Annual Peaks for Predeveloped and Mitigated. POC #1

| Year | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1956 | 0.003        | 0.000     |
| 1957 | 0.001        | 0.000     |
| 1958 | 0.001        | 0.000     |
| 1959 | 0.001        | 0.000     |
| 1960 | 0.001        | 0.000     |
| 1961 | 0.002        | 0.000     |
| 1962 | 0.000        | 0.000     |
| 1963 | 0.020        | 0.000     |
| 1964 | 0.005        | 0.000     |
| 1965 | 0.002        | 0.000     |

|      |       |       |
|------|-------|-------|
| 1966 | 0.000 | 0.000 |
| 1967 | 0.001 | 0.000 |
| 1968 | 0.001 | 0.000 |
| 1969 | 0.001 | 0.000 |
| 1970 | 0.001 | 0.000 |
| 1971 | 0.007 | 0.000 |
| 1972 | 0.007 | 0.000 |
| 1973 | 0.000 | 0.000 |
| 1974 | 0.003 | 0.000 |
| 1975 | 0.001 | 0.000 |
| 1976 | 0.003 | 0.000 |
| 1977 | 0.000 | 0.000 |
| 1978 | 0.003 | 0.000 |
| 1979 | 0.000 | 0.000 |
| 1980 | 0.000 | 0.000 |
| 1981 | 0.008 | 0.000 |
| 1982 | 0.014 | 0.000 |
| 1983 | 0.001 | 0.000 |
| 1984 | 0.001 | 0.000 |
| 1985 | 0.000 | 0.000 |
| 1986 | 0.001 | 0.000 |
| 1987 | 0.003 | 0.000 |
| 1988 | 0.000 | 0.000 |
| 1989 | 0.000 | 0.000 |
| 1990 | 0.000 | 0.000 |
| 1991 | 0.031 | 0.000 |
| 1992 | 0.165 | 0.000 |
| 1993 | 0.019 | 0.000 |
| 1994 | 0.000 | 0.000 |
| 1995 | 0.001 | 0.000 |
| 1996 | 0.004 | 0.000 |
| 1997 | 0.002 | 0.000 |
| 1998 | 0.000 | 0.000 |
| 1999 | 0.000 | 0.000 |
| 2000 | 0.000 | 0.000 |
| 2001 | 0.000 | 0.000 |
| 2002 | 0.000 | 0.000 |
| 2003 | 0.004 | 0.000 |
| 2004 | 0.005 | 0.000 |
| 2005 | 0.000 | 0.000 |
| 2006 | 0.000 | 0.000 |
| 2007 | 0.000 | 0.000 |
| 2008 | 0.000 | 0.000 |
| 2009 | 0.001 | 0.000 |
| 2010 | 0.001 | 0.000 |
| 2011 | 0.002 | 0.000 |

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

| Rank | Predeveloped | Mitigated |
|------|--------------|-----------|
| 1    | 0.1653       | 0.0000    |
| 2    | 0.0308       | 0.0000    |
| 3    | 0.0197       | 0.0000    |
| 4    | 0.0188       | 0.0000    |
| 5    | 0.0143       | 0.0000    |
| 6    | 0.0083       | 0.0000    |
| 7    | 0.0074       | 0.0000    |
| 8    | 0.0065       | 0.0000    |

|    |        |        |
|----|--------|--------|
| 9  | 0.0050 | 0.0000 |
| 10 | 0.0046 | 0.0000 |
| 11 | 0.0037 | 0.0000 |
| 12 | 0.0036 | 0.0000 |
| 13 | 0.0035 | 0.0000 |
| 14 | 0.0033 | 0.0000 |
| 15 | 0.0030 | 0.0000 |
| 16 | 0.0028 | 0.0000 |
| 17 | 0.0027 | 0.0000 |
| 18 | 0.0021 | 0.0000 |
| 19 | 0.0019 | 0.0000 |
| 20 | 0.0018 | 0.0000 |
| 21 | 0.0016 | 0.0000 |
| 22 | 0.0015 | 0.0000 |
| 23 | 0.0014 | 0.0000 |
| 24 | 0.0013 | 0.0000 |
| 25 | 0.0013 | 0.0000 |
| 26 | 0.0012 | 0.0000 |
| 27 | 0.0012 | 0.0000 |
| 28 | 0.0011 | 0.0000 |
| 29 | 0.0011 | 0.0000 |
| 30 | 0.0009 | 0.0000 |
| 31 | 0.0009 | 0.0000 |
| 32 | 0.0008 | 0.0000 |
| 33 | 0.0006 | 0.0000 |
| 34 | 0.0006 | 0.0000 |
| 35 | 0.0006 | 0.0000 |
| 36 | 0.0005 | 0.0000 |
| 37 | 0.0005 | 0.0000 |
| 38 | 0.0004 | 0.0000 |
| 39 | 0.0004 | 0.0000 |
| 40 | 0.0004 | 0.0000 |
| 41 | 0.0004 | 0.0000 |
| 42 | 0.0004 | 0.0000 |
| 43 | 0.0004 | 0.0000 |
| 44 | 0.0004 | 0.0000 |
| 45 | 0.0004 | 0.0000 |
| 46 | 0.0004 | 0.0000 |
| 47 | 0.0004 | 0.0000 |
| 48 | 0.0004 | 0.0000 |
| 49 | 0.0004 | 0.0000 |
| 50 | 0.0004 | 0.0000 |
| 51 | 0.0004 | 0.0000 |
| 52 | 0.0004 | 0.0000 |
| 53 | 0.0004 | 0.0000 |
| 54 | 0.0004 | 0.0000 |
| 55 | 0.0003 | 0.0000 |
| 56 | 0.0003 | 0.0000 |

## Duration Flows

The Facility PASSED

| Flow(cfs) | Predev | Mit | Percentage | Pass/Fail |
|-----------|--------|-----|------------|-----------|
| 0.0006    | 347    | 0   | 0          | Pass      |
| 0.0010    | 210    | 0   | 0          | Pass      |
| 0.0013    | 146    | 0   | 0          | Pass      |
| 0.0017    | 115    | 0   | 0          | Pass      |
| 0.0021    | 97     | 0   | 0          | Pass      |
| 0.0025    | 83     | 0   | 0          | Pass      |
| 0.0028    | 72     | 0   | 0          | Pass      |
| 0.0032    | 60     | 0   | 0          | Pass      |
| 0.0036    | 46     | 0   | 0          | Pass      |
| 0.0040    | 41     | 0   | 0          | Pass      |
| 0.0043    | 40     | 0   | 0          | Pass      |
| 0.0047    | 39     | 0   | 0          | Pass      |
| 0.0051    | 36     | 0   | 0          | Pass      |
| 0.0055    | 33     | 0   | 0          | Pass      |
| 0.0059    | 32     | 0   | 0          | Pass      |
| 0.0062    | 31     | 0   | 0          | Pass      |
| 0.0066    | 28     | 0   | 0          | Pass      |
| 0.0070    | 27     | 0   | 0          | Pass      |
| 0.0074    | 26     | 0   | 0          | Pass      |
| 0.0077    | 25     | 0   | 0          | Pass      |
| 0.0081    | 24     | 0   | 0          | Pass      |
| 0.0085    | 23     | 0   | 0          | Pass      |
| 0.0089    | 23     | 0   | 0          | Pass      |
| 0.0093    | 23     | 0   | 0          | Pass      |
| 0.0096    | 22     | 0   | 0          | Pass      |
| 0.0100    | 22     | 0   | 0          | Pass      |
| 0.0104    | 21     | 0   | 0          | Pass      |
| 0.0108    | 21     | 0   | 0          | Pass      |
| 0.0111    | 21     | 0   | 0          | Pass      |
| 0.0115    | 20     | 0   | 0          | Pass      |
| 0.0119    | 20     | 0   | 0          | Pass      |
| 0.0123    | 20     | 0   | 0          | Pass      |
| 0.0127    | 20     | 0   | 0          | Pass      |
| 0.0130    | 19     | 0   | 0          | Pass      |
| 0.0134    | 19     | 0   | 0          | Pass      |
| 0.0138    | 19     | 0   | 0          | Pass      |
| 0.0142    | 18     | 0   | 0          | Pass      |
| 0.0145    | 17     | 0   | 0          | Pass      |
| 0.0149    | 17     | 0   | 0          | Pass      |
| 0.0153    | 17     | 0   | 0          | Pass      |
| 0.0157    | 17     | 0   | 0          | Pass      |
| 0.0161    | 17     | 0   | 0          | Pass      |
| 0.0164    | 17     | 0   | 0          | Pass      |
| 0.0168    | 17     | 0   | 0          | Pass      |
| 0.0172    | 17     | 0   | 0          | Pass      |
| 0.0176    | 17     | 0   | 0          | Pass      |
| 0.0179    | 17     | 0   | 0          | Pass      |
| 0.0183    | 17     | 0   | 0          | Pass      |
| 0.0187    | 16     | 0   | 0          | Pass      |
| 0.0191    | 13     | 0   | 0          | Pass      |
| 0.0195    | 13     | 0   | 0          | Pass      |
| 0.0198    | 12     | 0   | 0          | Pass      |
| 0.0202    | 12     | 0   | 0          | Pass      |

|        |    |   |   |      |
|--------|----|---|---|------|
| 0.0206 | 10 | 0 | 0 | Pass |
| 0.0210 | 10 | 0 | 0 | Pass |
| 0.0213 | 10 | 0 | 0 | Pass |
| 0.0217 | 10 | 0 | 0 | Pass |
| 0.0221 | 10 | 0 | 0 | Pass |
| 0.0225 | 10 | 0 | 0 | Pass |
| 0.0229 | 10 | 0 | 0 | Pass |
| 0.0232 | 10 | 0 | 0 | Pass |
| 0.0236 | 10 | 0 | 0 | Pass |
| 0.0240 | 10 | 0 | 0 | Pass |
| 0.0244 | 10 | 0 | 0 | Pass |
| 0.0247 | 10 | 0 | 0 | Pass |
| 0.0251 | 10 | 0 | 0 | Pass |
| 0.0255 | 10 | 0 | 0 | Pass |
| 0.0259 | 10 | 0 | 0 | Pass |
| 0.0263 | 10 | 0 | 0 | Pass |
| 0.0266 | 9  | 0 | 0 | Pass |
| 0.0270 | 9  | 0 | 0 | Pass |
| 0.0274 | 9  | 0 | 0 | Pass |
| 0.0278 | 9  | 0 | 0 | Pass |
| 0.0281 | 9  | 0 | 0 | Pass |
| 0.0285 | 9  | 0 | 0 | Pass |
| 0.0289 | 9  | 0 | 0 | Pass |
| 0.0293 | 8  | 0 | 0 | Pass |
| 0.0297 | 8  | 0 | 0 | Pass |
| 0.0300 | 8  | 0 | 0 | Pass |
| 0.0304 | 8  | 0 | 0 | Pass |
| 0.0308 | 7  | 0 | 0 | Pass |
| 0.0312 | 7  | 0 | 0 | Pass |
| 0.0315 | 7  | 0 | 0 | Pass |
| 0.0319 | 7  | 0 | 0 | Pass |
| 0.0323 | 7  | 0 | 0 | Pass |
| 0.0327 | 7  | 0 | 0 | Pass |
| 0.0330 | 7  | 0 | 0 | Pass |
| 0.0334 | 7  | 0 | 0 | Pass |
| 0.0338 | 6  | 0 | 0 | Pass |
| 0.0342 | 6  | 0 | 0 | Pass |
| 0.0346 | 6  | 0 | 0 | Pass |
| 0.0349 | 6  | 0 | 0 | Pass |
| 0.0353 | 6  | 0 | 0 | Pass |
| 0.0357 | 6  | 0 | 0 | Pass |
| 0.0361 | 6  | 0 | 0 | Pass |
| 0.0364 | 6  | 0 | 0 | Pass |
| 0.0368 | 6  | 0 | 0 | Pass |
| 0.0372 | 6  | 0 | 0 | Pass |
| 0.0376 | 6  | 0 | 0 | Pass |
| 0.0380 | 6  | 0 | 0 | Pass |



## Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

## LID Report

| LID Technique                                          | Used for Treatment ?     | Total Volume Needs Treatment (ac-ft) | Volume Through Facility (ac-ft) | Infiltration Volume (ac-ft) | Cumulative Volume Infiltration Credit | Percent Volume Infiltrated | Water Quality | Percent Water Quality Treated | Comment                           |
|--------------------------------------------------------|--------------------------|--------------------------------------|---------------------------------|-----------------------------|---------------------------------------|----------------------------|---------------|-------------------------------|-----------------------------------|
| Gravel Trench Bed 3 POC                                | <input type="checkbox"/> | 36.82                                |                                 |                             | <input type="checkbox"/>              | 100.00                     |               |                               |                                   |
| Gravel Trench Bed 2                                    | <input type="checkbox"/> | 55.10                                |                                 |                             | <input type="checkbox"/>              | 99.93                      |               |                               |                                   |
| Total Volume Infiltrated                               |                          | 91.92                                | 0.00                            | 0.00                        |                                       | 99.96                      | 0.00          | 0%                            | No Treat. Credit                  |
| Compliance with LID Standard 8% of 2-yr to 50% of 2-yr |                          |                                      |                                 |                             |                                       |                            |               |                               | Duration Analysis Result = Passed |
|                                                        |                          |                                      |                                 |                             |                                       |                            |               |                               |                                   |

## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.

# Appendix

## Predeveloped Schematic



## Mitigated Schematic



*Predeveloped UCI File*



## Mitigated UCI File

RUN

```
GLOBAL
  WWHM4 model simulation
  START      1955 10 01      END      2011 09 30
  RUN INTERP OUTPUT LEVEL    3      0
  RESUME      0 RUN      1      UNIT SYSTEM      1
END GLOBAL
```

```
FILES
<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26    West Roof Drainage.wdm
MESSU    25    MitWest Roof Drainage.MES
          27    MitWest Roof Drainage.L61
          28    MitWest Roof Drainage.L62
          30    POCWest Roof Drainage1.dat
END FILES
```

```
OPN SEQUENCE
  INGRP      INDELT 00:15
    IMPLND      4
    RCHRES      1
    RCHRES      2
    COPY        1
    COPY      501
    DISPLY      1
  END INGRP
END OPN SEQUENCE
```

```
DISPLY
  DISPLY-INFO1
    # - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
    1      Gravel Trench Bed 3      MAX      1      2      30      9
  END DISPLY-INFO1
END DISPLY
```

```
COPY
  TIMESERIES
    # - # NPT NMN ***
    1      1      1
    501      1      1
  END TIMESERIES
END COPY
```

```
GENER
  OPCODE
    #      # OPCD ***
  END OPCODE
  PARM
    #      #      K ***
  END PARM
END GENER
```

```
PERLND
  GEN-INFO
    <PLS ><-----Name----->NBLKS      Unit-systems      Printer ***
    # - #      User      t-series      Engl Metr      ***
                                in      out      ***
  END GEN-INFO
  *** Section PWATER***
```

```
ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
END ACTIVITY
```

```
PRINT-INFO
  <PLS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
END PRINT-INFO
```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIEW VIRC VLE INFC HWT ***
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
END PWAT-PARM3
PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
4 ROOF TOPS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
4 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
4 0 0 4 0 0 0 1 9
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
4 0 0 0 0
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
4 400 0.01 0.1 0.1
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
4 0 0
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
4 0 0

```



```

END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->          <--Area-->    <-Target->    MBLK    ***
<Name>   #          <-factor->    <Name>   #    Tbl#    ***
Bldg D and C***
IMPLND   4          0.2    RCHRES   1      5
Building A and B***
IMPLND   4          0.2    RCHRES   2      5
Building E***
IMPLND   4          0.1    RCHRES   1      5

*****Routing*****
RCHRES   1          1    RCHRES   2      7
RCHRES   1          1    COPY     1     17
IMPLND   4          0.2    COPY     1     15
RCHRES   2          1    COPY    501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #   #      <Name> # #   ***
COPY    501 OUTPUT MEAN   1 1   48.4      DISPLY   1      INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   #      <Name> # #<-factor->strg <Name>   #   #      <Name> # #   ***
END NETWORK

RCHRES
GEN-INFO
RCHRES      Name      Nexits   Unit Systems      Printer      ***
# - #<-----><----> User T-series  Engr Metr LKFG      ***
      in out
1      Gravel Trench Be-005    2    1    1    1    28    0    1
2      Gravel Trench Be-008    2    1    1    1    28    0    1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1      1    0    0    0    0    0    0    0    0    0
2      1    0    0    0    0    0    0    0    0    0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL  PYR
# - # HYDR ADCA CONS HEAT SED  GQL  OXRX NUTR PLNK PHCB PIVL  PYR  *****
1      4    0    0    0    0    0    0    0    0    0    1    9
2      4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

HYDR-PARM1
RCHRES  Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each  FUNCT for each
      FG FG FG FG possible exit *** possible exit  possible exit
      * * * * * * * * * * * * * * * * * * * * * *
1      0 1 0 0    4 5 0 0 0    0 0 0 0 0 0    2 2 2 2 2
2      0 1 0 0    4 5 0 0 0    0 0 0 0 0 0    2 2 2 2 2
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->
1      1      0.01      0.0      0.0      0.5      0.0
2      2      0.01      0.0      0.0      0.5      0.0

```

```

END HYDR-PARM2
HYDR-INIT
  RCHRES Initial conditions for each HYDR section ***
  # - # *** VOL Initial value of COLIND Initial value of OUTDGT
  *** ac-ft for each possible exit for each possible exit
<-----><-----> <-----><-----><-----> *** <-----><-----><-----><----->
  1 0. 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
  2 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

```

```

FTABLE 1
  92 5
  Depth Area Volume Outflow1 Outflow2 Velocity Travel Time***
  (ft) (acres) (acre-ft) (cfs) (cfs) (ft/sec) (Minutes)***
  0.000000 0.022957 0.000000 0.000000 0.000000
  0.027778 0.022957 0.000223 0.000000 0.081019
  0.055556 0.022957 0.000446 0.000000 0.081019
  0.083333 0.022957 0.000670 0.000000 0.081019
  0.111111 0.022957 0.000893 0.000000 0.081019
  0.138889 0.022957 0.001116 0.000000 0.081019
  0.166667 0.022957 0.001339 0.000000 0.081019
  0.194444 0.022957 0.001562 0.000000 0.081019
  0.222222 0.022958 0.001786 0.000000 0.081019
  0.250000 0.022958 0.002009 0.000000 0.081019
  0.277778 0.022958 0.002232 0.000000 0.081019
  0.305556 0.022958 0.002455 0.000000 0.081019
  0.333333 0.022958 0.002678 0.000000 0.081019
  0.361111 0.022958 0.002902 0.000000 0.081019
  0.388889 0.022958 0.003125 0.000000 0.081019
  0.416667 0.022958 0.003348 0.000000 0.081019
  0.444444 0.022958 0.003571 0.000000 0.081019
  0.472222 0.022958 0.003794 0.000000 0.081019
  0.500000 0.022958 0.004018 0.000000 0.081019
  0.527778 0.022959 0.004241 0.000000 0.081019
  0.555556 0.022959 0.004464 0.000000 0.081019
  0.583333 0.022959 0.004687 0.000000 0.081019
  0.611111 0.022959 0.004910 0.000000 0.081019
  0.638889 0.022959 0.005134 0.000000 0.081019
  0.666667 0.022959 0.005357 0.000000 0.081019
  0.694444 0.022959 0.005580 0.000000 0.081019
  0.722222 0.022959 0.005803 0.000000 0.081019
  0.750000 0.022959 0.006026 0.000000 0.081019
  0.777778 0.022959 0.006250 0.000000 0.081019
  0.805556 0.022959 0.006473 0.000000 0.081019
  0.833333 0.022960 0.006696 0.000000 0.081019
  0.861111 0.022960 0.006919 0.000000 0.081019
  0.888889 0.022960 0.007143 0.000000 0.081019
  0.916667 0.022960 0.007366 0.000000 0.081019
  0.944444 0.022960 0.007589 0.000000 0.081019
  0.972222 0.022960 0.007812 0.000000 0.081019
  1.000000 0.022960 0.008035 0.000000 0.081019
  1.027778 0.022960 0.008259 0.000000 0.081019
  1.055556 0.022960 0.008482 0.000000 0.081019
  1.083333 0.022960 0.008705 0.000000 0.081019
  1.111111 0.022960 0.008928 0.000000 0.081019
  1.138889 0.022961 0.009152 0.000000 0.081019
  1.166667 0.022961 0.009375 0.000000 0.081019
  1.194444 0.022961 0.009598 0.000000 0.081019
  1.222222 0.022961 0.009821 0.000000 0.081019
  1.250000 0.022961 0.010044 0.000000 0.081019
  1.277778 0.022961 0.010268 0.000000 0.081019
  1.305556 0.022961 0.010491 0.000000 0.081019
  1.333333 0.022961 0.010714 0.000000 0.081019
  1.361111 0.022961 0.010937 0.000000 0.081019
  1.388889 0.022961 0.011161 0.000000 0.081019
  1.416667 0.022961 0.011384 0.000000 0.081019

```

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1.444444 | 0.022961 | 0.011607 | 0.000000 | 0.081019 |
| 1.472222 | 0.022962 | 0.011830 | 0.000000 | 0.081019 |
| 1.500000 | 0.022962 | 0.012054 | 0.000000 | 0.081019 |
| 1.527778 | 0.022962 | 0.012277 | 0.000000 | 0.081019 |
| 1.555556 | 0.022962 | 0.012500 | 0.000000 | 0.081019 |
| 1.583333 | 0.022962 | 0.012723 | 0.000000 | 0.081019 |
| 1.611111 | 0.022962 | 0.012947 | 0.000000 | 0.081019 |
| 1.638889 | 0.022962 | 0.013170 | 0.000000 | 0.081019 |
| 1.666667 | 0.022962 | 0.013393 | 0.000000 | 0.081019 |
| 1.694444 | 0.022962 | 0.013616 | 0.000000 | 0.081019 |
| 1.722222 | 0.022962 | 0.013840 | 0.000000 | 0.081019 |
| 1.750000 | 0.022962 | 0.014063 | 0.000000 | 0.081019 |
| 1.777778 | 0.022963 | 0.014286 | 0.000000 | 0.081019 |
| 1.805556 | 0.022963 | 0.014509 | 0.000000 | 0.081019 |
| 1.833333 | 0.022963 | 0.014733 | 0.000000 | 0.081019 |
| 1.861111 | 0.022963 | 0.014956 | 0.000000 | 0.081019 |
| 1.888889 | 0.022963 | 0.015179 | 0.000000 | 0.081019 |
| 1.916667 | 0.022963 | 0.015402 | 0.000000 | 0.081019 |
| 1.944444 | 0.022963 | 0.015626 | 0.000000 | 0.081019 |
| 1.972222 | 0.022963 | 0.015849 | 0.000000 | 0.081019 |
| 2.000000 | 0.022963 | 0.016072 | 0.000000 | 0.081019 |
| 2.027778 | 0.022963 | 0.016710 | 0.040914 | 0.081019 |
| 2.055556 | 0.022963 | 0.017348 | 0.115525 | 0.081019 |
| 2.083333 | 0.022964 | 0.017986 | 0.211431 | 0.081019 |
| 2.111111 | 0.022964 | 0.018624 | 0.323094 | 0.081019 |
| 2.138889 | 0.022964 | 0.019261 | 0.445932 | 0.081019 |
| 2.166667 | 0.022964 | 0.019899 | 0.575411 | 0.081019 |
| 2.194444 | 0.022964 | 0.020537 | 0.706863 | 0.081019 |
| 2.222222 | 0.022964 | 0.021175 | 0.835581 | 0.081019 |
| 2.250000 | 0.022964 | 0.021813 | 0.957039 | 0.081019 |
| 2.277778 | 0.022964 | 0.022451 | 1.067215 | 0.081019 |
| 2.305556 | 0.022964 | 0.023089 | 1.162979 | 0.081019 |
| 2.333333 | 0.022964 | 0.023727 | 1.242541 | 0.081019 |
| 2.361111 | 0.022964 | 0.024365 | 1.305935 | 0.081019 |
| 2.388889 | 0.022965 | 0.025002 | 1.355566 | 0.081019 |
| 2.416667 | 0.022965 | 0.025640 | 1.396778 | 0.081019 |
| 2.444444 | 0.022965 | 0.026278 | 1.458162 | 0.081019 |
| 2.472222 | 0.022965 | 0.026916 | 1.503039 | 0.081019 |
| 2.500000 | 0.022965 | 0.027554 | 1.546614 | 0.081019 |
| 2.527778 | 0.022965 | 0.028192 | 1.588995 | 0.081019 |

END FTABLE 1

FTABLE 2

92 5

| Depth<br>(ft) | Area<br>(acres) | Volume<br>(acre-ft) | Outflow1<br>(cfs) | Outflow2<br>(cfs) | Velocity<br>(ft/sec) | Travel Time***<br>(Minutes)*** |
|---------------|-----------------|---------------------|-------------------|-------------------|----------------------|--------------------------------|
| 0.000000      | 0.022957        | 0.000000            | 0.000000          | 0.000000          |                      |                                |
| 0.061111      | 0.022957        | 0.000561            | 0.000000          | 0.081019          |                      |                                |
| 0.122222      | 0.022957        | 0.001122            | 0.000000          | 0.081019          |                      |                                |
| 0.183333      | 0.022957        | 0.001684            | 0.000000          | 0.081019          |                      |                                |
| 0.244444      | 0.022958        | 0.002245            | 0.000000          | 0.081019          |                      |                                |
| 0.305556      | 0.022958        | 0.002806            | 0.000000          | 0.081019          |                      |                                |
| 0.366667      | 0.022958        | 0.003367            | 0.000000          | 0.081019          |                      |                                |
| 0.427778      | 0.022958        | 0.003928            | 0.000000          | 0.081019          |                      |                                |
| 0.488889      | 0.022958        | 0.004489            | 0.000000          | 0.081019          |                      |                                |
| 0.550000      | 0.022959        | 0.005051            | 0.000000          | 0.081019          |                      |                                |
| 0.611111      | 0.022959        | 0.005612            | 0.000000          | 0.081019          |                      |                                |
| 0.672222      | 0.022959        | 0.006173            | 0.000000          | 0.081019          |                      |                                |
| 0.733333      | 0.022959        | 0.006734            | 0.000000          | 0.081019          |                      |                                |
| 0.794444      | 0.022959        | 0.007296            | 0.000000          | 0.081019          |                      |                                |
| 0.855556      | 0.022960        | 0.007857            | 0.000000          | 0.081019          |                      |                                |
| 0.916667      | 0.022960        | 0.008418            | 0.000000          | 0.081019          |                      |                                |
| 0.977778      | 0.022960        | 0.008979            | 0.000000          | 0.081019          |                      |                                |
| 1.038889      | 0.022960        | 0.009541            | 0.000000          | 0.081019          |                      |                                |
| 1.100000      | 0.022960        | 0.010102            | 0.000000          | 0.081019          |                      |                                |
| 1.161111      | 0.022961        | 0.010663            | 0.000000          | 0.081019          |                      |                                |
| 1.222222      | 0.022961        | 0.011224            | 0.000000          | 0.081019          |                      |                                |
| 1.283333      | 0.022961        | 0.011786            | 0.000000          | 0.081019          |                      |                                |
| 1.344444      | 0.022961        | 0.012347            | 0.000000          | 0.081019          |                      |                                |
| 1.405556      | 0.022961        | 0.012908            | 0.000000          | 0.081019          |                      |                                |
| 1.466667      | 0.022962        | 0.013469            | 0.000000          | 0.081019          |                      |                                |

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1.527778 | 0.022962 | 0.014031 | 0.000000 | 0.081019 |
| 1.588889 | 0.022962 | 0.014592 | 0.000000 | 0.081019 |
| 1.650000 | 0.022962 | 0.015153 | 0.000000 | 0.081019 |
| 1.711111 | 0.022962 | 0.015715 | 0.000000 | 0.081019 |
| 1.772222 | 0.022963 | 0.016276 | 0.000000 | 0.081019 |
| 1.833333 | 0.022963 | 0.016837 | 0.000000 | 0.081019 |
| 1.894444 | 0.022963 | 0.017398 | 0.000000 | 0.081019 |
| 1.955556 | 0.022963 | 0.017960 | 0.000000 | 0.081019 |
| 2.016667 | 0.022963 | 0.018521 | 0.000000 | 0.081019 |
| 2.077778 | 0.022964 | 0.019082 | 0.000000 | 0.081019 |
| 2.138889 | 0.022964 | 0.019644 | 0.000000 | 0.081019 |
| 2.200000 | 0.022964 | 0.020205 | 0.000000 | 0.081019 |
| 2.261111 | 0.022964 | 0.020766 | 0.000000 | 0.081019 |
| 2.322222 | 0.022964 | 0.021328 | 0.000000 | 0.081019 |
| 2.383333 | 0.022965 | 0.021889 | 0.000000 | 0.081019 |
| 2.444444 | 0.022965 | 0.022451 | 0.000000 | 0.081019 |
| 2.505556 | 0.022965 | 0.023012 | 0.000000 | 0.081019 |
| 2.566667 | 0.022965 | 0.023573 | 0.000000 | 0.081019 |
| 2.627778 | 0.022965 | 0.024135 | 0.000000 | 0.081019 |
| 2.688889 | 0.022965 | 0.024696 | 0.000000 | 0.081019 |
| 2.750000 | 0.022966 | 0.025257 | 0.000000 | 0.081019 |
| 2.811111 | 0.022966 | 0.025819 | 0.000000 | 0.081019 |
| 2.872222 | 0.022966 | 0.026380 | 0.000000 | 0.081019 |
| 2.933333 | 0.022966 | 0.026942 | 0.000000 | 0.081019 |
| 2.994444 | 0.022966 | 0.027503 | 0.000000 | 0.081019 |
| 3.055556 | 0.022967 | 0.028064 | 0.000000 | 0.081019 |
| 3.116667 | 0.022967 | 0.028626 | 0.000000 | 0.081019 |
| 3.177778 | 0.022967 | 0.029187 | 0.000000 | 0.081019 |
| 3.238889 | 0.022967 | 0.029749 | 0.000000 | 0.081019 |
| 3.300000 | 0.022967 | 0.030310 | 0.000000 | 0.081019 |
| 3.361111 | 0.022968 | 0.030871 | 0.000000 | 0.081019 |
| 3.422222 | 0.022968 | 0.031433 | 0.000000 | 0.081019 |
| 3.483333 | 0.022968 | 0.031994 | 0.000000 | 0.081019 |
| 3.544444 | 0.022968 | 0.032556 | 0.000000 | 0.081019 |
| 3.605556 | 0.022968 | 0.033117 | 0.000000 | 0.081019 |
| 3.666667 | 0.022969 | 0.033679 | 0.000000 | 0.081019 |
| 3.727778 | 0.022969 | 0.034240 | 0.000000 | 0.081019 |
| 3.788889 | 0.022969 | 0.034802 | 0.000000 | 0.081019 |
| 3.850000 | 0.022969 | 0.035363 | 0.000000 | 0.081019 |
| 3.911111 | 0.022969 | 0.035925 | 0.000000 | 0.081019 |
| 3.972222 | 0.022970 | 0.036486 | 0.000000 | 0.081019 |
| 4.033333 | 0.022970 | 0.037047 | 0.000000 | 0.081019 |
| 4.094444 | 0.022970 | 0.037609 | 0.000000 | 0.081019 |
| 4.155556 | 0.022970 | 0.038170 | 0.000000 | 0.081019 |
| 4.216667 | 0.022970 | 0.038732 | 0.000000 | 0.081019 |
| 4.277778 | 0.022971 | 0.039293 | 0.000000 | 0.081019 |
| 4.338889 | 0.022971 | 0.039855 | 0.000000 | 0.081019 |
| 4.400000 | 0.022971 | 0.040416 | 0.000000 | 0.081019 |
| 4.461111 | 0.022971 | 0.040978 | 0.000000 | 0.081019 |
| 4.522222 | 0.022971 | 0.041540 | 0.000000 | 0.081019 |
| 4.583333 | 0.022972 | 0.042101 | 0.000000 | 0.081019 |
| 4.644444 | 0.022972 | 0.042663 | 0.000000 | 0.081019 |
| 4.705556 | 0.022972 | 0.043224 | 0.000000 | 0.081019 |
| 4.766667 | 0.022972 | 0.043786 | 0.000000 | 0.081019 |
| 4.827778 | 0.022972 | 0.044347 | 0.000000 | 0.081019 |
| 4.888889 | 0.022973 | 0.044909 | 0.000000 | 0.081019 |
| 4.950000 | 0.022973 | 0.045470 | 0.000000 | 0.081019 |
| 5.011111 | 0.022973 | 0.046031 | 0.010359 | 0.081019 |
| 5.072222 | 0.022973 | 0.046593 | 0.170908 | 0.081019 |
| 5.133333 | 0.022973 | 0.047154 | 0.420687 | 0.081019 |
| 5.194444 | 0.022974 | 0.051086 | 0.706863 | 0.081019 |
| 5.255556 | 0.022974 | 0.052490 | 0.980092 | 0.081019 |
| 5.316667 | 0.022974 | 0.053894 | 1.196793 | 0.081019 |
| 5.377778 | 0.022974 | 0.055298 | 1.337097 | 0.081019 |
| 5.438889 | 0.022974 | 0.056702 | 1.449020 | 0.081019 |
| 5.500000 | 0.022975 | 0.058106 | 1.546614 | 0.081019 |
| 5.561111 | 0.022975 | 0.059510 | 1.638406 | 0.081019 |

END FTABLE 2  
END FTABLES

```

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # tem strg<-factor->strg <Name> # # <Name> # # ***
WDM 2 PREC ENGL 1 PERLND 1 999 EXTNL PREC
WDM 2 PREC ENGL 1 IMPLND 1 999 EXTNL PREC
WDM 1 EVAP ENGL 0.76 PERLND 1 999 EXTNL PETINP
WDM 1 EVAP ENGL 0.76 IMPLND 1 999 EXTNL PETINP

```

END EXT SOURCES

```

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name> # <Name> # #<-factor->strg <Name> # <Name> tem strg strg***
RCHRES 2 HYDR RO 1 1 1 WDM 1004 FLOW ENGL REPL
RCHRES 2 HYDR O 1 1 1 WDM 1005 FLOW ENGL REPL
RCHRES 2 HYDR O 2 1 1 WDM 1006 FLOW ENGL REPL
RCHRES 2 HYDR STAGE 1 1 1 WDM 1007 STAG ENGL REPL
COPY 1 OUTPUT MEAN 1 1 48.4 WDM 701 FLOW ENGL REPL
COPY 501 OUTPUT MEAN 1 1 48.4 WDM 801 FLOW ENGL REPL
END EXT TARGETS

```

```

MASS-LINK
<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
<Name> <Name> # #<-factor-> <Name> <Name> # #***
MASS-LINK 5
IMPLND IWATER SURO 0.083333 RCHRES INFLOW IVOL
END MASS-LINK 5

MASS-LINK 7
RCHRES OFLOW OVOL 1 RCHRES INFLOW IVOL
END MASS-LINK 7

MASS-LINK 15
IMPLND IWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 15

MASS-LINK 17
RCHRES OFLOW OVOL 1 COPY INPUT MEAN
END MASS-LINK 17

```

END MASS-LINK

END RUN





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## **APPENDIX 3 – Soil Management Plan**

To be included with construction documents.



## **APPENDIX 4 – Supplemental Reports and Information**





July 25, 2017

Blue Summit Realty, LLC  
9323 Martin Way East, Suite 112  
Olympia, Washington 98516  
Attention: Brandon Johnson

Report  
Geotechnical and Stormwater Evaluation  
Proposed 32<sup>nd</sup> Avenue Apartments  
7201 and 7203 32<sup>nd</sup> Avenue NE  
Lacey, Washington  
Project No. 872-001-03

## INTRODUCTION

Insight Geologic, Inc. is pleased to provide our report for the evaluation of site soil conditions as they relate to building construction and the infiltration and disposal of stormwater at the site of your proposed apartment complex project to be located at 7201 and 7203 32<sup>nd</sup> Avenue NE in Lacey, Washington. The location of the site is shown relative to surrounding physical features in the Vicinity Map, Figure 1.

The properties consist of two parcels comprising approximately 4.77 acres. We understand that you plan to construct a residential development with associated parking and stormwater infrastructure, on the property. Stormwater is proposed to be infiltrated to the subsurface by pervious pavement and underground galleries.

Our services were performed in general accordance with our proposal dated May 31, 2017 and authorized on June 1, 2017.

## SCOPE OF SERVICES

The purpose of our services was to evaluate subsurface soil conditions as they relate to geotechnical properties and the infiltration and disposal of stormwater from the proposed development. We proposed to perform our evaluation in general accordance with the procedures outlined in the City of Lacey 2010 Stormwater Design Manual (2010 Manual). The specific tasks performed are outlined below.

1. Conducted a site reconnaissance to evaluate and mark proposed exploration locations at the site.
2. Performed utility location at the site to evaluate the presence of subsurface obstructions. We utilized the "One Call" coordinated utility location service to perform this task.
3. Drilled three (3), 12 to 16-foot deep borings using a truck-mounted drilling rig. In the absence of a site plan for the proposed development, we constructed the borings across the site from east to

west, along the common boundary between the two parcels, near the center of the site. The 2010 Manual requires at least one boring in the area of the proposed stormwater disposal structure to be drilled to the water table or confining till layer. We anticipated that this would be less than 30 feet below ground surface (bgs). Soil samples were collected continuously during drilling and were classified in general accordance with ASTM methodology.

4. Excavated 10 exploratory test pits using a small, track-mounted excavator. The test pits were distributed across the site to evaluate bearing conditions for the proposed buildings and parking areas. The test pits were conducted to depths of between 4 and 8 feet bgs and were backfilled at the end of the field day using the excavated soil.
5. Conducted appropriate laboratory testing on eight (8) soil samples for grain-size distribution to determine stormwater infiltration rates and a modified proctor test to determine maximum dry density for compaction purposes, as needed.
6. Collected six (6) representative samples of surface soil for the analysis of lead and arsenic, which may be present as a result of historic smelter operations in Tacoma, Washington.
7. Provided for the analysis of the soil samples for lead and arsenic using EPA 7000 series methodology.
8. Evaluated the laboratory results with respect to the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A cleanup levels for unrestricted land use.
9. Prepared a report to include a summary of our field activities, our findings, and recommendations for stormwater infiltration, site preparation and grading, bearing capacity, temporary and final cut slopes, earth pressures, and suitability of the on-site soils for use as fill, along with our design infiltration rate for the site in accordance with the City of Lacey 2010 Manual.

## **FINDINGS**

### **Surface Conditions**

The project site is situated at an elevation between 194 and 217 feet above mean sea level (MSL) and is presently the site of two single-family residences. The property is bounded by 32nd Avenue NE to the north, single family residential property to the west, planned multi-family housing to the east, and undeveloped wooded land to the south. The subject site slopes gently downhill from the south to the north. One single family residence fronts 32nd Avenue NE, with the second residence to the south, served by a driveway along the easterly property line of the northerly parcel.

### **Geology**

Based on our review of available published geologic maps, Vashon-age glacial recessional outwash deposits underlie the project site and surrounding area. This material is described as sandy gravels and beds of small gravels with few fines. This material was deposited by outwash rivers, during the waning stages of the most recent glacial period in the Puget Sound and is not glacially consolidated. These outwash deposits are underlain by Vashon age glacial till. The till consists of an unsorted mixture of silt, sands and gravels that was deposited at the base of the advancing glacier and was subsequently glacially compacted.

### **Subsurface Explorations**

We explored subsurface conditions at the site on June 13 and June 20, 2016 by advancing three exploratory borings and excavating 10 test pits in the locations as shown on the Site Plan, Figure 2. The borings were completed by Standard Environmental Probe using a Geoprobe 5410 direct push sampling rig. The test pits were excavated using a small, track-mounted excavator. A geologist from Insight Geologic monitored the explorations and maintained a log of the conditions encountered. The borings were completed at depths of up to 16 feet bgs. The depths of the borings were limited by the presence of dense glacial till. The test pits were completed at depths ranging from between 4 and 8 feet bgs. The soils were visually classified in general accordance with the system described in ASTM D2487-06. The exploration logs are contained in Attachment A.

### **Soil Conditions**

Surface conditions encountered within the explorations consisted of well and poorly graded sands and gravels with variable amounts of silt, in a loose and moist condition (SM, SP-SM, GP-GM, GW-GM). Beneath the surficial material, we generally encountered brown well-graded gravels with sand, in a loose to medium dense and moist condition. Underlying the gravels, in four of the test pits (TP-2, TP-3, TP-7 and TP-10) and one of the borings (B-1), we encountered very dense glacial till, consisting of gravel and sand with silt (GP-GM, SP-SM). Glacial till was encountered at depths that ranged from 3 feet bgs in test pit TP-2 and TP-10 to 10 feet bgs in boring B-1. Generally, till was encountered in the northern third of the site, with the exception of TP-10, which encountered glacial till at 3 feet near the southern parcel boundary. This is consistent with a generally level till layer as the surface topography slopes to the north. Glacial till was not identified in the remaining test pits, which were completed at depths of between 7 and 8 feet bgs, and the remaining borings, which were completed at depths of 16 feet bgs.

The soils encountered are consistent with Everett very gravely sandy loam, which is mapped for the area. These soils are generally formed from glacial outwash and generally have restrictive layers occurring at depths greater than 7 feet bgs. Percolation is generally high, with rates between 1.98 and 5.95 inches per hour, according to the U.S. Department of Agriculture Soil Survey. A small portion of the northern edge of the site is mapped as Kapowsin silt loam. This soil has restrictive layers approximately 2 to 3 feet below grade. Percolation in the Kapowsin silt loam is generally very low, with rates near 0.0 inches per hour and is consistent with soils developed from glacial till.

### **Groundwater Conditions**

Perched groundwater was encountered in test pit TP-8 at a depth of 7 feet bgs and within borings B-2 and B-3 at depths of 10 and 11 feet bgs, respectively. Groundwater was not encountered in the remaining test pits or borings at the site and no evidence of high groundwater level indicators were encountered. No evidence of perched groundwater was located at the glacial till contact. We anticipate that site groundwater levels will fluctuate somewhat with the seasons and precipitation, generally being highest in the late winter and early spring months.

### **Laboratory Testing**

We selected fourteen (14) soil samples for laboratory testing. Six of the samples obtained were sent to an outside laboratory, Libby Environmental, Inc. of Olympia, Washington, for lead and arsenic

analyses by EPA method 7010. The remaining eight samples were analyzed for gradation in general accordance with ASTM D422 to define soil class and obtain parameters for stormwater infiltration calculations. The laboratory test results are provided in Attachment B.

### LEAD AND ARSENIC

The results of the EPA Method 7010 analyses indicated that levels of lead and arsenic in the soils at the site appear to be below the cleanup levels mandated by the Washington State Department of Ecology. Laboratory test results showed that lead levels encountered in the soils at the site ranged from 6.3 to 95 mg/kg (parts per million). The threshold lead level for mandatory cleanup is 250 parts per million. The levels of arsenic found at the site varied from 9.6 to 15 parts per million. The mandatory cleanup threshold for arsenic is 20 parts per million. The test results for lead and arsenic are presented in Table 1. The sampling locations are shown on the Site Plan, Figure 2.

**Table 1. Lead and Arsenic – EPA Method 7010 Series**

| Sample Location | (mg/Kg)<br>Lead | (mg/Kg)<br>Arsenic |
|-----------------|-----------------|--------------------|
| S-1             | 33              | 12                 |
| S-2             | 6.3             | 12                 |
| S-3             | 22              | 13                 |
| S-4             | 8.6             | 15                 |
| S-5             | 95              | 9.6                |
| S-6             | 14              | 12                 |

### STORMWATER INFILTRATION

We completed a stormwater infiltration rate evaluation in general accordance with the 2010 City of Lacey Stormwater Design Manual (2010 Manual). The 2010 Manual contains a method utilizing gradation testing based on the  $D_{10}$  results of the ASTM grain-size distribution analyses to estimate long-term design infiltration rates (Section 6.3.3.2). The Method values are listed in Table 6.5 of the manual.

The facility has proposed stormwater infiltration via pervious pavement and underground galleries. This site is generally homogeneous and did not exhibit fine layering. Groundwater was not encountered within 6 feet of the base of the facility; however, a restrictive glacial till unit was encountered on average at a depth of 3 feet bgs in the northern third of the site.

Based on our gradation analyses, we calculate that the long-term design infiltration rate ( $F_{design}$ ) for the northern third of the site is 0.5 inches per hour, based on the depth to the restrictive unit, as per the 2010 Manual. The  $F_{design}$  for the gravels and sands at the site in the southern two-thirds of the site, at a depth of approximately 3 feet bgs, is 9.0 inches per hour. In addition, we recommend that infiltration galleries be sited in the southern portions of the property at a depth of about 3 feet to avoid the shallow till located in the northern third of the site. The results of our stormwater infiltration evaluation are presented in Table 2 and Figure 3.



**Table 2. Design Infiltration Rates – ASTM Method**

| Sample Location | Unit  | Depth Range (feet) | D <sub>10</sub> Value | Infiltration Rate (inches per hour) |
|-----------------|-------|--------------------|-----------------------|-------------------------------------|
| TP-5            | GW-GM | 0.5 – 4.0          | 0.14                  | 0.5                                 |
| TP-5            | GW    | 4.0 – 8.0          | 1.8                   | 9.0                                 |
| TP-6            | SP-SM | 0.5 – 5.0          | 0.16                  | 0.5                                 |
| TP-6            | GW    | 5.0 – 7.0          | 1.7                   | 9.0                                 |
| TP-8            | GP-GM | 0.5 – 3.0          | 0.22                  | 0.5                                 |
| TP-8            | GW    | 3.0 – 8.0          | 1.3                   | 9.0                                 |
| TP-9            | GP-GM | 0.5 – 2.0          | 0.15                  | 0.5                                 |
| TP-9            | GW    | 2.0 – 8.0          | 3.4                   | 9.0                                 |

## **CONCLUSIONS AND RECOMMENDATIONS**

### **General**

Based on the results of our review, subsurface explorations, and engineering analyses, it is our opinion that the proposed development is feasible from a geotechnical standpoint. We recommend that the proposed structures be supported on shallow concrete foundations that are designed using an allowable soil bearing capacity of 2,500 pounds per square foot (psf).

The soils encountered in our explorations are typically in a loose condition near ground surface. To limit the potential for structure settlement, we recommend that shallow foundations and slabs-on-grade be established on a minimum 1-foot thick layer of structural fill. Depending on final grading plans and the time of year earthwork is performed; it could be practical to reuse the on-site soils as structural fill under the foundations/slabs.

Stormwater infiltration at the site is feasible. We have provided a design infiltration rate of 0.5 inches per hour for the proposed stormwater infiltration system in the northern third of the site. A design infiltration rate of 9.0 inches per hour is recommended for the southern two-thirds of the site. Our borings were conducted during late spring conditions and the groundwater conditions encountered should be reflective of typical late spring seasonal conditions. However, no evidence of seasonal high groundwater was observed within the borings.

### **Earthwork**

#### **General**

We anticipate that site development earthwork will include clearing and stripping of existing vegetation, preparing subgrades, excavating for utility trenches, and placing and compacting structural fill. We expect that the majority of site grading can be accomplished with conventional earth moving equipment in proper working order.

Our explorations did not encounter appreciable amounts of debris or unsuitable soils associated with past site development. Still, it is possible that concrete slabs, abandoned utility lines or other development features could be encountered during construction. The contractor should be prepared to deal with these conditions.

### ***Clearing and Stripping***

Clearing and stripping should consist of removing surface and subsurface deleterious materials including sod/topsoil, trees, brush, debris and other unsuitable loose/soft or organic materials. Stripping and clearing should extend at least 5 feet beyond all structures and areas to receive structural fill.

We estimate that a stripping depth of about 0.5 foot will be required to remove the surficial organic layer encountered in our explorations. Deeper stripping depths may be required if additional unsuitable soils are exposed during stripping operations. We recommend that trees be removed by overturning so that the majority of roots are also removed. Depressions created by tree or stump removal should be backfilled with structural fill and properly compacted.

### ***Subgrade Preparation***

After stripping and excavating to the proposed subgrade elevation, and before placing structural fill or foundation concrete, the exposed subgrade should be thoroughly compacted to a firm and unyielding condition. The exposed subgrade should then be proof-rolled using loaded, rubber-tired heavy equipment. We recommend that Insight Geologic be retained to observe the proof-rolling prior to placement of structural fill or foundation concrete. Areas of limited access that cannot be proof-rolled can be evaluated using a steel probe rod. If soft or otherwise unsuitable areas are revealed during proof-rolling or probing, that cannot be compacted to a stable and uniformly firm condition, we generally recommend that: 1) the subgrade soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompact; or 2) the unsuitable soils be over-excavated and replaced with structural fill.

### ***Temporary Excavations and Groundwater Handling***

Excavations deeper than 4 feet should be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls were required under the Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, temporary cut slopes should be inclined no steeper than about 1.5H:1V (horizontal: vertical). This guideline assumes that all surface loads are kept at a minimum distance of at least one-half the depth of the cut away from the top of the slope, and that significant seepage is not present on the slope face. Flatter cut slopes were necessary where significant seepage occurs or if large voids are created during excavation. Some sloughing and raveling of cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather.

We anticipate that if perched groundwater is encountered during construction can be handled adequately with sumps, pumps, and/or diversion ditches. Groundwater handling needs will generally be lower during the late summer and early fall months. We recommend that the contractor performing

the work be made responsible for controlling and collecting groundwater encountered during construction.

### ***Permanent Slopes***

We do not anticipate that permanent slopes will be utilized for the proposed project other than in the stormwater pond. If permanent slopes are necessary, we recommend the slopes be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered.

To achieve uniform compaction, we recommend that fill slopes be overbuilt and subsequently cut back to expose well-compacted fill. Fill placement on slopes should be benched into the slope face and include keyways. The configuration of the bench and keyway depends on the equipment being used. Bench excavations should be level and extend into the slope face. We recommend that a vertical cut of about 3 feet be maintained for benched excavations. Keyways should be about 1-1/2 times the width of the equipment used for grading or compaction.

### ***Erosion Control***

We anticipate that erosion control measures such as silt fences, straw bales and sand bags will generally be adequate during development. Temporary erosion control should be provided during construction activities and until permanent erosion control measures are functional. Surface water runoff should be properly contained and channeled using drainage ditches, berms, swales, and tightlines, and should not discharge onto sloped areas. Any disturbed sloped areas should be protected with a temporary covering until new vegetation can take effect. Jute or coconut fiber matting, excelsior matting or clear plastic sheeting is suitable for this purpose. Graded or disturbed slopes should be tracked in-place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion. Ultimately, erosion control measures should be in accordance with local regulations and should be clearly described on project plans.

### ***Wet Weather Earthwork***

Some of the surface soils contain up to near 10 percent fines. When the moisture content of this soil is more than a few percent above the optimum moisture content, the soil will become unstable and it may become difficult or impossible to meet the required compaction criteria. Disturbance of near surface soils should be expected if earthwork is completed during periods of wet weather.

The wet weather season in this area generally begins in October and continues through May. However, periods of wet weather may occur during any month of the year. If wet weather earthwork is unavoidable, we recommend that:

- The ground surface is sloped so that surface water is collected and directed away from the work area to an approved collection/dispersion point.
- Earthwork activities not take place during periods of heavy precipitation.
- Slopes with exposed soil be covered with plastic sheeting or otherwise protected from erosion.



- Measures are taken to prevent on-site soil and soil stockpiles from becoming wet or unstable. Sealing the surficial soil by rolling with a smooth-drum roller prior to periods of precipitation should reduce the extent that the soil becomes wet or unstable.
- Construction traffic is restricted to specific areas of the site, preferably areas that are surfaced with materials not susceptible to wet weather disturbance.
- A minimum 1-foot thick layer of 4- to 6-inch quarry spalls is used in high traffic areas of the site to protect the subgrade soil from disturbance.
- Contingencies are included in the project schedule and budget to allow for the above elements.

## **Structural Fill Materials**

### ***General***

Material used for structural fill should be free of debris, organic material and rock fragments larger than 3 inches. The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines increases, soil becomes increasingly more sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve.

### ***On-Site Soil***

We anticipate that the majority of the on-site soils encountered during construction will consist of the gravels and sands located at or near the surface of the site. It is our opinion that this material is a suitable source for structural fill during a significant portion of the year. On-site materials used as structural fill should be free of roots, organic matter and other deleterious materials and particles larger than 3 inches in diameter.

### ***Select Granular Fill***

Select granular fill should consist of imported, well-graded sand and gravel or crushed rock with a maximum particle size of 3 inches and less than 5 percent passing a U.S. Standard No. 200 sieve based on the minus ¾-inch fraction. Organic matter, debris or other deleterious material should not be present. In our experience, "gravel borrow" as described in Section 9-03.14(1) of the 2008 WSDOT Standard Specifications is typically a suitable source for select granular fill during periods of wet weather, provided that the percent passing a U.S. Standard No. 200 sieve is less than 5 percent based on the minus ¾-inch fraction.

## **Structural Fill Placement and Compaction**

### ***General***

Structural fill should be placed on an approved subgrade that consists of uniformly firm and unyielding inorganic native soils or compacted structural fill. Structural fill should be compacted at a moisture content near optimum. The optimum moisture content varies with the soil gradation and should be evaluated during construction.

Structural fill should be placed in uniform, horizontal lifts and uniformly densified with vibratory compaction equipment. The maximum lift thickness will vary depending on the material and

compaction equipment used, but should generally not exceed the loose thicknesses provided on Table 3. Structural fill materials should be compacted in accordance with the compaction criteria provided in Table 4.

**Table 3. Recommended Uncompacted Lift Thickness**

| Compaction Equipment                            | Recommended Uncompacted Fill Thickness (Inches)                   |                                                                |
|-------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------|
|                                                 | Granular Materials Maximum Particle Size $\leq 1\frac{1}{2}$ inch | Granular Materials Maximum Particle Size $> 1\frac{1}{2}$ inch |
| Hand Tools (Plate Compactors and Jumping Jacks) | 4 – 8                                                             | Not Recommended                                                |
| Rubber-tire Equipment                           | 10 – 12                                                           | 6 – 8                                                          |
| Light Roller                                    | 10 – 12                                                           | 8 – 10                                                         |
| Heavy Roller                                    | 12 – 18                                                           | 12 – 16                                                        |
| Hoe Pack Equipment                              | 18 – 24                                                           | 12 – 16                                                        |

Note: The above table is intended to serve as a guideline and should not be included in the project specifications.

**Table 4. Recommended Compaction Criteria in Structural Fill Zones**

| Fill Type                                                                  | Percent Maximum Dry Density Determined by ASTM Test Method D 1557 at $\pm 3\%$ of Optimum Moisture |                           |           |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------|-----------|
|                                                                            | 0 to 2 Feet Below Subgrade                                                                         | $> 2$ Feet Below Subgrade | Pipe Zone |
| Imported or On-site Granular, Maximum Particle Size $< 1\frac{1}{4}$ -inch | 95                                                                                                 | 95                        | ----      |
| Imported or On-site Granular, Maximum Particle Size $> 1\frac{1}{4}$ -inch | N/A (Proof-roll)                                                                                   | N/A (Proof-roll)          | ----      |
| Trench Backfill <sup>1</sup>                                               | 95                                                                                                 | 92                        | 90        |

Note: <sup>1</sup>Trench backfill above the pipe zone in nonstructural areas should be compacted to at least 85 percent.

## Shallow Foundation Support

### General

We recommend that the proposed structure be founded on continuous wall or isolated column footings, bearing on a minimum 1-foot thick over-excavation and replacement with compacted structural fill. The structural fill zone should extend to a horizontal distance equal to the over-excavation depth on each side of the footing. The actual over-excavation depth will vary, depending on the conditions encountered.

We recommend that a representative from Insight Geologic observe the foundation surfaces before over-excavation, and before placing structural fill in over-excavations. This representative should confirm that adequate bearing surfaces have been prepared and that the soil conditions are as anticipated. Unsuitable foundation bearing soils should be recompacted or removed and replaced with compacted structural fill, as recommended by the geotechnical engineer.

### ***Bearing Capacity and Footing Dimensions***

We recommend an allowable soil bearing pressure of 2,500 psf for shallow foundations that are supported as recommended. This allowable bearing pressure applies to long-term dead and live loads exclusive of the weight of the footing and any overlying backfill. The allowable soil bearing pressure can be increased by one-third when considering total loads, including transient loads such as those induced by wind and seismic forces.

We recommend a minimum width of 18 inches for continuous wall footings and 2 feet for isolated column footings. For settlement considerations, we have assumed a maximum width of 4 feet for continuous wall footings and 6 feet for isolated column footings.

Perimeter footings should be embedded at least 12 inches below the lowest adjacent grade where the ground is flat. Interior footings should be embedded a minimum of 6 inches below the nearest adjacent grade.

### ***Settlement***

We estimate that total settlement of footings that are designed and constructed as recommended should be less than 1 inch. We estimate that differential settlements should be ½ inch or less between comparably loaded isolated footings or along 50 feet of continuous footing. We anticipate that the settlement will occur essentially as loads are applied during construction.

### ***Lateral Load Resistance***

Lateral loads on shallow foundation elements may be resisted by passive resistance on the sides of footings and by friction on the base of footings. Passive resistance may be estimated using an equivalent fluid density of 300 pounds per cubic foot (pcf), assuming that the footings are backfilled with structural fill. Frictional resistance may be estimated using 0.3 for the coefficient of base friction.

The lateral resistance values provided above incorporate a factor of safety of 1.5. The passive earth pressure and friction components can be combined, provided that the passive component does not exceed two-thirds of the total. The top foot of soil should be neglected when calculating passive resistance, unless the foundation perimeter area is covered by a slab-on-grade or pavement.

### ***Slabs-On-Grade***

Slabs-on-grade should be established on a minimum 1-foot thick section of structural fill extending to an approved bearing surface. A modulus of vertical subgrade reaction (subgrade modulus) can be used to design slabs-on-grade. The subgrade modulus varies based on the dimensions of the slab and the magnitude of applied loads on the slab surface; slabs with larger dimensions and loads are influenced by soils to a greater depth. We recommend a modulus value of 150 pounds per cubic inch (pci) for design of on-grade floor slabs with floor loads up to 500 psf. We are available to provide alternate subgrade modulus recommendations during design, based on specific loading information.

We recommend that slabs-on-grade in interior spaces be underlain by a minimum 4-inch thick capillary break layer to reduce the potential for moisture migration into the slab. The capillary break material should consist of a well-graded sand and gravel or crushed rock containing less than 5 percent fines



based on the fraction passing the ¾-inch sieve. The 4-inch thick capillary break layer can be included when calculating the minimum 1-foot thick structural fill section beneath the slab. If dry slabs are required (e.g., where adhesives are used to anchor carpet or tile to the slab), a waterproofing liner should be placed below the slab to act as a vapor barrier.

### **Subsurface Drainage**

It is our opinion that foundation footing drains and underslab drains are likely unnecessary for the proposed structure. The subsurface site soils are exceptionally well draining and it is unlikely that subsurface drains would produce water. The soils are suitable for roof runoff drywells and should be classified as Group A for the purposes of design.

### **Conventional Retaining Walls**

#### **General**

The following sections provide general guidelines for retaining wall design on this site. We should be contacted during the design phase to review retaining wall plans and provide supplemental recommendations, if needed.

#### **Drainage**

Positive drainage is imperative behind any retaining structure. This can be accomplished by using a zone of free-draining material behind the wall with perforated pipes to collect water seepage. The drainage material should consist of coarse sand and gravel containing less than 5 percent fines based on the fraction of material passing the ¾-inch sieve. The wall drainage zone should extend horizontally at least 12 inches from the back of the wall. If a stacked block wall is constructed, we recommend that a barrier such as a non-woven geotextile filter fabric be placed against the back of the wall to prevent loss of the drainage material through the wall joints.

A perforated smooth-walled rigid PVC pipe, having a minimum diameter of 4 inches, should be placed at the bottom of the drainage zone along the entire length of the wall. Drainpipes should discharge to a tightline leading to an appropriate collection and disposal system. An adequate number of cleanouts should be incorporated into the design of the drains in order to provide access for regular maintenance. Roof downspouts, perimeter drains or other types of drainage systems should not be connected to retaining wall drain systems.

#### **Design Parameters**

We recommend an active lateral earth pressure of 31 pcf (equivalent fluid density) for a level backfill condition. This assumes that the top of the wall is not structurally restrained and is free to rotate. For restrained walls that are fixed against rotation (at-rest condition), an equivalent fluid density of 45 pcf can be used for the level backfill condition. For seismic conditions, we recommend a uniform lateral pressure of 14H psf (where H is the height of the wall) be added to the lateral pressures. This seismic pressure assumes a peak ground acceleration of 0.32 g. Note that if the retaining system is designed as a braced system but is expected to yield a small amount during a seismic event, the active earth pressure condition may be assumed and combined with the seismic surcharge.

The recommended earth pressure values do not include the effects of surcharges from surface loads or structures. If vehicles were operated within one-half the height of the wall, a traffic surcharge should be added to the wall pressure. The traffic surcharge can be approximated by the equivalent weight of an additional 2 feet of backfill behind the wall. Other surcharge loads, such as construction equipment, staging areas and stockpiled fill, should be considered on a case-by-case basis.

## DOCUMENT REVIEW AND CONSTRUCTION OBSERVATION

We recommend that we be retained to review the portions of the plans and specifications that pertain to earthwork construction and stormwater infiltration. We recommend that monitoring, testing and consultation be performed during construction to confirm that the conditions encountered are consistent with our explorations and our stated design assumptions. Insight Geologic would be pleased to provide these services upon request.

## REFERENCES

International Code Council, "International Building Code", 2015.

*Seismic Compression of As-compacted Fill Soils with Variable Levels of Fines Content and Fines Plasticity*, Department of Civil and Environmental Engineering, University of California, Los Angeles, July 2004.

Washington State Department of Transportation (WSDOT), Standard Specifications for Road, Bridge and Municipal Construction Manual, 2016.

## LIMITATIONS

We have prepared this geotechnical and stormwater evaluation report for the exclusive use of Blue Summit Realty, LLC and their authorized agents, for the proposed 32<sup>nd</sup> Avenue Apartments project to be located at 7201 and 7203 32<sup>nd</sup> Avenue NE in Lacey, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, should be understood.

Please refer to Attachment C titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

————— ◀ ▶ —————

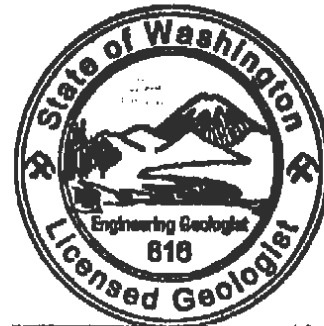


We appreciate the opportunity to be of service to you on this project. Please contact us if you have questions or require additional information.

Respectfully Submitted,  
INSIGHT GEOLOGIC, INC.



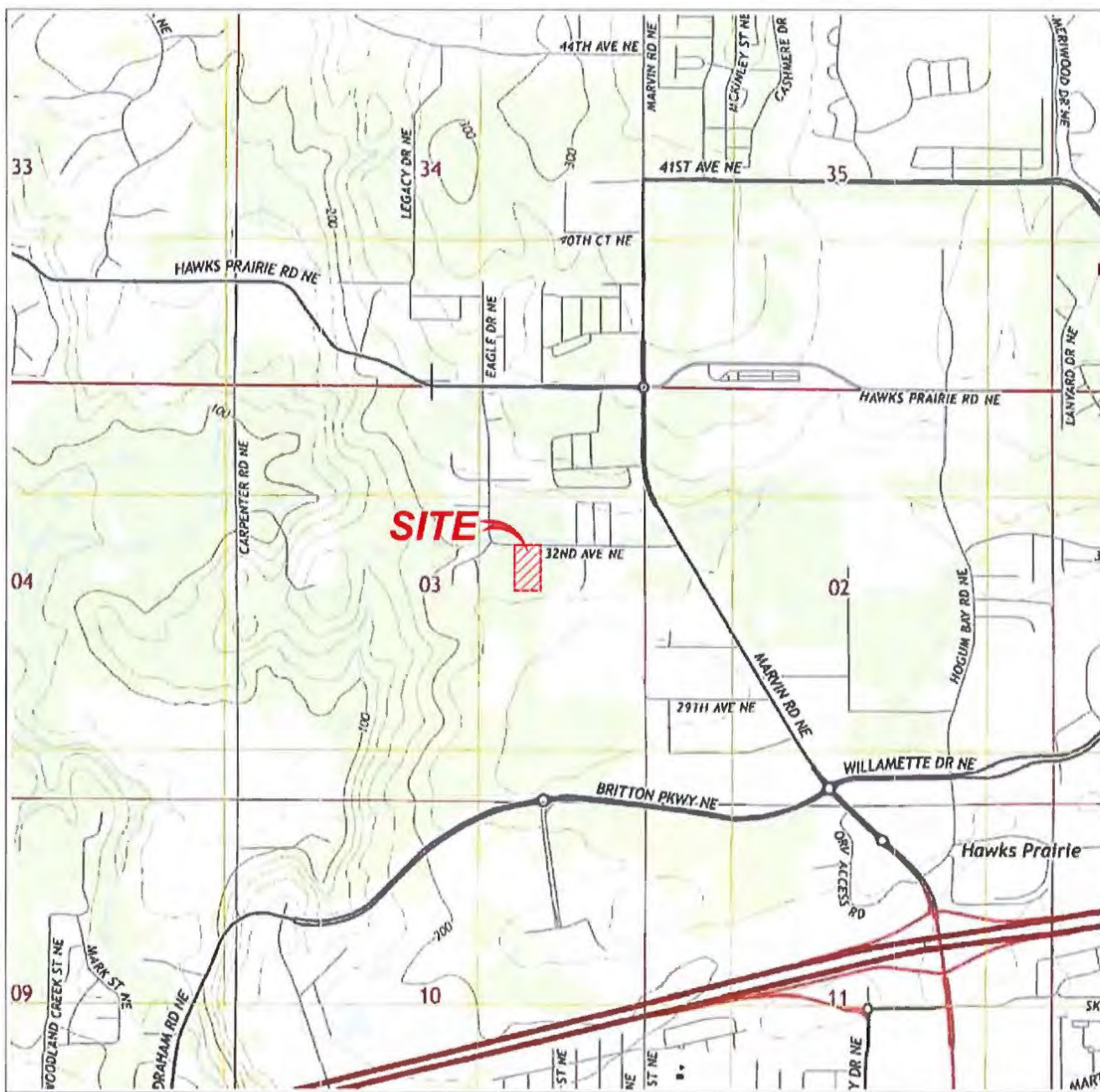
William E. Halbert, L.E.G., L.H.G.  
Principal



William E. Halbert

Attachments

## FIGURES



Source: Terrain Navigator Image (c) 1997

LACEY, WASHINGTON  
7.5 MINUTE QUADRANGLE  
Year 2014

SCALE: 1:24000

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Figure 1  
Vicinity Map





Source: Google Earth (c) 2016

### LEGEND:

-  **B-1** APPROXIMATE BORING LOCATION
-  **TP-1** APPROXIMATE TEST PIT LOCATION
-  **S-1** APPROXIMATE SAMPLE LOCATION
-  APPROXIMATE PROJECT BOUNDARY

SCALE: 1" = 120'

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Figure 2  
Site Plan





Source: Google Earth (c) 2016

# LEGEND:

**0.5"/hr** APPROXIMATE INFILTRATION RATE AREA (INCHES PER HOUR)  
 ——— APPROXIMATE PROJECT BOUNDARY

SCALE: 1" = 120'

7201 & 7203 32ND AVENUE NE  
 LACEY, WASHINGTON

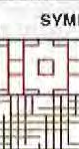


**Figure 3**  
**Infiltration Rate Map**

**ATTACHMENT A**  
**EXPLORATION LOGS**



## SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS                                                     |                                                                                           |                                 | SYMBOLS                                                                             |                                                                                     | GROUP NAME                                |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|
| COARSE GRAINED SOILS<br><br>MORE THAN 50% RETAINED ON NO. 200 SIEVE | GRAVEL AND GRAVELLY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | CLEAN GRAVEL<br>≤5% FINES       |    | GW                                                                                  | WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL |
|                                                                     |                                                                                           |                                 |    | GP                                                                                  | POORLY GRADED GRAVEL                      |
|                                                                     |                                                                                           | GRAVEL WITH FINES<br>≥12% FINES |    | GM                                                                                  | SILTY GRAVEL                              |
|                                                                     |                                                                                           |                                 |    | GC                                                                                  | CLAYEY GRAVEL                             |
|                                                                     | SAND AND SANDY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE          | CLEAN SAND<br>≤5% FINES         |    | SW                                                                                  | WELL-GRADED SAND, FINE TO COARSE SAND     |
|                                                                     |                                                                                           |                                 |    | SP                                                                                  | POORLY GRADED SAND                        |
|                                                                     |                                                                                           | SAND WITH FINES<br>≥12% FINES   |    | SM                                                                                  | SILTY SAND                                |
|                                                                     |                                                                                           |                                 |    | SC                                                                                  | CLAYEY SAND                               |
| FINE GRAINED SOILS<br><br>MORE THAN 50% PASSING NO. 200 SIEVE       | SILTS AND CLAYS<br><br>LIQUID LIMIT LESS THAN 50                                          | INORGANIC                       |    | ML                                                                                  | SILT                                      |
|                                                                     |                                                                                           |                                 |    | CL                                                                                  | CLAY                                      |
|                                                                     |                                                                                           | ORGANIC                         |    | OL                                                                                  | ORGANIC SILT, ORGANIC CLAY                |
|                                                                     | SILTS AND CLAYS<br><br>LIQUID LIMIT 50 OR MORE                                            | INORGANIC                       |   | MH                                                                                  | SILT OF HIGH PLASTICITY, ELASTIC SILT     |
|                                                                     |                                                                                           |                                 |  | CH                                                                                  | CLAY OF HIGH PLASTICITY, FAT CLAY         |
|                                                                     |                                                                                           |                                 | ORGANIC                                                                             |  | OH                                        |
| HIGHLY ORGANIC SOILS                                                |                                                                                           |                                 |  | PT                                                                                  | PEAT                                      |

## ADDITIONAL MATERIAL SYMBOLS

| SYMBOLS | TYPICAL DESCRIPTION             |
|---------|---------------------------------|
|         | CC CEMENT CONCRETE              |
|         | AC ASPHALT CONCRETE             |
|         | CR CRUSHED ROCK / QUARRY SPALLS |
|         | TS TOPSOIL/SOD/DUFF             |

## GROUNDWATER EXPLORATION SYMBOLS

- MEASURED GROUNDWATER LEVEL IN EXPLORATION, WELL, OR PIEZOMETER
- GROUNDWATER OBSERVED AT TIME OF EXPLORATION
- PERCHED WATER OBSERVED AT TIME OF EXPLORATION
- MEASURED FREE PRODUCT IN WELL OR PIEZOMETER

## STRATIGRAPHIC CONTACT

- APPROXIMATE CONTACT BETWEEN SOIL STRATA OR GEOLOGIC UNIT
- APPROXIMATE LOCATION OF SOIL STRATA CHANGE WITHIN GEOLOGIC SOIL UNIT
- APPROXIMATE GRADUAL CHANGE BETWEEN SOIL STRATA OR GEOLOGIC SOIL UNIT
- APPROXIMATE GRADUAL CHANGE OF SOIL STRATA WITHIN GEOLOGIC SOIL UNIT

## LABORATORY / FIELD TEST CLASSIFICATIONS

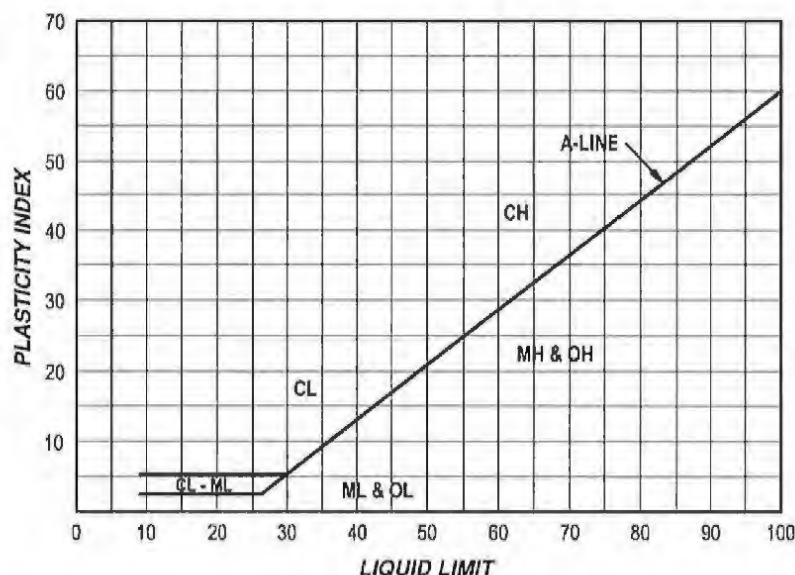
- %F PERCENT FINES
- AL ATTERBERG LIMITS
- CA CHEMICAL ANALYSIS
- CP LABORATORY COMPACTION TEST
- CS CONSOLIDATION TEST
- DS DIRECT SHEAR
- HA HYDROMETER ANALYSIS
- MC MOISTURE CONTENT
- MD MOISTURE CONTENT AND DRY DENSITY
- OC ORGANIC COMPOUND
- PM PERMEABILITY OR HYDRAULIC CONDUCTIVITY
- PP POCKET PENETROMETER
- SA SIEVE ANALYSIS
- TX TRIAXIAL COMPRESSION
- UC UNCONFINED COMPRESSION
- VS VANE SHEAR

## SAMPLER SYMBOLS

- 2.4 INCH I.D. SPLIT BARREL
- DIRECT-PUSH
- STANDARD PENETRATION TEST
- SHELBY TUBE
- PISTON
- BULK OR GRAB

## SHEEN CLASSIFICATIONS

- NS NO VISIBLE SHEEN
- SS SLIGHT SHEEN
- MS MODERATE SHEEN
- HS HEAVY SHEEN
- NT NOT TESTED



SOIL MOISTURE MODIFIERS:  
 DRY - ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH  
 MOIST - DAMP, BUT NO VISIBLE WATER  
 WET - VISIBLE FREE WATER OR SATURATED, USUALLY SOIL IS OBTAINED BELOW WATER TABLE

# B-1

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>DOWN<br>RECOVERED | U.S.G.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|-----------------------------|----------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 48/24                       | GP-GM    |   | Brown fine to coarse gravel with fine to coarse sand and silt, medium dense, moist           |                                           |
| 2               |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 4               | 2                             | 48/24                       | GP       |   | Brown fine to coarse gravel with fine to coarse sand, dense, moist                           |                                           |
| 6               |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 8               | 3                             | 48/24                       |          |                                                                                    |                                                                                              |                                           |
| 10              |                               |                             | GP-GM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |
| 12              |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 14              |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 16              |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 18              |                               |                             |          |                                                                                    |                                                                                              |                                           |
| 20              |                               |                             |          |                                                                                    |                                                                                              |                                           |

Groundwater not encountered

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 20, 2017

TOTAL DEPTH: 12 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: KEVIN VENDEHEY

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log B-1



# B-2

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>DRIVEN<br>RECOVERED | U.S.G.S. | LITHOLOGY                                                                           | SOIL DESCRIPTION                                                              | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|-------------------------------|----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 48/26                         | SM       |    | Dark brown silty fine to coarse sand with fine to coarse gravel, loose, moist |                                           |
| 2               |                               |                               |          |                                                                                     |                                                                               |                                           |
| 4               | 2                             | 48/24                         | GP       |    | Brown fine to coarse gravel with fine to coarse sand, medium dense, moist     |                                           |
| 6               |                               |                               |          |                                                                                     |                                                                               |                                           |
| 8               | 3                             | 48/23                         |          |    |                                                                               |                                           |
| 10              |                               |                               |          |   |                                                                               |                                           |
| 12              | 4                             | 48/26                         | SP       |  | Brown fine to medium sand, loose, wet                                         |                                           |
| 14              |                               |                               |          |                                                                                     |                                                                               |                                           |
| 16              |                               |                               |          |                                                                                     | Groundwater encountered at 10 feet                                            |                                           |
| 18              |                               |                               |          |                                                                                     |                                                                               |                                           |
| 20              |                               |                               |          |                                                                                     |                                                                               |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 20, 2017

TOTAL DEPTH: 16 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: KEVIN VENDEHEY

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log B-2

# B-3

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>NOT RECOVERED | U.S.G.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                               | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|-------------------------|----------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 48/26                   | SM       |   | Dark brown silty fine to coarse sand with fine to coarse gravel, loose, moist  |                                           |
| 2               |                               |                         |          |                                                                                    |                                                                                |                                           |
| 4               | 2                             | 48/27                   | GP       |   | Brown fine to coarse gravel with fine to coarse sand, medium dense, moist      |                                           |
| 6               |                               |                         |          |                                                                                    |                                                                                |                                           |
| 8               | 3                             | 48/30                   | GP       |   |                                                                                |                                           |
| 10              |                               |                         |          |                                                                                    |                                                                                |                                           |
| 12              | 4                             | 48/0                    | GP-GM    |  | Light gray fine to coarse gravel with fine to coarse sand and silt, dense, wet |                                           |
| 14              |                               |                         |          |                                                                                    |                                                                                |                                           |
| 16              |                               |                         |          |                                                                                    | Groundwater encountered at 11 feet                                             |                                           |
| 18              |                               |                         |          |                                                                                    |                                                                                |                                           |
| 20              |                               |                         |          |                                                                                    |                                                                                |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 20, 2017

TOTAL DEPTH: 16 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: KEVIN VENDEHEY

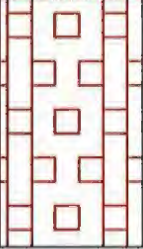
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log B-3

# TP-1

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                                              | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SM       |   | Dark brown silty fine to coarse sand with fine to coarse gravel, abundant roots, loose, moist |                                           |
| 1             |          |                                                                                    |                                                                                               |                                           |
| 2             |          |                                                                                    |                                                                                               |                                           |
| 3             | SP-SM    |   | Brown fine to coarse sand with fine to coarse gravel and silt, medium dense, moist            |                                           |
| 4             |          |                                                                                    |                                                                                               |                                           |
| 5             |          |                                                                                    |                                                                                               |                                           |
| 6             | GW       |  | Brown fine to coarse gravel with fine to coarse sand, dense, moist                            |                                           |
| 7             |          |                                                                                    |                                                                                               |                                           |
| 8             |          |                                                                                    |                                                                                               |                                           |
| 9             |          |                                                                                    |                                                                                               |                                           |
| 10            |          |                                                                                    | Groundwater not encountered                                                                   |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 7 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

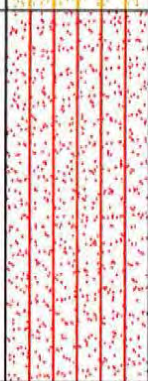
LACEY, WASHINGTON



Exploration Log TP-1



# TP-2

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                              | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SM       |  | Dark brown silty fine to coarse sand with fine to coarse gravel, abundant roots, loose, moist |                                           |
| 1             |          |                                                                                   |                                                                                               |                                           |
| 2             | SP-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, medium dense, moist            |                                           |
| 3             |          |                                                                                   |                                                                                               |                                           |
| 4             |          |                                                                                   | Grades to light gray, very dense, moist (till)                                                |                                           |
| 5             |          |                                                                                   |                                                                                               |                                           |
| 6             |          |                                                                                   |                                                                                               |                                           |
| 7             |          |                                                                                   |                                                                                               |                                           |
| 8             |          |                                                                                   |                                                                                               |                                           |
| 9             |          |                                                                                   |                                                                                               |                                           |
| 10            |          |                                                                                   | Groundwater not encountered                                                                   |                                           |

## LEGEND:

PROJECT NO.: B72-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 4 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

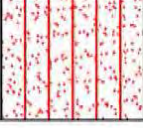
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-2

# TP-3

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | TS       |  | Sod                                                                                          |                                           |
| 1             | SP-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, medium dense, moist           |                                           |
| 2             | GP       |  | Brown fine to coarse gravel with fine to coarse sand, medium dense, moist                    |                                           |
| 3             | SP-SM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |
| 4             |          |                                                                                   | Groundwater not encountered                                                                  |                                           |
| 5             |          |                                                                                   |                                                                                              |                                           |
| 6             |          |                                                                                   |                                                                                              |                                           |
| 7             |          |                                                                                   |                                                                                              |                                           |
| 8             |          |                                                                                   |                                                                                              |                                           |
| 9             |          |                                                                                   |                                                                                              |                                           |
| 10            |          |                                                                                   |                                                                                              |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 4 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

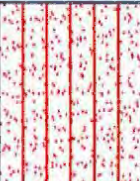
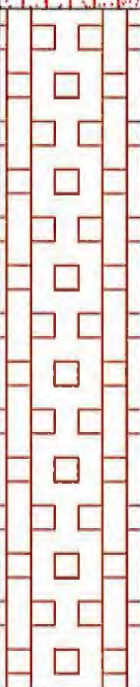
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-3

# TP-4

| DEPTH<br>(FT) | U.S.C.S.                    | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                                  | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|-----------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SP-SM                       |   | Brown fine to coarse sand with fine gravel and silt, abundant roots, loose, moist |                                           |
| 1             |                             |                                                                                    |                                                                                   |                                           |
| 2             | GW                          |  | Gray fine to coarse gravel with medium to coarse sand, loose, moist               |                                           |
| 3             |                             |                                                                                    |                                                                                   |                                           |
| 4             |                             |                                                                                    |                                                                                   |                                           |
| 5             |                             |                                                                                    |                                                                                   |                                           |
| 6             |                             |                                                                                    |                                                                                   |                                           |
| 7             | Groundwater not encountered |                                                                                    |                                                                                   |                                           |
| 8             |                             |                                                                                    |                                                                                   |                                           |
| 9             |                             |                                                                                    |                                                                                   |                                           |
| 10            |                             |                                                                                    |                                                                                   |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 7 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-4

# TP-5

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                            | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| 0             | TS       |  | Sod                                                                         |                                           |
| 1             |          |  | Brown fine to coarse gravel with fine to coarse sand and silt, loose, moist |                                           |
| 2             | GW-GM    |  |                                                                             |                                           |
| 3             |          |  |                                                                             |                                           |
| 4             |          |  |                                                                             |                                           |
| 5             |          |  | Brown fine to coarse gravel with medium to coarse sand, loose, moist        |                                           |
| 6             | GW       |  |                                                                             |                                           |
| 7             |          |  |                                                                             |                                           |
| 8             |          |  |                                                                             |                                           |
| 9             |          |                                                                                   | Groundwater not encountered                                                 |                                           |
| 10            |          |                                                                                   |                                                                             |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 8 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

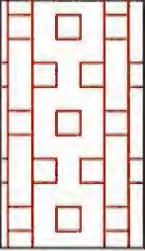
LACEY, WASHINGTON



Exploration Log TP-5



# TP-6

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                     | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------|
| 0             | TS       |   | Sod                                                                  |                                           |
| 1             | SP-SM    |   | Brown fine to coarse sand with fine gravel and silt, loose, moist    |                                           |
| 2             |          |                                                                                    |                                                                      |                                           |
| 3             |          |                                                                                    |                                                                      |                                           |
| 4             |          |                                                                                    |                                                                      |                                           |
| 5             | GW       |  | Brown fine to coarse gravel with medium to coarse sand, loose, moist |                                           |
| 6             |          |                                                                                    |                                                                      |                                           |
| 7             |          |                                                                                    | Groundwater not encountered                                          |                                           |
| 8             |          |                                                                                    |                                                                      |                                           |
| 9             |          |                                                                                    |                                                                      |                                           |
| 10            |          |                                                                                    |                                                                      |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 7 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

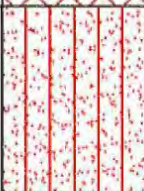
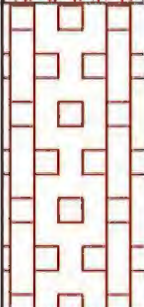
LACEY, WASHINGTON



Exploration Log TP-6



# TP-7

| DEPTH<br>(FT) | U.S.C.S.                    | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |  |
|---------------|-----------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|--|
| 0             | TS                          |  | Sod                                                                                          |                                           |  |
| 1             | SP-SM                       |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist                  |                                           |  |
| 2             | GW                          |  | Brown fine to coarse gravel with medium to coarse sand, loose, moist                         |                                           |  |
| 3             |                             |                                                                                   |                                                                                              |                                           |  |
| 4             |                             |                                                                                   |                                                                                              |                                           |  |
| 5             | SP-SM                       |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |  |
| 6             | Groundwater not encountered |                                                                                   |                                                                                              |                                           |  |
| 7             |                             |                                                                                   |                                                                                              |                                           |  |
| 8             |                             |                                                                                   |                                                                                              |                                           |  |
| 9             |                             |                                                                                   |                                                                                              |                                           |  |
| 10            |                             |                                                                                   |                                                                                              |                                           |  |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

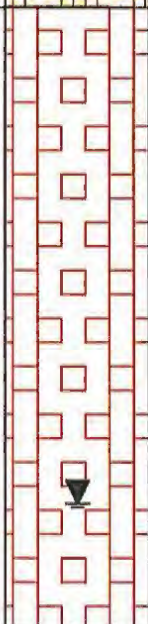
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-7

# TP-8

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                           | SOIL DESCRIPTION                                                                   | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | TS       |    | Sod                                                                                |                                           |
| 1             | GP-GM    |    | Brown fine to coarse gravel with fine to coarse sand and silt, medium dense, moist |                                           |
| 2             |          |                                                                                     |                                                                                    |                                           |
| 3             |          |                                                                                     |                                                                                    |                                           |
| 4             |          |                                                                                     |                                                                                    |                                           |
| 5             | GW       |   | Brown fine to coarse gravel with medium to coarse sand, medium dense, moist to wet |                                           |
| 6             |          |                                                                                     |                                                                                    |                                           |
| 7             |          |  |                                                                                    |                                           |
| 8             |          |                                                                                     | Groundwater encountered at 7 feet                                                  |                                           |
| 9             |          |                                                                                     |                                                                                    |                                           |
| 10            |          |                                                                                     |                                                                                    |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 8 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

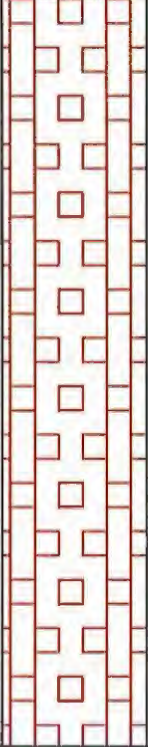
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-8

# TP-9

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                            | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| 0             | TS       |   | Sod                                                                         |                                           |
| 1             | GP-GM    |   | Brown fine to coarse gravel with fine to coarse sand and silt, loose, moist |                                           |
| 2             |          |                                                                                    |                                                                             |                                           |
| 3             |          |                                                                                    |                                                                             |                                           |
| 4             |          |                                                                                    |                                                                             |                                           |
| 5             | GW       |  | Gray fine to coarse gravel with coarse sand, loose, moist                   |                                           |
| 6             |          |                                                                                    |                                                                             |                                           |
| 7             |          |                                                                                    |                                                                             |                                           |
| 8             |          |                                                                                    |                                                                             |                                           |
| 9             |          |                                                                                    |                                                                             |                                           |
| 10            |          |                                                                                    |                                                                             |                                           |
|               |          |                                                                                    | Groundwater not encountered                                                 |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 8 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-9



# TP-10

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                              | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SM       |  | Dark brown silty fine to coarse sand with fine to coarse gravel, abundant roots, loose, moist |                                           |
| 1             |          |                                                                                   |                                                                                               |                                           |
| 2             | SP-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist                   |                                           |
| 3             |          |                                                                                   |                                                                                               |                                           |
| 4             |          |                                                                                   | Grades to light gray, very dense, moist (till)                                                |                                           |
| 5             |          |                                                                                   |                                                                                               |                                           |
| 6             |          |                                                                                   |                                                                                               |                                           |
| 7             |          |                                                                                   |                                                                                               |                                           |
| 8             |          |                                                                                   |                                                                                               |                                           |
| 9             |          |                                                                                   |                                                                                               |                                           |
| 10            |          |                                                                                   | Groundwater not encountered                                                                   |                                           |

## LEGEND:

PROJECT NO.: 872-001-03

DATE: JUNE 19, 2017

TOTAL DEPTH: 4 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Exploration Log TP-10

**ATTACHMENT B**  
**LABORATORY ANALYSES RESULTS**

## Gradation Analysis Summary Data

|                                             |                                    |
|---------------------------------------------|------------------------------------|
| <b>Job Name:</b> 7201 & 7203 32nd Avenue NE | <b>Sample Location:</b> TP-5       |
| <b>Job Number:</b> 872-001-03               | <b>Sample Name:</b> TP-5 0.5'-4.0' |
| <b>Date Tested:</b> 6/19/17                 | <b>Depth:</b> 0.5 - 4 Feet         |
| <b>Tested By:</b> Kevin Vandehey            |                                    |

Moisture Content (%) 15.3%

| <u>Sieve Size</u> | <u>Percent Passing</u> | <u>Size Fraction</u> | <u>Percent by Weight</u> |
|-------------------|------------------------|----------------------|--------------------------|
| 3.0 in. (75.0)    | 100.0                  | Coarse Gravel        | 8.6                      |
| 1.5 in. (37.5)    | 100.0                  | Fine Gravel          | 42.7                     |
| 3/4 in. (19.0)    | 91.4                   |                      |                          |
| 3/8 in. (9.5-mm)  | 67.6                   | Coarse Sand          | 13.2                     |
| No. 4 (4.75-mm)   | 48.8                   | Medium Sand          | 13.6                     |
| No. 10 (2.00-mm)  | 35.5                   | Fine Sand            | 15.4                     |
| No. 20 (.850-mm)  | 28.7                   |                      |                          |
| No. 40 (.425-mm)  | 21.9                   | Fines                | 6.6                      |
| No. 60 (.250-mm)  | 15.4                   | <b>Total</b>         | <b>100.0</b>             |
| No. 100 (.150-mm) | 10.9                   |                      |                          |
| No. 200 (.075-mm) | 6.6                    |                      |                          |

LL --  
 PL --  
 PI --

D<sub>10</sub> 0.14  
 D<sub>30</sub> 1.00  
 D<sub>60</sub> 7.10  
 D<sub>90</sub> 19.00

Cc 1.01  
 Cu 50.71

ASTM Classification  
 Group Name: **Well-Graded Gravel with Silt and Sand**  
 Symbol: **GW-GM**

## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-5  
Sample Name: TP-5 4.0'-8.0'  
Depth: 4 - 8 Feet

Moisture Content (%) 2.8%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 24.3              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 51.7              |
| 3/4 in. (19.0)    | 75.7            |               |                   |
| 3/8 in. (9.5-mm)  | 41.7            | Coarse Sand   | 12.8              |
| No. 4 (4.75-mm)   | 24.1            | Medium Sand   | 8.8               |
| No. 10 (2.00-mm)  | 11.2            | Fine Sand     | 1.5               |
| No. 20 (.850-mm)  | 4.6             |               |                   |
| No. 40 (.425-mm)  | 2.4             | Fines         | 0.9               |
| No. 60 (.250-mm)  | 1.6             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 1.2             |               |                   |
| No. 200 (.075-mm) | 0.9             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 1.80  
D<sub>30</sub> 6.40  
D<sub>60</sub> 15.00  
D<sub>90</sub> 28.00

Cc 1.52  
Cu 8.33

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-6  
Sample Name: TP-6 0.5'-5.0'  
Depth: 0.5 - 5 Feet

Moisture Content (%) 8.2%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 1.9               |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 27.0              |
| 3/4 in. (19.0)    | 98.1            |               |                   |
| 3/8 in. (9.5-mm)  | 86.9            | Coarse Sand   | 26.3              |
| No. 4 (4.75-mm)   | 71.1            | Medium Sand   | 19.9              |
| No. 10 (2.00-mm)  | 44.7            | Fine Sand     | 19.4              |
| No. 20 (.850-mm)  | 32.3            |               |                   |
| No. 40 (.425-mm)  | 24.9            | Fines         | 5.5               |
| No. 60 (.250-mm)  | 15.4            | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 10.1            |               |                   |
| No. 200 (.075-mm) | 5.5             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 0.16  
D<sub>30</sub> 0.42  
D<sub>60</sub> 3.40  
D<sub>90</sub> 10.20

Cc 0.32  
Cu 21.25

ASTM Classification  
Group Name: **Poorly-Graded Sand with Silt and Gravel**  
Symbol: **SP-SM**



## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-6  
Sample Name: TP-6 5.0'-7.0'  
Depth: 5 - 7 Feet

Moisture Content (%) 2.6%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 15.8              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 54.2              |
| 3/4 in. (19.0)    | 84.2            |               |                   |
| 3/8 in. (9.5-mm)  | 55.9            | Coarse Sand   | 17.2              |
| No. 4 (4.75-mm)   | 29.9            | Medium Sand   | 10.3              |
| No. 10 (2.00-mm)  | 12.7            | Fine Sand     | 1.5               |
| No. 20 (.850-mm)  | 5.3             |               |                   |
| No. 40 (.425-mm)  | 2.4             | Fines         | 0.9               |
| No. 60 (.250-mm)  | 1.5             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 1.2             |               |                   |
| No. 200 (.075-mm) | 0.9             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 1.70  
D<sub>30</sub> 4.80  
D<sub>60</sub> 11.00  
D<sub>90</sub> 24.00

Cc 1.23  
Cu 6.47

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**

## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-8  
Sample Name: TP-8 0.5'-3.0'  
Depth: 0.5 - 3 Feet

Moisture Content (%) 8.5%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 26.6              |
| 1.5 in. (37.5)    | 86.1            | Fine Gravel   | 26.7              |
| 3/4 in. (19.0)    | 73.4            |               |                   |
| 3/8 in. (9.5-mm)  | 58.6            | Coarse Sand   | 11.6              |
| No. 4 (4.75-mm)   | 46.7            | Medium Sand   | 18.9              |
| No. 10 (2.00-mm)  | 35.1            | Fine Sand     | 8.4               |
| No. 20 (.850-mm)  | 25.2            |               |                   |
| No. 40 (.425-mm)  | 16.2            | Fines         | 7.7               |
| No. 60 (.250-mm)  | 10.9            | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 7.8             |               |                   |
| No. 200 (.075-mm) | 7.7             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 0.22  
D<sub>30</sub> 1.40  
D<sub>60</sub> 10.10  
D<sub>90</sub> 46.00

Cc 0.88  
Cu 45.91

ASTM Classification

Group Name: **Poorly Graded Gravel with Silt and Sand**

Symbol: GP-GM

## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-8  
Sample Name: TP-8 3.0'-8.0'  
Depth: 3 - 8 Feet

Moisture Content (%) 3.6%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 28.4              |
| 1.5 in. (37.5)    | 85.7            | Fine Gravel   | 44.6              |
| 3/4 in. (19.0)    | 71.6            |               |                   |
| 3/8 in. (9.5-mm)  | 47.1            | Coarse Sand   | 14.0              |
| No. 4 (4.75-mm)   | 26.9            | Medium Sand   | 7.9               |
| No. 10 (2.00-mm)  | 13.0            | Fine Sand     | 2.9               |
| No. 20 (.850-mm)  | 7.7             |               |                   |
| No. 40 (.425-mm)  | 5.0             | Fines         | 2.2               |
| No. 60 (.250-mm)  | 3.7             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 2.9             |               |                   |
| No. 200 (.075-mm) | 2.2             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 1.30  
D<sub>30</sub> 5.20  
D<sub>60</sub> 10.50  
D<sub>90</sub> 46.00

Cc 1.98  
Cu 8.08

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-9  
Sample Name: TP-9 0.5'-2.0'  
Depth: 0.5 - 2 Feet

Moisture Content (%) 9.7%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 31.4              |
| 1.5 in. (37.5)    | 86.4            | Fine Gravel   | 33.2              |
| 3/4 in. (19.0)    | 68.6            |               |                   |
| 3/8 in. (9.5-mm)  | 46.5            | Coarse Sand   | 10.6              |
| No. 4 (4.75-mm)   | 35.4            | Medium Sand   | 7.6               |
| No. 10 (2.00-mm)  | 24.8            | Fine Sand     | 11.9              |
| No. 20 (.850-mm)  | 20.2            |               |                   |
| No. 40 (.425-mm)  | 17.2            | Fines         | 5.3               |
| No. 60 (.250-mm)  | 14.0            | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 10.2            |               |                   |
| No. 200 (.075-mm) | 5.3             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 0.15  
D<sub>30</sub> 3.10  
D<sub>60</sub> 15.00  
D<sub>90</sub> 46.00

Cc 4.27  
Cu 100.00

ASTM Classification

Group Name: **Poorly Graded Gravel with Silt and Sand**

Symbol: **GP-GM**

## Gradation Analysis Summary Data

Job Name: 7201 & 7203 32nd Avenue NE  
Job Number: 872-001-03  
Date Tested: 6/19/17  
Tested By: Kevin Vandehey

Sample Location: TP-9  
Sample Name: TP-9 2.0'-8.0'  
Depth: 2 - 8 Feet

Moisture Content (%) 2.4%

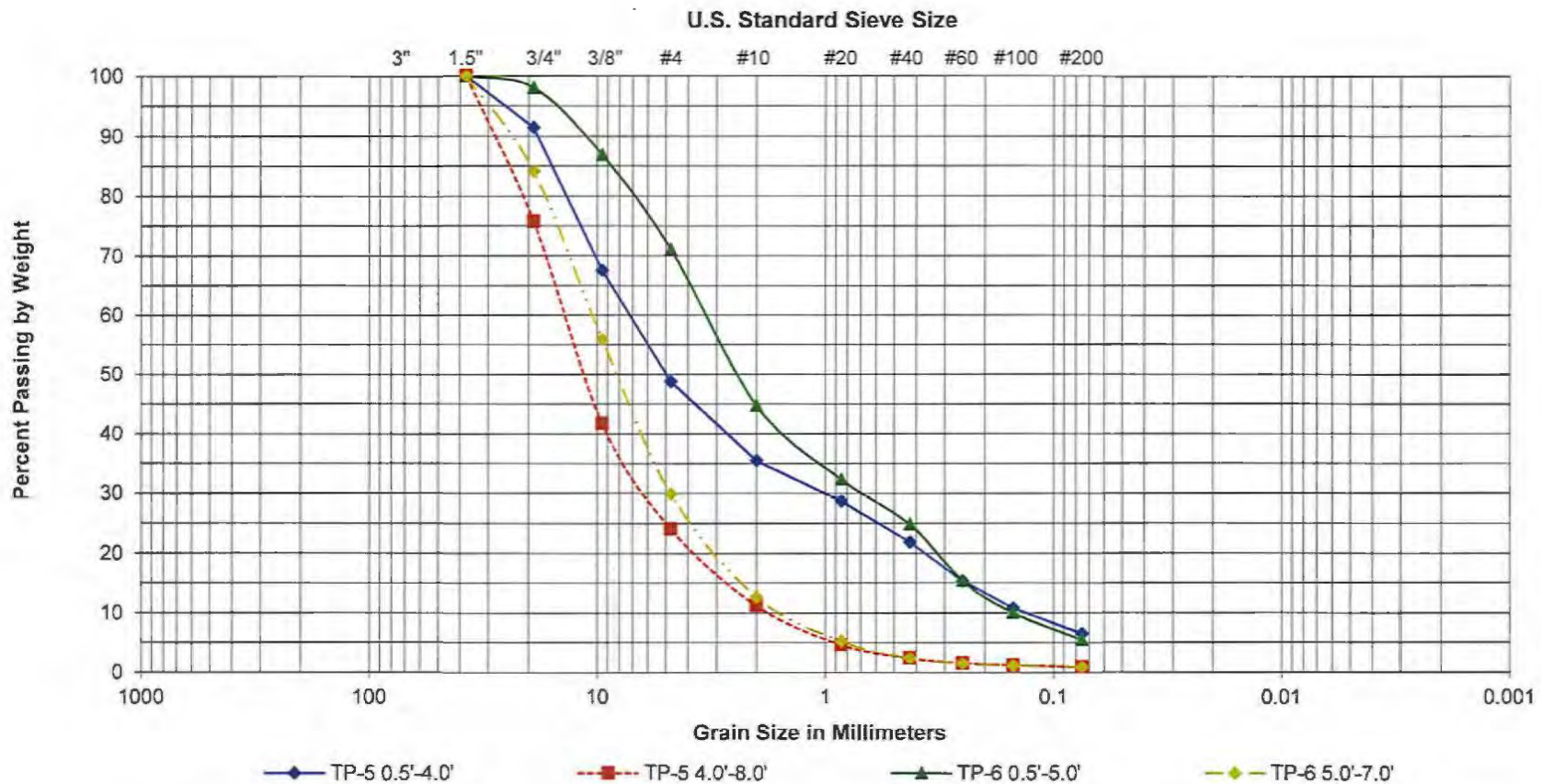
| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 31.0              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 53.1              |
| 3/4 in. (19.0)    | 69.0            |               |                   |
| 3/8 in. (9.5-mm)  | 35.8            | Coarse Sand   | 11.7              |
| No. 4 (4.75-mm)   | 15.9            | Medium Sand   | 3.5               |
| No. 10 (2.00-mm)  | 4.2             | Fine Sand     | 0.4               |
| No. 20 (.850-mm)  | 1.4             |               |                   |
| No. 40 (.425-mm)  | 0.7             | Fines         | 0.4               |
| No. 60 (.250-mm)  | 0.5             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 0.5             |               |                   |
| No. 200 (.075-mm) | 0.4             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 3.40  
D<sub>30</sub> 8.00  
D<sub>60</sub> 16.00  
D<sub>90</sub> 30.00

Cc 1.18  
Cu 4.71

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



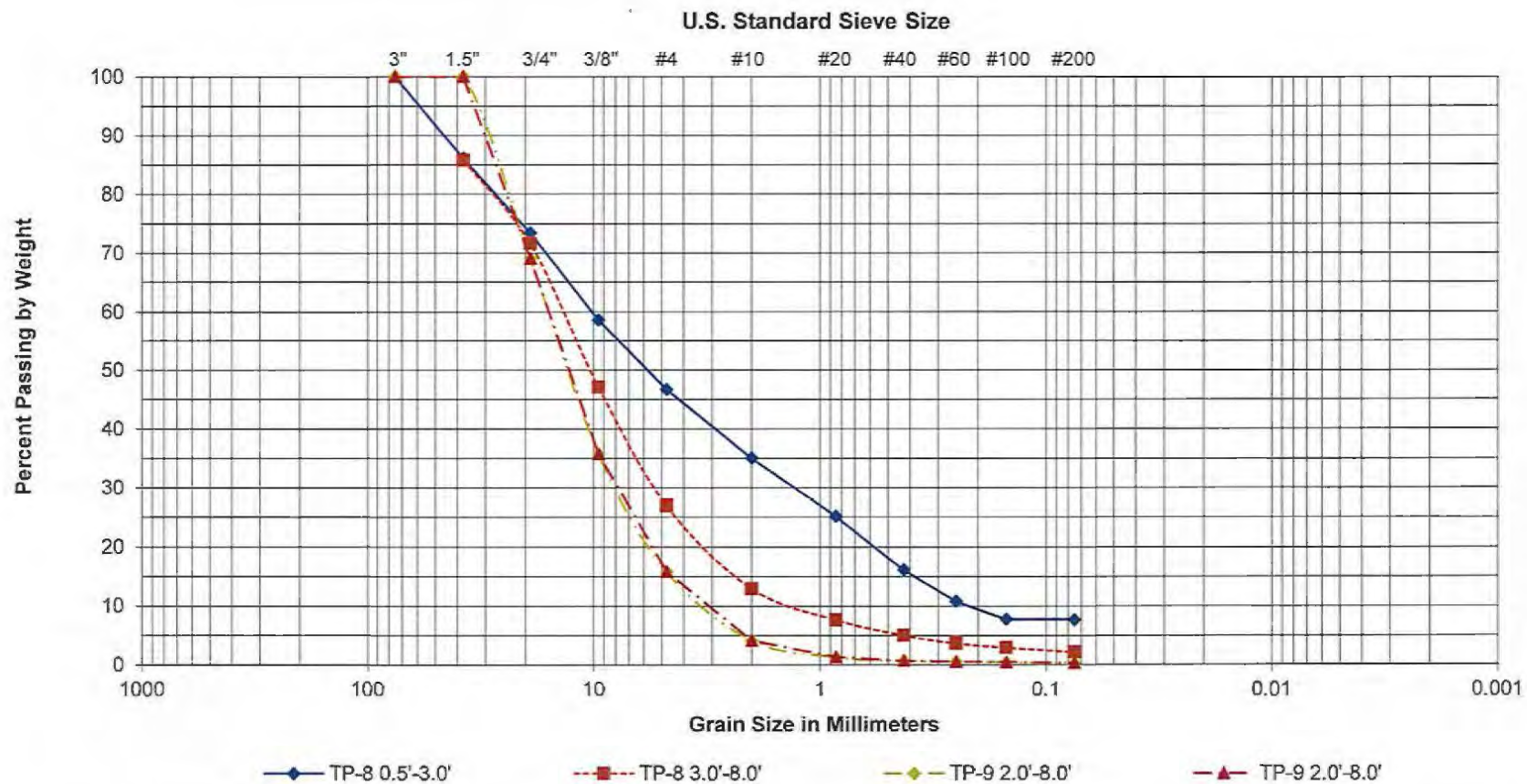
7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Graph 1  
Gradation Analysis Results





| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |              |

7201 & 7203 32ND AVENUE NE

LACEY, WASHINGTON



Graph 2  
Gradation Analysis Results



# Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

June 22, 2017

Bill Halbert  
Insight Geologic, Inc.  
1015 East Fourth Ave  
Olympia, WA 98506

Dear Mr. Halbert:

Please find enclosed the analytical data report for the 32<sup>nd</sup> Ave Apts. Project located in Lacey, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt  
*Senior Chemist*  
*Libby Environmental, Inc.*



# Libby Environmental, Inc.

## Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE  
Olympia, WA 98506.

Ph: 360-352-2110

Fax: 360-352-4154

Client: Insight Geologic

Address: 1015 East 4th Ave

City: Olympia State: WA Zip: 98501

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Client Project # 872-001-03

Date: 6/20/17

Page: 1 of 1

Project Manager: Bill Halbert

Project Name: 32nd Ave Apts.

Location: Lacey City, State: WA

Collector: Kevin Wanching Date of Collection: 6/19/17

Email: BillH@InsightGeologic.com



| Sample Number | Depth     | Time         | Sample Type | Container Type | VOC 8260 | NWTPH-Gx | BTEX 8021 | NWTPH-HCID | NWTPH-Dx | c PAH 8270 | PAH 8270 | Semi Vol 8270 | PCB 8082 | MTCA 5 Metals | RCRA 8 Metals | Lead, Arsenic, & PAH 9000 | Field Notes |
|---------------|-----------|--------------|-------------|----------------|----------|----------|-----------|------------|----------|------------|----------|---------------|----------|---------------|---------------|---------------------------|-------------|
| 1 <u>51</u>   | <u>6"</u> | <u>11:00</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 2 <u>52</u>   | <u>1'</u> | <u>12:00</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 3 <u>53</u>   | <u>1'</u> | <u>13:20</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 4 <u>54</u>   | <u>1'</u> | <u>14:00</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 5 <u>55</u>   | <u>1'</u> | <u>15:20</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 6 <u>56</u>   | <u>1'</u> | <u>16:30</u> | <u>Soil</u> | <u>4oz jar</u> |          |          |           |            |          |            |          |               |          |               |               | <u>X</u>                  |             |
| 7             |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 8             |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 9             |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 10            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 11            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 12            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 13            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 14            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 15            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 16            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |
| 17            |           |              |             |                |          |          |           |            |          |            |          |               |          |               |               |                           |             |

|                                        |                                  |                                    |                                   |                                                                                                                                                     |                                                     |
|----------------------------------------|----------------------------------|------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Relinquished by: <u>Kevin Wanching</u> | Date / Time: <u>6/20/17 7:50</u> | Received by: <u>Kevin Wanching</u> | Date / Time: <u>6/20/17 09:00</u> | <b>Sample Receipt</b><br>Good Condition? <u>(Y)</u> N<br>Temp. <u>19°C</u><br>Seals Intact? <u>(Y)</u> N N/A<br>Total Number of Containers <u>6</u> | Remarks:<br><br><br><br>TAT: 24HR 48HR <u>5-DAY</u> |
| Relinquished by:                       | Date / Time:                     | Received by:                       | Date / Time:                      |                                                                                                                                                     |                                                     |
| Relinquished by:                       | Date / Time:                     | Received by:                       | Date / Time:                      |                                                                                                                                                     |                                                     |
| Relinquished by:                       | Date / Time:                     | Received by:                       | Date / Time:                      |                                                                                                                                                     |                                                     |

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

# Libby Environmental, Inc.

32nd Ave Apts. PROJECT  
Insight Geologic, Inc.  
Lacey, Washington  
Libby Project # L170620-1  
Client Project # 872-001-03

4139 Libby Road NE  
Olympia, WA 98506  
Phone: (360) 352-2110  
FAX: (360) 352-4154  
Email: libbyenv@aol.com

## Analyses of Total Metals in Soil by EPA Method 7010 Series

| Sample Number                | Date Analyzed | Lead (mg/kg) | Arsenic (mg/kg) |
|------------------------------|---------------|--------------|-----------------|
| Method Blank                 | 6/21/17       | nd           | nd              |
| S1                           | 6/21/17       | 33           | 12              |
| S2                           | 6/21/17       | 6.3          | 12              |
| S3                           | 6/21/17       | 22           | 13              |
| S4                           | 6/21/17       | 8.6          | 15              |
| S5                           | 6/21/17       | 95           | 9.6             |
| S6                           | 6/21/17       | 14           | 10              |
| S6 Dup                       | 6/21/17       | 14           | 12              |
| Practical Quantitation Limit |               | 5.0          | 5.0             |

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

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## QA/QC for Total Metals in Soil by EPA Method 7010 Series

| Sample<br>Number | Date<br>Analyzed | Lead<br>(% Recovery) | Arsenic<br>(% Recovery) |
|------------------|------------------|----------------------|-------------------------|
| LCS              | 6/21/17          | 104%                 | 102%                    |
| S6 MS            | 6/21/17          | 92%                  | 95%                     |
| S6 MSD           | 6/21/17          | 102%                 | 89%                     |
| RPD              | 6/21/17          | 10%                  | 7%                      |

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%

ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Sherry Chilcutt

**ATTACHMENT C**  
**REPORT LIMITATIONS AND GUIDELINES FOR USE**

## **ATTACHMENT C**

### **REPORT LIMITATIONS AND GUIDELINES FOR USE<sup>1</sup>**

This attachment provides information to help you manage your risks with respect to the use of this report.

#### **GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS**

This report has been prepared for the exclusive use of Blue Summit Realty, LLC (Client) and their authorized agents. This report may be made available to regulatory agencies for review. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

Insight Geologic Inc. structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

#### **A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS**

Insight Geologic, Inc. considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless Insight Geologic specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If important changes are made after the date of this report, Insight Geologic should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

---

<sup>1</sup> Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; [www.asfe.org](http://www.asfe.org) .

### **SUBSURFACE CONDITIONS CAN CHANGE**

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or ground water fluctuations. Always contact Insight Geologic before applying a report to determine if it remains applicable.

### **MOST GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS**

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Insight Geologic reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

### **GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL**

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from Insight Geologic's professional judgment and opinion. Insight Geologic's recommendations can be finalized only by observing actual subsurface conditions revealed during construction. Insight Geologic cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by Insight Geologic should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining Insight Geologic for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

### **A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION**

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having Insight Geologic confer with appropriate members of the design team after submitting the report. Also retain Insight Geologic to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having Insight Geologic participate in pre-bid and pre-construction conferences, and by providing construction observation.

### **DO NOT REDRAW THE EXPLORATION LOGS**

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a

geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

### **GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE**

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with Insight Geologic and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

### **CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS**

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

### **READ THESE PROVISIONS CLOSELY**

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. Insight Geologic includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with Insight Geologic if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

### **GEOTECHNICAL, GEOLOGIC AND ENVIRONMENTAL REPORTS SHOULD NOT BE INTERCHANGED**

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.







July 7, 2016

Blue Summit Realty, LLC  
9323 Martin Way East, Suite 112  
Olympia, Washington 98516  
Attention: Brandon Johnson

Report  
Geotechnical and Stormwater Evaluation  
Proposed 32<sup>nd</sup> Avenue Apartments  
7235 32<sup>nd</sup> Avenue NE  
Lacey, Washington  
Project No. 872-001-02

## INTRODUCTION

Insight Geologic, Inc. is pleased to provide our report for the evaluation of site soil conditions as they relate to building construction and the infiltration and disposal of stormwater at the site of your proposed apartment complex project to be located at 7235 32<sup>nd</sup> Avenue NE in Lacey, Washington. The location of the site is shown relative to surrounding physical features in the Vicinity Map, Figure 1.

The property consists of a single parcel (Thurston County Tax Parcel No. 11803140300) comprising approximately 4.77 acres. We understand that a 56-unit multi-family residential development, consisting of 13 buildings with associated parking and stormwater infrastructure, are proposed for the property. Stormwater is proposed to be infiltrated to the subsurface by pervious pavement and underground galleries.

Our services were performed in general accordance with our proposal dated June 2, 2016 and authorized on June 6, 2016.

## SCOPE OF SERVICES

The purpose of our services was to evaluate subsurface soil conditions as they relate to geotechnical properties and the infiltration and disposal of stormwater from the proposed development. We proposed to perform our evaluation in general accordance with the procedures outlined in the City of Lacey 2010 Stormwater Design Manual (2010 Manual). The specific tasks performed are outlined below.

1. Conduct a site reconnaissance to evaluate and mark proposed boring locations at the site.
2. Perform utility location at the site to evaluate the presence of subsurface obstructions. We utilized the "One Call" coordinated utility location service to perform this task.

3. Drill three (3) borings in the locations of the proposed stormwater infiltration galleries using a truck-mounted drilling rig. The borings were completed at depths of between 7 and 13.5 feet below ground surface (bgs). Soil samples were collected continuously during drilling and were classified in general accordance with ASTM methodology.
4. Excavate 10 exploratory test pits using a small, track-mounted excavator. The test pits were distributed across the site to evaluate bearing conditions for the proposed buildings and parking areas. The test pits were conducted to depths of between 4 and 8 feet bgs, and were backfilled at the end of the field day using the excavated soil.
5. Conduct appropriate laboratory testing on seven (7) soil samples for grain-size distribution to determine soil class, geotechnical parameters and stormwater infiltration rates, as appropriate.
6. Prepare a report to include a summary of our field activities, our findings and recommendations for stormwater infiltration, site preparation and grading, bearing capacity, temporary and final cut slopes, earth pressures and suitability of the on-site soils for use as fill, along with our design infiltration rate for the site in accordance with the City of Lacey 2010 Manual.

## **FINDINGS**

### **Surface Conditions**

The project site is situated at an elevation between 190 and 212 feet above mean sea level (MSL) and is presently the site of a single family residence. The property is bounded by 32<sup>nd</sup> Avenue NE to the north, single family residential properties to the west, multi-family housing to the east, and undeveloped pasture land to the south. The subject site slopes gently to the north. The site is mostly wooded with an understory of salal. The single family residence fronts 32<sup>nd</sup> Avenue NE.

### **Geology**

Based on our review of available published geologic maps, Vashon-age glacial recessional outwash deposits underlie the project site and surrounding area. This material is described as sandy gravels and beds of small gravels with few fines. This material was deposited by outwash rivers, during the waning stages of the most recent glacial period in the Puget Sound and is not glacially consolidated. These outwash deposits are underlain by Vashon age glacial till. The till consists of an unsorted mixture of silt, sands and gravels that was deposited at the base of the advancing glacier and was subsequently glacially compacted.

### **Subsurface Explorations**

We explored subsurface conditions at the site on June 13 and June 20, 2016 by advancing three exploratory borings and excavating 10 test pits in the locations as shown on the Site Plan, Figure 2. The borings were completed by Standard Environmental Probe using a Geoprobe 5410 direct push sampling rig. The test pits were excavated using a small, track-mounted excavator. A geologist from Insight Geologic monitored the explorations and maintained a log of the conditions encountered. The borings were completed at depths of up to 13.5 feet bgs after encountering glacial till. The test pits were completed at depths ranging from 4 to 8 feet bgs. The soils were visually classified in general accordance with the system described in ASTM D2487-06. The exploration logs are contained in Attachment A.

### **Soil Conditions**

Surface conditions encountered within the explorations consisted of well graded sands and gravels with variable amounts of silt in a loose and moist condition (SW-SM, GW, GW-GM). Beneath the surficial material, we generally encountered brown, well-graded gravels with sand in a loose to medium dense and moist condition. Underlying the gravels, we encountered very dense glacial till, consisting of gravel and sand with silt (GP-GM, SP-SM). Glacial till was encountered at depths that ranged from 3 feet bgs in test pit TP-1 to 12.5 feet bgs in boring B-1. Generally, the depth to the till horizon decreased to the north, with the exception of TP-1, which encountered glacial till at 3 feet near the southern parcel boundary. This is consistent with a generally level till layer as the surface topography slopes to the north. Glacial till was not identified in test pits TP-6, TP-8 and TP-9, which were completed at depths of between 7 and 8 feet bgs.

The soils encountered are consistent with Everett very gravely sandy loam, which is mapped for the area. These soils are generally formed from glacial outwash and generally have restrictive layers occurring at depths greater than 7 feet bgs. Percolation is generally high, with rates between 1.98 and 5.95 inches per hour, according to the U.S. Department of Agriculture Soil Survey. A small portion of the northern edge of the site is mapped as Kapowsin silt loam. This soil has restrictive layers approximately 2 to 3 feet below grade. Percolation in the Kapowsin silt loam is generally very low with rates near 0.0 inches per hour and is consistent with soils developed from glacial till.

### **Groundwater Conditions**

Groundwater was not encountered in the test pits or borings at the site and no evidence of high groundwater level indicators were encountered. No evidence of perched groundwater was located at the glacial till contact. We anticipate that site groundwater levels will fluctuate somewhat with the seasons and precipitation, generally being highest in the late winter and early spring months.

### **Laboratory Testing**

We selected seven soil samples for gradation analyses in general accordance with ASTM D422 to define soil class and obtain parameters for stormwater infiltration calculations. Our laboratory test results are provided in Attachment B.

## **STORMWATER INFILTRATION**

We completed a stormwater infiltration rate evaluation in general accordance with the 2010 City of Lacey Stormwater Design Manual (2010 Manual). The 2010 Manual contains a method utilizing gradation testing based on the D10 results of the ASTM grain-size distribution analyses to estimate long-term design infiltration rates (Section 6.3.3.2). The Method values are listed in Table 6.5 of the manual.

The facility has proposed stormwater infiltration via pervious pavement and underground galleries. This site is generally homogeneous and did not exhibit fine layering. Groundwater was not encountered; however, a restrictive glacial till unit was encountered on average at a depth of 6 feet bgs.

Based on our gradation analyses, we calculate that the long-term design infiltration rate ( $F_{\text{design}}$ ) for



the gravels and sands at the site is 3.5 inches per hour, based on the depth to the restrictive unit as per the 2010 Manual. The results of our stormwater infiltration evaluation are presented in Table 1.

**Table 1. Design Infiltration Rates – ASTM Method**

| Sample Location | Unit  | Depth Range (feet) | D <sub>10</sub> Value | Infiltration Rate (inches per hour) |
|-----------------|-------|--------------------|-----------------------|-------------------------------------|
| TP-1            | SW-SM | 0 – 3.0            | 0.07                  | 1.1                                 |
| TP-2            | GW    | 3.5 – 6.5          | 1.0                   | 3.5                                 |
| TP-3            | GW    | 0 – 6.5            | 2.1                   | 3.5                                 |
| TP-6            | GW    | 0 – 7.0            | 2.5                   | 3.5                                 |
| TP-7            | GW    | 2.0 – 4.5          | 2.6                   | 3.5                                 |
| TP-8            | GW    | 2.0 – 8.0          | 1.4                   | 3.5                                 |
| TP-9            | GW    | 1.5 – 7.5          | 3.2                   | 3.5                                 |

## CONCLUSIONS AND RECOMMENDATIONS

### General

Based on the results of our review, subsurface explorations and engineering analyses, it is our opinion that the proposed development is feasible from a geotechnical standpoint. We recommend that the proposed structures be supported on shallow concrete foundations that are designed using an allowable soil bearing capacity of 2,500 pounds per square foot (psf).

The soils encountered in our explorations are typically in a loose condition near ground surface. To limit the potential for structure settlement, we recommend that shallow foundations and slabs-on-grade be established on a minimum 1-foot thick layer of structural fill. Depending on final grading plans and the time of year earthwork is performed; it could be practical to reuse the on-site soils as structural fill under the foundations/slabs.

Stormwater infiltration at the site is feasible. We have provided a design infiltration rate of 3.5 inches per hour for the proposed stormwater infiltration system. Our borings were conducted during late spring conditions and the groundwater conditions encountered should be reflective of typical late spring seasonal conditions. However, no evidence of seasonal high groundwater was observed within the borings.

### Earthwork

#### General

We anticipate that site development earthwork will include clearing and stripping of existing vegetation, preparing subgrades, excavating for utility trenches, and placing and compacting structural fill. We expect that the majority of site grading can be accomplished with conventional earth moving equipment in proper working order.

Our explorations did not encounter appreciable amounts of debris or unsuitable soils associated with past site development. Still, it is possible that concrete slabs, abandoned utility lines or other

development features could be encountered during construction. The contractor should be prepared to deal with these conditions.

### ***Clearing and Stripping***

Clearing and stripping should consist of removing surface and subsurface deleterious materials including sod/topsoil, trees, brush, debris and other unsuitable loose/soft or organic materials. Stripping and clearing should extend at least 5 feet beyond all structures and areas to receive structural fill.

We estimate that a stripping depth of about 0.5 foot will be required to remove the surficial organic layer encountered in our explorations. Deeper stripping depths may be required if additional unsuitable soils are exposed during stripping operations. We recommend that trees be removed by overturning so that the majority of roots are also removed. Depressions created by tree or stump removal should be backfilled with structural fill and properly compacted.

### ***Subgrade Preparation***

After stripping and excavating to the proposed subgrade elevation, and before placing structural fill or foundation concrete, the exposed subgrade should be thoroughly compacted to a firm and unyielding condition. The exposed subgrade should then be proof-rolled using loaded, rubber-tired heavy equipment. We recommend that Insight Geologic be retained to observe the proof-rolling prior to placement of structural fill or foundation concrete. Areas of limited access that cannot be proof-rolled can be evaluated using a steel probe rod. If soft or otherwise unsuitable areas are revealed during proof-rolling or probing, that cannot be compacted to a stable and uniformly firm condition, we generally recommend that: 1) the subgrade soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompact; or 2) the unsuitable soils be overexcavated and replaced with structural fill.

### ***Temporary Excavations and Groundwater Handling***

Excavations deeper than 4 feet should be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls were required under the Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, temporary cut slopes should be inclined no steeper than about 1.5H:1V (horizontal: vertical). This guideline assumes that all surface loads are kept at a minimum distance of at least one-half the depth of the cut away from the top of the slope, and that significant seepage is not present on the slope face. Flatter cut slopes were necessary where significant seepage occurs or if large voids are created during excavation. Some sloughing and raveling of cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather.

We anticipate that if perched groundwater is encountered during construction can be handled adequately with sumps, pumps, and/or diversion ditches. Groundwater handling needs will generally be lower during the late summer and early fall months. We recommend that the contractor performing the work be made responsible for controlling and collecting groundwater encountered during construction.

### ***Permanent Slopes***

We do not anticipate that permanent slopes will be utilized for the proposed project other than in the stormwater pond. If permanent slopes are necessary, we recommend the slopes be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered.

To achieve uniform compaction, we recommend that fill slopes be overbuilt and subsequently cut back to expose well-compacted fill. Fill placement on slopes should be benched into the slope face and include keyways. The configuration of the bench and keyway depends on the equipment being used. Bench excavations should be level and extend into the slope face. We recommend that a vertical cut of about 3 feet be maintained for benched excavations. Keyways should be about 1-1/2 times the width of the equipment used for grading or compaction.

### ***Erosion Control***

We anticipate that erosion control measures such as silt fences, straw bales and sand bags will generally be adequate during development. Temporary erosion control should be provided during construction activities and until permanent erosion control measures are functional. Surface water runoff should be properly contained and channeled using drainage ditches, berms, swales, and tightlines, and should not discharge onto sloped areas. Any disturbed sloped areas should be protected with a temporary covering until new vegetation can take effect. Jute or coconut fiber matting, excelsior matting or clear plastic sheeting is suitable for this purpose. Graded or disturbed slopes should be tracked in-place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion. Ultimately, erosion control measures should be in accordance with local regulations and should be clearly described on project plans.

### ***Wet Weather Earthwork***

Some of the near surface soils contain up to 10 percent fines. When the moisture content of this soil is more than a few percent above the optimum moisture content, the soil will become unstable and it may become difficult or impossible to meet the required compaction criteria. Disturbance of near surface soils should be expected if earthwork is completed during periods of wet weather.

The wet weather season in this area generally begins in October and continues through May. However, periods of wet weather may occur during any month of the year. If wet weather earthwork is unavoidable, we recommend that:

- ♦ The ground surface is sloped so that surface water is collected and directed away from the work area to an approved collection/dispersion point.
- ♦ Earthwork activities not take place during periods of heavy precipitation.



- Slopes with exposed soil be covered with plastic sheeting or otherwise protected from erosion.
- Measures are taken to prevent on-site soil and soil stockpiles from becoming wet or unstable. Sealing the surficial soil by rolling with a smooth-drum roller prior to periods of precipitation should reduce the extent that the soil becomes wet or unstable.
- Construction traffic is restricted to specific areas of the site, preferably areas that are surfaced with materials not susceptible to wet weather disturbance.
- A minimum 1-foot thick layer of 4- to 6-inch quarry spalls is used in high traffic areas of the site to protect the subgrade soil from disturbance.
- Contingencies are included in the project schedule and budget to allow for the above elements.

## **Structural Fill Materials**

### ***General***

Material used for structural fill should be free of debris, organic material and rock fragments larger than 3 inches. The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines increases, soil becomes increasingly more sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve.

### ***On-Site Soil***

We anticipate that the majority of the on-site soils encountered during construction will consist of the gravels and sands located at or near the surface of the site. It is our opinion that this material is a suitable source for structural fill during a significant portion of the year. On-site materials used as structural fill should be free of roots, organic matter and other deleterious materials and particles larger than 3 inches in diameter.

### ***Select Granular Fill***

Select granular fill should consist of imported, well-graded sand and gravel or crushed rock with a maximum particle size of 3 inches and less than 5 percent passing a U.S. Standard No. 200 sieve based on the minus ¾-inch fraction. Organic matter, debris or other deleterious material should not be present. In our experience, "gravel borrow" as described in Section 9-03.14(1) of the 2008 WSDOT Standard Specifications is typically a suitable source for select granular fill during periods of wet weather, provided that the percent passing a U.S. Standard No. 200 sieve is less than 5 percent based on the minus ¾-inch fraction.

## **Structural Fill Placement and Compaction**

### ***General***

Structural fill should be placed on an approved subgrade that consists of uniformly firm and unyielding inorganic native soils or compacted structural fill. Structural fill should be compacted at a moisture content near optimum. The optimum moisture content varies with the soil gradation and should be evaluated during construction.

Structural fill should be placed in uniform, horizontal lifts and uniformly densified with vibratory compaction equipment. The maximum lift thickness will vary depending on the material and compaction equipment used, but should generally not exceed the loose thicknesses provided on Table 2. Structural fill materials should be compacted in accordance with the compaction criteria provided in Table 3.

**Table 2. Recommended Uncompacted Lift Thickness**

| Compaction Equipment                            | Recommended Uncompacted Fill Thickness (inches)                   |                                                                |
|-------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------|
|                                                 | Granular Materials Maximum Particle Size $\leq 1\frac{1}{2}$ inch | Granular Materials Maximum Particle Size $> 1\frac{1}{2}$ inch |
| Hand Tools (Plate Compactors and Jumping Jacks) | 4 – 8                                                             | Not Recommended                                                |
| Rubber-tire Equipment                           | 10 – 12                                                           | 6 – 8                                                          |
| Light Roller                                    | 10 – 12                                                           | 8 – 10                                                         |
| Heavy Roller                                    | 12 – 18                                                           | 12 – 16                                                        |
| Hoe Pack Equipment                              | 18 – 24                                                           | 12 – 16                                                        |

Note: The above table is intended to serve as a guideline and should not be included in the project specifications.

**Table 3. Recommended Compaction Criteria in Structural Fill Zones**

| Fill Type                                                                  | Percent Maximum Dry Density Determined by ASTM Test Method D 1557 at $\pm 3\%$ of Optimum Moisture |                           |           |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------|-----------|
|                                                                            | 0 to 2 Feet Below Subgrade                                                                         | $> 2$ Feet Below Subgrade | Pipe Zone |
| Imported or On-site Granular, Maximum Particle Size $< 1\frac{1}{4}$ -inch | 95                                                                                                 | 95                        | ----      |
| Imported or On-site Granular, Maximum Particle Size $> 1\frac{1}{4}$ -inch | N/A (Proof-roll)                                                                                   | N/A (Proof-roll)          | ----      |
| Trench Backfill <sup>1</sup>                                               | 95                                                                                                 | 92                        | 90        |

Note: <sup>1</sup>Trench backfill above the pipe zone in nonstructural areas should be compacted to at least 85 percent.

## Shallow Foundation Support

### General

We recommend that the proposed structure be founded on continuous wall or isolated column footings, bearing on a minimum 1-foot thick overexcavation and replacement with compacted structural fill. The structural fill zone should extend to a horizontal distance equal to the overexcavation depth on each side of the footing. The actual overexcavation depth will vary, depending on the conditions encountered.

We recommend that a representative from Insight Geologic observe the foundation surfaces before overexcavation, and before placing structural fill in overexcavations. This representative should confirm that adequate bearing surfaces have been prepared and that the soil conditions are as



anticipated. Unsuitable foundation bearing soils should be recompact or removed and replaced with compacted structural fill, as recommended by the geotechnical engineer.

### ***Bearing Capacity and Footing Dimensions***

We recommend an allowable soil bearing pressure of 2,500 psf for shallow foundations that are supported as recommended. This allowable bearing pressure applies to long-term dead and live loads exclusive of the weight of the footing and any overlying backfill. The allowable soil bearing pressure can be increased by one-third when considering total loads, including transient loads such as those induced by wind and seismic forces.

We recommend a minimum width of 18 inches for continuous wall footings and 2 feet for isolated column footings. For settlement considerations, we have assumed a maximum width of 4 feet for continuous wall footings and 6 feet for isolated column footings.

Perimeter footings should be embedded at least 12 inches below the lowest adjacent grade where the ground is flat. Interior footings should be embedded a minimum of 6 inches below the nearest adjacent grade.

### ***Settlement***

We estimate that total settlement of footings that are designed and constructed as recommended should be less than 1 inch. We estimate that differential settlements should be ½ inch or less between comparably loaded isolated footings or along 50 feet of continuous footing. We anticipate that the settlement will occur essentially as loads are applied during construction.

### ***Lateral Load Resistance***

Lateral loads on shallow foundation elements may be resisted by passive resistance on the sides of footings and by friction on the base of footings. Passive resistance may be estimated using an equivalent fluid density of 300 pounds per cubic foot (pcf), assuming that the footings are backfilled with structural fill. Frictional resistance may be estimated using 0.3 for the coefficient of base friction.

The lateral resistance values provided above incorporate a factor of safety of 1.5. The passive earth pressure and friction components can be combined, provided that the passive component does not exceed two-thirds of the total. The top foot of soil should be neglected when calculating passive resistance, unless the foundation perimeter area is covered by a slab-on-grade or pavement.

### ***Slabs-On-Grade***

Slabs-on-grade should be established on a minimum 1-foot thick section of structural fill extending to an approved bearing surface. A modulus of vertical subgrade reaction (subgrade modulus) can be used to design slabs-on-grade. The subgrade modulus varies based on the dimensions of the slab and the magnitude of applied loads on the slab surface; slabs with larger dimensions and loads are influenced by soils to a greater depth. We recommend a modulus value of 150 pounds per cubic inch (pci) for design of on-grade floor slabs with floor loads up to 500 psf. We are available to provide alternate subgrade modulus recommendations during design, based on specific loading information.

We recommend that slabs-on-grade in interior spaces be underlain by a minimum 4-inch thick capillary break layer to reduce the potential for moisture migration into the slab. The capillary break material should consist of a well-graded sand and gravel or crushed rock containing less than 5 percent fines based on the fraction passing the 3/4-inch sieve. The 4-inch thick capillary break layer can be included when calculating the minimum 1-foot thick structural fill section beneath the slab. If dry slabs are required (e.g., where adhesives are used to anchor carpet or tile to the slab), a waterproofing liner should be placed below the slab to act as a vapor barrier.

### **Subsurface Drainage**

It is our opinion that foundation footing drains and underslab drains are likely unnecessary for the proposed structure. The subsurface site soils are exceptionally well draining and it is unlikely that subsurface drains would produce water. The soils are suitable for roof runoff drywells and should be classified as Group A for the purposes of design.

### **Conventional Retaining Walls**

#### **General**

The following sections provide general guidelines for retaining wall design on this site. We should be contacted during the design phase to review retaining wall plans and provide supplemental recommendations, if needed.

#### **Drainage**

Positive drainage is imperative behind any retaining structure. This can be accomplished by using a zone of free-draining material behind the wall with perforated pipes to collect water seepage. The drainage material should consist of coarse sand and gravel containing less than 5 percent fines based on the fraction of material passing the 3/4-inch sieve. The wall drainage zone should extend horizontally at least 12 inches from the back of the wall. If a stacked block wall is constructed, we recommend that a barrier such as a non-woven geotextile filter fabric be placed against the back of the wall to prevent loss of the drainage material through the wall joints.

A perforated smooth-walled rigid PVC pipe, having a minimum diameter of 4 inches, should be placed at the bottom of the drainage zone along the entire length of the wall. Drainpipes should discharge to a tightline leading to an appropriate collection and disposal system. An adequate number of cleanouts should be incorporated into the design of the drains in order to provide access for regular maintenance. Roof downspouts, perimeter drains or other types of drainage systems should not be connected to retaining wall drain systems.

#### **Design Parameters**

We recommend an active lateral earth pressure of 31 pcf (equivalent fluid density) for a level backfill condition. This assumes that the top of the wall is not structurally restrained and is free to rotate. For restrained walls that are fixed against rotation (at-rest condition), an equivalent fluid density of 45 pcf can be used for the level backfill condition. For seismic conditions, we recommend a uniform lateral pressure of 14H psf (where H is the height of the wall) be added to the lateral pressures. This seismic pressure assumes a peak ground acceleration of 0.32 g. Note that if the retaining system is designed

as a braced system but is expected to yield a small amount during a seismic event, the active earth pressure condition may be assumed and combined with the seismic surcharge.

The recommended earth pressure values do not include the effects of surcharges from surface loads or structures. If vehicles were operated within one-half the height of the wall, a traffic surcharge should be added to the wall pressure. The traffic surcharge can be approximated by the equivalent weight of an additional 2 feet of backfill behind the wall. Other surcharge loads, such as construction equipment, staging areas and stockpiled fill, should be considered on a case-by-case basis.

## DOCUMENT REVIEW AND CONSTRUCTION OBSERVATION

We recommend that we be retained to review the portions of the plans and specifications that pertain to earthwork construction and stormwater infiltration. We recommend that monitoring, testing and consultation be performed during construction to confirm that the conditions encountered are consistent with our explorations and our stated design assumptions. Insight Geologic would be pleased to provide these services upon request.

## REFERENCES

International Code Council, "International Building Code", 2009.

*Seismic Compression of As-compacted Fill Soils with Variable Levels of Fines Content and Fines Plasticity*, Department of Civil and Environmental Engineering, University of California, Los Angeles, July 2004.

Washington State Department of Transportation (WSDOT), Standard Specifications for Road, Bridge and Municipal Construction Manual, 2010.

## LIMITATIONS

We have prepared this geotechnical and stormwater evaluation report for the exclusive use of Blue Summit Realty, LLC and their authorized agents, for the proposed 32<sup>nd</sup> Avenue Apartments project to be located at 7235 32<sup>nd</sup> Avenue NE in Lacey, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, should be understood.

Please refer to Attachment C titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

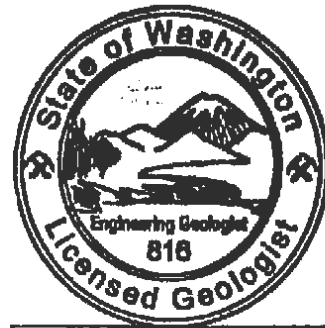
————— ◀ ▶ —————

We appreciate the opportunity to be of service to you on this project. Please contact us if you have questions or require additional information.

Respectfully Submitted,  
INSIGHT GEOLOGIC, INC.



William E. Halbert, L.E.G., L.H.G.  
Principal



William E. Halbert

Attachments

## FIGURES





Source: Terrain Navigator Image (c) 1997

LACEY, WASHINGTON  
7.5 MINUTE QUADRANGLE  
Year 2014

SCALE: 1:24000

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



INSIGHT GEOLOGIC, INC.

Figure 1  
Vicinity Map





Source: Google Earth (©) 2015

### LEGEND:

-  **B-1** APPROXIMATE BORING LOCATION
-  **TP-1** APPROXIMATE TEST PIT LOCATION
-  APPROXIMATE PROJECT BOUNDARY

  
SCALE: 1" = 120'

## 32ND AVENUE APARTMENTS

LACEY, WASHINGTON

**ATTACHMENT A**  
**EXPLORATION LOGS**



## SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS                                                     |                                                                                           |                                 | SYMBOLS |    | GROUP NAME                                |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------|---------|----|-------------------------------------------|
| COARSE GRAINED SOILS<br><br>MORE THAN 50% RETAINED ON NO. 200 SIEVE | GRAVEL AND GRAVELLY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | CLEAN GRAVEL<br>≤5% FINES       |         | GW | WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL |
|                                                                     |                                                                                           |                                 |         | GP | POORLY GRADED GRAVEL                      |
|                                                                     |                                                                                           | GRAVEL WITH FINES<br>≥12% FINES |         | GM | SILTY GRAVEL                              |
|                                                                     |                                                                                           |                                 |         | GC | CLAYEY GRAVEL                             |
|                                                                     | SAND AND SANDY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE          | CLEAN SAND<br>≤5% FINES         |         | SW | WELL-GRADED SAND, FINE TO COARSE SAND     |
|                                                                     |                                                                                           |                                 |         | SP | POORLY GRADED SAND                        |
|                                                                     |                                                                                           | SAND WITH FINES<br>≥12% FINES   |         | SM | SILTY SAND                                |
|                                                                     |                                                                                           |                                 |         | SC | CLAYEY SAND                               |
| FINE GRAINED SOILS<br><br>MORE THAN 50% PASSING NO. 200 SIEVE       | SILTS AND CLAYS<br><br>LIQUID LIMIT LESS THAN 50                                          | INORGANIC                       |         | ML | SILT                                      |
|                                                                     |                                                                                           |                                 |         | CL | CLAY                                      |
|                                                                     | SILTS AND CLAYS<br><br>LIQUID LIMIT 50 OR MORE                                            | ORGANIC                         |         | OL | ORGANIC SILT, ORGANIC CLAY                |
|                                                                     |                                                                                           | INORGANIC                       |         | MH | SILT OF HIGH PLASTICITY, ELASTIC SILT     |
|                                                                     |                                                                                           |                                 |         | CH | CLAY OF HIGH PLASTICITY, FAT CLAY         |
|                                                                     |                                                                                           |                                 | ORGANIC |    | OH                                        |
| HIGHLY ORGANIC SOILS                                                |                                                                                           |                                 |         | PT | PEAT                                      |

## ADDITIONAL MATERIAL SYMBOLS

| SYMBOLS | TYPICAL DESCRIPTION             |
|---------|---------------------------------|
|         | CC CEMENT CONCRETE              |
|         | AC ASPHALT CONCRETE             |
|         | CR CRUSHED ROCK / QUARRY SPALLS |
|         | TS TOPSOIL/SOD/DUFF             |

## GROUNDWATER EXPLORATION SYMBOLS

- MEASURED GROUNDWATER LEVEL IN EXPLORATION, WELL, OR PIEZOMETER
- GROUNDWATER OBSERVED AT TIME OF EXPLORATION
- PERCHED WATER OBSERVED AT TIME OF EXPLORATION
- MEASURED FREE PRODUCT IN WELL OR PIEZOMETER

## STRATIGRAPHIC CONTACT

- APPROXIMATE CONTACT BETWEEN SOIL STRATA OR GEOLOGIC UNIT
- APPROXIMATE LOCATION OF SOIL STRATA CHANGE WITHIN GEOLOGIC SOIL UNIT
- APPROXIMATE GRADUAL CHANGE BETWEEN SOIL STRATA OR GEOLOGIC SOIL UNIT
- APPROXIMATE GRADUAL CHANGE OF SOIL STRATA WITHIN GEOLOGIC SOIL UNIT

## LABORATORY / FIELD TEST CLASSIFICATIONS

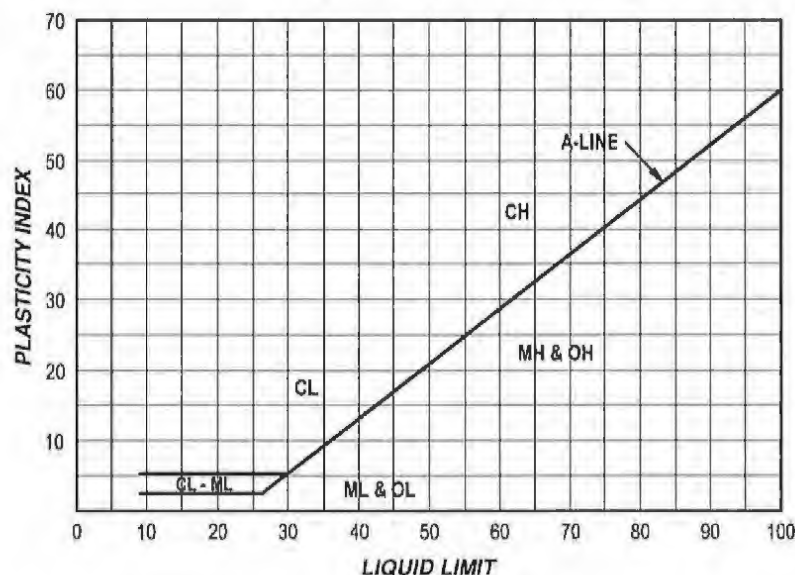
- %F PERCENT FINES
- AL ATTERBERG LIMITS
- CA CHEMICAL ANALYSIS
- CP LABORATORY COMPACTION TEST
- CS CONSOLIDATION TEST
- DS DIRECT SHEAR
- HA HYDROMETER ANALYSIS
- MC MOISTURE CONTENT
- MD MOISTURE CONTENT AND DRY DENSITY
- OC ORGANIC COMPOUND
- PM PERMEABILITY OR HYDRAULIC CONDUCTIVITY
- PP POCKET PENETROMETER
- SA SIEVE ANALYSIS
- TX TRIAXIAL COMPRESSION
- UC UNCONFINED COMPRESSION
- VS VANE SHEAR

## SAMPLER SYMBOLS

- 2.4 INCH I.D. SPLIT BARREL
- DIRECT-PUSH
- STANDARD PENETRATION TEST
- SHELBY TUBE
- PISTON
- BULK OR GRAB

## SHEEN CLASSIFICATIONS

- NS NO VISIBLE SHEEN
- SS SLIGHT SHEEN
- MS MODERATE SHEEN
- HS HEAVY SHEEN
- NT NOT TESTED



### SOIL MOISTURE MODIFIERS:

DRY - ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH

MOIST - DAMP, BUT NO VISIBLE WATER

WET - VISIBLE FREE WATER OR SATURATED, USUALLY SOIL IS OBTAINED BELOW WATER TABLE

# B-1

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>DOWN<br>DRIVEN<br>RECOVERED | U.S.G.S. | LITHOLOGY | SOIL DESCRIPTION                                                                   | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|---------------------------------------|----------|-----------|------------------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 48/18                                 | TS       |           | Sod                                                                                |                                           |
| 1               |                               |                                       |          |           | Brown fine to coarse gravel with fine to coarse sand and silt, loose, moist        |                                           |
| 2               |                               |                                       | GW-GM    |           |                                                                                    |                                           |
| 3               |                               |                                       |          |           |                                                                                    |                                           |
| 4               | 2                             | 96/40                                 |          |           | Brown fine to coarse gravel with fine to medium sand, medium dense, moist          |                                           |
| 5               |                               |                                       |          |           |                                                                                    |                                           |
| 6               |                               |                                       | GW       |           |                                                                                    |                                           |
| 7               |                               |                                       |          |           |                                                                                    |                                           |
| 8               |                               |                                       |          |           |                                                                                    |                                           |
| 9               |                               |                                       |          |           | Grades to coarse gravel with medium sand, trace silt                               |                                           |
| 10              |                               |                                       |          |           |                                                                                    |                                           |
| 11              |                               |                                       |          |           |                                                                                    |                                           |
| 12              |                               |                                       |          |           |                                                                                    |                                           |
| 13              |                               |                                       | SP-SM    |           | Brown fine to coarse sand with fine to coarse gravel and silt, dense, moist (till) |                                           |
| 14              |                               |                                       |          |           | Groundwater not encountered                                                        |                                           |
| 15              |                               |                                       |          |           |                                                                                    |                                           |

## LEGEND:

PROJECT NO.: 872001-02

DATE: JUNE 20, 2016

TOTAL DEPTH: 13.5 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: ANDREW JOHNSON

32ND AVENUE APARTMENTS

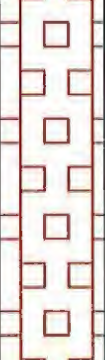
LACEY, WASHINGTON



Exploration Log B-1



# B-2

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>DRIVEN<br>RECOVERED                                                     | U.S.G.S.                                                                  | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                        | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 84/36                                                                             |                                                                           |  | Forest duff                                                             |                                           |
| 1               |                               |                                                                                   | SP-SM                                                                     |  | Brown silty fine sand with silt and fine to coarse gravel, loose, moist |                                           |
| 2               |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 3               | GW                            |  | Brown fine to coarse gravel with fine to medium sand, medium dense, moist |                                                                                   |                                                                         |                                           |
| 4               |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 5               |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 6               |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 7               |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 8               | 2                             | 12/12                                                                             | SP-SM                                                                     |  | Gray fine to medium sand with fine gravel and silt, dense, moist (till) |                                           |
| 9               | Groundwater not encountered   |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 10              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 11              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 12              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 13              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 14              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |
| 15              |                               |                                                                                   |                                                                           |                                                                                   |                                                                         |                                           |

## LEGEND:

PROJECT NO.: 872001-02

DATE: JUNE 20, 2016

TOTAL DEPTH: 8 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: ANDREW JOHNSON

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log B-2

# B-3

| DEPTH<br>(FEET) | SAMPLE<br>NUMBER<br>AND DEPTH | INCHES<br>DRIVEN<br>RECOVERED | U.S.G.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                              | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|-----------------|-------------------------------|-------------------------------|----------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|
| 0               | 1                             | 72/30                         | TS       |  | Sod                                                                           |                                           |
| 1               |                               |                               | SW-SM    |  | Brown fine to medium sand with fine gravel and silt, loose, moist             |                                           |
| 2               |                               |                               |          |                                                                                   |                                                                               |                                           |
| 3               | 2                             | 12/12                         | GW-GM    |  | Brown fine to coarse gravel with medium to coarse sand and silt, dense, moist |                                           |
| 4               |                               |                               |          |                                                                                   |                                                                               |                                           |
| 5               |                               |                               |          |                                                                                   |                                                                               |                                           |
| 6               |                               |                               |          |                                                                                   | Grades to very dense, (till)                                                  |                                           |
| 7               |                               |                               |          |                                                                                   | Groundwater not encountered                                                   |                                           |
| 8               |                               |                               |          |                                                                                   |                                                                               |                                           |
| 9               |                               |                               |          |                                                                                   |                                                                               |                                           |
| 10              |                               |                               |          |                                                                                   |                                                                               |                                           |
| 11              |                               |                               |          |                                                                                   |                                                                               |                                           |
| 12              |                               |                               |          |                                                                                   |                                                                               |                                           |
| 13              |                               |                               |          |                                                                                   |                                                                               |                                           |
| 14              |                               |                               |          |                                                                                   |                                                                               |                                           |
| 15              |                               |                               |          |                                                                                   |                                                                               |                                           |

## LEGEND:

PROJECT NO.: 872001-02

DATE: JUNE 20, 2016

TOTAL DEPTH: 7 FEET

DRILLING CONTRACTOR: STANDARD ENVIRONMENTAL PROBE

DRILLING EQUIPMENT: GEOPROBE 5410

DRILLING METHOD: DIRECT PUSH

LOGGED BY: ANDREW JOHNSON

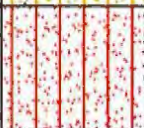
32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log B-3

# TP-1

| DEPTH<br>(FT)               | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |  |  |  |
|-----------------------------|----------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|--|--|--|
| 0                           | SW-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist                  |                                           |  |  |  |
| 1                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 2                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 3                           | SP-SM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |  |  |  |
| 4                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| Groundwater not encountered |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 5                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 6                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 7                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 8                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 9                           |          |                                                                                   |                                                                                              |                                           |  |  |  |
| 10                          |          |                                                                                   |                                                                                              |                                           |  |  |  |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 4 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-1



# TP-2

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY | SOIL DESCRIPTION                                                                        | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------|-----------------------------------------------------------------------------------------|-------------------------------------------|
| 0             |          |           | Brown fine to coarse gravel with fine to coarse sand and silt, very loose, moist        |                                           |
| 1             |          |           |                                                                                         |                                           |
| 2             | GW-GM    |           |                                                                                         |                                           |
| 3             |          |           |                                                                                         |                                           |
| 4             |          |           | Light brown fine to coarse gravel with fine to coarse sand, medium dense, moist         |                                           |
| 5             | GW       |           |                                                                                         |                                           |
| 6             |          |           |                                                                                         |                                           |
| 7             | SP-SM    |           | Light gray fine to coarse sand with fine to coarse gravel and silt, dense, moist (till) |                                           |
| 8             |          |           | Groundwater not encountered                                                             |                                           |
| 9             |          |           |                                                                                         |                                           |
| 10            |          |           |                                                                                         |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 7 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-2

# TP-3

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY | SOIL DESCRIPTION                                                                        | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------|-----------------------------------------------------------------------------------------|-------------------------------------------|
| 0             |          |           | Brown fine to coarse gravel with fine to coarse sand, loose, moist                      |                                           |
| 1             |          |           |                                                                                         |                                           |
| 2             |          |           |                                                                                         |                                           |
| 3             |          |           |                                                                                         |                                           |
| 4             |          |           |                                                                                         |                                           |
| 5             |          |           |                                                                                         |                                           |
| 6             |          |           |                                                                                         |                                           |
| 7             | SP-SM    |           | Light gray fine to coarse sand with fine to coarse gravel and silt, dense, moist (till) |                                           |
| 8             |          |           | Groundwater not encountered                                                             |                                           |
| 9             |          |           |                                                                                         |                                           |
| 10            |          |           |                                                                                         |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 7.5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-3



# TP-4

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY | SOIL DESCRIPTION                                                                        | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------|-----------------------------------------------------------------------------------------|-------------------------------------------|
| 0             |          |           | Brown fine to coarse gravel with fine to coarse sand, loose, moist                      |                                           |
| 1             |          |           |                                                                                         |                                           |
| 2             |          |           |                                                                                         |                                           |
| 3             |          |           |                                                                                         |                                           |
| 4             |          |           |                                                                                         |                                           |
| 5             | GW       |           |                                                                                         |                                           |
| 5             |          |           |                                                                                         |                                           |
| 5             | SP-SM    |           | Light gray fine to coarse sand with fine to coarse gravel and silt, dense, moist (till) |                                           |
| 6             |          |           |                                                                                         |                                           |
| 6             |          |           | Groundwater not encountered                                                             |                                           |
| 7             |          |           |                                                                                         |                                           |
| 8             |          |           |                                                                                         |                                           |
| 9             |          |           |                                                                                         |                                           |
| 10            |          |           |                                                                                         |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 6 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

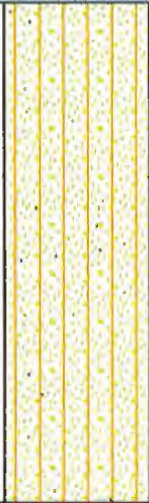
32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-4

# TP-5

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SW-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist                  |                                           |
| 1             |          |                                                                                   |                                                                                              |                                           |
| 2             |          |                                                                                   |                                                                                              |                                           |
| 3             |          |                                                                                   |                                                                                              |                                           |
| 4             | SP-SM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |
| 5             |          |                                                                                   |                                                                                              |                                           |
|               |          |                                                                                   | Groundwater not encountered                                                                  |                                           |
| 6             |          |                                                                                   |                                                                                              |                                           |
| 7             |          |                                                                                   |                                                                                              |                                           |
| 8             |          |                                                                                   |                                                                                              |                                           |
| 9             |          |                                                                                   |                                                                                              |                                           |
| 10            |          |                                                                                   |                                                                                              |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-5

# TP-6

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY | SOIL DESCRIPTION                                                   | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------|--------------------------------------------------------------------|-------------------------------------------|
| 0             |          |           | Brown fine to coarse gravel with fine to coarse sand, loose, moist |                                           |
| 1             |          |           |                                                                    |                                           |
| 2             |          |           |                                                                    |                                           |
| 3             |          |           |                                                                    |                                           |
| 4             |          |           |                                                                    |                                           |
| 5             |          |           |                                                                    |                                           |
| 6             |          |           |                                                                    |                                           |
| 7             |          |           |                                                                    |                                           |
| 8             |          |           |                                                                    |                                           |
| 9             |          |           |                                                                    |                                           |
| 10            |          |           |                                                                    |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 7 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

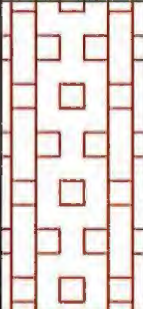
LACEY, WASHINGTON



Exploration Log TP-6



# TP-7

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                        | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SW-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist             |                                           |
| 1             |          |                                                                                   |                                                                                         |                                           |
| 2             | GW       |  | Brown fine to coarse gravel with fine to coarse sand, loose, moist                      |                                           |
| 3             |          |                                                                                   |                                                                                         |                                           |
| 4             |          |                                                                                   |                                                                                         |                                           |
| 5             | SP-SM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, dense, moist (till) |                                           |
| 6             |          |                                                                                   | Groundwater not encountered                                                             |                                           |
| 7             |          |                                                                                   |                                                                                         |                                           |
| 8             |          |                                                                                   |                                                                                         |                                           |
| 9             |          |                                                                                   |                                                                                         |                                           |
| 10            |          |                                                                                   |                                                                                         |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 5.5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

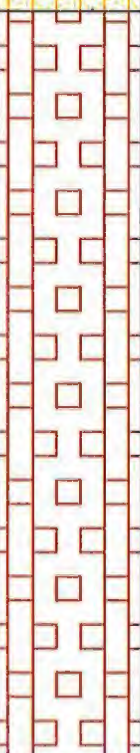
32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-7

# TP-8

| DEPTH<br>(FT) | U.S.C.S.                    | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                                | REMARKS AND<br>LABORATORY<br>TEST RESULTS |  |  |
|---------------|-----------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------|--|--|
| 0             | SW-SM                       |   | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist     |                                           |  |  |
| 1             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 2             | GW                          |  | Light brown fine to coarse gravel with fine to coarse sand, medium dense, moist |                                           |  |  |
| 3             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 4             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 5             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 6             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 7             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 8             | Groundwater not encountered |                                                                                    |                                                                                 |                                           |  |  |
| 9             |                             |                                                                                    |                                                                                 |                                           |  |  |
| 10            |                             |                                                                                    |                                                                                 |                                           |  |  |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 8 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

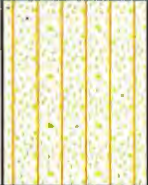
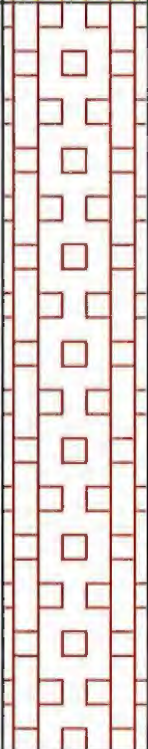
32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-8

# TP-9

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                          | SOIL DESCRIPTION                                                            | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| 0             | SW-SM    |   | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist |                                           |
| 1             |          |                                                                                    |                                                                             |                                           |
| 2             | GW       |  | Brown fine to coarse gravel with fine to coarse sand, loose, moist          |                                           |
| 3             |          |                                                                                    |                                                                             |                                           |
| 4             |          |                                                                                    |                                                                             |                                           |
| 5             |          |                                                                                    |                                                                             |                                           |
| 6             |          |                                                                                    |                                                                             |                                           |
| 7             |          |                                                                                    |                                                                             |                                           |
| 8             |          |                                                                                    | Groundwater not encountered                                                 |                                           |
| 9             |          |                                                                                    |                                                                             |                                           |
| 10            |          |                                                                                    |                                                                             |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 7.5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-9



# TP-10

| DEPTH<br>(FT) | U.S.C.S. | LITHOLOGY                                                                         | SOIL DESCRIPTION                                                                             | REMARKS AND<br>LABORATORY<br>TEST RESULTS |
|---------------|----------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------|
| 0             | SW-SM    |  | Brown fine to coarse sand with fine to coarse gravel and silt, loose, moist                  |                                           |
| 1             |          |                                                                                   |                                                                                              |                                           |
| 2             |          |                                                                                   |                                                                                              |                                           |
| 3             | SP-SM    |  | Light gray fine to coarse sand with fine to coarse gravel and silt, very dense, moist (till) |                                           |
| 4             |          |                                                                                   |                                                                                              |                                           |
| 5             |          |                                                                                   | Groundwater not encountered                                                                  |                                           |
| 6             |          |                                                                                   |                                                                                              |                                           |
| 7             |          |                                                                                   |                                                                                              |                                           |
| 8             |          |                                                                                   |                                                                                              |                                           |
| 9             |          |                                                                                   |                                                                                              |                                           |
| 10            |          |                                                                                   |                                                                                              |                                           |

## LEGEND:

PROJECT NO.: 872-001-02

DATE: JUNE 13, 2016

TOTAL DEPTH: 5 FEET

DRILLING EQUIPMENT: MINI EXCAVATOR

LOGGED BY: KEVIN VANDEHEY

32ND AVENUE APARTMENTS

LACEY, WASHINGTON



Exploration Log TP-10



**ATTACHMENT B**  
**LABORATORY ANALYSES RESULTS**

## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-1  
Sample Name: TP-1 0'-3'  
Depth: 0 - 3 Feet

Moisture Content (%) 6.9%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 10.9              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 33.8              |
| 3/4 in. (19.0)    | 89.1            |               |                   |
| 3/8 in. (9.5-mm)  | 73.7            | Coarse Sand   | 16.5              |
| No. 4 (4.75-mm)   | 55.3            | Medium Sand   | 15.6              |
| No. 10 (2.00-mm)  | 38.7            | Fine Sand     | 12.5              |
| No. 20 (.850-mm)  | 28.7            |               |                   |
| No. 40 (.425-mm)  | 23.1            | Fines         | 10.6              |
| No. 60 (.250-mm)  | 17.8            | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 14.1            |               |                   |
| No. 200 (.075-mm) | 10.6            |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 0.07  
D<sub>30</sub> 0.95  
D<sub>60</sub> 5.70  
D<sub>90</sub> 19.00

Cc 2.26  
Cu 81.43

ASTM Classification

Group Name: **Well-Graded Sand with Gravel and Silt**

Symbol: **SW-SM**

## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-2  
Sample Name: TP-2 3.5'-6.5'  
Depth: 3.5 - 6.5 Feet

Moisture Content (%) 2.7%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 27.0              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 47.0              |
| 3/4 in. (19.0)    | 73.0            |               |                   |
| 3/8 in. (9.5-mm)  | 47.2            | Coarse Sand   | 11.8              |
| No. 4 (4.75-mm)   | 25.9            | Medium Sand   | 9.1               |
| No. 10 (2.00-mm)  | 14.1            | Fine Sand     | 3.8               |
| No. 20 (.850-mm)  | 8.9             |               |                   |
| No. 40 (.425-mm)  | 5.0             | Fines         | 1.1               |
| No. 60 (.250-mm)  | 2.6             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 1.7             |               |                   |
| No. 200 (.075-mm) | 1.1             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 1.0  
D<sub>30</sub> 5.6  
D<sub>60</sub> 14.0  
D<sub>90</sub> 29.0

Cc 2.2  
Cu 14.0

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**

## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-3  
Sample Name: TP-3 0'-6.5'  
Depth: 0 - 6.5 Feet

Moisture Content (%) 2.0%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 37.0              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 39.1              |
| 3/4 in. (19.0)    | 63.0            |               |                   |
| 3/8 in. (9.5-mm)  | 39.9            | Coarse Sand   | 14.2              |
| No. 4 (4.75-mm)   | 23.8            | Medium Sand   | 7.7               |
| No. 10 (2.00-mm)  | 9.6             | Fine Sand     | 1.2               |
| No. 20 (.850-mm)  | 3.7             |               |                   |
| No. 40 (.425-mm)  | 1.9             | Fines         | 0.7               |
| No. 60 (.250-mm)  | 1.3             | Total         | 100.0             |
| No. 100 (.150-mm) | 1.0             |               |                   |
| No. 200 (.075-mm) | 0.7             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 2.1  
D<sub>30</sub> 6.5  
D<sub>60</sub> 18.0  
D<sub>90</sub> 32.0

Cc 1.12  
Cu 8.57

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**

## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-6  
Sample Name: TP-6 0'-7.0'  
Depth: 0 - 7 Feet

Moisture Content (%) 2.0%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 26.1              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 52.0              |
| 3/4 in. (19.0)    | 73.9            |               |                   |
| 3/8 in. (9.5-mm)  | 48.5            | Coarse Sand   | 13.9              |
| No. 4 (4.75-mm)   | 21.9            | Medium Sand   | 5.9               |
| No. 10 (2.00-mm)  | 8.0             | Fine Sand     | 1.4               |
| No. 20 (.850-mm)  | 3.8             |               |                   |
| No. 40 (.425-mm)  | 2.0             | Fines         | 0.6               |
| No. 60 (.250-mm)  | 1.3             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 0.9             |               |                   |
| No. 200 (.075-mm) | 0.6             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 2.5  
D<sub>30</sub> 6.1  
D<sub>60</sub> 14.0  
D<sub>90</sub> 29.0

Cc 1.06  
Cu 5.60

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-7  
Sample Name: TP-7 2.0'-4.5'  
Depth: 2 - 4.5 Feet

Moisture Content (%) 1.7%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 21.1              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 58.5              |
| 3/4 in. (19.0)    | 78.9            |               |                   |
| 3/8 in. (9.5-mm)  | 42.7            | Coarse Sand   | 13.2              |
| No. 4 (4.75-mm)   | 20.4            | Medium Sand   | 5.8               |
| No. 10 (2.00-mm)  | 7.1             | Fine Sand     | 1.0               |
| No. 20 (.850-mm)  | 2.8             |               |                   |
| No. 40 (.425-mm)  | 1.4             | Fines         | 0.4               |
| No. 60 (.250-mm)  | 0.8             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 0.6             |               |                   |
| No. 200 (.075-mm) | 0.4             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 2.6  
D<sub>30</sub> 7.7  
D<sub>60</sub> 14.0  
D<sub>90</sub> 26.0

Cc 1.63  
Cu 5.38

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**

## Gradation Analysis Summary Data

Job Name: 32nd Avenue Apartments  
Job Number: 872-001-02  
Date Tested: 6/21/16  
Tested By: Kevin Vandehey

Sample Location: TP-8  
Sample Name: TP-8 2.0'-8.0'  
Depth: 2 - 8 Feet

Moisture Content (%) 2.8%

| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 35.0              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 36.6              |
| 3/4 in. (19.0)    | 65.0            |               |                   |
| 3/8 in. (9.5-mm)  | 45.2            | Coarse Sand   | 14.0              |
| No. 4 (4.75-mm)   | 28.4            | Medium Sand   | 11.2              |
| No. 10 (2.00-mm)  | 14.4            | Fine Sand     | 2.3               |
| No. 20 (.850-mm)  | 6.5             |               |                   |
| No. 40 (.425-mm)  | 3.2             | Fines         | 0.9               |
| No. 60 (.250-mm)  | 1.8             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 1.3             |               |                   |
| No. 200 (.075-mm) | 0.9             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 1.4  
D<sub>30</sub> 5.1  
D<sub>60</sub> 17.0  
D<sub>90</sub> 31.0

Cc 1.09  
Cu 12.14

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



## Gradation Analysis Summary Data

**Job Name:** 32nd Avenue Apartments  
**Job Number:** 872-001-02  
**Date Tested:** 6/21/16  
**Tested By:** Kevin Vandehey

**Sample Location:** TP-9  
**Sample Name:** TP-9 1.5'-7.5'  
**Depth:** 1.5 - 7.5 Feet

Moisture Content (%) 2.1%

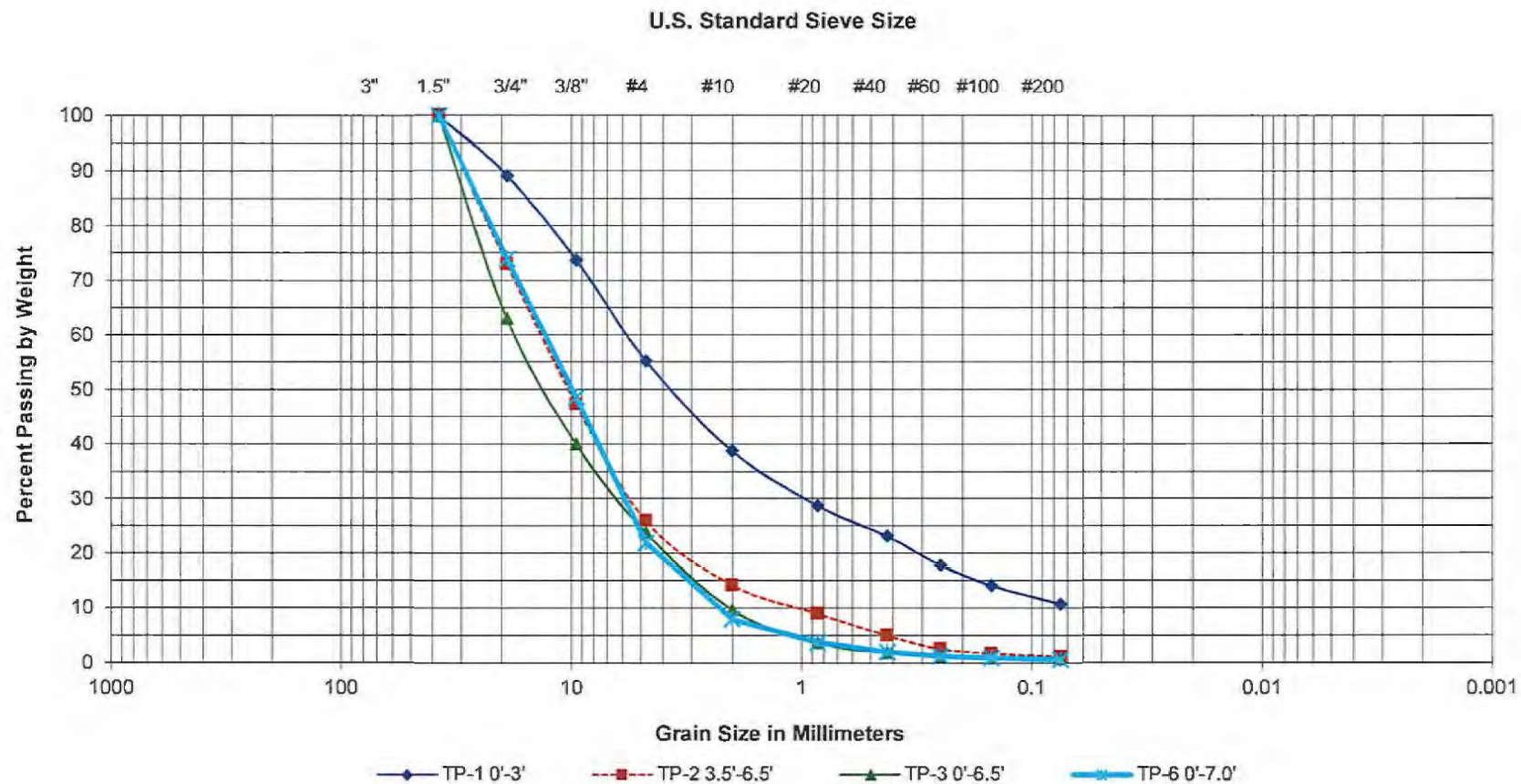
| Sieve Size        | Percent Passing | Size Fraction | Percent by Weight |
|-------------------|-----------------|---------------|-------------------|
| 3.0 in. (75.0)    | 100.0           | Coarse Gravel | 37.9              |
| 1.5 in. (37.5)    | 100.0           | Fine Gravel   | 46.0              |
| 3/4 in. (19.0)    | 62.1            |               |                   |
| 3/8 in. (9.5-mm)  | 33.5            | Coarse Sand   | 10.8              |
| No. 4 (4.75-mm)   | 16.2            | Medium Sand   | 4.1               |
| No. 10 (2.00-mm)  | 5.4             | Fine Sand     | 0.7               |
| No. 20 (.850-mm)  | 2.2             |               |                   |
| No. 40 (.425-mm)  | 1.3             | Fines         | 0.6               |
| No. 60 (.250-mm)  | 0.9             | <b>Total</b>  | <b>100.0</b>      |
| No. 100 (.150-mm) | 0.8             |               |                   |
| No. 200 (.075-mm) | 0.6             |               |                   |

LL --  
PL --  
PI --

D<sub>10</sub> 3.2  
D<sub>30</sub> 8.5  
D<sub>60</sub> 18.0  
D<sub>90</sub> 31.0

Cc 1.25  
Cu 5.63

ASTM Classification  
Group Name: **Well-Graded Gravel with Sand**  
Symbol: **GW**



**32ND AVENUE APARTMENTS**

LACEY, WASHINGTON



Graph 1  
Gradation Analysis Results



**32ND AVENUE APARTMENTS**

LACEY, WASHINGTON



Graph 2  
Gratation Analysis Results

**ATTACHMENT C**  
**REPORT LIMITATIONS AND GUIDELINES FOR USE**



## **ATTACHMENT C**

### **REPORT LIMITATIONS AND GUIDELINES FOR USE<sup>1</sup>**

This attachment provides information to help you manage your risks with respect to the use of this report.

#### **GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS**

This report has been prepared for the exclusive use of Blue Summit Realty, LLC (Client) and their authorized agents. This report may be made available to regulatory agencies for review. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

Insight Geologic Inc. structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

#### **A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS**

Insight Geologic, Inc. considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless Insight Geologic specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If important changes are made after the date of this report, Insight Geologic should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

---

<sup>1</sup> Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; [www.asfe.org](http://www.asfe.org).

### **SUBSURFACE CONDITIONS CAN CHANGE**

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or ground water fluctuations. Always contact Insight Geologic before applying a report to determine if it remains applicable.

### **MOST GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS**

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Insight Geologic reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

### **GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL**

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from Insight Geologic's professional judgment and opinion. Insight Geologic's recommendations can be finalized only by observing actual subsurface conditions revealed during construction. Insight Geologic cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by Insight Geologic should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining Insight Geologic for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

### **A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION**

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having Insight Geologic confer with appropriate members of the design team after submitting the report. Also retain Insight Geologic to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having Insight Geologic participate in pre-bid and pre-construction conferences, and by providing construction observation.

### **DO NOT REDRAW THE EXPLORATION LOGS**

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a

geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

### **GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE**

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with Insight Geologic and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

### **CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS**

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

### **READ THESE PROVISIONS CLOSELY**

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. Insight Geologic includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with Insight Geologic if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

### **GEOTECHNICAL, GEOLOGIC AND ENVIRONMENTAL REPORTS SHOULD NOT BE INTERCHANGED**

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.



**Gateway Multi-Family complex**

**Maintenance and Source Control Manual**

**Prepared for:** Freestone Companies  
6820 20<sup>th</sup> Street,  
Fife, WA 98424

**May 22, 2020**

**Prepared by:** Lance Talmadge, EIT

**Reviewed by:** Steve D Hatton  
HATTON GODAT PANTIER  
3910 Martin Way E., Suite B  
Olympia, WA 98506  
(360) 943-1599

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## 1. Project Description

The **Error! Reference source not found.** project is located west of the intersection of Marvin Rd NE and 32<sup>nd</sup> Ave NE in the City of Lacey in Section 3, Township 18, Range 1 West, W.M. on tax parcel numbers 11803140300, 11803130400, and 11803130401. The project proposes to construct a 183-unit multifamily apartment complex consisting of 12 apartment buildings, an office building and associated parking and utilities. The project will also include frontage improvements along 32<sup>nd</sup> Ave NE and will retain approximately 88,250 square feet of native area in designated tree tracts.

## 2. Maintenance Importance and Intent

The importance of maintenance for the proper function of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) area due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include:

- Maintain designed stormwater infiltration capacity.
- Maintain ability of storm facility to attenuate flow rates.
- Maintain ability to safely convey design stormwater flows.
- Maintain ability to treat stormwater runoff quality.
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems.
- Clearly identify systems so they can be protected.
- Keep maintenance costs low.
- Prevent large-scale or expensive stormwater system failures.
- Prevent water quality violations or damage to downstream properties.

The intent of this section and manual is to pass on to the responsibly party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

## 3. Responsible Parties

The responsible parties for the maintenance, inspection and operation of the stormwater facilities is the owner Freestone Companies. The stormwater facilities described in this maintenance plan are, roof drywells, infiltration trenches, swales and conveyance structures. Section 5 of this manual describes the necessary procedures to successful long-term operation of the stormwater facilities. This manual is to be kept at the Gateway Multifamily Complex 7235 32nd Avenue, Lacey WA The Maintenance and Source Control Manual must be made available for inspection by the City of Lacey upon request.

## 4. Facilities Requiring Maintenance

Four stormwater facilities are addressed in this stormwater maintenance manual. They are: drywells, trenches, swales and catch basin filters. The private owner is responsible for all stormwater facilities. The roof drywells operate by infiltrating the water directly into the ground. Downspouts are connected via piping and cleanouts to direct the runoff the drywell. The drywell is sized in such a way to store runoff long enough to allow it to infiltrate into the ground. Infiltration trenches operate in the same way. The runoff the trenches receive is collected from parking areas through a stormwater catch basin filter that treats the runoff before infiltrating it. Swales collect runoff from the frontage area, swale collect store and infiltrate runoff through a gravel trench bed placed at the bottom of the swale.

### Your Stormwater Facilities

This section consists of two parts that are to be used together: the **Facility Key** and the **Site Plan**. Review the site plan and identify the numbers denoting a feature of the system. Then check the facility key for the feature type and checklist name.

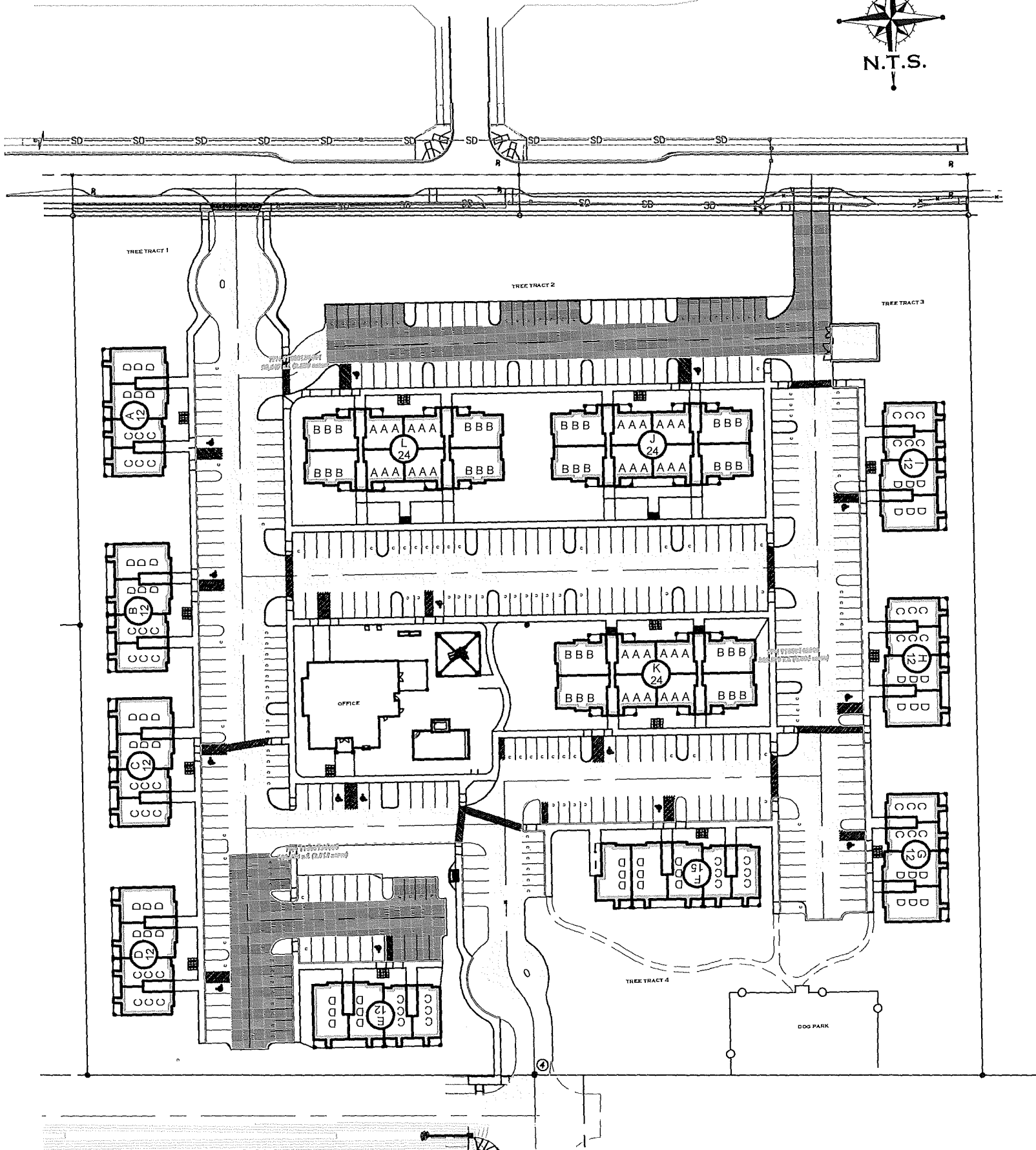
### Facility Key

The stormwater facility in your site is comprised of the following elements:

| Type of Feature and Checklist Name       | Location on Site Plan |
|------------------------------------------|-----------------------|
| Infiltration Trenches                    | 1                     |
| Bioretention Swales                      | 2                     |
| Drywells, French Drains or Downspouts    | 3                     |
| Fencing, Shrubbery and other Landscaping | 4                     |
| Catch Basins and Piping                  | 5                     |

# GATEWAY MULTIFAMILY

7235 32ND NE, LACEY, WA 98516



FACILITY KEY



## 5. Maintenance Instructions

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facilities' required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the city, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the city.

### Maintaining Stormwater Facilities

All stormwater facilities need to be maintained. Regular maintenance ensures proper functioning and keeps the facility aesthetically appealing. This Stormwater Facility Maintenance Guide was designed to help explain how stormwater facilities work and provide user-friendly guidance on how to maintain them to keep them up to standards.

As a facility owner you are responsible for regularly maintaining your privately-owned drainage facilities such as ponds, catch basins and pipes. Local governments maintain stormwater facilities located in public roadways.

### Maintenance Checklists

The checklists in this guide are for you to use when inspecting and maintaining the stormwater facilities in your neighborhood. If you are missing a particular checklist, or if you have additional facilities not identified or addressed in this guide, please contact your developer or local jurisdiction.

The checklists are in table format for ease of use and brevity. Each checklist tells you what part of the feature to check, how often to check, what to check for, and what to do about it. Log sheets are included to help you keep track of when you last surveyed the storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer. These tools include:

- Gloves.
- A flashlight (to look into catch basins, manholes or pipes).
- A long pole or broom handle (see below).
- Some kind of pry bar or lifting tool for pulling manhole and grate covers.

A listing of resources is also included within this packet (see next page). Here you will find the phone numbers of the agencies referred-to in the tables.

### **SAFETY WARNING:**

**Due to OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a pole or broom handle that is**



**long enough when you are checking sediment depths in confined spaces. Always properly replace grates and lids.**

**NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF THE OPEN HOLE.**

#### **Checklist Instructions**

The following pages contain maintenance checklists covering most of the needs for the components of your drainage system, as well as for some components that you may not have (you can ignore those that don't apply to your system). Let us know if there are any components of your drainage system that you do not recognize or are missing from these pages.

You may call the City of Lacey at (360) 491-5600 for technical guidance. Please do not hesitate to call, especially if you are unsure whether a situation you have discovered may be a problem.

#### **Resource Listing**

If you are unsure whether a problem exists, please contact the City at the number below and ask for technical assistance with your situation. Other resources are listed for your convenience and as references associated with the checklists.

Lacey Public Works Department

(360) 491-5600 [www.ci.lacey.wa.us/](http://www.ci.lacey.wa.us/)

Thurston County Environmental Health

Hazardous Waste Disposal (oil, paint, pesticides, etc.)

(360) 754-4111 [www.co.thurston.wa.us/health/ehhw/hwprevent](http://www.co.thurston.wa.us/health/ehhw/hwprevent)

Solid Waste Disposal (yard waste, construction waste, contaminated soils, etc.)

(360) 786-5136 [www.co.thurston.wa.us/health/ehhw/index](http://www.co.thurston.wa.us/health/ehhw/index)

WSU Thurston Co. Extension (Water Resource Ed. Programs, Envir. Stewardship info.)

(360) 786-5445 <http://thurston.wsu.edu/water/>

# Log Sheet

Use copies of this log sheet to keep track of when maintenance inspections occur and what items, if any, are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so others can easily access them.

|                          |                   |                            |
|--------------------------|-------------------|----------------------------|
| <b>Location:</b> _____   |                   | <b>Date Checked:</b> _____ |
| <b>Checked By:</b> _____ |                   |                            |
| <b>Name:</b> _____       |                   | <b>Phone:</b> _____        |
| <b>Address:</b> _____    |                   |                            |
| <b>City:</b> _____       | <b>Zip:</b> _____ |                            |

| Facility | Component Checked | Observations |
|----------|-------------------|--------------|
|          |                   |              |
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## Stormwater Facility Inspection and Maintenance Procedure

Stormwater facilities play an important role in managing the 4 feet of rainfall we receive in Lacey in an average year. The term "stormwater facility" refers to any landscaped or structural feature that collects, conveys, cleans or infiltrates runoff water. There are many types of stormwater facilities, ranging from simple swales and ponds to more complicated filter systems and flow control devices. Your on-site stormwater facilities work together to control runoff water, reduce flooding, and prevent pollution.

Owners of commercial property, multifamily residential property, or single-family residential properties with privately-owned drainage and stormwater facilities are required by City of Lacey Codes to maintain their facilities to established standards for full functionality (City of Lacey Stormwater Code, LMC 14.25). Facility owners are responsible for performing inspections of stormwater facilities, and for performing any maintenance identified by the inspections.

Basic maintenance work may be performed by the owner or property manager, although some tasks are best left to an experienced contractor. The inspection of stormwater facilities and any required maintenance work must be completed and reported annually to the City of Lacey Public Works Department by the date specified on the *Stormwater Facilities Inspection and Maintenance Annual Reporting Form* obtainable on the city's web site at <http://www.ci.lacey.wa.us/city-government/city-departments/public-works/waterresources/storm-and-surface-water-programs/private-facilities>).

Again, note that most large development sites will also have a Maintenance and Source Control Manual that was prepared as part of the site development, and should have been provided to the property owners. Look to your site's Maintenance and Source Control Manual for information on the project, the facilities on the site, maintenance responsibilities, and maintenance activities. Where a Maintenance and Source Control Manual is not available, the following steps are provided as general guidance:

### Step 1. Identify

The first step is facility identification, so you know what types of stormwater facilities you have. Look on the site plan of your property, and note the main facility types indicated (such as rain gardens and infiltration trenches), along with related drainage components (such as catch basins, pipes, and debris barriers). Locate the various facilities on the ground.

Note that most drainage systems consist of components for four main purposes: stormwater collection (e.g., catch basins), conveyance (e.g., pipes and swales), water quality treatment (e.g., wet ponds) and flow control (via infiltration and/or surface discharge).

To assist you in identifying components, refer to the definitions and illustrations on the pages that follow.

**Step 2. Inspect**

For all facility components that you have identified, conduct an inspection. You may conduct the inspection yourself and/or with co-owners, or you may use a property manager or vendor to perform the inspection. Refer to the following Stormwater Facility Maintenance Checklists, which describe the maintenance standards for each component, and also identify and describe defects and their remedies.

For each facility, note on the Inspection and Maintenance Checklist the condition of the facility (good, fair or poor), and any problems or other observations.

**Step 3. Maintain**

For all facility components, if the inspection indicates maintenance is needed, have the work performed by competent personnel. Basic maintenance tasks may be performed by the property owner(s) or property manager, but difficult or potentially dangerous tasks should be performed by a qualified vendor. Be safe! Use caution when inspecting and working on or near facilities, and stay out of confined spaces such as catch basins and manholes.

Note the action taken and the date, and record this information on the Log Sheet. Mark the check boxes on the Inspection and Maintenance Checklist corresponding to the maintenance accomplished on each facility.

**Step 4. Submit**

Submit the completed *Stormwater Facilities Inspection and Maintenance Annual Reporting Form* by August 15 each year to: Lacey Water Resources, 420 College Street SE, Lacey, WA 98503. The completed checklist may be mailed, e-mailed (if available) or delivered in person to Lacey City Hall.

## Common Stormwater Facilities: Identification and Actions

### Biofiltration Swale:

A longitudinally sloped, wide, shallow, vegetation-lined channel with gently sloping sides and a flat bottom designed to remove pollutants by means of sedimentation, filtration, soil sorption, and/or plant uptake. Some water also infiltrates into the soil as it slowly flows along the swale.



### Actions to keep swales functioning:

- Remove debris, litter, and flow obstructions from the swale.
- Mow the swale and maintain healthy grass cover.
- Prevent dirt, rocks, and weeds from accumulating, but avoid use of herbicides (remove manual).
- Do not fill-in the swale with rocks, bark, etc.
- Aerate the soil to preserve infiltration capacity.

### Downspout Infiltration

Includes an infiltration trench or drywell intended only for the use in infiltrating runoff from roof surfaces. Infiltration trenches and drywells are backfilled with washed drain rock, allowing for temporary storage of stormwater runoff in the voids of the drain rock material. Stored runoff gradually infiltrates into the surrounding soil.

### Actions to keep downspout infiltration functioning:

- Remove litter, leaves debris, and obstructions from the infiltration trench or drywell.
- Stabilize adjacent landscaped areas to avoid runoff from eroding and mobilizing soil into the surface inlet.

### Culvert

A pipe that continues conveyance flow from a ditch or swale under the ground surface, typically under driveways and cross-streets. Usually connects ("daylights") to another ditch, swale or pond. The end of a pipe or culvert is often surrounded by rock "riprap" to prevent soil erosion.



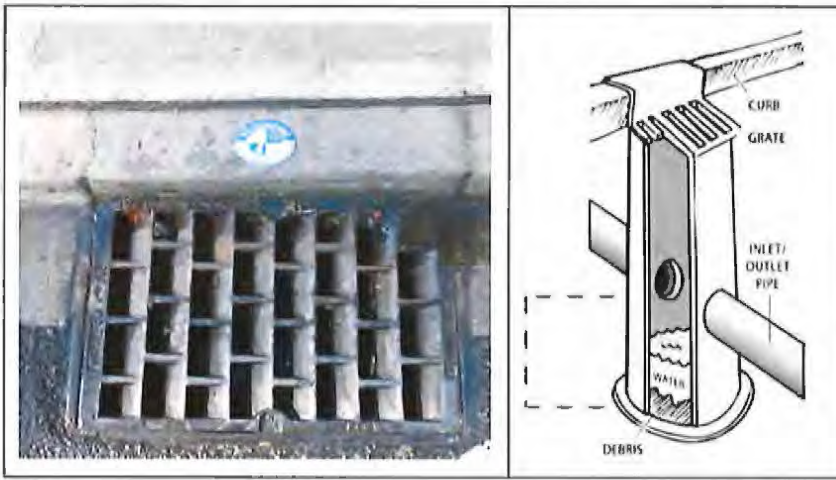
Actions to keep culverts functioning:

- Remove debris, litter, and obstructions from the openings at the culvert ends.
- Remove soil, sod, and vegetation building from the culvert openings.
- Replace rock riprap at the culvert ends.
- Repair any damage to the culvert ends.



### Catch Basin:

An underground concrete box structure with a slotted metal grate on top that collects runoff water from the ground surface. Typically located within pavement in parking lots and in the street gutter, usually next to a curb. Gate on top lets water in and keeps larger debris out. Sediment settling in the sump in the bottom (below the pipe openings) and must be removed periodically. Catch basins have an outlet pipe between the grate and the sump, to let the cleaner water flow out to a storm pond or other location. Some catch basins have both inflow and outflow pipes, to convey collected runoff water through.



### Actions to keep catch basins function:

- Remove litter, leaves, debris, and obstructions from catch basin grates.
- Hire a professional to remove sediment buildup from sump (if road is privately owned; catch basins in the public right-of-way are maintained by the city).



**Basin Bio-Swale**

| Drainage System Feature | Problem or Defect              | Conditions To Check for                                                                                                                                        | Check | What to Do for Desired Condition                                                                                                                                                                                                                                         | Done |
|-------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| General                 | Sediment Accumulation on Grass | Sediment depth exceeds 2 inches or inhibits vegetation growth in 10 percent or more of swale                                                                   |       | Remove sediment deposits on grass treatment area of the biofiltration swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.                                   |      |
|                         | Standing Water                 | When water stands in the swale between storms and does not drain freely.                                                                                       |       | Swale must drain freely and not contain standing water between storms. Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale. |      |
|                         | Flow Spreader                  | Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.                                                        |       | Level the spreader and clean so that flows are spread evenly over entire swale width.                                                                                                                                                                                    |      |
|                         | Constant Baseflow              | Small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded muddy channel has formed in the swale bottom. |       | Base flow removed from swale. Add a low flow pea gravel drain in the length of the swale or bypass the baseflow around the swale                                                                                                                                         |      |
|                         | Poor Vegetation Coverage       | Grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.                                                                          |       | Swale has no bare spots and grass is thick and healthy. Determine why grass growth is poor and correct that condition. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or re-seed into loosened, fertile soil.         |      |
|                         | Vegetation                     | When the grass becomes excessively tall (higher than 10") when nuisance weeds and other vegetation start to take over.                                         |       | Mow vegetation or remove nuisance vegetation so that flow not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.                                                                                                                       |      |
| General                 | Excessive Shading              | Grass growth is poor because sunlight does not reach swale.                                                                                                    |       | If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.                                                                                                                                                                                |      |

|       |                                        |                                                                                                                                                                                         |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|-------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Swale | Inlet/Outlet                           | Inlet/outlet areas clogged with sediment and/or debris.                                                                                                                                 |  | No debris or sediment present. Remove trash and debris from biofiltration swale.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|       | Trash and Debris Accumulation.         | Eroded or scoured swale bottom due to flow channelization, or higher flows.                                                                                                             |  | No eroded or scoured areas in biofiltration swale. Cause of erosion or scour addressed. For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8 inch intervals.                                                                                                                                                   |  |
|       | Poisonous Vegetation and Noxious Weeds | Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the: <a href="#">Thurston County Noxious Weeds List</a> . |  | Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. ( <i>Coordinate with Thurston County Health Department.</i> ) Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) <i>Complete eradication of noxious weeds may not be possible.</i> |  |
|       |                                        |                                                                                                                                                                                         |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |

## Manufactured Media Filters

| Drainage System Feature    | Problem or Defect                 | Conditions To Check for                                                                          | Check | What to Do for Desired Condition                                               | Done |
|----------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------|------|
| Drain Pipes/cleanouts      | Sediment in Drain Pipes/Cleanouts | Accumulated sediment that exceeds 20% of the diameter                                            |       | No sediment or debris in drainpipes or cleanouts. Sediment and debris removed. |      |
| Belowground Cartridge Type | Media                             | Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently. |       | Contact Manufacturer                                                           |      |
|                            | Short circuiting                  | Flows do not properly enter device                                                               |       | Contact Manufacturer                                                           |      |

## Downspout Infiltration

| Drainage System Feature      | Problem or Defect    | Conditions To Check for                                                                         | Check | What to Do for Desired Condition                                                                                                                                                                                                                        | Done |
|------------------------------|----------------------|-------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Rock Trench/ Well            | Inflow Disruption    | Accumulated trash, debris, or sediment on drain rock surface impeding sheet flow into facility. |       | Sheet flow re-established. Material removed and disposed of in accordance with applicable solid waste requirements.                                                                                                                                     |      |
|                              | Inflow Disruption    | Vegetation/moss present on drain rock surface impeding sheet flow into facility.                |       | Material removed, and sheet flow reestablished.                                                                                                                                                                                                         |      |
|                              | Inflow Disruption    | Water ponding at surface or standing water in subgrade observation port.                        |       | Inflow to facility is consistent and no ponding is observed. Inlet piping is clear and/or rock or sand reservoirs have been replaced.                                                                                                                   |      |
| Inlet/Outlet Pipe Conveyance | Accumulated Sediment | Sediment in the sump.                                                                           |       | Sump contains no sediment.                                                                                                                                                                                                                              |      |
| Roof Downspout               | Overflow             | Water overflows from the gutter or downspout during rain.                                       |       | First try cleaning out the gutter and downspouts. If this doesn't solve the problem, a larger drywell may be needed. Contact the city before changing the design or upgrading to a larger drywell.                                                      |      |
| Storage Sump                 | Sediment in Sump     | Excess sediment accumulates in sump                                                             |       | Material removed and disposed of in accordance with applicable solid waste requirements                                                                                                                                                                 |      |
|                              | Access Lid Problems  | Access lid cannot be opened or is missing.                                                      |       | Access lid is functioning as designed. Refer to record drawings to confirm type, function, and required components.                                                                                                                                     |      |
| Roof                         | Moss                 | Moss and algae are taking over the shadier parts of the shingles                                |       | Disconnect the flexible part of the downspout that leads to the drywell. Then perform moss removal as desired. Pressure wash or use fatty acid solutions instead of highly toxic pesticides or chlorine bleach. Install a zinc strip as a preventative. |      |





## Fencing/Shrubby Screen/Other Landscaping

| Drainage System Feature | Problem or Defect                        | Conditions To Check for                                                                                  | Check | What to Do for Desired Condition                                                                      | Done |
|-------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------|------|
| General                 | Missing or Broken Parts/Dead Shrubby     | Any defect in the fence or screen that permits easy entry to a facility                                  |       | Fence is mended or shrubs replaced to form a solid barrier to entry.                                  |      |
|                         | Erosion                                  | Erosion has resulted in an opening under a fence that allows entry by people or pets.                    |       | Soil under fence replaced so that no opening exceeds 4 inches in height.                              |      |
|                         | Unruly Vegetation                        | Shrubby is growing out of control or is infested with weeds. See also Thurston County Noxious Weeds List |       | Shrubby is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds. |      |
| Fences                  | Damaged parts                            | Posts out of plumb more than 6 inches.                                                                   |       | Posts plumb to within 1.5 inches of plumb.                                                            |      |
|                         |                                          | Top rails bent more than 6 inches.                                                                       |       | Top rail free of bends greater than 1 inch.                                                           |      |
|                         |                                          | Any part of fence (including posts, top rails, and fabric) more than 1 foot out of design alignment.     |       | Fence is aligned and meets designed standards.                                                        |      |
|                         |                                          | Missing or loose tension wire.                                                                           |       | Tension wire in place and holding fabric.                                                             |      |
|                         |                                          | Missing or loose barbed wire that is sagging more than 2.5 inches between posts.                         |       | Barbed wire in place with less than 0.75-inch sag between posts.                                      |      |
|                         |                                          | Extension arm missing, broken, or bent out of shape more than 1.5 inches.                                |       | Extension arm in place with no bends larger than 0.75 inch.                                           |      |
|                         | Deteriorated Paint or Protective Coating | Part or parts that have a rusting or scaling condition that has affected structural adequacy.            |       | Structurally adequate posts or parts with a uniform protective coating.                               |      |
|                         | Openings in Fabric                       | Openings in fabric are such that an 8 inch diameter ball could fit through.                              |       | No openings in fabric.                                                                                |      |

## Conveyance Pipes

| Drainage System Feature | Problem or Defect                | Conditions To Check for                                                                                                                                                                                                                                                                                                           | Check | What to Do for Desired Condition                                                                                                    | Done |
|-------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------|------|
| Pipes                   | Sediment, Debris, and Vegetation | Accumulated sediment should not exceed 20 percent of the diameter of the pipe. Vegetation should not reduce free movement of water through pipes. Ensure that the protective coating is not damaged or rusted. Dents should not significantly impede flow. Pipe should not have major cracks or flaws allowing water to leak out. |       | Clean out pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe. |      |

## Access Roads and Easements

| Drainage System Feature | Problem or Defect   | Conditions To Check for                                                                                              | Check | What to Do for Desired Condition                                                                                                                          | Done |
|-------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| General                 | Access              | Check to determine if there is adequate access to your stormwater facilities for maintenance vehicles                |       | If there is not adequate access, check with the city to determine whether an easement exists. If so, a maintenance road may need to be constructed there. |      |
| Access Road             | Blocked Roadway     | Debris that could damage vehicle tires (glass or metal)                                                              |       | Clear all potential damaging material.                                                                                                                    |      |
|                         | Blocked Roadway     | Any obstructions that reduce clearance above and along the road to less than the required width (minimum of 15 feet) |       | Clear above and along roadway so there is enough clearance.                                                                                               |      |
| Road Surface            | Bad Road conditions | Check for potholes, ruts, mushy spots, or woody debris that limits access by maintenance vehicles.                   |       | Add gravel or remove wood as necessary.                                                                                                                   |      |
| Shoulders and Ditches   | Erosion             | Check for erosion along roadway.                                                                                     |       | Repair erosion with additional soil or gravel.                                                                                                            |      |

## 6. Vegetation Maintenance

New landscaping includes the following plants:

Deciduous Trees: Prairifire Crabapple, Vine Maple, Cardinal Royal Mt. Ash.

Coniferous Trees: Alaskan Weeping Cedar

Shrubs: Scarletta Leucothoe, Paificic Waxleaf Myrtle, Western Sword Fern, Pink Princess Escallonia, Otto Luyken Laurel, Ostbo Red Mt. Laurel, Dwarf Fountain Grass, Pink Cloud Winter Heath, Variegated Jap. Pieris, Bunchberry, Unique Rhododendron, Emerald Green Arb., Evergreen Salal.

## 7. Pollution Source Control Measures

### A. Pollution Source Control Plan

Pollution source controls are actions taken by a person or business to reduce the amount of pollution reaching surface and ground waters. Controls, also called “best management practices” (BMPs) include:

- Altering the activity (e.g., substitute non-toxic products, recycle used oil, route floor drains to sanitary sewer rather than storm sewer)
- Enclosing or covering the activity (e.g., building a roof)
- Segregating the activity (e.g., diverting runoff away from an area that is contaminated)
- Routing runoff from the activity to a treatment alternative (e.g., a wastewater treatment facility, sanitary sewer, or stormwater treatment area)

#### Recommended Pollution Control Practices For Business Owners

Pollution source controls are needed because of the contamination found in runoff from commercial areas and the effect of this contamination on aquatic life and human health. Research on urban runoff in the Puget Sound area and elsewhere has found oil and grease, nutrients, organic substances, toxic metals, bacteria, viruses and sediments at unacceptable levels. Effects of contaminated runoff include closure of shellfish harvesting areas and swimming areas, mortality of young fish and other aquatic organisms, tumors on fish and impairment of fish reproduction.

#### Materials Used and Wastes Generated

Of particular concern are drives and parking areas. Because of heavy vehicle usage, the concentration of oil and grease in stormwater may exceed the Ecology guidelines of 10 mg/l. Although there are no local data to confirm this view, limited research in the San Francisco Bay area found the mean concentration of oil and grease in stormwater to exceed 10 mg/l.

#### General Principles of Pollution Prevention

This section describes the basic pollution prevention principles that every business and homeowner must consider. Most of these are common sense “housekeeping” types of solutions. With collective action by individuals and businesses throughout the region in implementing each of these principles, the improvement in water quality could be substantial. Although most of these principles are aimed at commercial or industrial activities, many items apply to individual residents as well.

#### **1. Avoid the activity or reduce its occurrence**

If possible, avoid the activity or do it less frequently. Is there a substitute process or a different material available to get the job done? Can a larger run of a process be performed at one time, thus reducing the number of times per week or month it needs to be repeated? For instance, raw materials could be delivered close to the time of use instead of being stockpiled and exposed to the weather. Perhaps the site could avoid one solvent-washing step altogether. Apply lawn care chemicals following directions and only as needed. Many lawns are excessively fertilized.

Do not apply herbicides right before it rains. Ecology or the Thurston County Department of Public Health and Social Services can provide pollution prevention assistance.

## **2. Move activities under shelter**

Sometimes it is fairly easy to move an activity indoors out of the weather. The benefits of this are twofold; preventing runoff contamination, and providing for easier, more controlled cleanup if a spill occurs. An example would be unloading and storing barrels of chemicals inside a garage area instead of doing it outside. Please be aware that moving storage areas indoors may require installation of fire suppression equipment or other building modifications as required by the International Building Code (IBC), the International Fire Code or local ordinances.

## **3. Clean up spills quickly**

Promptly contain and clean up solid and liquid pollutant leaks and spills on any exposed soil, vegetation, or paved area. Commercial spill kits are available, but readily available absorbents such as kitty litter also work well in many cases. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.

## **4. Use less material**

Don't buy or use more material than you really need. This not only helps keep potential disposal, storage, and pollution problems to a minimum, but will probably save money, too.

## **5. Use the least toxic materials available**

Investigate the use of materials that are less toxic than what is used now. Perhaps a caustic-type detergent or a solvent could be replaced with a more environmentally friendly product. Such a change might allow the site to discharge process water to the sanitary sewer instead of paying for expensive disposal (contact the City of Lacey Wastewater Utility or the LOTT Clean Water Alliance to find out about allowable sanitary sewer discharges and pretreatment permits). Remember that even if using a biodegradable product, nothing but uncontaminated water is allowed to enter the stormwater drainage system.

## **6. Create and maintain vegetated areas near activity locations**

Vegetation of various kinds can help filter pollutants out of stormwater, so it is advisable to route stormwater through vegetated areas located near the activity. For instance, many parking lots contain grassy islands, typically formed in a "hump." By creating those islands as depressions instead of humps, they can be

used to treat runoff from the parking lot or roof. Also, don't forget the erosion control benefits of vegetation at a site.

### **7. Locate activities as far as possible from surface drainage paths**

Activities located as far as possible from known drainage paths, ditches, streams, other water bodies, and storm drains will be less likely to pollute, since it will take longer for material to reach the drainage feature. This gives more time to react to a spill, or if it is a "housekeeping" issue, may protect the local waters long enough for you to clean up the area around the activity. Don't forget that groundwater protection is important throughout the region, no matter where the activity is located, so the actions taken on your site on a day-to-day basis are always important, even in dry weather.

### **8. Maintain stormwater drainage systems**

Pollutants can concentrate over time in storm drainage structures such as catch basins, ditches, and storm drains. When a large storm event occurs, it can mobilize these pollutants and carry them to receiving waters. Develop and implement maintenance practices, inspections, and schedules for treatment facilities (e.g., detention ponds, oil/water separators, vegetated swales). Clean oils, debris, sludge, etc., from all BMP systems regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems, to prevent the contamination of stormwater.

Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills. Also repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.

Requirements for cleaning stormwater facilities are discussed in Volume IV of the 2014 Ecology Manual, specifically BMP S417. Maintenance standards can be found in Chapter 3, Appendix 3B.

### **9. Reduce, reuse, and recycle as much as possible**

Always look for ways to recycle instead of just disposing. This can save money as well as keep both hazardous and non-hazardous materials out of the landfills.

Learn more about other businesses that have made process changes allowing recycling of chemicals by calling Ecology at 1-800-RECYCLE and requesting publications No. 92-45 and No. 90-22. Another unique recycling opportunity for businesses is available through the Industrial Materials Exchange. This free service acts as a waste or surplus "matchmaker," helping one company's waste become another company's asset. For instance, waste vegetable oil can become biofuel for another business. Call Industrial Materials Exchange at (206) 625-6232 to list potentially usable solid or chemical waste in their publication.

#### **10. Be an advocate for stormwater pollution prevention**

Help friends, neighbors, and business associates find ways to reduce stormwater pollution in their activities. Most people want clean water and do not pollute intentionally. Share your ideas and the BMPs in this chapter to get them thinking about how their everyday activities effect water quality.

#### **11. Report problems**

We all must do our part to protect water, fish, wildlife, and our own health by implementing proper BMPs, and reporting water quality problems that we observe. In the City of Lacey, call the Department of Public Works at (360) 491-5644 to report dumping to sewers and to report spills and other incidents involving storm drains or ditches. Also contact Ecology's Southwest Regional Office at (360) 407-6300.

#### **12. Provide oversight and training**

Assign one or more individuals at your place of business to be responsible for stormwater pollution control. Hold regular meetings to review the overall operation of BMPs. Establish responsibilities for inspections, operation and maintenance (O&M), documentation, and availability for emergency situations. Train all team members in the operation, maintenance, and inspection of BMPs and reporting procedures.

#### **13. Dust control**

Sweep paved material handling and storage areas regularly as needed, to collect and dispose of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water.

#### **14. Eliminate illicit connections**

An illicit connection is formally defined in the city's NPDES Municipal Stormwater Permit, but generally includes any connection to the city stormwater system that is not intended, permitted, or used for collecting and conveying stormwater. A common problem with the stormwater drainage system for most communities is the existence of illicit connections of wastewater to the storm drainage system. Wastewater other than stormwater runoff, such as wash water, must be discharged to a wastewater collection system, and may not be discharged to a storm drainage system (the storm drainage system does not drain to a wastewater treatment plant). Many businesses and residences have internal building drains, sump overflows, process wastewater discharges, and even sanitary sewer and septic system pipes that were connected to the nearby storm drainage system in the past as a matter of course.



All businesses and residences must examine their plumbing systems to determine if illicit connections exist. Any time it is found that toilets, sinks, appliances, showers and bathtubs, floor drains, industrial process waters, and/or other indoor activities are connected to the stormwater drainage system, these connections must be immediately rerouted to the sanitary or septic system, holding tanks, or a process treatment system.

#### **15. Dispose of waste properly**

Every business and residence in the city must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally four options for disposal depending on the type of materials. These options include:

- Sanitary sewer and septic systems
  - Recycling facilities
  - Municipal solid waste disposal facilities
  - Hazardous waste treatment, storage, and disposal facilities
1. Warning signs (e.g., "Dump No Waste – Drains to Stream") shall be painted or embossed on or adjacent to all storm drain inlets. They shall be repainted as needed. Materials needed to undertake this task can be purchased or may be available from the Public Involvement Coordinator for the Department of Public Works.
  2. Sediment removed from basins, ponds and swales shall be disposed of in a proper manner. Contact the local governing jurisdiction for inspection prior to completing this task.
  3. No activities shall be conducted on site that are likely to result in short-term, highly concentrated discharge of pollution to the stormwater system. Such activities may include, but are not limited to, heavy vehicle maintenance and cleaning of equipment used in the periodic maintenance of buildings and paved surfaces.
  4. Use of pesticides and fertilizers shall be minimized.
  5. Do not dump paint, solvents, oils, or other such substances, including landscape waste, into storm drains or ponds. A local automotive service center may recycle oil and oil filters.

## **CITY OF LACEY**

### **STORMWATER POLLUTION SOURCE CONTROL CHECKLIST**

**Project Name: HATC Triplex**

*Check all activities that will occur at proposed project.*

- ☐ Boat/Ship Building, Repair or Maintenance (see BMP S401)
- ☐ Commercial Animal Handling (see BMP S402)
- ☐ Commercial Composting (see BMP S403)
- ☐ Commercial Printing Operations (see BMP S404)
- ☐ De-Icing and Anti-Icing Operations- Airport and Streets (see BMP S405)
- ☐ Streets/ Highways (see BMP S406)
  - ✓ Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots (see BMP S407)
- ☐ Dust Control at Manufacturing Areas (see BMP S408)
- ☐ Fueling at Dedicated Stations (see BMP S409)
  - ✓ Landscaping and Lawn/Vegetation Maintenance (see BMP S411)
- ☐ Loading and Unloading of potential pollutants (see BMP S412)
- ☐ Log Sorting and Handling (see BMP S413)
  - ✓ Maintenance and Repair of Vehicles and Equipment (see BMP S414)
- ☐ Maintenance of Public and Private Utility Corridors and Facilities (see BMP S415)
- ☐ Maintenance of Roadside Ditches (see BMP S416)
  - ✓ Maintenance of Stormwater Drainage and Treatment Systems (see BMP S417)
- ☐ Manufacturing Activities- Outside (see BMP S418)
- ☐ Mobile Fueling of Vehicles and Heavy Equipment (see BMP S419)
- ☐ Painting/Finishing/Coating of Vehicles/Boats/Buildings/Equipment (see BMP S420)
  - ✓ Parking and Storage of Vehicles and Equipment (see BMP S421)
- ☐ Railroad Yards (see BMP S422)
- ☐ Recyclers/Scrap Yards (see BMP S423)
  - ✓ Roof/Building Drains at Manufacturing and Commercial Buildings (see BMP S424)
- ☐ Erosion and Sediment Control at Commercial or Industrial Sites (see BMP S425)
  - ✓ Potential Spills of Oil or Hazardous Substances (see BMP S426)
- ☐ Storage of Liquids, Food Waste, or Dangerous Waste Containers (see BMP S427)
- ☐ Storage of Liquids in Permanent Aboveground Tanks (see BMP S428)
- ☐ Storage or Transfer (Outside) of Solid Raw Materials, By-products or Finished Products (see BMP S429)
- ☐ Urban Streets (see BMP S430)

- Washing and Steam Cleaning Vehicles/Equipment/Building Structures (see BMP S431)
- Wood Treatment Areas (see BMP S432)
- Spas, Pools, Hot Tubs, and Fountains (see BMP S433)

#### **S407 BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots**

**Description of Pollutant Sources:** Dust can cause air and water pollution problems particularly at demolition sites and in arid areas where reduced rainfall exposes soil particles to transport by air.

**Pollutant Control Approach:** Minimize dust generation and apply environmentally friendly and government approved dust suppressant chemicals, if necessary.

#### **Applicable Operational BMPs:**

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge.
- Use only local and/or state government approved dust suppressant chemicals such as those listed in Ecology Publication #96-433, *Techniques for Dust Prevention and Suppression*.
- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity such as irrigation.
- Apply stormwater containment to prevent the conveyance of sediment into storm drains or receiving waters.
- Ecology prohibits the use of motor oil for dust control. Take care when using lignin derivatives and other high BOD chemicals in areas susceptible to contaminating surface water or ground water.
- Consult with Ecology and the local permitting authority on discharge permit requirements if the dust suppression process results in a wastewater discharge to the ground, ground water, storm drain, or surface water.

#### **Recommended Additional Operational BMPs for Roadways and Other Trafficked Areas:**

- Consider limiting use of off-road recreational vehicles on dust generating land.
- Consider graveling or paving unpaved permanent roads and other trafficked areas at municipal, commercial, and industrial areas.
- Consider paving or stabilizing shoulders of paved roads with gravel, vegetation, or local government approved chemicals.
- Encourage use of alternate paved routes, if available.
- Vacuum sweep fine dirt and skid control materials from paved roads soon after winter weather ends or when needed.
- Consider using pre-washed traction sand to reduce dust emissions.

**Additional Recommended Operational BMPs for Dust Generating Areas:**

- Prepare a dust control plan. Helpful references include: Control of Open Fugitive Dust Sources (EPA-450/3-88-088), and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).
- Limit exposure of soil (dust source) as much as feasible.
- Stabilize dust-generating soil by growing and maintaining vegetation, mulching, topsoiling, and/or applying stone, sand, or gravel.
- Apply windbreaks in the soil such as trees, board fences, tarp curtains, bales of hay, etc.

**S411 BMPs for Landscaping and Lawn/Vegetation Management**

**Description of Pollutant Sources:** Landscaping can include grading, soil transfer, vegetation removal, pesticide and fertilizer applications, and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Lawn and vegetation management can include control of objectionable weeds, insects, mold, bacteria, and other pests with pesticides. Examples include weed control on golf course lawns, access roads, and utility corridors and during landscaping; sap stain and insect control on lumber and logs; rooftop moss removal; killing nuisance rodents; fungicide application to patio decks, and residential lawn/plant care. It is possible to release toxic pesticides such as pentachlorophenol, carbamates, and organometallics to the environment by leaching and dripping from treated parts, container leaks, product misuse, and outside storage of pesticide contaminated materials and equipment. Poor management of the vegetation and poor application of pesticides or fertilizers can cause appreciable stormwater contamination.

**Pollutant Control Approach:** Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Develop and implement an Integrated Pest Management Plan (IPM) and use pesticides only as a last resort. Carefully apply pesticides/ herbicides, in accordance with label instructions. Maintain appropriate vegetation, with proper fertilizer application where practicable, to control erosion and the discharge of stormwater pollutants. Where practicable grow plant species appropriate for the site, or adjust the soil properties of the subject site to grow desired plant species.

**Applicable Operational BMPs for Landscaping:**

- Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Do not dispose of collected vegetation into waterways or storm sewer systems.

**Recommended Additional Operational BMPs for Landscaping:**

- Conduct mulch-mowing whenever practicable
- Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.
- Use mulch or other erosion control measures on soils exposed for more than one week during the dry season or two days during the rainy season.

- Store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations when using oil or other chemicals. Ensure that employees are familiar with proper spill cleanup procedures.
- Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application rate for the types of soil and vegetation encountered.
- Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and drought-resistant plants.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

#### **Applicable Operational BMPs for the Use of Pesticides:**

- Develop and implement an IPM (See section on IPM in Applicable Operational BMPs for Vegetation Management) and use pesticides only as a last resort.
- Implement a pesticide-use plan and include at a minimum: a list of selected pesticides and their specific uses; brands, formulations, application methods and quantities to be used; equipment use and maintenance procedures; safety, storage, and disposal methods; and monitoring, record keeping, and public notice procedures. All procedures shall conform to the requirements of Chapter 17.21 RCW and Chapter 16-228 WAC(Appendix IV-D: Regulatory Requirements That Impact Stormwater Programs R.7).
- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should readily degrade in the environment and/or have properties that strongly bind it to the soil. Conduct any pest control activity at the life stage when the pest is most vulnerable. For example, if it is necessary to use a *Bacillus thuringiensis* application to control tent caterpillars, apply it to the material before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.
- Apply the pesticide according to label directions. Do not apply pesticides in quantities that exceed manufacturer's instructions.
- Mix the pesticides and clean the application equipment in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- Store pesticides in enclosed areas or in covered impervious containment. Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm sewers. Do not hose down the paved areas to a storm sewer or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.
- Clean up any spilled pesticides. Keep pesticide contaminated waste materials in designated covered and contained areas.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Spraying pesticides within 100 feet of open waters including wetlands, ponds, and rivers, streams, creeks, sloughs and any drainage ditch or channel that leads to open water may

have additional regulatory requirements beyond just following the pesticide product label. Additional requirements may include:

- Obtaining a discharge permit from Ecology.
- Obtaining a permit from the local jurisdiction.
- Using an aquatic labeled pesticide.
- Flag all sensitive areas including wells, creeks, and wetlands prior to spraying.
- Post notices and delineate the spray area prior to the application, as required by the local jurisdiction or by Ecology.
- Conduct spray applications during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

**Recommended Additional Operational BMPs for the use of pesticides:**

- Consider alternatives to the use of pesticides such as covering or harvesting weeds, substitute vegetative growth, and manual weed control/moss removal.
- Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants, such as Pythium root rot, ashy stem blight, and parasitic nematodes. The following are three possible mechanisms for disease control by compost addition (USEPA Publication 530-F-9-044):
  1. Successful competition for nutrients by antibiotic production;
  2. Successful predation against pathogens by beneficial microorganism; and
  3. Activation of disease-resistant genes in plants by composts.

*Installing an amended soil/landscape system can preserve both the plant system and the soil system more effectively. This type of approach provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working as an effective stormwater infiltration system and a sustainable nutrient cycle.*

- Once a pesticide is applied, evaluate its effectiveness for possible improvement. Records should be kept showing the effectiveness of the pesticides considered.
- Develop an annual evaluation procedure including a review of the effectiveness of pesticide applications, impact on buffers and sensitive areas (including potable wells), public concerns, and recent toxicological information on pesticides used/proposed for use. If individual or public potable wells are located in the proximity of commercial pesticide applications, contact the regional Ecology hydrogeologist to determine if additional pesticide application control measures are necessary.
- Rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.

*For more information, contact the Washington State University (WSU) Extension Home-Assist Program, (253) 445-4556, or Bio-Integral Resource Center (BIRC), P.O. Box 7414, Berkeley,*

CA.94707, or EPA to obtain a publication entitled "Suspended, Canceled, and Restricted Pesticides" which lists all restricted pesticides and the specific uses that are allowed.

**Applicable Operational BMPs for Vegetation Management:**

- Use at least an eight-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. Return natural plant debris and mulch to the soil, to continue recycling nutrients indefinitely.
- Select the appropriate turfgrass mixture for the climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. However, they do not, repel root-feeding lawn pests such as Crane Fly larvae, and are toxic to ruminants such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans. Endophytic grasses are commercially available; use them in areas such as parks or golf courses where grazing does not occur. Local agricultural or gardening resources such as Washington State University Extension office can offer advice on which types of grass are best suited to the area and soil type.
- Use the following seeding and planting BMPs, or equivalent BMPs to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, BMP C123: Plastic Covering, and BMP C124: Sodding.
- Adjusting the soil properties of the subject site can assist in selection of desired plant species. For example, design a constructed wetland to resist the invasion of reed canary grass by layering specific strata of organic matters (e.g., composted forest product residuals) and creating a mildly acidic pH and carbon-rich soil medium. Consult a soil restoration specialist for site-specific conditions.
- Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Conduct aeration while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than ¾-inch deep.
- Mowing is a stress-creating activity for turfgrass. Grass decreases its productivity when mown too short and there is less growth of roots and rhizomes. The turf becomes less tolerant of environmental stresses, more disease prone and more reliant on outside means such as pesticides, fertilizers, and irrigation to remain healthy. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf. Generally mowing only 1/3 of the grass blade height will prevent stressing the turf.



***Irrigation:***

- The depth from which a plant normally extracts water depends on the rooting depth of the plant. Appropriately irrigated lawn grasses normally root in the top 6 to 12 inches of soil; lawns irrigated on a daily basis often root only in the top 1 inch of soil. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. The amount of water applied depends on the normal rooting depth of the turfgrass species used, the available water holding capacity of the soil, and the efficiency of the irrigation system. Consult with the local water utility, Conservation District, or Cooperative Extension office to help determine optimum irrigation practices.

***Fertilizer Management:***

- Turfgrass is most responsive to nitrogen fertilization, followed by potassium and phosphorus. Fertilization needs vary by site depending on plant, soil, and climatic conditions. Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization. For details on soils testing, contact the local Conservation District, a soils testing professional, or a Washington State University Extension office.
- Apply fertilizers in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters. Do not fertilize when the soil is dry. Alternatively, do not apply fertilizers within three days prior to predicted rainfall. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs.
- Use slow release fertilizers such as methylene urea, IDBU, or resin coated fertilizers when appropriate, generally in the spring. Use of slow release fertilizers is especially important in areas with sandy or gravelly soils.
- Time the fertilizer application to periods of maximum plant uptake. Ecology generally recommends application in the fall and spring, although Washington State University turf specialists recommend four fertilizer applications per year.
- Properly trained persons should apply all fertilizers. Apply no fertilizer at commercial and industrial facilities, to grass swales, filter strips, or buffer areas that drain to sensitive water bodies unless approved by the local jurisdiction.

***Integrated Pest Management***

An IPM program might consist of the following steps:

Step 1: Correctly identify problem pests and understand their life cycle

Step 2: Establish tolerance thresholds for pests.

Step 3: Monitor to detect and prevent pest problems.

Step 4: Modify the maintenance program to promote healthy plants and discourage pests.

Step 5: Use cultural, physical, mechanical or biological controls first if pests exceed the tolerance thresholds.

Step 6: Evaluate and record the effectiveness of the control and modify maintenance practices to support lawn or landscape recovery and prevent recurrence.

For an elaboration of these steps, refer to Appendix IV-F: Example of an Integrated Pest Management Program.

#### **S414 BMPs for Maintenance and Repair of Vehicles and Equipment**

**Description of Pollutant Sources:** Pollutant sources include parts/vehicle cleaning, spills/leaks of fuel and other liquids, replacement of liquids, outdoor storage of batteries/liquids/parts, and vehicle parking.

**Pollutant Control Approach:** Control of leaks and spills of fluids using good housekeeping and cover and containment BMPs.

##### **Applicable Operational BMPs:**

- Inspect all incoming vehicles, parts, and equipment stored temporarily outside for leaks.
- Use drip pans or containers under parts or vehicles that drip or that are likely to drip liquids, such as during dismantling of liquid containing parts or removal or transfer of liquids.
- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.
- Remove liquids from vehicles retired for scrap.
- Empty oil and fuel filters before disposal. Provide for proper disposal of waste oil and fuel.
- Do not pour/convey washwater, liquid waste, or other pollutants into storm drains or to surface water. Check with the local sanitary sewer authority for approval to convey water to a sanitary sewer.
- Do not connect maintenance and repair shop floor drains to storm drains or to surface water.
- To allow for snowmelt during the winter, install a drainage trench with a sump for particulate collection. Use the drainage trench for draining the snowmelt only and not for discharging any vehicular or shop pollutants.

##### **Applicable Structural Source Control BMPs:**

- Conduct all maintenance and repair of vehicles and equipment in a building, or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated water.
- Operators may conduct maintenance of refrigeration engines in refrigerated trailers in the parking area. Exercise due caution to avoid the release of engine or refrigeration fluids to storm drains or surface water.
- Park large mobile equipment, such as log stackers, in a designated contained area.

##### **Additional applicable BMPs:**

- S409 BMPs for Fueling At Dedicated Stations

- S410 BMPs for Illicit Connections to Storm Drains
- S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material
- S426 BMPs for Spills of Oil and Hazardous Substances
- S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers
- S428 BMPs for Storage of Liquids in Permanent Aboveground Tanks
- S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products
- S431 BMPs for Washing and Steam Cleaning Vehicles/ Equipment/ Building Structures

**Applicable Treatment BMPs:** Convey contaminated stormwater runoff from vehicle staging and maintenance areas to a sanitary sewer, if allowed by the local sewer authority, or to an API or CP oil and water separator followed by a basic treatment BMP (See Volume V), applicable filter, or other equivalent oil treatment system.

*Note this applicable treatment BMP for contaminated stormwater.*

**Recommended Additional Operational BMPs:**

- Store damaged vehicles inside a building or other covered containment, until successfully removing all liquids.
- Clean parts with aqueous detergent based solutions or non-chlorinated solvents such as kerosene or high flash mineral spirits, and/or use wire brushing or sand blasting whenever practicable. Avoid using toxic liquid cleaners such as methylene chloride, 1,1,1-trichloroethane, trichloroethylene or similar chlorinated solvents. Choose cleaning agents that can be recycled.
- Inspect all BMPs regularly, particularly after a significant storm. Identify and correct deficiencies to ensure that the BMPs are functioning as intended.
- Avoid hosing down work areas. Use dry methods for cleaning leaked fluids.
- Recycle greases, used oil, oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic fluids, transmission fluids, and engine oils (see Appendix IV-C: Recycling/Disposal of Vehicle Fluids/Other Wastes\*).
- Do not mix dissimilar or incompatible waste liquids stored for recycling.

**S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems**

**Description of Pollutant Sources:** Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil/water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Oil and grease, hydrocarbons, debris, heavy metals, sediments and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

**Pollutant Control Approach:** Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

**Applicable Operational BMPs:**

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in V-4.6 Maintenance Standards for Drainage Facilities in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O&M improvements.
- Promptly repair any deterioration threatening the structural integrity of stormwater facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure adequacy of storm sewer capacities and prevent heavy sediment discharges to the sewer system.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to an appropriate local or state government approved disposal site.
- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than six inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may have as little as 12 inches sediment storage below the invert. These catch basins need frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.
- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catch basin.
- Post warning signs; "Dump No Waste - Drains to Ground Water," "Streams," "Lakes," or emboss on or adjacent to all storm drain inlets *where possible*.
- Disposal of sediments and liquids from the catch basins must comply with Appendix IV-G: Recommendations for Management of Street Wastes.

**Additional Applicable BMPs:** Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility. Those BMPs include:

- S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites
- S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers
- S426 BMPs for Spills of Oil and Hazardous Substances
- S410 BMPs for Illicit Connections to Storm Drains
- S430 BMPs for Urban Streets

## **S421 BMPs for Parking and Storage of Vehicles and Equipment**

**Description of Pollutant Sources:** Public and commercial parking lots such as retail store, fleet vehicle (including rent-a-car lots and car dealerships), equipment sale and rental parking lots, and parking lot driveways, can be sources of toxic hydrocarbons and other organic compounds, including oils and greases, metals, and suspended solids.

**Pollutant Control Approach:** If the parking lot is a **high-use site** as defined below, provide appropriate oil removal equipment for the contaminated stormwater runoff.

### **Applicable Operational BMPs:**

- If washing a parking lot, discharge the washwater to a sanitary sewer, if allowed by the local sewer authority, or other approved wastewater treatment system, or collect washwater for off-site disposal.
- Do not hose down the area to a storm sewer or receiving water. Vacuum sweep parking lots, storage areas, and driveways regularly to collect dirt, waste, and debris.

**Applicable Treatment BMPs:** An oil removal system such as an API or CP oil and water separator, catch basin filter, or equivalent BMP, approved by the local jurisdiction, is necessary for parking lots meeting the threshold vehicle traffic intensity level of a high-use site.

### **Vehicle High-Use Sites**

Establishments subject to vehicle high-use intensity are significant sources of oil contamination of stormwater. Examples of potential high use areas include customer parking lots at fast food stores, grocery stores, taverns, restaurants, large shopping malls, discount warehouse stores, quick-lube shops, and banks. If the PGIS for a high-use site exceeds 5,000 square feet in a threshold discharge area, an oil control BMP from the Oil Control Menu (in Volume V) is necessary. A high-use site at a commercial or industrial establishment has one of the following characteristics: (Gaus/King County, 1994)

- Is subject to an expected average daily vehicle traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area: or
- Is subject to storage of a fleet of 25 or more diesel vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.).

## **S424 BMPs for Roof/ Building Drains at Manufacturing and Commercial Buildings**

**Description of Pollutant Sources:** Stormwater runoff from roofs and sides of manufacturing and commercial buildings can be sources of pollutants caused by leaching of roofing materials, building vents, and other air emission sources. Research has identified vapors and entrained liquid and solid droplets/particles as potential pollutants in roof/building runoff. Metals, solvents, acidic/alkaline pH, BOD, and organics, are some of the pollutant constituents identified.

Ecology has performed a study on zinc in industrial stormwater. The study is presented in Ecology Publication 08-10-025 *Suggested Practices to reduce Zinc Concentrations in Industrial Stormwater Discharges*, website: <https://fortress.wa.gov/ecy/publications/summarypages/0810025.html>. The user should refer to this document for more details on addressing zinc in stormwater.

**Pollutant Control Approach:** Evaluate the potential sources of stormwater pollutants and apply source control BMPs where feasible.

**Applicable Operational Source Control BMPs:**

- If leachates and/or emissions from buildings are suspected sources of stormwater pollutants, then sample and analyze the stormwater draining from the building.
- Sweep the area routinely to remove any zinc residuals.
- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures such as air pollution control equipment, selection of materials, operational changes, material recycle, process changes, etc.

**Applicable Structural Source Control BMPs:**

- Paint/coat the galvanized surfaces as described in Ecology Publication # 08-10-025.

**Applicable Treatment BMPs:**

Treat runoff from roofs to the appropriate level. The facility may use enhanced treatment BMPs as described in Volume V. Some facilities regulated by the Industrial Stormwater General Permit, or local jurisdiction, may have requirements that cannot be achieved with enhanced treatment BMPs. In these cases, additional treatment measures may be required. A treatment method for meeting stringent requirements such as Chitosan-Enhanced Sand Filtration may be appropriate.

**S426 BMPs for Spills of Oil and Hazardous Substances**

**Description of Pollutant Sources:** Federal law requires owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining, or consuming oil and/or oil products to have a Spill Prevention and Emergency Cleanup Plan (SPECP). The SPECP is required if the above ground storage capacity of the facility, is 1,320 gallons or more of oil. Additionally, the SPECP is required if any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines {40 CFR 112.1 (b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. State Law requires owners of businesses that produce dangerous wastes to have a SPECP. These businesses should refer to Appendix IV-D: Regulatory Requirements That Impact Stormwater ProgramsR.6. The federal definition of oil is oil of any kind or any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

**Pollutant Control Approach:** Maintain, update, and implement a Spill Prevention and Emergency Cleanup Plan.

**Applicable Operational BMPs:** The businesses and public agencies identified in Appendix IV-A: Urban Land Uses and Pollutant Generating Sources required to prepare and implement a Spill Prevention and Emergency Cleanup Plan shall implement the following:

- Prepare a Spill Prevention and Emergency Cleanup Plan (SPECP), which includes:
  - A description of the facility including the owner's name and address.
  - The nature of the activity at the facility.

- The general types of chemicals used or stored at the facility.
  - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves.
  - Cleanup procedures.
  - Notification procedures used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified.
  - The name of the designated person with overall spill cleanup and notification responsibility.
- Train key personnel in the implementation of the SPEC. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to contact in the event of a spill.
  - Update the SPEC regularly.
  - Immediately notify Ecology, the local jurisdiction, and the local Sewer Authority if a spill may reach sanitary or storm sewers, ground water, or surface water, in accordance with federal and Ecology spill reporting requirements.
  - Immediately clean up spills. Do not use emulsifiers for cleanup unless there is an appropriate disposal method for the resulting oily wastewater. Do not wash absorbent material down a floor drain or into a storm sewer.
  - Locate emergency spill containment and cleanup kit(s) in high-potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

**Recommended Additional Operational BMP:** Spill kits should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids where applicable. In fueling areas: Package absorbent material in small bags for easy use and make available small drums for storage of absorbent and/or used absorbent. Deploy spill kits in a manner that allows rapid access and use by employees.

## 8. Annual Cost of Maintenance

TO BE COMPLETED WITH CONSTRUCTION DOCUMENTS.



Construction Stormwater General Permit

# Stormwater Pollution Prevention Plan (SWPPP)

for

## GATEWAY MULTI-FAMILY COMPLEX

Prepared for:

The Washington State Department of Ecology  
*Southwest Regional Office*

| Permittee / Owner   | Developer           | Operator / Contractor |
|---------------------|---------------------|-----------------------|
| Freestone Companies | Freestone Companies | TBD                   |

Site Address: 7235 32 Ave NE, Lacey, WA

### Certified Erosion and Sediment Control Lead (CESCL)

| Name | Organization | Contact Phone Number |
|------|--------------|----------------------|
| TBD  | TBD          | TBD                  |

### SWPPP Prepared By

| Name                | Organization               | Contact Phone Number |
|---------------------|----------------------------|----------------------|
| Lance Talmadge, EIT | Hatton Godat Pantier, Inc. | (360) 943-1599       |

### SWPPP Preparation Date

May 2020

### Project Construction Dates

| Activity / Phase | Start Date | End Date |
|------------------|------------|----------|
| Clearing/Grading | TBD        | TBD      |
| Construction     | TBD        | TBD      |
| Stabilization    | TBD        | TBD      |

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## List of Acronyms and Abbreviations

---

| <b>Acronym / Abbreviation</b> | <b>Explanation</b>                                                |
|-------------------------------|-------------------------------------------------------------------|
| <b>303(d)</b>                 | Section of the Clean Water Act pertaining to Impaired Waterbodies |
| <b>BFO</b>                    | Bellingham Field Office of the Department of Ecology              |
| <b>BMP(s)</b>                 | Best Management Practice(s)                                       |
| <b>CESCL</b>                  | Certified Erosion and Sediment Control Lead                       |
| <b>CO<sub>2</sub></b>         | Carbon Dioxide                                                    |
| <b>CRO</b>                    | Central Regional Office of the Department of Ecology              |
| <b>CSWGP</b>                  | Construction Stormwater General Permit                            |
| <b>CWA</b>                    | Clean Water Act                                                   |
| <b>DMR</b>                    | Discharge Monitoring Report                                       |
| <b>DO</b>                     | Dissolved Oxygen                                                  |
| <b>Ecology</b>                | Washington State Department of Ecology                            |
| <b>EPA</b>                    | United States Environmental Protection Agency                     |
| <b>ERO</b>                    | Eastern Regional Office of the Department of Ecology              |
| <b>ERTS</b>                   | Environmental Report Tracking System                              |
| <b>ESC</b>                    | Erosion and Sediment Control                                      |
| <b>GULD</b>                   | General Use Level Designation                                     |
| <b>NPDES</b>                  | National Pollutant Discharge Elimination System                   |
| <b>NTU</b>                    | Nephelometric Turbidity Units                                     |
| <b>NWRO</b>                   | Northwest Regional Office of the Department of Ecology            |
| <b>pH</b>                     | Power of Hydrogen                                                 |
| <b>RCW</b>                    | Revised Code of Washington                                        |
| <b>SPCC</b>                   | Spill Prevention, Control, and Countermeasure                     |
| <b>su</b>                     | Standard Units                                                    |
| <b>SWMMEW</b>                 | Stormwater Management Manual for Eastern Washington               |
| <b>SWMMWW</b>                 | Stormwater Management Manual for Western Washington               |
| <b>SWPPP</b>                  | Stormwater Pollution Prevention Plan                              |
| <b>TESC</b>                   | Temporary Erosion and Sediment Control                            |
| <b>SWRO</b>                   | Southwest Regional Office of the Department of Ecology            |
| <b>TMDL</b>                   | Total Maximum Daily Load                                          |
| <b>VFO</b>                    | Vancouver Field Office of the Department of Ecology               |
| <b>WAC</b>                    | Washington Administrative Code                                    |
| <b>WSDOT</b>                  | Washington Department of Transportation                           |
| <b>WWHM</b>                   | Western Washington Hydrology Model                                |

## 1 Project Information

Project/Site Name: Gateway Multifamily Complex  
Street/Location: 7235 32 Ave NE, Lacey, WA  
City: Lacey State: WA Zip code: 98501  
Subdivision: N/A  
Receiving waterbody: N/A

### 1.1 Existing Conditions

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: 9.54  
Disturbed acreage: 9.54  
Existing structures: Three single family homes with outbuildings and utilities.  
Landscape: Existing lawn areas. Native vegetation and shrubs.  
  
Topography: High at 212 on southern property line. Low at 190+/- along northern property line at 32<sup>nd</sup> avenue. Approximately 3-5% slopes across site.

Drainage patterns: Sheet flow south to north.

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes): None

List of known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody: None

Table 1 includes a list of suspected and/or known contaminants associated with the construction activity.

**Table 1 – Summary of Site Pollutant Constituents**

| Constituent<br>(Pollutant) | Location | Depth | Concentration |
|----------------------------|----------|-------|---------------|
|                            |          |       |               |
|                            |          |       |               |
|                            |          |       |               |
|                            |          |       |               |
|                            |          |       |               |

## **1.2 Proposed Construction Activities**

### **Description of site development (example: subdivision):**

183-unit multifamily complex with associated utilities and improvements. 12 Apartment buildings and an office and recreation area included.

### **Description of construction activities (example: site preparation, demolition, excavation):**

Site Preparation, demolition, grading, paving, construction. Installation of wet and dry utilities.

### **Description of site drainage including flow from and onto adjacent properties. Must be consistent with Site Map in Appendix A:**

Sheet flow south to north. Dispersion and infiltration on site with ponding along the ditch line at 32<sup>nd</sup> avenue. Large inlet catch basin and 24" bypass pipe runs along the frontage.

### **Description of final stabilization (example: extent of revegetation, paving, landscaping):**

Final stabilization will include utility installation, paving, building construction, construction of drainage facilities and installation of landscaping/lighting.

### ***Contaminated Site Information:***

**Proposed activities regarding contaminated soils or groundwater (example: on-site treatment system, authorized sanitary sewer discharge):**

N/A

## **2 Construction Stormwater Best Management Practices (BMPs)**

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e., hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

### **2.1 The 13 Elements**

#### **2.1.1 Element 1: Preserve Vegetation / Mark Clearing Limits**

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Trees that are to be preserved shall be clearly delineated, both in the field and on the plans. Protected vegetation will be confirmed by the City of Lacey Urban Forester.

In general, natural vegetation and native topsoil shall be retained in an undisturbed state to the maximum extent possible. Natural vegetation within the wetlands must be retained within the marked high intensity buffers. Grading activities may occur within the outer 25 feet of the buffer line but grades and vegetation must be returned to their native condition. The BMPs relevant to marking the clearing limits that will be applied for this project include:

- High Visibility Plastic or Metal Fence (BMP C103)
- Silt Fence (BMP C233)

The contractor shall install High Visibility Plastic or Metal Fencing and paint the top 2-feet of fence posts with bright pink or orange paint along the construction limits. With City of Lacey Inspector approval, the contractor may combine clearing limits fencing and filter fabric fencing into a single product by using orange filter fabric fence where it is needed and orange plastic fencing where filter fabric fencing is not shown on the approved Temporary Erosion and Sediment Control Plans.



### **2.1.2 Element 2: Establish Construction Access**

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (BMP C105)

Install stabilized construction entrances at the locations and per the details shown on the approved Temporary Erosion and Sediment Control Plans. An existing driveway/road will serve access to onsite construction activities. This stabilized entrance is part of the overall parcel and will keep sediment onsite. Construction traffic will be restricted to a single entry. The contractor shall designate a construction road/parking area stabilization as shown on the plans or locate one deemed suitable for construction activities.

Alternate construction access BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

#### **Alternate BMPs**

### 2.1.3 Element 3: Control Flow Rates

Construction flow are not to leave the site without first passing through a flow control BMP. Sediment traps are designated throughout the site. Proposed ponds and bioretention swales may serve as sediment traps provided excavation of the design bottom occurs after site stabilization and removal of all construction sediments has occurred. BMPs for flow control include:

- Sediment Trap (BMP C240)
- Level Spreader (BMP C206)
- Interceptor Dike and Swale (BMP 200)

Alternate flow control BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, the project must comply with Minimum Requirement 7 (Ecology 2005). In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements (e.g. discharge to combined sewer systems).

Will you construct stormwater retention and/or detention facilities?

☒ Yes ☐ No

Will you use permanent infiltration ponds or other low impact development (example: rain gardens, bio-retention, porous pavement) to control flow during construction?

☒ Yes ☐ No

#### **Alternate BMPs**

- Temporary Sediment Pond (BMP C241)
- Wattles (BMP C235)

### **2.1.4 Element 4: Install Sediment Controls**

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Storm Drain Inlet Protection (BMP C220)
- Silt Fence (BMP C233)
- Temporary Sediment Pond (BMP 241)

Install Filter Fabric Fencing/Silt Fence at locations shown and per the details and notes on the approved Temporary Erosion and Sediment Control Plans. Install Storm Drain Inlet Protection/Inlet Sediment Protection/Catch Basin Inserts into all catch basins/curb inlets/storm drain inlets within 500-feet of the site.

Alternate sediment control BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

In addition, sediment will be removed from paved areas in and adjacent to construction work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize washoff of sediments from adjacent streets in runoff.

#### **Alternate BMPs**

- Interceptor Dike and Swale (BMP 200)

### 2.1.5 Element 5: Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)

The project site is located west of the Cascade Mountain Crest. From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast. These stabilization requirements apply to all soils on site, whether at final grade or not. The local permitting authority may adjust these time limits if it can be shown that a development site's erosion and runoff potential justifies a different standard.

From October 1 through April 30, clearing, grading, and other soil-disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that the transportation of sediment from the construction site to receiving waters will be prevented.

In general, cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting or seeded and mulched. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

Alternate soil stabilization BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

#### **West of the Cascade Mountains Crest**

| Season                | Dates                | Number of Days Soils Can be Left Exposed |
|-----------------------|----------------------|------------------------------------------|
| During the Dry Season | May 1 – September 30 | 7 days                                   |
| During the Wet Season | October 1 – April 30 | 2 days                                   |

Anticipated project dates: TBD

Will you construct during the wet season?

☐ Yes ☒ No

### **Alternate BMPs**

- Sodding (BMP C124)
- Topsoiling/Composting (BMP C125)
- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)

### **2.1.6 Element 6: Protect Slopes**

All cut and fill slopes will be designed, constructed, and protected in a manner than minimizes erosion. The following specific BMPs will be used to protect slopes for this project:

- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Surface Roughening (BMP C130)

All disturbed areas shall be seeded and mulched per the notes and details in the approved Temporary Erosion and Sediment Control Plans and in BMPs C120 and C121. In no case shall soils remain unworked and unstabilized for more than 7 days during the dry season (May 1 to September 30) or more than 2 days during the wet season ( October 1 to April 30).

Alternate slope protection BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

Will steep slopes be present at the site during construction?

☐ Yes ☒ No

### **Alternate BMPs**

- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)

### **2.1.7 Element 7: Protect Drain Inlets**

All storm drain inlets and culverts made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets and culverts that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

- Storm Drain Inlet Protection (BMP C220)

Inlet protection is the last component of a treatment train and protection of drain inlets include additional sediment and erosion control measures. Inlet protection devices will be cleaned (or removed and replaced), when sediment has filled the device by one third (1/3) or as specified by the manufacturer.

Inlets will be inspected weekly at a minimum and daily during storm events.

### **2.1.8 Element 8: Stabilize Channels and Outlets**

The project is anticipated to take place during the dry season and the topography of the site is flat. No flows are anticipated to leave the construction site. If flows are observed to be leaving the site refer to and implement the following BMPs from the alternate list.

If runoff is downstream runoff occurs, the following process will be implemented. Conveyance channels will be designed, constructed and stabilized. The 10-year, 1-hour peak flow rate indicated by an approved continuous runoff simulation model, increased by a factor of 1.6, will be used for outlet protection. Stabilization, including armoring material, adequate to prevent erosion of outlets shall be provided at the outlets of all conveyance systems.

Alternate channel and outlet stabilization BMPs are included in Appendix B as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix E). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix E), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix B after the first sign that existing BMPs are ineffective or failing.

#### **Alternate BMPs**

- Nets and Blankets (BMP C122)



### 2.1.9 Element 9: Control Pollutants

The following pollutants are anticipated to be present on-site:

**Table 2 – Pollutants**

| Pollutant (List pollutants and source, if applicable) |
|-------------------------------------------------------|
|                                                       |
|                                                       |
|                                                       |
|                                                       |
|                                                       |
|                                                       |
|                                                       |

All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. BMPs to be implemented to control specific sources of pollutants are discussed below.

Maintenance, fueling, and/or repair of heavy equipment and vehicles required to occur on-site shall follow the requirements listed below. If the contractor chooses to store fueling tanks or petroleum product storage containers onsite, they will amend this SWPPP to provide total volume of fuel stored onsite, the capacity of the second containment for each tank, and provide a Spill Prevention, Control, and Countermeasure (SPCC) Plan which complies with the Federal regulations of the Clean Water Act (CWA).

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.
- On-site fueling tanks and petroleum product storage containers shall include secondary containment.
- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.
- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.
- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?

☐ Yes ☒ No

Will wheel wash or tire bath system BMPs be used during construction?

☐ Yes ☒ No

Will pH-modifying sources be present on-site?

☒ Yes ☐ No If yes, check the source(s).

**Table 3 – pH-Modifying Sources**

|                                     |                                                           |
|-------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/>            | None                                                      |
| <input type="checkbox"/>            | Bulk cement                                               |
| <input type="checkbox"/>            | Cement kiln dust                                          |
| <input type="checkbox"/>            | Fly ash                                                   |
| <input type="checkbox"/>            | Other cementitious materials                              |
| <input type="checkbox"/>            | New concrete washing or curing waters                     |
| <input checked="" type="checkbox"/> | Waste streams generated from concrete grinding and sawing |
| <input type="checkbox"/>            | Exposed aggregate processes                               |
| <input type="checkbox"/>            | Dewatering concrete vaults                                |
| <input type="checkbox"/>            | Concrete pumping and mixer washout waters                 |
| <input type="checkbox"/>            | Recycled concrete                                         |
| <input type="checkbox"/>            | Recycled concrete stockpiles                              |
| <input type="checkbox"/>            | Other (i.e., calcium lignosulfate) [please describe: ]    |

Demolition:

- Dust from construction activities will be controlled using Dust Control Measures (BMP C140).
- Storm drain inlets vulnerable to stormwater discharge carrying dust, soil, or debris will be protected using Storm Drain Inlet Protection (BMP C220 as described above for Element 7).
- Process water and slurry resulting from sawcutting and surfacing operations will be prevented from entering the waters of the State by implementing Sawcutting and Surfacing Pollution Prevention measures (BMP C152).

Concrete and grout:

- Process water and slurry resulting from concrete work will be prevented from entering the waters of the State by implementing Concrete Handling measures (BMP C151).
- Conduct concrete work in designated Concrete Washout Area (BMP C154)

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Will uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters?

☐ Yes ☒ No

Sanitary wastewater:

- Portable sanitation facilities will be firmly secured, regularly maintained, and emptied when necessary.

Solid Waste:

- Solid waste will be stored in secure, clearly marked containers.

Other:

- Other BMPs will be administered as necessary to address any additional pollutant sources on site.

### **2.1.10 Element 10: Control Dewatering**

Discharge foundation, vault, and trench de-watering water, which has similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond.

Discharge clean, non-turbid de-watering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.

Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.

Other treatment or disposal options may include:

1. Infiltration.
2. Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
3. Ecology-approved on-site chemical treatment or other suitable treatment technologies.
4. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
5. Use of a sedimentation bag that discharges to a ditch or swale for small volumes of localized dewatering.

### **2.1.11 Element 11: Maintain BMPs**

Maintain and repair all temporary and permanent Construction SWPPP BMPs as needed to ensure continued performance of their intended function in accordance with BMP specifications.

Remove all temporary Construction SWPPP BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed. Note: Some temporary Construction SWPPP BMPs are biodegradable and designed to remain in place following construction, such as compost socks. Provide protection to all BMPs installed for the permanent control of stormwater from sediment and compaction. All BMPs that are to remain in place following completion of construction shall be examined and placed in full operating conditions. If sediment enters the BMPs during construction, it shall be removed; and the facility shall be returned to the conditions specified in the construction documents.

Remove or stabilize trapped sediment on site, or remove sediment and dispose of it off site if sediment cannot be worked into the project site. Permanently stabilize disturbed soil resulting from removal of BMPs or vegetation. Implement the following BMPs:

- Materials on Hand (BMP C150)
- Certified Erosion and Sediment Control Lead (BMP C160)

### **2.1.12 Element 12: Manage the Project**

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:
  - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
  - Site inspections and monitoring will be conducted in accordance with Special Condition S4 of the CSWGP. Sampling locations are indicated on the [Site Map](#). Sampling station(s) are located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
  - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.
- Schedule major earthwork during the dry season.

In addition, project management will incorporate the key components listed below:

As this project site is located west of the Cascade Mountain Crest, the project will be managed according to the following key project components:

#### Phasing of Construction

- The construction project is being phased to the extent practicable in order to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.
- Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C 162).

#### Seasonal Work Limitations

- From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:
  - Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
  - Limitations on activities and the extent of disturbed areas; and
  - Proposed erosion and sediment control measures.
- Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance.

- The following activities are exempt from the seasonal clearing and grading limitations:
  - Routine maintenance and necessary repair of erosion and sediment control BMPs;
  - Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and
  - Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

#### Coordination with Utilities and Other Jurisdictions

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

#### Inspection and Monitoring

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:
  - Assess the site conditions and construction activities that could impact the quality of stormwater, and
  - Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.
- Whenever inspection and/or monitoring reveals that the BMPs identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

#### Maintaining an Updated Construction SWPPP

- This SWPPP shall be retained on-site or within reasonable access to the site.



- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.
- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

### **2.1.13 Element 13: Protect Low Impact Development BMPs**

Low Impact Development (LID) BMP's for this site include all lawn, landscape areas and, bioretention swales. Protect all completed LID BMPs from compaction, excavation and all other construction activities to the greatest extent possible. Clearly mark and protect completed LID areas from construction traffic. Mark lawn and landscape areas with High Visibility Plastic or Metal Fencing. Provide buffer zones to ensure construction activities remain off the lawn and landscape areas. Keep grading to a minimum, incorporate natural topography where applicable.

Implement the following BMPs:

1. Clearly mark and protect completed LID areas from construction traffic.
2. Mark LID areas with high visibility plastic or metal fencing.
3. Provide buffer zones to ensure construction activities
4. Clearly document and plan to meet and walk through the site with equipment operations prior to construction to clarify construction boundaries, limits of disturbance and construction activities in the vicinity of LID areas.
5. General/primary construction must inform other subcontractors of applicable LID BMP protection requirements.
6. Complete construction and erosion control activities in one section of the site before beginning activity in another section.
7. Preserve any portion of the site with permeable soils to promote infiltration of stormwater runoff.
8. Leave areas of rich topsoil in place, or if excavated, utilize elsewhere on the site to amend areas with sparse or nutrient deficient topsoil.
9. Bioretention swales shall be begin operation until all erosion causing project improvements (including removal of the gravel access road) are completed and all exposed ground surfaces are stabilized by revegetation or landscaping.
10. If machinery must operate in the bioretention area for excavation, use lightweight, low ground-contact pressure equipment and rip the base of at completion to scarify soil to a minimum of 12 inches.
11. Check for compaction prior to planting. If compaction occurs, aerate the bioretention soil and then proceed to plant.

### **Implement BMPs**

- Buffer Zone (BMP C102)
- High Visibility Fence (BMP C103)
- Silt Fence (BMP C233)

### **Alternate BMPs**

- Wattles (BMP C235)
- Interceptor Dike and Swale (BMP C200)

## **3 Pollution Prevention Team**

**Table 7 – Team Information**

| <b>Title</b>                                               | <b>Name(s)</b>                     | <b>Phone Number</b> |
|------------------------------------------------------------|------------------------------------|---------------------|
| <b>Certified Erosion and Sediment Control Lead (CESCL)</b> | TBD                                | TBD                 |
| <b>Resident Engineer</b>                                   | Hatton Godat Pantier -Steve Hatton | (360) 943-1599      |
| <b>Emergency Ecology Contact</b>                           | TBD                                | TBD                 |
| <b>Emergency Permittee/ Owner Contact</b>                  | TBD                                | TBD                 |
| <b>Non-Emergency Owner Contact</b>                         | Freestone Companies                | 253-896-1300        |
| <b>Monitoring Personnel</b>                                | TBD                                | TBD                 |
| <b>Ecology Regional Office</b>                             | Southwest Regional Office          | (360) 407-6300      |

## 4 Monitoring and Sampling Requirements

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book but must be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

### 4.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a Certified Erosion and Sediment Control Lead (CESCL) per BMP C160. The name and contact information for the CESCL is provided in Section 5 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The site inspector will record each site inspection using the site log inspection forms provided in Appendix D. The site inspection log forms may be separated from this SWPPP document, but will be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

There are no planned discharge point(s) from the site, although runoff from the site could occur south of the storm pond, east of the building, or at either entrance. The south and east property lines should be monitored for signs that sediment laden water is/has left the site, and BMPs should be modified to prevent this from happening.

## 4.2 Stormwater Quality Sampling

### 4.2.1 Turbidity Sampling

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Inspection/sampling will be conducted when/where any discharge is notice from the site.

Method for sampling turbidity:

**Table 8 – Turbidity Sampling Method**

|                                     |                                                                                        |
|-------------------------------------|----------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)    |
| <input type="checkbox"/>            | Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size) |

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU or the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU or the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours.
  - **Southwest Region** (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum,): (360) 407-6300 or [http://www.ecy.wa.gov/programs/spills/forms/nerts\\_online/SWRO\\_nerts\\_online.html](http://www.ecy.wa.gov/programs/spills/forms/nerts_online/SWRO_nerts_online.html)
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
  - Turbidity is 25 NTU (or lower).
  - Transparency is 33 cm (or greater).

- Compliance with the water quality limit for turbidity is achieved.
  - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
  - 1% - 10% over background turbidity, if background is 50 NTU or greater
- The discharge stops or is eliminated.

#### 4.2.2 pH Sampling

pH monitoring is required for "Significant concrete work" (i.e., greater than 1000 cubic yards poured concrete over the life of the project). The use of recycled concrete or engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO<sub>2</sub>) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO<sub>2</sub> sparging or dry ice.

Method for sampling pH:

**Table 9 – pH Sampling Method**

|                                     |                               |
|-------------------------------------|-------------------------------|
| <input type="checkbox"/>            | pH meter                      |
| <input type="checkbox"/>            | pH test kit                   |
| <input checked="" type="checkbox"/> | Wide range pH indicator paper |

## **5 Discharges to 303(d) or Total Maximum Daily Load (TMDL) Waterbodies**

### **5.1 303(d) Listed Waterbodies**

There are no planned discharge points from this project, though construction stormwater could sheet flow away from landscaped areas.

Is the receiving water 303(d) (Category 5) listed for turbidity, fine sediment, phosphorus, or pH?

☐ Yes ☒ No

List the impairment(s): N/A

### **5.2 TMDL Waterbodies**

Waste Load Allocation for CWSGP discharges: N/A

List and describe BMPs: N/A

## **6 Reporting and Record Keeping**

### **6.1 Record Keeping**

#### **6.1.1 Site Log Book**

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

#### **6.1.2 Records Retention**

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

#### **6.1.3 Updating the SWPPP**

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.



## 6.2 Reporting

### 6.2.1 Discharge Monitoring Reports

**Cumulative soil disturbance is one (1) acre or larger; therefore,** Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

To sign up for WQWebDMR go to:

<http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html>

### 6.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Specific information to be included in the noncompliance report is found in Special Condition S5.F.3 of the CSWGP.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- **Central Region** at (509) 575-2490 for Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, or Yakima County
- **Eastern Region** at (509) 329-3400 for Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County
- **Northwest Region** at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County
- **Southwest Region** at (360) 407-6300 for Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum

Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO<sub>2</sub> sparging is planned for adjustment of high pH water.

## **A. Site Map**

# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

PROJECT PROPONENT  
FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

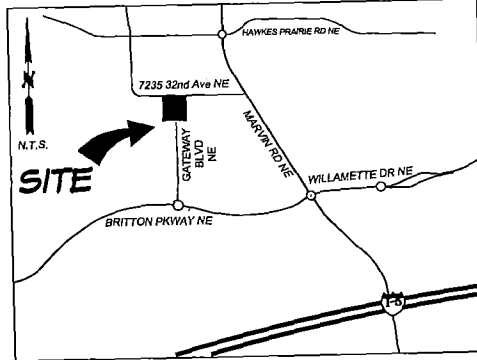
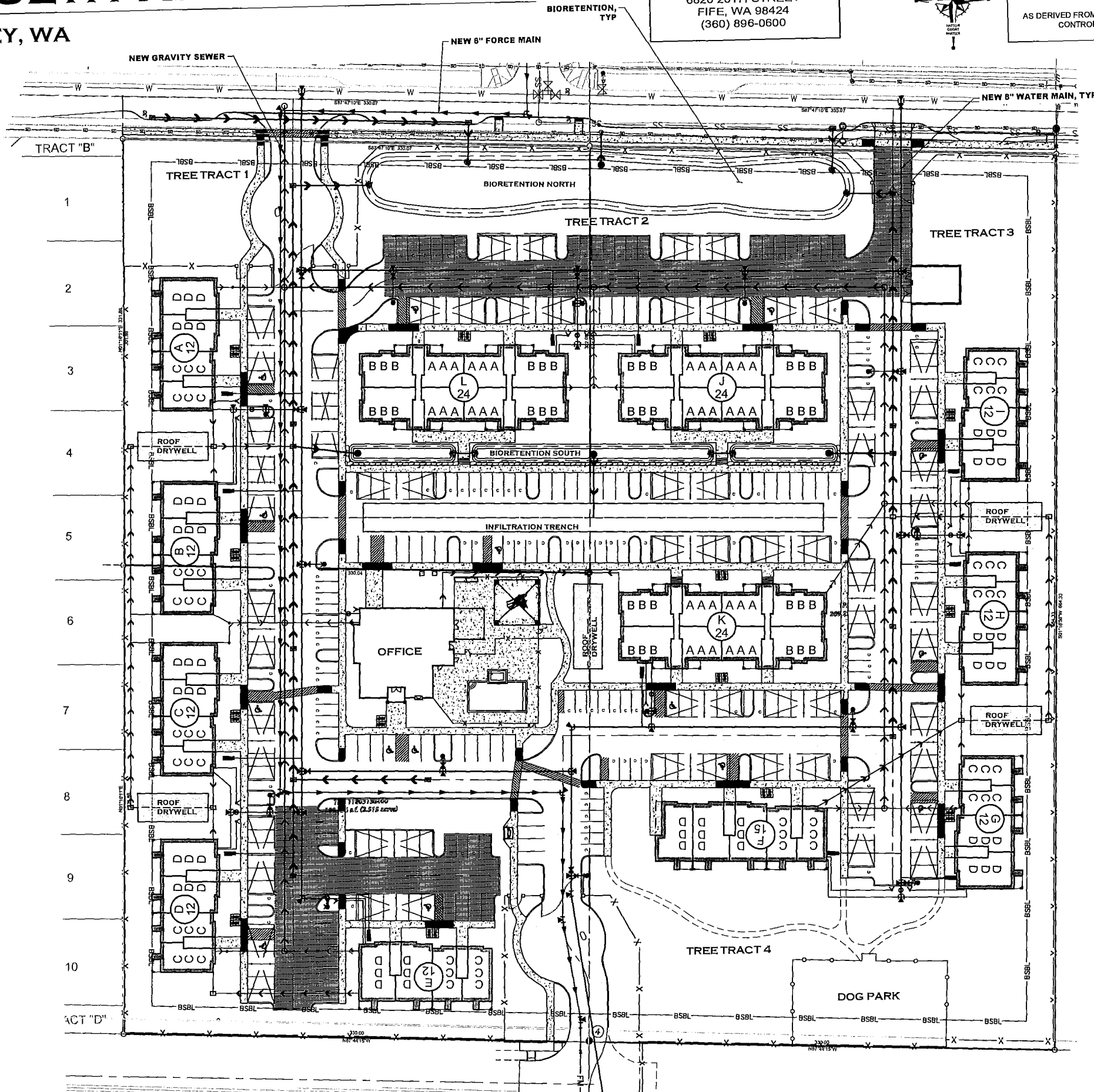
CITY OF LACEY  
VERTICAL DATUM  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105  
MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

## SHEET INDEX

- 1 PRELIMINARY SITE PLAN
- 2 PRELIMINARY HORIZONTAL CONTROL PLAN
- 3 PRELIMINARY DEMO & EROSION CONTROL PLAN
- 4 PRELIMINARY SOIL PROFILES - 'A' PROFILE
- 5 PRELIMINARY SOIL PROFILES - 'B' PROFILE
- 6 PRELIMINARY SOIL PROFILES - 'C' PROFILE
- 7 PRELIMINARY SOIL PROFILES - 'D' PROFILE
- 8 PRELIMINARY SOIL PROFILES - 'E' PROFILE
- 9 PRELIMINARY SOIL PROFILES - 'F' PROFILE
- 10 PRELIMINARY GRADING & DRAINAGE PLAN
- 11 PRELIMINARY DRAINAGE DETAILS
- 12 PRELIMINARY WATER PLAN
- 13 PRELIMINARY ONSITE SEWER PLAN
- 14 PRELIMINARY OFFSITE SEWER PLAN

## LEGEND

- EX. BLOW OFF
- EX. FIRE HYDRANT
- EX. WATER METER
- EX. WATER VALVE
- EX. SANITARY SEWER CLEAN OUT
- EX. SANITARY SEWER MANHOLE
- EX. CB TYPE 2 w/ SOLID LID
- EX. CB TYPE 2
- EX. CATCH BASIN TYPE 1
- EX. POWER POLE
- EX. TELEPHONE MANHOLE
- EX. POWER TRANSFORMER
- EX. JUNCTION BOX
- EX. LUMINAIRE
- EX. SIGN
- EX. STRIPING
- EX. OVERHEAD UTILITIES
- EX. OVERHEAD POWER
- EX. FIBER OPTIC
- EX. FORCEMAIN
- EX. SANITARY SEWER
- EX. DRAINAGE LINE
- EX. WATER LINE
- EX. EDGE OF PAVEMENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- FINISH MAJOR CONTOUR
- FINISH MINOR CONTOUR
- NEW FENCE
- NEW WATER LINE
- NEW STORM LINE
- NEW ROOF DRAIN LINE
- NEW SEWER LINE
- NEW FIRE HYDRANT
- NEW WATER METER
- NEW RPBA
- NEW FDC
- NEW PV
- NEW GATE VALVE
- NEW 2" BLOW OFF ASSEMBLY
- NEW SEWER CLEAN OUT
- NEW SEWER MANHOLE
- NEW CATCH BASIN
- NEW CATCH BASIN w/ SOLID LID
- NEW DOWN SPOUT
- NEW CLEAN OUT
- NEW OBSERVATION PORT
- WETLAND AREA
- NEW INFILTRATION TRENCH
- NEW ASPHALT
- NEW CONCRETE
- NEW POROUS PAVEMENT

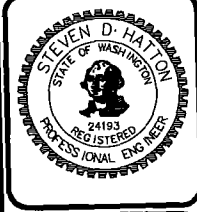


VICINITY MAP

## SITE DEVELOPMENT

SITE ADDRESS: 7235 32ND AVE NE, LACEY, WA 98516  
PARCEL NO: 11803140300, 11803130400, 1180310401  
S/T/R: SEC. 03, T. 18N., RGE. 1W.,  
JURISDICTION: THURSTON  
SITE AREA: 9.54 AC  
ZONING: LD - LIGHT DENSITY  
SETBACKS:  
FRONT: 20'  
SIDE: 20'  
REAR: 20'  
WATER: CITY OF LACEY  
SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY  
PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 183 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32  
MAXIMUM BLDG COVERAGE: 50%  
(8) C, C, D, D = 2,8227.2  
(3) B, A, B = 20,013.39  
(1) C, C, D, D = 4,556  
OFFICE = 3,944.75  
TOTAL: 56,741.34 / 415,562 SQ FT (9.54 ACRES)  
TOTAL COVERAGE: 13.6%  
OPEN AREA:  
30% OPEN SPACE REQ:  
2.87 OPEN SPACE / 9.54 AC  
TOTAL OPEN SPACE: 30%  
TREE RETAIN OR TRACTS TO EQUAL 5% OF GROSS SITE.  
PRESERVED TREES ON SITE: 39%  
TREE RETAIN AREAS: 1.57 / 9.54  
TOTAL RETENTION: 15.3%

DESIGNED BY: HSDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

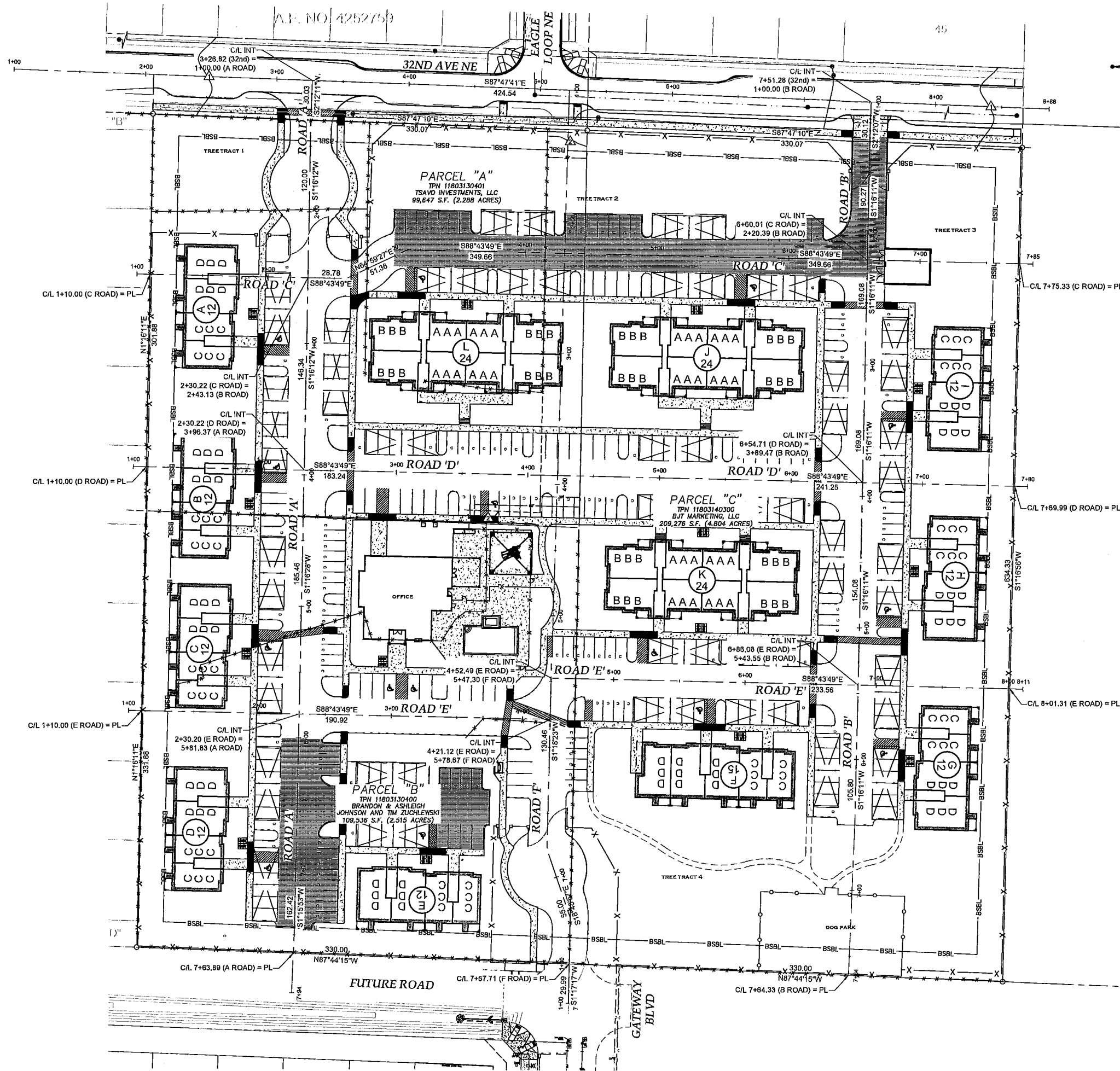


HATTON GODAT PANTIER  
AND  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
huttonpantier.com

DATE:  
REVISIONS:

TP# 11803140300, 11803130400, 1180310401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND AVE NE, LACEY, WA 98516  
PRELIMINARY SITE PLAN

AGENCY NO.  
SHEET: 1 OF 14  
INDEX: 19-085 pre-cov.dwg  
JOB: 19-085



CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80  
SCALE: 1" = 40'

DESCRIPTIONS

PARCEL "A":  
THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON, EXCEPTING THEREFROM THE NORTH 30 FEET FOR EXISTING ROADWAY.

PARCEL "B":  
THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON.

PARCEL "C":  
THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON, EXCEPTING THAT PORTION CONVEYED TO THURSTON COUNTY BY DEED RECORDED SEPTEMBER 2, 1976 UNDER RECORDING NO. 875822.

LEGEND

- 1/4 RIGHT OF WAY DESCRIBED IN DEED TO THURSTON COUNTY RECORDED UNDER AUDITOR'S FILE NO. 875982
- EASEMENT GRANTED TO PUKET SOUND POWER & LIGHT COMPANY RECORDED UNDER AUDITOR'S FILE NO. 983210
- \* EASEMENT TO BE ABANDONED

NOTES

THIS DRAWING IS BASED ON BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BUTLER SURVEYING. HATTON GODAT PANTIER HAS NOT PERFORMED AN INDEPENDENT SURVEY OF THE SITE. THE FOLLOWING ITEMS WERE ADDED TO THE BUTLER SURVEY BY HGP:

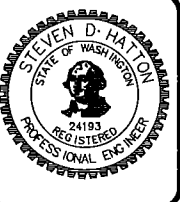
- ADJACENT PLATS
- EASEMENT AF 8983219
- RIGHT OF WAY REFERENCE AF 875992
- UTILITY INFORMATION IN PLAT OF GATEWAY DIVISION 28

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

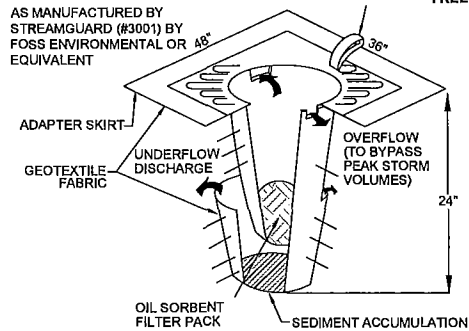


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hattonpantier.com

REVISIONS:  
DATE:

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY HORIZONTAL  
CONTROL PLAN  
SECTION 12, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO.  
SHEET: 2 OF 14  
INDEX: 19-085 PRELIMINARY  
JOB: 19-085



### INLET SEDIMENT PROTECTION

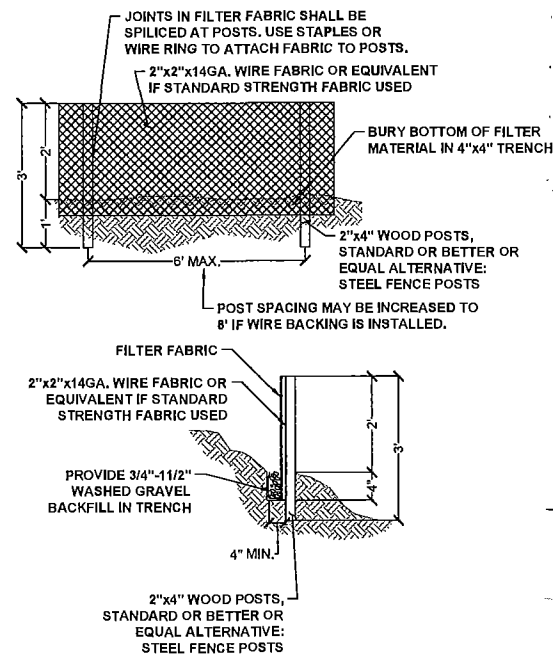
N.T.S.

#### INLET SEDIMENT PROTECTION NOTES:

1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

#### FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 4 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOE RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.



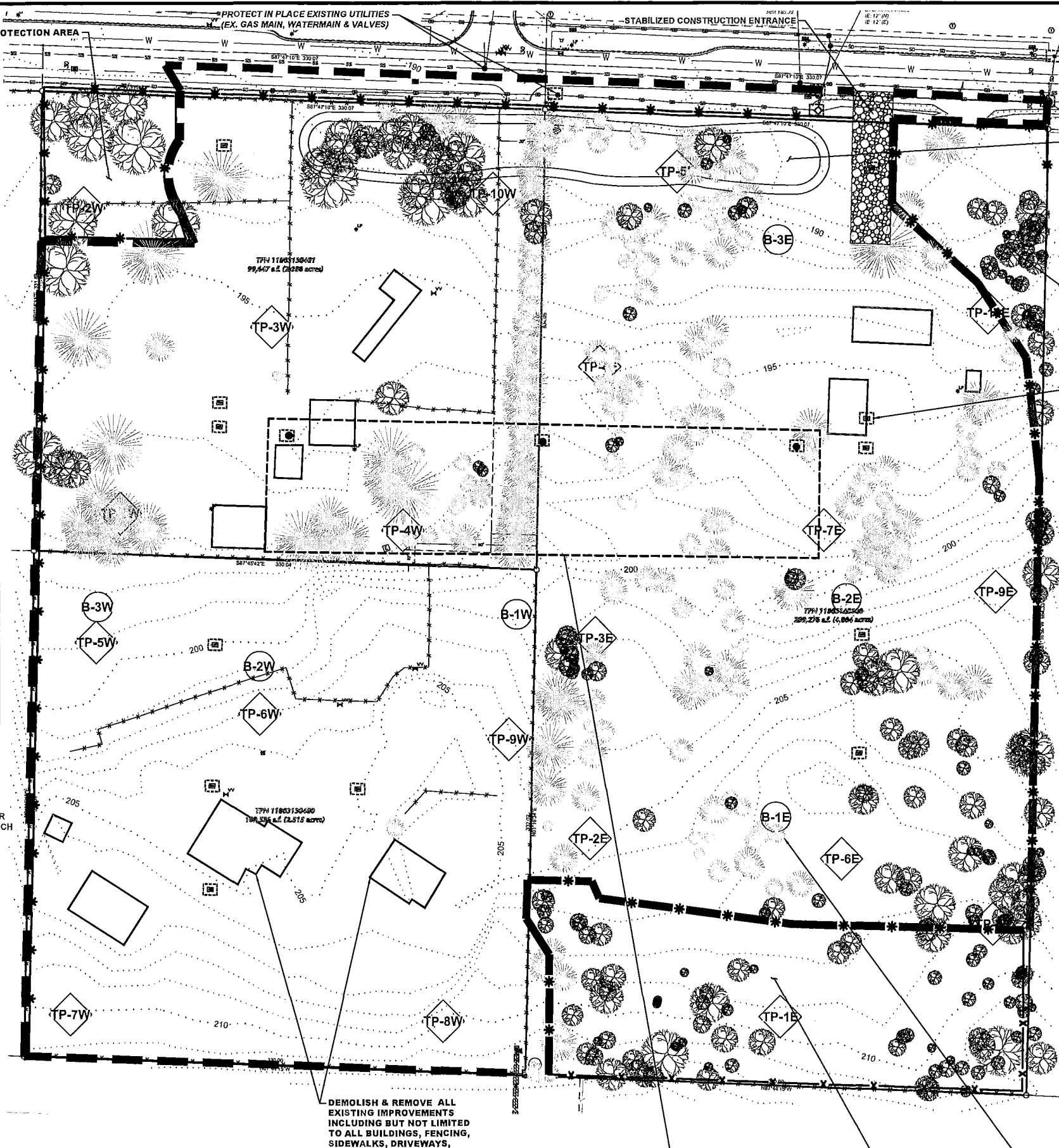
### FILTER FABRIC FENCE DETAIL

N.T.S.

#### TOPOGRAPHIC NOTE:

THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

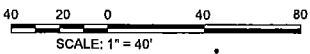


**CITY OF LACEY**

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.



### LEGEND

- CLEARING LIMITS
- \* FILTER FABRIC FENCING/TREE PROTECTION
- INLET SEDIMENT PROTECTION
- E-B-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- ◇ TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- W-B-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- ◇ W-TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.

#### GENERAL EROSION CONTROL NOTES:

1. A CERTIFIED EROSION AND SEDIMENT CONTROL PLAN (ESCP) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS TBD, AND THEIR OFFICE TELEPHONE NUMBER IS TBD.
2. APPROVAL OF THIS EROSION / SEDIMENT CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER, OR DISCHARGE STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR-AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY-TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR-AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY-TO ENSURE THEIR CONTINUED FUNCTIONING.
9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHETHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



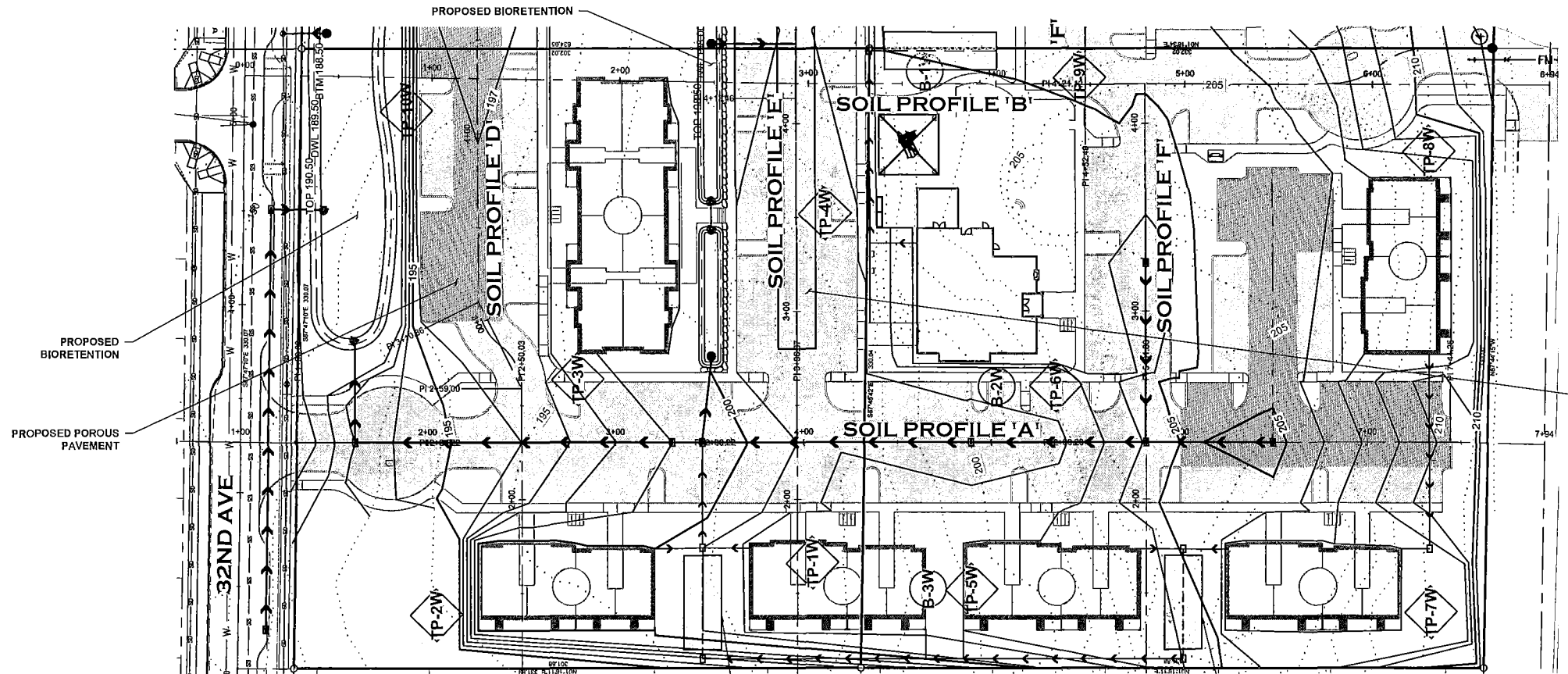
**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

DATE: \_\_\_\_\_  
REVISIONS: \_\_\_\_\_

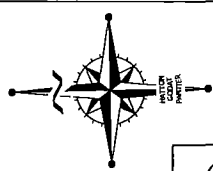
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND N.E. LACEY, WA 98516  
**PRELIMINARY DEMO & EROSION CONTROL PLAN**

AGENCY NO. \_\_\_\_\_  
SHEET: 3 OF 14  
INDEX: 19-085-pre-ec.dwg  
JOB: 19-085





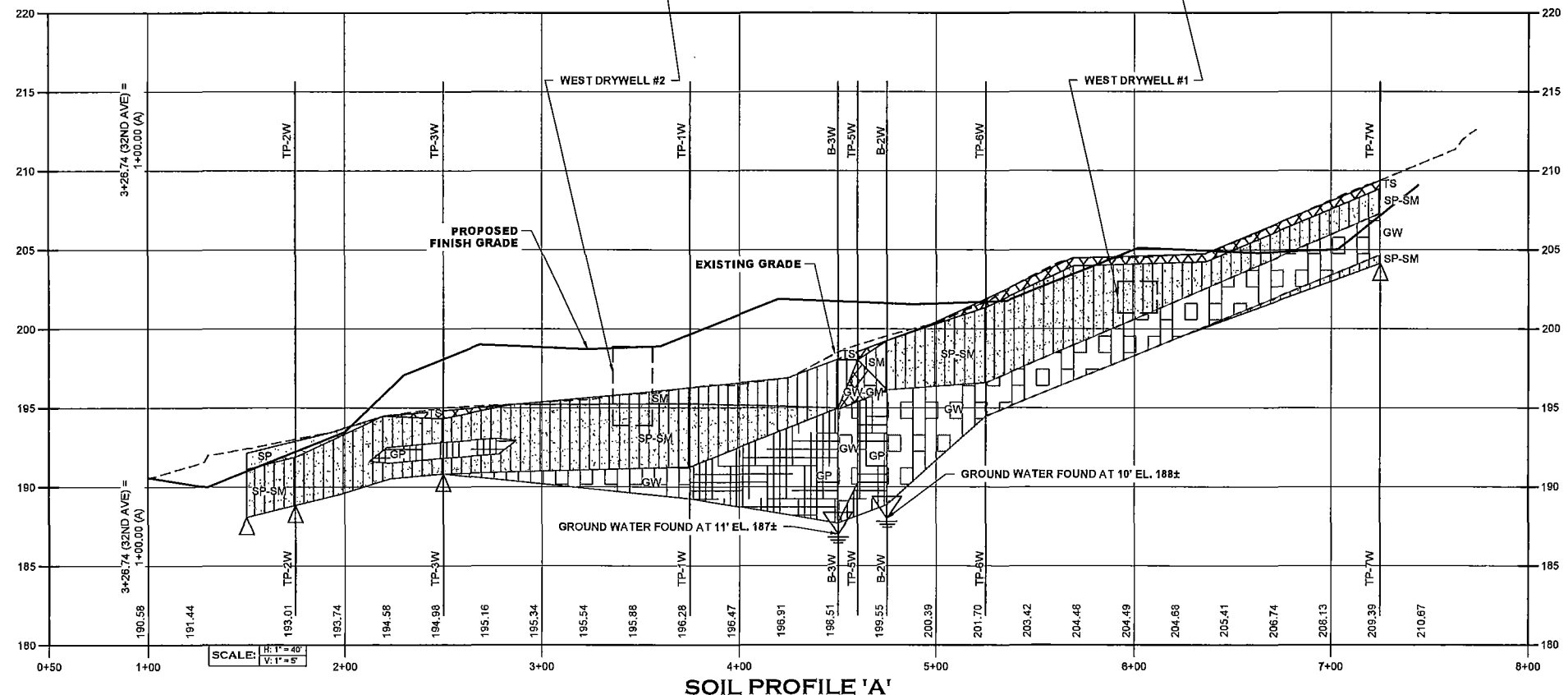
CITY OF LACEY  
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SCALE: 1" = 40'

LEGEND

- B-E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- B-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- TP-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER



SOIL PROFILE 'A'

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.  
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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
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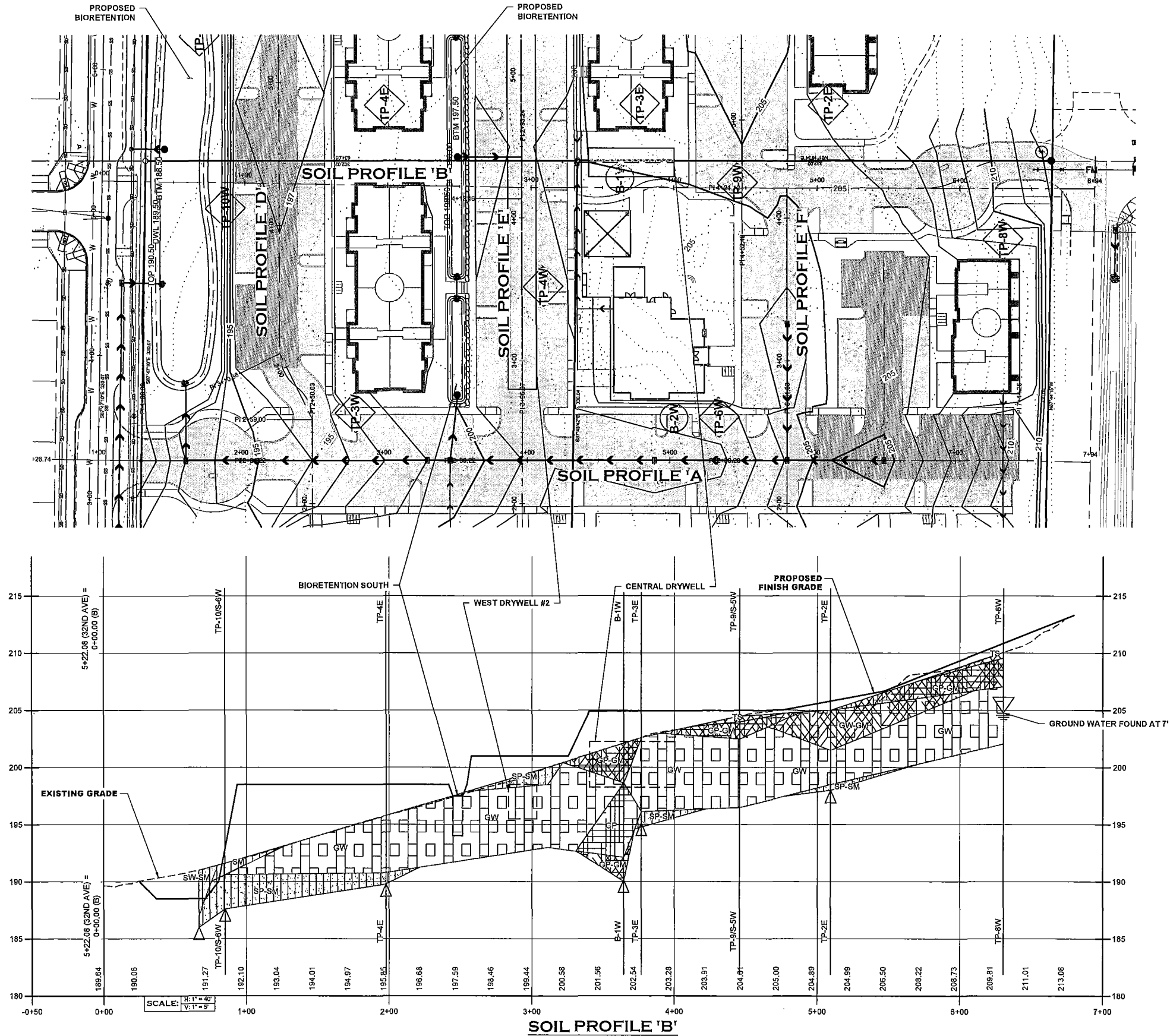
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hattonpantier.com

REVISIONS: DATE:

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND AVE. LACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'A' PROFILE  
SECTION 61, TOWNSHIP 18 NORTH, RANGE 7 WEST

AGENCY NO.  
SHEET: 4 OF 14  
INDEX: 19-085 PRELIMINARY  
JOB: 19-085

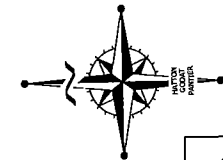




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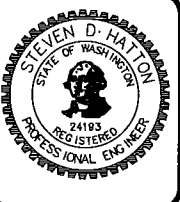


40 20 0 40 80  
SCALE: 1" = 40'

LEGEND

- B-E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- TP-E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- B-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- TP-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

DESIGNED BY: HGL/DI  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



HATTON GODAT PANTIER  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

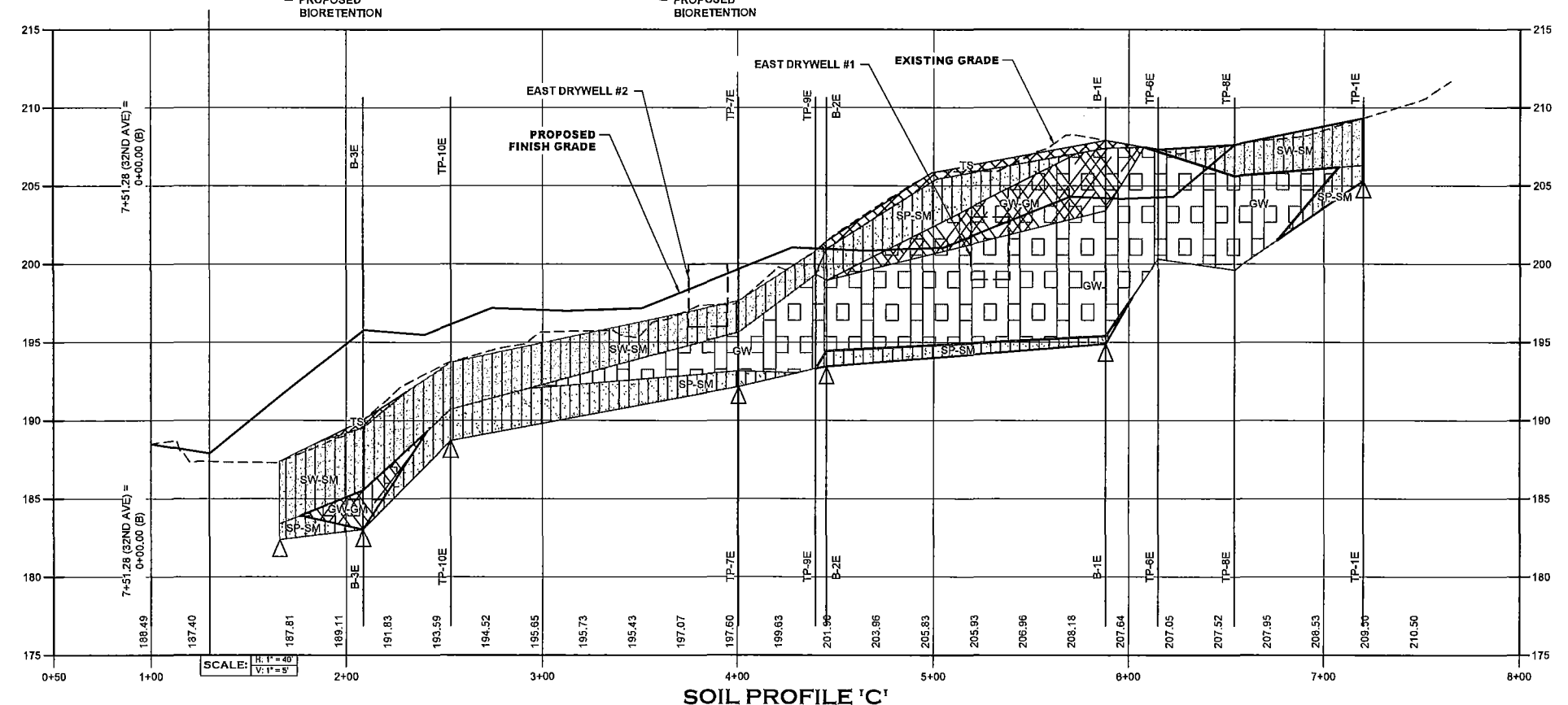
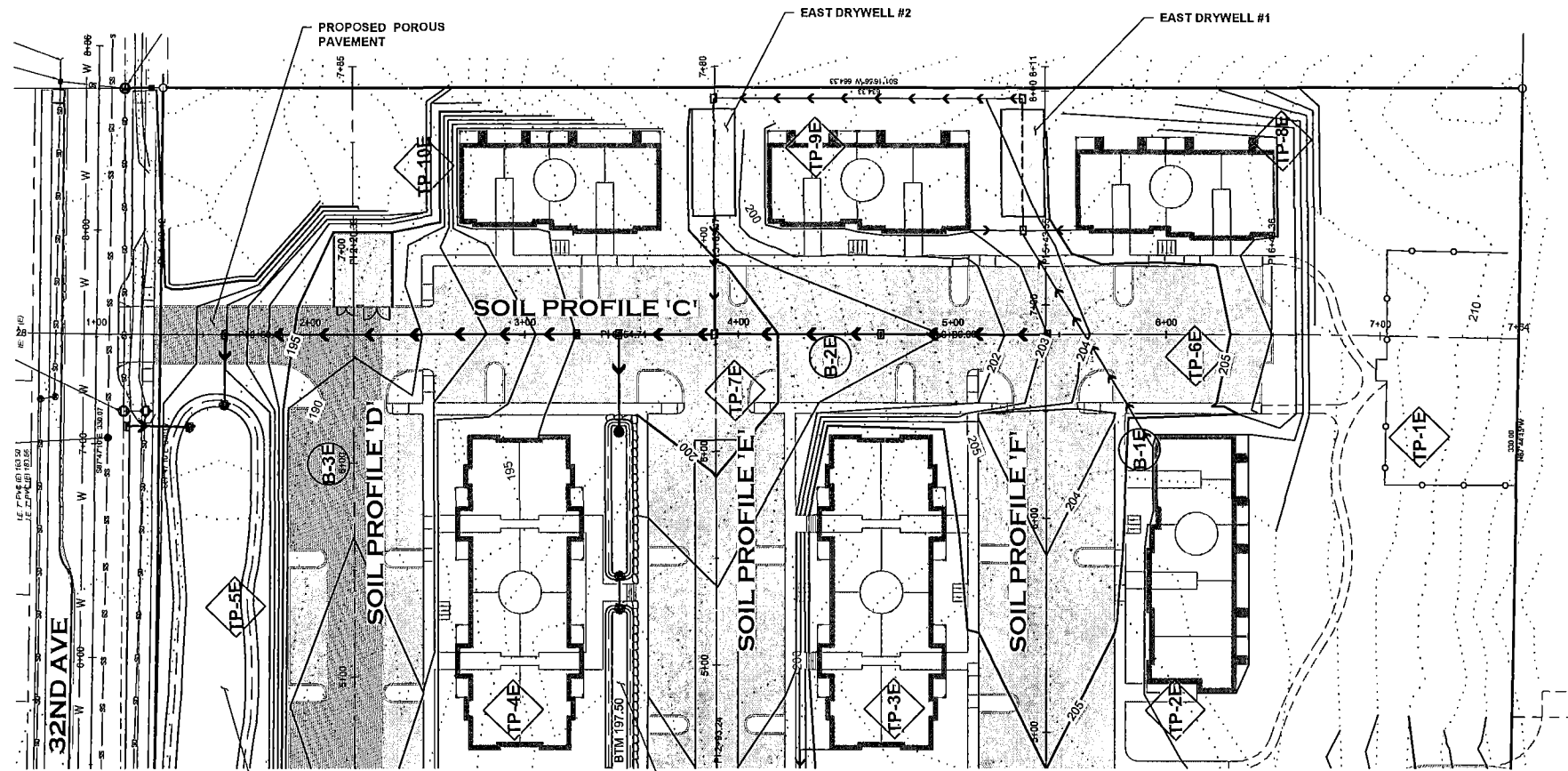
REVISIONS: DATE:

TP# 11803140300, 11803110400, 11803130401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'B' PROFILE  
SECTION 01, TOWNSHIP 18 NORTH, RANGE 3 WEST

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NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

AGENCY NO. \_\_\_\_\_  
SHEET: 5 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

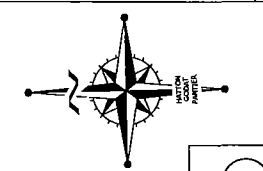


CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105



40 20 0 40 80  
SCALE: 1" = 40'

LEGEND

- B-E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- TP-E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- B-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- TP-W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

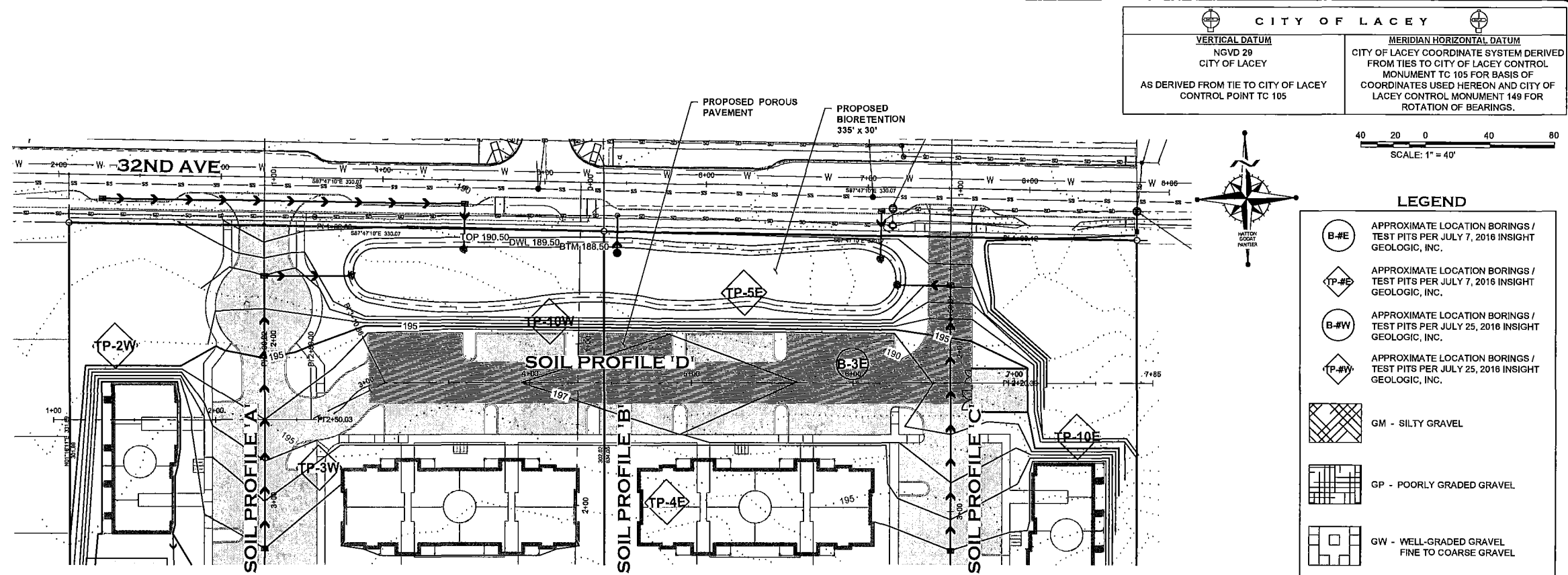


HATTON GODAT PANTIER  
AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

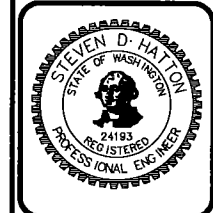
REVISIONS: DATE:

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NELACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'C' PROFILE  
SECTION 16, TOWNSHIP 16 NORTH, RANGE 1 WEST

AGENCY NO.  
SHEET: 6 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085



DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



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ENGINEERS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

| REVISIONS: | DATE: |
|------------|-------|
|            |       |
|            |       |
|            |       |
|            |       |

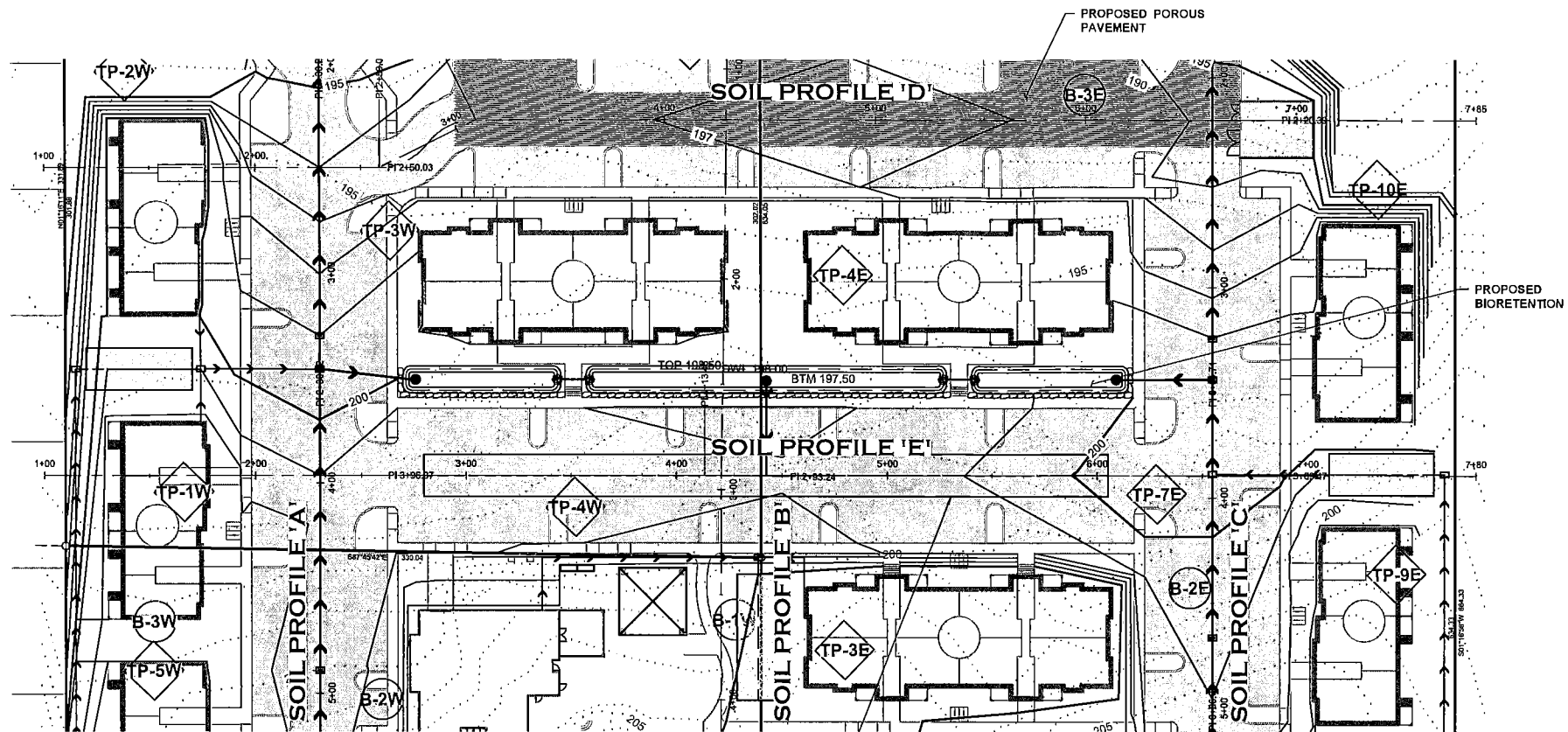
TP# 11803140300, 11803130400, 11803130401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'D' PROFILE  
SECTION G, TOWNSHIP 11 NORTH, RANGE 1 WEST

AGENCY NO.  
SHEET: 7 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

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**CITY OF LACEY**

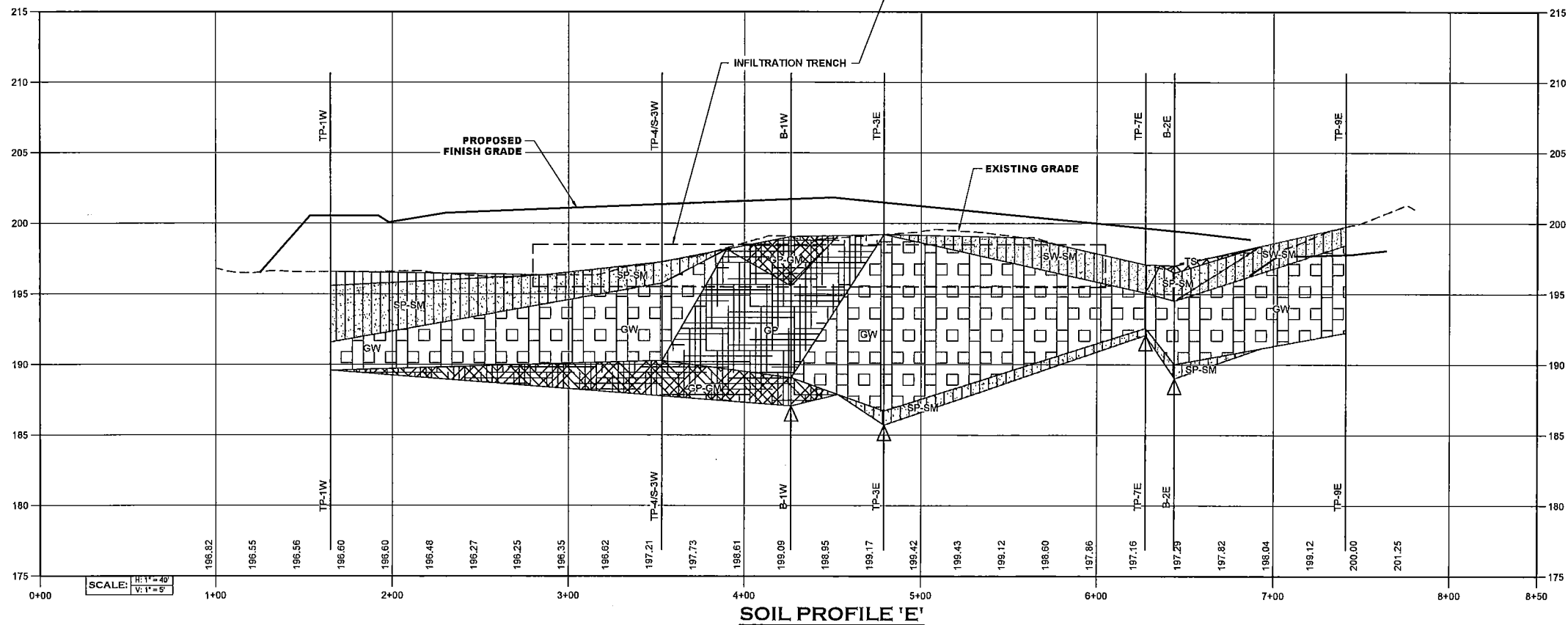
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|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VERTICAL DATUM</b><br>NGVD 28<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | <b>MERIDIAN HORIZONTAL DATUM</b><br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

SCALE: 1" = 40'



**LEGEND**

|  |                                                                                   |
|--|-----------------------------------------------------------------------------------|
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.  |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.  |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC. |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC. |
|  | GM - SILTY GRAVEL                                                                 |
|  | GP - POORLY GRADED GRAVEL                                                         |
|  | GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL                                     |
|  | SM - SILTY SAND                                                                   |
|  | SP - POORLY GRADED SAND                                                           |
|  | SW - WELL-GRADED SAND FINE TO COARSE SAND                                         |
|  | TS - TOPSOIL / SOD / DUFF                                                         |
|  | GROUND WATER LOCATION                                                             |
|  | SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER                                      |



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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

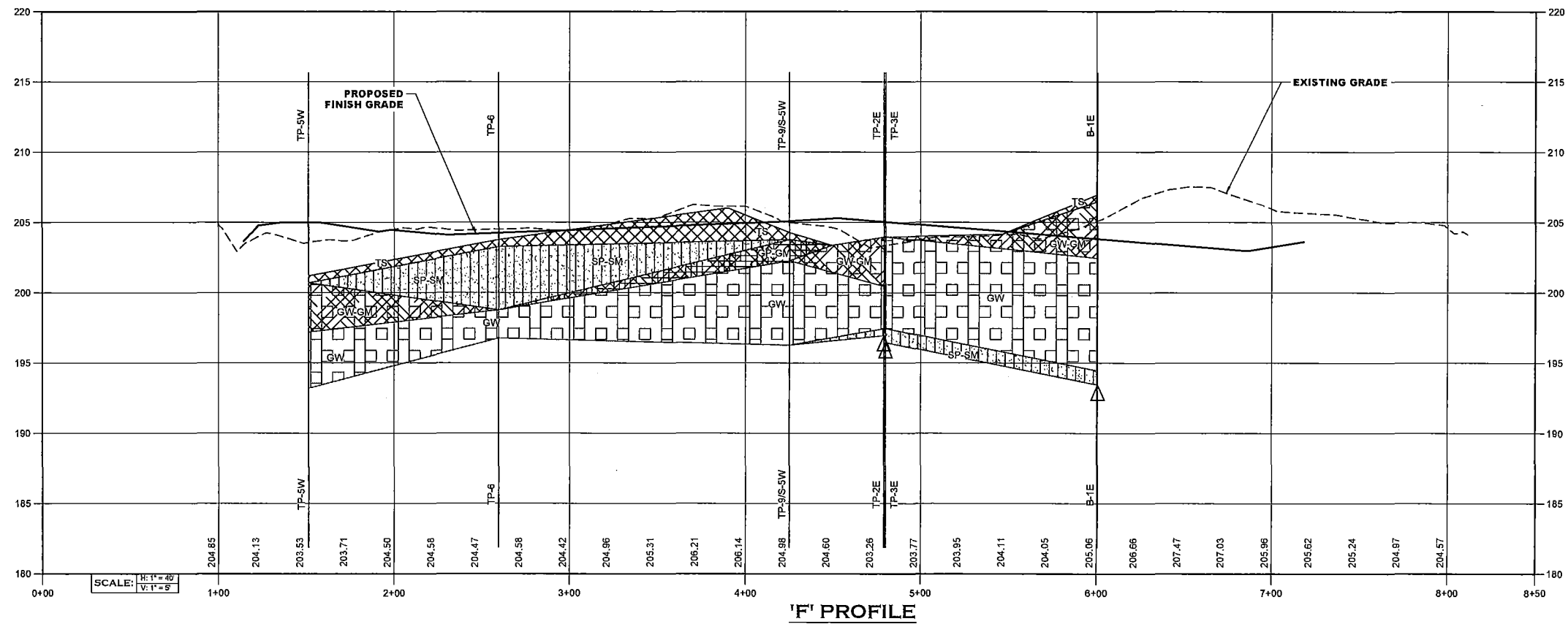
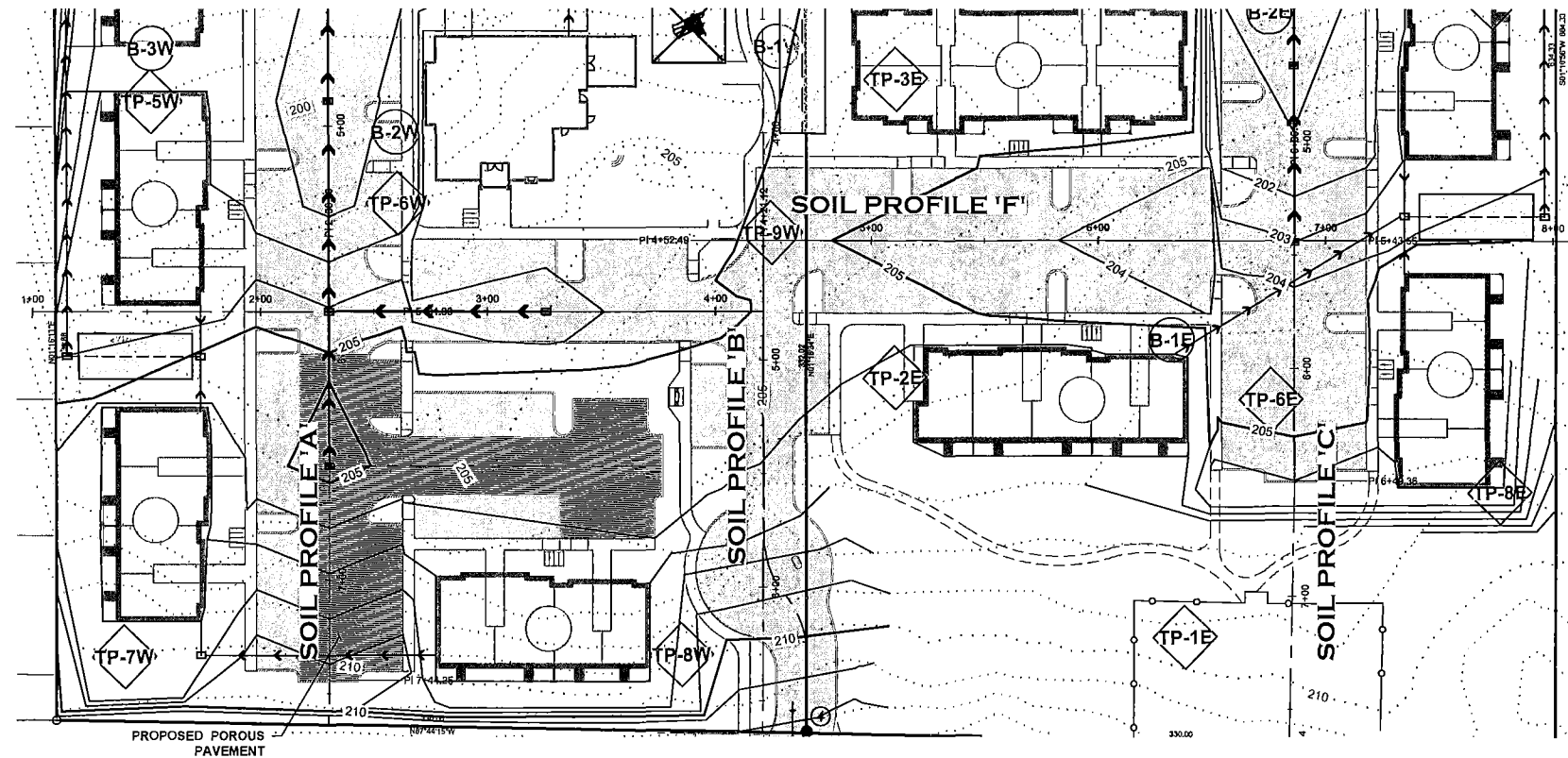


**HATTON GODAT PANTIER**  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: \_\_\_\_\_  
DATE: \_\_\_\_\_

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES - 'E' PROFILE**

AGENCY NO. \_\_\_\_\_  
SHEET: 8 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085

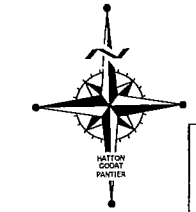


**CITY OF LACEY**

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TO 105



40 20 0 40 60  
SCALE: 1" = 40'

- LEGEND**
- (B-E) APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
  - (TP-E) APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
  - (B-W) APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
  - (TP-W) APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
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  - GP - POORLY GRADED GRAVEL
  - GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
  - SM - SILTY SAND
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  - SW - WELL-GRADED SAND FINE TO COARSE SAND
  - TS - TOPSOIL / SOD / DUFF
  - ▽ GROUND WATER LOCATION
  - △ SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

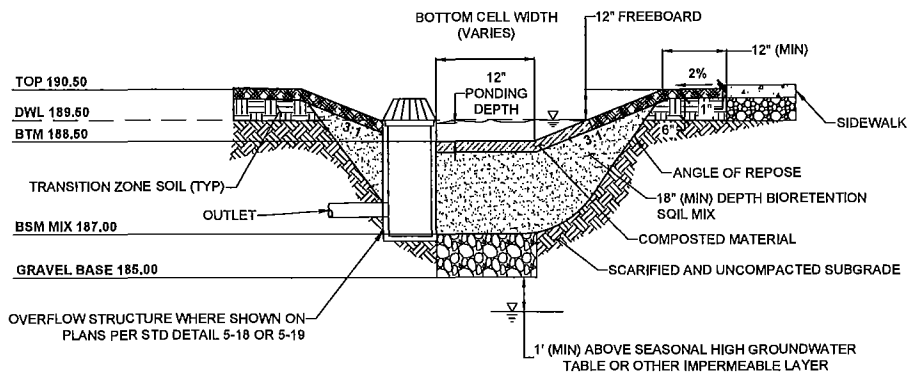
REVISIONS: DATE: \_\_\_\_\_

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES**  
- 'F' PROFILE

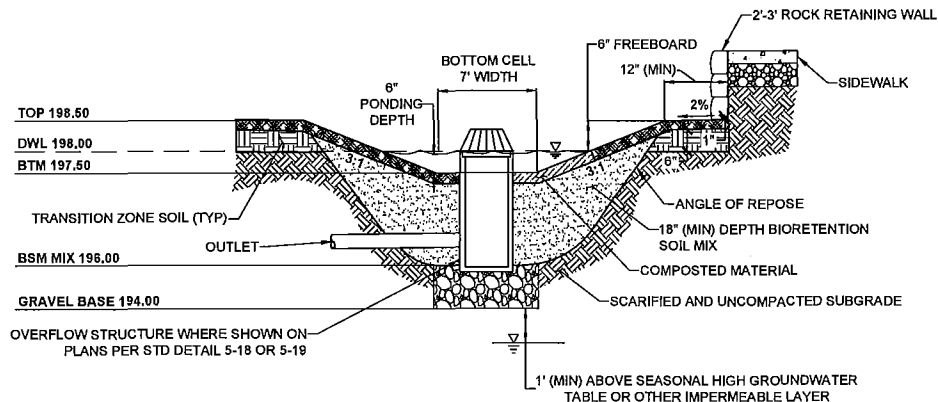
AGENCY NO. \_\_\_\_\_  
SHEET: 9 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085



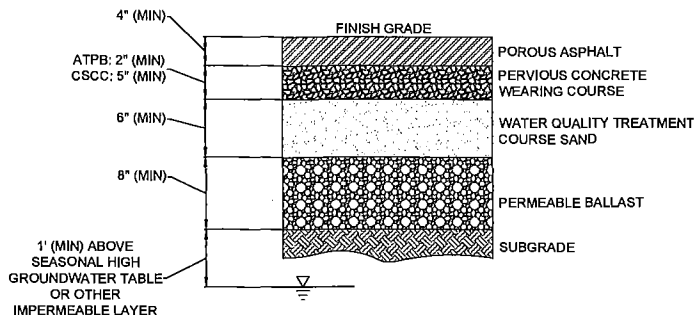




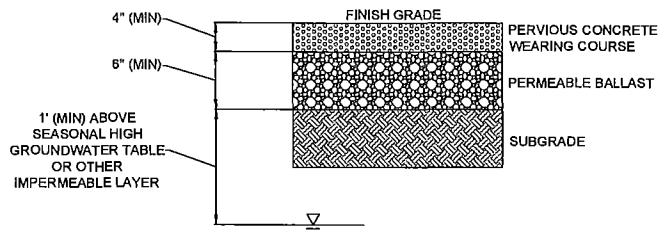
**BIORETENTION SECTION - NORTH**  
N.T.S.



**BIORETENTION SECTION - SOUTH**  
N.T.S.



**POROUS ASPHALT DETAIL**  
N.T.S.

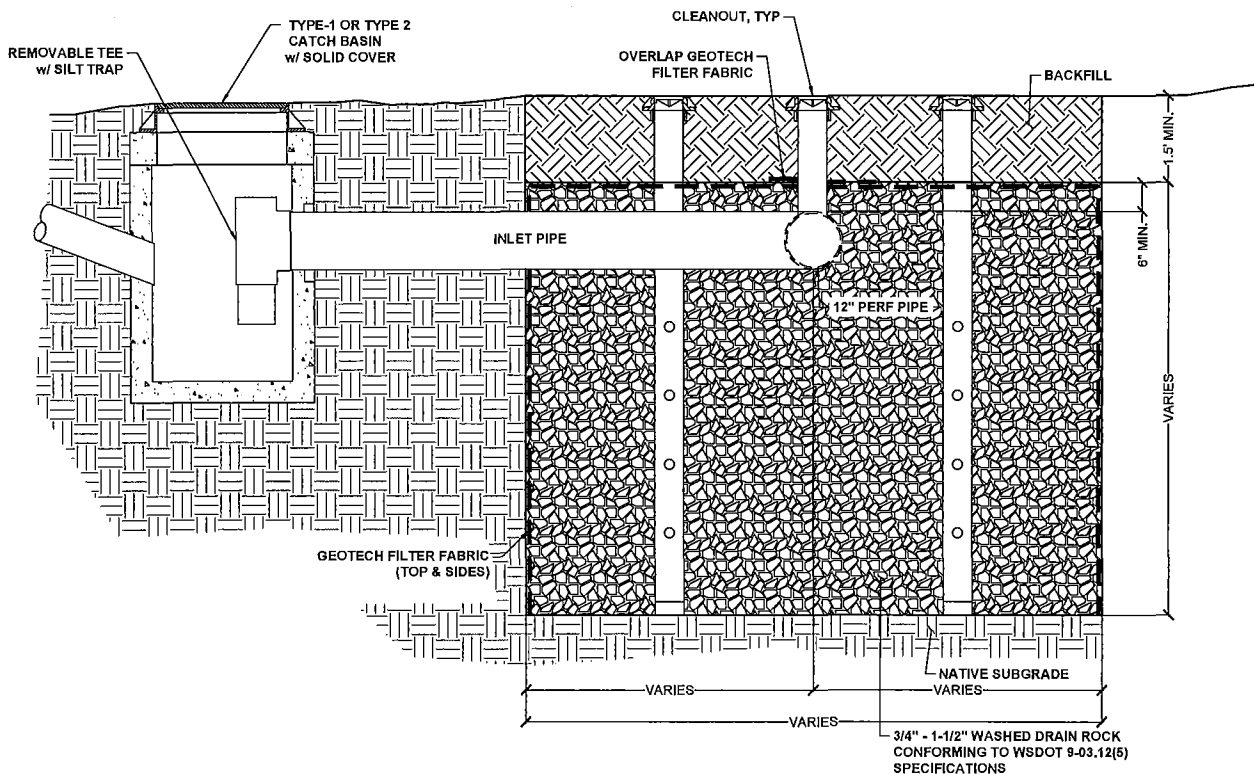


**POROUS SIDEWALK DETAIL**  
N.T.S.



**ONSITE PAVING SECTION  
STANDARD DUTY**  
N.T.S.

\*NOTE:  
ALL DEPTHS COMPACTED  
TO 95% MIN. DENSITY



**INFILTRATION TRENCH DETAIL, TYP**  
N.T.S.

**STORMWATER FACILITY ELEVATIONS**

| FACILITY            | FG                | GRAVEL TOP | GRAVEL BASE | HARDPAN |
|---------------------|-------------------|------------|-------------|---------|
| WEST DRYWELL #1     | 205±              | 203±       | 201±        | 197±    |
| WEST DRYWELL #2     | 201±              | 199±       | 194±        | 189±    |
| CENTRAL DRYWELL     | 206±              | 203±       | 199±        | 192±    |
| EAST DRYWELL #1     | 204±              | 203±       | 199±        | 194±    |
| EAST DRYWELL #2     | 201±              | 200±       | 198±        | 191±    |
| INFILTRATION TRENCH | 201±              | 198.5±     | 195.5±      | 190±    |
| BIORETENTION SOUTH  | 198.5 (SWALE TOP) | 195±       | 194±        | 188±    |
| BIORETENTION NORTH  | 190.5 (SWALE TOP) | 187±       | 185±        | 180±    |

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: V



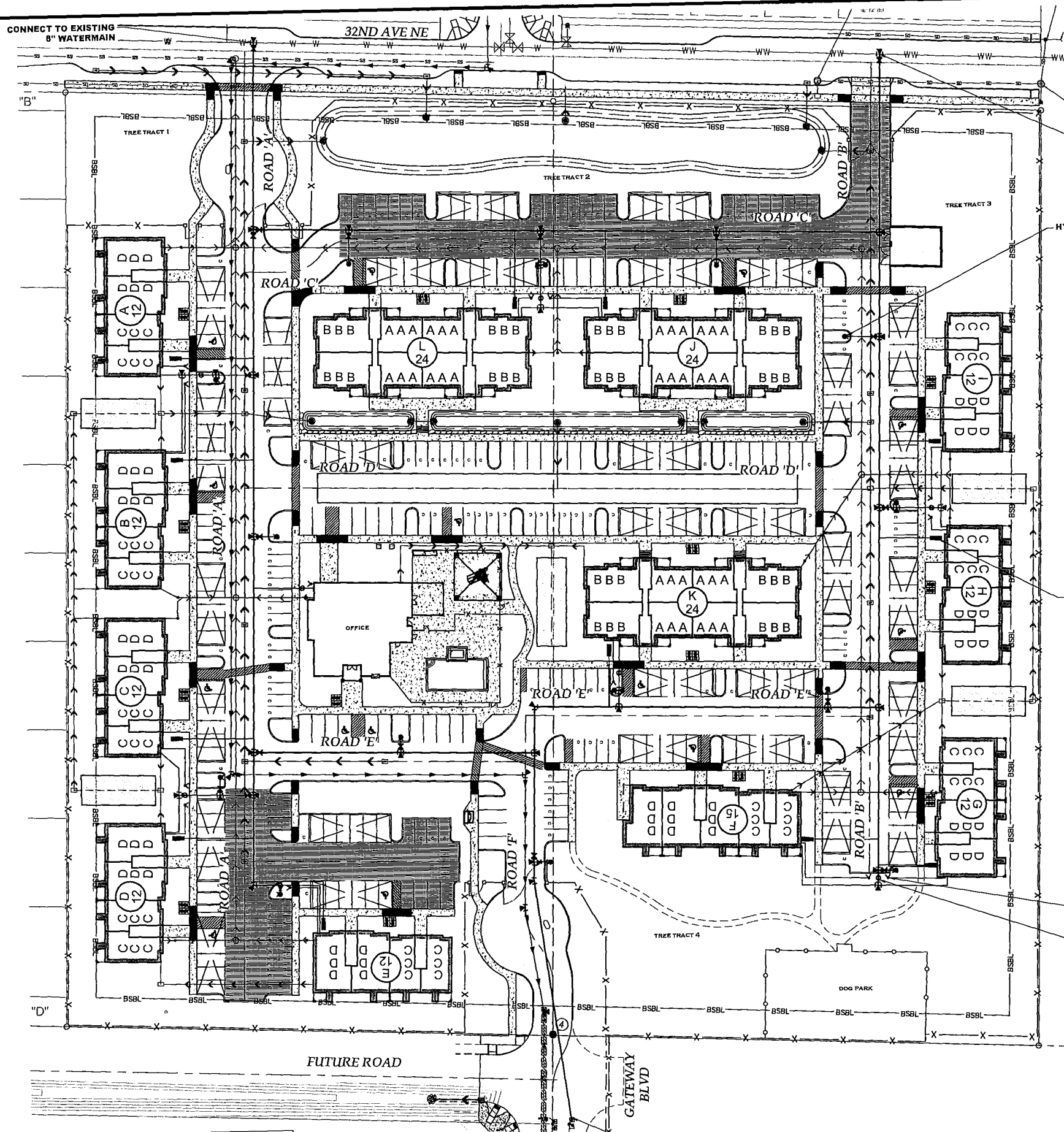
**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS:  
DATE:

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND N ELACEY, WA 98516  
**PRELIMINARY GRADING & DRAINAGE DETAILS**  
SECTION 01, TOWNSHIP 14 NORTH, RANGE 1 WEST

AGENCY NO.:  
SHEET: 11 OF 14  
INDEX: 19-085-pre-def.dwg  
JOB: 19-085



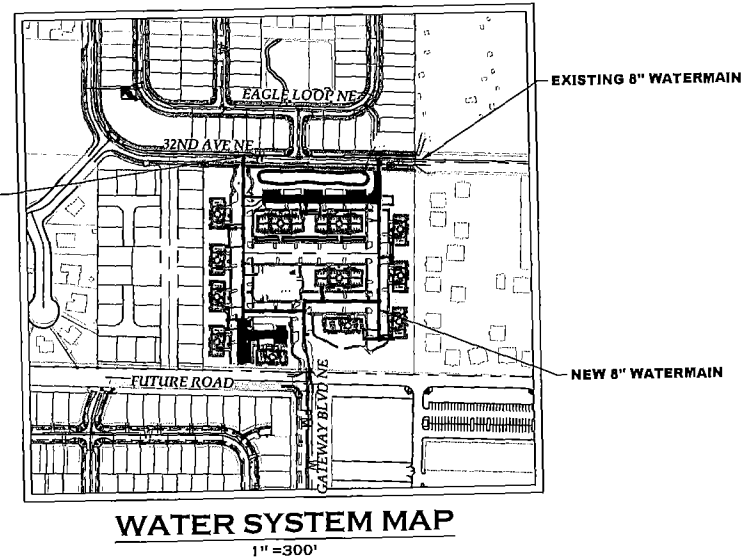


**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

DESIGNED BY: HGD/DT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**TOPOGRAPHIC NOTE:**  
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THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
PUBLIC WORKS DIRECTOR

TP# 11603140300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY WATER PLAN**

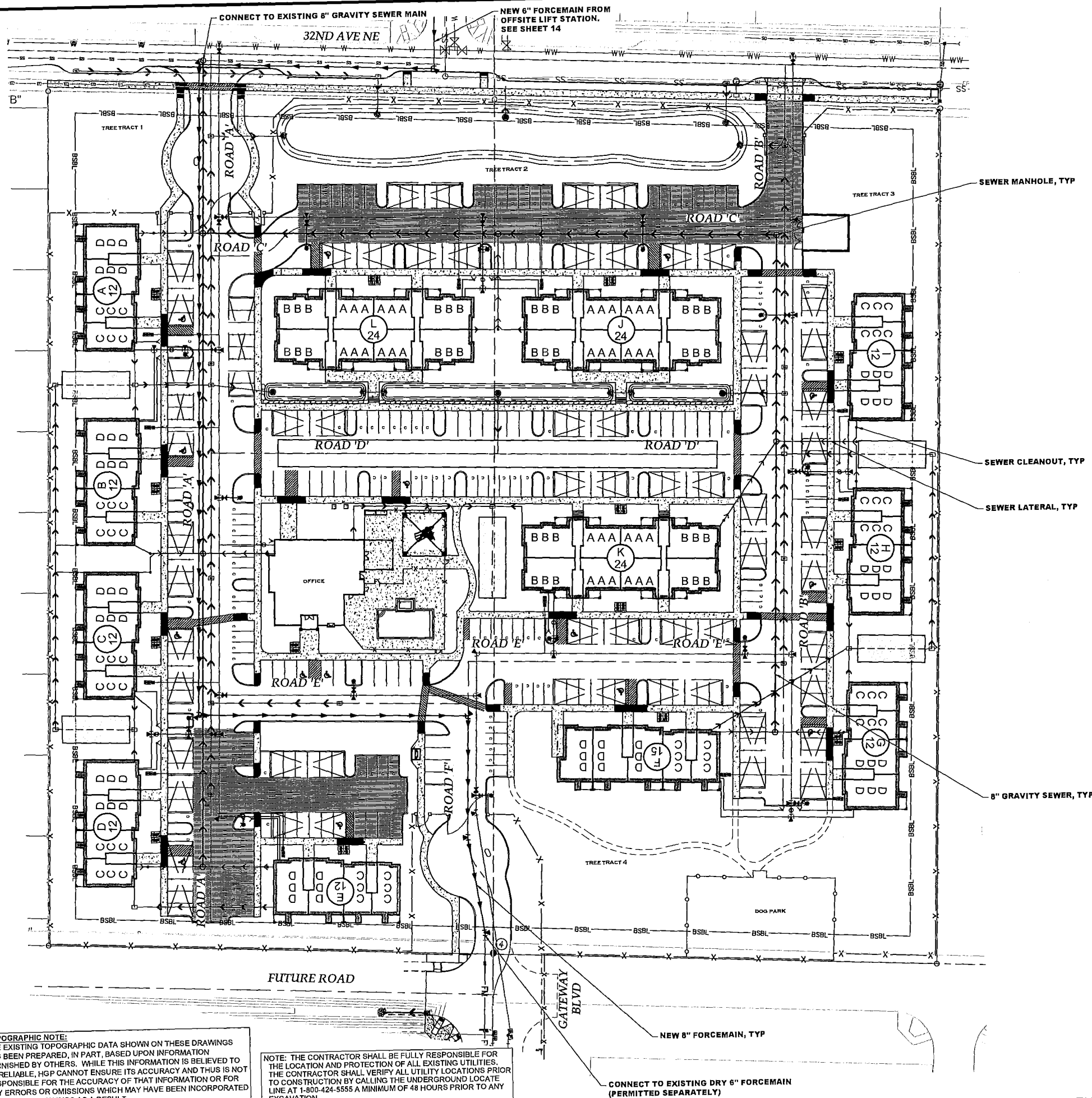
SECTION 03, TOWNSHIP 18 NORTH, RANGE 1, WEST

AGENCY NO. \_\_\_\_\_  
SHEET: 12 OF 14  
INDEX: 19-085-pre-wdr.dwg  
JOB: 19-085

REVISIONS:  
DATE:  
DATE:

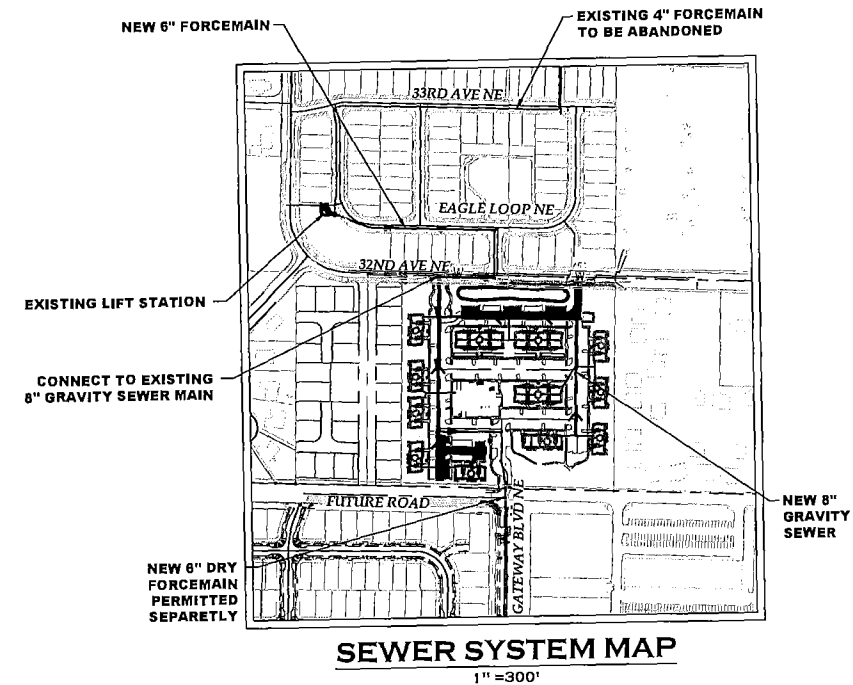
**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

DESIGNED BY: HGD/DT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



| CITY OF LACEY                                                                                                  |                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VERTICAL DATUM</b><br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105 | <b>MERIDIAN HORIZONTAL DATUM</b><br>CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TC 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS. |

DESIGNED BY: HGLDT  
 DRAWN BY: JCH  
 CHECKED BY: SDH  
 DATE: MAY 2020  
 SCALE: 1" = 40'



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TP# 1180310300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**  
 7235 32ND NE LACEY, WA 98516  
**PRELIMINARY ONSITE SEWER PLAN**

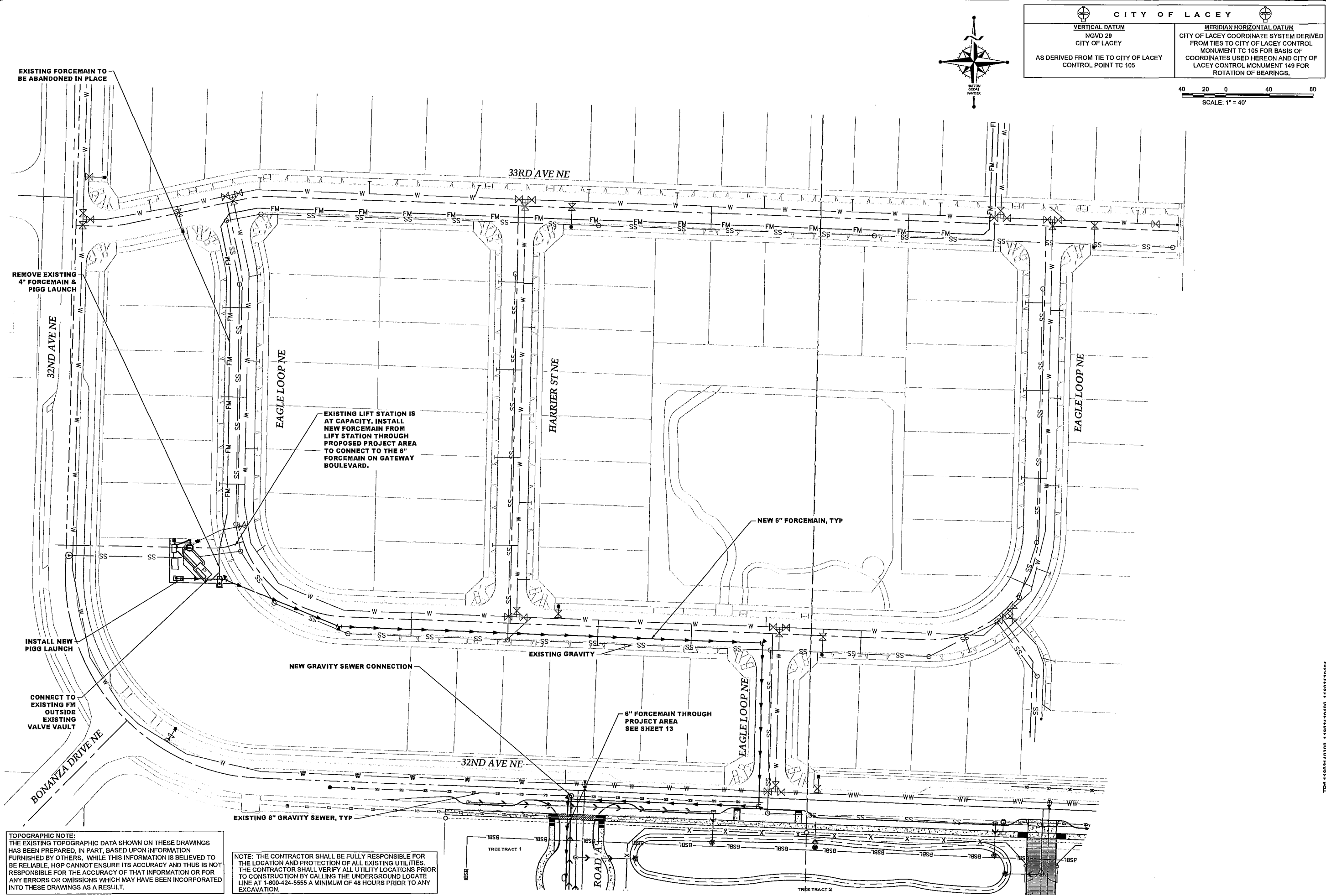
AGENCY NO. \_\_\_\_\_  
 SHEET: 13 OF 14  
 INDEX: 19-085-pre-swr.dwg  
 JOB: 19-085

REVISIONS: \_\_\_\_\_  
 DATE: \_\_\_\_\_

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 AND  
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 OLYMPIA, WA 98506  
 TEL: 360.943.1599 FAX: 360.357.6299  
 hattonpantier.com



DESIGNED BY: HGLDT  
 DRAWN BY: JCH  
 CHECKED BY: SDH  
 DATE: MAY 2020  
 SCALE: 1" = 40'



**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TO 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

STEVEN D. HATTON  
STATE OF WASHINGTON  
REGISTERED  
24193  
PROFESSIONAL ENGINEER

**HATTON GODAT PANTIER**  
AND  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: \_\_\_\_\_  
DATE: \_\_\_\_\_

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY OFFSITE  
SEWER PLAN**

AGENCY NO. \_\_\_\_\_  
SHEET: 14 OF 14  
INDEX: 19-085 pre-swr.dwg  
JOB: 19-085

SECTION 02, TOWNSHIP 18 NORTH, RANGE 1 WEST

**TOPOGRAPHIC NOTE:**  
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

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# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

## SHEET INDEX

- 1 PRELIMINARY SITE PLAN
- 2 PRELIMINARY HORIZONTAL CONTROL PLAN
- 3 PRELIMINARY DEMO & EROSION CONTROL PLAN
- 4 PRELIMINARY SOIL PROFILES - 'A' PROFILE
- 5 PRELIMINARY SOIL PROFILES - 'B' PROFILE
- 6 PRELIMINARY SOIL PROFILES - 'C' PROFILE
- 7 PRELIMINARY SOIL PROFILES - 'D' PROFILE
- 8 PRELIMINARY SOIL PROFILES - 'E' PROFILE
- 9 PRELIMINARY SOIL PROFILES - 'F' PROFILE
- 10 PRELIMINARY GRADING & DRAINAGE PLAN
- 11 PRELIMINARY DRAINAGE DETAILS
- 12 PRELIMINARY WATER PLAN
- 13 PRELIMINARY ONSITE SEWER PLAN
- 14 PRELIMINARY OFFSITE SEWER PLAN

## LEGEND

- EX. BLOW OFF
- EX. FIRE HYDRANT
- EX. WATER METER
- EX. WATER VALVE
- EX. SANITARY SEWER CLEAN OUT
- EX. SANITARY SEWER MANHOLE
- EX. CB TYPE 2 w/ SOLID LID
- EX. CB TYPE 2
- EX. CATCH BASIN TYPE 1
- EX. POWER POLE
- EX. TELEPHONE MANHOLE
- EX. POWER TRANSFORMER
- EX. JUNCTION BOX
- EX. LUMINAIRE
- EX. SIGN
- EX. STRIPING
- EX. OVERHEAD UTILITIES
- EX. OVERHEAD POWER
- EX. FIBER OPTIC
- EX. FORCEMAIN
- EX. SANITARY SEWER
- EX. DRAINAGE LINE
- EX. WATER LINE
- EX. EDGE OF PAVEMENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- FINISH MAJOR CONTOUR
- FINISH MINOR CONTOUR
- NEW FENCE
- NEW WATER LINE
- NEW STORM LINE
- NEW ROOF DRAIN LINE
- NEW SEWER LINE
- NEW FIRE HYDRANT
- NEW WATER METER
- NEW RPBA
- NEW FDC
- NEW PV
- NEW GATE VALVE
- NEW 2" BLOW OFF ASSEMBLY
- NEW SEWER CLEAN OUT
- NEW SEWER MANHOLE
- NEW CATCH BASIN
- NEW CATCH BASIN w/ SOLID LID
- NEW DOWN SPOUT
- NEW CLEAN OUT
- NEW OBSERVATION PORT
- WETLAND AREA
- NEW INFILTRATION TRENCH
- NEW ASPHALT
- NEW CONCRETE
- NEW POROUS PAVEMENT

## PROJECT PROPONENT

FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

## CITY OF LACEY

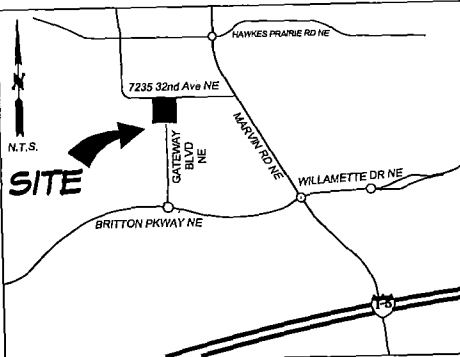
VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

## MERIDIAN HORIZONTAL DATUM

CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

SCALE: 1" = 40'



VICINITY MAP

## SITE DEVELOPMENT

SITE ADDRESS: 7235 32ND AVE NE, LACEY, WA 98516

PARCEL NO: 11803140300, 11803130400, 1180310401  
S/T/R: SEC. 03, T. 18N., RGE. 1W.,  
JURISDICTION: THURSTON

SITE AREA: 9.54 AC  
ZONING: LD - LIGHT DENSITY  
SETBACKS:

FRONT: 20'  
SIDE: 20'  
REAR: 20'

WATER: CITY OF LACEY  
SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY

PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 183 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32

MAXIMUM BLDG COVERAGE: 50%  
(8) C, C, D, D = 2,8227.2  
(3) B, A, B = 20,013.39  
(1) C, C, D, D = 4,556  
OFFICE = 3,944.75

TOTAL: 56,741.34 / 415,562 SQ FT (9.54 ACRES)  
TOTAL COVERAGE: 13.6%

OPEN AREA:  
30% OPEN SPACE REQ:  
2.87 OPEN SPACE / 9.54 AC  
TOTAL OPEN SPACE: 30%

TREE RETAIN OR TRACTS TO EQUAL 5% OF GROSS  
SITE.

PRESERVED TREES ON SITE: 39%  
TREE RETAIN AREAS: 1.57 / 9.54  
TOTAL RETENTION: 15.3%

DESIGNED BY: HSDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



HATTON GODAT PANTIER  
AND  
ENGINEERS  
SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpantier.com

DATE:

REVISIONS:

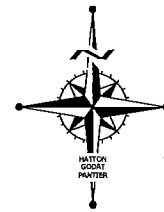
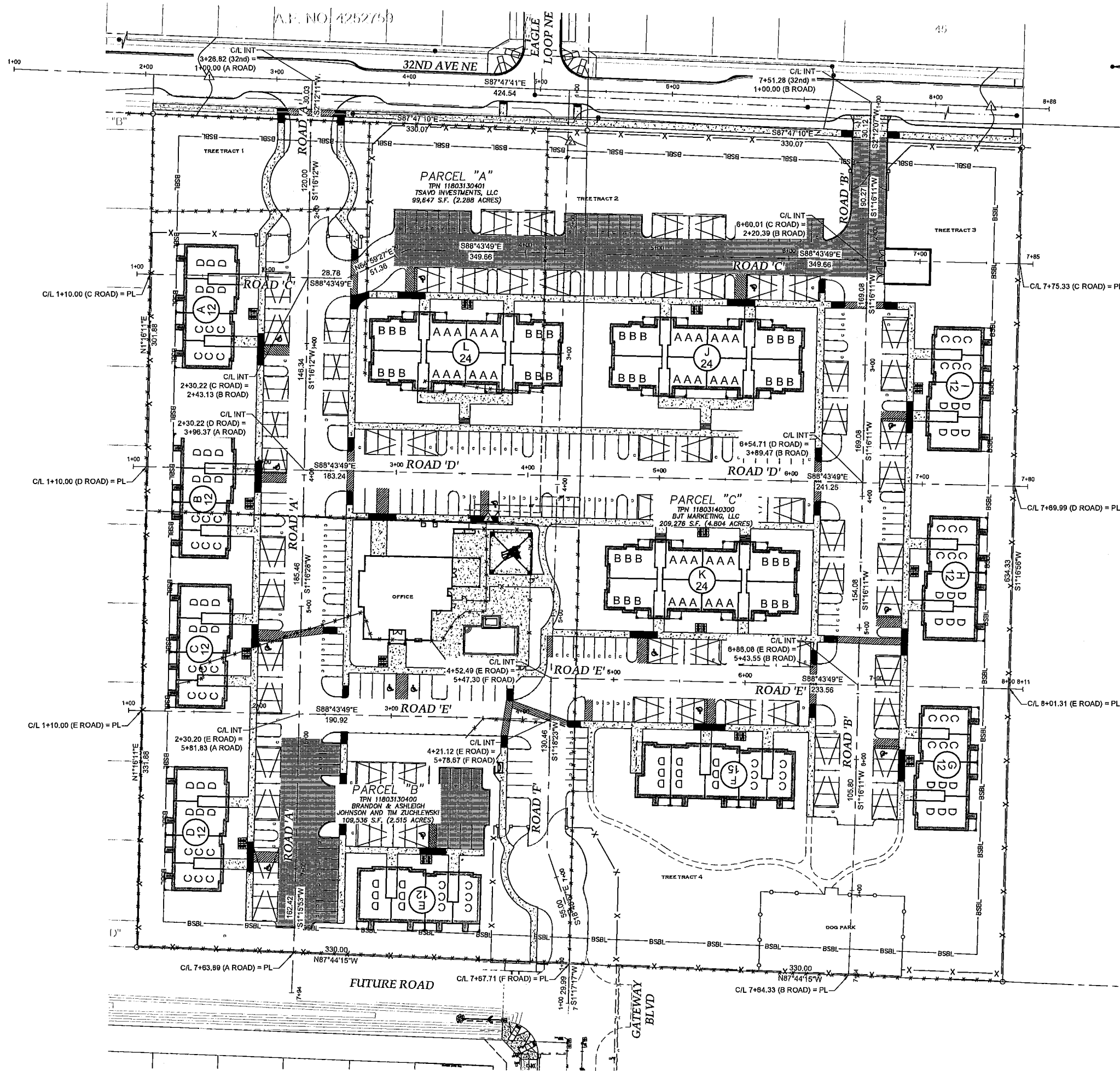
TP# 11803140300, 11803130400, 1180310401

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND AVE NE, LACEY, WA 98516

PRELIMINARY SITE PLAN

AGENCY NO.  
SHEET: 1 OF 14  
INDEX: 19-085 pre-cov.dwg  
JOB: 19-085





CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'

DESCRIPTIONS

PARCEL "A":  
THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON, EXCEPTING THEREFROM THE NORTH 30 FEET FOR EXISTING ROADWAY.

PARCEL "B":  
THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON.

PARCEL "C":  
THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, 1/4, IN THURSTON COUNTY, WASHINGTON, EXCEPTING THAT PORTION CONVEYED TO THURSTON COUNTY BY DEED RECORDED SEPTEMBER 2, 1976 UNDER RECORDING NO. 875922.

LEGEND

- 1/4 RIGHT OF WAY DESCRIBED IN DEED TO THURSTON COUNTY RECORDED UNDER AUDITOR'S FILE NO. 875922
- EASEMENT GRANTED TO PUKET SOUND POWER & LIGHT COMPANY RECORDED UNDER AUDITOR'S FILE NO. 983219
- \* EASEMENT TO BE ABANDONED

NOTES

THIS DRAWING IS BASED ON BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BUTLER SURVEYING. HATTON GODAT PANTIER HAS NOT PERFORMED AN INDEPENDENT SURVEY OF THE SITE. THE FOLLOWING ITEMS WERE ADDED TO THE BUTLER SURVEY BY HGP:

- ADJACENT PLATS
- EASEMENT AF 8983219
- RIGHT OF WAY REFERENCE AF 875922
- UTILITY INFORMATION IN PLAT OF GATEWAY DIVISION 28

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

STEVEN D. HATTON  
STATE OF WASHINGTON  
REGISTERED  
PROFESSIONAL ENGINEER

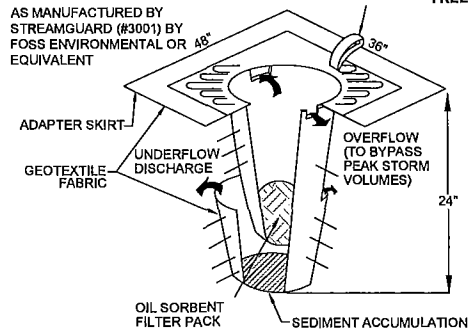
HATTON GODAT PANTIER  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516

PRELIMINARY HORIZONTAL  
CONTROL PLAN

SECTION 12, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO.  
SHEET: 2 OF 14  
H:\gml19-00019-005\PRELIMINARY  
INDEX: 19-085-pre-hcp.dwg  
JOB: 19-085



### INLET SEDIMENT PROTECTION

N.T.S.

#### INLET SEDIMENT PROTECTION NOTES:

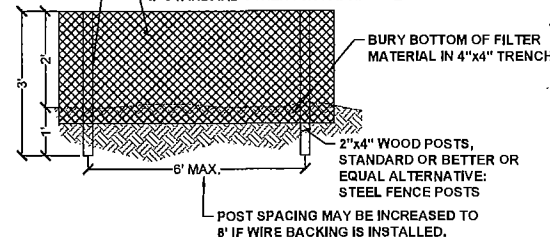
1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

#### FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 4 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOE RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

JOINTS IN FILTER FABRIC SHALL BE SPICED AT POSTS. USE STAPLES OR WIRE RING TO ATTACH FABRIC TO POSTS.

2"x2"x14GA. WIRE FABRIC OR EQUIVALENT IF STANDARD STRENGTH FABRIC USED



2"x4" WOOD POSTS, STANDARD OR BETTER OR EQUAL ALTERNATIVE: STEEL FENCE POSTS

POST SPACING MAY BE INCREASED TO 8' IF WIRE BACKING IS INSTALLED.

2"x2"x14GA. WIRE FABRIC OR EQUIVALENT IF STANDARD STRENGTH FABRIC USED

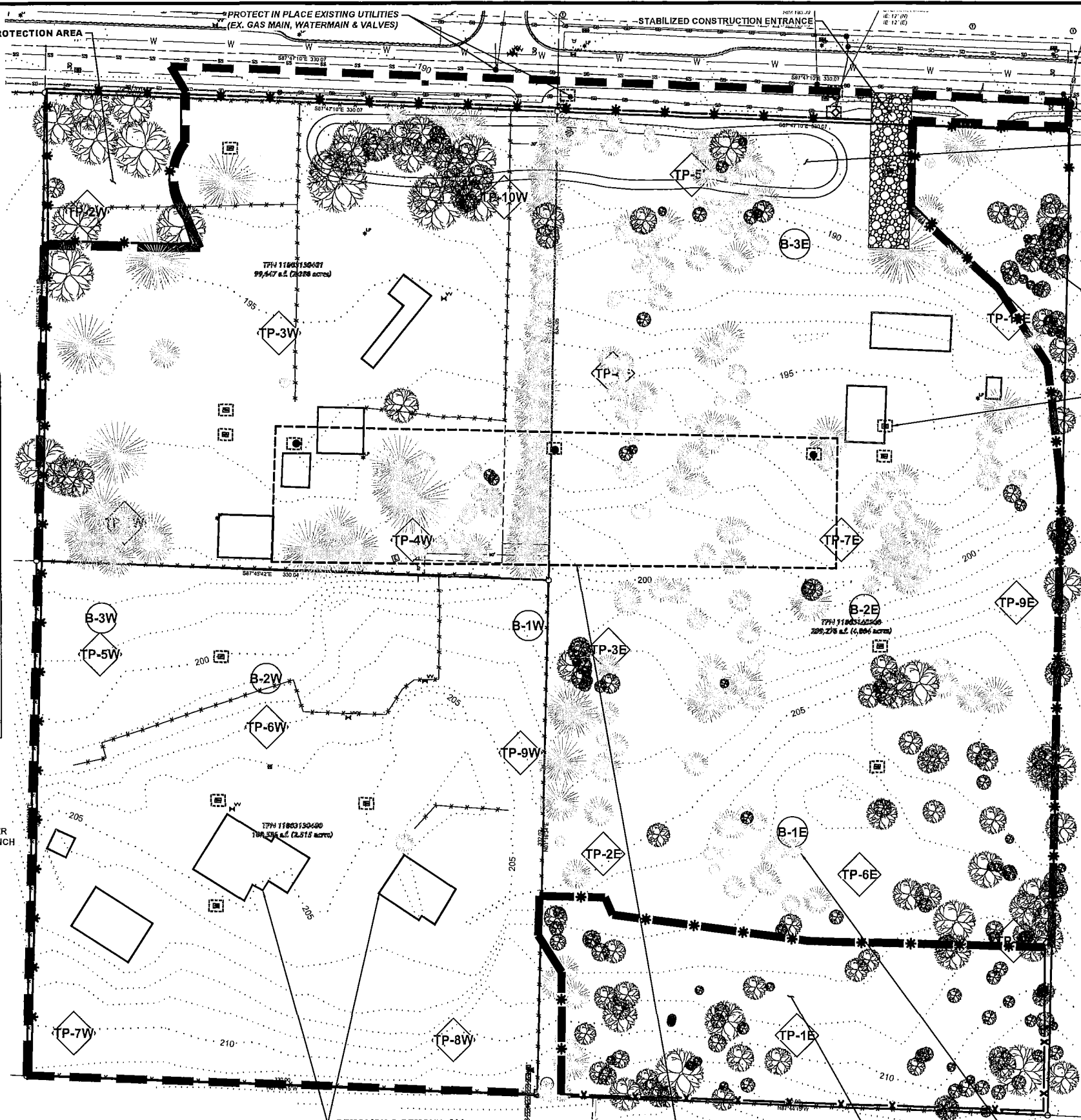
PROVIDE 3/4"-1 1/2" WASHED GRAVEL BACKFILL IN TRENCH

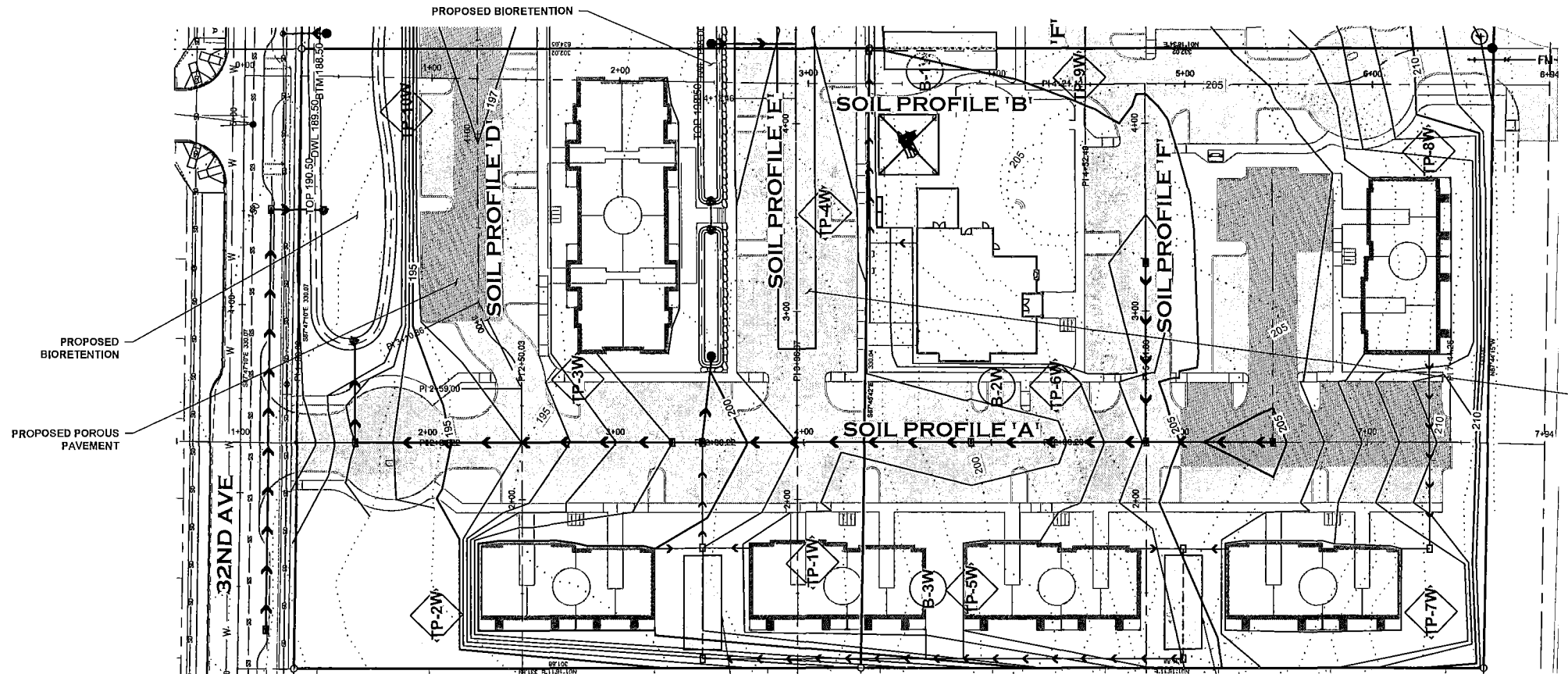
4" MIN.

2"x4" WOOD POSTS, STANDARD OR BETTER OR EQUAL ALTERNATIVE: STEEL FENCE POSTS

### FILTER FABRIC FENCE DETAIL

N.T.S.



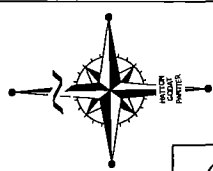


**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

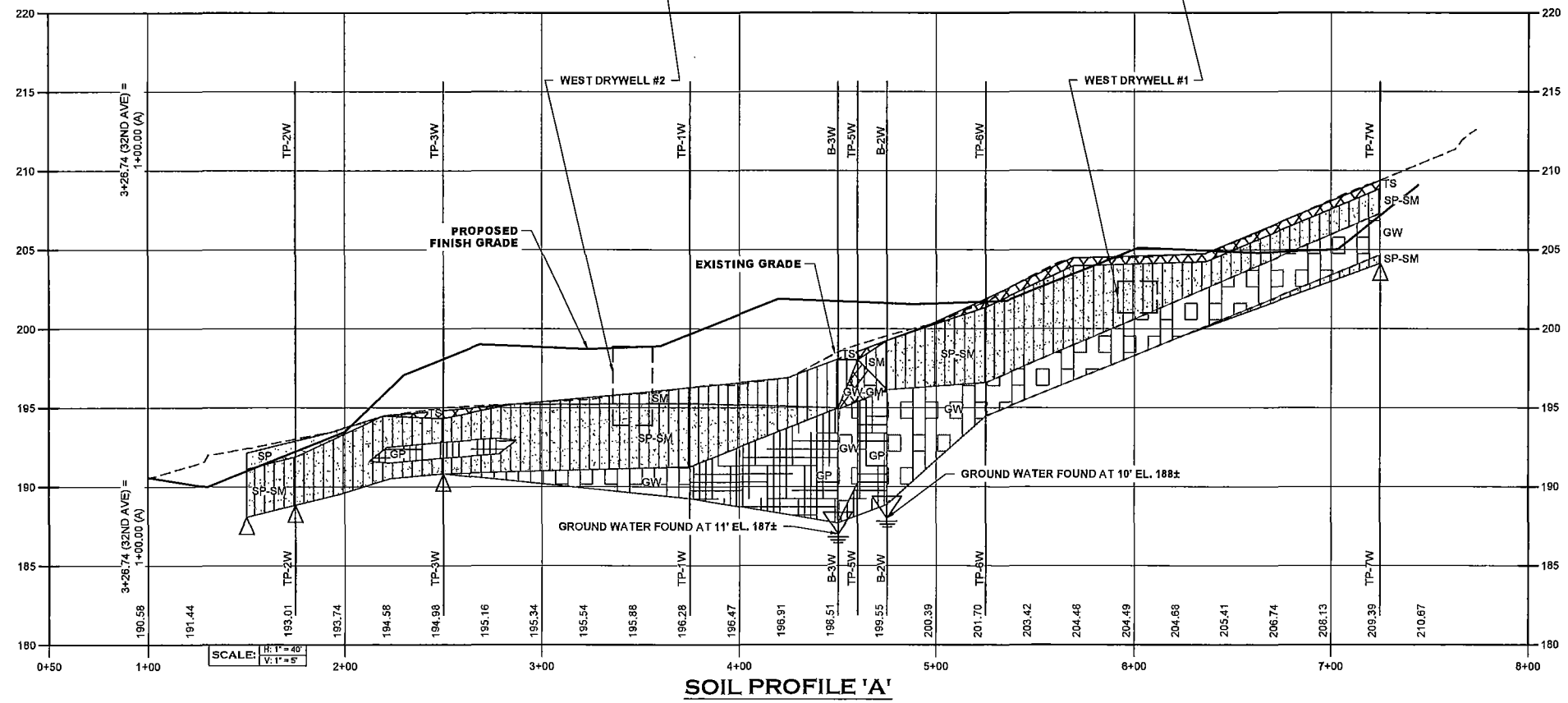
AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105



40 20 0 40 80  
SCALE: 1" = 40'

**LEGEND**

- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER



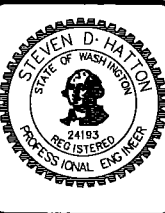
**SOIL PROFILE 'A'**

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E., SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE:

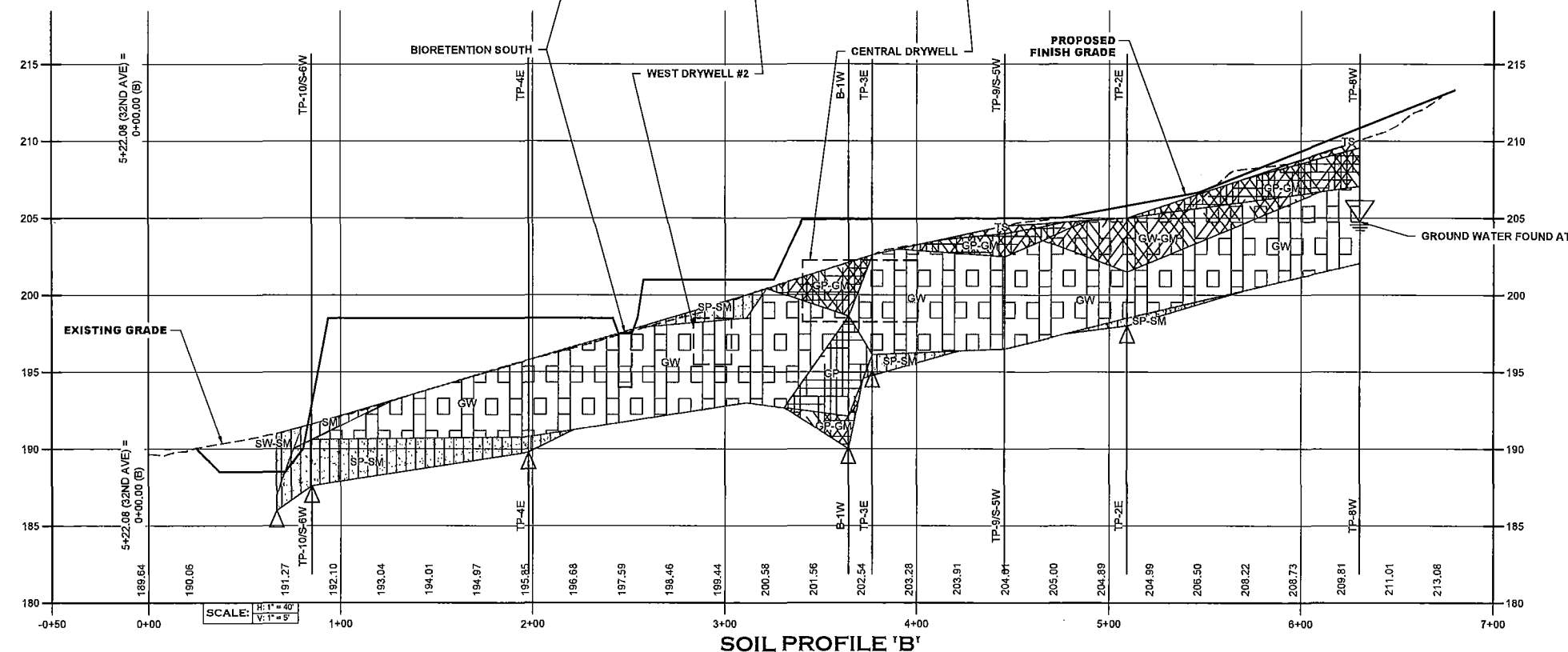
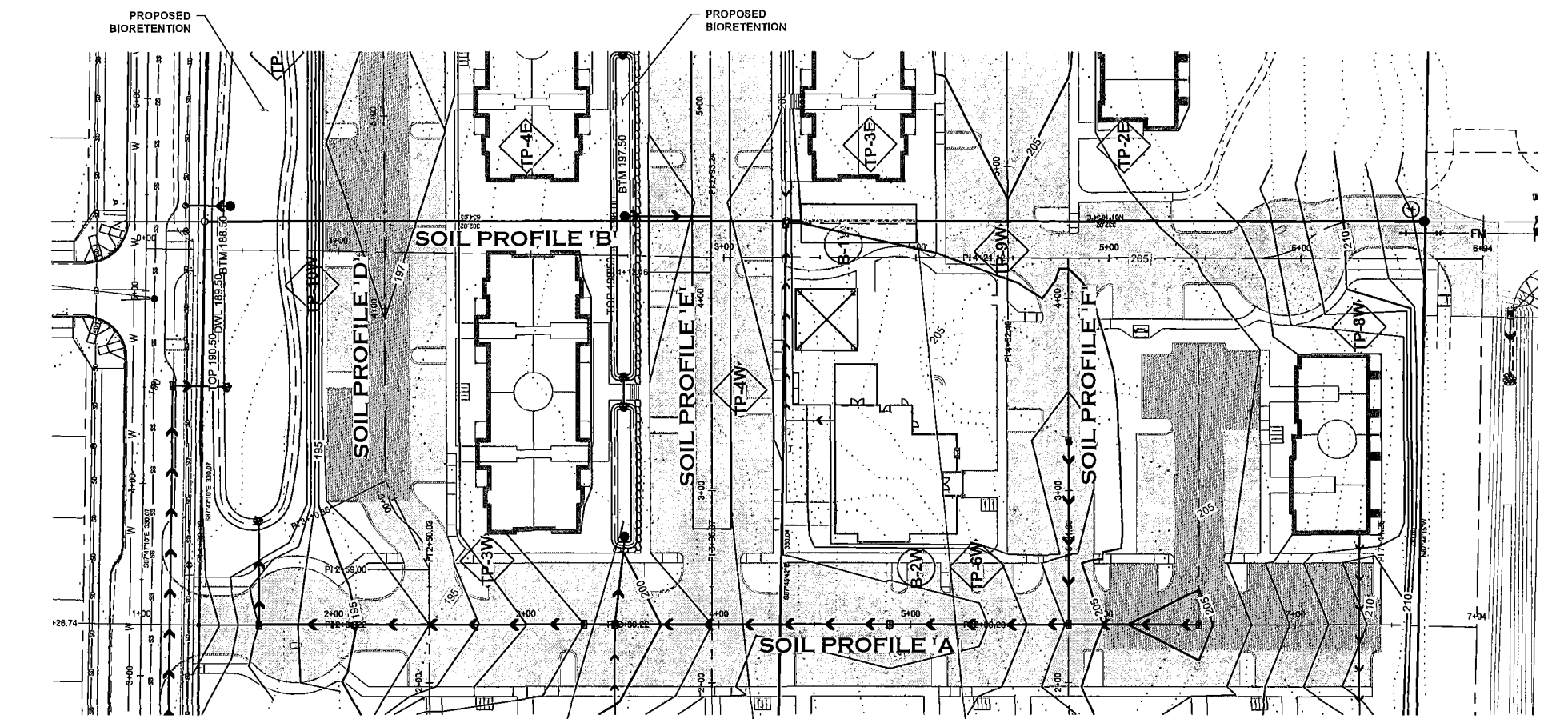
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND AVE. LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES - 'A' PROFILE**

AGENCY NO.  
SHEET: 4 OF 14  
INDEX: 19-085 PRE-SOIL PROFILES.dwg  
JOB: 19-085

TP# 11803140300, 11803130400, 11803130401

SECTION 61, TOWNSHIP 18 NORTH, RANGE 7 WEST

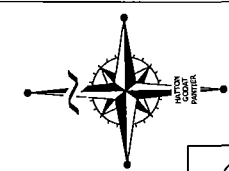




**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.



40 20 0 40 80  
SCALE: 1" = 40'

**LEGEND**

- B-E
- TP-E
- B-W
- TP-W
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

DESIGNED BY: HGL/DI  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE:

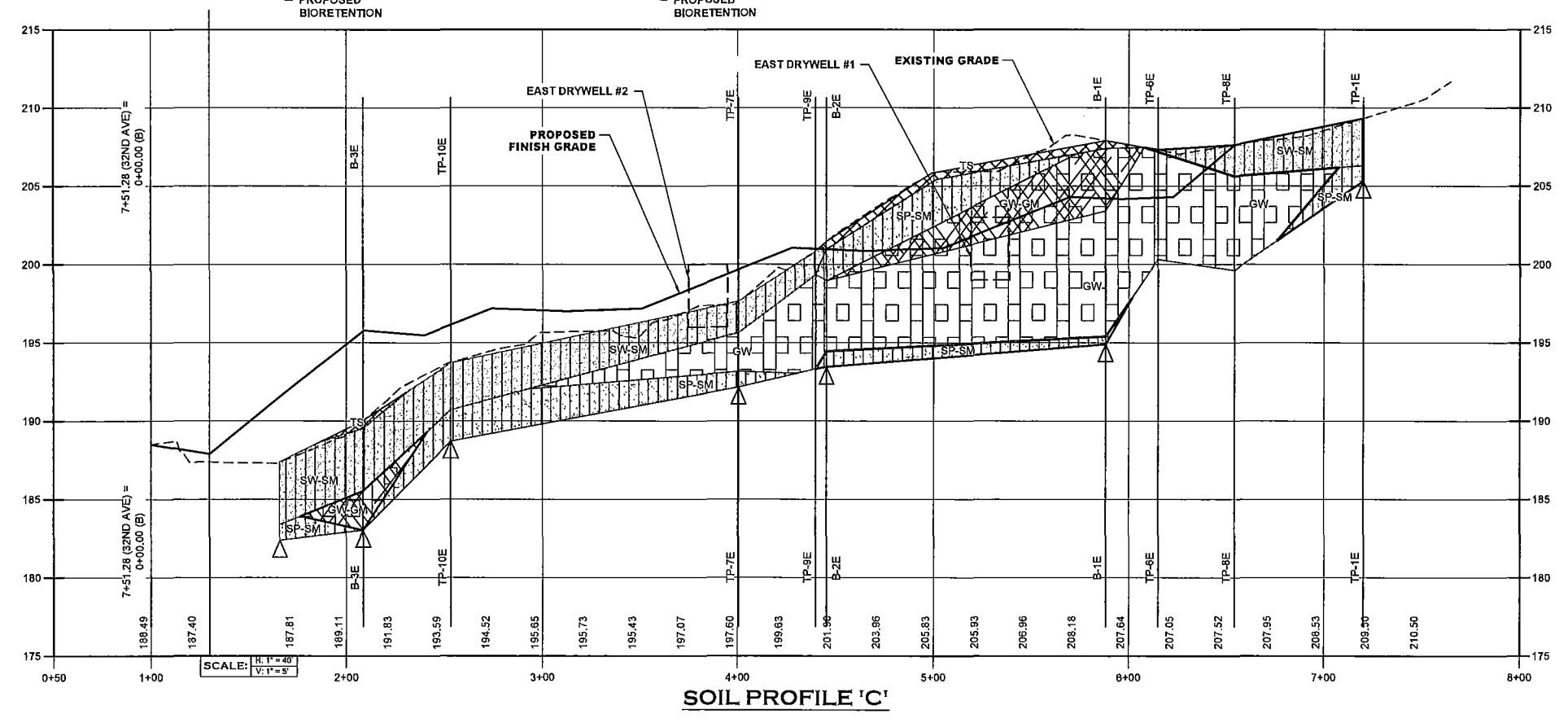
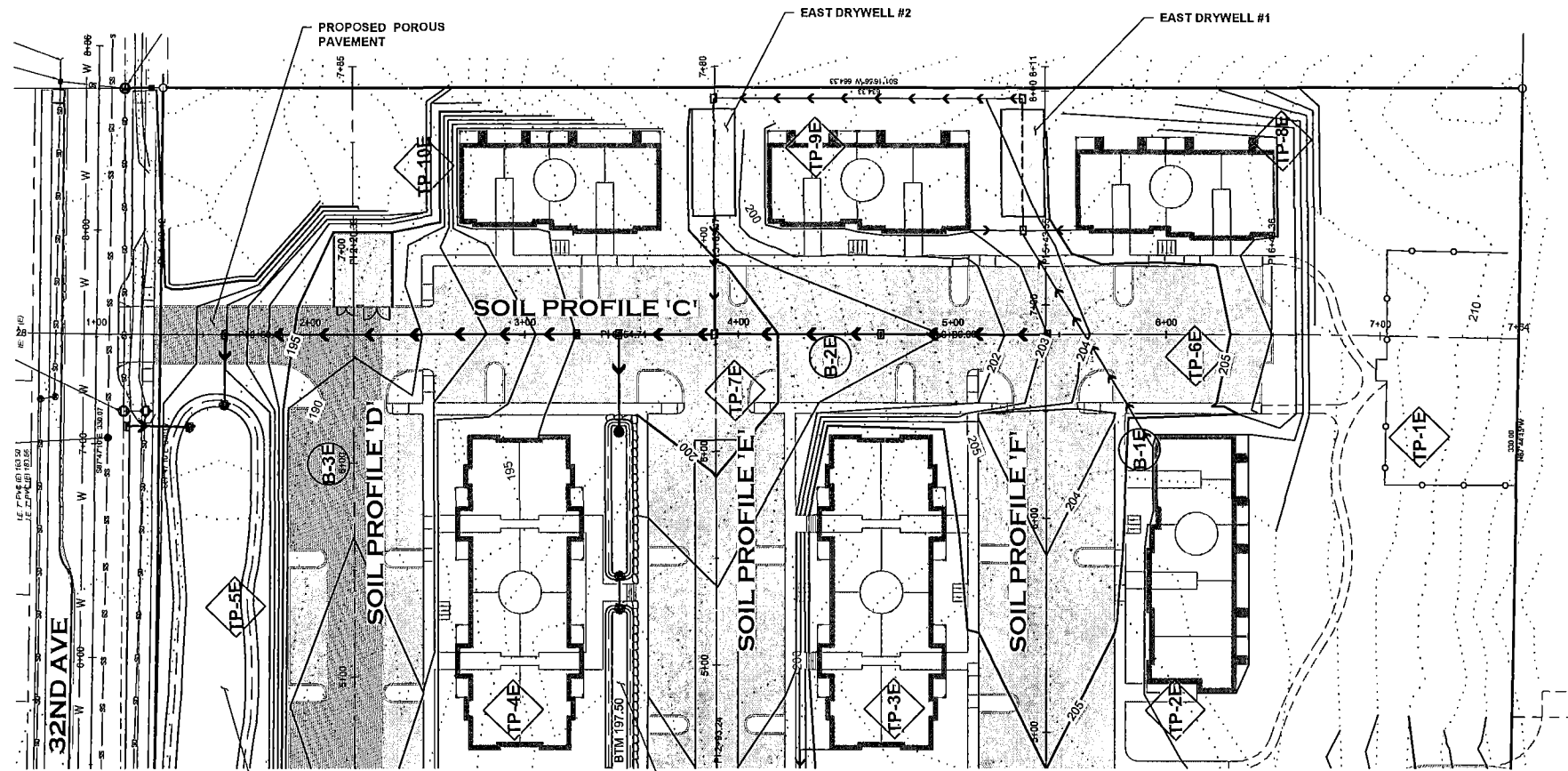
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL**  
**PROFILES - 'B' PROFILE**

AGENCY NO.:  
SHEET: 5 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

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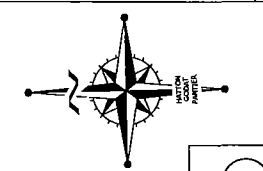


CITY OF LACEY

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105



SCALE: 1" = 40'

- LEGEND**
- B-E: APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
  - TP-E: APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2018 INSIGHT GEOLOGIC, INC.
  - B-W: APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
  - TP-W: APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
  - GM - SILTY GRAVEL
  - GP - POORLY GRADED GRAVEL
  - GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
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  - TS - TOPSOIL / SOD / DUFF
  - GROUND WATER LOCATION
  - SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

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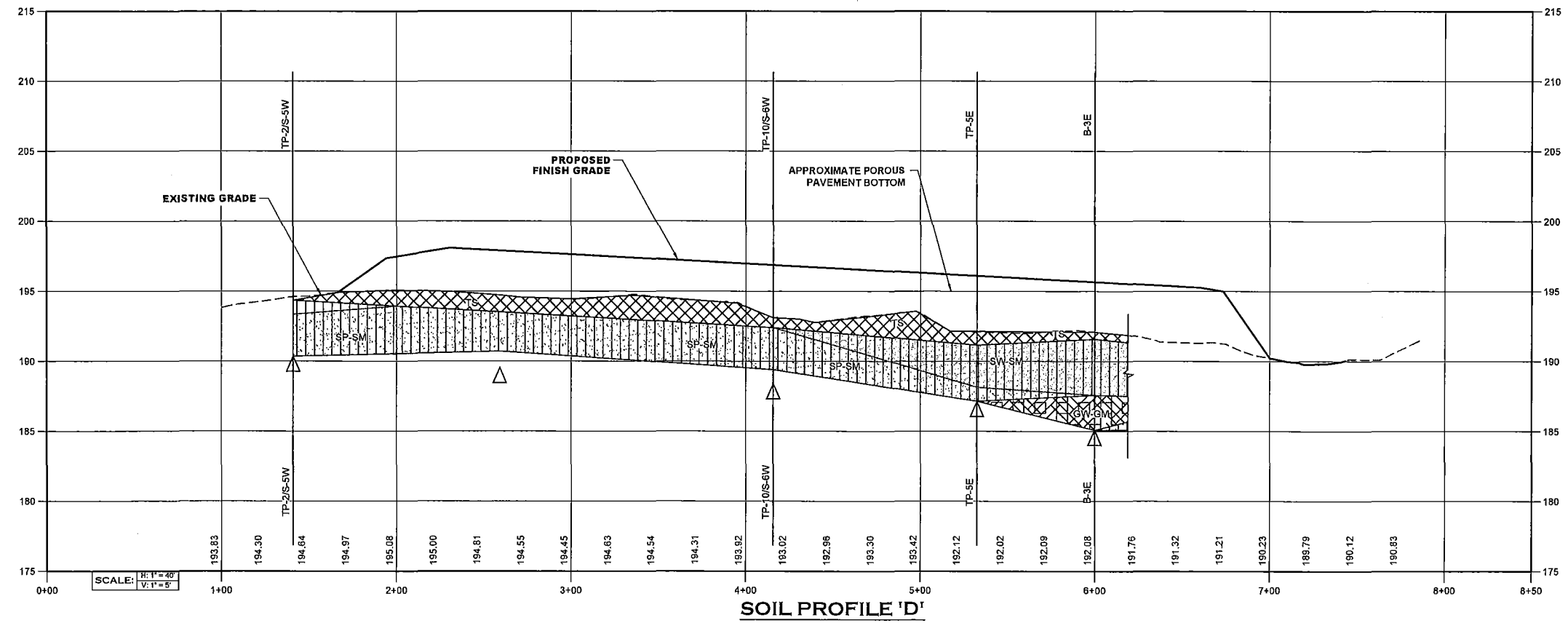
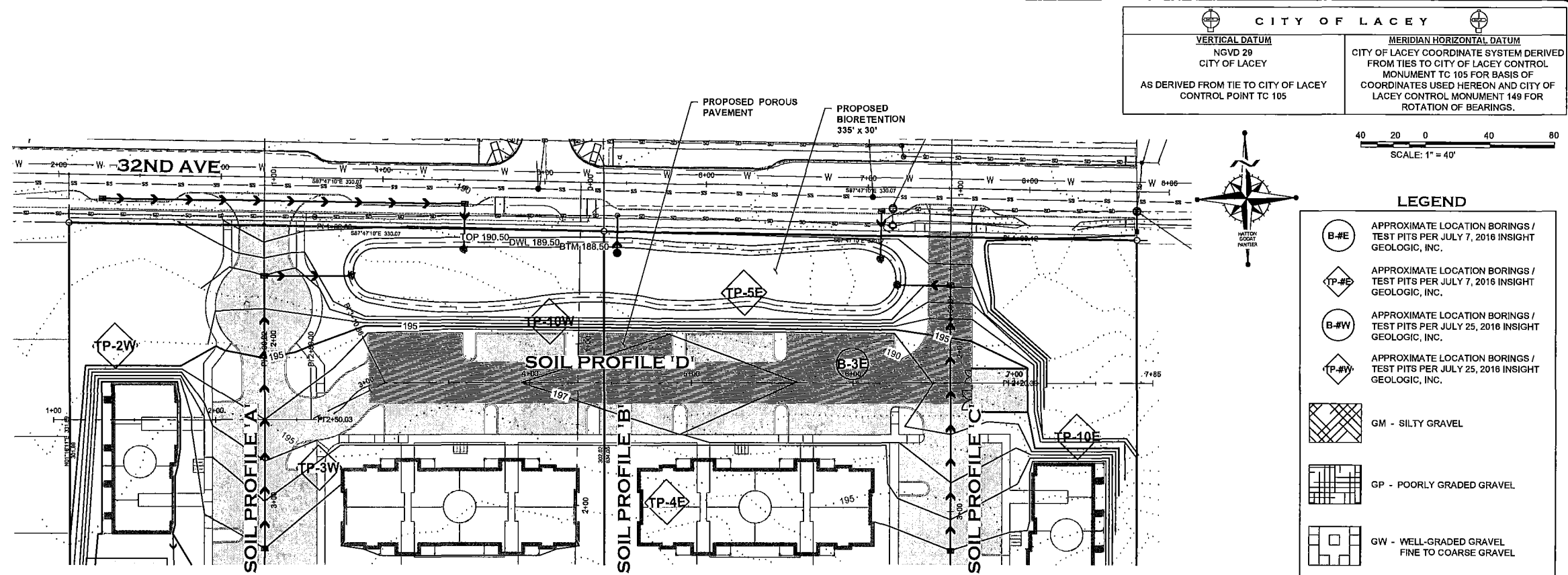
DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

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TEL: 360.943.1599 FAX: 360.357.6299  
huttonpantier.com

REVISIONS: DATE:

TP# 11803140300, 11803130400, 11803130401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NELACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'C' PROFILE  
SECTION 16, TOWNSHIP 16 NORTH, RANGE 1 WEST

AGENCY NO.:  
SHEET: 6 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085



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DESIGNED BY: HGLDT

DRAWN BY: JCH

CHECKED BY: SDH

DATE: MAY 2020

SCALE: 1" = 40'

STEVEN D. HATTON

STATE OF WASHINGTON

REGISTERED

24193

PROFESSIONAL ENGINEER

**HATTON GODAT PANTIER**

AND SURVEYORS

ENGINEERS

3910 MARTIN WAY E. SUITE B

OLYMPIA, WA 98506

TEL: 360.943.1599 FAX: 360.357.6299

hattonpantier.com

REVISIONS:

DATE:

TP# 11803140300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**

7235 32ND NE LACEY, WA 98516

**PRELIMINARY SOIL**

**PROFILES 'D' PROFILE**

SECTION 05, TOWNSHIP 11 NORTH, RANGE 1 WEST

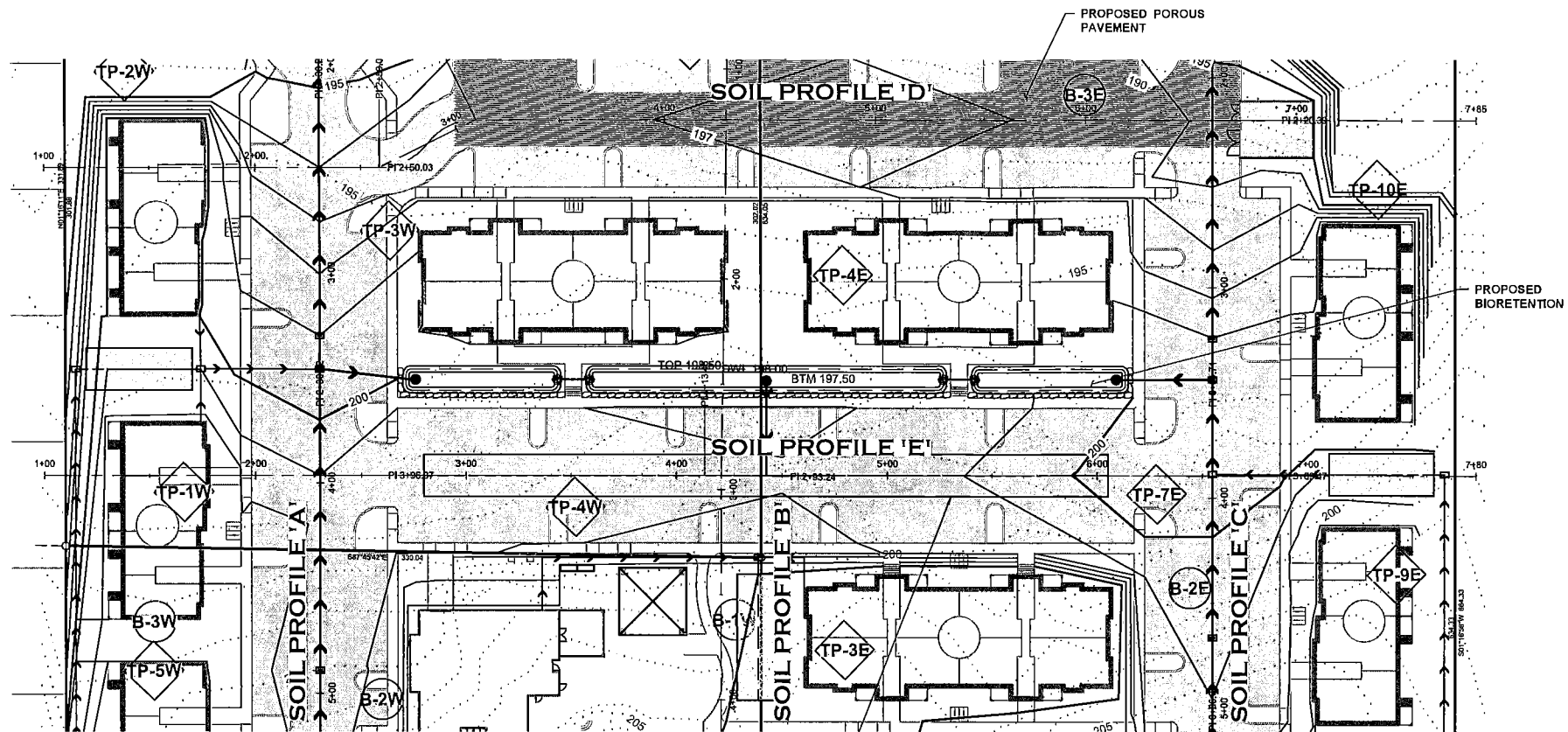
AGENCY NO.

SHEET: 7 OF 14

140619-00019-085 PRELIMINARY

INDEX: 19-085 pre-soil profiles.dwg

JOB: 19-085



**CITY OF LACEY**

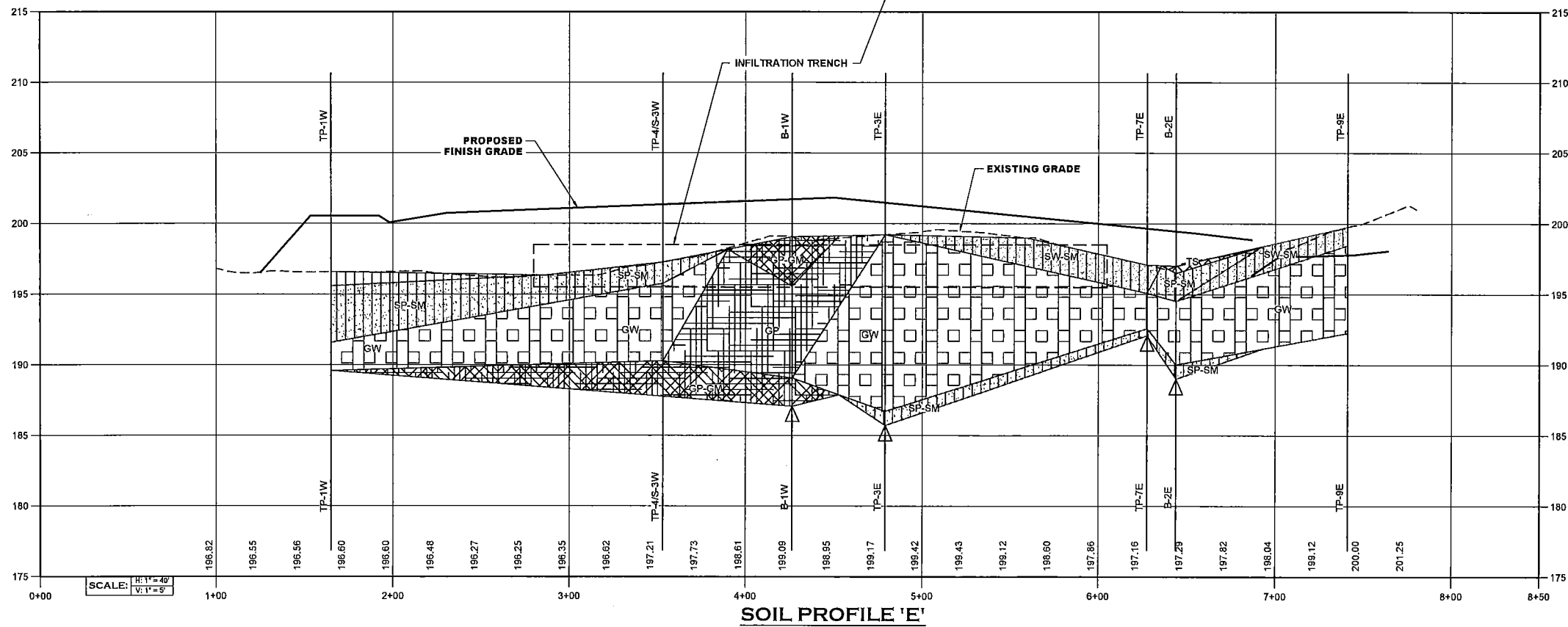
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|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VERTICAL DATUM</b><br>NGVD 28<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | <b>MERIDIAN HORIZONTAL DATUM</b><br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

SCALE: 1" = 40'



**LEGEND**

|  |                                                                                   |
|--|-----------------------------------------------------------------------------------|
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.  |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.  |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC. |
|  | APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2018 INSIGHT GEOLOGIC, INC. |
|  | GM - SILTY GRAVEL                                                                 |
|  | GP - POORLY GRADED GRAVEL                                                         |
|  | GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL                                     |
|  | SM - SILTY SAND                                                                   |
|  | SP - POORLY GRADED SAND                                                           |
|  | SW - WELL-GRADED SAND FINE TO COARSE SAND                                         |
|  | TS - TOPSOIL / SOD / DUFF                                                         |
|  | GROUND WATER LOCATION                                                             |
|  | SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER                                      |

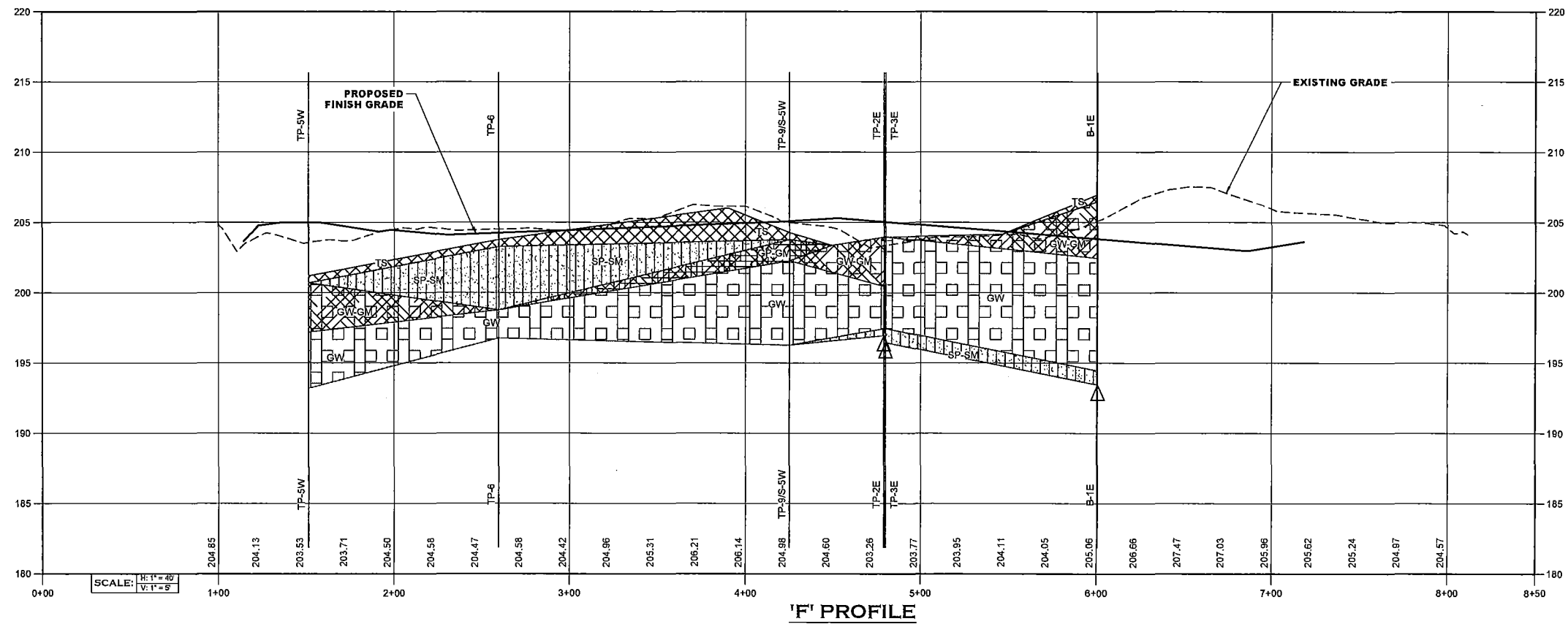
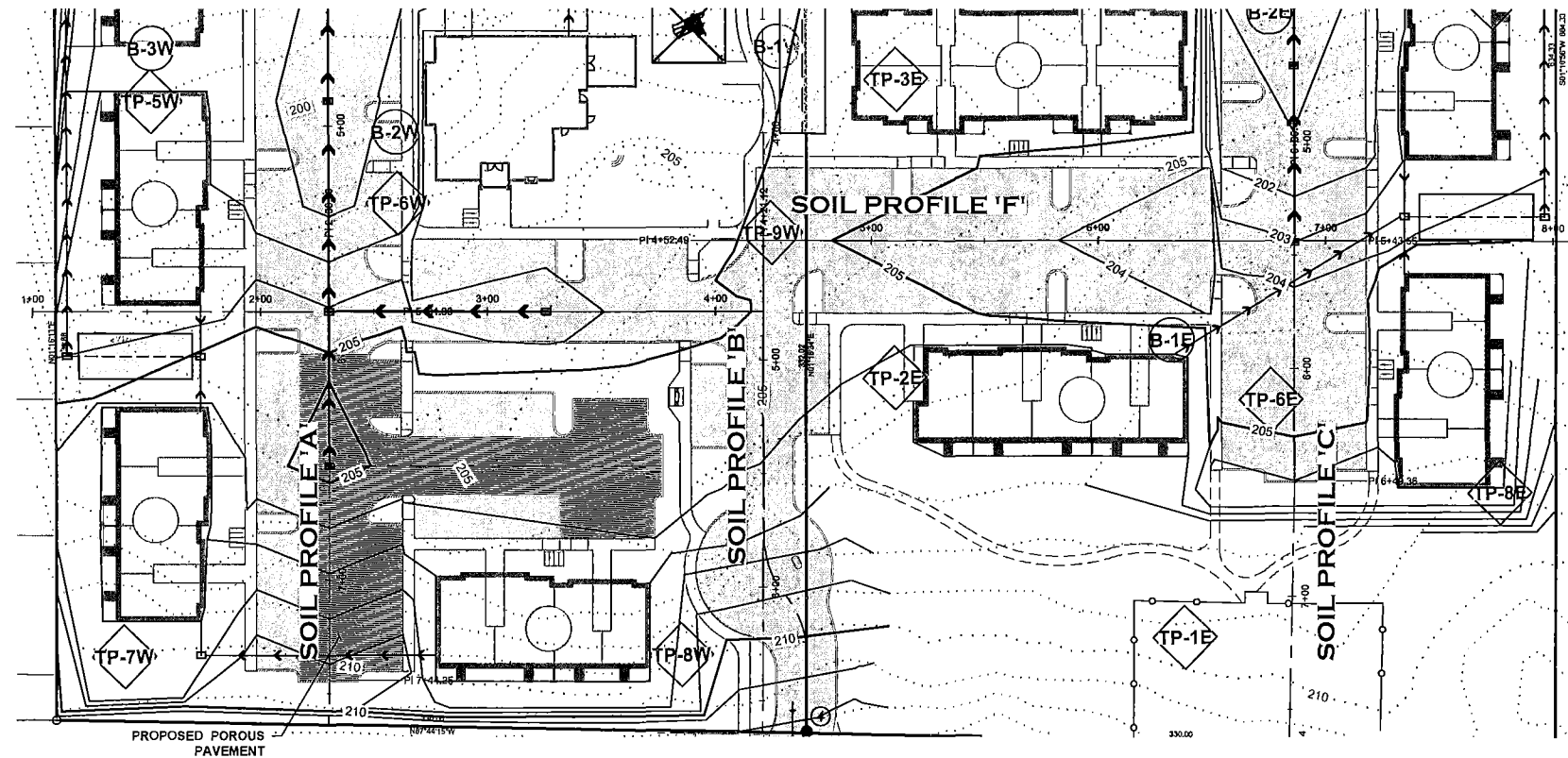


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|                                                                                                                                                                                                                                                                    |                 |                |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|-----------------|
| DESIGNED BY: HGLDT                                                                                                                                                                                                                                                 | CHECKED BY: JCH | DATE: MAY 2020 | SCALE: 1" = 40' |
|                                                                                                                                                                                                                                                                    |                 |                |                 |
| <p align="center"><b>HATTON GODAT PANTIER</b><br/>ENGINEERS AND SURVEYORS<br/>3910 MARTIN WAY E., SUITE B<br/>OLYMPIA, WA 98506<br/>TEL: 360.943.1599 FAX: 360.357.6299<br/>hattonpantier.com</p>                                                                  |                 |                |                 |
| <p>REVISIONS: _____ DATE: _____</p>                                                                                                                                                                                                                                |                 |                |                 |
| <p>TP# 11803140300, 11803130400, 11803130401</p> <p><b>GATEWAY MULTI-FAMILY COMPLEX</b><br/>7235 32ND NE LACEY, WA 98516</p> <p align="center"><b>PRELIMINARY SOIL PROFILES - 'E' PROFILE</b></p> <p align="right">SECTION 03, TOWNSHIP 14 NORTH, RANGE 1 WEST</p> |                 |                |                 |
| <p>AGENCY NO. _____</p> <p>SHEET: 8 OF 14</p> <p>INDEX: 19-085 pre-soil profiles.dwg</p> <p>JOB: 19-085</p>                                                                                                                                                        |                 |                |                 |



**CITY OF LACEY**

VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TO 105



40 20 0 40 60  
SCALE: 1" = 40'

**LEGEND**

- B-#E
- TP-#E
- B-#W
- TP-#W
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
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3910 MARTIN WAY E., SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE: \_\_\_\_\_

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES**  
- 'F' PROFILE

AGENCY NO. \_\_\_\_\_  
SHEET: 9 OF 14  
INDEX: 19-085-pre-soil-profiles.dwg  
JOB: 19-085

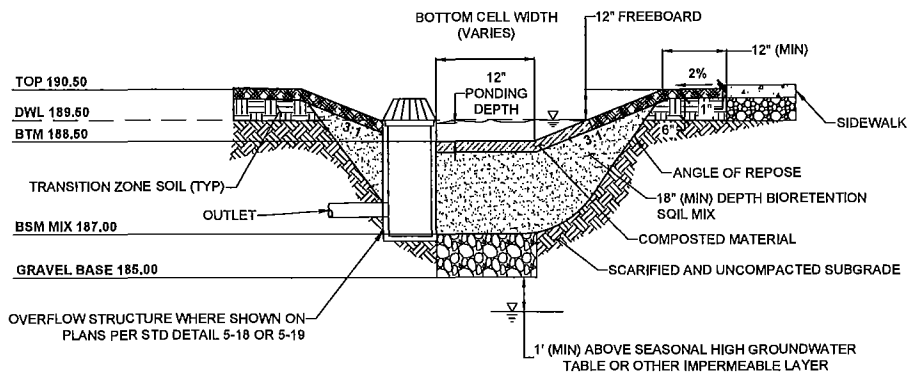
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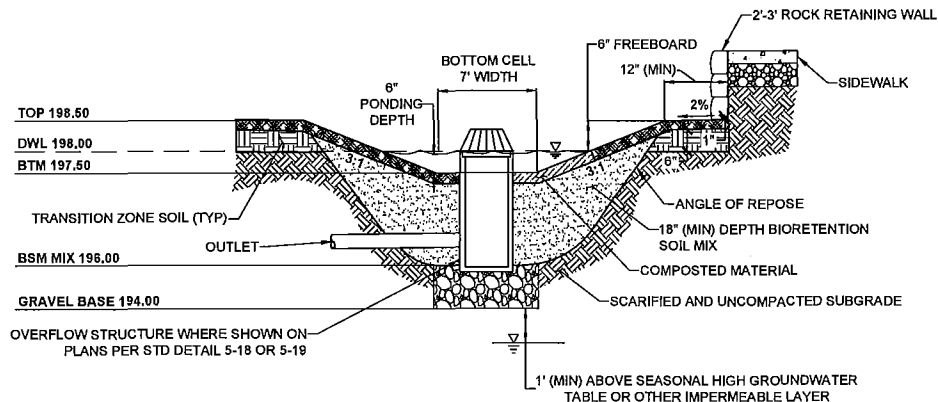
NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.



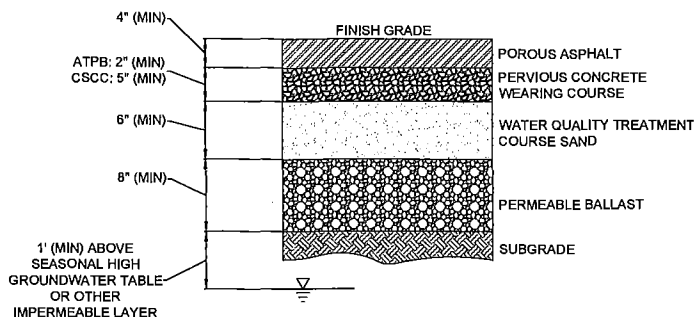




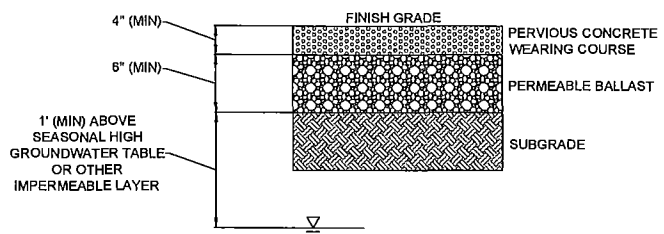
**BIORETENTION SECTION - NORTH**  
N.T.S.



**BIORETENTION SECTION - SOUTH**  
N.T.S.



**POROUS ASPHALT DETAIL**  
N.T.S.

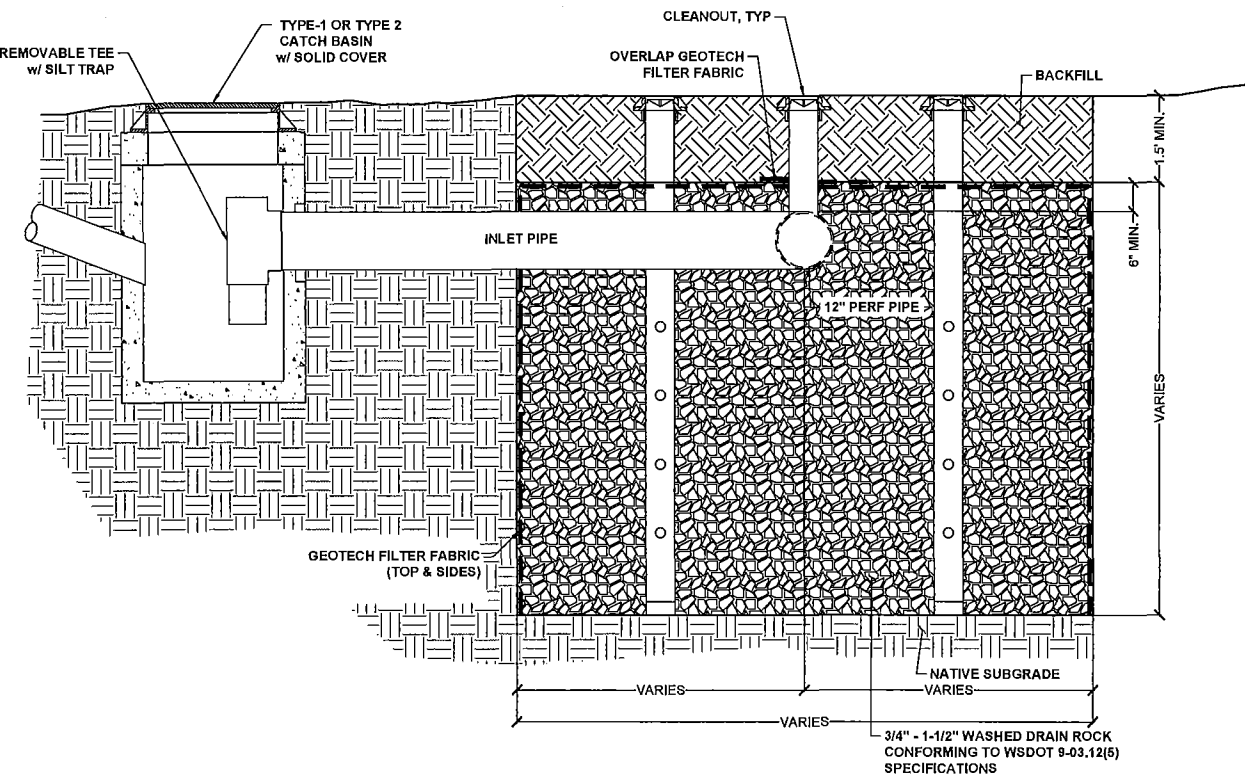


**POROUS SIDEWALK DETAIL**  
N.T.S.



**ONSITE PAVING SECTION  
STANDARD DUTY**  
N.T.S.

\*NOTE:  
ALL DEPTHS COMPACTED  
TO 95% MIN. DENSITY



**INFILTRATION TRENCH DETAIL, TYP**  
N.T.S.

**STORMWATER FACILITY ELEVATIONS**

| FACILITY            | FG                | GRAVEL TOP | GRAVEL BASE | HARDPAN |
|---------------------|-------------------|------------|-------------|---------|
| WEST DRYWELL #1     | 205±              | 203±       | 201±        | 197±    |
| WEST DRYWELL #2     | 201±              | 199±       | 194±        | 189±    |
| CENTRAL DRYWELL     | 206±              | 203±       | 199±        | 192±    |
| EAST DRYWELL #1     | 204±              | 203±       | 199±        | 194±    |
| EAST DRYWELL #2     | 201±              | 200±       | 198±        | 191±    |
| INFILTRATION TRENCH | 201±              | 198.5±     | 195.5±      | 190±    |
| BIORETENTION SOUTH  | 198.5 (SWALE TOP) | 195±       | 194±        | 188±    |
| BIORETENTION NORTH  | 190.5 (SWALE TOP) | 187±       | 185±        | 180±    |

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 10'



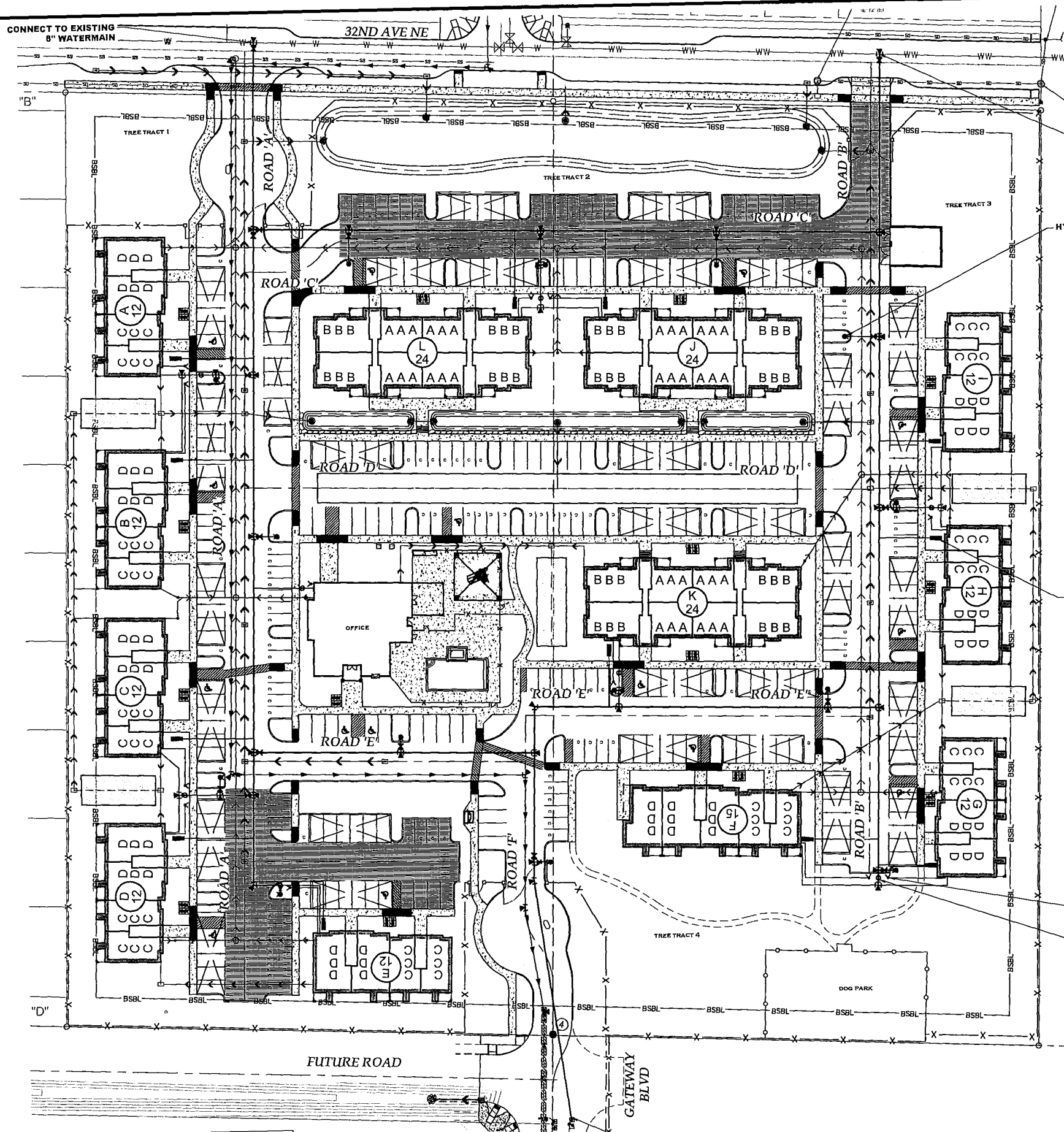
**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS:  
DATE:

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND N. LACEY, WA 98516  
**PRELIMINARY GRADING & DRAINAGE DETAILS**

AGENCY NO.:  
SHEET: 11 OF 14  
INDEX: 19-085-pre-def.dwg  
JOB: 19-085





**CITY OF LACEY**

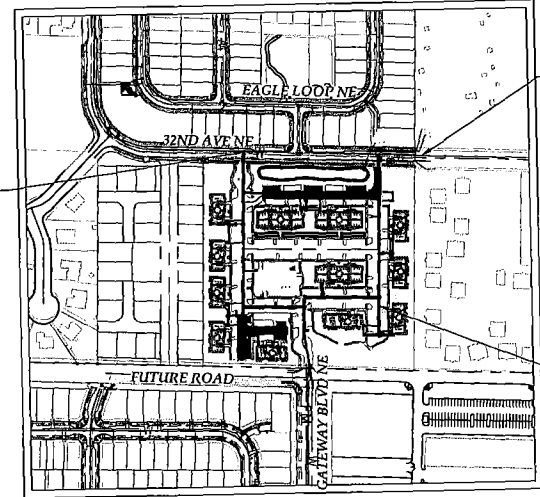
**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'



**WATER SYSTEM MAP**  
1"=300'

**TOPOGRAPHIC NOTE:**  
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THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PUBLIC WORKS DIRECTOR

DESIGNED BY: HGP/DT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1"=40'

**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: \_\_\_\_\_ DATE: \_\_\_\_\_

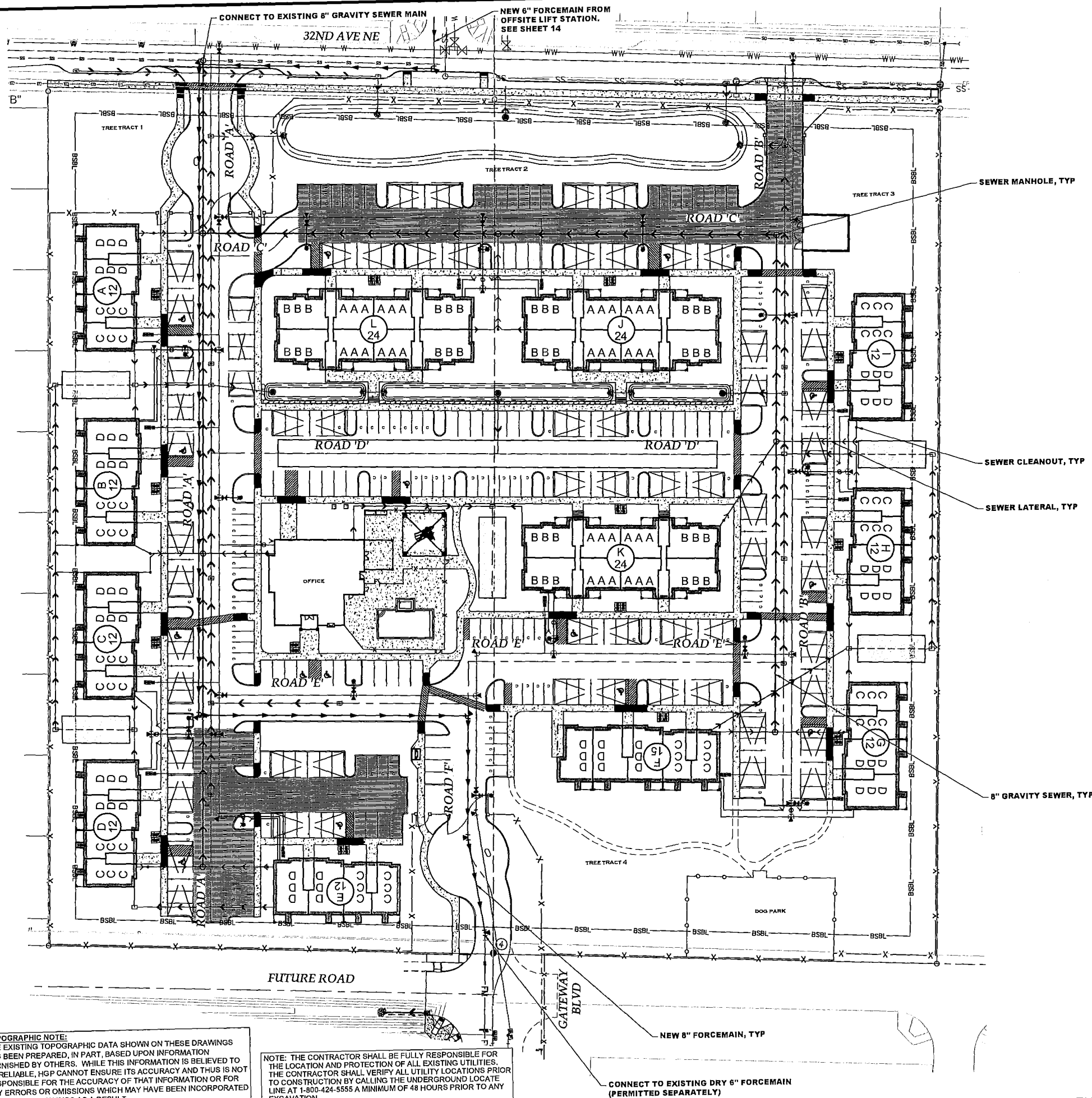
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY WATER PLAN**

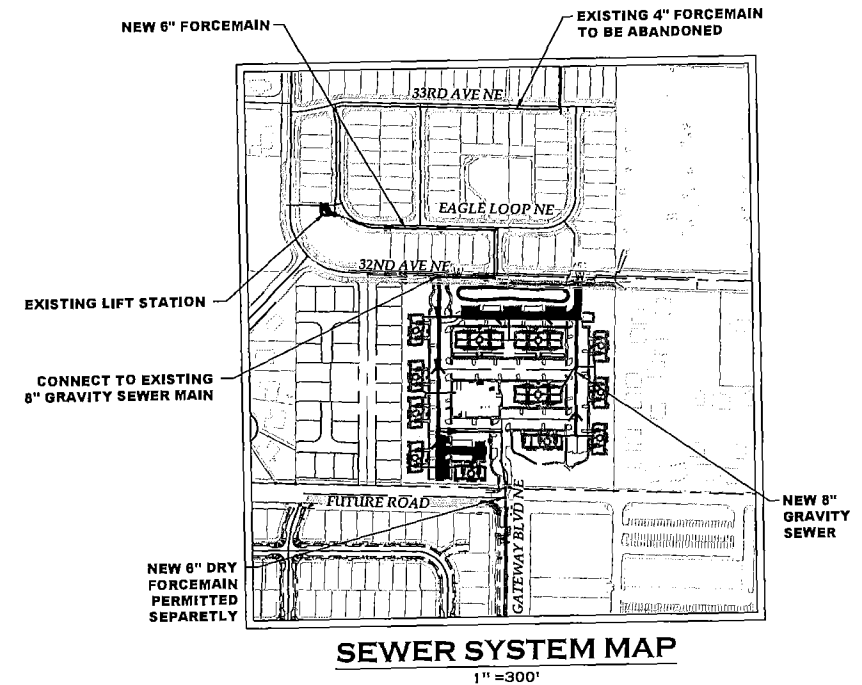
AGENCY NO. \_\_\_\_\_  
SHEET: 12 OF 14  
INDEX: 19-085-pre-wdr.dwg  
JOB: 19-085

TP# 11803140300, 11803130400, 11803130401

SECTION 03, TOWNSHIP 18 NORTH, RANGE 1, WEST



| CITY OF LACEY                                                                                              |                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |
| 40 20 0 40 80<br>SCALE: 1" = 40'                                                                           |                                                                                                                                                                                                                                              |

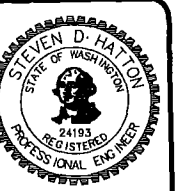


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CONNECT TO EXISTING DRY 6" FORCEMAIN  
(PERMITTED SEPARATELY)

DESIGNED BY: HGD/LDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



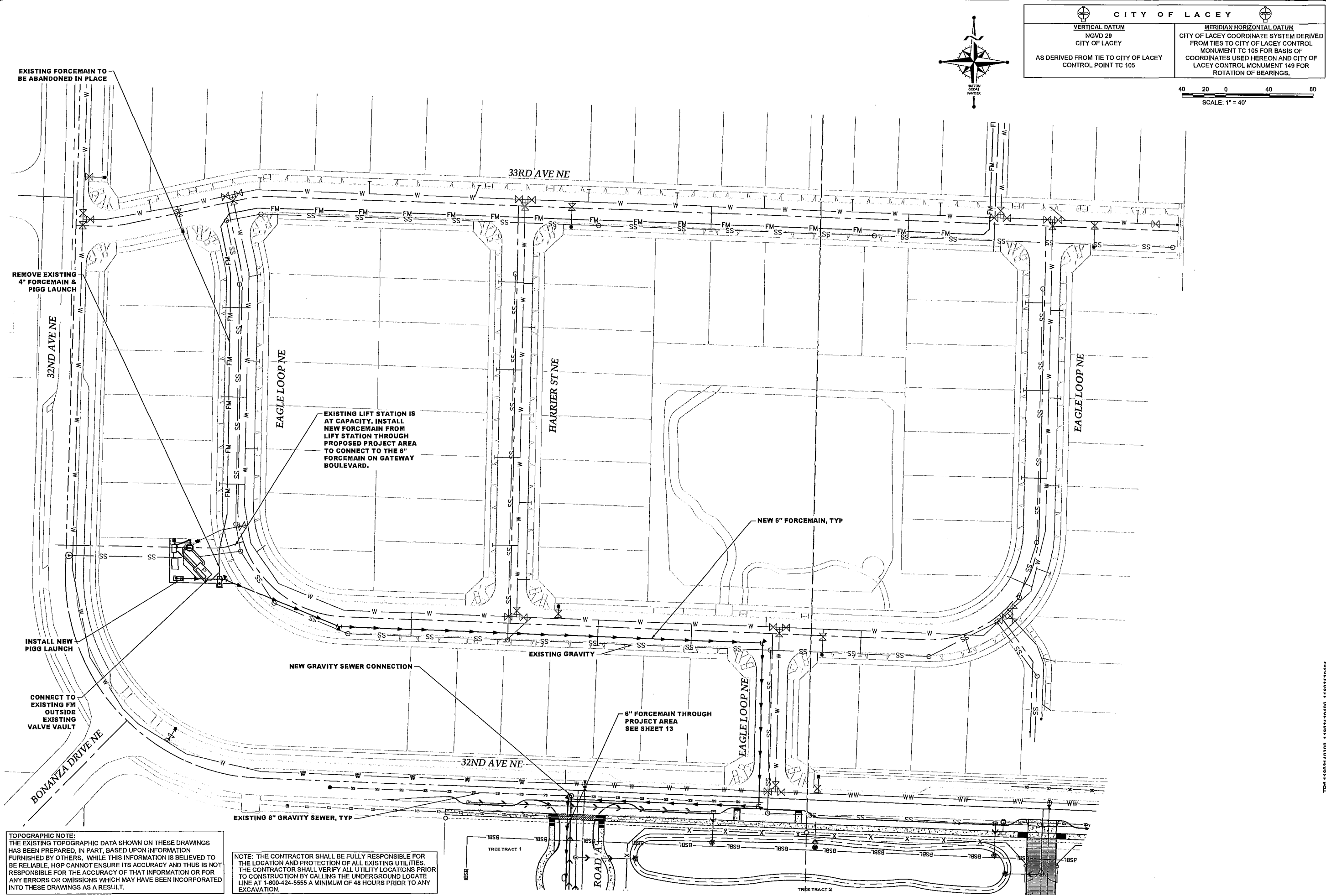
**HATTON GODAT PANTIER**  
AND  
ENGINEERS  
SURVEYORS  
3910 MARTIN WAY E. SUITE B  
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TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS:  
DATE:

TP# 1180310300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY ONSITE  
SEWER PLAN**

AGENCY NO.:  
SHEET: 13 OF 14  
INDEX: 19-085-pre-swr.dwg  
JOB: 19-085

SECTION 41, TOWNSHIP 18 NORTH, RANGE 1 WEST



**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TO 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TO 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

STEVEN D. HATTON  
STATE OF WASHINGTON  
REGISTERED  
24193  
PROFESSIONAL ENGINEER

**HATTON GODAT PANTIER**  
AND  
ENGINEERS  
AND SURVEYORS  
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OLYMPIA, WA 98506  
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hattonpantier.com

TP# 11803140300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY OFFSITE  
SEWER PLAN**

SECTION 02, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO. \_\_\_\_\_  
SHEET: 14 OF 14  
INDEX: 19-085 pre-swr.dwg  
JOB: 19-085

## **B. BMP Detail**



## **BMP C101: Preserving Natural Vegetation**

### ***Purpose***

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20 to 30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

### ***Conditions of Use***

- Natural vegetation must be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.
- As required by the city or other agencies.

### ***Design and Installation Specifications***

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. City ordinances to save natural vegetation and trees should be reviewed.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- **Construction Equipment:** This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- **Grade Changes:** Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- **Excavations:** Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:
  - Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
  - Backfill the trench as soon as possible.
  - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, dogwood, red alder, western hemlock, western red cedar, and Douglas-fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and Pacific madrone is high, while that of western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.



- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western red cedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

### ***Maintenance Standards***

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, prune cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.



**BMP C103: High Visibility Fence*****Purpose***

Fencing is intended to:

- Restrict clearing to approved limits
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed
- Limit construction traffic to designated construction entrances, exits or internal roads
- Protect areas where marking with flagging/survey tape may not provide adequate protection

***Conditions of Use***

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared
- As necessary to control vehicle access to and on the site

***Design and Installation Specifications***

- High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least 4 feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every 6 inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 pounds/feet using the American Society for Testing and Materials (ASTM) D4595 testing method.
- If appropriate install fabric silt fence in accordance with BMP C233 to act as high visibility fence. Except that the silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.
- Metal fences are the least preferred but might be appropriate to address security concerns. Metal fencing shall be designed and installed according to the manufacturer's specifications.
- Metal fences shall be at least 4 feet high and must be highly visible.
- Fences shall not be wired or stapled to trees.

***Maintenance Standards***

- If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.



**BMP C105: Stabilized Construction Entrance/Exit*****Purpose***

Stabilized Construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

***Conditions of Use***

Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential construction, provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access, based on lot size and configuration.

***Design and Installation Specifications***

- See Figure 5.1 for details. Note: the 100 foot minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100 feet).
- Construct stabilized construction entrances with a 12-inch-thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. For single-family residential lots pad may be reduced in length to fit site, to no less than 20 feet long, and in depth, to 6 inches thick with 4-inch to 6-inch quarry spalls, provided that performance standards are still met.
- Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products raise pH levels in stormwater and concrete discharge to surface waters of the State is prohibited.
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:
  - Grab Tensile Strength (ASTM D4751): 200 psi minimum
  - Grab Tensile Elongation (ASTM D4632): 30 percent maximum
  - Mullen Burst Strength (ASTM D3786-80a): 400 psi minimum
  - AOS (ASTM D4751): 20 to 45 (U.S. standard sieve size)
- Fencing (see BMP C103) shall be installed as necessary to restrict traffic to the construction entrance.

- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.

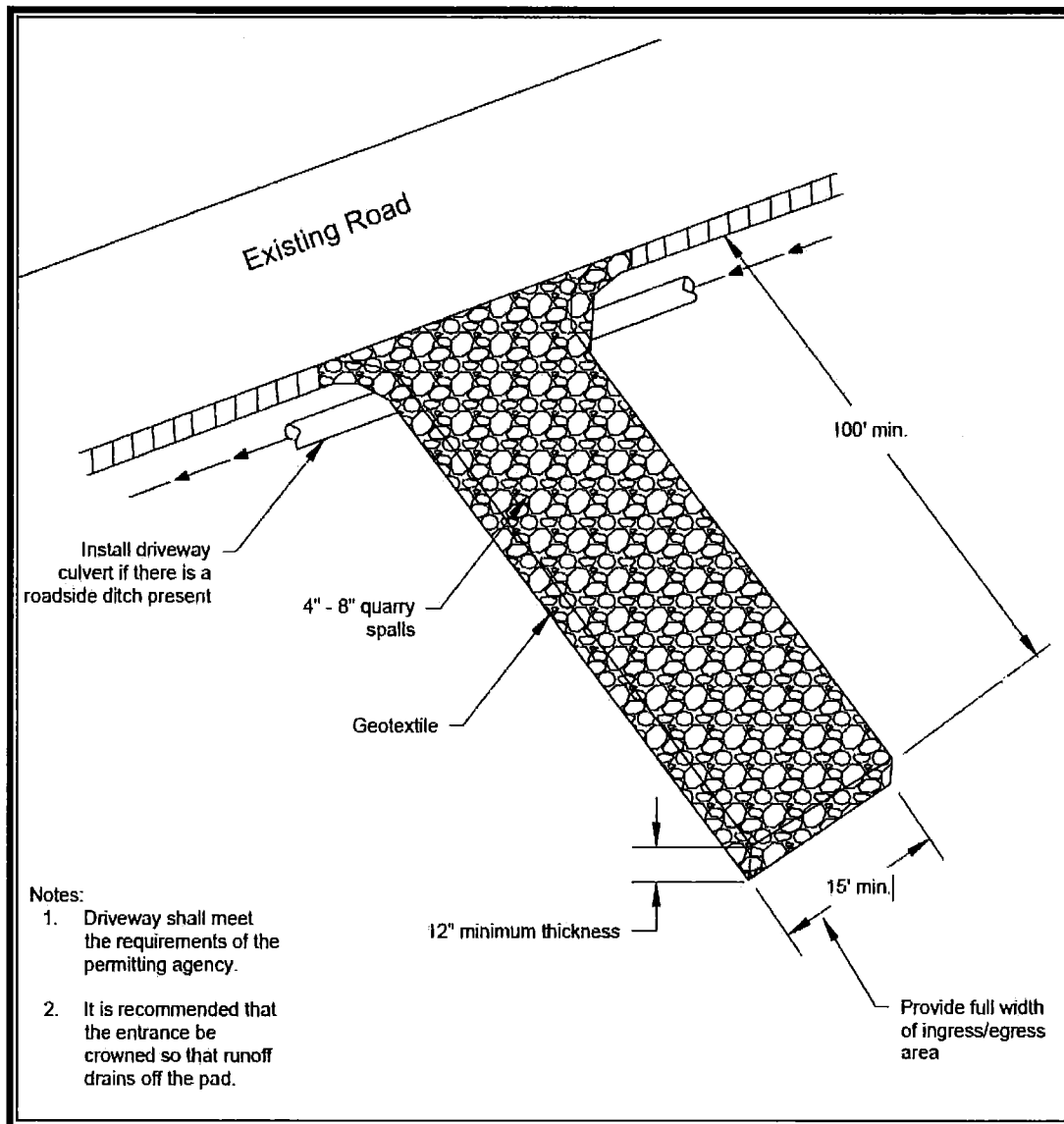
### ***Maintenance Standards***

- Quarry spalls shall be added if the pad is no longer in accordance with the specifications.
- On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.
- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water may be required. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper as these sweepers create dust and throw soil into nearby storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMP C103) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

### ***Approved as Equivalent***

Ecology has approved specific products as able to meet the requirements of BMP C105. However, the products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. The list of products is available on Ecology’s web site at [www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html](http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html).

If a project wishes to use any of the “approved as equivalent” BMPs in the City of Lacey, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.



**Figure 5.1. Stabilized Construction Entrance.**





## **BMP C120: Temporary and Permanent Seeding**

### ***Purpose***

Seeding reduces erosion by stabilizing exposed soils with a well-established vegetative cover. This is one of the most effective methods of reducing erosion.

### ***Conditions of Use***

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.
- The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.
- Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.
- Between October 1 and March 30 seeding requires a cover of mulch with straw or an erosion control blanket until 75 percent grass cover is established.
- Where the term “fully established” is used to describe vegetative cover or plantings, it shall be understood to mean that healthy vegetation covers 90 percent of exposed soil.
- Inspect all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) that will prevent erosion.

### ***Design and Installation Specifications***

- Seed retention/detention ponds as required.
- Install channels intended for vegetation before starting major earthwork and hydroseeded with a Bonded Fiber Matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If

vegetated channels cannot be established by seed before water flow, install sod in the channel bottom—over hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- The seedbed should be firm and rough. All soil shall be roughened no matter what the slope. If compaction is required for engineering purposes, slopes must be track walked before seeding. Backblading or smoothing of slopes greater than 4:1 is not allowed if they are to be seeded.
- New and more effective restoration-based landscape practices rely on deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical the subgrade should be initially ripped to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches the rototilling process should be done in multiple lifts, or the prepared soil system shall be prepared properly and then placed to achieve the specified depth.
- Organic matter is the most appropriate form of “fertilizer” because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form. A natural system typically releases 2 to 10 percent of its nutrients annually. Chemical fertilizers have since been formulated to simulate what organic matter does naturally.
- In general, 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer can be used at a rate of 90 pounds per acre. Slow-release fertilizers shall be used because they are more efficient and have fewer environmental impacts. It is recommended that areas being seeded for final landscaping conduct soil tests to determine the exact type and quantity of fertilizer needed. This will prevent the over-application of fertilizer. Fertilizer must not be added to the hydromulch machine and agitated more than 20 minutes before it is to be used. If agitated too much, the slow-release coating is destroyed.
- There are numerous products available on the market that takes the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal is a good source of long-term, slow-release, available nitrogen.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- On steep slopes, BFM or Mechanically Bonded Fiber Matrix (MBFM) products should be used. BFM/MBFM products are applied at a minimum rate of

3,000 pounds per acre of mulch with approximately 10 percent tackifier. Application is made so that a minimum of 95 percent soil coverage is achieved. Numerous products are available commercially and should be installed per manufacturer's instructions. Most products require 24 to 36 hours to cure before a rainfall and cannot be installed on wet or saturated soils. Generally, these products come in 40- to 50-pound bags and include all necessary ingredients except for seed and fertilizer.

- BFM and MBFM have some advantages over blankets:
  - No surface preparation required
  - Can be installed via helicopter in remote areas
  - On slopes steeper than 2.5:1, blanket installers may need to be roped and harnessed for safety
  - They are at least \$1,000 per acre cheaper installed.
- In most cases, the shear strength of blankets is not a factor when used on slopes, only when used in channels. BFM and MBFM are good alternatives to blankets in most situations where vegetation establishment is the goal.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See also postconstruction soil quality and depth in Chapter 7, Section 7.4.1.
- When installing seed via hydroseeding operations, only about one-third of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:
  1. Phase 1 – Install all seed and fertilizer with 25 to 30 percent mulch and tackifier onto soil in the first lift.
  2. Phase 2 – Install the rest of the mulch and tackifier over the first lift.Or, enhance vegetation by:
  1. Installing the mulch, seed, fertilizer, and tackifier in one lift.
  2. Spread or blow straw over the top of the hydromulch at a rate of 800 to 1,000 pounds per acre.
  3. Hold straw in place with a standard tackifier.

Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

- Irrigation
- Reapplication of mulch
- Repair of failed slope surfaces.

This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM or Mechanically Bonded Fiber Matrix (MBFM) (3,000 pounds per acre minimum).

- Seed may be installed by hand if:
  - Temporary and covered by straw, mulch, or topsoil
  - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in the tables below include recommended mixes for both temporary and permanent seeding, and rates are provided as pounds of pure live seed per acre.
- Other mixes may be appropriate, depending on the soil type and hydrology of the area. Consult the local revegetation experts or the local conservation district for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the city may be used.
- Table 5.3 represents the standard mix for areas requiring a temporary vegetative cover.

| <b>Table 5.3. Temporary Erosion Control Seed Mix.</b> |                                        |                                       |
|-------------------------------------------------------|----------------------------------------|---------------------------------------|
| <b>Common Name</b>                                    | <b>Species</b>                         | <b>Pounds Pure Live Seed per Acre</b> |
| Spike bentgrass                                       | <i>Agrostis exarata</i>                | 0.1                                   |
| California brome                                      | <i>Bromus carinatus</i>                | 10.5                                  |
| Tufted hairgrass                                      | <i>Deschampsia cespitosa</i>           | 0.4                                   |
| Blue wildrye                                          | <i>Elymus glaucus</i>                  | 11.4                                  |
| California oatgrass                                   | <i>Danthonia californica</i>           | 6.0                                   |
| Native red fescue                                     | <i>Festuca rubra</i> var. <i>rubra</i> | 2.5                                   |
| Meadow barley                                         | <i>Hordeum brachyantherum</i>          | 8.2                                   |
| <b>Total</b>                                          |                                        | <b>39.1</b>                           |

- Table 5.4 lists a recommended mix for landscaping seed.

| Table 5.4. Landscaping Seed Mix. |                                        |                                |
|----------------------------------|----------------------------------------|--------------------------------|
| Common Name                      | Species                                | Pounds Pure Live Seed per Acre |
| Sideoats grama                   | <i>Bouteloua curtipendula</i>          | 7.3                            |
| California oatgrass              | <i>Danthonia californica</i>           | 6.6                            |
| Native red fescue                | <i>Festuca rubra</i> var. <i>rubra</i> | 4.2                            |
| Prairie Junegrass                | <i>Koeleria macrantha</i>              | 0.9                            |
| <b>Total</b>                     |                                        | <b>19.0</b>                    |

- Table 5.5 lists a low-maintenance turf seed mix that may be used in dry situations where there is little to no watering.

| Table 5.5. Low-Growing Turf Seed Mix. |                                        |                                |
|---------------------------------------|----------------------------------------|--------------------------------|
| Common Name                           | Species                                | Pounds Pure Live Seed per Acre |
| Hard fescue                           | <i>Festuca brevipila</i>               | 3.1                            |
| Sheep fescue                          | <i>Festuca ovina</i>                   | 3.1                            |
| Native red fescue                     | <i>Festuca rubra</i> var. <i>rubra</i> | 3.5                            |
| Prairie Junegrass                     | <i>Koeleria macrantha</i>              | 0.6                            |
| <b>Total</b>                          |                                        | <b>10.2</b>                    |

- Table 5.6 lists a mix for bioswales and other intermittently wet areas.

| Table 5.6. Bioswale Seed Mix. |                                        |                                |
|-------------------------------|----------------------------------------|--------------------------------|
| Common Name                   | Species                                | Pounds Pure Live Seed per Acre |
| American sloughgrass          | <i>Beckmannia syzigachne</i>           | 0.9                            |
| Tufted hairgrass              | <i>Deschampsia cespitosa</i>           | 0.6                            |
| Blue wildrye                  | <i>Elymus glaucus</i>                  | 11.4                           |
| Native red fescue             | <i>Festuca rubra</i> var. <i>rubra</i> | 2.8                            |
| Meadow barley                 | <i>Hordeum brachyantherum</i>          | 9.8                            |
| Northwestern mannagrass       | <i>Glyceria occidentalis</i>           | 5.2                            |
| <b>Total</b>                  |                                        | <b>30.7</b>                    |

- Table 5.7 lists a low-growing seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.

| <b>Table 5.7. Low Growing Wet Area Seed Mix.</b> |                                        |                                       |
|--------------------------------------------------|----------------------------------------|---------------------------------------|
| <b>Common Name</b>                               | <b>Species</b>                         | <b>Pounds Pure Live Seed per Acre</b> |
| California brome                                 | <i>Bromus carinatus</i>                | 10.5                                  |
| Columbia brome                                   | <i>Bromus vulgaris</i>                 | 8.7                                   |
| Tufted hairgrass                                 | <i>Deschampsia cespitosa</i>           | 0.4                                   |
| California oatgrass                              | <i>Danthonia californica</i>           | 5.0                                   |
| Native red fescue                                | <i>Festuca rubra</i> var. <i>rubra</i> | 2.4                                   |
| Western manna grass                              | <i>Glyceria occidentalis</i>           | 3.5                                   |
| Meadow barley                                    | <i>Hordeum brachyantherum</i>          | 8.2                                   |
| <b>Total</b>                                     |                                        | <b>38.5</b>                           |

- Table 5.8 lists a recommended meadow seed mix that is intended for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months.

| <b>Table 5.8. Meadow Seed Mix.</b> |                                        |                                       |
|------------------------------------|----------------------------------------|---------------------------------------|
| <b>Common Name</b>                 | <b>Species</b>                         | <b>Pounds Pure Live Seed per Acre</b> |
| Common yarrow                      | <i>Achillea millefolium</i>            | 0.07                                  |
| Pearly everlasting                 | <i>Anaphalis margaritacea</i>          | 0.01                                  |
| California brome                   | <i>Bromus carinatus</i>                | 7.84                                  |
| California oatgrass                | <i>Danthonia californica</i>           | 3.73                                  |
| Blue wildrye                       | <i>Elymus glaucus</i>                  | 7.60                                  |
| Idaho fescue                       | <i>Festuca idahoensis</i>              | 1.74                                  |
| Native red fescue                  | <i>Festuca rubra</i> var. <i>rubra</i> | 1.88                                  |
| Sickle keeled lupine               | <i>Lupinus albicaulis</i>              | 2.22                                  |
| Fowl bluegrass                     | <i>Poa palustris</i>                   | 0.36                                  |
| <b>Total</b>                       |                                        | <b>22.9</b>                           |

### **Maintenance Standards**

- Reseed any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, an alternate method, such as sodding, mulching, or nets/blankets, shall be used. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the city when sensitive areas would otherwise be protected.



- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

***Approved as Equivalent***

Ecology has approved specific products as able to meet the requirements of BMP C120. However, the products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. The list of products is available on Ecology’s web site at [www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html](http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html).

If a project wishes to use any of the “approved as equivalent” BMPs in the City of Lacey, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.



## **BMP C121: Mulching**

### ***Purpose***

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

### ***Conditions of Use***

As a temporary cover measure, mulch shall be used:

- For fewer than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year and must be refreshed periodically.
- For seeded areas, mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40- to 50-pound bags. Seed and fertilizer are added at time of application.

### ***Design and Installation Specifications***

For mulch materials, application rates, and specifications, see Table 5.9. Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95 percent covered (i.e., not visible under the mulch layer). Note: Thicknesses may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "compost" is selected, it must be a coarse compost that meets the following size gradations when tested in accordance with the U.S. Composting Council "Test Methods for the Examination of Compost and Composting" Test Method 02.02-B.

**Table 5.9. Mulch Standards and Guidelines.**

| <b>Mulch Material</b>          | <b>Quality Standards</b>                                                                                                                                   | <b>Application Rates</b>                                                  | <b>Remarks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Straw                          | Air-dried; free from undesirable seed and coarse material.                                                                                                 | 2" to 3" thick; five bales per 1,000 sq. ft. or 2 to 3 tons per acre      | Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high water elevation of surface waters (due to flotation). |
| Hydromulch                     | No growth inhibiting factors.                                                                                                                              | Approx. 25 to 30 lbs per 1,000 sq. ft. or 1,500 to 2,000 lbs per acre     | Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 0.75 to 1 inch clog hydromulch equipment. Fibers should be kept to less than 0.75 inch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Compost                        | No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.              | 2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)       | More effective control can be obtained by increasing thickness to 3 inches. Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125 or the postconstruction soil quality and depth BMP see Chapter 7, Section 7.4.1. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorous impaired water bodies.                                                                                                                                                                                                                     |
| Chipped Site Vegetation        | Average size should be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.                    | 2" thick min.                                                             | This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10 percent because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.                                                                                                                                                                                                                                                                                                |
| Wood-based Mulch or Wood Straw | No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations. | 2" thick min.; approx. 100 tons per acre (approx. 800 lbs per cubic yard) | This material is often called "hog fuel" or "hogged fuel." The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).                                                                                                                                                                                                                                                                                                                           |
| Wood Strand Mulch              | A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.                                   | 2" thick min.                                                             | Cost-effective protection when applied with adequate thickness. A minimum of 95 percent of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between one-sixteenth and three-eighths inch. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT Standard Specification 9-14.4(4)).                                                                                                                                                                                                                                                                                                                   |

### **Coarse Compost**

- Mulch may be applied at any time of the year and must be refreshed periodically
- Minimum Percent passing 3-inch sieve openings 100 percent
- Minimum Percent passing 1-inch" sieve openings 90 percent
- Minimum Percent passing 0.75-inch sieve openings 70 percent
- Minimum Percent passing 0.25-inch sieve openings 40 percent

Mulch used within the ordinary high water mark of surface waters must be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material.

### ***Maintenance Standards***

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.



## **BMP C123: Plastic Covering**

### ***Purpose***

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

### ***Conditions of Use***

- Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.
- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than 6 months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to \$1.50 to \$2 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
  - Temporary ditch liner
  - Pond liner in temporary sediment pond
  - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored
  - Emergency slope protection during heavy rains
  - Temporary drainpipe (“elephant trunk”) used to direct water.

### ***Design and Installation Specifications***

- Plastic slope cover must be installed as follows:
  - Run plastic up and down slope, not across slope.



- Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
- Minimum of 8-inch overlap at seams.
- On long or wide slopes, or slopes subject to wind, tape all seams.
- Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
- Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
- Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion.
- Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 6 mil.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

#### ***Maintenance Standards***

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

#### ***Approved as Equivalent***

Ecology has approved specific products as able to meet the requirements of BMP C123. However, the products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. The list of products is available on Ecology’s web site at [www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html](http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html).

If a project wishes to use any of the “approved as equivalent” BMPs in the City of Lacey, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

## **BMP C122: Nets and Blankets**

### ***Purpose***

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows. Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (for example, coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

### ***Conditions of Use***

Erosion control nets and blankets shall be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap. One hundred percent synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of blankets include:

- Surface preparation required
- On slopes steeper than 2.5H:1V, blanket installers may need to be roped and harnessed for safety
- They cost at least \$4,000 to \$6,000 per acre installed.

Advantages of blankets include:

- Installation without mobilizing special equipment
- Installation by anyone with minimal training
- Installation in stages or phases as the project progresses

- Installers can hand place seed and fertilizer as they progress down the slope
- Installation in any weather
- There are numerous types of blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

### ***Design and Installation Specifications***

- See Figures 5.3 and 5.4 for typical orientation and installation of blankets used in channels and as slope protection. Note: These are typical only; all blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Installation of Blankets on Slopes:
  - Complete final grade and track walk up and down the slope.
  - Install hydromulch with seed and fertilizer.
  - Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
  - Install the leading edge of the blanket into the small trench and staple approximately every 18 inches. NOTE: Staples are metal, U-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
  - Roll the blanket slowly down the slope as installer walks backwards. NOTE: The blanket rests against the installer's legs. Staples are installed as the blanket is unrolled. It is critical that the proper staple pattern is used for the blanket being installed. The blanket is not to be allowed to roll down the slope on its own as this stretches the blanket making it impossible to maintain soil contact. In addition, no one is allowed to walk on the blanket after it is in place.
  - If the blanket is not long enough to cover the entire slope length, the trailing edge of the upper blanket must overlap the leading edge of the lower blanket and be stapled. On steeper slopes, this overlap must be installed in a small trench, stapled, and covered with soil.
- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the design engineer

consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available at the following web site:

- WSDOT (Section 3.2.4):

[www.wsdot.wa.gov/NR/rdonlyres/3B41E087-FA86-4717-932D-D7A8556CCD57/0/ErosionTrainingManual.pdf](http://www.wsdot.wa.gov/NR/rdonlyres/3B41E087-FA86-4717-932D-D7A8556CCD57/0/ErosionTrainingManual.pdf).

- Use jute matting in conjunction with mulch (BMP C121). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- One hundred percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning they break down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

### ***Maintenance Standards***

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

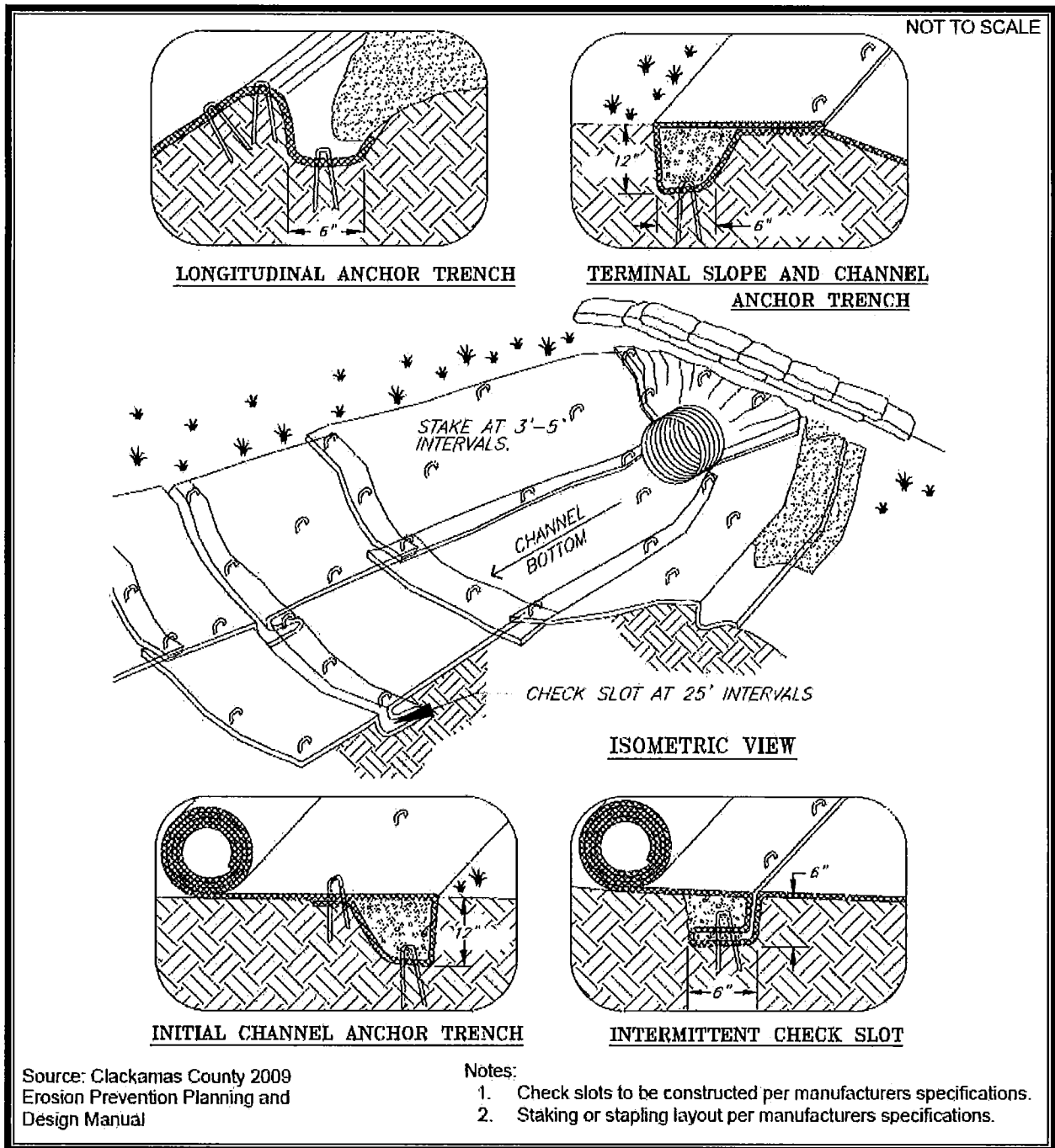
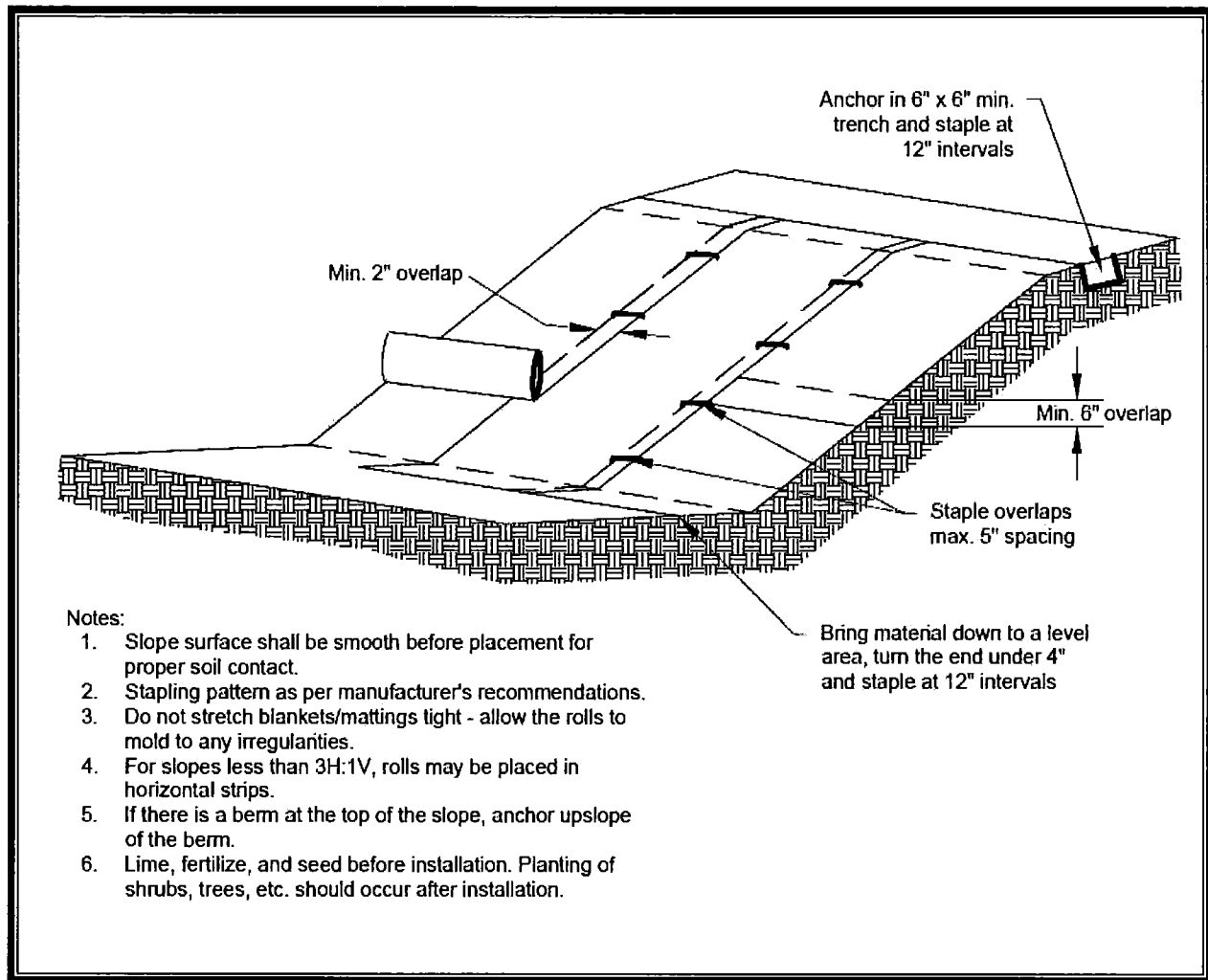


Figure 5.3. Channel Installation.



**Figure 5.4. Slope Installation.**



**BMP C124: Sodding*****Purpose***

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

***Conditions of Use***

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

***Design and Installation Specifications***

Sod shall be free of weeds, of uniform thickness (approximately 1 inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

- Shape and smooth the surface to final grade in accordance with the approved grading plan. The swale needs to be overexcavated 4 to 6 inches below design elevation to allow room for placing soil amendment and sod.
- Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than 10 percent or the permeability is less than 0.6 inches per hour. See <[www.ecy.wa.gov/programs/swfa/organics/soil.html](http://www.ecy.wa.gov/programs/swfa/organics/soil.html)> for further information.
- Fertilize according to the supplier's recommendations.
- Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
- Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
- Roll the sodded area and irrigate.
- When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

***Maintenance Standards***

If the grass is unhealthy, the cause shall be determined and appropriate action taken to re-establish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.





## **BMP C125: Topsoiling/Composting**

### ***Purpose***

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding. Note that this BMP is functionally the same as the postconstruction soil quality and depth BMP (see Chapter 7, Section 7.4.1), which is required for all disturbed areas that will be developed as lawn or landscaped areas at the completed project site.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

### ***Conditions of Use***

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted condition if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practicable, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native soil, incorporate amendments into on-site soil, or importing blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from, and what vegetation was on site before disturbance, invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated

to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhiza products when using off-site topsoil.

### ***Design and Installation Specifications***

Meet the following requirements for disturbed areas requiring disruption and topsoiling: that will be developed as lawn or landscaped areas at the completed project site:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
  - A minimum depth of 8 inches. Scarify subsoils below the topsoil layer at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or restructuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system.
  - A minimum organic content of 10 percent dry weight in planting beds, and 5 percent organic matter content in turf areas. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
  - A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
  - If blended topsoil is imported, then fines shall be limited to 25 percent passing through a U.S. #200 sieve.
  - Mulch planting beds with 2 inches of organic material.
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments.
  - When using the option of incorporating amendments to meet the organic content requirement, use compost that meets the composted material specification for bioretention (see Chapter 7, Section 7.4.4), with the exception that the compost may have up to 35 percent biosolids or manure.
  - Sections three through seven of the document entitled *Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* provide useful guidance for implementing whichever option is chosen. The document includes guidance for preapproved default strategies and guidance for custom strategies. As of this printing the document can be found at:  
<[www.soilsforsalmon.org/pdf/Soil\\_BMP\\_Manual.pdf](http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf)>.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example,

incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.

- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.
- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to prevent a lack of bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.
- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and clay loam). Avoid areas of natural groundwater recharge.
- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Stockpiled topsoil is to be reapplied to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.

Stockpiling of topsoil shall occur in the following manner:

- Side slopes of the stockpile shall not exceed 2H:1V
- Between October 1 and April 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil
  - Within 2 days, complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.

- Between May 1 and September 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.
  - Within 7 days, complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- When native topsoil is to be stockpiled and reused the following should apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:
  - Re-install topsoil within 4 to 6 weeks
  - Do not allow the saturation of topsoil with water
  - Do not use plastic covering.

***Maintenance Standards***

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

## **BMP C140: Dust Control**

### ***Purpose***

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

### ***Conditions of Use***

For use in areas (including roadways) subject to surface and air movement of dust where on site and off-site impacts to roadways, drainage ways, or surface waters are likely.

### ***Design and Installation Specifications***

Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.

- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Oil based products are prohibited from use as a dust suppressant. The city may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control. Use of PAM could be a cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.

- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than 0.75 mm) to 10 to 20 percent.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Restrict use of paved roadways by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.

Contact your Puget Sound Clean Air Agency <[www.pscleanair.org](http://www.pscleanair.org)> for guidance and training on other dust control measures. Compliance with Puget Sound Clean Air Agency guidance and BMPs constitutes compliance with this BMP.

#### ***Maintenance Standards***

- Respray area as necessary to keep dust to a minimum.

## **BMP C150: Materials on Hand**

### ***Purpose***

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy summer rains. Having these materials on site reduces the time needed to implement BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

### ***Conditions of Use***

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric, and steel T-posts.
- Materials are stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A contractor or developer could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

### ***Design and Installation Specifications***

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum that will cover numerous situations includes:

| <b>Material</b>                  |
|----------------------------------|
| Clear Plastic, 6 mil             |
| Drainpipe, 6- or 8-inch diameter |
| Sandbags, filled                 |
| Straw Bales for mulching,        |
| Quarry Spalls                    |
| Washed Gravel                    |
| Geotextile Fabric                |
| Catch Basin Inserts              |
| Steel "T" Posts                  |
| Silt fence material              |
| Straw Wattles                    |



***Maintenance Standards***

- All materials with the exception of the quarry spalls, steel T-posts, and gravel must be kept covered and out of both sun and rain.
- Restock materials used as needed.

**BMP C151: Concrete Handling*****Purpose***

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

***Conditions of Use***

Any time concrete is used, utilize these management practices. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways.

***Design and Installation Specifications***

Ensure that washout of concrete trucks, chutes, pumps, and internals is performed at an approved off-site location or in designated concrete washout areas, in accordance with BMP C154. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.

Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas.

- Wash off hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels into formed areas only.
- Wash equipment difficult to move, such as concrete pavers in areas that do not directly drain to natural or constructed stormwater conveyances.
- Do not allow washdown from areas, such as concrete aggregate driveways, to drain directly to natural or constructed stormwater conveyances.

- Contain washwater and leftover product in a lined container when no formed areas are available. Dispose of contained concrete in a manner that does not violate groundwater or surface water quality standards.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15 feet of surface waters.
- Refer to BMPs C252 and C253 for pH adjustment requirements.
- Refer to the CSWGP for pH monitoring requirements if the project involves one of the following activities:
  - Significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete used over the life of a project)
  - The use of engineered soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
- Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

***Maintenance Standards***

- Check containers for holes in the liner daily during concrete pours and repaired the same day.

**BMP C152: Sawcutting and Surfacing Pollution Prevention*****Purpose***

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry from entering waters of the State.

***Conditions of Use***

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

***Design and Installation Specifications***

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate groundwater or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose process water in a manner that does not violate groundwater or surface water quality standards.

- Handle and dispose cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

***Maintenance Standards***

- Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the State. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and vacuum trucks.

## **BMP C209: Outlet Protection**

### ***Purpose***

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

### ***Conditions of Use***

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or artificial drainage feature such as a stream, wetland, lake, or ditch.

### ***Design and Installation Specifications***

- The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1 foot above the maximum tailwater elevation or 1 foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.
- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulics Manual, available through WSDOT Engineering Publications <[www.wsdot.wa.gov/Publications/Manuals/index.htm](http://www.wsdot.wa.gov/Publications/Manuals/index.htm)>.)
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following shall be used for riprap outlet protection:
  - If the discharge velocity at the outlet is less than 5 feet per second (pipe slope typically less than 10 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1 foot.
  - For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets shall be used under riprap to prevent scour and channel erosion.

- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a hydraulic project approval (HPA). See Chapter 6, Section 6.3.5, for more information on outfall system design.

### ***Maintenance Standards***

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

## BMP C220: Storm Drain Inlet Protection

### *Purpose*

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

### *Conditions of Use*

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. If these BMPs are used on active roadways, projects shall install appropriate traffic control to ensure vehicle and pedestrian traffic is not exposed to the roadway obstructions. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap.

Also use inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction can add significant amounts of sediment into the roof drain system. If possible delay installing lawn and yard drains until just before landscaping or cap these drains to prevent sediment from entering the system until completion of landscaping. Consider erosion protection methods around each finished lawn and yard drain until area is stabilized.

Table 5.10 lists several options for inlet protection. All of the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to 1 acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

| Table 5.10. Storm Drain Inlet Protection. |                                    |                                       |                                                                                           |
|-------------------------------------------|------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------|
| Type of Inlet Protection                  | Emergency Overflow                 | Applicable for Paved/Earthen Surfaces | Conditions of Use                                                                         |
| <b>Drop Inlet Protection</b>              |                                    |                                       |                                                                                           |
| Excavated drop inlet protection           | Yes, temporary flooding will occur | Earthen                               | Applicable for heavy flows. Easy to maintain. Large area Requirement: 30- by 30-feet/acre |
| Block and gravel drop inlet protection    | Yes                                | Paved or Earthen                      | Applicable for heavy concentrated flows. Will not pond.                                   |
| Gravel and wire drop inlet protection     | No                                 |                                       | Applicable for heavy concentrated flows. Will pond. Can withstand traffic.                |
| Catch basin filters                       | Yes                                | Paved or Earthen                      | Frequent maintenance required.                                                            |
| <b>Curb Inlet Protection</b>              |                                    |                                       |                                                                                           |
| Curb inlet protection with a wooden weir  | Small capacity overflow            | Paved                                 | Used for sturdy, more compact installation.                                               |
| Lock and gravel curb inlet protection     | Yes                                | Paved                                 | Sturdy, but limited filtration.                                                           |
| <b>Culvert Inlet Protection</b>           |                                    |                                       |                                                                                           |
| Culvert inlet sediment trap               |                                    |                                       | 18-month expected life.                                                                   |



***Design and Installation Specifications***

- **Excavated Drop Inlet Protection:** An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.
  - Provide a depth of 1 to 2 feet as measured from the crest of the inlet structure
  - Slope sides of excavation no steeper than 2H:1V
  - Minimum volume of excavation 35 cubic yards
  - Shape basin to fit site with longest dimension oriented toward the longest inflow area
  - Install provisions for draining to prevent standing water problems
  - Clear the area of all debris
  - Grade the approach to the inlet uniformly
  - Drill weep holes into the side of the inlet
  - Protect weep holes with screen wire and washed aggregate
  - Seal weep holes when removing structure and stabilizing area
  - Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.
- **Block and Gravel Filter:** A barrier formed around the storm drain inlet with standard concrete blocks and gravel. See also Figure 5.16.
  - Provide a height of 1 to 2 feet above inlet
  - Recess the first row 2 inches into the ground for stability
  - Support subsequent courses by placing a 2 by 4 through the block opening
  - Do not use mortar
  - Lay some blocks in the bottom row on their side for dewatering the pool
  - Place hardware cloth or comparable wire mesh with 0.5-inch openings over all block openings
  - Place washed rock, 0.75- to 3-inch diameter, just below the top of blocks on slopes of 2H:1V or flatter.

- **Gravel and Wire Mesh Filter:** A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.
  - Use a hardware cloth or comparable wire mesh with 0.5-inch openings
  - Use coarse aggregate
  - Provide a height 1 foot or more, 18 inches wider than inlet on all sides
  - Place wire mesh over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure
  - Overlap the strips if more than one strip of mesh is necessary
  - Place coarse aggregate over the wire mesh
  - Provide at least a 12-inch depth of gravel over the entire inlet opening and extend at least 18 inches on all sides.
- **Catch Basin Filters:** Use inserts designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. The combination of inlet protection and filters may provide flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way.
  - Provides 5 cubic feet of storage
  - Requires dewatering provisions
  - Provides a high-flow bypass that will not clog under normal use at a construction site
  - Insert the catch basin filter in the catch basin just below the grating.
- **Curb Inlet Protection with Wooden Weir:** Barrier formed around a curb inlet with a wooden frame and gravel.
  - Use wire mesh with 0.5-inch openings
  - Use extra strength filter cloth
  - Construct a frame
  - Attach the wire and filter fabric to the frame
  - Pile coarse washed aggregate against wire/fabric
  - Place weight on frame anchors.

- **Block and Gravel Curb Inlet Protection:** Barrier formed around an inlet with concrete blocks and gravel. See Figure 5.17.
  - Use wire mesh with 0.5-inch openings.
  - Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
  - Place a 2 by 4 stud through the outer holes of each spacer block to align the front blocks.
  - Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
  - Place wire mesh over the outside vertical face.
  - Pile coarse aggregate against the wire to the top of the barrier.
- **Curb and Gutter Sediment Barrier:** Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 5.18.
  - Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet
  - Construct a horseshoe shaped sedimentation trap on the outside of the berm sized to sediment trap standards for protecting a culvert inlet.

### ***Maintenance Standards***

- Inspect catch basin filters frequently, especially after storm events. Clean or replace clogged inserts. For systems with clogged stone filters pull away from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

### ***Approved as Equivalent***

Ecology has approved specific products as able to meet the requirements of BMP C220. However, the products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. The list of products is available on Ecology’s web site at [www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html](http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html).

If a project wishes to use any of the “approved as equivalent” BMPs in the City of Lacey, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

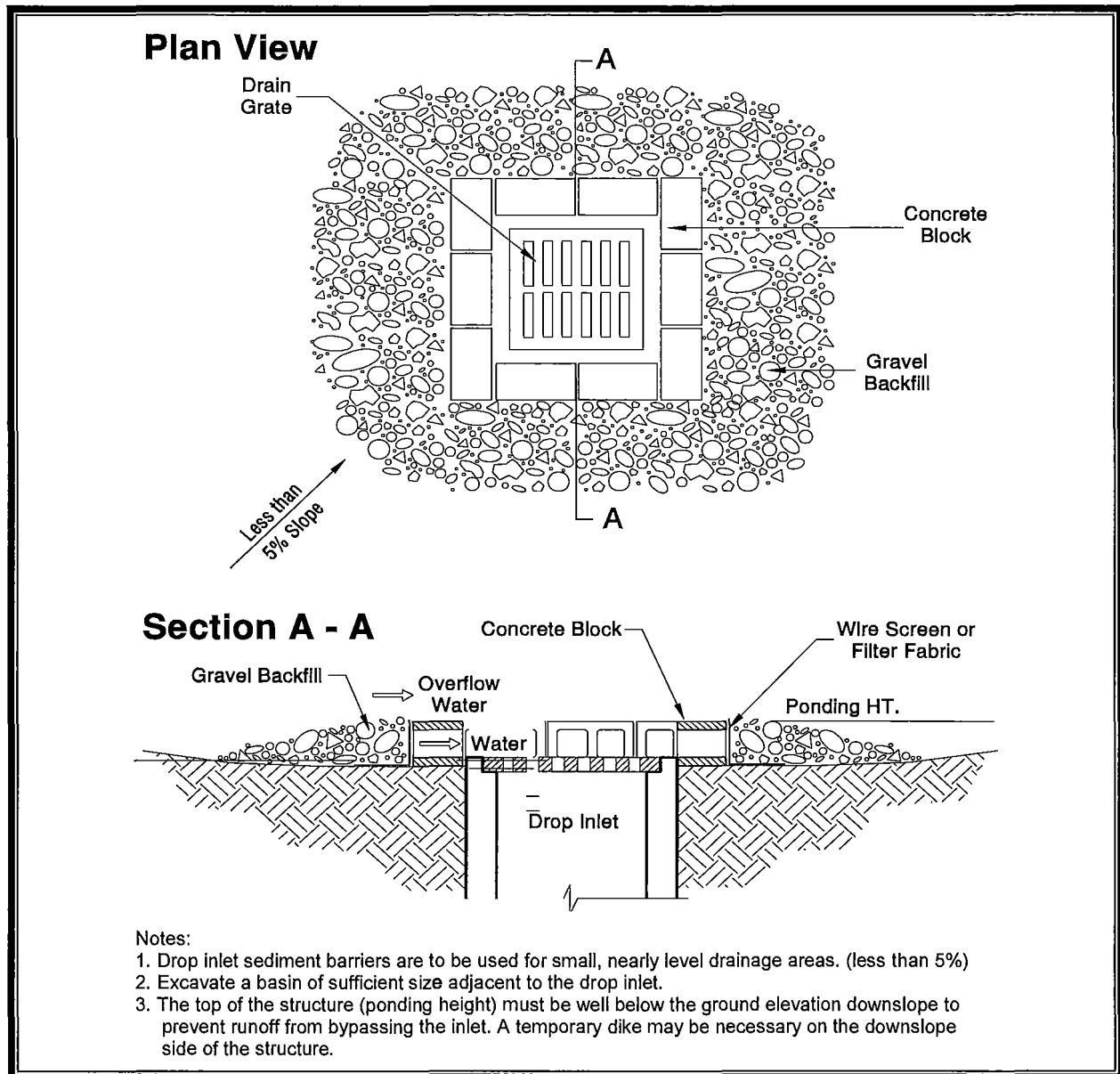


Figure 5.16. Block and Gravel Filter

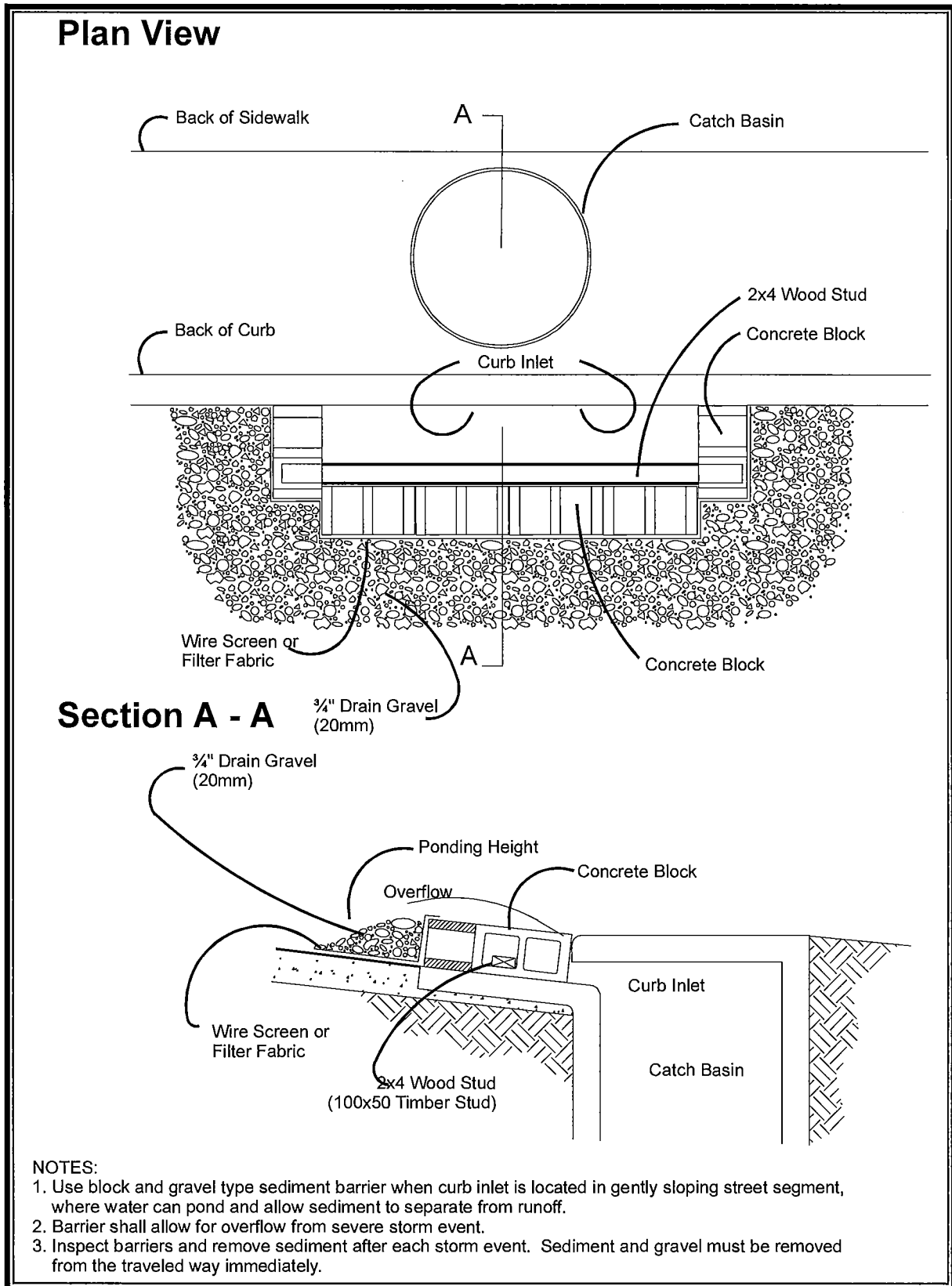
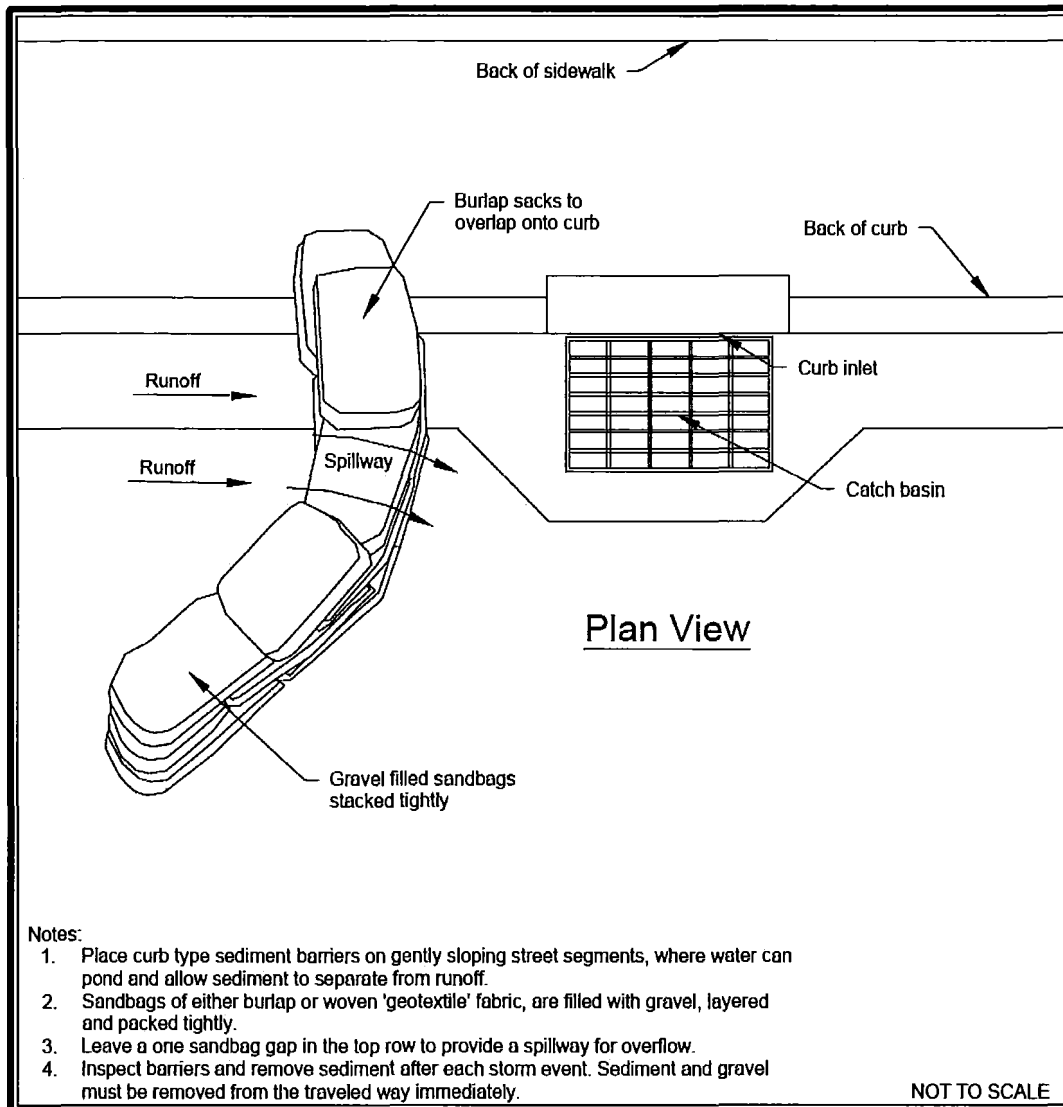


Figure 5.17. Block and Gravel Curb Inlet Protection.



**Figure 5.18. Curb and Gutter Barrier.**



## **BMP C241: Temporary Sediment Pond**

### ***Purpose***

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

### ***Conditions of Use***

Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal BMP.

A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

### ***Design and Installation Specifications***

Sediment ponds must be installed only on sites where failure of the structure would not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment traps and ponds are attractive to children and can be very dangerous. If fencing of the pond is planned, the type of fence and its location shall be shown on the Construction SWPPP.

- Structures having a maximum storage capacity at the top of the dam of 10 acre-feet (435,600 cubic feet) or more are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC).
- See Figures 5.26, 5.27, and 5.28 for details.
- Projects that are constructing permanent detention facilities or infiltration basins and trenches can use the rough-graded permanent facilities for traps. The surface area requirements of the sediment pond must be met. This may require temporarily enlarging the permanent basin to comply with the surface area requirements. The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the pond from the surface or by pumping. The permanent control structure must be installed after the site is fully stabilized.
- Use of infiltration facilities for sedimentation ponds during construction tends to clog the soils and reduce their capacity to infiltrate. If infiltration facilities are to be used, the sides and bottom of the facility must only be rough excavated to a minimum of 2 feet above final grade. Final grading of the infiltration facility shall occur only when all contributing drainage areas are fully stabilized. The infiltration pretreatment facility should be fully constructed and used with the sedimentation pond to help prevent clogging.



**Determining Pond Geometry:**

- Obtain the discharge from the hydrologic calculations of the peak flow for the 2-year recurrence interval runoff event ( $Q_2$ ). Use a 15-minute time step and an approved continuous runoff model for the developed (unmitigated) site. If the time of concentration is less than 30 minutes, a 5-minute time step may be required. The 10-year recurrence interval peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. If no hydrologic analysis is required, the Rational Method may be used.
- Determine the required surface area at the top of the riser pipe with the equation:

$$SA = 2 \times Q_2 / 0.00096$$

OR

2,080 square feet per cubic feet per second (cfs) of inflow

- See BMP C240 for more information on the derivation of the surface area calculation.
- The basic geometry of the pond can now be determined using the following design criteria:
  - Required surface area SA (from Step 2 above) at top of riser.
  - Minimum 3.5-foot depth from top of riser to bottom of pond.
  - Maximum 3H:1V interior side slopes and maximum 2H:1V exterior slopes. The interior slopes can be increased to a maximum of 2H:1V if fencing is provided at or above the maximum water surface.
  - One foot of freeboard between the top of the riser and the crest of the emergency spillway.
  - Flat bottom.
  - Minimum 1-foot deep spillway.
  - Length-to-width ratio between 3:1 and 6:1.

**Sizing of Discharge Mechanisms:**

- The outlet for the pond consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing drainage area for a 100-year recurrence interval storm. If, due to site conditions and pond geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year recurrence

# WASHINGTON FORESTRY CONSULTANTS, INC.

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Olympia, WA 98501

- Preliminary Tree Protection Plan-

## GATEWAY MULTI-FAMILY COMPLEX

7235 32nd Ave NE  
Lacey, WA

Prepared for: City of Lacey Community Development

Prepared by: Washington Forestry Consultants, Inc.

Date: August 21, 2020

### Introduction and Overview

The project proponent is planning to develop a 159-unit multi-family complex with 11 buildings on 9.54 acres over 3 parcels in Lacey, Washington.

The City of Lacey has retained WFCI to:

- Evaluate existing trees on the site, pursuant to Chapter 14.32 of the Lacey Tree Protection and Vegetation Preservation Ordinance.
- Make recommendations for trees suitable to be saved in open space or tree tract areas, along with required protection and cultural measures.

### Observations

#### Methodology

WFCI has conducted an inventory and evaluation of the trees on the site using variable area plots installed on a systematic grid across the eastern portion site. Trees 4 inches diameter at breast height (DBH) outside this area were tallied to determine the number, distribution and condition of existing trees. The potential of the trees to be incorporated into the new project was assessed<sup>1</sup>. The evaluation used methodology developed by the International Society of Arboriculture and Matheny and Clark (1998)<sup>2</sup>.

<sup>1</sup> Nelda Metheny and James R. Clark. (1998). Trees and Development: A Technical Guide to Preservation of Trees during Land Development. International Society of Arboriculture, Champaign, IL.

<sup>2</sup> Nelda Metheny and James R. Clark. (1994). A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas (2nd Edition). International Society of Arboriculture, Champaign, IL.

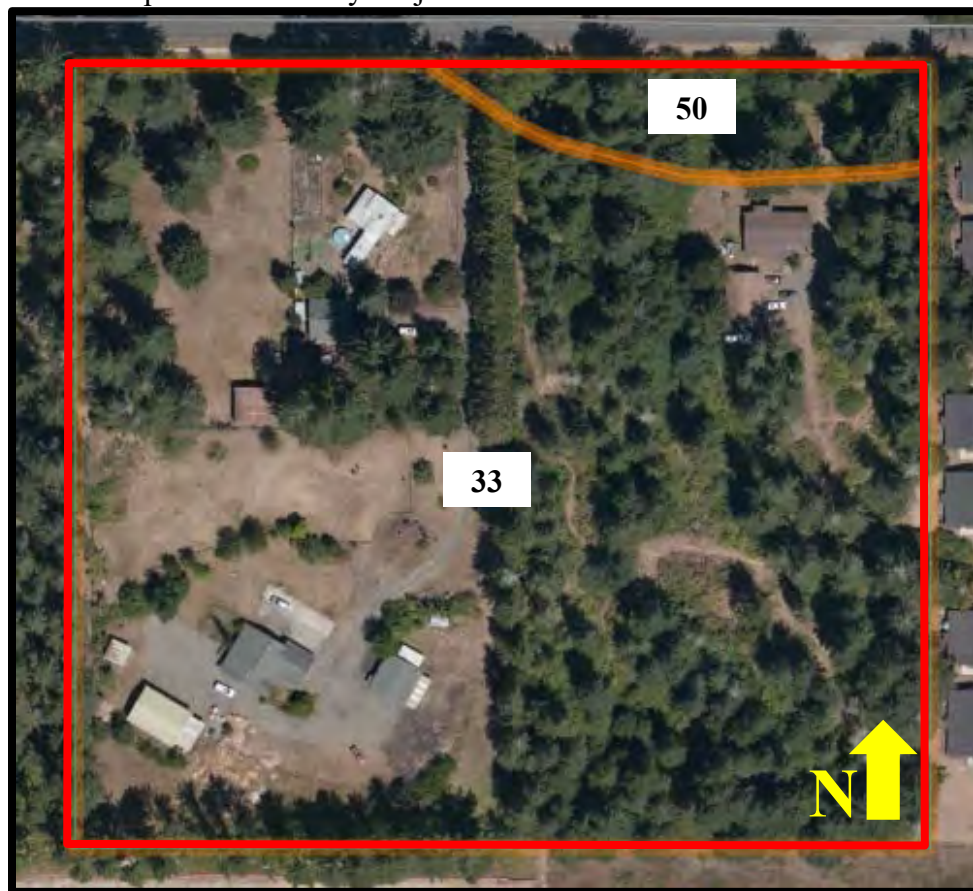
## Site Description

The project area consists of 3 parcels totaling 9.54 acres. Each parcel contains at least 1 single-family home and multiple outbuildings. The topography on the site is generally flat to gently rolling. It is bordered by 32nd Ave NE to the north, residential homes to the east and west, and a government facility under construction to the south.

## Soil Depth and Productivity

According to the Natural Resource Conservation Service Soil Survey, there are 2 main soil types on the parcel: the Everett very gravelly sandy loam and the Kapowsin silt loam. The location and extent of each soil type is illustrated on the aerial photo in Figure 1 below.

**Figure 1.** Soils Map of the Gateway Project from the Natural Resource Conservation Service.



- Project Area Boundary
- 33 - Everett very gravelly sandy loam
- 50 - Kapowsin silt loam

The predominant soil type in the project area is the Everett very gravelly sandy loam. The Everett very gravelly sandy loam is a very deep, somewhat excessively drained soil found on terraces and outwash plains. It formed in glacial outwash. Permeability is rapid. Plant available water capacity is low. The effective rooting depth is 60 inches or more and the hazard of runoff and erosion is slight. The potential for windthrow of trees is 'slight' under normal conditions. Seedling mortality is severe and new trees require irrigation to establish.

Soils in the northeastern corner of the project area consist of the Kapowsin silt loam. This is a moderately deep, moderately well drained soil on till plains. It is formed in compact glacial till. A weakly cemented hardpan occurs at a depth of 20 to 30 inches. Permeability is moderate above the hardpan and very slow through the pan. The available water capacity for plants is moderate. The effective rooting depth for trees is about 20 to 30 inches. Because of the rooting depth is restricted by the hardpan trees are subject to occasional windthrow.

**In areas where grading brings the hardpan nearer to the surface, the hardpan must be fractured under new trees to provide soil volume for root development and to improve drainage around the tree.**

### **Tree Conditions**

There are 3 forest cover types for the purposes of description, 1 on each parcel. The location and extent of each cover type is illustrated on the aerial photo in Appendix 1.

Forest Cover Type I - This cover type occurs over half of the project area on the eastern parcel. It consists of a mostly-contiguous stand of second-growth Douglas-fir (*Pseudotsuga menziesii*) with a few red alder (*Alnus rubra*), Scouler's willow (*Salix scouleriana*), and 1 Oregon white oak (*Quercus garryana*). The stand is approximately 40 years old. Some small clearings occur throughout the cover type.

Tree size ranges from 5 to 28 inches diameter at breast height (DBH). The stocking is somewhat variable, averaging about 123 trees per acre (see Appendix III).

The majority of the trees were in 'Fair' to 'Good' condition and most have the potential to be incorporated into the project when only tree health is considered. Most of the perimeter trees in the proposed tree tracts appeared healthy.



**Photo 1.** View of trees along southern margin of Cover Type I in proposed tree tract area.  
View looking south.

The understory includes salal (*Gaultheria shallon*), ocean spray (*Holodiscus discolor*), bracken fern (*Pteridium aquilinum*), sword fern (*Polystichum munitum*), blackberry (*Rubus armeniacus*), trailing blackberry (*Rubus ursinus*), Oregon-grape (*Mahonia aquifolium*), English hawthorn (*Crataegus laevigata*), Indian-plum (*Oemleria cerasiformis*), snowberry (*Symphoricarpos albus*), western hazel (*Corylus cornuta*), Scotch broom (*Cytisus scoparius*), thimbleberry (*Rubus parviflorus*), English holly (*Ilex aquifolium*), grasses and broadleaved weeds.

Forest Cover Type II - This cover type occurs on the northwest parcel. It is a low-density, mixed species stand of native and planted coniferous and broadleaved trees. Species include Douglas-fir, incense-cedar (*Calocedrus decurrens*), western redcedar (*Thuja plicata*), shore pine (*Pinus contorta*), Norway spruce (*Picea abies*), flowering plum (*Prunus cerasifera*), and Pacific yew (*Taxus brevifolia*).

There are approximately 100 trees on this 2.27 acre cover type (44 trees per acre). Tree sizes range up to 34 inches DBH. Tree condition ranges from 'Poor' to 'Good,' with most trees described as being in 'Fair' condition or better.





**Photo 2.** View of trees near northwest corner of Cover Type II in proposed tree tract area.  
View looking south.

Understory plants in Cover Type III include salal, western hazel, bracken fern, thimbleberry, rhododendron (*Rhododendron spp.*), evergreen huckleberry (*Vaccinium ovatum*), red mountain huckleberry (*Vaccinium parvifolium*), grasses and broadleaved trees.

Cover Type III - This cover type includes the southwest parcel, which is sparsely forested. There are 11 trees over 4 inches DBH in this cover type. Species include Douglas-fir, red maple (*Acer rubrum*), Leyland cypress (*Cupressocyparis x. leylandii*), apple (*Malus domestica*), and black locust (*Robinia pseudoacacia*). Tree size ranges up to 10 inches DBH. Most trees are in 'Fair' condition or better.



**Photo 3.** View of trees in Cover Type III. View looking west.

Understory vegetation in Cover Type III is sparse and consists mostly of grasses and weeds.

## **Off-Site Impacts**

Tree removal within this project site may impact off-site trees on the property to the east. They will become exposed to westerly and southwesterly winds once site clearing has begun. These trees will need to be protected during construction by placing tree protection fencing 5 ft. beyond their dripline.

Stumps should not be excavated within 10 ft. of trees all trees to be retained, but could be ground out. Additional evaluation of off-site trees by WFCI should occur during site clearing to determine if other hazard trees are created.

## **Forest Practices Permit**

Trees removed from this parcel will contain more than 5,000 board feet. Therefore, a Class IV General Forest Practices Permit from the City of Lacey is required.

## **Recommendations**

### **Minimum Tree Tract Requirements**

The City of Lacey Tree and Vegetation Protection and Preservation Ordinance (Chapter 14.32) requires that a minimum of 5% of the gross project area be set aside as a dedicated tree tract.

The following is a summary of the tree tract calculations:

|                                          |                          |
|------------------------------------------|--------------------------|
| Total Project Area                       | 9.54 acres               |
| Total Tree Tract Areas (Appendix II)     | 1.57 acres (16.5%)       |
| Minimum Requirement for Tree Tract       | <u>0.48 acres (5.0%)</u> |
| Excess of Minimum Tree Tract Requirement | 1.09 acres (11.5%)       |

Two of the tree tract areas have quality trees and would provide a buffer for the project from the land use to the south and west. As drawn, the tree tract would include about 16.5% of the project area, exceeding the minimum 5% requirement by 1.09 acres.

Two of the tree tract areas (Tree Tracts 1 and 4) are fully stocked with quality trees, so no replanting would be required in these areas (Pictures 1 and 2). The other 2 tree tract areas (Tree Tracts 2 and 3) either do not contain quality trees, or are not large enough to retain the trees contained therein. These 2 areas will need to be replanted to achieve 90% tree canopy coverage within 15 years.

Replacement trees planted on 12 ft. centers would be necessary to meet this requirement. Replacement trees would need to be 1.5 inches in caliper if deciduous, or 6 ft. tall at the time of planting if coniferous.



**Photo 3.** View of shrubby vegetation in northeast corner of project area (Tree Tract 3).  
View looking south.

### **Tree Replacement and Establishment of New Trees on Lots**

The City of Lacey also has a tree retention/planting requirement for developing properties. There is 347,173 ft<sup>2</sup> outside of the tree tracts. Four replacement trees are required for every 5,000 ft<sup>2</sup> of lot area. Therefore, a total of 278 trees will need to be saved or replanted. This is in addition to the trees retained in the dedicated tree tract. If the applicant is required to plant all 278 trees, then the projected cost would be \$65,000.

Planted replacement trees should be selected from the Lacey approved general tree list and be at least 2 inch caliper B&B trees for deciduous species and 6 - 7 foot tall conifers. Thirty percent (30%) of planted trees should be native conifers.

### **Street Trees**

Street trees will be required along the frontage of 32<sup>nd</sup> Ave. NW. The recommended street tree is red oak (*Quercus rubra*). Twelve (12) trees would be needed, planted approximately on 45-50 ft centers. The trees should be a minimum of 2 inches caliper balled and burlap trees. They should be planted according to the required City of Lacey standards. The projected installed cost of these trees is \$3,900.



## **Pruning**

Any trees to be saved should be pruned to provide 10 feet of building clearance, 8 feet of clearance over lawns, sidewalks, and landscaping and 15 feet over driveways and parking areas. All other necessary crown cleaning to remove dead, dying, damaged and defective branches should be done during the site clearing phase. All pruning should be completed by or supervised by an International Society of Arboriculture Certified Arborist<sup>®</sup>. The pruning should conform to the ANSI A300 standards for proper pruning.

## **Tree Protection Requirements**

Trees that are saved must be protected during construction by temporary orange plastic mesh fencing on driven posts (Appendix IV), located at the edge of the critical root zone. The individual critical root zones are 5 feet outside the drip line of all edge trees unless otherwise delineated by WFCI.

There should be no equipment activity within the critical root zone. No irrigation lines, trenches, or other utilities should be installed within the critical root zone. If roots are encountered outside the critical root zone, they should be cut cleanly with a saw and covered immediately with moist soil. Noxious vegetation within the critical root zone should be removed by hand. If a proposed save tree must be impacted by grading or fills, then the tree should be re-evaluated by WFCI to determine if the tree can be saved and mitigating measures, or if the tree should be removed.

## **Timeline for Tree Protection Activity**

1. Provide WFCI a final copy of the grading plan with the proposed site improvements. We will then prepare the final tree protection plan.
2. Add the tree protection fence locations, fence detail, and ‘timeline for tree protection activity’ to the grading plan and label one copy as the ‘tree protection plan’. This should be submitted to the City of Lacey for approval. Tree protection fences will be required along the perimeter (abutting construction) of all save tree areas, including off-site trees.
3. Stake the clearing limits and flag the tree protection fence locations.
4. Conduct a pre-job conference with WFCI prior to the start of clearing. We will mark any additional removals necessary within the tree retention areas.
5. Complete the logging.
6. Install tree protection fences at the edge of the construction limits. WFCI should be contacted to inspect the fences prior to the start of clearing.
7. Maintain fences throughout clearing, grading and construction.
8. Plant replacement trees, if necessary, during the appropriate season of planting (October 15 through December 1 and March 1 through April 15).

## Summary

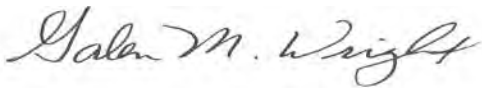
The project proponent is planning a 159 unit multi-family housing complex with 11 buildings on 9.47 acres in the City of Lacey. Two (2) of the 4 areas will need to be replanted to achieve 90% canopy coverage within 15 years. The other 2 of the proposed tree tract areas are fully stocked with healthy long term trees and will need to be protected with tree protection fencing. Off-site trees to the east of the project area will also need to be protected with tree protection fencing.

A total of 278 trees will need to be replanted in the buildable area of the project to achieve the minimum tree density requirement. Twelve (12) street trees will also need to be planted along 32<sup>nd</sup> St. NE to serve as street trees.

Please give us a call if you have any questions.

Respectfully submitted,

Washington Forestry Consultants, Inc.



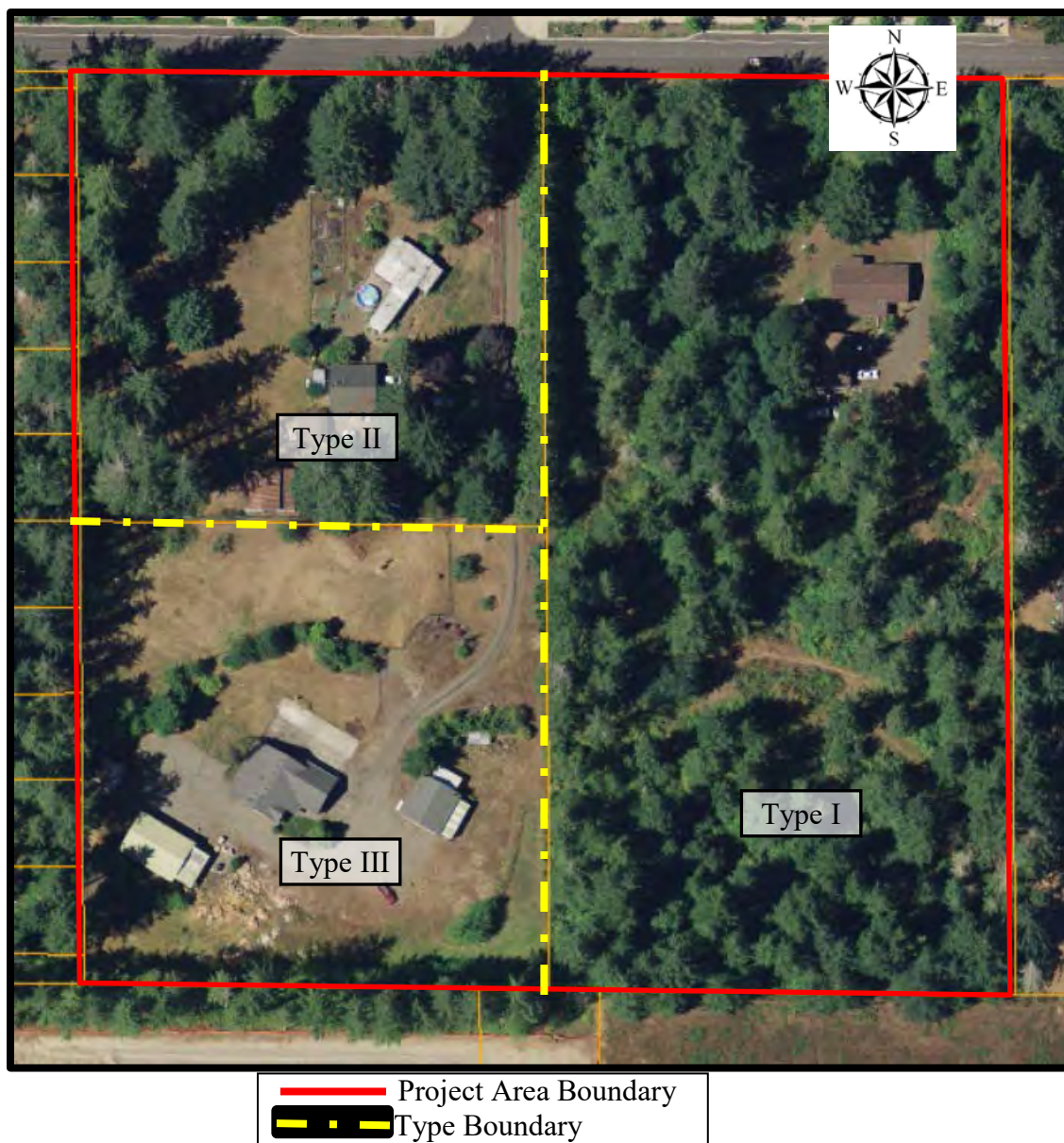
Galen M. Wright, ACF, AS  
ISA Bd. Certified Master Arborist PN-129BU  
Certified Forester No. 44  
ISA Tree Risk Assessor Qualified  
ASCA Tree and Plant Appraisal Qualified



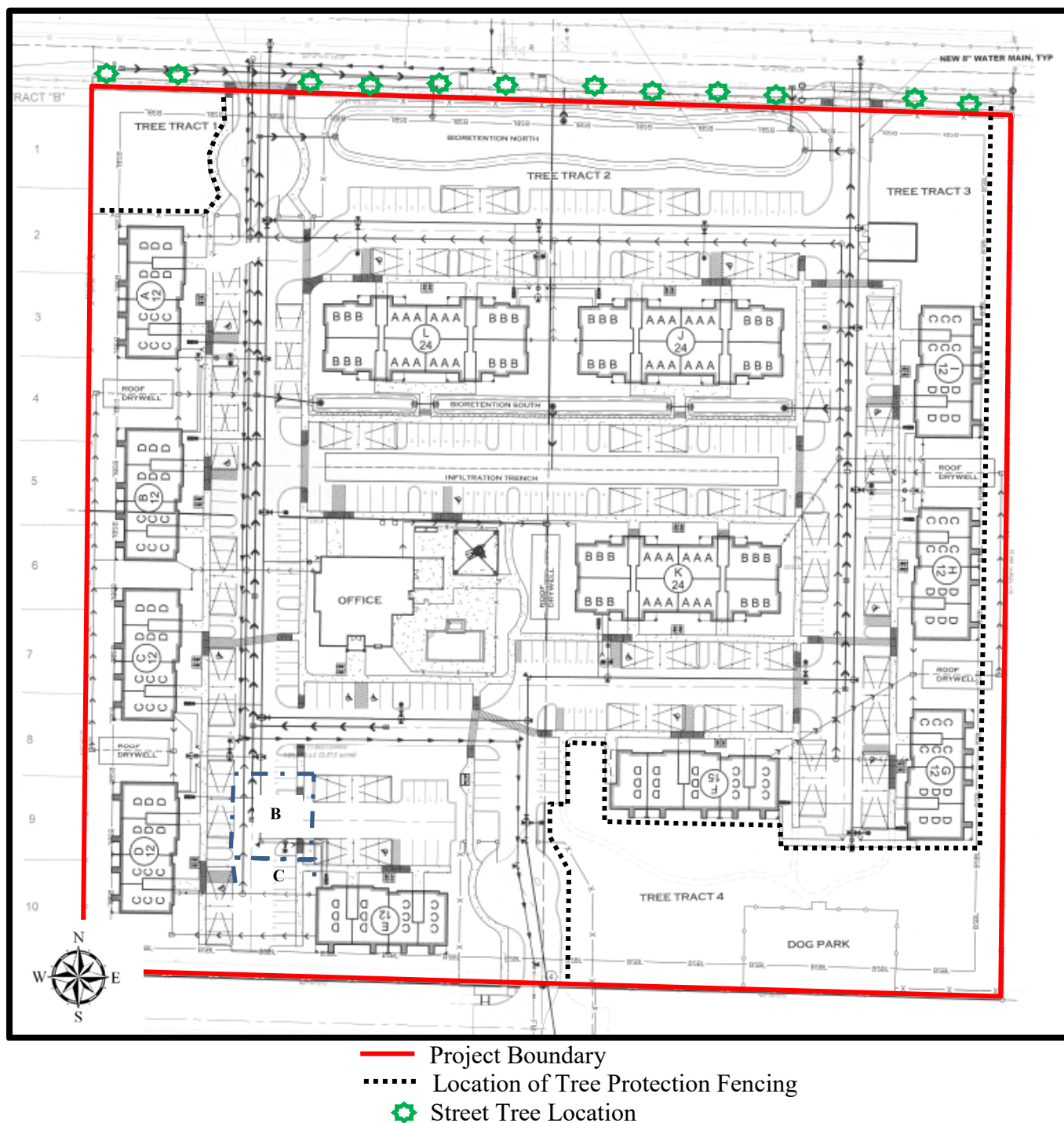
Riley Stark, Professional Forester  
ISA Bd. Certified Master Arborist  
Municipal Specialist, PN-7780BM  
ISA Tree Risk Assessor Qualified

**Appendix I - Aerial Photo of Gateway Multi-Family Complex Project Area  
with Forest Cover Types Indicated**

**(2018 Thurston County Geodata)**



**Appendix II - Preliminary Site Plans for Gateway Multi-Family Complex Project Area with Tree Tract Areas and Tree Protection Fencing Locations Indicated.**

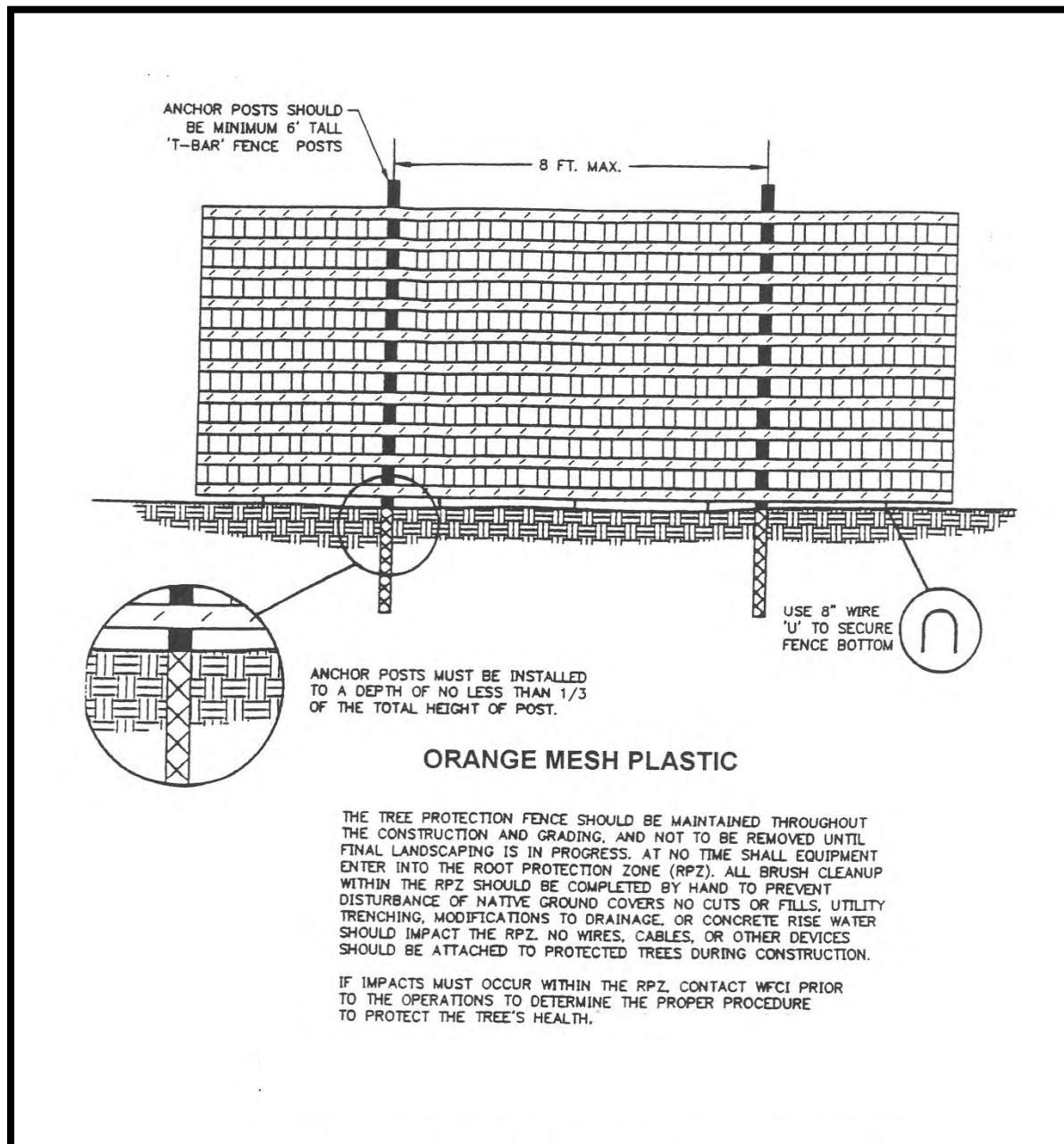


### Appendix III - Summary of Inventory Plot Data from Site

| Stand Table Summary |     |        |       |           |                  |                |              |              |               |                     |               |                       |                       |        |        |     |
|---------------------|-----|--------|-------|-----------|------------------|----------------|--------------|--------------|---------------|---------------------|---------------|-----------------------|-----------------------|--------|--------|-----|
| TC TSTNDSUM         |     |        |       |           | Project 32ND AVE |                |              |              |               |                     |               |                       |                       |        |        |     |
| T001 R001 S01 T0001 |     |        |       |           |                  |                |              |              |               | T001 R001 S01 T0001 |               |                       |                       |        |        |     |
| Twp                 | Rge | Sec    | Tract | Type      | Acres            | Plots          | Sample Trees |              |               | Page:               | 1             |                       |                       |        |        |     |
| 001                 | 001 | 01     | 1     | 0001      | 4.77             | 6              | 27           |              |               | Date:               | 6/30/2016     |                       |                       |        |        |     |
|                     |     |        |       |           |                  |                |              |              |               | Time:               | 8:27:31AM     |                       |                       |        |        |     |
| Spc                 | S   | Sample |       | Av        |                  | Trees/<br>Acre | BA/<br>Acre  | Logs<br>Acre | Average Log   |                     | Tons/<br>Acre | Net<br>Cu.Ft.<br>Acre | Net<br>Bd.Ft.<br>Acre | Totals |        |     |
|                     |     | DBH    | Trees | FF<br>16' | Hi<br>Tot        |                |              |              | Net<br>Cu.Ft. | Net<br>Bd.Ft.       |               |                       |                       | Tons   | Cunits | MBF |
| DF                  |     | 5      | 1     | 99        | 17               | 24.446         | 3.33         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 7      | 1     | 99        | 17               | 12.473         | 3.33         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 10     | 2     | 99        | 17               | 12.223         | 6.67         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 11     | 4     | 98        | 17               | 20.203         | 13.33        |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 12     | 3     | 98        | 17               | 12.732         | 10.00        |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 13     | 2     | 98        | 17               | 7.233          | 6.67         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 14     | 3     | 99        | 17               | 9.354          | 10.00        |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 15     | 2     | 98        | 17               | 5.432          | 6.67         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 16     | 4     | 99        | 17               | 9.349          | 13.33        |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 17     | 4     | 99        | 17               | 8.459          | 13.33        |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | 28     | 1     | 99        | 17               | .780           | 3.33         |              |               |                     |               |                       |                       |        |        |     |
| DF                  |     | Totals | 27    | 99        | 17               | 122.885        | 90.00        |              |               |                     |               |                       |                       |        |        |     |
| Totals              |     |        | 27    | 99        | 17               | 122.885        | 90.00        |              |               |                     |               |                       |                       |        |        |     |



## Appendix IV - Tree Protection Fence Detail



## **Appendix V - Glossary of Forestry and Arboricultural Terminology**

**DBH:** Diameter at Breast Height (measured 4.5 ft. above the ground line on the high side of the tree).

**Crown:** Portion of a trees stem covered by live foliage.

**Crown Position:** Position of the crown with respect to other trees in the stand.

**Dominant Crown Position:** Receives light from above and from the sides.

**Codominant Crown Position:** Receives light from above and some from the sides.

**Intermediate Crown Position:** Receives little light from above and none from the sides. Trees tend to be slender with poor live crown ratios.

**Suppressed Crown Position:** Receives no light from above and none from the sides. Trees tend to be slender with poor live crown ratios.

**Live Crown Ratio:** Ratio of live foliage on the stem of the tree. Example: A 100' tall tree with 40 feet of live crown would have a 40% live crown ratio. Conifers with less than 30% live crown ratio are generally not considered to be long-term trees in forestry.

**Root Protection Zone/Critical Root Zone:** A radius from the trees stem of 1 foot for each 1 inch of DBH unless otherwise determined by WFCI. For example, a 7 inch DBH tree would have a critical root zone radius of 7 feet.

**Condition Class Descriptions:**

| <b>CONDITION CLASS</b> | <b>CHARACTERISTICS</b>                                                                                                                                                                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Excellent</b>       | Single stem; Normal foliage color; No branch dieback; No apparent insect or disease problems; No other apparent problems;                                                                                                                             |
| <b>Very Good</b>       | Single stem; Normal foliage color; No branch dieback or only a few minor branches died back; No apparent insect or disease problems; No other apparent problems, or they are minor and do not impact the long-term survival of the tree;              |
| <b>Good</b>            | Single stem; Normal foliage color; Minor branch dieback; Minor problems such as crown unbalanced; Minor foliage problems; Expected to be a long-term tree;                                                                                            |
| <b>Fair</b>            | Single stem or double stem that is not expected to fail soon<br>Crown may be slightly thinned due to exposure or reduced vigor; Minor branch dieback and 1 or 2 major branches died back; Minor insect or disease problems; Tree expected to survive; |
| <b>Poor</b>            | Single or Multiple stem tree; Thinning crown; Foliage color yellowed; Inadequate live crown ratio; Major and minor branch dieback; Not a long-term tree or quality tree for development;                                                              |
| <b>Very Poor</b>       | Single or Multiple stem tree; Severe thinning crown; Yellow foliage; Major branch dieback; Expected to die within 5 years or so;                                                                                                                      |
| <b>Hazard Tree</b>     | Dead, dying, diseased, defective; Would be hazardous to new development or if other targets are placed within reach of tree;                                                                                                                          |



## APPENDIX VI - Assumptions and Limiting Conditions

- 1) Any legal description provided to the Washington Forestry Consultants, Inc. is assumed to be correct. Any titles and ownership's to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
- 2) It is assumed that any property is not in violation of any applicable codes, ordinances, statutes, or other governmental regulations, unless otherwise stated.
- 3) Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, Washington Forestry Consultants, Inc. can neither guarantee nor be responsible for the accuracy of information.
- 4) Washington Forestry Consultants, Inc. shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
- 5) Loss or alteration of any part of this report invalidated the entire report.
- 6) Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc.
- 7) Neither all or any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc. -- particularly as to value conclusions, identity of Washington Forestry Consultants, Inc., or any reference to any professional society or to any initialed designation conferred upon Washington Forestry Consultants, Inc. as stated in its qualifications.
- 8) This report and any values expressed herein represent the opinion of Washington Forestry Consultants, Inc., and the fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence neither of a subsequent event, nor upon any finding in to reported.
- 9) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
- 10) Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the tree or other plant or property in question may not arise in the future.

***Note: Even healthy trees can fail under normal or storm conditions. The only way to eliminate all risk is to remove all trees within reach of all targets. Annual monitoring by an ISA Certified Arborist or Certified Forester will reduce the potential of tree failures. It is impossible to predict with certainty that a tree will stand or fail, or the timing of the failure. It is considered an 'Act of God' when a tree fails, unless it is directly felled or pushed over by man's actions.***



# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

## SHEET INDEX

- 1 PRELIMINARY SITE PLAN
- 2 PRELIMINARY HORIZONTAL CONTROL PLAN
- 3 PRELIMINARY DEMO & EROSION CONTROL PLAN
- 4 PRELIMINARY SOIL PROFILES - 'A' PROFILE
- 5 PRELIMINARY SOIL PROFILES - 'B' PROFILE
- 6 PRELIMINARY SOIL PROFILES - 'C' PROFILE
- 7 PRELIMINARY SOIL PROFILES - 'D' PROFILE
- 8 PRELIMINARY SOIL PROFILES - 'E' PROFILE
- 9 PRELIMINARY SOIL PROFILES - 'F' PROFILE
- 10 PRELIMINARY GRADING & DRAINAGE PLAN
- 11 PRELIMINARY DRAINAGE DETAILS
- 12 PRELIMINARY WATER PLAN
- 13 PRELIMINARY ONSITE SEWER PLAN
- 14 PRELIMINARY OFFSITE SEWER PLAN

## LEGEND

- EX. BLOW OFF
- EX. FIRE HYDRANT
- EX. WATER METER
- EX. WATER VALVE
- EX. SANITARY SEWER CLEAN OUT
- EX. SANITARY SEWER MANHOLE
- EX. CB TYPE 2 w/ SOLID LID
- EX. CB TYPE 2
- EX. CATCH BASIN TYPE 1
- EX. POWER POLE
- EX. TELEPHONE MANHOLE
- EX. POWER TRANSFORMER
- EX. JUNCTION BOX
- EX. LUMINAIRE
- EX. SIGN
- EX. STRIPING
- EX. OVERHEAD UTILITIES
- EX. OVERHEAD POWER
- EX. FIBER OPTIC
- EX. FORCE MAIN
- EX. SANITARY SEWER
- EX. DRAINAGE LINE
- EX. WATER LINE
- EX. EDGE OF PAVEMENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- FINISH MAJOR CONTOUR
- FINISH MINOR CONTOUR
- NEW FENCE
- NEW WATER LINE
- NEW STORM LINE
- NEW ROOF DRAIN LINE
- NEW SEWER LINE
- NEW FIRE HYDRANT
- NEW WATER METER
- NEW RPBA
- NEW FDC
- NEW PIV
- NEW GATE VALVE
- NEW 2" BLOW OFF ASSEMBLY
- NEW SEWER CLEAN OUT
- NEW SEWER MANHOLE
- NEW CATCH BASIN
- NEW CATCH BASIN w/ SOLID LID
- NEW DOWN SPOUT
- NEW CLEAN OUT
- NEW OBSERVATION PORT
- WETLAND AREA
- NEW INFILTRATION TRENCH
- NEW ASPHALT
- NEW CONCRETE
- NEW POROUS PAVEMENT

## PROJECT PROPONENT

FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

## CITY OF LACEY

### VERTICAL DATUM

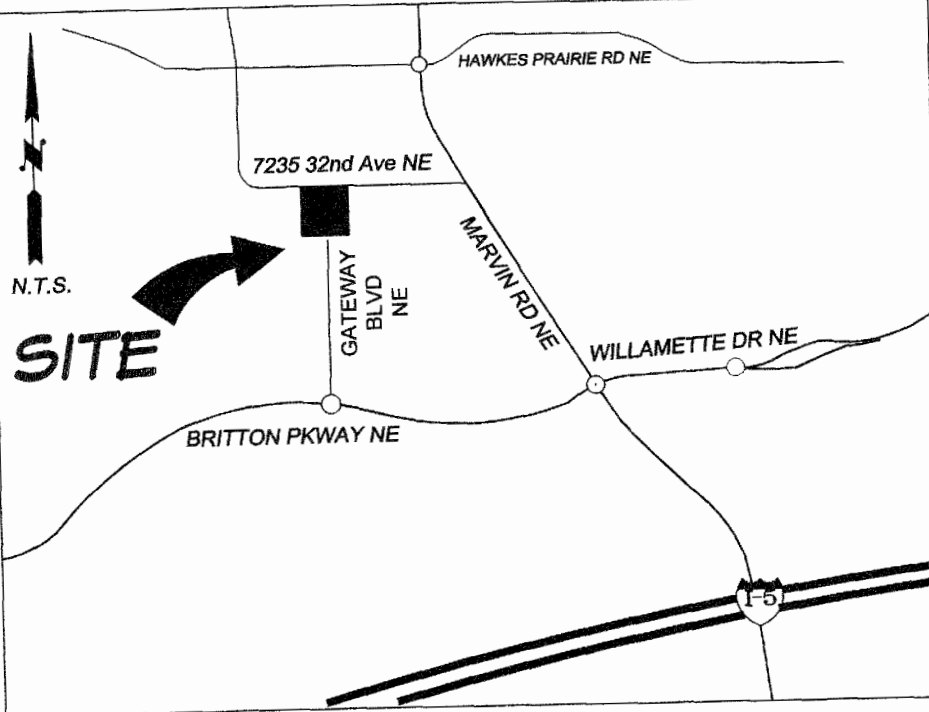
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

### MERIDIAN HORIZONTAL DATUM

CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80  
SCALE: 1" = 40'



## VICINITY MAP

## SITE DEVELOPMENT

SITE ADDRESS: 7235 32ND AVE NE, LACEY, WA 98516

PARCEL NO: 11803140300, 11803130400, 1180310401  
S/T/R: SEC. 03, T. 18N., RGE. 1W.,  
JURISDICTION: THURSTON

SITE AREA: 9.54 AC  
ZONING: LD - LIGHT DENSITY  
SETBACKS:  
FRONT: 20'  
SIDE: 20'  
REAR: 20'

WATER: CITY OF LACEY  
SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY

PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 183 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32

MAXIMUM BLDG COVERAGE: 50%  
(9) C, C, D, D = 36,778 S.F.  
(3) B, A, A, B = 23,76 S.F.  
OFFICE = 3,945 S.F.

TOTAL: 64,489 / 415,562 SQ FT (9.54 ACRES)  
TOTAL COVERAGE: 15.5%

OPEN AREA:  
30% OPEN SPACE REQ:  
2.87 OPEN SPACE / 9.54 AC  
TOTAL OPEN SPACE: 30%

TREE RETAIN OR TRACTS TO EQUAL 5% OF GROSS  
SITE.

PRESERVED TREES ON SITE: 39%  
TREE RETAIN AREAS: 1.57 / 9.54  
TOTAL RETENTION: 15.3%

TP# 11803140300, 11803130400, 1180310401

GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA 98516

PRELIMINARY SITE PLAN

AGENCY NO. \_\_\_\_\_  
SHEET: 1 OF 14  
INDEX: 19-085 pre-cov.dwg  
JOB: 19-085



# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

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## PROJECT PROPONENT

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6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

## CITY OF LACEY

### VERTICAL DATUM

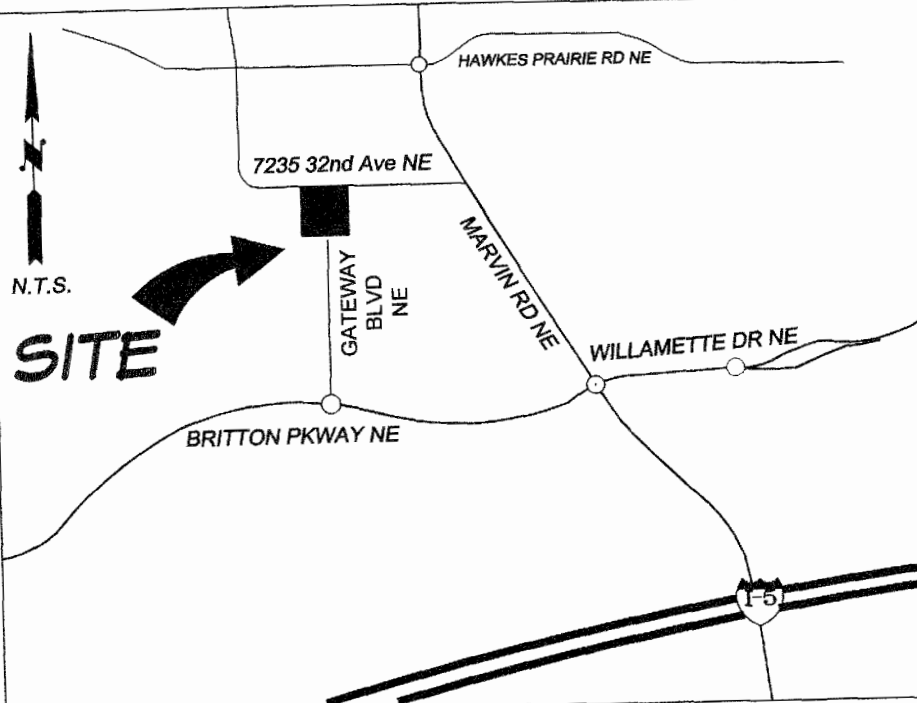
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

### MERIDIAN HORIZONTAL DATUM

CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

SCALE: 1" = 40'



## VICINITY MAP

## SITE DEVELOPMENT

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SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY

PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 183 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32

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(9) C, C, D, D = 36,778 S.F.  
(3) B, A, A, B = 23,76 S.F.  
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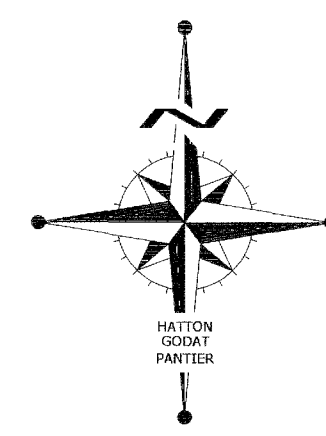
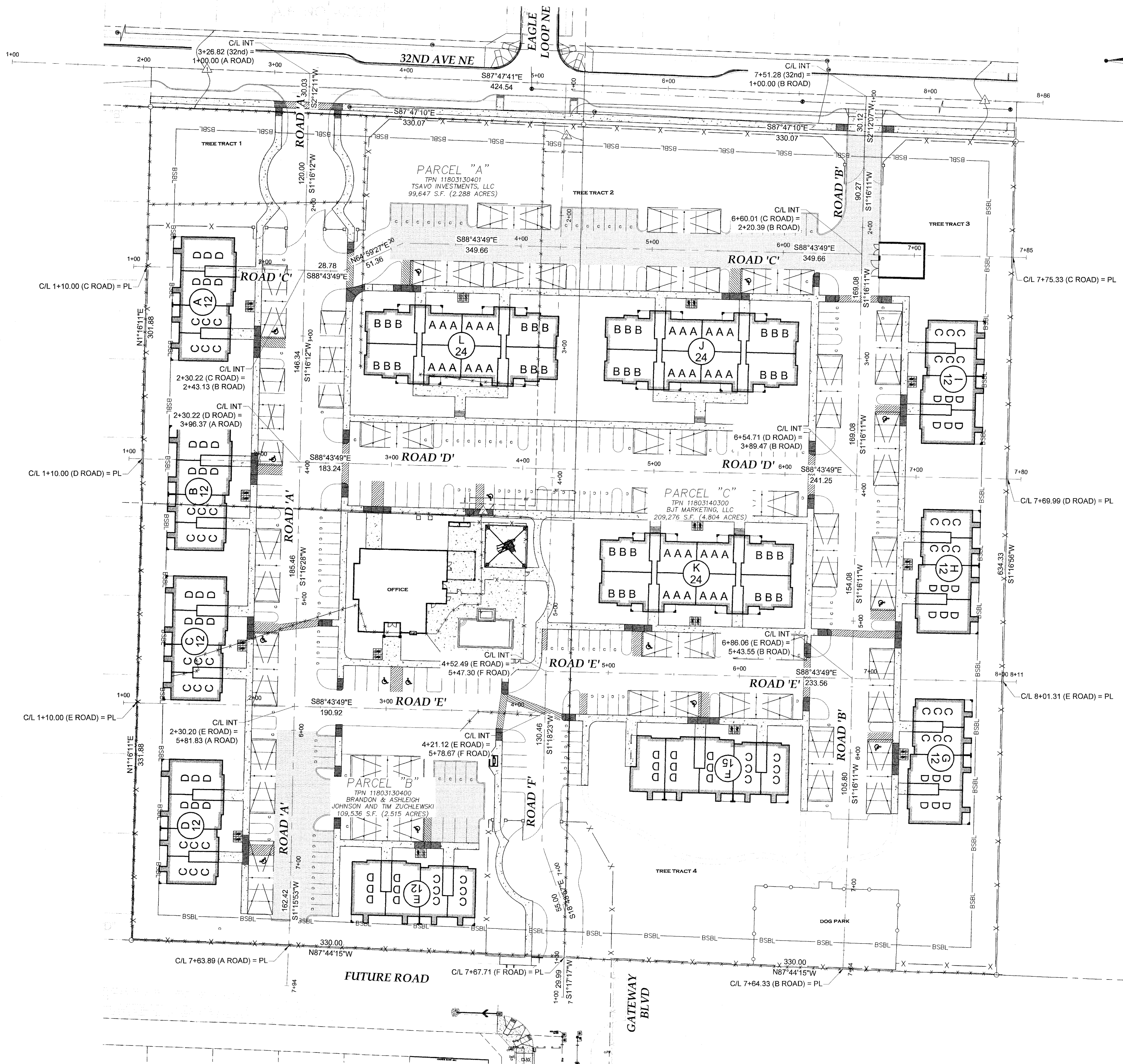
TP# 11803140300, 11803130400, 1180310401

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND AVE NE, LACEY, WA 98516

## PRELIMINARY SITE PLAN

AGENCY NO. \_\_\_\_\_  
SHEET: 1 OF 14  
INDEX: 19-085 pre-cov.dwg  
JOB: 19-085





**CITY OF LACEY**  
**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

40 20 0 40 80  
SCALE: 1" = 40'

**DESCRIPTIONS**

**PARCEL "A":**  
THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON, EXCEPTING THEREFROM THE NORTH 50 FEET FOR EXISTING ROADWAY.

**PARCEL "B":**  
THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON.

**PARCEL "C":**  
THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M., IN THURSTON COUNTY, WASHINGTON, EXCEPTING THAT PORTION CONVEYED TO THURSTON COUNTY BY DEED RECORDED SEPTEMBER 2, 1976 UNDER RECORDING NO. 975922.

**LEGEND**

- 60' RIGHT OF WAY DESCRIBED IN DEED TO THURSTON COUNTY RECORDED UNDER AUDITOR'S FILE NO. 975992
- EASEMENT GRANTED TO PUGET SOUND POWER & LIGHT COMPANY RECORDED UNDER AUDITOR'S FILE NO. 983219
- EASEMENT TO BE ABANDONED

**NOTES**

THIS DRAWING IS BASED ON BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BUTLER SURVEYING. HATTON GODAT PANTIER HAS NOT PERFORMED AN INDEPENDANT SURVEY OF THE SITE. THE FOLLOWING ITEMS WERE ADDED TO THE BUTLER SURVEY BY HGP:

- ADJACENT PLATS
- EASEMENT AF#983219
- RIGHT OF WAY REFERENCE AF#975992
- UTILITY INFORMATION IN PLAT OF GATEWAY DIVISION 2B

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

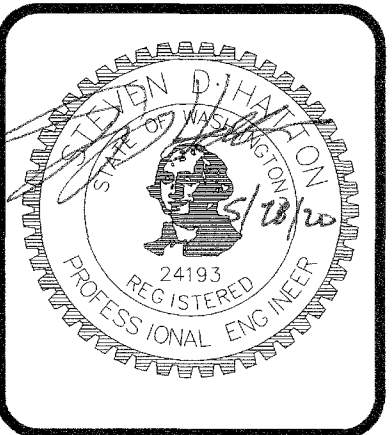
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY HORIZONTAL CONTROL PLAN**

AGENCY NO.  
SHEET: 2 OF 14  
H:\dgn\19-000\19-085\PRELIMINARY  
INDEX: 19-085\_pre-hcp.dwg  
JOB: 19-085

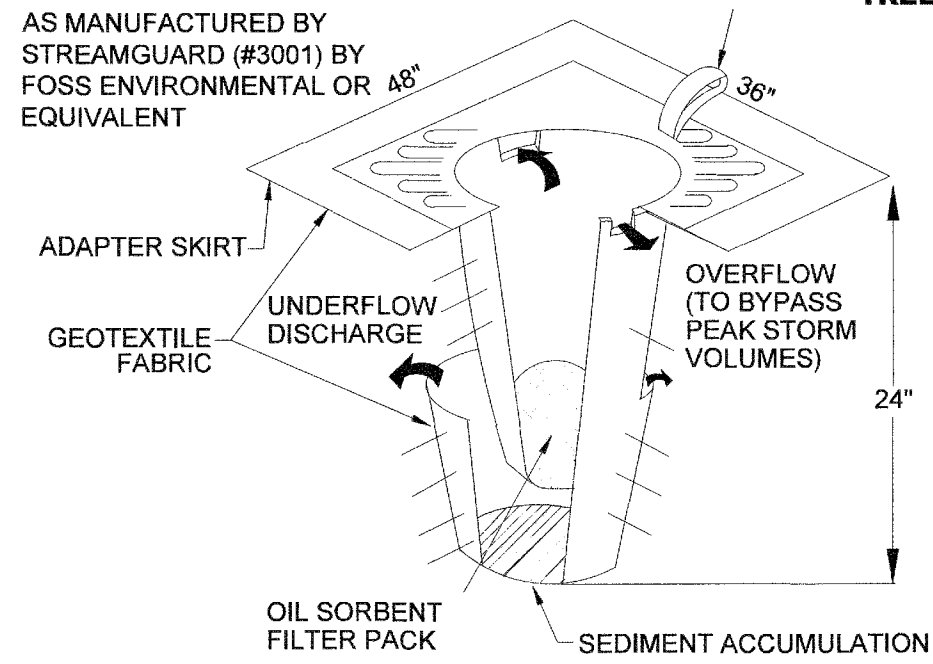
REVISIONS:  
DATE:

**HATTON GODAT PANTIER**  
AND  
SURVEYORS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com



DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'





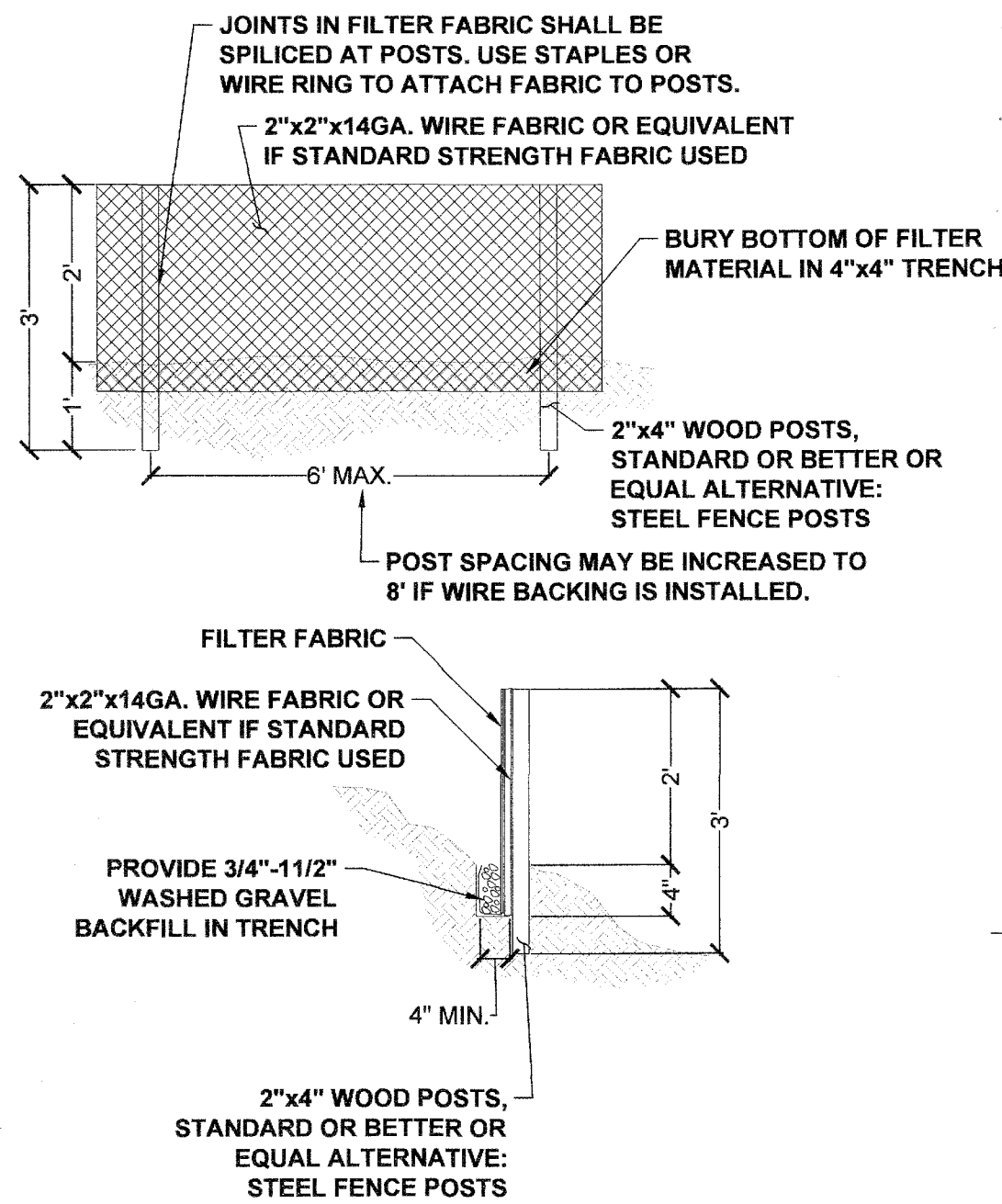
### INLET SEDIMENT PROTECTION

N.T.S.

- INLET SEDIMENT PROTECTION NOTES:**
1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
  2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

### FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 4 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.



### FILTER FABRIC FENCE DETAIL

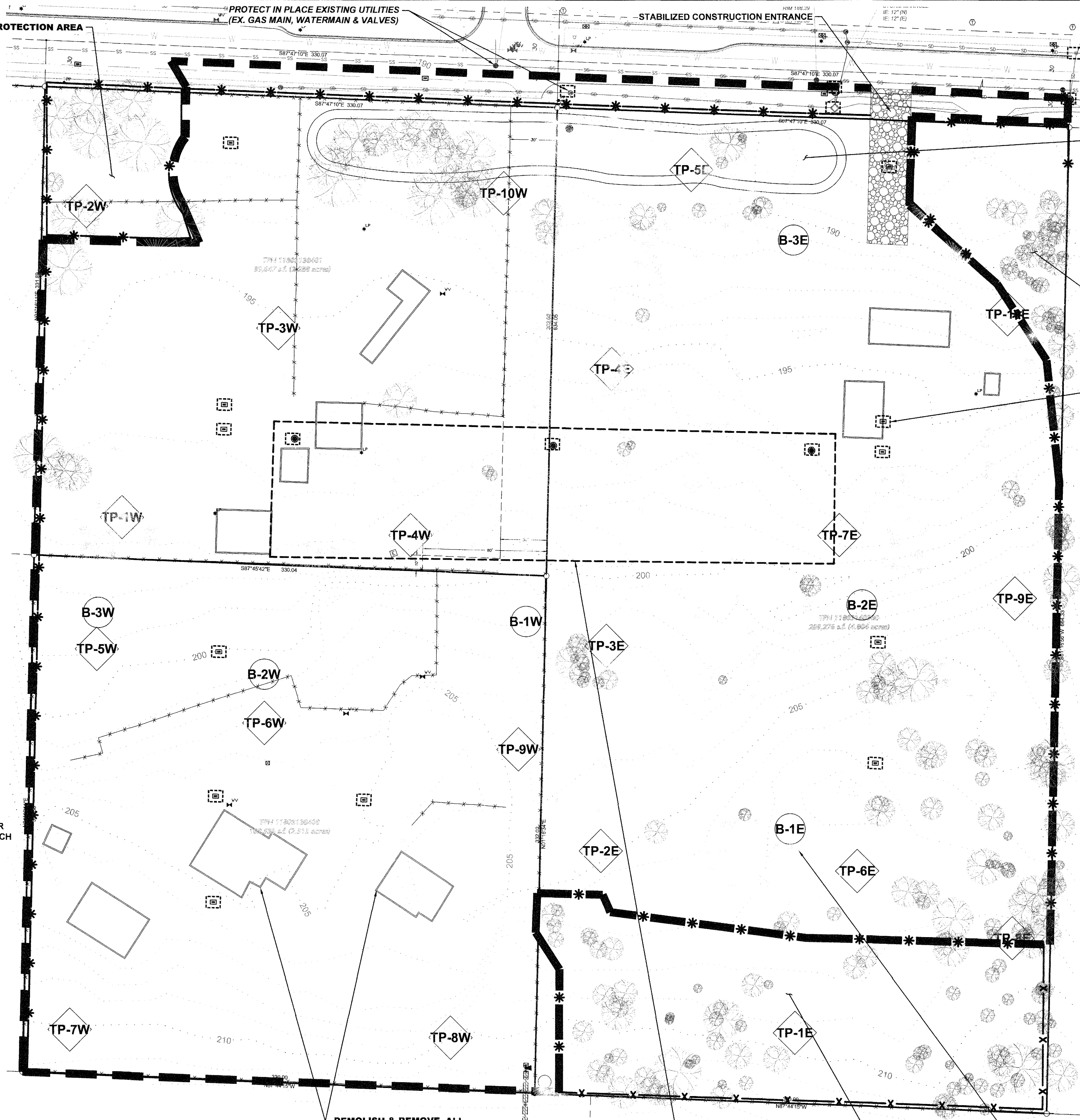
N.T.S.

**TOPOGRAPHIC NOTE:**  
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THIS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

**NOTE:** THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

**DEMOLISH & REMOVE ALL EXISTING IMPROVEMENTS INCLUDING BUT NOT LIMITED TO ALL BUILDINGS, FENCING, SIDEWALKS, DRIVEWAYS, PARKING AREAS, UTILITIES, TANKS, GATES ETC.**

**PROPOSED INFILTRATION FACILITIES IN THIS REGION. AVOID EXCESSIVE CONSTRUCTION ACTIVITIES THAT WOULD RESULT IN HEAVY COMPACTION**



| CITY OF LACEY                                                                                              |                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |

40 20 0 40 80  
SCALE: 1" = 40'

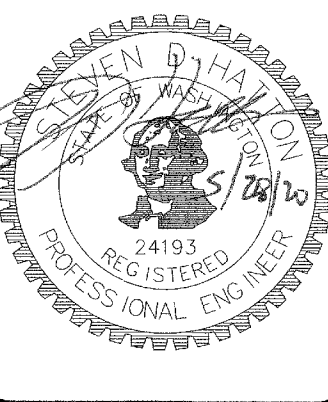


### LEGEND

- ■ ■ CLEARING LIMITS
- \* FILTER FABRIC FENCING/TREE PROTECTION
- INLET SEDIMENT PROTECTION
- EB-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- TP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- WB-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- WTP-# APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.

- GENERAL EROSION CONTROL NOTES:**
1. A CERTIFIED EROSION AND SEDIMENT CONTROL (ESC) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS: TBD AND THEIR OFFICE TELEPHONE NUMBER IS: TBD
  2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
  3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
  4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
  5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER, OR DISCHARGE STANDARDS.
  6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
  7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
  8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
  9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
  10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
  11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
  12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHETHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
  13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
  14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
  15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
  16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
  17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING, HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



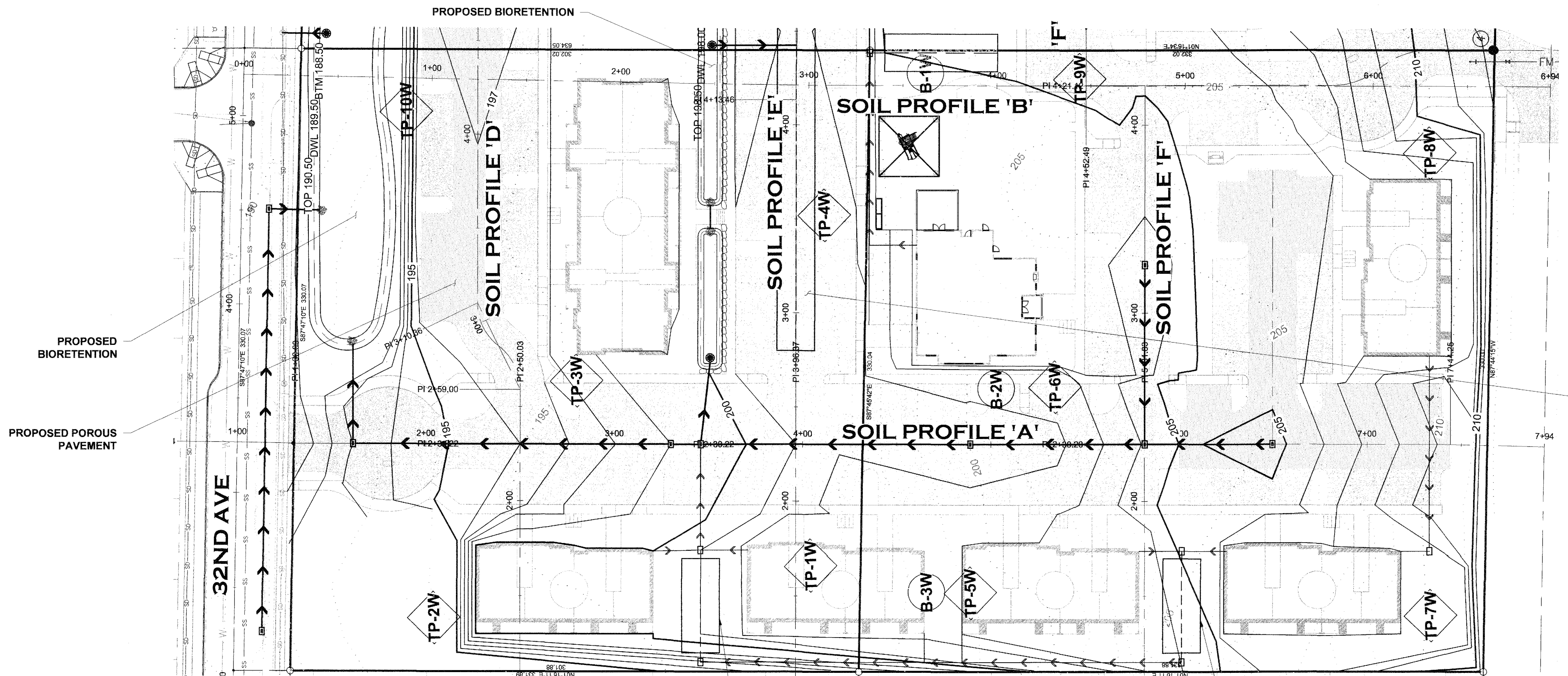
**HATTON GODAT PANTIER**  
AND SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
haddonpanter.com

REVISIONS:  
DATE:

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NELACEY, WA 98516  
**PRELIMINARY DEMO & EROSION CONTROL PLAN**

AGENCY NO.  
SHEET: 3 OF 14  
INDEX: 19-085-pre-ec.dwg  
JOB: 19-085



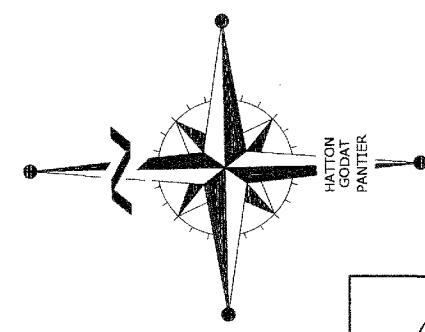


**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TC 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

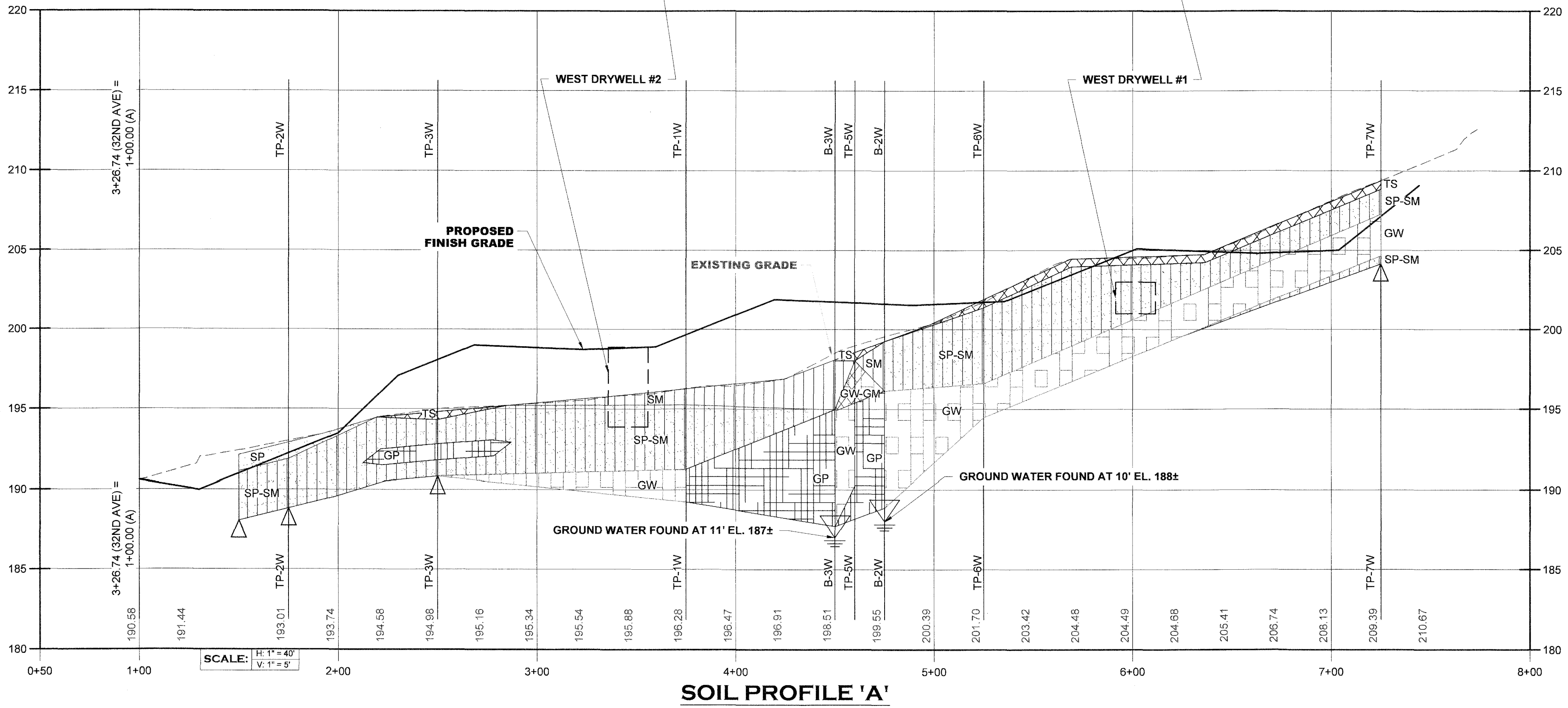
DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



40 20 0 40 80  
SCALE: 1" = 40'

**LEGEND**

- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER



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NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpanter.com

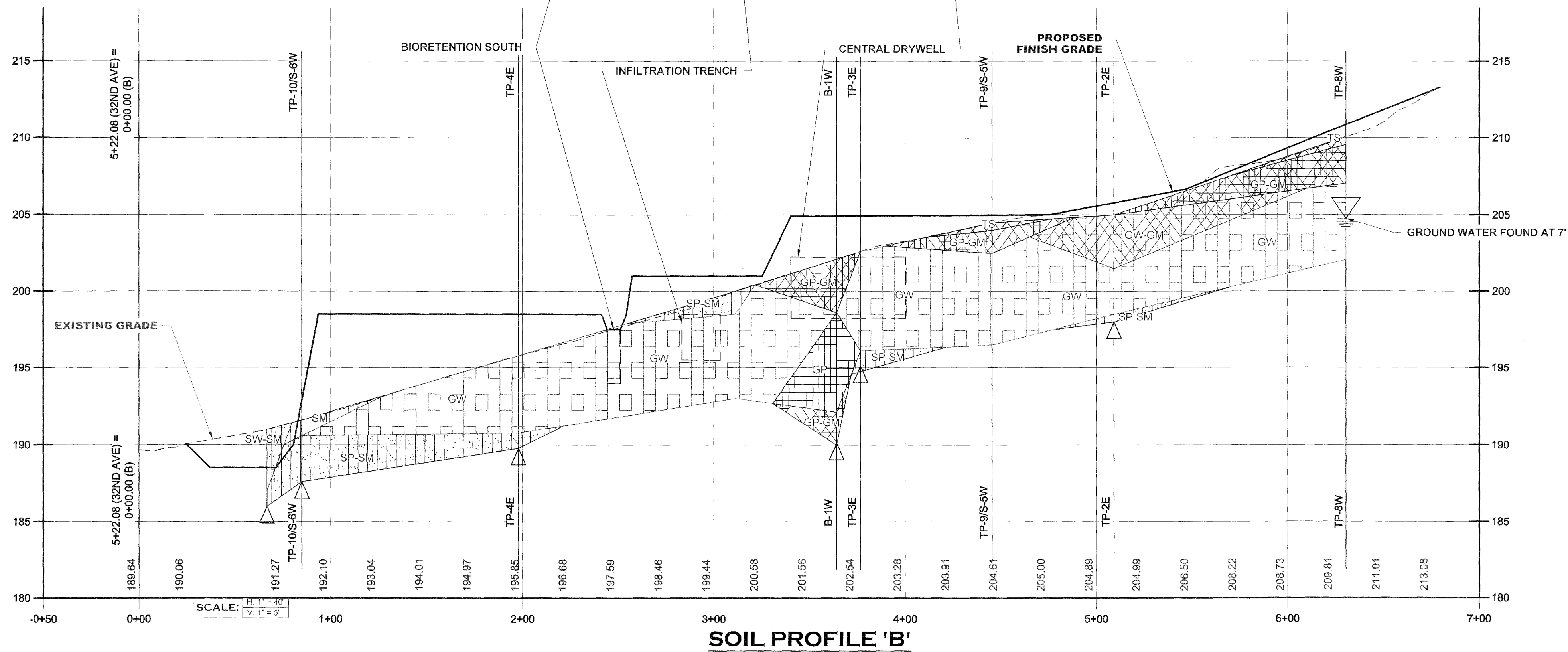
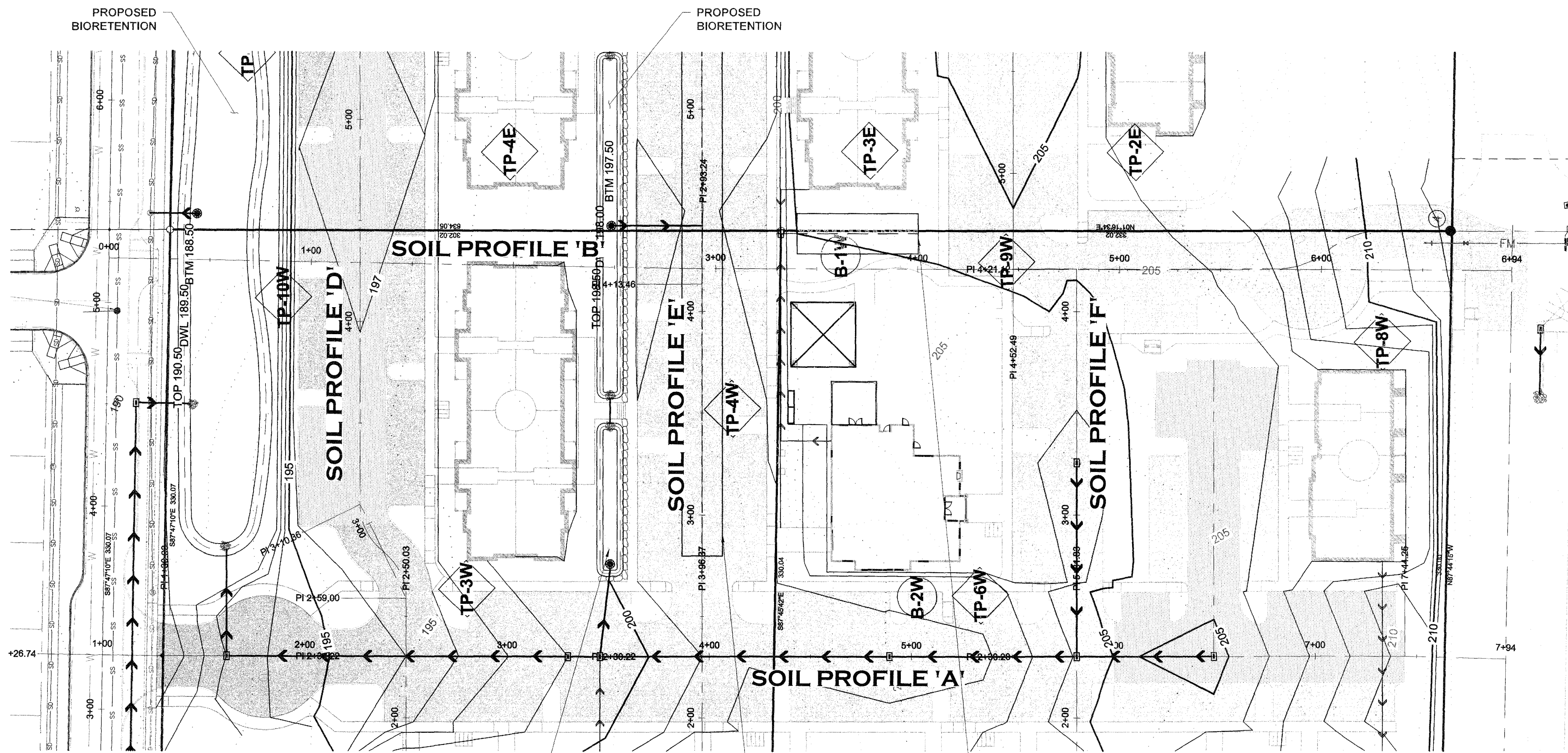
DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

REVISIONS: DATE:

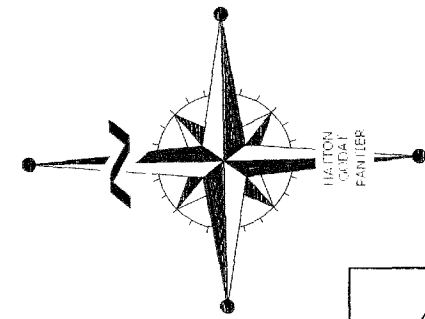
AGENCY NO. 11803130401  
GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY SOIL PROFILES - 'A' PROFILE  
SHEET: 4 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

SECTION 05, TOWNSHIP 8 NORTH, RANGE 1 WEST





| CITY OF LACEY                                                                                              |                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM<br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | MERIDIAN HORIZONTAL DATUM<br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |

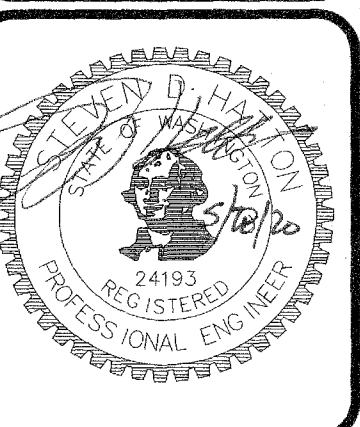


40 20 0 40 80  
SCALE: 1" = 40'

#### LEGEND

- B-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- TP-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- B-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- TP-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
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- SP - POORLY GRADED SAND
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- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

DESIGNED BY: HOLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT**  
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OLYMPIA, WA 98506  
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hattonpantier.com

| REVISIONS: | DATE: |
|------------|-------|
|            |       |
|            |       |
|            |       |

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL**  
**PROFILES - 'B' PROFILE**

AGENCY NO.:  
SHEET: 5 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

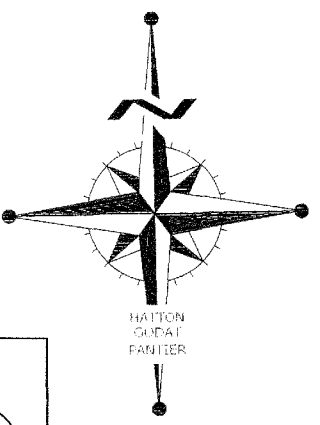
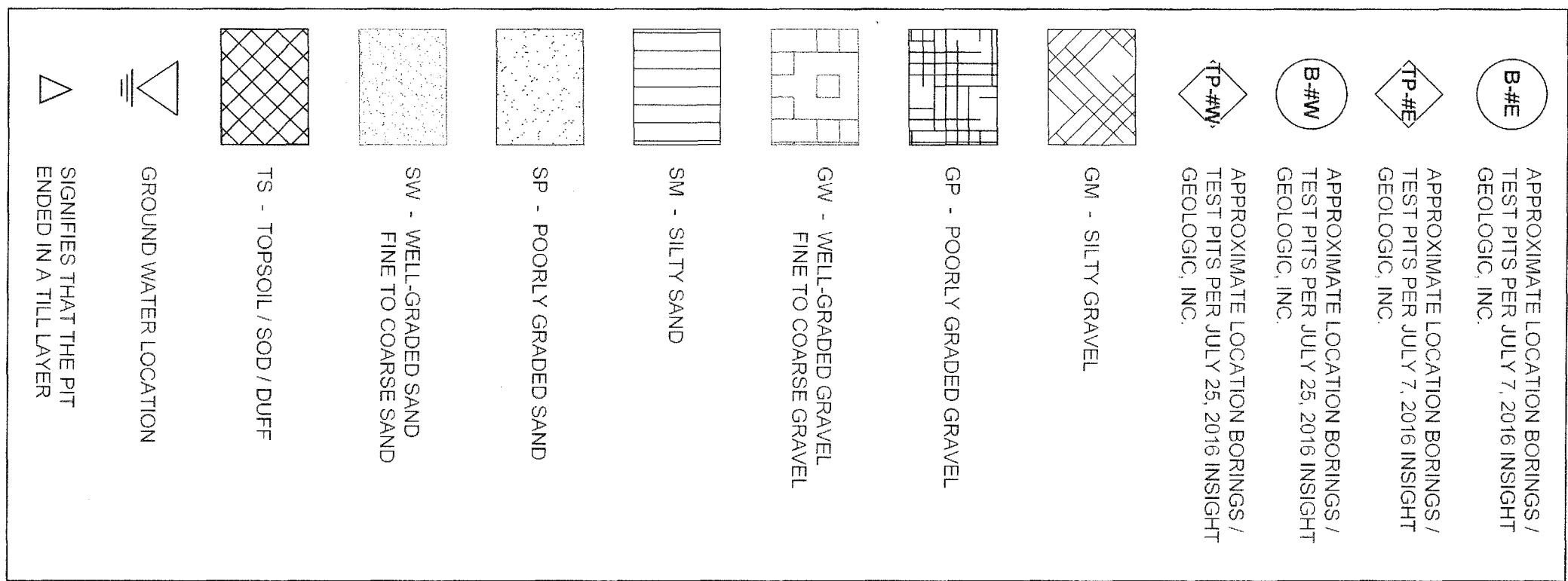
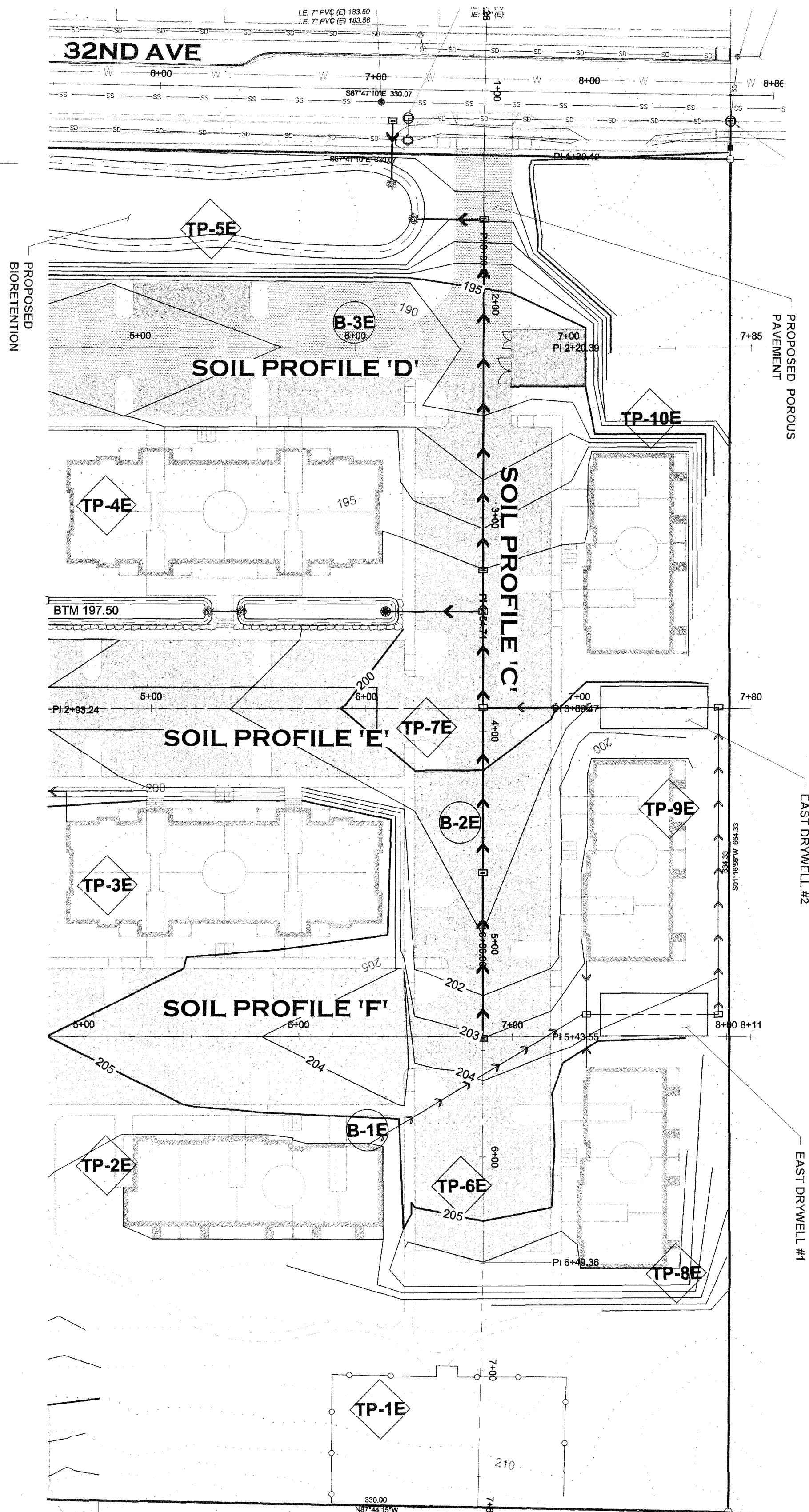
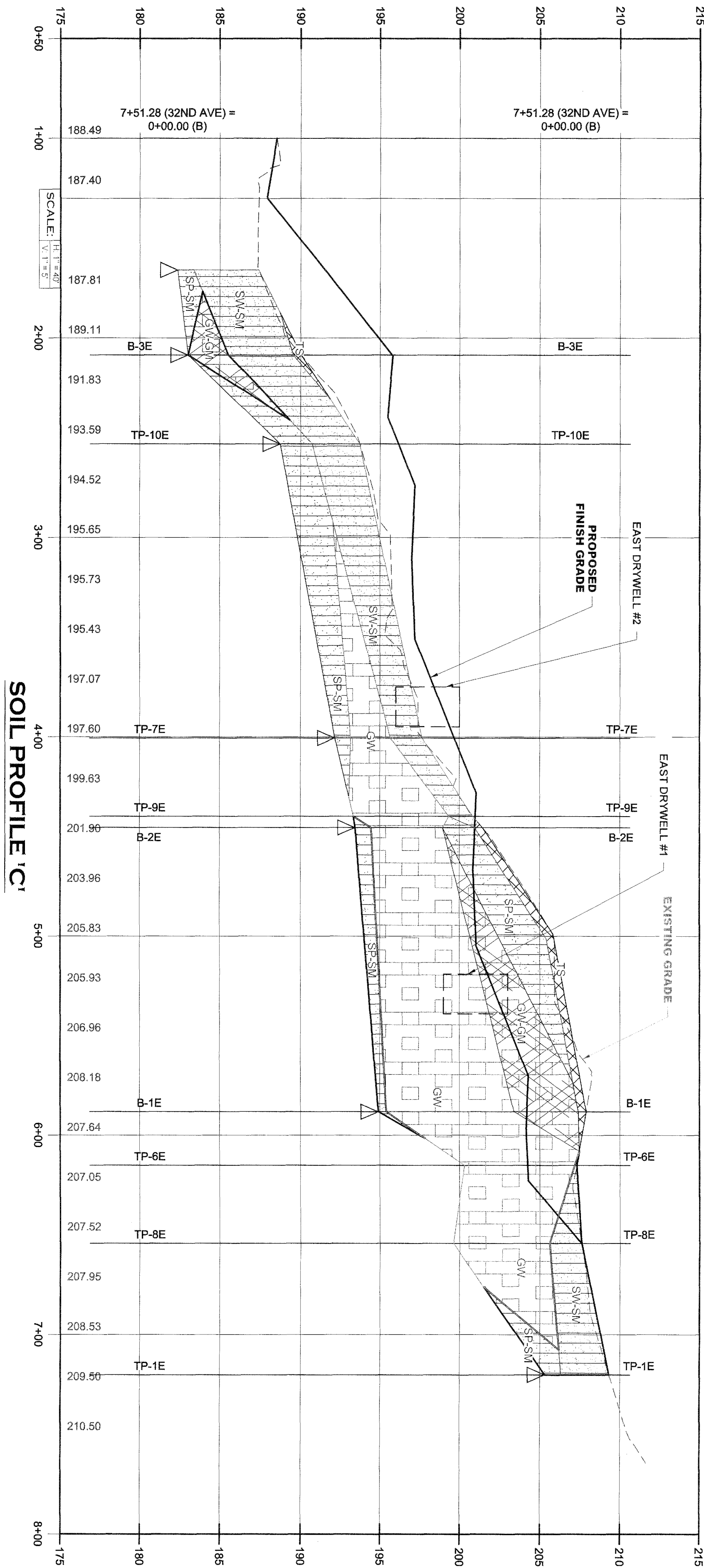
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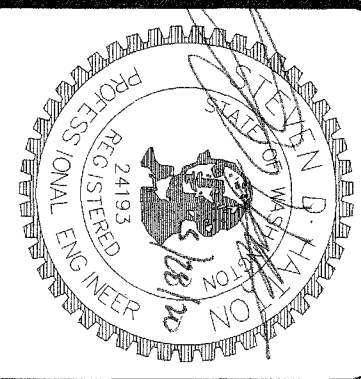
CITY OF LACEY  
VERTICAL DATUM: NGVD 29  
CITY OF LACEY  
MERIDIAN HORIZONTAL DATUM: FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS.

TP# 11803140300, 11803130400, 11803130401

GATEWAY MULTI-FAMILY COMPLEX  
7235 32ND NE LACEY, WA 98516  
PRELIMINARY SOIL  
PROFILES - 'C' PROFILE

REVISIONS: DATE:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
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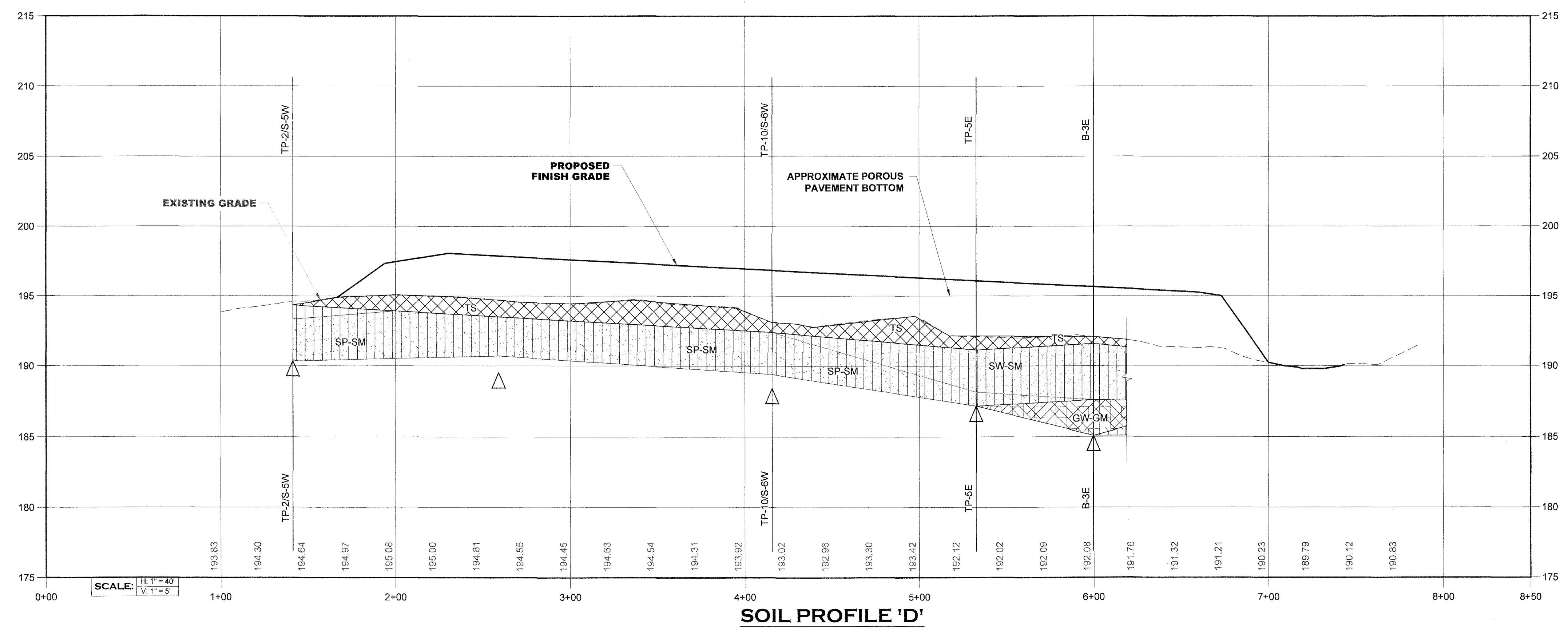
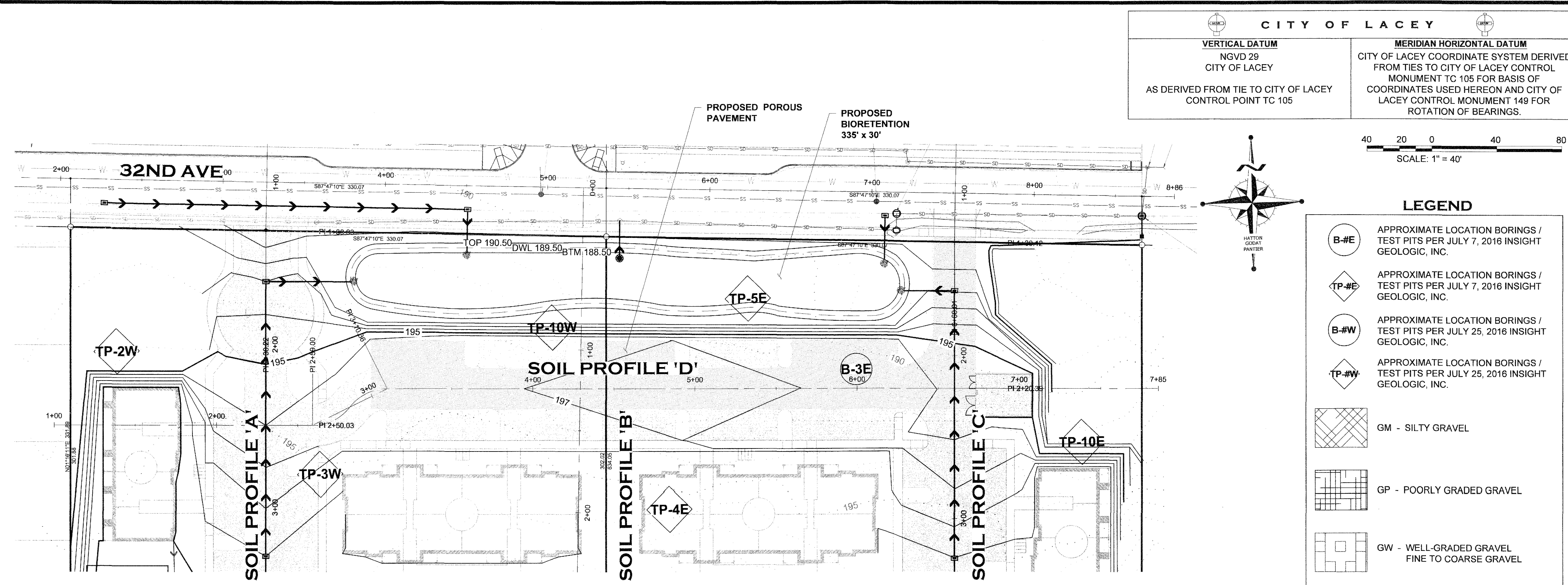


DESIGNED BY: HG/LDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

AGENCY NO.:  
SHEET: 6 OF 14  
DATE: 10/19/2019  
INDEX: 19-085  
JOB: 19-085

SECTION 03, TOWNSHIP 16 NORTH, RANGE 1 WEST





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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpantier.com

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES - 'D' PROFILE**

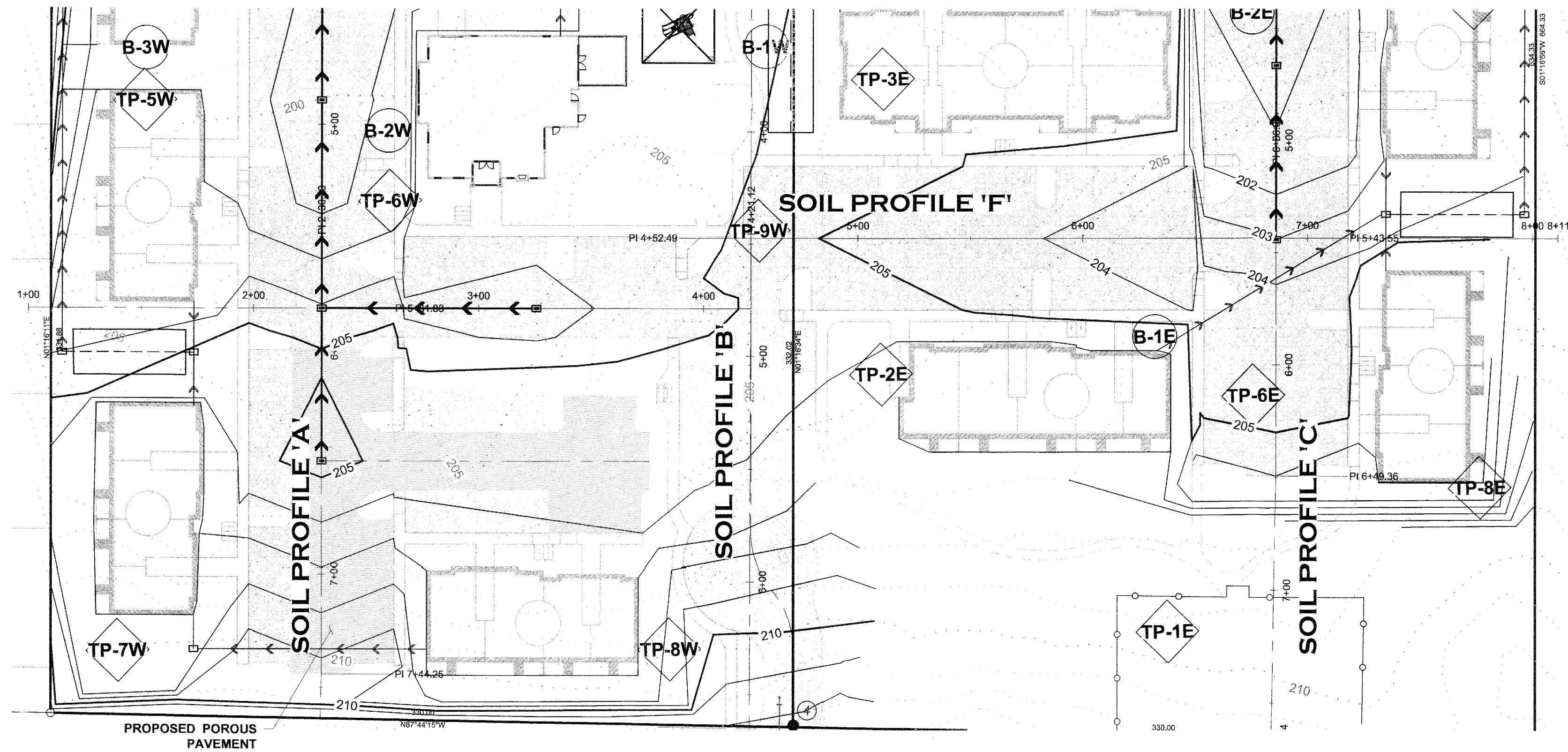
AGENCY NO. \_\_\_\_\_  
SHEET: 7 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

SECTION 03, TOWNSHIP 16 NORTH, RANGE 1 WEST

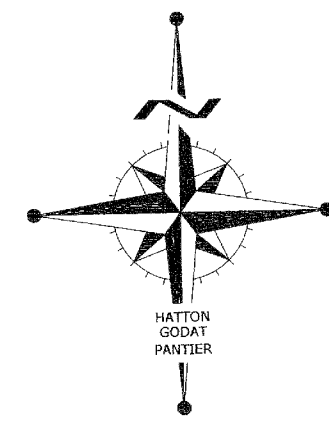








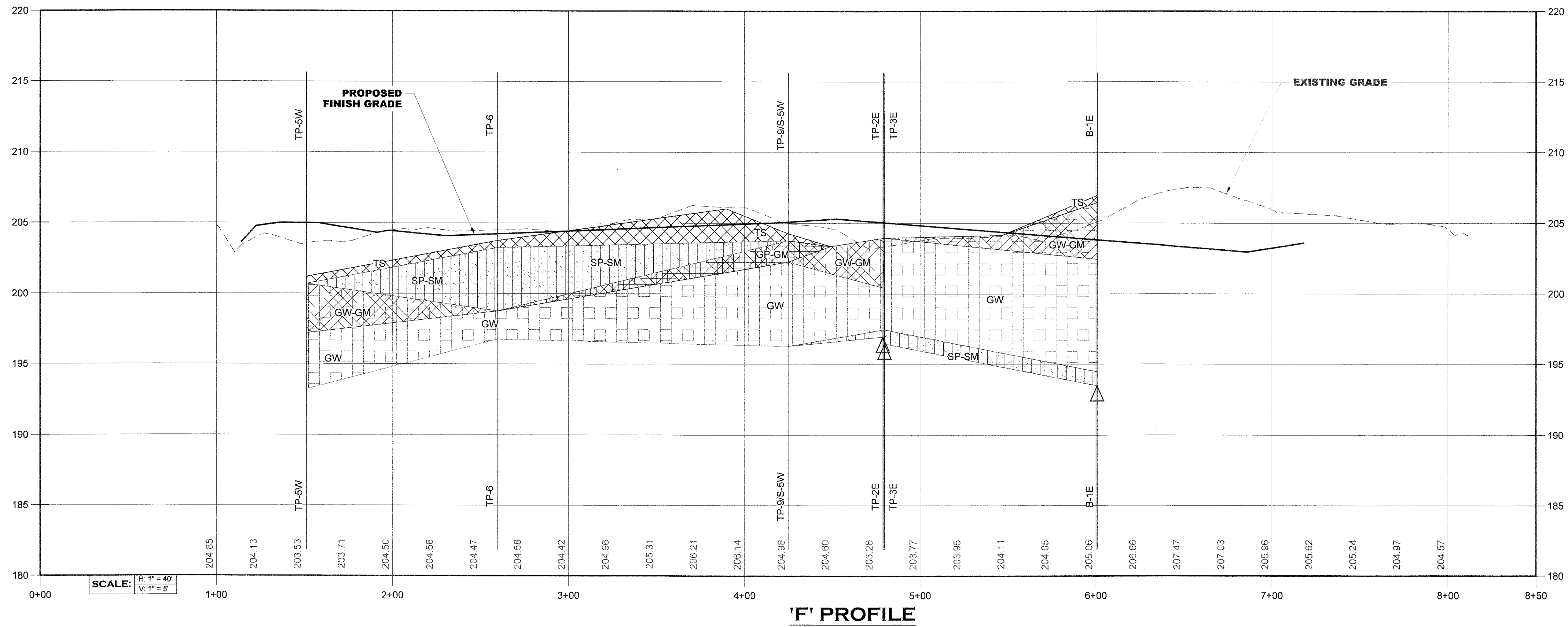
| CITY OF LACEY                                             |                                                                                                                                                                                                  |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VERTICAL DATUM                                            | MERIDIAN HORIZONTAL DATUM                                                                                                                                                                        |
| NGVD 29<br>CITY OF LACEY                                  | CITY OF LACEY COORDINATE SYSTEM DERIVED FROM TIES TO CITY OF LACEY CONTROL MONUMENT TO 105 FOR BASIS OF COORDINATES USED HEREON AND CITY OF LACEY CONTROL MONUMENT 149 FOR ROTATION OF BEARINGS. |
| AS DERIVED FROM TIE TO CITY OF LACEY CONTROL POINT TC 105 |                                                                                                                                                                                                  |



40 20 0 40 80  
SCALE: 1" = 40'

#### LEGEND

- B-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 7, 2016 INSIGHT GEOLOGIC, INC.
- TP-#E APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- B-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- TP-#W APPROXIMATE LOCATION BORINGS / TEST PITS PER JULY 25, 2016 INSIGHT GEOLOGIC, INC.
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GW - WELL-GRADED GRAVEL FINE TO COARSE GRAVEL
- SM - SILTY SAND
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- SW - WELL-GRADED SAND FINE TO COARSE SAND
- TS - TOPSOIL / SOD / DUFF
- GROUND WATER LOCATION
- SIGNIFIES THAT THE PIT ENDED IN A TILL LAYER

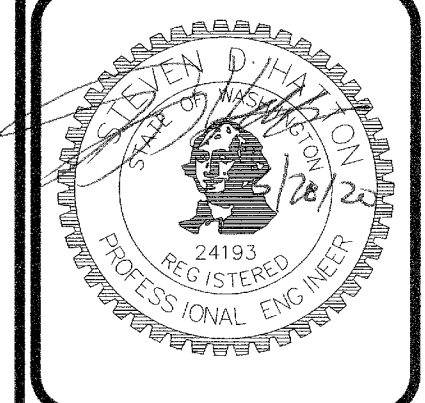


THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

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DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
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hattonpantier.com

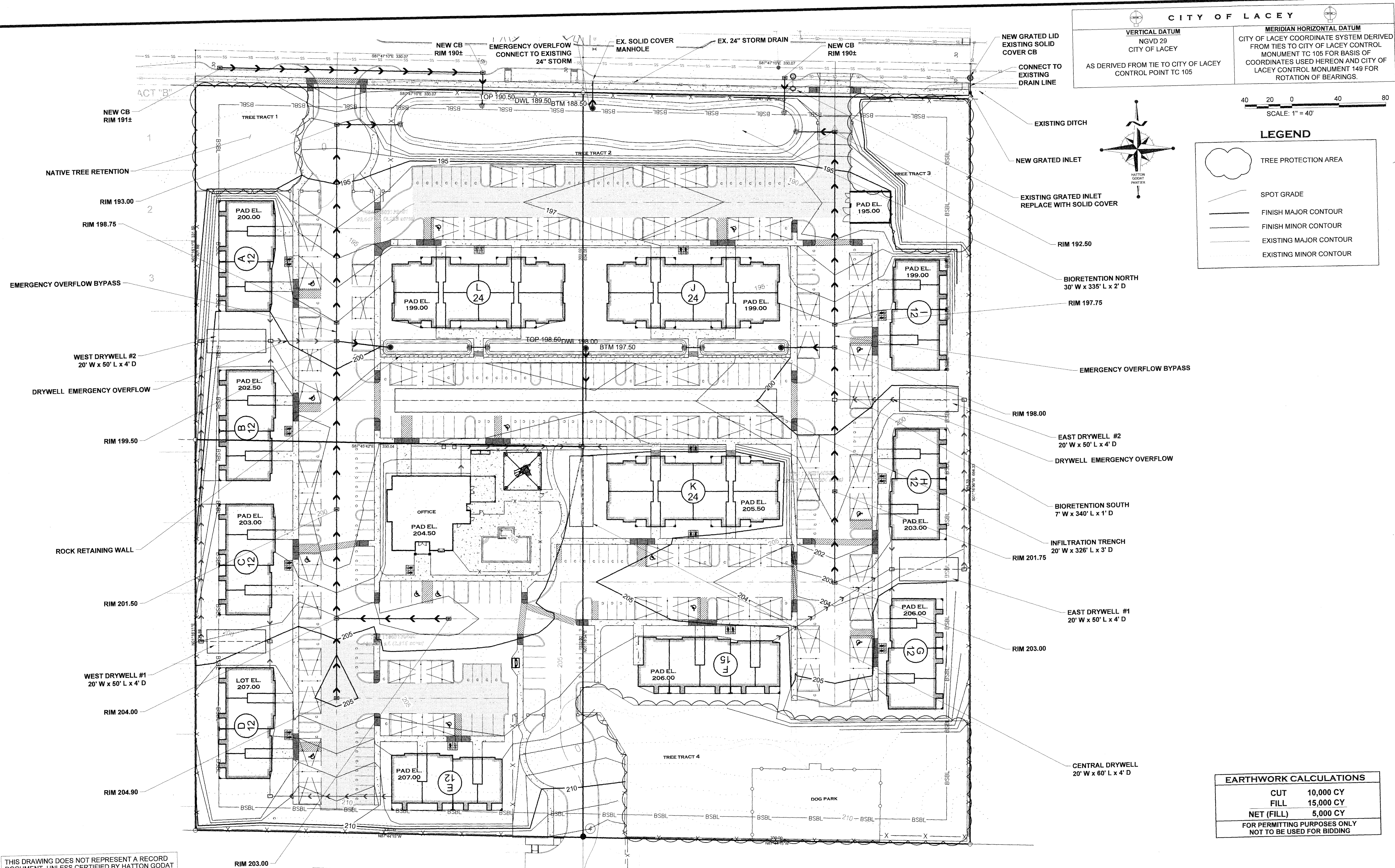
REVISIONS: DATE: \_\_\_\_\_

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND N LACEY, WA 98516  
**PRELIMINARY SOIL PROFILES**  
- 'F' PROFILE

AGENCY NO. \_\_\_\_\_  
SHEET: 9 OF 14  
INDEX: 19-085 pre-soil profiles.dwg  
JOB: 19-085

SECTION 03, TOWNSHIP 18 NORTH, RANGE 1 WEST





**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

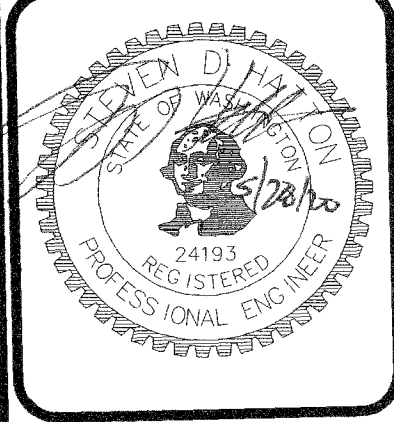
**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80  
SCALE: 1" = 40'

**LEGEND**

- TREE PROTECTION AREA
- SPOT GRADE
- FINISH MAJOR CONTOUR
- FINISH MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

DESIGNED BY: HGP/DT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
AND  
SURVEYORS  
ENGINEERS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS:

DATE:

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NELACEY, WA 98516  
**PRELIMINARY GRADING &  
DRAINAGE PLAN**

AGENCY NO.  
SHEET: 10 OF 14  
INDEX: 19-085 pre-grd & dm.dwg  
JOB: 19-085

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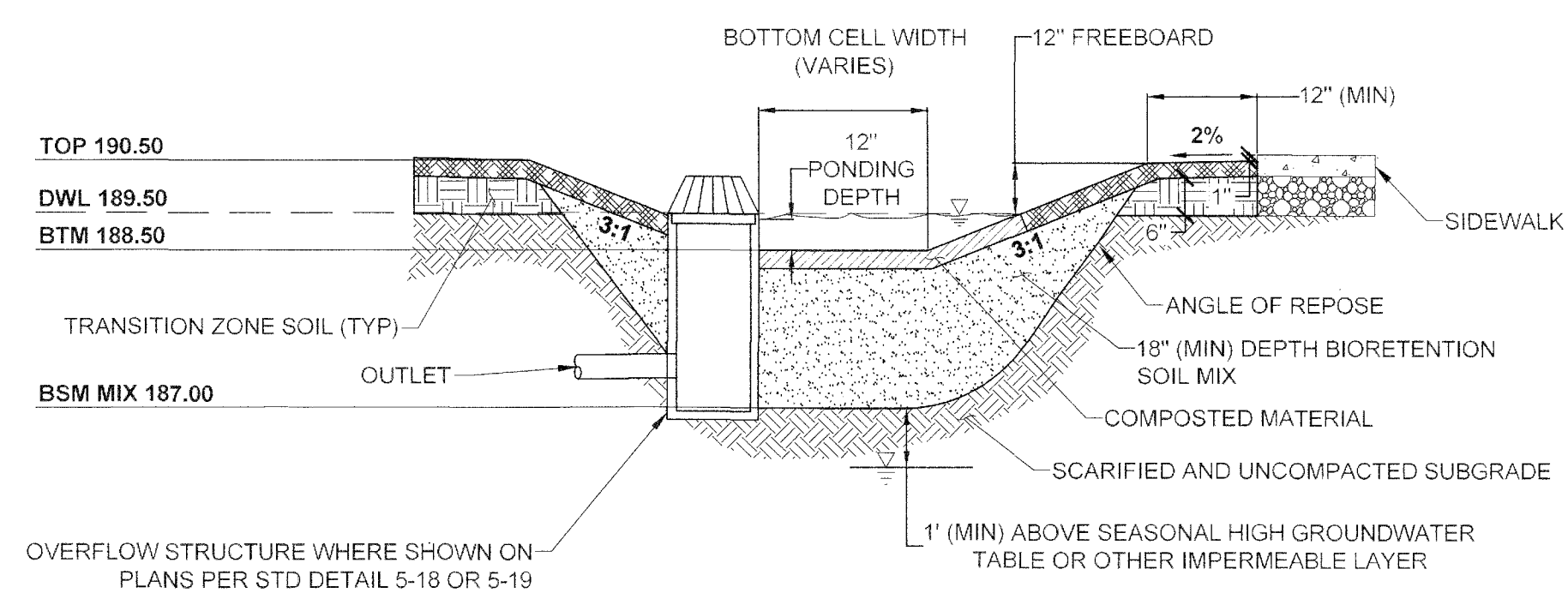
THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
PUBLIC WORKS DIRECTOR

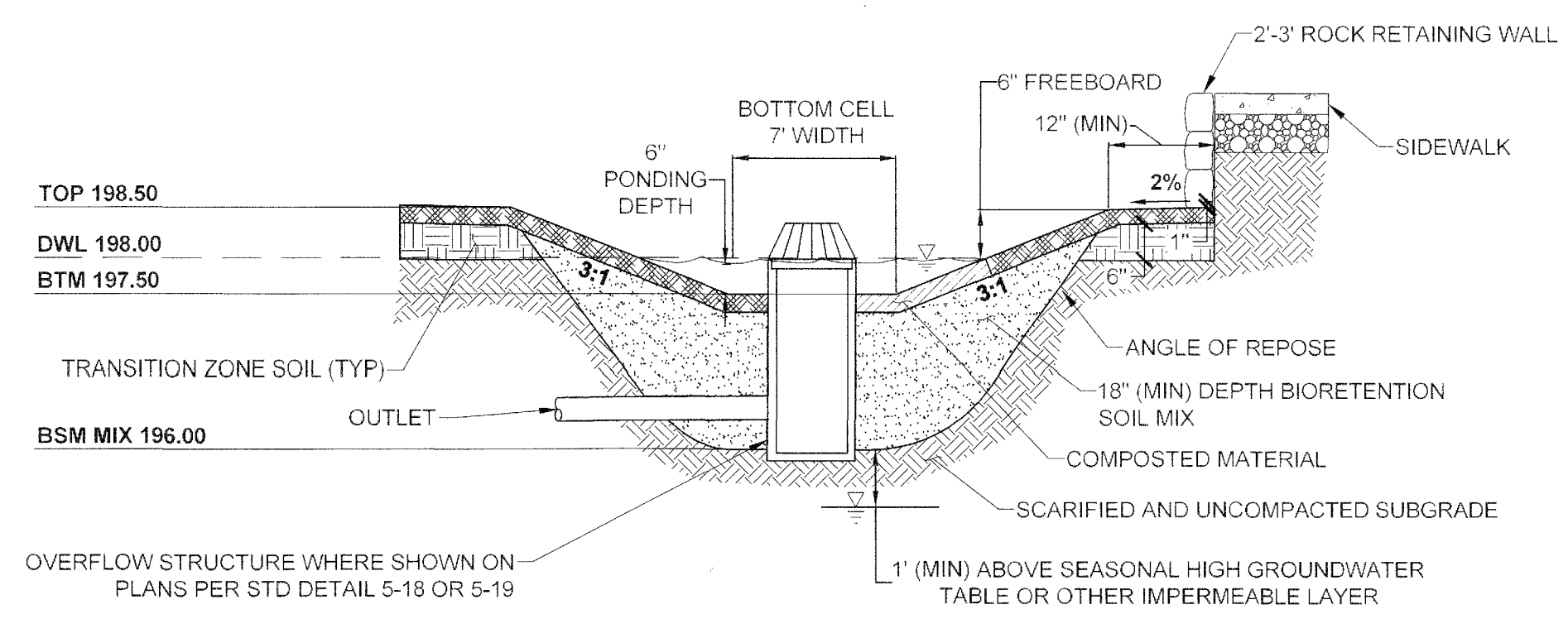
| EARTHWORK CALCULATIONS                                     |           |
|------------------------------------------------------------|-----------|
| CUT                                                        | 10,000 CY |
| FILL                                                       | 15,000 CY |
| NET (FILL)                                                 | 5,000 CY  |
| FOR PERMITTING PURPOSES ONLY<br>NOT TO BE USED FOR BIDDING |           |

SECTION 03, TOWNSHIP 1 NORTH, RANGE 1 WEST

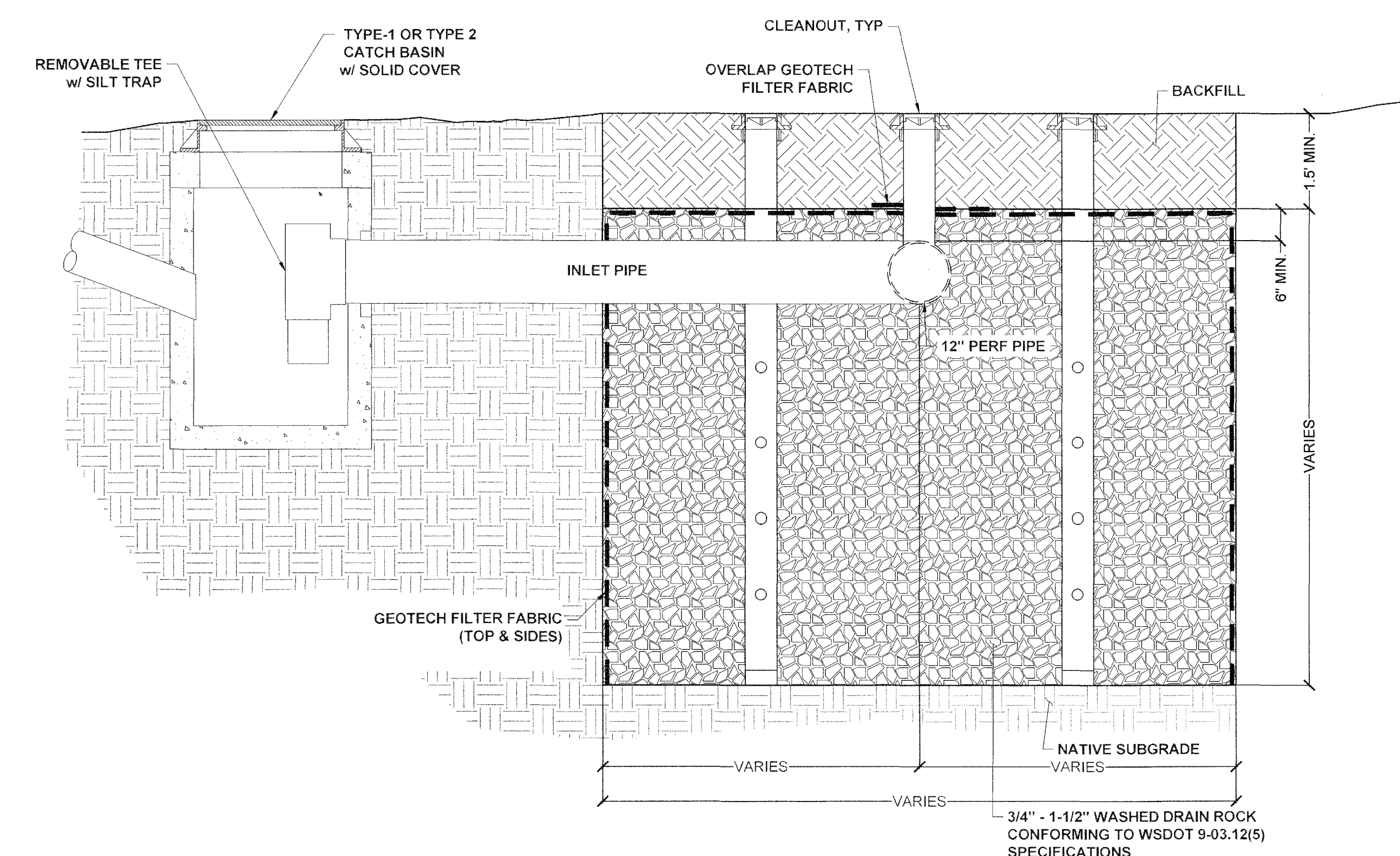




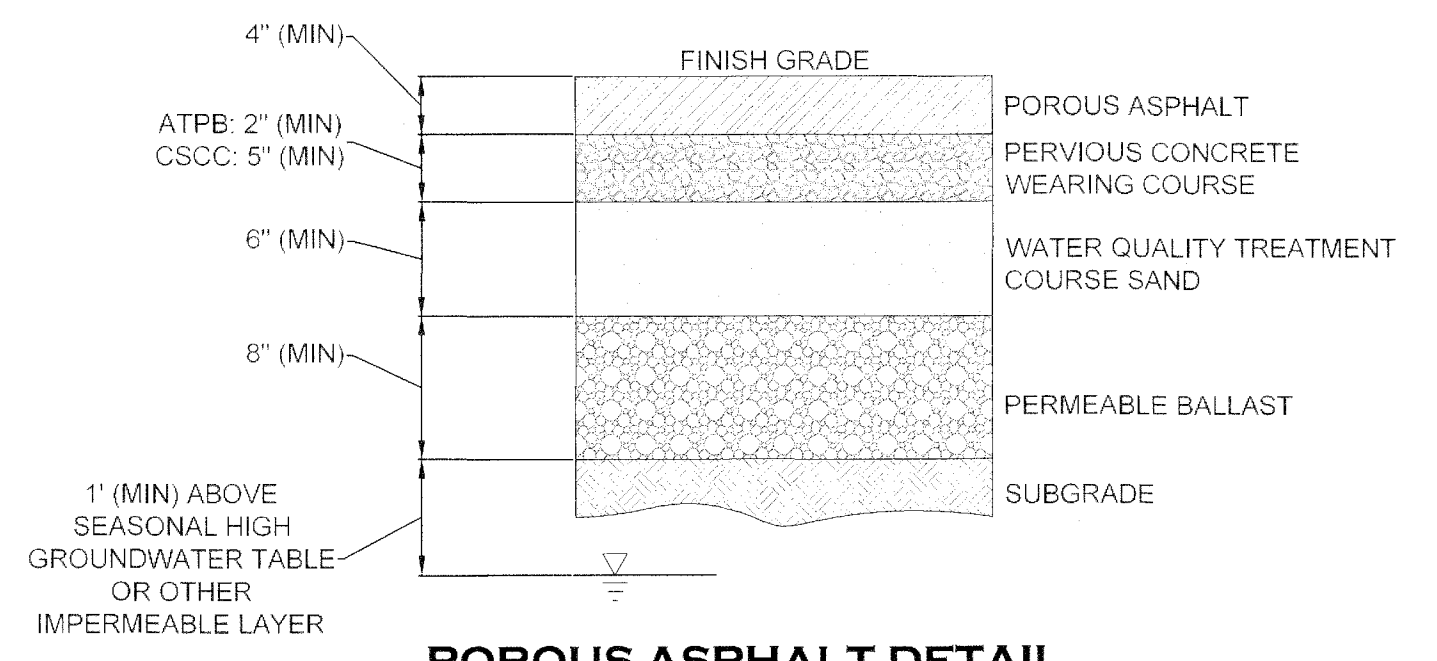
**BIORETENTION SECTION - NORTH**  
N.T.S.



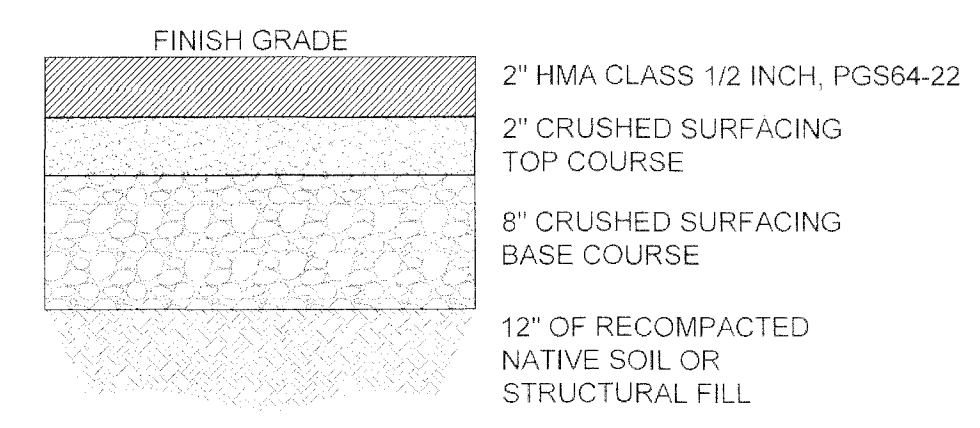
**BIORETENTION SECTION - SOUTH**  
N.T.S.



**INFILTRATION TRENCH DETAIL, TYP**  
N.T.S.

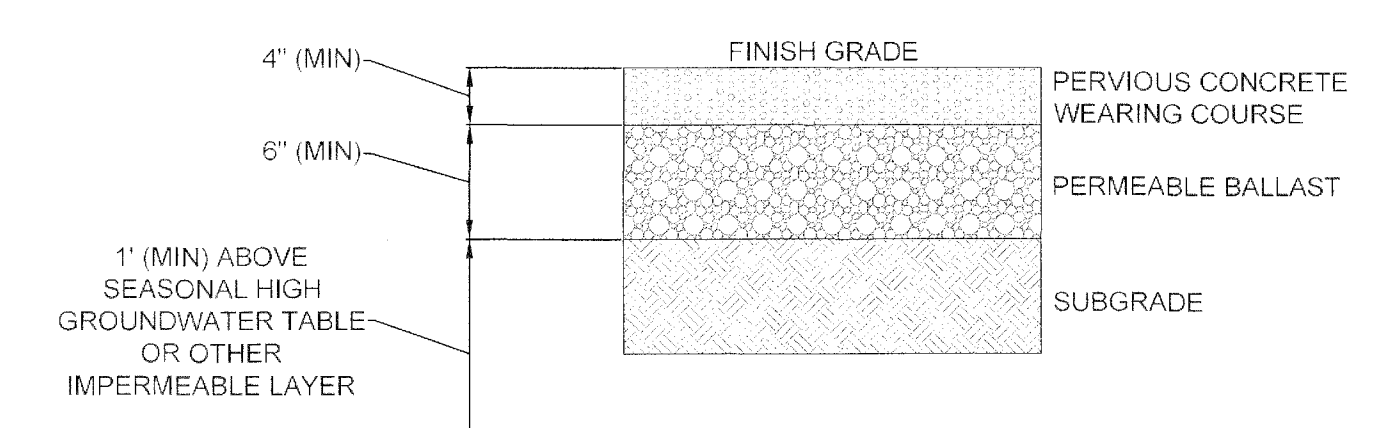


**POROUS ASPHALT DETAIL**  
N.T.S.



**ONSITE PAVING SECTION  
STANDARD DUTY**  
N.T.S.

\*NOTE:  
ALL DEPTHS COMPACTED  
TO 95% MIN. DENSITY



**POROUS SIDEWALK DETAIL**  
N.T.S.

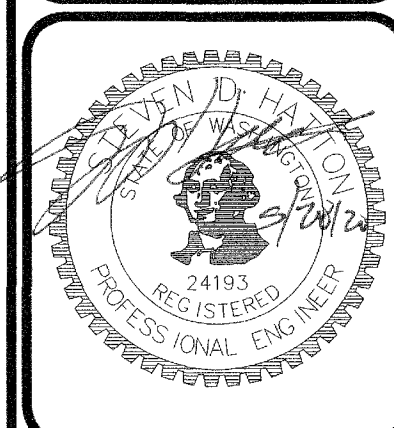
**STORMWATER FACILITY ELEVATIONS**

| FACILITY            | FG                | GRAVEL TOP | GRAVEL BASE | HARDPAN |
|---------------------|-------------------|------------|-------------|---------|
| WEST DRYWELL #1     | 205±              | 203±       | 201±        | 197±    |
| WEST DRYWELL #2     | 201±              | 199±       | 194±        | 189±    |
| CENTRAL DRYWELL     | 205±              | 203±       | 199±        | 192±    |
| EAST DRYWELL #1     | 204±              | 203±       | 199±        | 194±    |
| EAST DRYWELL #2     | 201±              | 200±       | 196±        | 191±    |
| INFILTRATION TRENCH | 201±              | 198.5±     | 195.5±      | 190±    |
| BIORETENTION SOUTH  | 198.5 (SWALE TOP) | 197.5±     | 196±        | 188±    |
| BIORETENTION NORTH  | 190.5 (SWALE TOP) | 188.5±     | 187±        | 185±    |

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.  
ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 10'



**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

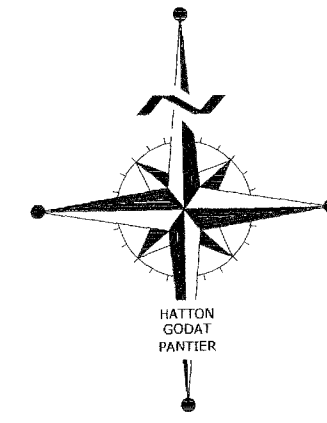
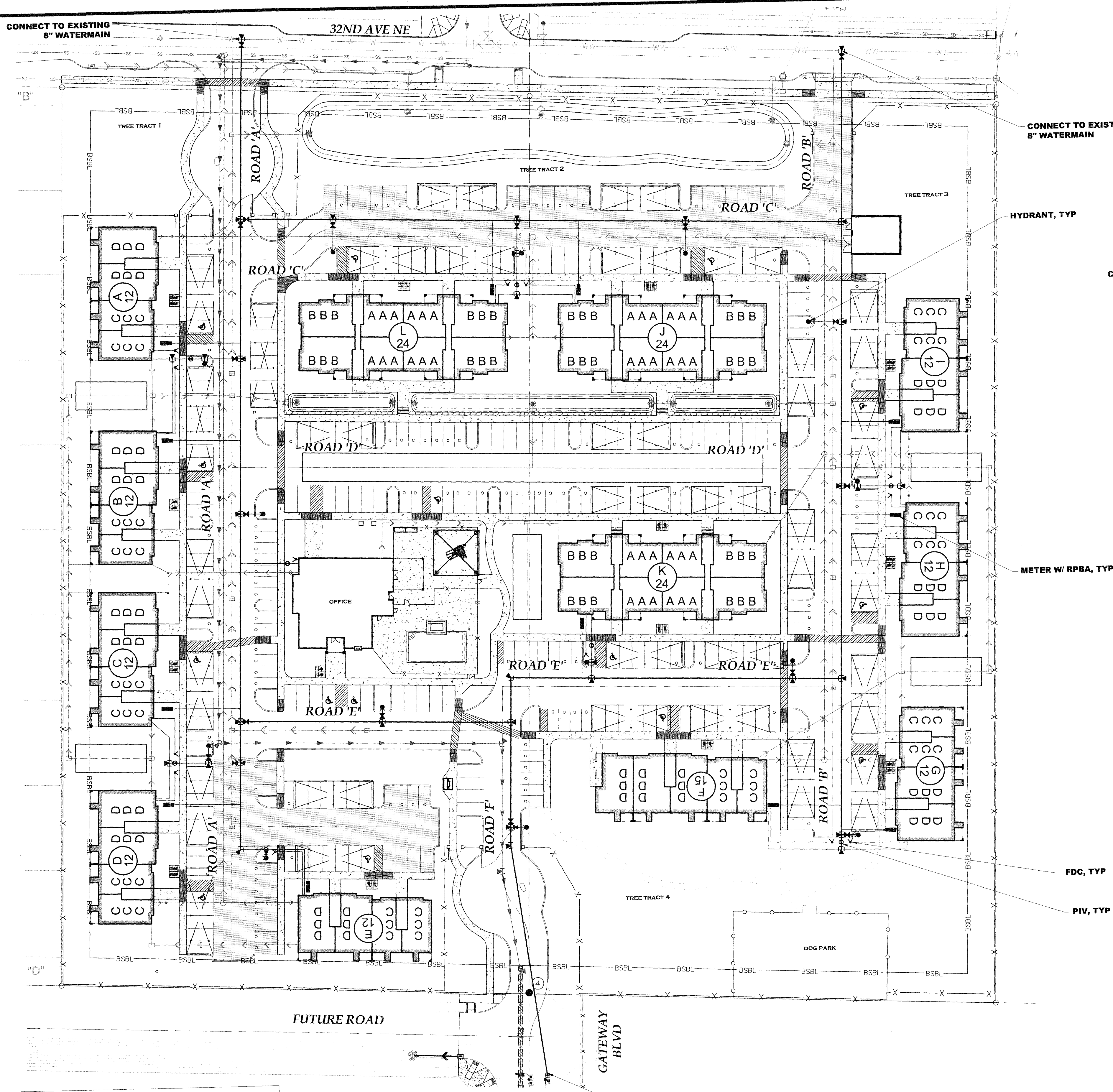
REVISIONS:  
DATE:

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NELACEY, WA 98516  
**PRELIMINARY GRADING & DRAINAGE DETAILS**

AGENCY NO.:  
SHEET: 11 OF 14  
H:\dgn\19-000\19-085\PRELIMINARY  
INDEX: 19-085 pre-det.dwg  
JOB: 19-085

SECTION 03, TOWNSHIP 16 NORTH, RANGE 1 WEST



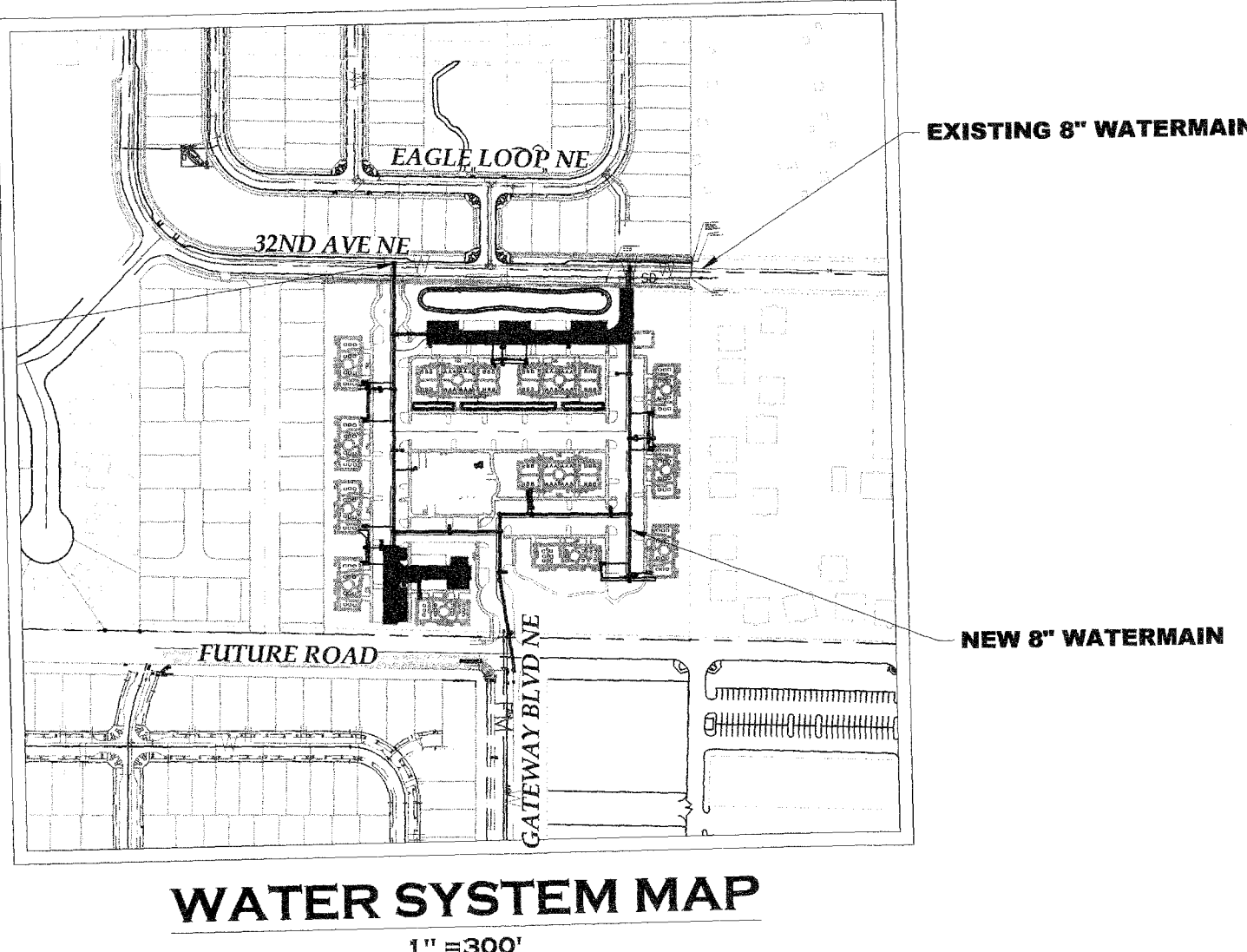


**CITY OF LACEY**

**VERTICAL DATUM**  
NGVD 29  
CITY OF LACEY  
AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

**MERIDIAN HORIZONTAL DATUM**  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80  
SCALE: 1" = 40'



**TOPOGRAPHIC NOTE:**  
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THIS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

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THE FOLLOWING PLANS SUBMITTED TO THE CITY OF LACEY FOR REVIEW HAVE BEEN REVIEWED UNDER MY SUPERVISION

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
PUBLIC WORKS DIRECTOR

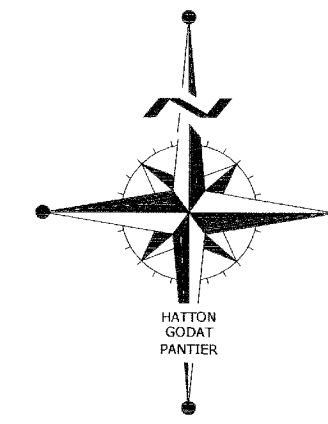
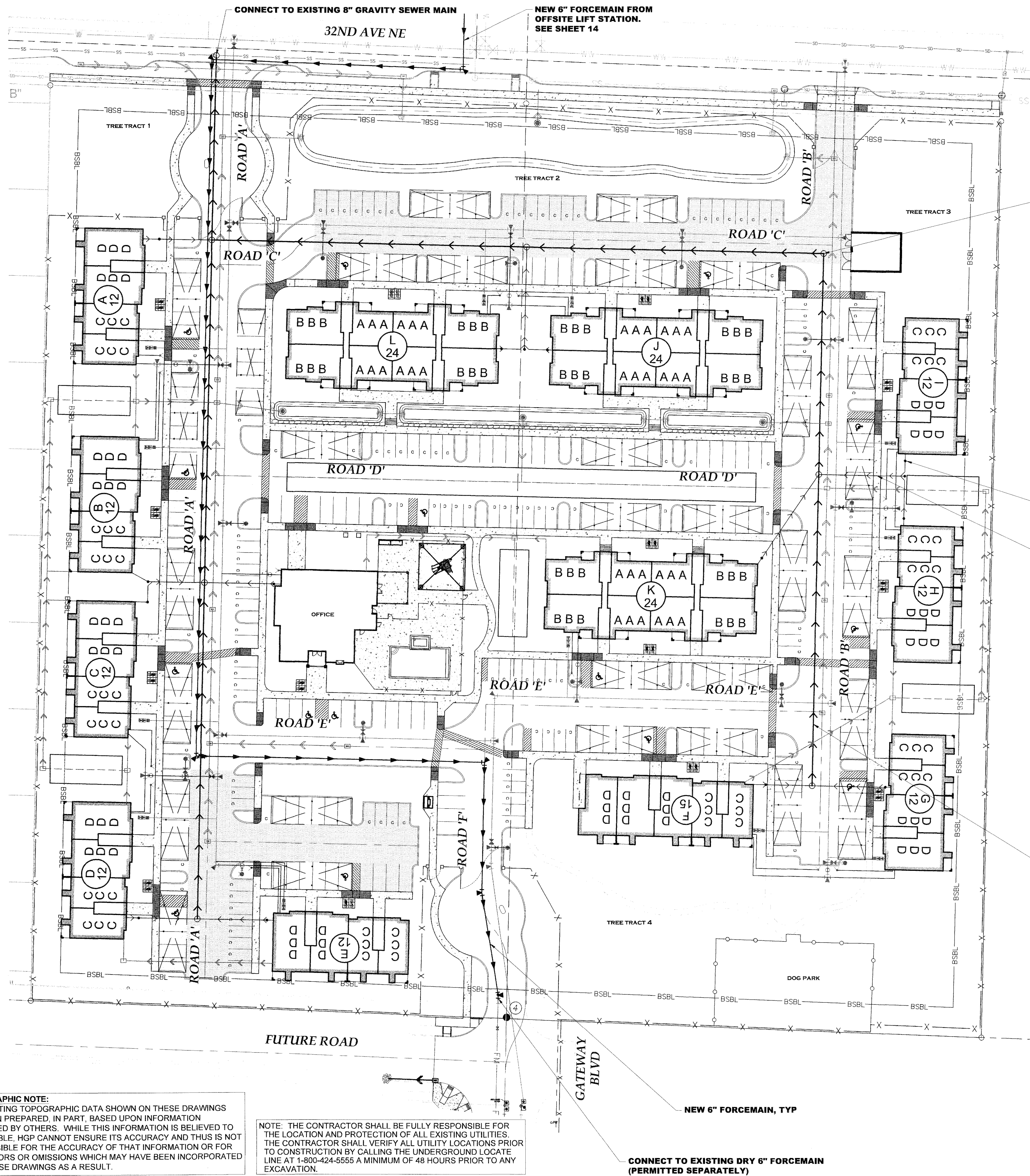
DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'

**HATTON GODAT PANTIER**  
AND  
ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY WATER PLAN**

AGENCY NO. \_\_\_\_\_  
SHEET: 12 OF 14  
INDEX: 19-085 pre-wtr.dwg  
JOB: 19-085





**CITY OF LACEY**

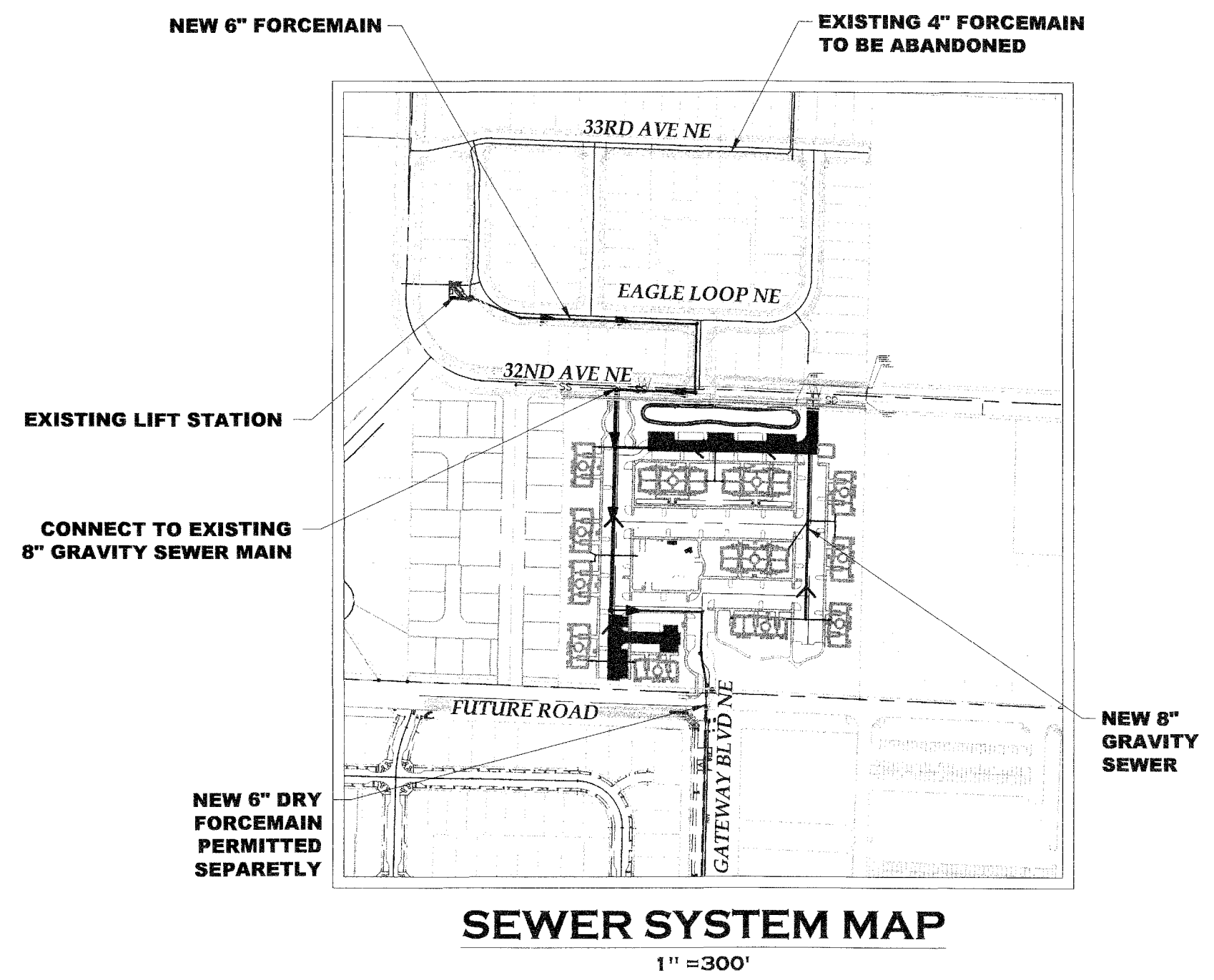
VERTICAL DATUM  
NGVD 29  
CITY OF LACEY

AS DERIVED FROM TIE TO CITY OF LACEY  
CONTROL POINT TC 105

MERIDIAN HORIZONTAL DATUM  
CITY OF LACEY COORDINATE SYSTEM DERIVED  
FROM TIES TO CITY OF LACEY CONTROL  
MONUMENT TC 105 FOR BASIS OF  
COORDINATES USED HEREON AND CITY OF  
LACEY CONTROL MONUMENT 149 FOR  
ROTATION OF BEARINGS.

40 20 0 40 80

SCALE: 1" = 40'



**TOPOGRAPHIC NOTE:**  
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**CONNECT TO EXISTING DRY 6" FORCEMAIN  
(PERMITTED SEPARATELY)**

DESIGNED BY: HGLDT

DRAWN BY: JCH

CHECKED BY: SDH

DATE: MAY 2020

SCALE: 1"=40'

**HATTON GODAT PANTIER**  
ENGINEERS AND SURVEYORS  
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OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
haddonpantier.com

TP# 11803140300, 11803130400, 11803130401

**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

**PRELIMINARY ONSITE  
SEWER PLAN**

AGENCY NO. \_\_\_\_\_

SHEET: 13 OF 14

INDEX: 19-085 pre-swr.dwg

JOB: 19-085



EXISTING FORCEMAIN TO  
BE ABANDONED IN PLACE

REMOVE EXISTING  
4" FORCEMAIN &  
PIGG LAUNCH

32ND AVE NE

EAGLE LOOP NE

33RD AVE NE

HARRIER ST NE

EAGLE LOOP NE

EXISTING LIFT STATION IS  
AT CAPACITY. INSTALL  
NEW FORCEMAIN FROM  
LIFT STATION THROUGH  
PROPOSED PROJECT AREA  
TO CONNECT TO THE 6"  
FORCEMAIN ON GATEWAY  
BOULEVARD.

NEW 6" FORCEMAIN, TYP

EXISTING GRAVITY

NEW GRAVITY SEWER CONNECTION

INSTALL NEW  
PIGG LAUNCH

CONNECT TO  
EXISTING FM  
OUTSIDE  
EXISTING  
VALVE VAULT

BONANZA DRIVE NE

32ND AVE NE

EXISTING 8" GRAVITY SEWER, TYP

6" FORCEMAIN THROUGH  
PROJECT AREA  
SEE SHEET 13

EAGLE LOOP NE

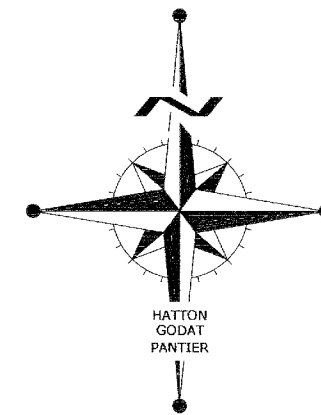
TREE TRACT 1

TREE TRACT 2

ROAD 'A'

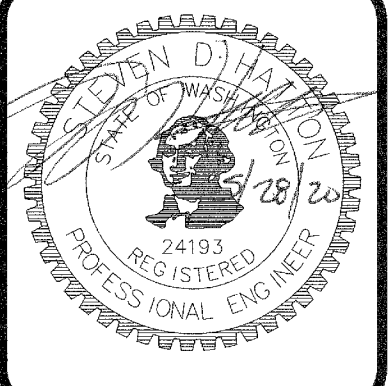
**TOPOGRAPHIC NOTE:**  
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| CITY OF LACEY                                                                                                     |                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VERTICAL DATUM</b><br>NGVD 29<br>CITY OF LACEY<br>AS DERIVED FROM TIE TO CITY OF LACEY<br>CONTROL POINT TC 105 | <b>MERIDIAN HORIZONTAL DATUM</b><br>CITY OF LACEY COORDINATE SYSTEM DERIVED<br>FROM TIES TO CITY OF LACEY CONTROL<br>MONUMENT TC 105 FOR BASIS OF<br>COORDINATES USED HEREON AND CITY OF<br>LACEY CONTROL MONUMENT 149 FOR<br>ROTATION OF BEARINGS. |
| 40 20 0 40 80<br>SCALE: 1" = 40'                                                                                  |                                                                                                                                                                                                                                                     |

DESIGNED BY: HGLDT  
DRAWN BY: JCH  
CHECKED BY: SDH  
DATE: MAY 2020  
SCALE: 1" = 40'



**HATTON GODAT PANTIER**  
AND  
ENGINEERS  
SURVEYORS  
3910 MARTIN WAY E, SUITE B  
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TEL: 360.943.1599 FAX: 360.357.6299  
hattonpantier.com

REVISIONS: DATE:

TP# 11803140300, 11803130400, 11803130401  
**GATEWAY MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516  
**PRELIMINARY OFFSITE  
SEWER PLAN**

AGENCY NO.  
SHEET: 14 OF 14  
INDEX: 19-085, pre-swr.dwg  
JOB: 19-085

SECTION 03, TOWNSHIP 16 NORTH, RANGE 1 WEST



**7235 32ND AVE NE, LACEY, WA**

FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

SITE ADDRESS:  
7235 32ND AVE NE  
LACEY, WA  
98516

PARCEL NO: 11803140300, 11803130400, 1180310401  
S/T/R: SEC. 03, T. 18N., RGE. 1W.,  
JURISDICTION: THURSTON

SITE AREA: 9.54 AC  
ZONING: LD - LIGHT DENSITY  
SETBACKS:  
FRONT: 20'  
SIDE: 20'  
REAR: 20'  
WATER: CITY OF LACEY  
SEWER: CITY OF LACEY  
ELECTRIC/GAS: PUGET SOUND ENERGY

PARKING RATIO: 1.5 REQ.  
TOTAL: 344 SPACES / 182 UNITS  
TOTAL: 1.89 PARKING RATIO  
COMPACT REQ: 30-50%  
105 / 344 = 30.5%  
1:10 OR 2 PER BLDG. REQ: 27  
TOTAL: 32

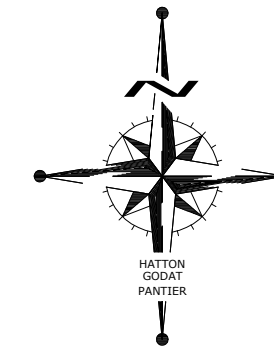
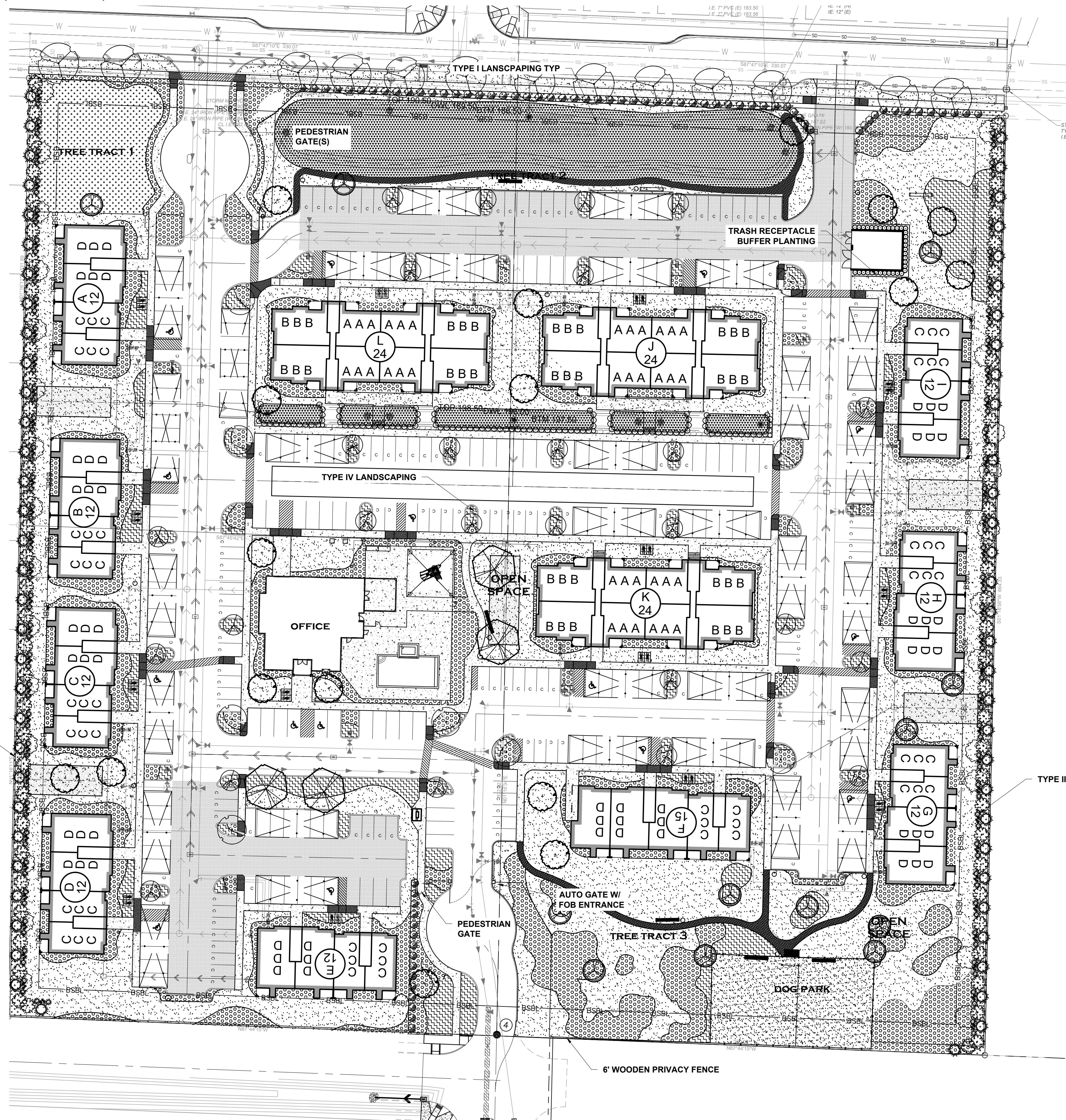
MAXIMUM BLDG COVERAGE: 50%  
 (8) C, C, D, D = 2,8227.2  
 (3) B, A, B = 20,013.39  
 (1) C, C, D, D, D = 4,556  
OFFICE = 3,944.75

TOTAL: 56,741.34 / 415,562 SQ FT (9.54 ACRES)  
TOTAL COVERAGE: 13.6%

OPEN AREA:  
30% OPEN SPACE REQ:  
2.87 OPEN SPACE / 9.54 AC  
TOTAL OPEN SPACE: 30%

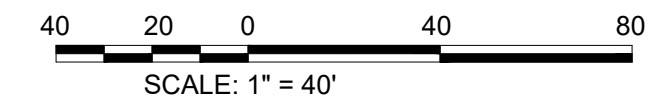
TREE RETAIN OR TRACTS TO EQUAL 5% OF GROSS SITE.

PRESERVED TREES ON SITE: 39%  
TREE RETAIN AREAS: 1.46 / 9.54  
 TOTAL RETENTION : 15.3%

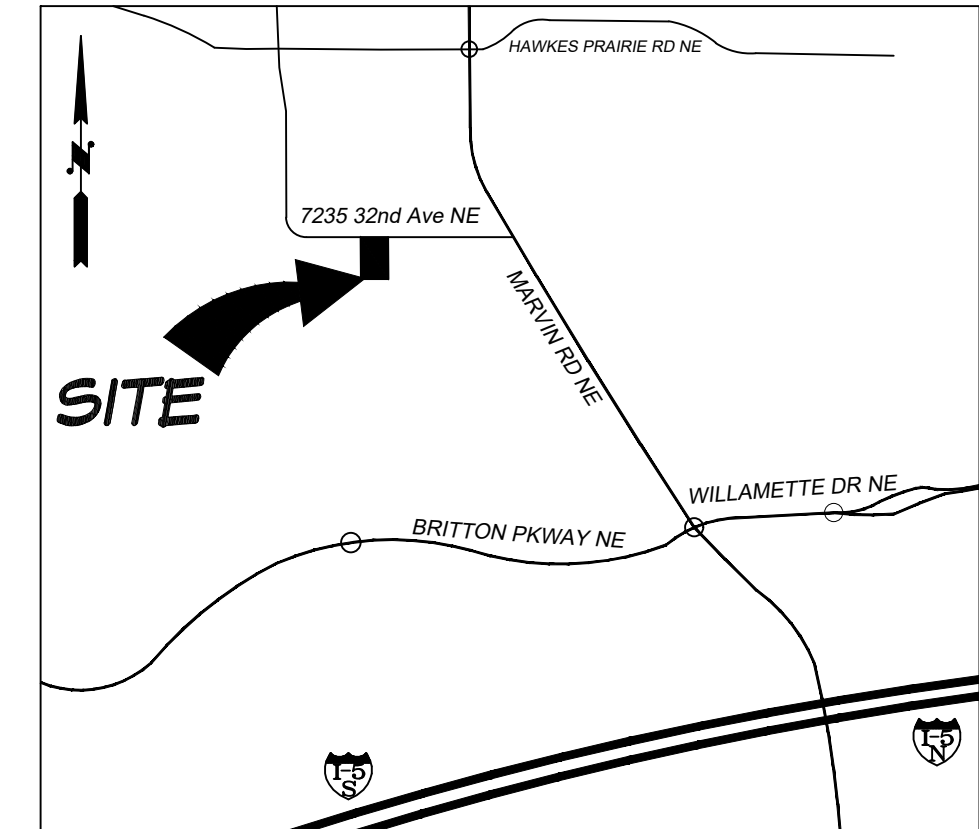


**THURSTON COUNTY**

**VERTICAL DATUM**  
THURSTON COUNTY  
CONTROL  
PHOTOGRAMMETRY

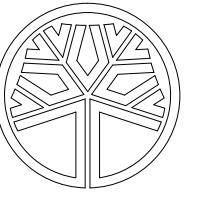


### VICINITY MAP



| PRELIMINARY LANDSCAPING SPECIFICATIONS |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                     |                                                                    |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| SYMBOL                                 | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                     |                                                                    |
|                                        | PLANT NAME/TYPE                                                                                                                                                                                                                                                                                                                                                                         | COMMON NAME                                                                                                                                                                                                         | SIZE                                                               |
|                                        | STREET TREES<br><i>Tilia cordata</i> 'Halka'<br><i>Cercidophyllum japonicum</i><br><i>Quercus rubrum</i>                                                                                                                                                                                                                                                                                | Summer Sprite Linden<br>Katsura Tree<br>Red Oak                                                                                                                                                                     | 2" GAL. MIN.                                                       |
|                                        | DECIDUOUS PARKING/SHADE TREES<br><i>Acer truncatum</i> x <i>A. p.</i> 'Morrnend'<br><i>Fraxinus pennsylvanica</i> 'Rugley'                                                                                                                                                                                                                                                              | Pacific Sunset Maple<br>Prairie Spike Ash                                                                                                                                                                           | 2" GAL. MIN.                                                       |
|                                        | DECID. PARKING/COLUMNAR TREES<br><i>Sorbus Aucuparia</i> 'Fastigiata'<br><i>Malus x adirondack</i>                                                                                                                                                                                                                                                                                      | Pyramidal Mountain Ash<br>Adirondack Crabapple                                                                                                                                                                      | 2" GAL. MIN.                                                       |
|                                        | OPEN SPACE SHADE/ACCENT TREES<br>DECIDUOUS<br><i>Cercis canadensis</i> 'Forest Pansy'<br><i>Nyssa Sylvatica</i><br><i>Cercidophyllum japonicum</i>                                                                                                                                                                                                                                      | Forest Pansy Redbud<br>Black Tupelo<br>Katsura Tree                                                                                                                                                                 | 2" GAL. MIN.                                                       |
|                                        | CONIFER<br><i>Chamaecyparis nootka</i> , 'Pendula'<br><i>Chamaecyparis obtusa</i> 'Gracilis'<br><i>Firus leucodermis</i>                                                                                                                                                                                                                                                                | Weeping Alaskan Cedar<br>Dwarf Hinoki Cypress<br>Bosnian Pine                                                                                                                                                       | 6"-7" HT. B+B                                                      |
|                                        | PERIMETER BUFFER TREES<br><i>Taxus heterophylla</i><br><i>Calocedrus decurrens</i><br><i>Cedrus deodora</i><br><i>Cupressus x. leylandii</i>                                                                                                                                                                                                                                            | Western Hemlock<br>Incense Cedar<br>Deodar Cedar<br>Leyland Cypress                                                                                                                                                 | 6"-7" HT. B+B                                                      |
|                                        | <i>Betula utilis</i> var. 'Jacquemontii'<br><i>Populus tremuloides</i>                                                                                                                                                                                                                                                                                                                  | Jacquemontii Birch<br>Quaking Aspen                                                                                                                                                                                 |                                                                    |
|                                        | ORNAMENTAL SHRUB AND GROUNDCOVERS<br><br><i>Spiraea x. bumalda</i> 'Gold Flame'<br><i>Viburnum tinus</i> 'Compactum'<br><i>Prunus laurocerasus</i> 'Otto Luyken'<br><i>Rhododendron</i> 'Unique'<br><i>Miscanthus s. 'Purpurascens'</i><br><i>Hemerocallis</i> var.<br><i>Pennisetum alopecuroides</i> 'Hamelin'<br><i>Cotoneaster dammeri</i> 'Lanfast'<br><i>Vinca minor</i> 'Bowles' | <br><br>Gold Flame Spiraea<br>Spring Bouquet Laurustinus<br>Otto Luyken Laurene<br>Unique Rhododendron<br>Purple Autumn Grass<br>Daffily<br>Dwarf Fountain Grass<br>Lanfast Cotoneaster<br>Bowles Common Periwinkle | 3 GAL.<br>or 5 GAL.<br><br><br>1 GAL.<br>(ground-covers)           |
|                                        | SHADE TOLERANT NATIVE SHRUBS / GROUNDCOVER<br><i>Saultheria salina</i><br><i>Mahonia repens</i><br><i>Polystichum munitum</i><br><i>Rhododendron macrophyllum</i>                                                                                                                                                                                                                       | Evergreen Salal<br>Lon Oregon Grape<br>Western Sword Fern<br>Pacific Rhododendron                                                                                                                                   | 1-5 GAL.                                                           |
|                                        | SCREENING SHRUBS<br><i>Chamaecyparis</i> 'Boulevard'<br><i>Cupressus Leylandii</i><br><i>Thuja occidentalis</i> 'Smaragd'                                                                                                                                                                                                                                                               | Boulevard False Cypress<br>Leyland Cypress<br>Emerald Green Arborvitae                                                                                                                                              | 5'-6" HT.<br>5'-6" HT.                                             |
|                                        | BUFFER RESTORATION NATIVE MIX<br><i>Physocarpus capitatus</i><br><i>Vaccinium ovatum</i><br><i>Saultheria salina</i><br><i>Mahonia repens</i><br><i>Polystichum munitum</i><br><i>Cornus stolonifera</i><br><i>Rubus spectabilis</i><br><i>Physocarpus capitatus</i>                                                                                                                    | Pacific Ninebark<br>Evergreen Huckleberry<br>Evergreen Salal<br>Lon Oregon Grape<br>Western Sword Fern<br>Red-Twig Dogwood<br>Salmonberry<br>Pacific Ninebark                                                       | 2 GAL.<br>2 GAL.<br>1 GAL.<br>1 GAL.<br>2 GAL.<br>2 GAL.<br>2 GAL. |
|                                        | BIO-SCAPE MIX<br>PM JUNCUS BLUE ARROWS'<br>IS IRIS SIBIRICA                                                                                                                                                                                                                                                                                                                             | BLUE ARROWS RUSH<br>SIBERIAN IRIS                                                                                                                                                                                   | 1 GAL #2' O.C.<br>1 GAL #3' O.C.                                   |
|                                        | CRUSHED GRAVEL TRAIL                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |                                                                    |
|                                        | DOS PARK PEA GRAVEL                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                     |                                                                    |
|                                        | HYDROSEEDED LAWN AREAS                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                     |                                                                    |
|                                        | EXISTING VEGETATION TO REMAIN                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                     |                                                                    |

DESIGNED BY: CA / JCH  
DRAWN BY: JCH  
CHECKED BY: CA  
DATE: NOV 2019  
SCALE: AS SHOWN  
V



CHRISTIAN L. ALDRICH  
 CERTIFICATE NO. 585  
 EXPIRES ON 4-5-2020

**HATTON GODAT** ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
[huttonpantier.com](http://huttonpantier.com)

DATE: \_\_\_\_\_

REVISIONS:

TP# 11803140300, 11803130400, 11803130401

**GRIFFIN MULTI-FAMILY COMPLEX**

7235 32ND NELACEY, WA 98516

# PRELIMINARY LANDSCAPE PLAN

SECTION 03, TOWNSHIP 18 NORTH, RANGE 1 WEST

AGENCY NO. \_\_\_\_\_  
SHEET: 1 OF 01  
E:\dgn\19-000\19-085\PRELIMINARY  
INDEX: Preliminary Landscape Plan  
Sheet.dwg  
JOB: 19-085



# GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

## PROJECT PROPONENT

FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

## OPEN SPACE AREA SUMMARY:

MINIMUM OPEN SPACE REQUIRED BY PLANNED RESIDENTIAL DEVELOPMENT = 30%  
GROSS SITE AREA = 9.54 ACRES  
DEDICATED AREA = 0.0 ACRES  
NET SITE AREA = 9.54 ACRES  
TOTAL REQUIRED OPEN SPACE = 2.86 ACRES

## OPEN SPACE PROVIDED:

PRIVATE OPEN SPACES  
MULTIFAMILY UNITS (BALCONIES/PATIOS) 53 S.F. PER  
UNIT TYPE A, B, C, D (171 UNITS)

= 0.21 ACRES

## COMMON OPEN SPACES

TREE TRACT 1 = .17 ACRES  
TREE TRACT 2 = .56 ACRES  
TREE TRACT 3 = .27 ACRES  
TREE TRACT 4 = .89 ACRES\*  
LANDSCAPED AREAS = .97 ACRES

(INCLUDES ALL LANDSCAPED AREAS AND 20' PERIMETER BUFFERS,  
EXCLUDING TREE TRACTS)

TOTAL COMMON OPEN SPACE = 2.86 ACRES

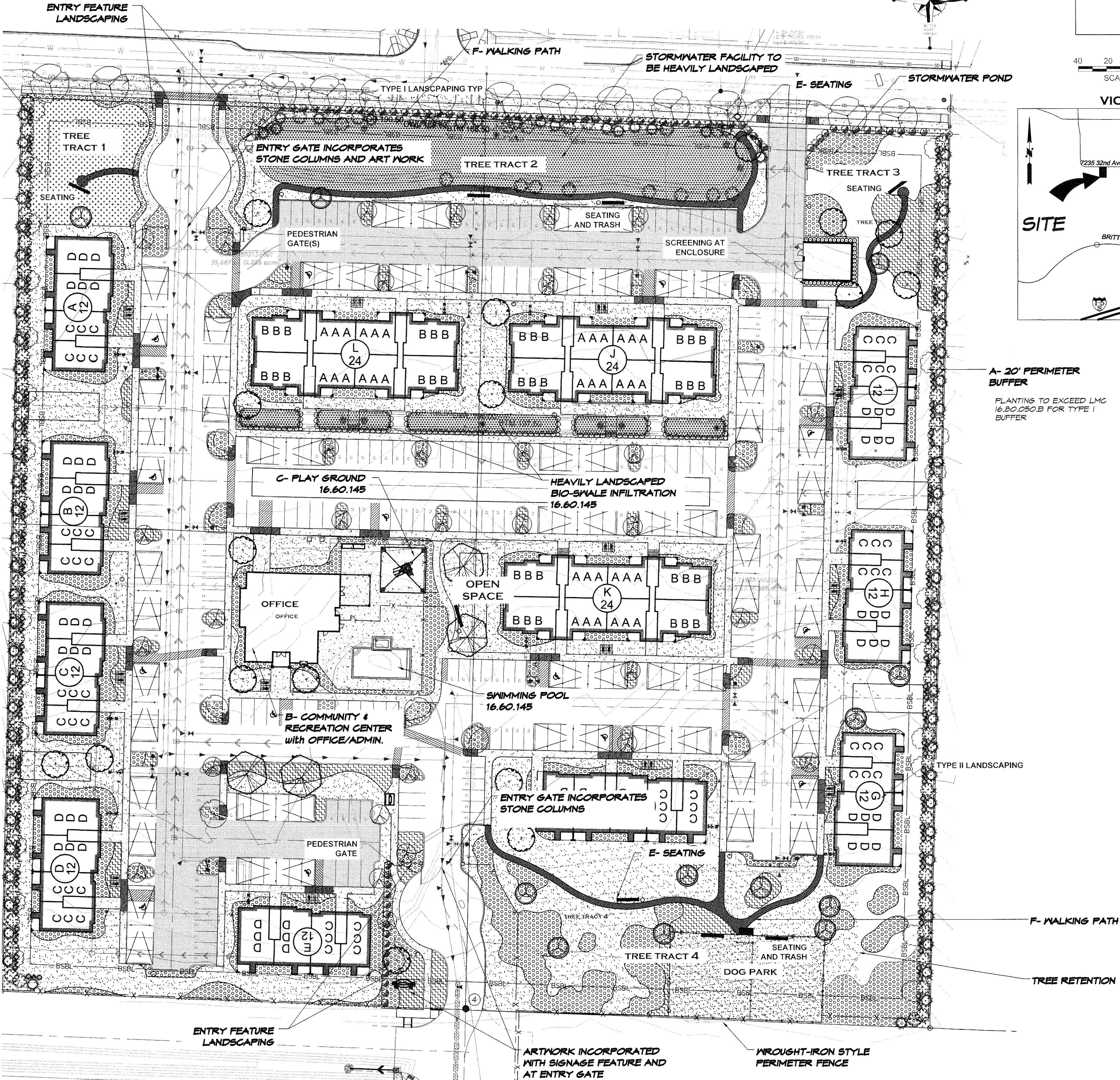
TOTAL OPEN SPACE PROVIDED = 3.07 ACRES

(32.2% OF NET SITE AREA)

\* TRACT 4 SATISFIES TREE PRESERVATION AREA OF 5% (0.89 AC = 9.3%)

## OPEN SPACE AND RECREATION AMENITY SCHEDULE

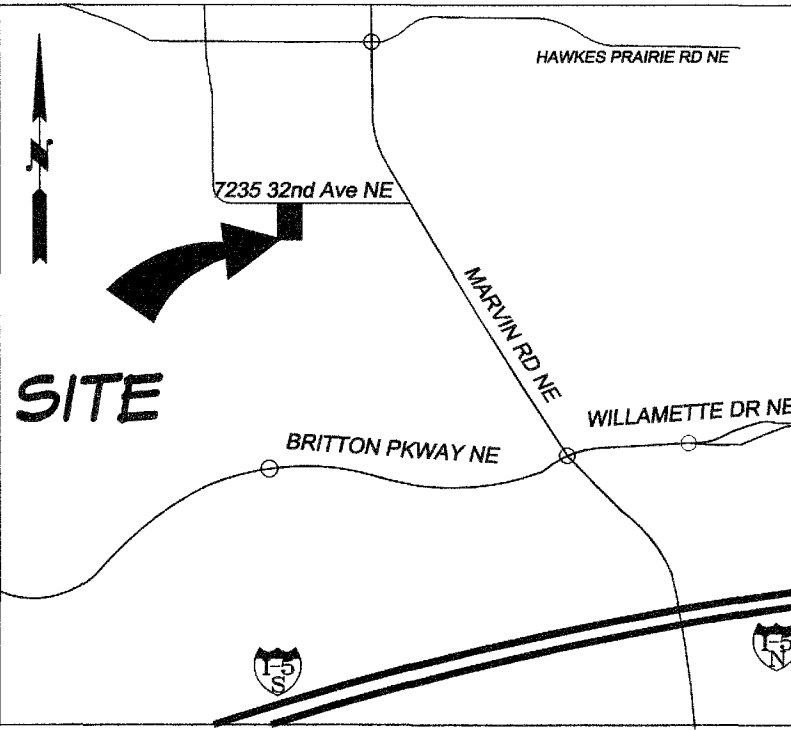
| DESCRIPTION                 | OUTLINE SPECIFICATION                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PERIMETER BUFFER            | LANDSCAPED BUFFER AREA INCLUDES TREES, SHRUBS, AND GROUNDCOVERS. SELECTIVE RETENTION OF EXISTING TREES WHERE APPROPRIATE.                                                                                                                                                                                                                   |
| COMMUNITY RECREATION CENTER | ~3,930 SF COMMUNITY BUILDING WITH LEASING OFFICE. COMMON AMENITIES INCLUDE:<br>- FITNESS CENTER<br>- MULTIPURPOSE ROOM AND LOUNGE<br>- OUTDOOR PATIO WITH BBQ (6,631 SQ FT)<br>- COVERED POOL WITH RETRACTING COVER<br>- POOL DECK, CHANGING ROOMS & SHOWERS<br>- PORTE-COCHERE ENTRY FOR LEASING OFFICE & CONCIERGE SERVICE, CART PARKING. |
| PLAY GROUND / TOT LOT       | PLAY AREA WITH PLAY STRUCTURE FOR AGES 4-12. IMPROVEMENTS INCLUDE:<br>- PLAY STRUCTURES<br>- SAFETY SURFACE WITH CURBING<br>- SEATING                                                                                                                                                                                                       |
| DOG PARK                    | ~6,600 SF FENCED AREA FOR DOG ACTIVE PLAY. IMPROVEMENTS INCLUDE:<br>- 4' HT. CHAINLINK FENCING<br>- WATERING AND WASTE DUMP STATION<br>- SUPERVISED OFF-LEASH PLAY ONLY<br>- REQUIREMENTS FOR ALL DOG WASTE TO BE DISPOSED OF OFF-SITE.<br>- SIGNAGE WILL BE PROVIDED TO THIS AFFECT.                                                       |
| SITE FURNITURE              | 6' BENCH<br>TRASH RECEPTACLE LOCATIONS                                                                                                                                                                                                                                                                                                      |
| WALKING TRAILS              | 5 FT WIDE PATH CONNECTING TO SITE CIRCULATION<br>- WOOD CHIP SURFACE<br>- LOCATE FOR MINIMAL IMPACT TO VEGETATION<br>- BUFFER PROTECTION SIGNAGE<br>- LOW LEVEL LIGHTING AT NORTH WETLAND ONLY                                                                                                                                              |
| STORMWATER AREAS            | OPEN SPACE USED FOR STORMWATER TREATMENT, RETENTION AND INFILTRATION. PERMANENTLY VEGETATED AND STABILIZED.                                                                                                                                                                                                                                 |
| TREE RETENTION AREAS        | AREAS DESIGNATED FOR TREE RETENTION. ACTUAL AREAS TO BE DETERMINED DURING PROJECT STAKING.                                                                                                                                                                                                                                                  |



THURSTON COUNTY  
VERTICAL DATUM  
THURSTON COUNTY  
CONTROL  
PHOTOGRAMMETRY

SCALE: 1" = 40'

## VICINITY MAP



A- 20' PERIMETER  
BUFFER

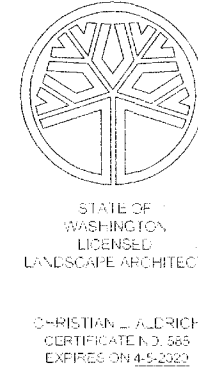
PLANTING TO EXCEED LMC  
16.00.050.B FOR TYPE I  
BUFFER

TYPE II LANDSCAPING

F- WALKING PATH

TREE RETENTION

DESIGNED BY: CA / JCH  
DRAWN BY: JCH  
CHECKED BY: CA  
DATE: NOV 2019  
SCALE: AS SHOWN



HATTON GODAT PANTIER  
AND  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E, SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpantier.com

REVISIONS:  
DATE:

TP# 118031-03200, 118031-04000, 118031-04001  
GRIFFIN MULTI-FAMILY COMPLEX  
7235 32ND AVE NE, LACEY, WA 98516

## OPEN SPACE PLAN

AGENCY NO.  
SHEET: 1 OF 01  
E:\gri\19-000\19-085\PRELIMINARY  
INDEX: PPRD&OS.dwg  
JOB: 19-085



GATEWAY MULTI-FAMILY COMPLEX

7235 32ND AVE NE, LACEY, WA

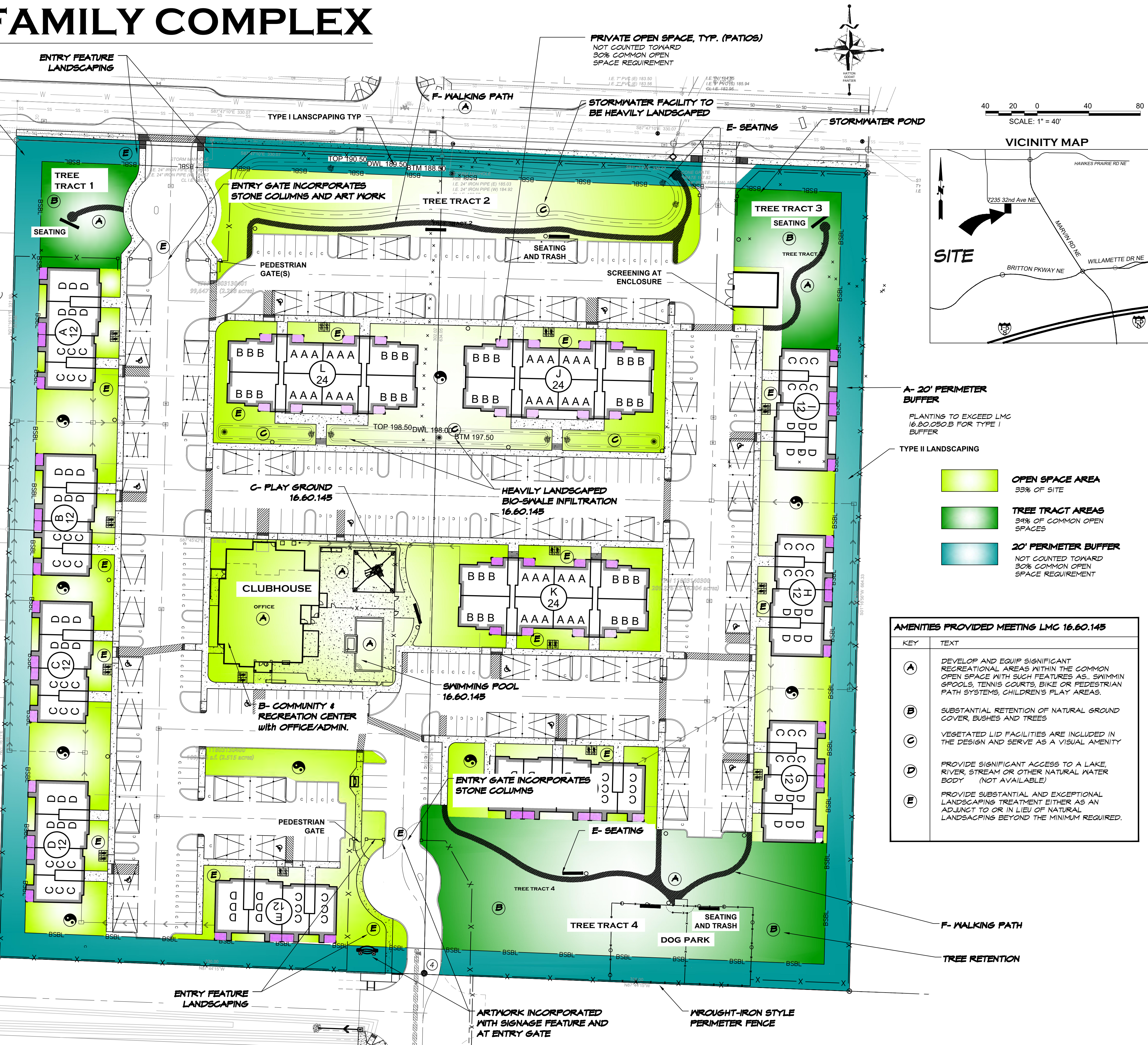
PROJECT PROPONENT  
FREESTONE COMPANIES  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

OPEN SPACE AREA SUMMARY:  
MINIMUM OPEN SPACE REQUIRED BY PLANNED RESIDENTIAL DEVELOPMENT = 30%  
GROSS SITE AREA = 9.54 ACRES  
DEDICATED AREA = 0.0 ACRES  
NET SITE AREA = 9.54 ACRES  
TOTAL REQUIRED OPEN SPACE = 2.86 ACRES

OPEN SPACE PROVIDED:  
COMMON OPEN SPACES  
TREE TRACT 1 = .13 ACRES  
TREE TRACT 2 = .42 ACRES (DOES NOT COUNT TOWARD TREE AREA)  
TREE TRACT 3 = .18 ACRES  
TREE TRACT 4 = .70 ACRES\*  
RECREATION BUILDING AREA = .49 ACRES  
ORNAMENTAL LANDSCAPE = 1.24 ACRES  
(INCLUDES ALL LANDSCAPED AREAS AND 20' PERIMETER BUFFERS, EXCLUDING TREE TRACTS)  
TOTAL COMMON OPEN SPACE = 3.15 ACRES = 33% OF NET SITE AREA

PRIVATE OPEN SPACES  
MULTIFAMILY UNITS (BALCONIES/PATIOS) 53 S.F. PER UNIT TYPE A, B, C, D (171 UNITS)  
= 0.21 ACRES  
TOTAL OPEN SPACE PROVIDED = 3.36 ACRES (35% OF NET SITE AREA)  
\* TRACT 4 SATISFIES TREE PRESERVATION AREA OF 5% (0.89 AC = 9.3%)

| OPEN SPACE AND RECREATION AMENITY SCHEDULE |                                                                                                                                                                                                                                                                                                                                             |  |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DESCRIPTION                                | OUTLINE SPECIFICATION                                                                                                                                                                                                                                                                                                                       |  |
| PERIMETER BUFFER                           | LANDSCAPED BUFFER AREA INCLUDES TREES, SHRUBS, AND GROUNDCOVERS. SELECTIVE RETENTION OF EXISTING TREES WHERE APPROPRIATE.                                                                                                                                                                                                                   |  |
| COMMUNITY RECREATION CENTER                | ~3,930 SF COMMUNITY BUILDING WITH LEASING OFFICE. COMMON AMENITIES INCLUDE:<br>- FITNESS CENTER<br>- MULTIPURPOSE ROOM AND LOUNGE<br>- OUTDOOR PATIO WITH BBQ (6,631 SQ FT)<br>- COVERED POOL WITH RETRACTING COVER<br>- POOL DECK, CHANGING ROOMS & SHOWERS<br>- PORTE-COCHERE ENTRY FOR LEASING OFFICE & CONCIERGE SERVICE, CART PARKING. |  |
| PLAY GROUND / TOT LOT                      | PLAY AREA WITH PLAY STRUCTURE FOR AGES 4-12<br>IMPROVEMENTS INCLUDE:<br>- PLAY STRUCTURES<br>- SAFETY SURFACE WITH CURBING<br>- SEATING                                                                                                                                                                                                     |  |
| DOG PARK                                   | ~6,600 SF FENCED AREA FOR DOG ACTIVE PLAY<br>IMPROVEMENTS INCLUDE:<br>- 4' HT. CHAINLINK FENCING<br>- WATERING AND WASTE DUMP STATION<br>- SUPERVISED OFF-LEASH PLAY ONLY<br>- REQUIREMENTS FOR ALL DOGS WASTE TO BE DISPOSED OF OFF-SITE.<br>- SIGNAGE WILL BE PROVIDED TO THIS AFFECT.                                                    |  |
| SITE FURNITURE                             | 6' BENCH<br>TRASH RECEPTACLE LOCATIONS<br>DOUBLE BICYCLE RACK                                                                                                                                                                                                                                                                               |  |
| PASSIVE RECREATIONAL AMENITIES             | THESE LOCATIONS WOULD PROVIDE ONE OR MORE AMENITIES MEETING 16.60.140.4B:<br>- RAISED BED FOR COMMUNITY GARDENING<br>- BIRD OR SQUIRREL FEEDERS<br>- SMALL STATUARY<br>- SELECT ROCK SUITABLE FOR SITTING<br>- SPECIAL NATIVE LANDSCAPE DISPLAY<br>- UNIQUE PAVERS TO PROVIDE SENSE OF PLACE                                                |  |
| WALKING TRAILS                             | 5 FT WIDE PATH CONNECTING TO SITE CIRCULATION<br>- WOOD CHIP SURFACE<br>- LOCATE FOR MINIMAL IMPACT TO VEGETATION<br>- BUFFER PROTECTION SIGNAGE<br>- LOW LEVEL LIGHTING AT NORTH WETLAND ONLY                                                                                                                                              |  |
| STORMWATER AREAS                           | OPEN SPACE USED FOR STORMWATER TREATMENT, RETENTION AND INFILTRATION. PERMANENTLY VEGETATED AND STABILIZED.                                                                                                                                                                                                                                 |  |
| TREE RETENTION AREAS                       | AREAS DESIGNATED FOR TREE RETENTION. ACTUAL AREAS TO BE DETERMINED DURING PROJECT STAKING.                                                                                                                                                                                                                                                  |  |



DESIGNED BY: CA / DL  
DRAWN BY: DL  
CHECKED BY: CA  
DATE: JAN 2021  
SCALE: 1" = 40'

HATTON GODAT PANTIER  
ENGINEERS AND SURVEYORS  
3910 MARTIN WAY E. SUITE B  
OLYMPIA, WA 98506  
TEL: 360.943.1599 FAX: 360.357.6299  
hatterpantier.com

GRIFFIN MULTI-FAMILY COMPLEX  
7127 32ND AVE NE, LACEY, WA 98516  
OPEN SPACE PLAN

AGENCY NO. \_\_\_\_\_  
SHEET: 1 OF 66  
E:\landscape\19-000\19-085  
INDEX: 19-085-LA.dwg  
JOB: 19-085



October 19, 2020

Ms. Samra Seymour  
City of Lacey Community Planning & Development  
420 College Street SE  
Lacey, WA 98503

RE: Griffin Multifamily  
Lacey #19-353  
LMC 16.60 Open Space requirements

Dear Samra,

The following is an analysis of how the proposed project meets the requirements of LMC 16.60 Planned Residential Development (PRD).

Proposed density summary is as follows:

|                             |                              |
|-----------------------------|------------------------------|
| Gross site area             | 9.54 acres                   |
| Allowed density per MD 6-16 | 16 du/ac                     |
| Allowed units, base density | 153 du                       |
| 20% density bonus per PRD   | 30 du (see discussion below) |
| Total proposed units        | 183 du                       |

A PRD is allowed within a Moderate density district, on previously unplatted sites of two acres, minimum (16.60.080). The PRD will be connected to two streets, one major arterial and one collector (16.60.090). No platting or internal right of way dedication is proposed. Proposed setbacks and side yards will follow the underlying zoning for MD6-16, with the exception of 20' perimeter buffers as required in 16.60.110.

To allow a 20% density bonus in MD6-16 the PRD requires a minimum of 30% of the gross land area for common open space (16.60.140A1). All open space and amenities in this project will be owned, maintained and operated by the project owner. A summary of the open space areas is as follows:

|                                       |                          |
|---------------------------------------|--------------------------|
| Gross site area                       | 9.54 ac                  |
| Dedicated area                        | 0.0 ac                   |
| Min. required Common Open Space (30%) | 2.86 ac                  |
| Open space provided                   |                          |
| Common open space                     | 0.17 ac Tree Tract 1     |
|                                       | 0.56 ac Tree Tract 2     |
|                                       | 0.27 ac Tree Tract 3     |
|                                       | 0.89 ac Tree Tract 4     |
|                                       | 0.97 ac Landscaped areas |
| Total Common Open Space=              | 2.86 ac                  |
| Private open space                    | 0.21 ac Private patios   |
| Total Open Space Provided             | 3.07 ac (32.2%)          |

Up to 50% of the common open space may be satisfied by preservation of tree stands or wetlands or critical area habitat and their associated buffers (16.60.140A3). All open space amenities in the project will be inviting, accessible (unfenced and ADA compliant), visible & notorious (signed), safe (lighted), secure (monitored), and comfortable (furniture provided).

Hatton Good of Pantier, Inc.  
3910 Nathan Way E., Suite 1  
Olympia, WA 98510

T: 360.943.1528  
F: 360.937.4246  
900.700.1893

h@hnpantier.com

LMC 16.60.145 requires at least four of a list of five amenities to be provided in order to receive the density bonus, A through E below (*in italics*). A narrative for each is provided outlining the base criteria required by zoning, and how the proposed project is meeting or exceeding that to achieve the density bonus.

*A. Develop and equip significant recreational areas within the common open space with such features as, but not limited to, swimming pools, tennis courts, bike or pedestrian path systems, children's play areas;*

A central recreation complex with a wide range of facilities is proposed, including swimming pool, covered play area with climbing equipment, outdoor BBQ facility and patio deck, indoor lounge, physical fitness center and game room. The recreation building complex includes the building (roughly 3,900 sf) and additional 6,600 sf outside area.

While it is typical for multifamily complexes to have management offices and other common facilities they are not required in the zoning code. Design standards in LMC 14.23 address pedestrian access, parking, connectivity, and common open space amenities, but do not require robust active-use recreation and indoor facilities. The amenities provided in this PRD go well above the standard design criteria, and provide secure, friendly, and accessible facilities as outlined above. These are in addition to pedestrian pathways, seating, bicycle parking, lighting and other furnishing that create a cohesive environment for the pedestrian-oriented tenant, including connectivity to the public ways.

*B. Substantial retention of natural ground cover, bushes and trees;*

The project provides substantial retention of natural vegetation in the form of four tree tract areas. These tracts will enable the retention of existing mature trees in 'contiguous' areas suitable for both passive and active recreation. Walking paths with seating are incorporated to and through these tracts. A 6,600 sf fenced dog-park area is incorporated into one of the tracts in a fashion that will minimize impact on new and adjacent residents.

All trees were surveyed on the site and reviewed by the City's forester for appropriate retention. The site design provides several areas of contiguous blocks ("tracts") for tree retention to meet the intent of the PRD requirements. Low-impact style (bark chip) trails will be provided thru these tracts.

A minimum 5% of the site is required for tree tract per LMC 14.32.064. The project provides a total of 1.89 acres of tree tract (20%). A tree tract summary is provided above.

*C. Vegetated LID facilities are included in the design and serve as a visual amenity;*

A large vegetated LID (Low-Impact Development) bio-infiltration facility is proposed for the low (north) portion of the site. This location will not only provide additional buffer from lower density housing north of 32<sup>nd</sup> Avenue, but also provide an opportunity for passive open space and visual amenity for the PRD. BMP's for bio-infiltration in Lacey's Drainage manual requires LID plantings to replicate hydrologic functions including succession plants and hydrophytic vegetation (DDECM Vol.7 Section 7.4.4, BMP's T5.14B and T7.30). The PRD proposes a more detailed level of planting in this facility, which would potentially be a monolithic planting of wetland vegetation. To achieve a more aesthetic facility and increase buffering from the street, additional shrub and tree species will be incorporated resulting in a naturalistic setting with an evergreen component along the property line.

A similar bio-retention facility would be located south of buildings L & J, taking advantage of highly permeable site soils mid-site. Again, these LID facilities will be landscaped more heavily than the Drainage Manual dictates, so they provide an aesthetic 'back yard' to these units blending with the ornamental landscape at the building.

D. Provide significant access to a lake, river, stream or other natural water body:

Does not apply.

E. Provide substantial and exceptional landscaping treatment either as an adjunct to or in lieu of natural landscaping beyond the minimum.

The grounds of the proposed multifamily complex will be extensively landscaped beyond the minimum requirements of LMC 16.80. Examples are as follows:

a. Perimeter fencing is not required by code. The site proposes a continuous wrought-iron style fence on the perimeter with electric gate operators. The fence style proposed will be a high quality product and include architectural details such as stone-clad columns.

b. Entrance landscaping will be robust, detailed, and will incorporate artwork in the form of plasma cut ornamental steel at each entry as part of the entry signage. This artwork will provide project identity as an amenity. Perimeter landscape buffers will exceed Type 1 standards:

Per LMC 16.80.050.B:

b. Provide a minimum of one conifer at least seven feet tall for every one-hundred fifty square feet arranged in a manner to obstruct views into the property. Permitted conifer species are those with the ability to develop a minimum branching width of eight feet within five years. Sufficient soil must be provided to enable growth of trees to maturity. Structural solutions may be required when necessary to support trees with limited soil availability. [PRD perimeter buffers will provide one tree for every 100 s.f. to bolster screening.

c. Provide shrubs at a rate of one shrub per twenty square feet of landscaped area. Shrubs shall be at least sixteen inches tall at planting and have a mature height between three and four feet. [This standard will be met or exceeded]

d. Ground cover shall cover the remainder of the landscape strip within three years.

[This standard will be met or exceeded]

e. A minimum of fifteen feet of width shall be required when Type I landscaping design is utilized. [A 20' landscaped buffer will be provided per LMC 16.60.140]

c. Signage throughout the project will also incorporate the art work's pattern as a logo to provide wayfinding and a sense of place. Signage will be placed near the tree tracts, trail areas, dog park and central recreation center.

d. Site furnishings. The project will provide site furniture such as benches, trash receptacles, pedestrian level lighting for trail areas, and waste-station (dog park), as well as within the enclosed and fenced pool deck and tot-lot patio areas. Furniture style will compliment the signage and artwork motif.

Thank you for your review.

Sincerely,  
**HATTON GQDAT PANTIER**

  
Chris Aldrich, RLA  
Planning Manager

Enclosures: Updated Open Space Plan, 10.27.20



**CERTIFICATION OF PUBLIC NOTICE**

I, Samra Seymour, for the City of Lacey hereby certify that public notice for the Griffin Multi-family Site Plan Review (19-353) was given as follows:

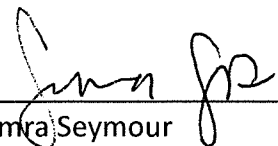
**APPLICATION**

Notice of Application Published: August 27, 2021  
Notice of Application Posted: August 26, 2020  
Posting Locations: property frontage on 32<sup>nd</sup> Ave NE  
Environmental Determination Published: December 17, 2021

**HEARING**

Notice of Public Hearing Published: January 29, 2021  
Notice of Public Hearing Posted: January 29, 2021  
Posting Locations: property frontage on 32<sup>nd</sup> Ave NE  
Notice of Public Hearing Mailed to Mailing List: January 29, 2021

The above is an accurate accounting of the public notice provided for the project.

  
\_\_\_\_\_  
Samra Seymour

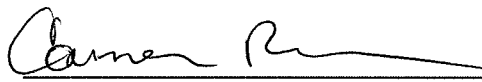
2.4.21  
\_\_\_\_\_  
Date

STATE OF WASHINGTON)

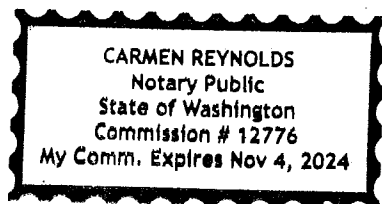
) ss.  
County of Thurston )

This is to certify that on Feb 04, 21 before the undersigned Notary Public, personally appeared Samra Seymour Planner for the City of Lacey.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above written.

  
\_\_\_\_\_  
Notary Public in and for the State of Washington, residing  
at: Lacey WA

My Commission Expires: Nov 4, 2024



## NOTICE OF PUBLIC HEARING

This is to notify you that the City of Lacey Hearings Examiner will conduct a public hearing on February 8, 2021, the hearing will be held virtually via Zoom Web Conferencing, and is for consideration of the following item(s):

City of Lacey Project #19-353: Griffin Multi-family - SW Olympia, LLC is proposing to develop a 183-unit multi-family complex consisting of twelve (12) apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential. The project is located at 7235/7201/7203 32nd Ave NE, Lacey, Thurston County, Washington. Assessor's parcels 11803140300, 11803130400, and 11803130401

If you want to state your opinion of this project, please register at the below web address to virtually attend the public hearing. Be prepared to speak briefly to the Hearings Examiner. What you say will then become part of the public record. If you cannot attend the virtual public hearing but wish to comment, please write a letter to: Hearings Examiner, 420 College St. SE, Lacey, WA 98503. Your letter will become part of the public record if we receive it before the hearing.

Information on this project, including a study of possible environmental impacts, is available upon request to the Community Development Department at (360) 491-5642, or to the project planner, Samra Seymour, via email at [sseymour@ci.lacey.wa.us](mailto:sseymour@ci.lacey.wa.us)

If you need special accommodations to participate in this meeting, please call us at (360) 491-5642 by 10:00 a.m. the business day before the hearing. To register to participate in the hearing please go to [https://us02web.zoom.us/webinar/register/WN\\_r8ssF61BRw2hyeC75UbBOA](https://us02web.zoom.us/webinar/register/WN_r8ssF61BRw2hyeC75UbBOA). **You must register prior to the hearing in order to testify.**

LACEY COMMUNITY DEVELOPMENT DEPARTMENT  
Samra Seymour, Senior Planner  
[sseymour@ci.lacey.wa.us](mailto:sseymour@ci.lacey.wa.us)  
420 College St. SE  
Lacey, WA 98503

DID YOUR NEIGHBORS RECEIVE THIS NOTICE?  
PLEASE SHARE IT WITH THEM!



**7235 32ND AVE NE, LACEY, WA**

**FREESTONE COMPANIES**  
6820 20TH STREET  
FIFE, WA 98424  
(360) 896-0600

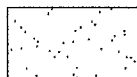
|                                                                      |              |
|----------------------------------------------------------------------|--------------|
| MINIMUM OPEN SPACE REQUIRED BY PLANNED RESIDENTIAL DEVELOPMENT = 30% |              |
| GROSS SITE AREA                                                      | = 9.54 ACRES |
| DEDICATED AREA                                                       | = 0.0 ACRES  |
| NET SITE AREA                                                        | = 9.54 ACRES |
| TOTAL REQUIRED OPEN SPACE                                            | = 2.86 ACRES |

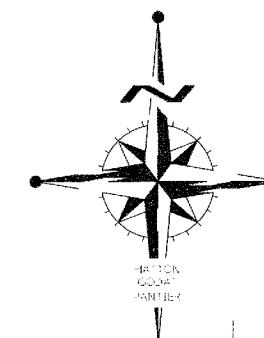
PRIVATE OPEN SPACES  
MULTIFAMILY UNITS (BALCONIES/PATIOS) 53 S.F. PER  
UNIT TYPE A, B, C, D (171 UNITS)

COMMON OPEN SPACES

|                  |             |
|------------------|-------------|
| TREE TRACT 1     | = .17 ACRES |
| TREE TRACT 2     | = .56 ACRES |
| TREE TRACT 3     | = .27 ACRES |
| TREE TRACT 4     | = .89 ACRES |
| LANDSCAPED AREAS | = .97 ACRES |

|                           |                                          |
|---------------------------|------------------------------------------|
| TOTAL COMMON OPEN SPACE   | = 2.86 ACRES                             |
| TOTAL OPEN SPACE PROVIDED | = 3.07 ACRES<br>(32.2% OF NET SITE AREA) |

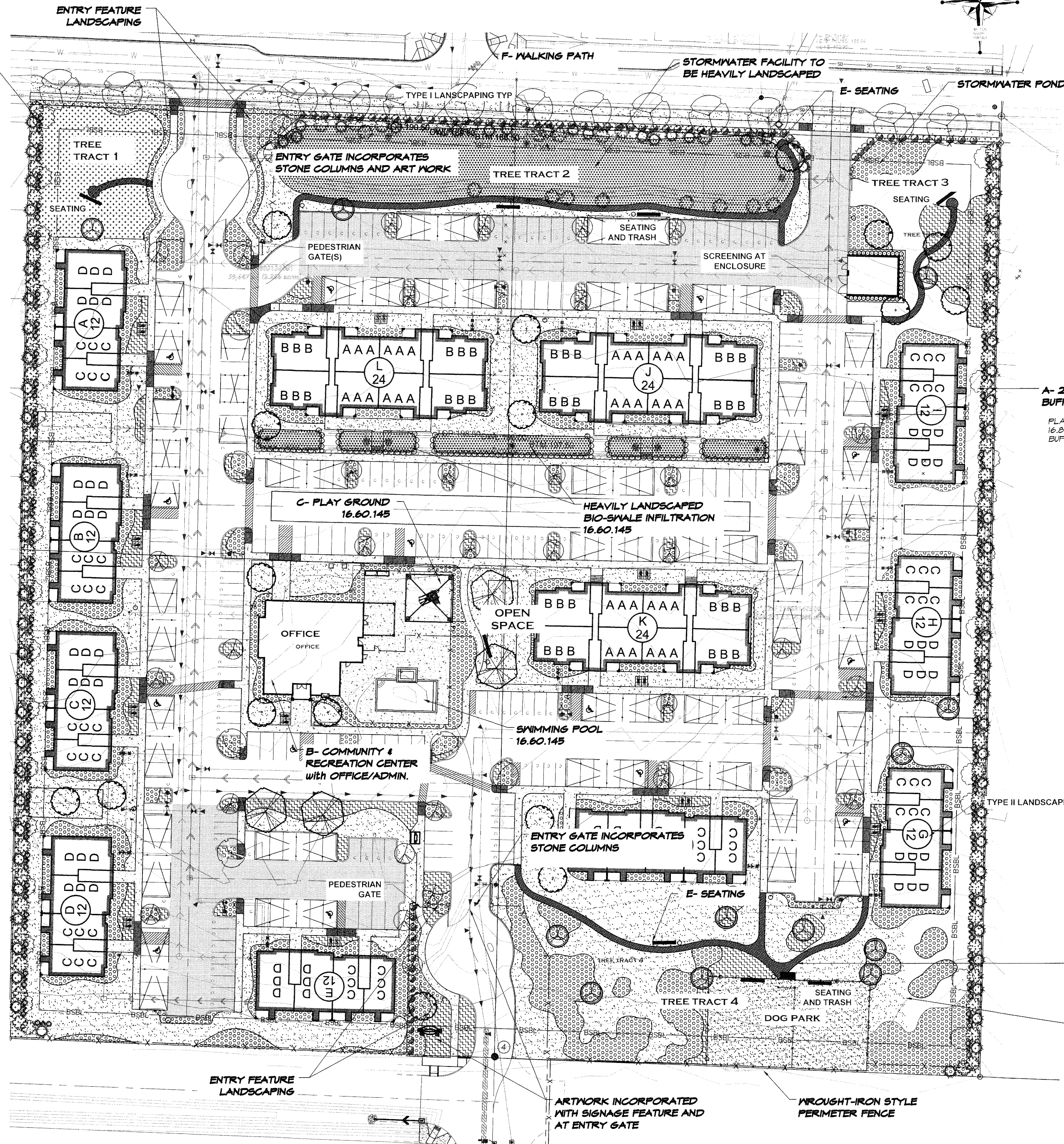
| DESCRIPTION                                                                                                                                                                                  | OUTLINE SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PERIMETER BUFFER                                                                                                                                                                             | LANDSCAPED BUFFER AREA INCLUDES TREES, SHRUBS, AND GROUNDCOVERS. SELECTIVE RETENTION OF EXISTING TREES WHERE APPROPRIATE.                                                                                                                                                                                                                                                                                                        |
| COMMUNITY RECREATION CENTER                                                                                                                                                                  | ~3,980 SF COMMUNITY BUILDING WITH LEASING OFFICE. COMMON AMENITIES INCLUDE: <ul style="list-style-type: none"> <li>- FITNESS CENTER</li> <li>- MULTIPURPOSE ROOM AND LOUNGE</li> <li>- OUTDOOR PATIO WITH BBQ (6,637 SQ FT)</li> <li>- COVERED POOL WITH RETRACTING COVER</li> <li>- POOL DECK, CHANGING ROOMS &amp; SHOWERS</li> <li>- PORTE-COCHERE ENTRY FOR LEASING OFFICE &amp; CONCIERGE SERVICE, CART PARKING.</li> </ul> |
| PLAY GROUND / TOT LOT                                                                                                                                                                        | PLAY AREA WITH PLAY STRUCTURE FOR AGES 4-12 IMPROVEMENTS INCLUDE: <ul style="list-style-type: none"> <li>- PLAY STRUCTURES</li> <li>- SAFETY SURFACE WITH CURBING</li> <li>- SEATING</li> </ul>                                                                                                                                                                                                                                  |
| DOG PARK<br>                                                                                              | ~6,600 SF FENCED AREA FOR DOG ACTIVE PLAY IMPROVEMENTS INCLUDE: <ul style="list-style-type: none"> <li>- 4' HT. CHAINLINK FENCING</li> <li>- WATERING AND WASTE DUMP STATION</li> <li>- SUPERVISED OFF-LEASH PLAY ONLY</li> <li>- REQUIREMENTS FOR ALL DOG WASTE TO BE DISPOSED OF OFF-SITE</li> <li>- SIGNAGE WILL BE PROVIDED TO THIS AFFECT.</li> </ul>                                                                       |
| SITE FURNITURE<br><br> | 6' BENCH<br>TRASH RECEPTACLE LOCATIONS                                                                                                                                                                                                                                                                                                                                                                                           |
| WALKING TRAILS<br>                                                                                        | 5 FT WIDE PATH CONNECTING TO SITE CIRCULATION <ul style="list-style-type: none"> <li>- WOOD CHIP SURFACE</li> <li>- LOCATE FOR MINIMAL IMPACT TO VEGETATION</li> <li>- BUFFER PROTECTION SIGNAGE</li> <li>- LOW LEVEL LIGHTING AT NORTH WETLAND ONLY</li> </ul>                                                                                                                                                                  |
| STORMWATER AREAS<br>                                                                                      | OPEN SPACE USED FOR STORMWATER TREATMENT, RETENTION AND INFILTRATION. PERMANENTLY VEGETATED AND STABILIZED.                                                                                                                                                                                                                                                                                                                      |
| TREE RETENTION AREAS                                                                                                                                                                         | AREAS DESIGNATED FOR TREE RETENTION. ACTUAL AREAS TO BE DETERMINED DURING PROJECT STAKING.                                                                                                                                                                                                                                                                                                                                       |



40 20 0 40 80

SCALE: 1" = 40'

PLANTING TO EXCEED LMC  
16.80.050.B FOR TYPE I  
BUFFER



STATE OF  
WASHINGTON  
LICENSED  
LANDSCAPE ARCHITECT

C-151818 - J. A. DRICK  
CORPORATION, 2, 585  
EXPIRES ON 4-1-2002

REVISIONS: \_\_\_\_\_

DATE: \_\_\_\_\_

**GRIFFIN MULTI-FAMILY COMPLEX**  
7235 32ND NE LACEY, WA 98516

## OPEN SPACE PLAN

AGENCY NO. \_\_\_\_\_  
SHEET: 1 OF 01  
E:\dgn\19-000\19-085\PRELIMINARY  
INDEX: PPRD&OS.dwg  
JOB: 19-085



## Order Confirmation

**Customer**

CITY OF LACEY

**Customer Account**

258711

**Customer Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Customer Phone**

360-491-3214

**Customer Fax**

360-412-3181

**Sales Rep**

ctrunick@mcclatchy.com

**Payor Customer**

CITY OF LACEY

**Payor Account**

258711

**Payor Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Payor Phone**

360-491-3214

**Customer EMail**

pedmonds@ci.lacey.wa.us

**Order Taker**

ctrunick@mcclatchy.com

**PO Number**

P0027307

**Payment Method**

Invoice

**Blind Box**

**Tear Sheets**

0

**Proofs**

0

**Affidavits**

1

**Net Amount**

\$264.95

**Tax Amount**

\$0.00

**Total Amount**

\$264.95

**Payment Amount**

\$0.00

**Amount Due**

\$264.95

**Ad Order Number**

0004739459

**Order Source**

**Ordered By**

Ryan Andrews

**Special Pricing**

**Invoice Text**

P0027307

**Promo Type**

**Package Buy**

**Materials**

## Ad Order Information

|                  |                 |                          |                         |
|------------------|-----------------|--------------------------|-------------------------|
| <u>Ad Number</u> | <u>Ad Type</u>  | <u>Production Method</u> | <u>Production Notes</u> |
| 0004739459-01    | OLY-Legal Liner | AdBooker                 |                         |

|                           |                      |                    |                |
|---------------------------|----------------------|--------------------|----------------|
| <u>External Ad Number</u> | <u>Ad Attributes</u> | <u>Ad Released</u> | <u>Pick Up</u> |
|                           |                      | No                 |                |

|                |              |
|----------------|--------------|
| <u>Ad Size</u> | <u>Color</u> |
| 1 X 65 li      |              |

|                     |                          |                  |                      |
|---------------------|--------------------------|------------------|----------------------|
| <u>Product</u>      | <u>Placement</u>         | <u>Times Run</u> | <u>Schedule Cost</u> |
| TAC-OL-The Olympian | 0300 - Legals Classified | 1                | \$205.50             |

|                                         |                                |
|-----------------------------------------|--------------------------------|
| <u>Run Schedule Invoice Text</u>        | <u>Position</u>                |
| #6976 NOTICE OF APPLICATION Notice is h | 0301 - Legals & Public Notices |

|                  |
|------------------|
| <u>Run Dates</u> |
| 08/27/2020       |

|                            |                          |                  |                      |
|----------------------------|--------------------------|------------------|----------------------|
| <u>Product</u>             | <u>Placement</u>         | <u>Times Run</u> | <u>Schedule Cost</u> |
| TAC-upsell.theolympian.com | 0300 - Legals Classified | 1                | \$59.45              |

|                                         |                                |
|-----------------------------------------|--------------------------------|
| <u>Run Schedule Invoice Text</u>        | <u>Position</u>                |
| #6976 NOTICE OF APPLICATION Notice is h | 0301 - Legals & Public Notices |

|                  |
|------------------|
| <u>Run Dates</u> |
| 08/27/2020       |

**NOTICE OF APPLICATION**

Notice is hereby given that the City of Lacey received an application for Site Plan Review and Preliminary Planned Residential Development application on June 18, 2020, for the following proposal:

Application # 19-353: SW Olympia LLC by Hatton Godat Pantier is proposing to construct a 183-unit multi-family complex consisting of 12 apartment buildings, an office building, and associated parking and utilities on 9.54 acres zoned Moderate Density Residential. The site address is 7201, 7203, and 7235 32nd Ave. NE, Lacey Washington. The parcel numbers are 11803140300, 11803130400, and 11803130401 and is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

On August 26, 2020, this application was deemed complete pursuant to RCW 36.70B.070. This determination of completeness means that the application is sufficient for continued review. Pursuant to WAC 197-11-355, the City of Lacey is using the Optional DNS process. The City of Lacey expects to issue a determination of nonsignificance (DNS) for this project. The complete application, notice of application, supporting documents and project information may be reviewed at the City of Lacey Community and Economic Development Department. Anyone who wishes to make comment on this application may do so within 14 days from the date the application was deemed complete. If you would like to comment on this proposal please contact Ryan Andrews, Planning Manager, of the City of Lacey Department of Community and Economic Development at the address or telephone number located below. Comments on this application shall be received by the city before **5:00 p.m., September 9, 2020.**

LACEY COMMUNITY AND ECONOMIC  
DEVELOPMENT DEPARTMENT  
420 College Street SE  
Lacey, WA 98503  
(360) 491-5642

## Order Confirmation

**Customer**

CITY OF LACEY

**Customer Account**

258711

**Customer Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Customer Phone**

360-491-3214

**Customer Fax**

360-412-3181

**Sales Rep**

cdaniels@mcclatchy.com

**Payor Customer**

CITY OF LACEY

**Payor Account**

258711

**Payor Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Payor Phone**

360-491-3214

**Customer EMail**

pedmonds@ci.lacey.wa.us

**Order Taker**

cdaniels@mcclatchy.com

**PO Number**

Legal Notice

**Payment Method**

Invoice

**Blind Box**

**Tear Sheets**

0

**Proofs**

0

**Affidavits**

1

**Net Amount**

\$236.17

**Tax Amount**

\$0.00

**Total Amount**

\$236.17

**Payment Amount**

\$0.00

**Amount Due**

\$236.17

**Ad Order Number**

0004862473

**Order Source**

**Ordered By**

Samra Seymour

**Special Pricing**

**Invoice Text**

P0027559.DOC

**Promo Type**

**Package Buy**

**Materials**



## Ad Order Information

|                  |                 |                          |                         |
|------------------|-----------------|--------------------------|-------------------------|
| <u>Ad Number</u> | <u>Ad Type</u>  | <u>Production Method</u> | <u>Production Notes</u> |
| 0004862473-01    | OLY-Legal Liner | AdBooker                 |                         |

|                           |                      |                    |                |
|---------------------------|----------------------|--------------------|----------------|
| <u>External Ad Number</u> | <u>Ad Attributes</u> | <u>Ad Released</u> | <u>Pick Up</u> |
|                           |                      | No                 |                |

|                |              |
|----------------|--------------|
| <u>Ad Size</u> | <u>Color</u> |
| 1 X 58 li      |              |

|                     |                          |                  |                      |
|---------------------|--------------------------|------------------|----------------------|
| <u>Product</u>      | <u>Placement</u>         | <u>Times Run</u> | <u>Schedule Cost</u> |
| TAC-OL-The Olympian | 0300 - Legals Classified | 1                | \$181.10             |

|                                          |                                |
|------------------------------------------|--------------------------------|
| <u>Run Schedule Invoice Text</u>         | <u>Position</u>                |
| NOTICE OF PUBLIC HEARING Notice is hereb | 0301 - Legals & Public Notices |

|                  |
|------------------|
| <u>Run Dates</u> |
| 01/29/2021       |

|                            |                          |                  |                      |
|----------------------------|--------------------------|------------------|----------------------|
| <u>Product</u>             | <u>Placement</u>         | <u>Times Run</u> | <u>Schedule Cost</u> |
| TAC-upsell.theolympian.com | 0300 - Legals Classified | 1                | \$55.07              |

|                                          |                                |
|------------------------------------------|--------------------------------|
| <u>Run Schedule Invoice Text</u>         | <u>Position</u>                |
| NOTICE OF PUBLIC HEARING Notice is hereb | 0301 - Legals & Public Notices |

|                  |
|------------------|
| <u>Run Dates</u> |
| 01/29/2021       |

# NOTICE OF PUBLIC HEARING

Notice is hereby given that the City of Lacey Hearings Examiner will conduct a public hearing on February 8, 2021, at 9:30am. The hearing will be held virtually via Zoom Web Conferencing, and is for consideration of the following item:

Project# 19-353: SW Olympia, LLC is proposing to develop a 183-unit multi-family complex consisting of twelve (12) apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential. The project is located at 7235/7201/7203 32nd Ave NE, Lacey, Thurston County, Washington. Assessor's parcels 11803140300, 11803130400, and 11803130401

The purpose of the public hearing is to give citizens an opportunity to testify to the Hearings Examiner regarding the above proposal. Any interested citizen may testify at the virtual hearing by registering to testify ahead of the hearing at the following web address: [https://us02web.zoom.us/webinar/register/WN\\_r8ssF61BRw2hyeC75UbBOA](https://us02web.zoom.us/webinar/register/WN_r8ssF61BRw2hyeC75UbBOA). Anyone who cannot attend the virtual meeting may give testimony in a letter addressed to: Hearings Examiner, 420 College St. SE, Lacey, WA 98503. If your letter is received before the hearing, it will become part of the public record. Prior to the hearing, information regarding the proposal, including an environmental impact analysis, may be obtained by contacting Samra Seymour, Senior Planner at the City of Lacey Community and Economic Development Department by phone at (360) 491-5642 or email at [ss Seymour@ci.lacey.wa.us](mailto:ss Seymour@ci.lacey.wa.us).

If you need special accommodations to participate in this meeting, please call us at (360) 491-5642 by 10:00 a.m. the day before the meeting.

LACEY COMMUNITY DEVELOPMENT  
DEPARTMENT  
Samra Seymour, Senior Planner

Published: January 29, 2021

## Order Confirmation

**Customer**

CITY OF LACEY

**Customer Account**

258711

**Customer Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Customer Phone**

360-491-3214

**Customer Fax**

360-412-3181

**Sales Rep**

cdaniels@mcclatchy.com

**Payor Customer**

CITY OF LACEY

**Payor Account**

258711

**Payor Address**

420 COLLEGE ST SE  
LACEY WA 985031238 USA

**Payor Phone**

360-491-3214

**Customer EMail**

pedmonds@ci.lacey.wa.us

**Order Taker**

cdaniels@mcclatchy.com

**PO Number**

Legal Notice

**Payment Method**

Invoice

**Blind Box**

**Tear Sheets**

0

**Proofs**

0

**Affidavits**

1

**Net Amount**

\$203.50

**Tax Amount**

\$0.00

**Total Amount**

\$203.50

**Payment Amount**

\$0.00

**Amount Due**

\$203.50

**Ad Order Number**

0004833427

**Order Source**

**Ordered By**

Samra Seymour

**Special Pricing**

**Invoice Text**

P0027524.DOC

**Promo Type**

**Package Buy**

**Materials**

## Ad Order Information

|                         |                       |                                 |                                |
|-------------------------|-----------------------|---------------------------------|--------------------------------|
| <b><u>Ad Number</u></b> | <b><u>Ad Type</u></b> | <b><u>Production Method</u></b> | <b><u>Production Notes</u></b> |
| 0004833427-01           | OLY-Legal Liner       | AdBooker                        |                                |

|                                  |                             |                                 |                       |
|----------------------------------|-----------------------------|---------------------------------|-----------------------|
| <b><u>External Ad Number</u></b> | <b><u>Ad Attributes</u></b> | <b><u>Ad Released</u></b><br>No | <b><u>Pick Up</u></b> |
|----------------------------------|-----------------------------|---------------------------------|-----------------------|

|                       |                     |
|-----------------------|---------------------|
| <b><u>Ad Size</u></b> | <b><u>Color</u></b> |
| 2 X 25 li             |                     |

|                       |                          |                         |                             |
|-----------------------|--------------------------|-------------------------|-----------------------------|
| <b><u>Product</u></b> | <b><u>Placement</u></b>  | <b><u>Times Run</u></b> | <b><u>Schedule Cost</u></b> |
| TAC-OL-The Olympian   | 0300 - Legals Classified | 1                       | \$155.00                    |

|                                         |                                |
|-----------------------------------------|--------------------------------|
| <b><u>Run Schedule Invoice Text</u></b> | <b><u>Position</u></b>         |
| PUBLIC NOTICE Pursuant to RCW 43.21.C a | 0301 - Legals & Public Notices |

**Run Dates**  
12/17/2020

|                            |                          |                         |                             |
|----------------------------|--------------------------|-------------------------|-----------------------------|
| <b><u>Product</u></b>      | <b><u>Placement</u></b>  | <b><u>Times Run</u></b> | <b><u>Schedule Cost</u></b> |
| TAC-upsell.theolympian.com | 0300 - Legals Classified | 1                       | \$48.50                     |

|                                         |                                |
|-----------------------------------------|--------------------------------|
| <b><u>Run Schedule Invoice Text</u></b> | <b><u>Position</u></b>         |
| PUBLIC NOTICE Pursuant to RCW 43.21.C a | 0301 - Legals & Public Notices |

**Run Dates**  
12/17/2020

### PUBLIC NOTICE

Pursuant to RCW 43.21.C and WAC 197-11, NOTICE IS HEREBY GIVEN that on December 16, 2020, City of Lacey Department of Community Development issued a mitigated determination of nonsignificance relative to the environmental impact of the following described proposal:

Application 19-353: SW Olympia LLC is proposing the construction of a 183-unit multi-family complex consisting of 12 apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential. The site addresses are 7235/7201/7203 32nd Ave NE. Assessor's parcels 11803140300, 11803130400, and 11803130401 and it is located in Section 03, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public upon request.

LACEY COMMUNITY DEVELOPMENT DEPARTMENT  
420 College Street SE  
Lacey, WA 98503  
360.491.5642

Published: December 17, 2020



DEPARTMENT OF COMMUNITY  
DEVELOPMENT

**NOTICE OF COMPLETE APPLICATION**

NOTICE DATE: August 26, 2020  
APPLICANT: Chris Aldrich, Hatton Godat Pantier

We have received the following application/supplemental materials for your proposal:

|                                                          |                                                             |
|----------------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Binding Site Plan               | <input type="checkbox"/> Shoreline/Wetland Permit           |
| <input type="checkbox"/> Conditional Use                 | <input checked="" type="checkbox"/> Site Plan Review        |
| <input checked="" type="checkbox"/> Environmental Review | <input type="checkbox"/> Townhouse Development              |
| <input type="checkbox"/> Final Plat                      | <input type="checkbox"/> Village Center                     |
| <input type="checkbox"/> Planned Residential Development | <input checked="" type="checkbox"/> Other (Preliminary PRD) |
| <input type="checkbox"/> Preliminary Plat                |                                                             |

Date Received: June 18, 2020  
Project Name: Griffin Multifamily  
Project Location: 7201, 7203, and 7235 32<sup>nd</sup> Ave. NE  
Project Number: 19-353

X Your application is now considered COMPLETE per RCW 36.70B.070, and will be subject to the standards and regulations in effect on the date of this notice. Be advised that the determination of completeness shall not preclude the City from requesting additional information or studies either at the time of this notice or subsequently if new information is required or substantial changes in the proposed action occur.

The application materials have been reviewed for completeness purposes only. The technical aspects of the application have not been reviewed. A determination of completeness does not constitute approval of the proposal.

☐ Your application is NOT COMPLETE.

The following information must be received before the application can be considered complete:

\_\_\_\_\_

Please submit the requested materials to the attention of \_\_\_\_\_ at:

City of Lacey  
420 College St. SE  
Lacey, WA 98503  
(360) 491-5642

## **NOTICE OF APPLICATION WITH THE OPTIONAL DNS PROCESS**

The City of Lacey Department of Community and Economic Development has received the following application for Site Plan Review and Preliminary Planned Residential Development.

Date Application Received: June 18, 2020

Project Name: Griffin Multifamily. Project no. 19-353.

Project Description: Construction of a 183-unit multi-family complex consisting of 12 apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential.

Project Location: 7201, 7203, and 7235 32<sup>nd</sup> Ave. NE. Located in a portion of Section 3, Township 18N, Range 1 W, W.M. Assessor's parcel no.'s 11803140300, 11803130400, 11803130401.

### **The following studies and/or reports are required as a part of this application:**

Traffic Impact Analysis, Tree Report, Stormwater Report

### **This Application will undergo the following approval process:**

Environmental Review: A review of the submitted Environmental Checklist and other supporting studies will be conducted.

Other Permits/Approvals Required: City Council Approval, Class IV Forest Practice Application, Multifamily Design Review Approval, Civil Drawing Approval, Building and Grading Permits

### **At minimum, this project will be subject to the following regulations:**

LMC Title 14 "Buildings and Construction", LMC Title 16 "Zoning", IBC/IFC, City of Lacey Stormwater Design Manual, Development Guidelines and Public Works Standards.

On August 26, 2020 this application was deemed complete pursuant to RCW 36.70B.070. This determination of completeness means that the application is sufficient for continued review. This determination does not preclude the City of Lacey or other reviewing agencies from requesting additional information or studies either at the time of this notice or subsequently, if new information is required or if substantial changes in the proposal occur.

Pursuant to WAC 197-11-355, the City of Lacey is using the Optional DNS process. The Optional Process enables the comment periods for the environmental review and notice of application to be integrated. The City of Lacey expects to issue a Determination of Nonsignificance for this project. This commenting period may be your only opportunity to comment on the environmental impacts of the proposal. Copies of the environmental checklist and supporting materials may be reviewed at Lacey City Hall.

Anyone may review any document submitted as part of this project application and may comment on this proposal. No action will be taken on this application for 14 days from the date of this notice or before September 9, 2020.

If you would like to make written comments, these may be directed to **Ryan Andrews, Planning Manager** in the Department of Community and Economic Development at the address below. If a public hearing is required as part of the application review process, any member of the public may request to be notified, and may give written or oral comment on the proposal to the Hearings Examiner, and may request a copy of any decisions made on the project. A request for advance notification should be made to the Department of Community and Economic Development.

NOTE: Pursuant to RCW 43.21C.075 and Lacey Municipal Code 14.24.170(A), a project denial based upon environmental information, and a conditioned or mitigated Determination of Nonsignificance (DNS) may be appealed by any agency or aggrieved person. Appeals are filed either with the Community Development Department when there is also an underlying governmental action or with the City Council if there is no underlying governmental action. Appeals to the City Council must be filed within ten (10) days of the issuance of the written decision (refer to the Lacey Municipal Code for time periods on appeals filed with the Community Development Department).

Lacey Community and Economic Development Department  
420 College St. SE  
Lacey, WA 98503  
(360) 491-5642





## TRANSMITTAL MEMORANDUM

Department of Community Development  
420 College St. SE, Lacey, WA 98503  
360-491-5642

Date: August 26, 2020

Project Name: Griffin Multifamily

Case Number: 19-353

Parcel Number(s): 11803140300, 11803130400, 11803130401

Please review the attached project information and notify **Ryan Andrews, Planning Manager**, in our office in writing of any comments or recommendations by **September 9, 2020**. Your comments will become part of the record and utilized in the decision-making process. You may either mail your comments to the above-mentioned address or e-mail them to [randrews@ci.lacey.wa.us](mailto:randrews@ci.lacey.wa.us)

---

### TYPE OF APPLICATION:

Site Plan Review and Preliminary Planned Residential Development Application to construct a 183-unit multifamily complex consisting of 12 apartment buildings, an office building, and associated parking and utilities on 9.54 acres zoned Moderate Density Residential.

---

### TO:

- |                                          |                                         |
|------------------------------------------|-----------------------------------------|
| ✓ Building Codes – Jeff                  | ○ CPED                                  |
| ✓ Fire Codes – Terry                     | ✓ Puget Sound Energy – Amy              |
| ✓ Development Review Division - Tom      | ✓ Intercity Transit                     |
| ✓ Traffic Division                       | ✓ Postmaster                            |
| ✓ Water Resources Engineer - Doug        | ✓ North Thurston Public Schools         |
| ✓ Erosion Control - Carlos               | ✓ Olympic Region Clean Air Agency       |
| ✓ Addressing – Marci                     | ✓ WA State Dept. of Fish and Wildlife   |
| ✓ Police Department – Joe Upton          | ○ Regional Biologist                    |
| ✓ Site Plan Review Committee             | ✓ WA State Department of Ecology        |
| ○ R. Walk                                | ✓ WA State Historic Preservation Office |
| ○ S.Egger                                | ✓ Nisqually Tribe                       |
| ✓ Thurston County, adjacent jurisdiction | ✓ Squaxin Island Tribe                  |

If comments are not received by the date noted above, it will be construed that your agency/department does not have any comments or objections to the project as proposed.

## Samra Seymour

---

**From:** Marci Price  
**Sent:** Wednesday, September 09, 2020 3:11 PM  
**To:** Ryan Andrews  
**Subject:** Griffin Multifamily #19-353  
**Attachments:** Griffin Multifamily Complex #19-353.xlsx

Ryan....The addresses for the apartment complex are attached. While the City does not assign individual unit numbers, please have the applicant send me a list of the "proposed" unit numbers before SPR approval is granted. I need to insure that they are in compliance with our addressing ordinance, Chapter 12.04.050 C.3., where the first digit of the unit number reflects the floor of the unit, and the order is from left to right when facing the building.

Also, please have them denote the street number on each building and route to me for 2<sup>nd</sup> review. Not just to verify that they have labeled them correctly, but so that I can check that the addresses I have assigned are logical...thanks!

*Marci Price*

Land Management Specialist  
Community & Economic Development Dept.  
City of Lacey  
420 College St. SE  
Lacey, WA 98503  
360-438-2634

*"Those who bring sunshine to the lives of others, can not keep it from themselves"*

| Griffin Multifamily Complex #19-353 |       |      |        |     |        |         |
|-------------------------------------|-------|------|--------|-----|--------|---------|
| Parcels 118031 40300/30400/30401    |       |      |        |     | 9.9.20 |         |
| BLDG#                               | ST. # | NAME | SUFFIX | DIR | Zip    | # Units |
| A                                   | 7107  | 32ND | AVE    | NE  | 98516  | 12      |
| B                                   | 7111  | 32ND | AVE    | NE  | 98516  | 12      |
| C                                   | 7115  | 32ND | AVE    | NE  | 98516  | 12      |
| D                                   | 7119  | 32ND | AVE    | NE  | 98516  | 12      |
| E                                   | 7123  | 32ND | AVE    | NE  | 98516  | 12      |
| F                                   | 7143  | 32ND | AVE    | NE  | 98516  | 15      |
| G                                   | 7147  | 32ND | AVE    | NE  | 98516  | 12      |
| H                                   | 7151  | 32ND | AVE    | NE  | 98516  | 12      |
| I                                   | 7155  | 32ND | AVE    | NE  | 98516  | 12      |
| J                                   | 7135  | 32ND | AVE    | NE  | 98516  | 24      |
| K                                   | 7139  | 32ND | AVE    | NE  | 98516  | 24      |
| L                                   | 7131  | 32ND | AVE    | NE  | 98516  | 24      |
| OFFICE                              | 7127  | 32ND | AVE    | NE  | 98516  |         |



## SPR AND SITE PLAN REVIEW COMMENTS

---

**Meeting Date:** 08/27/2020

**Case #** 19-353

**Applicant Name:** Freestone Co/Griffin **Project:** Multi-Family

**Location:** 7235-7203 32<sup>nd</sup> Ave NE **Notes By:** Terry McDaniel

**Planner:** Andrews

---

### **Timing of Installations/Fire Hydrant Requirements:**

1. One fire hydrant shall be installed, tested and approved prior to building permit issuance. (LMC 14.07.501.4.) Fire hydrants shall be provided every 330 feet unless the fire flow is greater than **1,500 gpm** then it shall be every 300 feet in accordance with IFC table (C102.1) and (LMC 14.07) for the building. Fire hydrants shall be placed no closer than 40 feet from the building or structure protected.

### **Fire Flow Requirements:**

2. The required fire-flow for the building shall be not less than **1,500 gpm** for 2 hours in accordance with IFC Appendix B. Said fire-flow is based on square footage/ building construction type, including a 50% credit for the installation of automatic fire sprinkler systems. (IFC section 507.1 LMC 14.07.015). The initial calculation is always based on type 5b wood framed construction as a worst case scenario for fire flow. **Please be advised the square footage of the building shall be provided for an accurate fire-flow calculation.**

### **Sprinkler System Requirements:**

3. The purposed building's shall require a sprinkler system the purposed building's shall be equipped with an approved automatic sprinkler system and shall be installed in accordance with NFPA 13 (2016 Edition) standards. In addition a fire department connection shall be installed in accordance with (LMC 14.07) a fire department connection shall be located within 40 feet of a fire hydrant. **The building shall have its own FDC line with KNOX locking caps or plugs.**

### **Fire Sprinkler Underground Piping Requirements:**

4. A separate building permit shall be required for the installation of fire sprinkler system underground piping. The design shall be in accordance with NFPA 24 Standards (2010 Edition) and City of Lacey Public Works Design Standards. Underground sprinkler piping shall be designed only by a Washington State Level III Certified contractor. Plans and specifications shall be submitted to the City of Lacey Building Department for review and approval prior to installation. Fire sprinkler system underground lead-in piping shall be installed only by a Washington State Level "U" Certified contractor. The submitted plans shall be accompanied by the level "U" certification of the installing contractor installing the underground piping. LMC 14.07.015; WAC 212-80-030

### **Fire Alarm System Requirements:**

5. An approved addressable fire alarm system with supervised monitoring shall be provided throughout the buildings in accordance with the City of Lacey Municipal Code (LMC 17.07) and NFPA 72 Standards (2016 Edition). **It's approved to have one monitoring system but each building needs its own fire alarm panel that reports to the monitored panel.**

### **Fire Apparatus Access Road Requirement:**

6. An approved 20-foot wide all-weather surface fire apparatus access roads shall be provided to within 150-feet of all exterior portions of the buildings at ground level. Said fire apparatus access road shall be located not less than 10-feet from the building. (IFC Section 503.1)
7. An approved aerial fire apparatus access roadway shall be provided along one entire side of the building when any portion of the building is in excess of 30-feet in height from the grading median of the building to the roofing eaves. Said aerial fire-apparatus access road shall be not less than 26-feet in width and be not less than 15-feet away or further than 30-feet away from the building. Aerial fire apparatus access roadways shall be constructed in accordance with AASHTO HB-17 Standards for a single axle weight load of 46,000 lbs. and a gross weight load of 75,000 lbs. (IFC Section D105)

### **General Requirements:**

8. Approved 12" minimum address numbers shall be provided on the building in a location facing the fire apparatus access roadway. The address numbers shall contrast the buildings color. (IFC Section 505.1; LMC 14.07.015)
9. An approved Fire Department and Police Department key-box shall be provided on the building in accordance with (IFC Section 506) and (LMC 14.07). Said fire department key-box shall be installed in a location approved by the City of Lacey Fire Code Official. Said key-box shall contain keys necessary for fire department and police department access to the interior of the building and any other location necessary for fire department or police department operations. Go to **[knoxbox.com](http://knoxbox.com)** for City of Lacey key boxes for Lacey Fire District #3 and Lacey Police Department. Upon completion of the key-box installation, the City of Lacey Fire C Specialist shall install the necessary keys and cover. (IFC Section 506). **The Police Department Knox shall be on the clubhouse building not each individual building.**
10. Approved fire lane marking shall be provided where necessary to discourage obstructions by the parking of private vehicles. Upon completion of final road surfaces and curbing construction, the City of Lacey Fire Code Official shall perform a site inspection to determine locations where fire lane marking will be necessary to discourage the parking of private vehicles. Said fire lane marking, where applicable, shall be provided and approved prior to final occupancy approval. IFC Section D-103.6; LMC 14.07.015
11. One sign shall be located at an approved location at the entrance of to the property shall be provided for a map of the entire complex. This site map shall include the roadway layout, building locations, building addresses.
12. Fire extinguishers shall be provided every 75 feet in accordance with (LMC 14.07) fire extinguishers shall be the 2a10bc type.
13. Access gates shall be in accordance with section 103.5 of the IFC all access gates shall require a KNOX box backup key switch in addition to a strobe activated gate.
14. Please note we are under the International Fire Code 2015 Edition and all NFPA code requirements of the most recent year published.

### **Required Fire Inspections:**

15. The City of Lacey fire code official shall conduct the necessary inspections or witness required tests to ascertain compliance with applicable fire codes. The applicant shall contact the City of Lacey Building Department, at (360) 491-5642, to schedule the required inspection or to request witness of required tests. At least 24 hours shall be allowed for scheduling. (IFC Section 106.2)

Terry McDaniel  
Fire Code Specialist  
City of Lacey  
360-456-7783



**CITY OF LACEY  
DEVELOPMENT REVIEW  
PUBLIC WORKS DIVISION  
SITE PLAN REVIEW CONDITIONS**



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|                                                       |                                   |
|-------------------------------------------------------|-----------------------------------|
| <b>PW FILE #:</b> 118-03-140300                       | <b>COMMENTS DATE:</b> 9/18/2020   |
| <b>OWNER:</b> SW Olympia LLC (Scott Griffin)          | <b>H.T.E. CASE NUMBER:</b> 19-353 |
| <b>APPLICANT:</b> Same                                |                                   |
| <b>PROPOSED USE:</b> 183 Multifamily Unit Development |                                   |
| <b>PLANNER:</b> Ryan Andrews                          | <b>NOTES BY:</b> Tom Stiles       |

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**Specific Water Improvements:**

1. With this project, a 12-inch water main shall be extended from 32<sup>nd</sup> Avenue to the water main recently installed in 31<sup>st</sup> Avenue/Gateway Boulevard. With the proposed layout, the 12-inch main will be on one side of the loop and appropriately sized water mains will be extended on the other side of the loop to provide domestic, water quality and fire protection needs.
2. Domestic water meters along with Reduced Pressure Backflow Assembly units shall be provided for each building. (DG&PWS 6.120 F) and (City of Lacey 2017 DG & PWS, Appendix P)
3. An irrigation meter with a Double Check Valve Assembly backflow prevention device is suggested for all landscaped areas. (DG&PWS 6.120 F)

**General Water Improvements:**

4. When connection to the public water system is desired by a customer (or required by the City) connected to a well exempt from the provisions of Revised Code of Washington 90.44.050, the "exempt" well must be properly decommissioned per Department of Ecology (DOE) standards prior to making the connection. When connection to the public water system is desired by a customer connected to an existing well that has a water right issued by the DOE, a physical disconnect between the well and the public water system must be made and maintained. This is necessary to assure that an unapproved auxiliary water supply (the customer's well) will not contaminate the City's water supply. Provided it is in compliance with DOE setback standards and purpose of use restriction on the customers water right for said well, the customer's "permitted" well may be kept serviceable for irrigation purposes only. In addition, if a well is to be used for irrigation, a Reduced Pressure Backflow Assembly (RPBA) is required and shall be installed as premise isolation at the public water supply service connection. If an existing

well is not to be used for irrigation purposes, it must be decommissioned per DOE standards. No water meter will be installed until the RPBA is installed and cross connection inspection has been completed to the satisfaction of the City. (DG&PWS, Water, 6.120 E.)

5. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: "The property owner adjacent to the public Right-of-Way will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way". (DG&PWS, Water, Irrigation 6.210)
6. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of Lacey Water System Plan, AWWA, Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official's standards. Actual main size, loop closures, and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site. (DG&PWS, Water 6.010)
7. Show all adjacent wells within 100-feet of the proposed project with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).
8. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time. (DG&PWS General Notes Water Main Installation)
9. Extend water mains throughout the project to satisfy City of Lacey Water Comprehensive Plan requirements. Also, water mains shall be extended throughout the site to assure fire, water quality and domestic requirements can be satisfied. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline. (DG&PWS, Water 6.020)
10. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (360.413.4386) to coordinate the fire flow modeling.
11. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be "cut", a disruption fee will be charged in accordance with Lacey Municipal Code 12.16.055.
12. The builder/applicant/owner is required to purchase each water meter prior to the issuance of each building permit. (DG&PWS Water 6.121)

### **Specific Sewer Improvements:**

13. 8-inch sewer mains shall be extended throughout the site to provide the project with sewer.
14. Building locations shall be designed to allow maintenance vehicles to access the site (the design vehicle is a 38-feet long, with an inside turning radius of 45-feet). Covered parking may be restricted to assure maintenance vehicles are accommodated.
15. The existing lift station this project discharges to is at capacity. With this project, a 6-inch force main shall be extended from the existing lift station to the existing sewer main in Gateway Boulevard (due to timing issues, a majority of this work has been completed). Also, the wet well, pumps and panel at the existing lift station may need to be upsized. In order to determine final design requirements, the project engineer will need to work with Brandon McAllister to determine design elements.

### **General Sewer Improvements:**

16. All existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.
17. All proposed structures shall be connected to sanitary sewer. (DG&PWS, Sewer 7A.010) Public mains with associated appurtenances shall be installed to serve the proposed project with sewer.
18. Sewer main extensions shall be located 6-feet off the centerline of the street/drive area on the South or West side. Sewer stubs shall be provided to each building connecting to the public main. Side sewers for each building shall be connected to a manhole, pipes shall not connect to manholes with an angle less than 90 degrees in relation to the outlet pipe. (DG&PWS, Sewer 7A.010)
19. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology. (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21)

### **Specific Stormwater Improvements:**

20. Treatment and infiltration facilities shall be constructed for stormwater associated with the site, adjacent properties currently discharging to the site along with the half street stormwater associated with the frontage along 32<sup>nd</sup> Avenue.

21. The site is located within a critical recharge area and a known impacted stream (Eagle Creek). Stormwater treatment shall include enhanced treatment for metal and phosphorous.

**Please see Doug Christenson's comments for additional specific stormwater conditions**

**General Stormwater Improvements:**

22. This project shall comply with the City of Lacey 2016 Stormwater Design Manual (LMC 14.27). Stormwater drainage and erosion control submittals shall be in conformance with the formatting and content requirements described in Chapter 3 of the 2016 Stormwater Design Manual.
23. A final Stormwater Site Plan, including a drainage report and drainage plans in conformance with current Stormwater Design Manual standards, shall be provided prior to final Public Works civil approval. Some key elements to be included within the report are: the project engineer's certification; descriptions of how each of the Core Requirements is being addressed; construction SWPPP; basin map and plan drawings; hydrologic modeling inputs and results (including the WWHM 2012 Data files produced with the model); summary data of sub-basin areas, design calculations, and facility sizing; soils report and infiltration analysis; soil management plan; maintenance agreement/covenant; and a stormwater facilities maintenance manual (SDM 2.2.1).
24. This project shall retain, disperse, and infiltrate stormwater on-site to the maximum extent feasible. Design of infiltration facilities requires site infiltration analysis, to determine wet-season soil and groundwater conditions and to establish a long-term design infiltration rate. (SDM 2.2.5 & 7.2)
25. Storm water shall be dispersed throughout the site to simulate pre-development infiltration to the maximum extent possible. Preferably, each building will have an individual roof drain infiltration system.
26. The maximum depth of an infiltration facility is 20 feet below the surrounding finished (developed) ground elevation, in order to provide for long-term maintenance access to the facility.
27. A Construction Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning site work or construction of the project. A complete SWPPP consists of both a narrative report and a temporary erosion and sediment control plan drawing. Each of the 13 SWPPP Elements as identified in Chapter 5 of the City of Lacey 2016 Stormwater Design Manual shall be addressed and included in the

construction SWPPP. If site conditions render any SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative report.

28. A Stormwater Facility Maintenance Manual per chapter 3 of the City of Lacey 2016 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance manual shall be included in the drainage report as part of the stormwater site plan.

The maintenance manual shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to civil drawing approval.

29. From October 1 through April 30, clearing, grading, and other soil disturbing activities shall be prohibited unless shown to the satisfaction of the City of Lacey that sediment-laden runoff will be prevented from leaving the site. (SDM 5.2.3)

#### **Specific Transportation Improvements:**

30. With this project, 32<sup>nd</sup> Avenue shall be constructed to Major Local Residential roadway standards. See Detail 4-4.0 dated 12/15/14 from the City of Lacey 2017 Development Guidelines & Public Works Standards Manual. This section of roadway requires 27-feet of half-street Right-of-Way.
31. The proposed project access shall also be tied to 31<sup>st</sup> Avenue (currently being built to the south of this project).
32. All residential projects, whether single or multi-family, which abut a collector roadway are required to establish a buffer from it. The buffer must be 20-feet in width and maintained by the property owner. This buffer will apply to the 31<sup>st</sup> Avenue side of the project. (DG&PWS, Transportation 4B.065)

#### **Please see Martin Hoppe's comments for additional specific transportation conditions**

#### **General Transportation Improvements:**

33. Street lighting levels (LED lighting) shall satisfy City of Lacey requirements for roadways and intersections. If they don't current meet these requirements, additional street lighting shall be installed for all streets fronting this project (Street lighting per City of Lacey spacing Standards). All street light designs shall be prepared by an engineering firm capable of performing such work. (DG&PWS, Transportation, Illumination 4E.010)

34. As a condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the applicant/owner must provide a copy of a billing statement to the City. If service has not been established, the applicant/owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. **Without the information outlined above or a copy of a previous billing statement, the service will remain in the applicant/owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.**
35. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).
36. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards. (DG & PWS, Transportation 4B.025)
37. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.
38. Traffic mitigations as determined by the Traffic Impact Analysis are required. Conditions of Lacey Municipal Code 14.21 shall be satisfied.
39. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located in the Development Guidelines shall be required in or along the public Right-of-Way, including medians. (DG&PWS, Transportation 4G.100)

#### **General Surveying Requirements:**

40. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as "utility" easements on the civil drawings and in the easement document. Specific requirements will be determined at the of

plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).

41. The City of Lacey Coordinate System is a ground scale coordinate system derived from the Washington Coordinate System, NAD 83/91. Units are expressed in feet. Data can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing this coordinate system.(DG&PWS 3.025)
42. City of Lacey Vertical Datum has elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD29). Units are expressed in feet. A benchmark listing can be obtained from Lacey Public Works Department. Civil drawings shall be submitted utilizing the City of Lacey Vertical Datum. (DG&PWS 3.025)
43. Right-of-Way shall be dedicated for a project that requires Site Plan Review approval. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).
44. Immediately adjacent to all public Right of Way a 10-foot joint utility easement area shall be dedicated to accommodate the installation of private and public utilities (2017 Development Guidelines and Public Works Standards Roadway details).

**Other Requirements:**

45. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time complete application is obtained (complete application is determined by the City of Lacey Community Development Department). (LMC )
46. If any part of these comments as established by existing plans, guidelines, codes and the like as established by ordinances shall be found invalid, all other parts shall remain in effect. (DG&PWS 3.035)
47. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval. (DGPWS 3.040)
48. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).



49. Prior to civil drawing approval, one paper set of drawings along with a PDF copy of the drainage report and civil drawings shall be submitted for all approved final plans. (DG&PWS Chapter 3.040,B)
50. Prior to final Public Works Construction approval, “as-built” bonded paper drawings along with the revised civil drawings in AutoCAD and PDF formats shall be submitted for all approved final plans. (DG&PWS Chapter 3.040, J)
51. Certificate of Occupancy for any building will not be issued until all improvements shown on the approved civil drawings are installed by the applicant and approved by the City. (DG&PWS 4B.080)
52. A 20 percent maintenance bond or financial guarantee of the engineer’s estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).
53. Along with the civil review application and the completed, signed and stamped checklist from Chapter 3 of the Development Guidelines, please provide three sets of civil drawings, two drainage reports and one electronic copy of the civil drawings (PDF format). These drawings shall be submitted directly to the City of Lacey Public Works Department. **Drawings submitted to other City departments will not satisfy this requirement.** (DG&PWS 3.040, B)
54. The property owner(s) adjacent to the public Right-of-Way shall be responsible for maintaining the planter strip and street trees (weeding, pruning, irrigating, mowing, etc.) in the public Right-of-Way in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review. (Development Guidelines & Public Works Standards, Transportation 4G.100D).
55. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon occurs causing valve boxes, sewer manholes or other appurtenances to protrude above or settle below the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30 day time period, the City will fix the problem and bill the property owner. This language

shall be included on the face of any binding site plan or easement documents submitted to the City.

56. A Bill of Sale for water, sewer and street lighting improvements being installed with this project is a requirement for approval. Prior to Final Public Works approval of the project, Bill of Sale documents shall be submitted to and approved by the City.

End of Comments

## Samra Seymour

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**From:** Doug Christenson  
**Sent:** Friday, September 18, 2020 12:34 PM  
**To:** Ryan Andrews; Tom Stiles  
**Subject:** RE: Griffin Multi-Family 32nd Ave. NE. Project no. 19-353.

Hi Ryan,

Thanks for being patient while my review dragged into overtime. This project was relatively complex from a stormwater perspective, with various subsurface and facility aspects to consider, so it has taken me longer to process. Overall, the drainage report and plan are pretty complete and well-presented, but I have a few concerns.

My main concern has to do with a technicality in the permeable pavement that is proposed for some parking areas, where a 6" sand layer is proposed to provide treatment. Trouble is, this approach doesn't automatically meet the enhanced treatment standard of our manual. However, I will okay this project for preliminary stormwater acceptance, but would like to include the following as a condition of approval, to be addressed in the civil plans:

Enhanced treatment of stormwater is required for all pollution-generating surfaces. For permeable pavement, the underlying soil shall meet the Soil Suitability Criteria in Section 8.6.3 of the 2016 Stormwater Design Manual. Alternatively, a treatment course may be included in the pavement section if supporting information is provided to verify that the enhanced treatment standard is met.

Thank you,  
Doug

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**From:** Ryan Andrews  
**Sent:** Friday, September 18, 2020 10:14 AM  
**To:** Tom Stiles ; Doug Christenson  
**Subject:** Griffin Multi-Family 32nd Ave. NE. Project no. 19-353.

Hi Tom and Doug. The comment period on this project ended last week. I am checking with both of you on the status of your comments as I have gotten all comments back except for PW and stormwater.

Thanks!  
-Ryan



**CITY COUNCIL**  
ANDY RYDER  
*Mayor*  
CYNTHIA PRATT  
*Deputy Mayor*

CAROLYN COX  
ED KUNKEL  
LENNY GREENSTEIN  
MALCOLM MILLER  
MICHAEL STEADMAN

**CITY MANAGER**  
SCOTT SPENCE

September 9, 2020

Gregary Heath, PE  
2214 Tacoma Road  
Puyallup, WA 98371

**SUBJECT: Griffin Multi-Family, 19-353, Traffic Impact Analysis Approval**

Dear Mr. Heath:

I have reviewed the Transportation Impact Analysis (TIA) for this project, and recommended approval based on the following conditions:

**City of Lacey Mitigation**

According to the TIA, which was prepared according to the requirements of the City of Lacey's Development Guidelines and Public Works Standards, the project will generate over 50 trips during the PM Peak Hour.

The TIA included a trip distribution based on the City of Lacey Existing Plus Committed Regional Traffic Model. This distribution was used to calculate traffic mitigation fees required to offsite traffic impacts according to LMC 14.21. A tabulation of the calculated mitigation fee is attached.

The actual fee will be determined at the date of payment for issuance of the building permit, water meter, or other approval process. The fee shall be increased on July 1, and each year thereafter in an amount equal to the increase in the Engineering News Record Construction Cost Index.

The TIA identified the intersection of Marvin Road NE and 32<sup>nd</sup> Avenue NE as having a level of service of F with the project and previously approved pipeline projects, which is below the City standards. However, the proposed access on Gateway Boulevard will improve connectivity and create an alternate route for residents and is therefore an acceptable mitigation strategy.

**Thurston County Mitigation**

Thurston County has requested a traffic mitigation fee of \$47,145 to mitigate offsite impacts. Please find the county's mitigation attached.

**Multi-Modal Mitigation**

According to the Thurston Regional Planning Council's 1999 Household Travel Survey, 5.6% of all trips are made by bicycling or walking. This project is expected to generate a similar number of pedestrians and cyclists. The Transportation Comprehensive Plan identifies the need for sidewalk, bike lanes and other facilities to

accommodate multi-modal transportation. The multi-modal impacts from this project shall be mitigated by constructing frontage improvements according to Lacey's standards.

### **Site Plan**

The gated accesses must meet section 4B.075 of the Development Guidelines.

If you have any questions, please contact me at (360) 438-2680.

Sincerely,

A handwritten signature in cursive script that reads "Christopher Stolberg".

Christopher Stolberg, EIT  
Transportation Engineer

Cc: Michele Capestany, Traffic Mitigation Coordinator  
Tom Stiles, Development Review Manager  
Samra Seymour, Senior Planner  
Ryan Andrews, Planning Manager  
File

# Commercial Traffic Mitigation Fee Estimate

File/ Parcel Number: 1180314-0300, -0400, -0401  
 Thurston County Project Number 2020101505  
 Lacey PW File #: 19-353  
 Project Description: Griffin Multi-Family

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ITE Land Use Code: 221  
 Land Use Name: (Multifamily Housing (Mid-Rise))  
 Trip Rate: 0.44  
 Per: ( Dwelling Units)  
 During: (Weekday, PM Peak of Adj. Street, 1 hr. 4-6 PM)  
 Units 183  
 Total Project Trips Generated: 81  
 Internal Capture Rate:  
 Passby Rate: 0.00%  
 New Trips 81  
 Traffic Analysis Zone: 508  
 Total Trips in TAZ: 232

Updated: \_\_\_\_\_  
 Updated: \_\_\_\_\_  
 Updated: \_\_\_\_\_  
 Created: 09/09/2020 CRS

| Account Number                                          | Project                                                               | 2020/2021<br>Cost per<br>Trip | TAZ Trips @<br>project | Distrib.<br>Percent | Project<br>Trips<br>Generated | Commercial<br>Credit | 2020/2021 Traffic<br>Mitigation |
|---------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------|------------------------|---------------------|-------------------------------|----------------------|---------------------------------|
| 102-0000-224.50-03                                      | 45th Avenue and College Street Improvements                           | \$ 380.02                     | 4                      | 1.7%                | 1.0                           | 0.5                  | \$ 190.01                       |
| 102-0000-224.50-23                                      | Sleater-Kinney at 14th Ave Improvements                               | \$ 267.45                     | 1                      | 0.4%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-25                                      | College Street Extension NE                                           | \$ 1,008.65                   | 16                     | 6.9%                | 6.0                           | 3.0                  | \$ 3,025.95                     |
| 102-0000-224.50-28                                      | Carpenter Road Capacity /Safety Improvements<br>Pacific to Shady Lane | \$ 1,176.76                   | 3                      | 1.3%                | 1.0                           | 0.5                  | \$ 588.38                       |
| 102-0000-224.50-29                                      | Mullen Road Capacity/Safety Improvements East<br>of Ruddell           | \$ 1,296.97                   | -                      | 0.0%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-33                                      | Martin Way & I-5 Interchange Improvements                             | \$ 1,296.97                   | -                      | 0.0%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-38                                      | Carpenter Rd from Martin Way to Britton<br>Parkway                    | \$ 1,296.97                   | 9                      | 3.9%                | 3.0                           | 1.5                  | \$ 1,945.46                     |
| 102-0000-224.50-39                                      | Marvin Road-- Britton to Columbia Drive NE                            | \$ 1,296.97                   | 232                    | 100.0%              | 81.0                          | 40.5                 | \$ 52,527.29                    |
| 102-0000-224.50-40                                      | Rainier Road from Yelm Hwy to City Limits (near<br>Beckonridge)       | \$ 764.90                     | 3                      | 1.3%                | 1.0                           | 0.5                  | \$ 382.45                       |
| 102-0000-224.50-41                                      | Yelm Highway Improvements Ruddell Road to<br>East City Limits         | \$ 1,296.97                   | 1                      | 0.4%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-42                                      | 6th Avenue / Sleater Kinney Improvements                              | \$ 1,296.97                   | 2                      | 0.9%                | 1.0                           | 0.5                  | \$ 648.49                       |
| 102-0000-224.50-43                                      | Golf Club Road Extension                                              | \$ 176.55                     | -                      | 0.0%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-44                                      | Martin Way / Hoh Street Intersection<br>Improvements                  | \$ 235.40                     | 1                      | 0.4%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-45                                      | Willamette Drive / 31st Ave Intersection<br>Improvements              | \$ 294.25                     | 5                      | 2.2%                | 2.0                           | 1.0                  | \$ 294.25                       |
| 102-0000-224.50-46                                      | Hogum Bay Road Improvements                                           | \$ 1,296.97                   | 12                     | 5.2%                | 4.0                           | 2.0                  | \$ 2,593.94                     |
| 102-0000-224.50-47                                      | Carpenter Rd/Mullen Rd Intersection<br>Improvements                   | \$ 342.54                     | 1                      | 0.4%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-49                                      | College Street Reconstruction -- Lacey Blvd to<br>37th Ave            | \$ 1,296.97                   | 8                      | 3.4%                | 3.0                           | 1.5                  | \$ 1,945.46                     |
| 102-0000-224.50-50                                      | Marvin Road and Britton Parkway Intersection<br>Improvements          | \$ 103.92                     | 149                    | 64.2%               | 52.0                          | 26.0                 | \$ 2,701.92                     |
| 102-0000-224.50-51                                      | 31st Avenue Extension Hogum Bay to Marvin<br>Road                     | \$ 1,296.97                   | 150                    | 64.7%               | 52.0                          | 26.0                 | \$ 33,721.22                    |
| 102-0000-224.50-52                                      | Britton Parkway and Carpenter Road Intersection<br>Improvements       | \$ 379.88                     | 26                     | 11.2%               | 9.0                           | 4.5                  | \$ 1,709.46                     |
| 102-0000-224.50-58                                      | Willamette Drive / Campus Glen Drive<br>Roundabout                    | \$ 498.82                     | -                      | 0.0%                | -                             | -                    | \$ -                            |
| 102-0000-224.50-53                                      | 2 & 3 Axle Truck Trip Fee                                             | \$ 886.09                     |                        |                     | -                             |                      | \$ -                            |
| 102-0000-224.50-54                                      | 4 - 6 Axle Truck Trip Fee                                             | \$ 2,944.91                   |                        |                     | -                             | -                    | \$ -                            |
| <b>CITY OF LACEY PROPORTIONATE SHARE<br/>MITIGATION</b> |                                                                       |                               |                        |                     |                               |                      | <b>\$ 102,274.26</b>            |

Note: This estimate is prepared with the best available information. The City reserves the right to update this estimate at any time.

|                                                 |  |                                                          |  |
|-------------------------------------------------|--|----------------------------------------------------------|--|
| County Project Reviewer <u>Arthur Saint, PE</u> |  | Date <u>9/8/2020</u>                                     |  |
| Permit Type <u>City of Lacey, Multi-Family</u>  |  | Ref. Traffic Analysis (Firm, Date) <u>Heath 6-18-20</u>  |  |
| Permit No. <u>2020101505</u>                    |  | Project Description <u>183 Unit Multi-family complex</u> |  |
| Permit Name <u>Griffin Multi-Family</u>         |  | Number of New Trips <u>81</u>                            |  |

| County Road<br>Project No. | Capital Facility Project Description                      | Project Cost<br><small>in Thousands of Dollars</small> | Constant<br>Denominator | Per Trip<br>Cost | New<br>Trips | Mitigation                               |
|----------------------------|-----------------------------------------------------------|--------------------------------------------------------|-------------------------|------------------|--------------|------------------------------------------|
| 61335A                     | 15th Ave (Olympia City Limits - Draham)                   | \$8,000,000                                            | 4000                    | \$2,000          | 6            | \$12,000                                 |
| 61335B                     | Draham St NE (15th- Carpenter)                            | \$3,000,000                                            | 4000                    | \$750            | 6            | \$4,500                                  |
| 61364                      | Johnson Point Rd/Hawks Prairie Rd Intersection            | \$500,000                                              | 3500                    | \$143            | 10           | \$1,430                                  |
| 61338                      | Meridian Rd (Martin Way- City Limits)                     | \$2,000,000                                            | 4000                    | \$500            | 1            | \$500                                    |
| 61318                      | Yelm Highway & Meridian Rd Intersection Improvements      | \$2,500,000                                            | 3500                    | \$715            | 1            | \$715                                    |
| 61478                      | Marvin Road (Pacific Ave/SR 510 to Mullen)- full buildout | \$28,000,000                                           | 4000                    | \$7,000          | 4            | \$28,000                                 |
| Affected Jurisdictions     |                                                           |                                                        |                         |                  |              | <b>THURSTON COUNTY SUBTOTAL \$47,145</b> |
|                            |                                                           |                                                        |                         |                  |              |                                          |
|                            |                                                           |                                                        |                         |                  |              |                                          |
|                            |                                                           |                                                        |                         |                  |              |                                          |
|                            |                                                           |                                                        |                         |                  |              |                                          |
| <b>TOTAL</b>               |                                                           |                                                        |                         |                  |              | <b>\$47,145</b>                          |

**NOTES:**

1. This estimate was prepared with the best available information. The traffic mitigation estimate will be updated annually based on the most current Capital Facilities Plan (CFP).
2. All traffic mitigation unless otherwise noted are due prior to final plat approval, certificate of occupancy or final project acceptance.
3. Project Number: Accounting number for Capital Facility Project.
4. Trip "Hits": Project generated trips intersecting or passing through the project limits of a particular capital facilities project.
5. Project Cost: Please refer to the County Comprehensive Plan, Capital Facility Chapter for additional information.
6. Consistent Denominator: This number represents the capacity at or near Level of Service 'D' or 'C' in the urban and rural areas respectively under ideal conditions as described in the Highway Capacity Manual.
7. The Project cost for Yelm Highway Capacity Project (Henderson to Blvd) has been reduced by \$1,052,000 to reflect the City of Olympia owned/maintained portion.





COUNTY COMMISSIONERS

John Hutchings  
District One

Gary Edwards  
District Two

Tye Menser  
District Three



**PUBLIC WORKS**

An Accredited Agency of the  
American Public Works Association

Jennifer D. Walker, PMP  
Director

September 17, 2020

Chris Stolberg  
City Of Lacey  
420 COLLEGE ST SE  
LACEY WA 98503-1238

SUBJECT: **Giffin Mult-Family, Folder Sequence#20-104202**  
**Project #: 2020101505**

REFERENCE: Traffic Impact Analysis – Dated 6-18-20

Dear Mr. Stolberg:

Upon review of the proposed project referenced above, Public Works has the following comment:

1. To mitigate traffic impacts within Thurston County, the proponent will need to contribute \$ 143 to Thurston County Public Works prior to final project approval, pursuant to County Road Standards and Title 17.10 of the Thurston County Code. See attached worksheet prepared by county staff for project specific details.

If you have any questions or comments, please call me at (360) 867-2043.

Sincerely,

Arthur Saint, PE  
Thurston County Public Works  
Development Review Section

Attachment: Traffic Mitigation Worksheet

|                                                 |  |                                                          |  |
|-------------------------------------------------|--|----------------------------------------------------------|--|
| County Project Reviewer <u>Arthur Saint, PE</u> |  | Date <u>9/17/2020</u>                                    |  |
| Permit Type <u>City of Lacey, Multi-Family</u>  |  | Ref. Traffic Analysis (Firm, Date) <u>Heath 6-18-20</u>  |  |
| Permit No. <u>2020101505</u>                    |  | Project Description <u>183 Unit Multi-family complex</u> |  |
| Permit Name <u>Griffin Multi-Family</u>         |  | Number of New Trips <u>81</u>                            |  |

| County Road Project No.       | Capital Facility Project Description           | Project Cost<br><small>in Thousands of Dollars</small> | Constant Denominator | Per Trip Cost | New Trips | Mitigation                      |
|-------------------------------|------------------------------------------------|--------------------------------------------------------|----------------------|---------------|-----------|---------------------------------|
| 61364                         | Johnson Point Rd/Hawks Prairie Rd Intersection | \$500,000                                              | 3500                 | \$143         | 1         | \$143                           |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
| <b>Affected Jurisdictions</b> |                                                |                                                        |                      |               |           | <b>THURSTON COUNTY SUBTOTAL</b> |
|                               |                                                |                                                        |                      |               |           | <b>\$143</b>                    |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
|                               |                                                |                                                        |                      |               |           |                                 |
| <b>TOTAL</b>                  |                                                |                                                        |                      |               |           | <b>\$143</b>                    |

**NOTES:**

1. This estimate was prepared with the best available information. The traffic mitigation estimate will be updated annually based on the most current Capital Facilities Plan (CFP).
2. All traffic mitigation unless otherwise noted are due prior to final plat approval, certificate of occupancy or final project acceptance.
3. Project Number: Accounting number for Capital Facility Project.
4. Trip "Hits": Project generated trips intersecting or passing through the project limits of a particular capital facilities project.
5. Project Cost: Please refer to the County Comprehensive Plan, Capital Facility Chapter for additional information.
6. Consistent Denominator: This number represents the capacity at or near Level of Service 'D' or 'C' in the urban and rural areas respectively under ideal conditions as described in the Highway Capacity Manual.
7. The Project cost for Yelm Highway Capacity Project (Henderson to Blvd) has been reduced by \$1,052,000 to reflect the City of Olympia owned/maintained portion.



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

*PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300  
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341*

September 9, 2020

Ryan Andrews, Planning Manager  
City of Lacey  
Community Development Department  
PO Box 3400  
Lacey, WA 98509-3400

Dear Ryan Andrews:

Thank you for the opportunity to comment on the optional determination of nonsignificance/notice of application for the Gateway Multifamily Complex Project (19-353) as proposed by SW Olympia LLC. The Department of Ecology (Ecology) reviewed the environmental checklist and has the following comment(s):

**SOLID WASTE MANAGEMENT: Derek Rockett (360) 407-6287**

All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from the local jurisdictional health department prior to filling. All removed debris resulting from this project must be disposed of at an approved site. Contact the local jurisdictional health department for proper management of these materials.

**TOXICS CLEANUP/TACOMA SMELTER PLUME:**

**Eva Barber, Technical Assistance Coordinator (360) 407-7094**

This proposed project is located in an area that may have been contaminated with heavy metals due to the air emissions originating from the old Asarco smelter in north Tacoma (visit Ecology's Tacoma Smelter Plume map search tool:

<https://fortress.wa.gov/ecy/smeltersearch/>).

Soil contamination from the former Asarco smelter poses a risk to human health and the environment. Children are at especially high risk from direct exposure to contaminated soil. Construction workers, landscapers, gardeners, and others who work in the soils are also at risk.

Ecology recommends that the lead agency include the following as conditions of approval, prior to the issuance of any site development permits or the initiation of grading, filling, or clearing:

- Sample the soil and analyze for arsenic and lead following the [2012 Tacoma Smelter Plume Guidance](#). The soil sampling results shall be sent to Ecology for review. If the project includes open space areas, contact the Technical Assistance Coordinator, Eva Barber, for assistance in soil sampling methodology within the open space area.
- If lead or arsenic are found at concentrations above the Model Toxics Control Act (MTCA) cleanup levels (Chapter 173-340 WAC); the owners, potential buyers, construction workers, and others shall be notified of their occurrence. The MTCA cleanup level for arsenic is 20 parts per million (ppm) and lead is 250 ppm.
- If lead, arsenic and/or other contaminants are found at concentrations above MTCA cleanup levels, the applicant shall:
  - 1) Develop soil remediation plan and enter into the Voluntary Cleanup Program with Ecology. For more information on the Voluntary Cleanup Program, visit Ecology's website at: <http://www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm>.
  - 2) Obtain an opinion letter from Ecology stating that the proposed soil remediation plan will likely result in no further action under MTCA. The applicant shall provide to the local land use permitting agency the opinion letter from Ecology.
  - 3) Prior to finalizing site development permits, provide to the local land use permitting agency "No Further Action" determination from Ecology indicating that the remediation plans were successfully implemented under MTCA.
- If soils are found to be contaminated with arsenic, lead, or other contaminants, extra precautions shall be taken to avoid escaping dust, soil erosion, and water pollution during grading and site construction. Site design shall include protective measures to isolate or remove contaminated soils from public spaces, yards, and children's play areas. Contaminated soils generated during site construction shall be managed and disposed of in accordance with state and local regulations, including the Solid Waste Handling Standards regulation (Chapter 173-350 WAC). For information about soil disposal contact the local health department in the jurisdiction where soils will be placed.

The link below provides a fact sheet that explains more how the arsenic and lead clean-up levels were set and why Ecology sees that they are protective for human health:  
<https://fortress.wa.gov/ecy/publications/SummaryPages/1109095.html>.

For assistance and information about Tacoma Smelter Plume and soils contamination, the applicant shall contact, Eva Barber with the Toxics Cleanup Program at (360) 407-7094 or via email at [Eva.Barber@ecy.wa.gov](mailto:Eva.Barber@ecy.wa.gov).

**TOXICS CLEANUP: Thomas Middleton (360) 407-7263**

If contamination is suspected, discovered, or occurs during the proposed SEPA action, testing of the potentially contaminated media must be conducted. If contamination of soil or groundwater is readily apparent, or is revealed by testing, Ecology must be notified. Contact the Environmental Report Tracking System Coordinator for the Southwest Regional Office (SWRO) at (360) 407-6300. For assistance and information about subsequent cleanup and to identify the type of testing that will be required, contact Thomas Middleton with the SWRO, Toxics Cleanup Program at (360) 407-7263.

**WATER QUALITY/WATERSHED RESOURCES UNIT:  
Morgan Maupin (360) 407-7320**

Construction Stormwater General Permit (CSWGP) is required.

Construction Stormwater General Permit:

The following construction activities require coverage under the Construction Stormwater General Permit:

1. Clearing, grading and/or excavation that results in the disturbance of one or more acres **and** discharges stormwater to surface waters of the State; and
2. Clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more **and** discharge stormwater to surface waters of the State.
  - a) This includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, **and** discharge to surface waters of the State; and
3. Any size construction activity discharging stormwater to waters of the State that Ecology:
  - a) Determines to be a significant contributor of pollutants to waters of the State of Washington.
  - b) Reasonably expects to cause a violation of any water quality standard.

If there are known soil/ground water contaminants present on-site, additional information (including, but not limited to: temporary erosion and sediment control plans; stormwater pollution prevention plan; list of known contaminants with concentrations and depths found; a site map depicting the sample location(s); and additional studies/reports regarding contaminant(s)) will be required to be submitted. For additional information on contaminated construction sites, please contact Carol Serdar at [Carol.Serdar@ecy.wa.gov](mailto:Carol.Serdar@ecy.wa.gov), or by phone at (360) 742-9751.

Additionally, sites that discharge to segments of waterbodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorous, or to waterbodies covered by a TMDL may need to meet additional sampling and record keeping requirements. See condition S8 of the Construction Stormwater General Permit for a description of these requirements. To see if your site discharges to a TMDL or 303(d)-listed waterbody, use Ecology's Water Quality Atlas at: <https://fortress.wa.gov/ecy/waterqualityatlas/StartPage.aspx>.

The applicant may apply online or obtain an application from Ecology's website at: [http://www.ecy.wa.gov/programs/wq/stormwater/construction/- Application](http://www.ecy.wa.gov/programs/wq/stormwater/construction/-Application). Construction site operators must apply for a permit at least 60 days prior to discharging stormwater from construction activities and must submit it on or before the date of the first public notice.

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology  
Southwest Regional Office

(GMP:202004436)

cc: Derek Rockett, SWM  
Eva Barber, TCP  
Thomas Middleton, TCP  
Morgan Maupin, WQ  
Scott Griffin, SW Olympia LLC (Contact)  
Chris Aldrich, Hatton Godat Pantier (Contact)

## Samra Seymour

---

**From:** Chris Stolberg  
**Sent:** Tuesday, February 02, 2021 1:21 PM  
**To:** 'Chris Aldrich'  
**Cc:** Samra Seymour  
**Subject:** RE: Griffin MF (Lacey #19-353)

Hi Chris,

What you've shown is acceptable for the minimum entrance lengths. I think it is reasonable to split the volumes 50/50 because that matches what was in the TIA.

Thanks,

Chris Stolberg, EIT  
Transportation Engineer  
City of Lacey  
(360) 438-2640  
[cstolber@ci.lacey.wa.us](mailto:cstolber@ci.lacey.wa.us)

---

**From:** Chris Aldrich <ChrisA@hattonpantier.com>  
**Sent:** Monday, February 1, 2021 9:46 PM  
**To:** Chris Stolberg <CStolber@ci.lacey.wa.us>  
**Cc:** Samra Seymour <Sseymour@ci.lacey.wa.us>  
**Subject:** FW: Griffin MF (Lacey #19-353)

External Email Warning! Use caution before clicking links or opening attachments.

Thanks Chris! 🙏

---

**From:** Chris Aldrich  
**Sent:** Monday, February 1, 2021 2:33 PM  
**To:** Samra Seymour <[Sseymour@ci.lacey.wa.us](mailto:Sseymour@ci.lacey.wa.us)>; [cstolberg@ci.lacey.wa.us](mailto:cstolberg@ci.lacey.wa.us)  
**Cc:** Jeff Pantier <[JeffP@hattonpantier.com](mailto:JeffP@hattonpantier.com)>  
**Subject:** Griffin MF (Lacey #19-353)

Chris-

Thanks for your last minute input on this. Sounds like you're ok with a 50/50 split of PMPH trips to apply at each gated entry for Griffin MF project. With 81 PMPH trips x 50% north/50% south, the MINIMUM entrance queue would need to be:  $81 \text{ trips} \times 50\% = 40.5 \times .5' / \text{trip} = 21' \text{ min.}$

The south entrance has over 46', and I'm attaching a diagram showing we can meet that 21' for the north entrance on 32<sup>nd</sup>. (Currently the site plan has it at 20' so there would be a little tweak to final plans.)

Could you please confirm via email to Samra this is ok with your department? Thank you!

Chris Aldrich, RLA Planning Manager  
Hatton GODAT Pantier



3910 Martin Way E, Suite B  
Olympia, WA 98506  
Phone 360-943-1599 x 124  
Fax 360-357-6299  
Cell 360-561-8586  
[www.hattonpantier.com](http://www.hattonpantier.com)

**32ND AVE NE**

**TREE TRACT 1**

**X=21' MIN**

BSB, BSBL, BSL labels indicating boundary lines.

A north arrow pointing towards the top right corner.

# GATED ENTRANCE - NORTH QUEUING DISTANCE



# NORTH THURSTON PUBLIC SCHOOLS

CONSTRUCTION & DESIGN • 6620 CARPENTER ROAD S.E. • LACEY, WASHINGTON 98503  
TELEPHONE (360) 412-4500 • FAX (360) 412-4505 • WWW.NTHURSTON.K12.WA.US

December 13, 2019

Ms. Samra Seymour, Senior Planner  
City of Lacey, Department of Community Development  
420 College St. SE  
Lacey, WA 98503

RE: NORTH THURSTON PUBLIC SCHOOLS NO. 3  
Comments Re: 19-353 Freestone Co / Griffin 7201, 7203, 7235 NE 32 Ave (3 lots)

Dear Ms. Seymour:

North Thurston Public Schools (NTPS) received the City of Lacey's request for review of the proposed Project 19-353 Freestone Co / Griffin 7201, 7203, 7235 NE 32 Ave (3 lots). NTPS has had the opportunity to review the application for the proposed development which the City forwarded along with the notice. In response to your consultation request, NTPS provides the following:

The proposed development will create additional residential units within North Thurston Public Schools boundaries. The proposed residential units are planned to be served by South Bay Elementary School, Chinook Middle School and North Thurston High School.

NTPS has determined that future proposed housing units will generate approximately .40 FTE per multi-family unit. This determination is based on multipliers derived from the attached Student Generation Factor worksheet for NTPS and U.S. Census data as presented in Demographic Multipliers for Common Configurations of Standard Housing Types for School Age Children from U.S. Department of Commerce.

As described in the district's Capital Facilities Plan (CFP), NTPS schools are over capacity. NTPS does not own sufficient land for additional schools nor sufficient facilities to house the projected additional students generated by the proposed development. Purchases of land with available water and sewer service, temporary classrooms and future facilities to house children are anticipated as a result of the increased enrollment projected from new residences such as this subdivision. In addition, sidewalks and bus facilities must be created to provide safe walking routes and transportation services for school children.

The cost of purchasing land and temporary classrooms and constructing new school facilities is estimated to be \$1,329 per each new multi-family residential unit. This assessment of costs is based upon Appendix A of the CFP, Tables 18 and 19. The district adjusts this assessment annually to reflect the district's current costs. Therefore, for the 182 multi-family units proposed under this application, the cost of mitigating impacts is found to be \$241,878. Such costs are subject to inflation.

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# NORTH THURSTON PUBLIC SCHOOLS

CONSTRUCTION & DESIGN • 6620 CARPENTER ROAD S.E. • LACEY, WASHINGTON 98503  
TELEPHONE (360) 412-4500 • FAX (360) 412-4505 • WWW.NTHURSTON.K12.WA.US

The State Environmental Policy Act requires proposed developments to mitigate probable significant adverse environmental impacts on the environment, which includes public schools. See WAC 197-11-444(2)(d)(iii). The addition of new students to NTPS facilities as a result of the proposed future development constitutes such an impact. Similarly, the State Subdivision Act, in RCW 58.17.110(2), requires that the permitting jurisdiction find that proposed plats adequately provide for schools and school grounds. The proposed development must provide mitigation to ensure that such facilities are available for the future proposed new residents.

For these reasons, NTPS has determined that mitigation measures are needed to compensate for the impact of the increased student enrollment that this development will generate on its schools. NTPS asks that the City note such mitigation measures in the City's staff report for consideration of the proposed application, in its SEPA threshold determination, and on the face of the plat when recorded.

If the proponent of this proposed development provides NTPS with evidence that the assumptions of the CFP's Appendix A are not applicable to its proposed new units, NTPS may revise this assessment. NTPS may consider unusual circumstances of specific developments and may adjust the projected fee amount for specific developments if necessary. Should the developer provide NTPS with cause to revise its assessment, NTPS shall set forth its reasons for adjusting the fee in written findings submitted to the City by letter.

Finally, we would appreciate it if the City would promptly provide us notice of the date and time of any hearing on the proposal and a copy of any environmental determination made or other notice generated concerning this proposed project. These comments are provided based upon the information that has been made available to NTPS at this time. Please note that NTPS reserves its rights to provide further and additional comments on this application.

Thank you for the opportunity to respond concerning this proposed development. Please call me at (360) 412-4500 if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dean Martinolich", is written over a horizontal line.

Dean Martinolich  
Director of Construction & Design

cc: Dr. Debra Clemens, Superintendent, NTPS  
Monty Sabin, Assistant Superintendent of Operations, NTPS  
John Suessman, Director of Transportation, NTPS  
Amy Richardson, Principal of South Bay Elementary, NTPS

**Samra Seymour**

---

**From:** LPMc <lespetmcc@gmail.com>  
**Sent:** Friday, September 04, 2020 12:45 PM  
**To:** Ryan Andrews  
**Subject:** Apartment Complex

External Email Warning! Use caution before clicking links or opening attachments.

Hello Ryan,

We've been informed about 183 apartments coming to Lacey. My question is per usual: **Where will the trees be replanted?** In fact, **Tree City** should be telling us where *all of this development* is going to be responsible for planting trees? The Hawk's Prairie area seems to be getting more than our share of new projects and some of them have destroyed way more trees than they should have. Again, **please tell me where to look for all the new planting?**

Many of us moved here because of the trees and their ability to provide oxygen and also for their beauty.

Thanks,

Leslie McClure

## Samra Seymour

---

**From:** ken zych <zychka@gmail.com>  
**Sent:** Friday, September 04, 2020 9:05 PM  
**To:** Ryan Andrews  
**Cc:** Karen Samaras; Bill Samaras  
**Subject:** Apartments

External Email Warning! Use caution before clicking links or opening attachments.

I live in NE Lacey and I oppose the plan for 183 apartments that will be spread across 12 buildings on about 9.5 acres in the 7200 block of 32nd Avenue Northeast. The increased traffic and impact on the environment as well as schools will be detrimental to the quality of life for existing residents. Please let me know when the public hearing will be held so I can voice my opposition in person.

Kenneth Zych  
9116 52nd Lane NE  
Lacey, WA 98516

**Samra Seymour**

---

**From:** portia <portiababy4@gmail.com>  
**Sent:** Sunday, September 06, 2020 2:21 PM  
**To:** Ryan Andrews  
**Subject:** Apt complex

External Email Warning! Use caution before clicking links or opening attachments.

NO to the proposed giant apt complex in Hawks prairie off Marvin. There is already too many apt and too much traffic. WE DON'T NEED OR WANT MORE APARTMENTS!!!!!! WE DON'T WANT MORE CALIFORNIA SCUM MOVING HERE!!! WE DON'T NEED MORE PEOPLE IN AN ALREADY CROWDED AREA THAT HAS WATER PROBLEMS!!!!

NO TO THE GREEDY DEVELOPER!!!!  
NO NO NO NO!!!!



## Samra Seymour

---

**From:** Marcie Cleaver <gairhart@comcast.net>  
**Sent:** Friday, September 04, 2020 6:02 PM  
**To:** Ryan Andrews  
**Subject:** FW: COMMENTS FOR PROPOSED APARTMENT BUILDING 7235 32AVE NE LACEY

External Email Warning! Use caution before clicking links or opening attachments.

Hello Randy,

I have some comments for the proposed apartment building off Marvin Road, 7235 32 Ave NE in Lacey

- How do you propose to handle all the traffic wanting to get onto Marvin Road. This area is already a busy area. Please look at this and try to mitigate the best you can. It can be a real mess during commuter times. Yes, the new diamond interchange will help but that benefit will soon dissipate as more and more warehouse, residential/apartment units are built in the area.
- Best to have some lower than market rate units. This provides for those with entry level jobs like teachers and others who are working but can't pay the \$1200 or more per month for an apartment. With that number of market rate units they can afford to have some that are reserved for entry level job salaried position jobs. Make sure they really go to those with lower incomes, not like in Bellevue where there was fraud going on and higher income folks were living in low rent units.
- How do you propose to mitigate for all the impervious surfaces? Ideally all the storm water will remain on site for filtration and absorption into the soils. There are a lot of best practices out there, you may already require this by code, I don't know.
- Can you mandate/ask for some electric car charging stations. This would make their units more desirable to EV owners and promote more folks to purchase them.
- Does the city have green standards or incentives for high efficiency furnaces, solar arrays, green building standards such as better windows and thermal breaks? High efficiency units go for a premium in Seattle. Why not have a building or two be high efficiency with possible higher unit rents but the tenant would gain that back with lower utility bills. Some renters are willing to pay more for green units.
- Use native plants such as current bushes and Oregon grape that provide for pollinator and bird nourishment. These require less water, survive better and are a win-win in my opinion. Seems that there is going to be loss of habitat so the lease they can do is something like this. Better yet would be a wildflower area but this takes some maintenance. However, they may be willing given the wonderful color and beauty this provides. What a vista in the spring and summer if they choose to irrigate!

These are some of my thoughts. I have not commented before on something like this so I may have farfetched ideas but I think it is in the direction the City of Lacey should move towards.

Thanks for listening.

Cordially,

Marcie

## Samra Seymour

---

**From:** Jenny Gessler - Le-Vel <jliska04@gmail.com>  
**Sent:** Tuesday, September 08, 2020 9:42 AM  
**To:** Ryan Andrews  
**Subject:** Proposed Development on 32nd Ave

External Email Warning! Use caution before clicking links or opening attachments.

Hi Ryan,

I am submitting my concern over the apartment development proposed for 32nd Ave. I was quite vocal about the duplexes that were going in next to our neighborhood off Bonanza Dr.

I saw on Zillow that the adjacent properties were purchased and then it was mentioned by city employees that the other parcels would be developed in the future as well. I mistakenly assumed those properties would be developed the same way (higher end duplexes). Now we are going to have 183 apartments! What kind of apartments? Higher end units or low income living?

My concerns:

32nd isn't developed now to support the traffic. I was told that as the developments came, sidewalks and street lights would be put in. Well drive that road and see how the already existing business plots and other residential areas have not and are likely not required to install lights and sidewalks. So the development will put those in but that does not account for the increase in traffic and that other existing developments will not be putting them in.

Do the local schools have room to support the increase in kids?

Do we have the fire station resources for the increase in development? As HP has grown have we added to the manning and resources within the FD?

Has the local police staffing been increased for the non stop development in the HP area?

Traffic increase - the city response will be that this development will exit off 31st as well correct? And that the new roundabout at 31st will alleviate congestion?

Thank you for your time.

Kind Regards,

Jenny & Mike Gessler



**CITY COUNCIL**  
ANDY RYDER  
*Mayor*  
CYNTHIA PRATT  
*Deputy Mayor*

LENNY GREENSTEIN  
MICHAEL STEADMAN  
CAROLYN COX  
ED KUNKEL  
MALCOLM MILLER

**CITY MANAGER**  
SCOTT SPENCE

## **DETERMINATION OF NONSIGNIFICANCE**

SEPA/Case Number: 19-353

**Description of Proposal:** Construction of a 183-unit multi-family complex consisting of 12 apartment buildings, an office building, and associated parking and utilities on a 9.54 acre site zoned Moderate Density Residential

**Proponent:** SW Olympia LLC – Scott Griffin

**Location of Proposal:** 7235/7201/7203 32<sup>nd</sup> Ave NE, Lacey, Thurston County, Washington. Assessor's parcels 11803140300, 11803130400, and 11803130401

**Lead Agency:** City of Lacey Community Development Department

**Threshold Determination:** As provided by RCW 43.21C.240 and WAC 197-11-158, the lead agency has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the applicable development regulations and comprehensive plan adopted under Chapter 36.70A RCW and in other local, state, or federal laws or rules. Therefore, this proposal is not likely to have a significant adverse impact upon the environment, an Environmental Impact Statement is not required under RCW 43.21C.030(2)(C), and the City of Lacey will not require additional mitigation measures under SEPA. This decision was made after review of an Environmental Checklist and other information on file with the City. This information is available to the public upon request.

☐ There is no comment period for this DNS.

☐ This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 14 days. Comments must be submitted by [Click **here** and type date]

☒ The comment period, pursuant to WAC 197-11-355, was combined with the Notice of Application comment period, using the Optional DNS Process. The comment period closed on September 9, 2020.

#### Environmental Conditions:

1. Traffic impact fees mitigating impacts to Thurston County roads in the amount totaling \$143 shall be paid prior to building permit issuance to the City of Lacey. The City of Lacey will then forward to Thurston County the collected impact fees.
2. Prior to site disturbing work the soils on site shall be sampled and analyzed for arsenic and lead. The soil sampling results shall be sent to the Department of Ecology (ECY) for review.
3. If lead or arsenic are found at concentrations above the Model Toxics Control Act (MTCA) cleanup levels (WAC 173-340) the owners, potential buyers, construction workers and others shall be notified of their occurrence. The applicant shall also contact the Environmental Report Tracking System Coordinator at the Ecology Southwest Regional Office at (360)407-6300. The MTCA cleanup level for arsenic is 20 ppm and lead is 250 ppm.
4. If lead, arsenic and/or other contaminants are found at concentrations above MTCA cleanup levels, prior to grading permit issuance the applicant shall:
  - a) Enter into the Voluntary Cleanup Program with Ecology prior to issuance of any site development or disturbance permits;
  - b) Obtain an opinion letter from Ecology stating that the proposed soil remediation will likely result in no further action under MTCA;
  - c) Provide the City with written verification from Ecology that development permits are consistent with the cleanup action plan developed under the requirements of the Voluntary Cleanup Program.
5. If soils are found to be contaminated with arsenic, lead or other contaminants, extra precautions shall be taken to avoid escaping dust, soil erosion, and water pollution during grading and site construction. Site design shall include protective measures to isolate or remove contaminated soils from public spaces, yards, and children's play areas.
6. Contaminated soils generated during site construction shall be managed and disposed of in accordance with state and local regulations, including the Solid Waste Handling Standards regulation (WAC 173-350). For information about soil disposal contact the local health department in the jurisdiction where soils will be placed.
7. All mitigation measures volunteered by the developer and described within each element of the submitted environmental checklist shall be implemented into the design and/or development of the proposed development.

#### Findings of Fact:

1. Thurston County Public Works Department provided comments dated September 17, 2020 identifying one County road projects that will be impacted by traffic generated by this proposal. One (1) p.m. peak hour trips will impact County Road

Project No. 61364 Johnson Point Rd/Hawks Prairie Rd Intersection with a proportionate per trip cost of \$143.00 per trip.

2. Based on the review of the application materials and comments received from Thurston County, it is determined that the identified probable significant adverse impact to the Thurston County road system will be mitigated with the payment of traffic impact fees to Thurston County prior to building permit issuance for each building.
3. The Washington State Department of Ecology (Ecology) submitted comments dated September 9, 2020, that identified this property on its Tacoma Asarco Smelter Plume map as one that is likely contaminated with heavy metals due to the air emissions originating from the former Asarco smelter in Tacoma. Additionally, nearby properties have identified contaminants originating from the Asarco Smelter.
4. Soil contamination from the former Asarco smelter poses a risk to human health and the environment. Construction workers, landscapers, gardeners, and others who work in the soils are at risk.
5. Based on information from the Department of Ecology's ongoing Tacoma Smelter Plume Toxics Cleanup Program the Responsible Official has determined that there is potential for soils contaminated with lead and/or arsenic to be located on the subject site. The potential identified probable significant adverse impacts to site development workers and future residents will be mitigated with soil sampling, analysis and a cleanup plan if contamination is found.
6. No other probable significant adverse impacts were identified through the review of the environmental checklist and application materials that would not be addressed and/or governed by the provisions of the Lacey Municipal code.

**Assigned Staff Person:** Samra Seymour, AICP, Senior Planner

**Responsible Official:** Rick Walk, AICP, Director of Community & Economic Development

**Address:** 420 College Street SE, Lacey, WA 98503

**Phone:** (360) 491-5642      **Fax:** (360) 438-2669

**Date:** December 16, 2020      **Signature:**



**Appeal Deadline:** 5:00 p.m. on December 30, 2020

NOTE: Pursuant to RCW 43.21.C.075 and Lacey City Code 14.24.170(A), a project denial based upon environmental information, and a conditioned or mitigated Determination of Nonsignificance (DNS) may be appealed by any agency or aggrieved person. Appeals are filed either with the Community Development Department when there is also an underlying governmental action or with the City Council if there is no underlying governmental action. Appeals to the City Council must be filed within fourteen (14) days of the issuance of the written decision (refer to the Lacey City Code for time periods on appeals filed with the Community Development Department).

cc: Department of Ecology



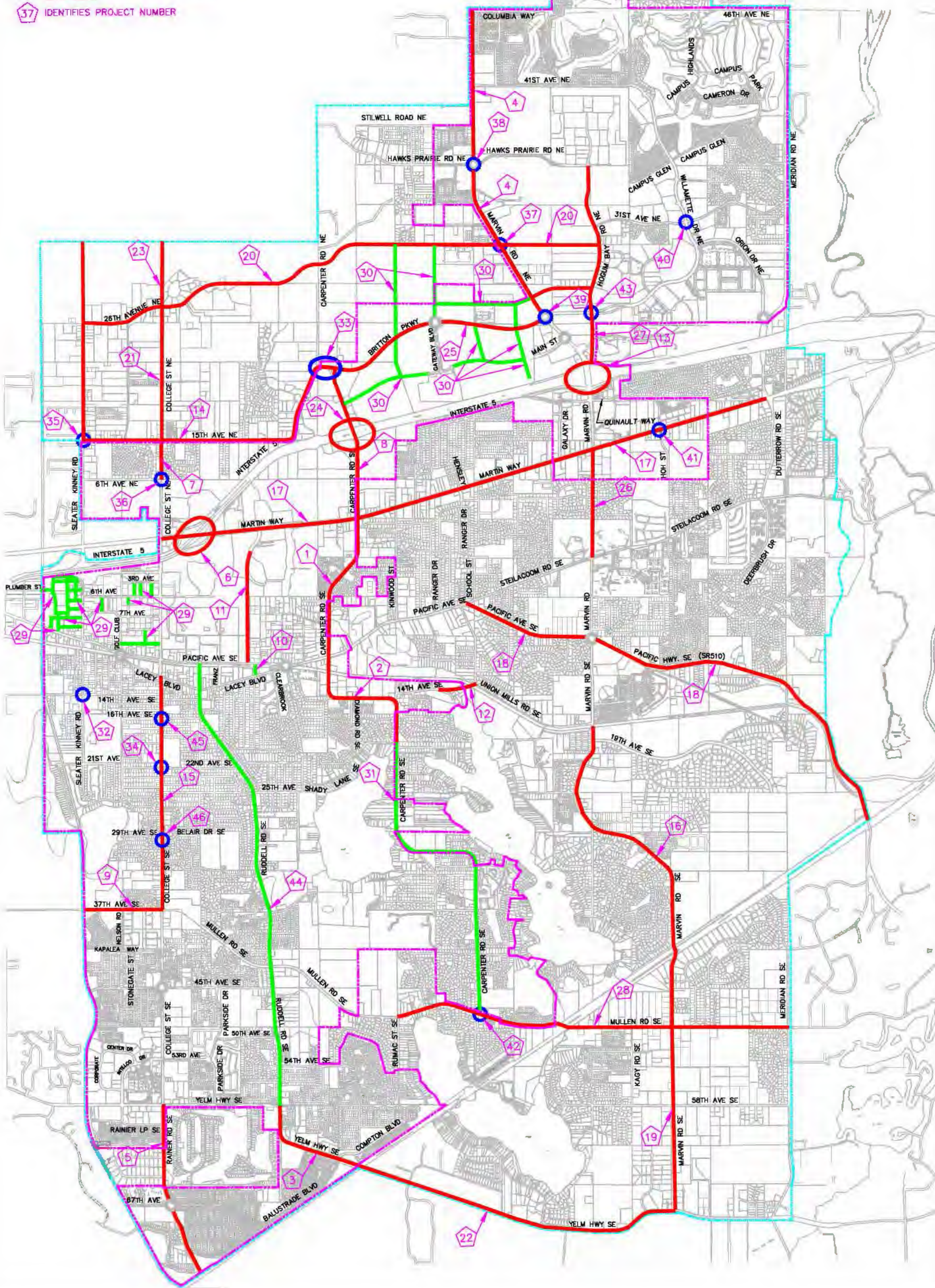
CITY OF LACEY  
PROJECT MAP

SCALE IN FEET

0 1500 3000 4500

LEGEND:

- REGIONALLY SIGNIFICANT PROJECTS
- LOCALLY SIGNIFICANT PROJECTS
- INTERSECTION PROJECTS
- URBAN GROWTH MANAGEMENT AREA
- CITY LIMITS
- IDENTIFIES PROJECT NUMBER





## ***Regionally Significant Projects***

The projects listed below have regional significance not only for Lacey residents, but also for regional traffic. Modeling efforts by both the TRPC and City of Lacey indicate that these projects are needed to maintain the adopted level of service standard. Many of these projects are jointly sponsored by other jurisdictions.

| <b>Project Number</b> | <b>Project</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b>              | <b><u>Carpenter Road Widening from Pacific Avenue to Martin Way</u></b><br>This project is currently under construction and is scheduled to be completed by June 2012. The project involves widening Carpenter Road from two to four lanes with auxiliary turn lanes, bike lanes, planter strips, and sidewalks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>2</b>              | <b><u>Carpenter Road Capacity and Safety Improvements from Pacific Avenue to Shady Lane</u></b><br>This project involves widening Carpenter Road to a 4/5-lane roadway from Pacific Avenue to Diamond Loop Road, 3/4-lane roadway (two lanes northbound/one lane southbound) from Diamond Loop Road to 14 <sup>th</sup> Avenue SE including the realignment at 14 <sup>th</sup> Avenue, and widening to a 2/3-lane roadway with medians and auxiliary turn lanes from 14 <sup>th</sup> Avenue SE to Shady Lane. This improvement is expected to be continued to Mullen Road. The roadway includes bike lanes, medians, planter strips, and sidewalks for the entire project limits. .<br><br>A pre-design study was completed to determine the lane transitions described above. The City also completed portions of these improvements with the 2009 overlay program. A study should be completed from Shady Lane to Mullen Road to maximize the current right-of-way. |
| <b>3</b>              | <b><u>Yelm Highway Widening from Ruddell Road to Compton Boulevard</u></b><br>This project was partially completed during the 2010 overlay program by adding pavement width for a two-way center turn lane for the project limits. Upon completion of the Yelm Highway sidewalk near the apartments, the remaining improvements can be deferred until the bridge is widened over the rail line at the Centennial Station. The ultimate improvements involve widening of Yelm Highway to 4/5- lanes with medians and auxiliary turn lanes, bike lanes, planter strips, and sidewalks. This project should be designed to accommodate future widening to the south.                                                                                                                                                                                                                                                                                                       |
| <b>4</b>              | <b><u>Marvin Road Widening from Britton Parkway to Columbia Way NE</u></b><br>This project involves the widening of Marvin Road to 4 lanes with medians and auxiliary turn lanes from Britton Parkway to Hawks Prairie Road and 2 lanes with medians and auxiliary turn lanes from Hawks Prairie Road to Columbia Way NE. The project includes bike lanes, planter strips, and sidewalks. A center median will need to be incorporated with strict access control to maintain LOS. The single lane roundabout at Hawks Prairie Road will need to be converted into a multi-lane roundabout, and a new single lane roundabout is required at 41 <sup>st</sup> Ave NE.                                                                                                                                                                                                                                                                                                    |

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <p>Current modeling demonstrates Marvin Road would need to be widened to five lanes from Hawks Prairie Road to Columbia Way NE without the roundabout and access control. The traffic impact study for the Hawks Prairie Master Planned Community identified Marvin Road operates acceptably as a 2-lane roadway with medians and a single lane roundabout at 41<sup>st</sup> Ave NE (formerly Willamette Drive) and strict access control.</p> <p>In addition, traffic analysis performed by the South Puget Sound Community College and Olympic Region Headquarters identifies a new multi-lane roundabout is needed at 31<sup>st</sup> Avenue NE Extension with Marvin Road.</p>                                                                                       |
| 5              | <p><b><u>Rainier Road Widening from Yelm Highway to South UGA</u></b></p> <p>This project envisions a 4/5 lane arterial from the old south city limits near 62<sup>nd</sup> Ave SE then transitions to a 2/3 lane major collector to the south UGA. The southern collector is expected to be constructed with development. The project includes bike lanes, planter strips, medians, and sidewalks for the length of the project limits. Strict access control must be incorporated into the design.</p> <p>Travel demand modeling shows the need for a 4/5 lane arterial for the entire project limits. Based on a corridor study completed with the Horizon Pointe development, right-of-way for a five-lane cross-section shall be reserved for the entire limits.</p> |
| 6              | <p><b><u>Martin Way /I-5 Interchange Project</u></b></p> <p>This project envisions a major reconstruction of the Martin Way interchange to a partial cloverleaf interchange with ramp meters. This will be a WSDOT project supported by the City of Lacey.</p> <p>The City completed the 2010 LTSAAE Report, a freeway corridor study for Interstate 5 from the Sleater-Kinney interchange to the Nisqually interchange to evaluate alternatives for improvements to interchanges. An interchange justification report (IJR) is being prepared with WSDOT and the Federal Highway Administration to verify the proposed interchange configuration.</p>                                                                                                                    |
| 7              | <p><b><u>College Street NE Extension from Martin Way to 15<sup>th</sup> Avenue NE</u></b></p> <p>This project involves the extension of a major collector on College Street north from 6<sup>th</sup> Avenue NE to 15<sup>th</sup> Avenue NE, with significant rechannelization from Martin Way to 6<sup>th</sup> Avenue. The improvements will include bicycle lanes, and sidewalks. Planter strips will be incorporated as right-of-way permits. This project is currently in design.</p>                                                                                                                                                                                                                                                                               |
| 8              | <p><b><u>Carpenter Road Widening from Martin Way to Britton Parkway</u></b></p> <p>This project involves widening of Carpenter Road to 4/5 lanes with medians, bicycle lanes, planter strips and sidewalks. This project will improve horizontal and vertical deficiencies of the roadway.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <p>The City completed the 2010 LTSAAE Report, a freeway corridor study for I-5 from the Sleater-Kinney interchange to the Nisqually interchange to evaluate alternatives for improvements to interchanges. The LTSAAE report identifies the bridge configuration and collector-distributor road will need further consideration after multiple freeway improvements are completed. The current Interchange Justification Report (IJR) planning should develop an approved concept.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 9              | <p><b><u>37<sup>th</sup> Avenue from College Street to west City Limits (Chehalis Western Trail)</u></b></p> <p>This roadway will be a 2/3 lane collector, with medians, bicycle lanes, planter strips and sidewalks. This will complete Lacey's portion of the regional corridor plan to connect Lacey to Tumwater at Capital Boulevard.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 11             | <p><b><u>Desmond Drive Extension from Martin Way to Pacific Avenue</u></b></p> <p>The City envisions a new 2/3 lane collector with medians, bike lanes, planter strips and sidewalks. A corridor study needs to be completed to develop a route that will accommodate all property owners. Consideration for north-south connectivity to Lebanon Street extension should also be considered.</p> <p>In the late 1980's, Saint Martin's University proposed the 3<sup>rd</sup>/6<sup>th</sup> Avenue extension from Desmond Drive to College Street for secondary access to the Department of Ecology and proposed State office complex. The City included this project in the Transportation Plan for many years. Within the last several years, all parties have assessed the drawbacks of this connection. Current modeling shows a greater benefit for a north-south connection to provide the secondary access necessary for future development. This connection would divert traffic from both College Street and Carpenter Road.</p> |
| 12             | <p><b><u>14<sup>th</sup> Avenue SE Extension from Carpenter Road to Union Mills Road</u></b></p> <p>This project involves extending 14<sup>th</sup> Avenue SE to Union Mills Road to relieve pressure on the intersection of Carpenter Road and Pacific Avenue. It is envisioned that this roadway will be a residential collector. An analysis of environmental impacts of this road will determine its feasibility.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 13             | <p><b><u>Marvin Road/I-5 Urban Interchange Improvements (Phase 2)</u></b></p> <p>This project will complete the next phase of the Marvin Road interchange project, which constructs a full single point urban interchange (SPUI). This will be a WSDOT project supported by the City of Lacey.</p> <p>The City completed the 2010 LTSAAE, a freeway corridor study for I-5 from the Sleater-Kinney interchange to the Nisqually interchange to evaluate alternatives for improvements to interchanges. The preferred configuration for the Marvin Road Interchange is to complete the SPUI. Additional recommendations included a Hogum Bay slip ramp to improve access for freight and a collector-distributor that extends to Carpenter Road. The current Interchange Justification Report (IJR) planning should develop an approved concept.</p>                                                                                                                                                                                        |

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14             | <p><b><u>15th Avenue NE/Draham Road widening from Carpenter Road to Sleater-Kinney Road</u></b></p> <p>This project will widen 15<sup>th</sup> Avenue to a 4/5 lane arterial with medians, bicycle lanes, planter strips, and sidewalks. This project will improve horizontal and vertical deficiencies of the roadway. Also, efforts to improve the condition of untreated stormwater that currently flows into Woodland Creek will be incorporated in the project. This project will be coordinated with the future extension to Lilly Road. The City will support Thurston County for their project.</p>                                                                                                                                                                                                                                                                                                                |
| 15             | <p><b><u>College Street Corridor Improvements from Lacey Boulevard to 37<sup>th</sup> Avenue SE/Mullen Road</u></b></p> <p>The City adopted the College Street Corridor Study to develop a long range plan for the College Street corridor. This study identified a phased approach to improve safety and access for all modes of users over the next 20 years. The project identifies 3 new roundabouts, with widening to a 4-lane road with a median between the roundabouts. The widening is asymmetrical between roundabouts. The project also includes Type 2 bike lanes and sidewalks.</p> <p>Additional traffic is anticipated at 16<sup>th</sup> Ave, 22<sup>nd</sup> Ave, 29<sup>th</sup> Ave, and Belair Dr. as a result of the roundabouts. Improvements to these streets should be considered as part of the project or as a standalone project. The details of this project are included in the appendix.</p> |
| 16             | <p><b><u>Marvin Road Widening from Union Mills Road to Mullen Road</u></b></p> <p>This project will preserve right-of-way for a future 4/5 lane roadway with medians, bicycle lanes, planter strips and sidewalks. The City will support Thurston County for their project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17             | <p><b><u>Martin Way Enhancements from College Street to Meridian Road</u></b></p> <p>This project will enhance Martin Way to the standards identified in the current Development Guidelines, which includes medians, bicycle lanes, planter strips and sidewalks. Access management to reduce turning conflicts and improve safety is an integral portion of this project. Improvements will include Intelligent Transportation System (ITS) features also.</p> <p>The City envisions Martin Way to be a high-density multimodal corridor. The Regional Urban Corridor Task Force has identified the entire Martin Way corridor as their top priority. The City will support Thurston County for their portion of the project.</p>                                                                                                                                                                                         |
| 18             | <p><b><u>Pacific Avenue Widening from Union Mills Road to Marvin Road (SR 510)</u></b></p> <p>This project will widen Pacific Avenue to 4/5 lane roadway with medians, bicycle lanes, planter strips, and sidewalks. The City will support Thurston County for their project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19             | <p><b><u>Marvin Road Extension from Mullen Road to Yelm Highway</u></b></p> <p>This project is a feasibility study for extending Marvin Road south to Yelm Highway, including identification appropriate configuration and alignment. This will preserve the corridor for future connection. The City will support Thurston County for their project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 20             | <p><b><u>26<sup>th</sup> Avenue NE Extension from Hogum Bay Road to Sleater-Kinney Road</u></b></p> <p>This project involves a new 2/3 lane roadway with median, bicycle lanes, planter strips and sidewalks in three phases. The first phase is anticipated to be between Hogum Bay Road and Marvin Road. The project will be an offset from 31<sup>st</sup> Avenue NE north of the LOTT Infiltration Facility, and expected to continue adjacent to the proposed South Puget Sound Community College, then continues through the proposed Olympic Region Headquarters, through the new Lacey Greenway Park to Sleater-Kinney Road. The project will be coordinated with Thurston County.</p> <p>In addition, traffic analysis performed by the South Puget Sound Community College and Olympic Region Headquarters identifies a new multi-lane roundabout is needed at 31<sup>st</sup> Avenue NE Extension with Marvin Road.</p> |
| 21             | <p><b><u>College Street NE Extension from 15<sup>th</sup> Avenue to 26<sup>th</sup> Avenue NE</u></b></p> <p>This project involves a new 2/3 lane collector roadway with planter strips and sidewalks. The City will support Thurston County with this project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 22             | <p><b><u>Yelm Highway Widening from Compton Blvd to Marvin Road Extension</u></b></p> <p>This project involves widening Yelm Highway to four lanes with a two way center turn lane, bicycle lanes, planter strips, pedestrian refuge islands and sidewalks. A center median should be incorporated along the roadway where left turns are not permitted. The City will support Thurston County for their project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 23             | <p><b><u>College Street NE Extension from 26<sup>th</sup> Avenue NE to Hawks Prairie Road</u></b></p> <p>This project involves a new 2/3 lane collector roadway with planter strips and sidewalks. The City will support Thurston County with this project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 24             | <p><b><u>Carpenter Road Interchange Justification Report</u></b></p> <p>Analysis from the 2010 LTSAAE report showed that traffic growth in the City of Lacey will exceed the capacity of the improved interchanges at Martin Way and Marvin Road proposed in this Plan. The report identified a potential layout of the Carpenter Road interchange. Upon construction of both the Martin Way and Marvin Road Interchanges, the City should evaluate the assumptions in the LTSAAE report to determine if the Carpenter Road interchange should be pursued.</p> <p>This interchange could provide additional access into the central Lacey area north and south of I-5 and redistribute trips away from congestion at the Marvin Road and Martin Way interchanges.</p>                                                                                                                                                              |

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25             | <p><b><u>Britton Parkway Phase 2</u></b></p> <p>This project involves the continuation of Britton Parkway from Gateway Boulevard to Carpenter Road with medians, bike lanes, planter strips and sidewalks.</p>                                                                                                                                                                                                                                                                                                                                                                                                |
| 26             | <p><b><u>Marvin Road from Martin Way to Steilacoom Road</u></b></p> <p>This project should provide signal coordination and add access control to reduce turning conflicts and improve safety. The project will be coordinated with WSDOT and Thurston County.</p>                                                                                                                                                                                                                                                                                                                                             |
| 27             | <p><b><u>Hogum Bay Road from I-5 to Hawks Prairie Road</u></b></p> <p>This project improves Hogum Bay Road to a collector roadway with a major emphasis on freight mobility, including construction of a roundabout at Hogum Bay Road and Willamette Drive NE. The project is currently in design, and is partially funded for construction through the Freight Mobility Strategic Investment Board and Surface Transportation Program.</p>                                                                                                                                                                   |
| 28             | <p><b><u>Mullen Road Enhancements from Rumac Road SE to Kagy Street SE</u></b></p> <p>This project will extend the enhancements completed along Mullen Road between Ruddell Road and Timberline High School further east to Afflerbaugh Drive. The enhanced roadway section is a major collector with medians, bike lanes, planter strips, and sidewalks. This project should eventually be extended to Meridian Road. There is an existing railroad trestle near Afflerbaugh Drive that creates a challenge for future widening. The City will support Thurston County for their portion of the project.</p> |



## Locally Significant Projects

The projects listed below have local significance. All modeling efforts by the City indicate that these projects are needed to enhance circulation and improve safety.

| Project Number | Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10             | <b><u>New Connection from Pacific Avenue to Lacey Boulevard</u></b><br>Implementing the one-way couplet identified several interconnecting roadways between Pacific Avenue and Lacey Boulevard. The City has completed most connections. One more connection will be made at Lebanon Street.                                                                                                                                                                                                                                                 |
| 29             | <b><u>Downtown Design Circulating Roadways</u></b><br>This project includes new roadways and enhancements to the existing roadway system to promote pedestrian travel and economic development in the central business district. Several new roadways are proposed for the area between South Sound Center to College Street, and I-5 to Lacey Boulevard. The goal is to more evenly distribute traffic while improving pedestrian and bicycle access. This plan adopts and supports the efforts of the Woodland District Plan.              |
| 30             | <b><u>NE Lacey (Hawks Prairie) Interconnecting Roadways</u></b><br>This project includes new roadways to promote pedestrian travel and economic development in the northeast area. This Transportation Plan adopts and supports the efforts of the Hawks Prairie Plan.                                                                                                                                                                                                                                                                       |
| 31             | <b><u>Carpenter Road Enhancements from Shady Lane to Mullen Road</u></b><br>This project involves widening Carpenter Road to a two-lane roadway with a two-way center turn lane, bike lanes, planter strips, pedestrian refuge islands, medians, and sidewalks. Major emphasis is placed on non-pedestrian and bicycle travel. A detailed pre-design study should be completed to determine where and how the lane transitions should be accomplished near 14 <sup>th</sup> Avenue. This project should be coordinated with Thurston County. |
| 44             | <b><u>Ruddell Road Corridor Study from Pacific Avenue to Yelm Highway</u></b><br>The project is to develop a long-range plan for Ruddell Road similar to the plan the City prepared for the College Street Corridor, a full corridor analysis, incorporating pedestrian and bicycle travel and strict access control. In accordance with the study, right of way should be reserved for a four-lane boulevard with auxiliary turn lanes, bike lanes, pedestrian refuge islands, planter strips, medians, and sidewalks.                      |

## ***Intersection Projects***

The projects listed below are intersections identified for future improvements:

| <b>Project Number</b> | <b>Project</b>                                                              |
|-----------------------|-----------------------------------------------------------------------------|
| <b>32</b>             | Sleater Kinney Road and 14 <sup>th</sup> Avenue SE intersection improvement |
| <b>33</b>             | Britton Parkway and Carpenter Road intersection realignment                 |
| <b>34</b>             | College Street and 22 <sup>nd</sup> Avenue SE intersection improvement      |
| <b>35</b>             | Sleater-Kinney Road and 15 <sup>th</sup> Avenue NE intersection improvement |
| <b>36</b>             | College Street/6 <sup>th</sup> Avenue NE intersection improvement           |
| <b>37</b>             | Marvin Road/31 <sup>st</sup> Avenue NE intersection improvement             |
| <b>38</b>             | Hawks Prairie Road/Marvin Road intersection improvement                     |
| <b>39</b>             | Marvin Road/Britton Parkway intersection improvement                        |
| <b>40</b>             | Willamette Drive/31 <sup>st</sup> Avenue NE intersection improvement        |
| <b>41</b>             | Martin Way/Hoh Street intersection improvement                              |
| <b>42</b>             | Carpenter Road/Mullen Road intersection improvement                         |
| <b>43</b>             | Willamette Drive/Hogum Bay Road intersection improvement                    |
| <b>45</b>             | College Street/16 <sup>th</sup> Avenue SE intersection improvement          |
| <b>46</b>             | College Street/29 <sup>th</sup> Avenue SE intersection improvement          |
| <b>47</b>             | Willamette Drive/Campus Glen Drive intersection improvement                 |

## ***Strategy Corridors***

Strategy corridors are those streets or intersections which typically have been constructed or improved to four or five lanes in width between intersections, or are streets or intersections bounded by existing land use or environmental features that preclude further widening. These strategy corridors are in areas where growth is encouraged and typically coincide with the designation of a high density corridor, city center, core area or activity center where a concentration of commercial and other uses is desired, especially when that growth increases densities and proximity of different types of land uses. Peak hour vehicular congestion in these corridors is likely to exceed levels of service, which would otherwise be acceptable within the transportation system. The following corridors are identified as strategy corridors in the City of Lacey:

- Willamette Drive NE between Marvin Road NE and 31<sup>st</sup> Ave NE
- Marvin Road between Willamette Drive NE and south city limit line
- Martin Way from the west city limit line to Carpenter Road
- Martin Way from Galaxy Drive NE to Marvin Road
- College Street between Martin Way and Yelm Highway SE
- Yelm Highway SE from the west city limit line to Ruddell Road SE
- Pacific Avenue SE from the west city limit line to east city limit line
- Lacey Boulevard SE from Golf Club Road SE to Homann Drive SE
- Sleater-Kinney Road SE from Interstate 5 to Pacific Avenue SE

## 2021 SIX YEAR TRANSPORTATION IMPROVEMENT PROGRAM SUMMARY

| Current Process | LACEY STIP ID | PROJECT TITLE                                                       | 2021 Total Project Cost |
|-----------------|---------------|---------------------------------------------------------------------|-------------------------|
| Planned         | 11-005        | College Street Extension NE                                         | \$ 3,533,000            |
| Planned         | 11-010        | Carpenter Rd Capacity and Safety Improvements Pacific to Shady Lane | \$ 4,711,000            |
| Planned         | 11-013        | Marvin Road from Britton Parkway to Columbia Drive                  | \$ 16,640,000           |
| Planned         | 11-014        | Martin Way / I-5 Interchange Improvements                           | \$ 45,600,000           |
| Planned         | 11-015        | Carpenter Road Widening from Martin Way to Britton Parkway          | \$ 20,452,000           |
| Planned         | 11-016        | Rainier Road from Yelm Hwy to City Limits (near Beckonridge)        | \$ 3,062,000            |
| Planned         | 11-018        | Britton Parkway -- Phase II                                         | \$ 2,500,000            |
| Planned         | 11-020        | Sleater-Kinney at 14th Ave Improvements                             | \$ 940,000              |
| Planned         | 11-021        | College Street Corridor Improvements                                | \$ 40,000,000           |
| Planned         | 11-024        | Yelm Highway Improvements from Ruddell Rd to Amtrak Bridge          | \$ 5,300,000            |
| Planned         | 11-025        | Martin Way East Roadway Improvements                                | \$ 5,500,000            |
| Planned         | 11-026        | Lacey Hawks Prairie Business District (LHPBD) Commercial Corridors  | \$ 11,000,000           |
| Planned         | 14-001        | Willamette Drive / Campus Glen Drive Roundabout                     | \$ 1,700,000            |
| Right of Way    | 19-001        | College St Corridor -- Phase 3 (College St and 16th Ave Roundabout) | \$ 2,000,000            |
| Right of Way    | 19-002        | Electric Vehicle Charging Stations                                  | \$ 1,000                |
| Pending Grant   | 20-001        | College St Corridor -- Phase 4 (College St and 29th Roundabout)     | \$ 1,709,419            |
| Pending Grant   | 20-002        | Citywide Signal ITS Detection Upgrades                              | \$ 345,000              |
| Pending Grant   | 20-003        | Willamette Dr and Campus Glen Dr Roundabout                         | \$ 250,000              |
| Total TIP Costs |               |                                                                     | \$ 165,243,419          |

### Projects to be Removed

|        |        |                                                              |              |
|--------|--------|--------------------------------------------------------------|--------------|
| Funded | 11-017 | Britton Parkway and Carpenter Road Intersection Improvements | \$ 1,500,000 |
|--------|--------|--------------------------------------------------------------|--------------|

Indicates Changes

# 2020/2021 TRANSPORTATION IMPROVEMENT MITIGATION LIST

Table 14T-15  
Referred from 14.21.026,.040B(2)

|                                 |                                                                    | b                      | Capped or a/b          | d                      | e = (b-d)     | f = (0.90*e)    | Varies by Type   |                      |               |            |
|---------------------------------|--------------------------------------------------------------------|------------------------|------------------------|------------------------|---------------|-----------------|------------------|----------------------|---------------|------------|
| Account Number                  | Project                                                            | 2019-2020 Project Cost | 2020-2021 Project Cost | Consistent Denominator | Cost per Trip | Existing Volume | Remaining Volume | Mitigated Volume 90% | Collection    | % of Total |
| <b>COMPLETED PROJECTS</b>       |                                                                    |                        |                        |                        |               |                 |                  |                      |               |            |
| 102-0000-224.50-03              | 45th Avenue and College Street Improvements                        | \$ 1,312,994           | \$ 1,330,063           | 3500                   | \$ 380.02     | 1,645           | 1,855            | 1,670                | \$ 634,440    | 48%        |
| 102-0000-224.50-50              | Marvin Road and Britton Parkway Intersection Improvements          | \$ 410,369             | \$ 415,704             | 4000                   | \$ 103.93     | 595             | 3,405            | 3,065                | \$ 318,481    | 77%        |
| 102-0000-224.50-43              | Golf Club Road Extension                                           | \$ 609,992             | \$ 617,922             | 3500                   | \$ 176.55     | -               | 3,500            | 3,150                | \$ 556,130    | 90%        |
| 102-0000-224.50-44              | Martin Way / Hoh Street Intersection Improvements                  | \$ 813,324             | \$ 823,897             | 3500                   | \$ 235.40     | 1,352           | 2,148            | 1,933                | \$ 455,073    | 55%        |
| 102-0000-224.50-45              | Willamette Drive / 31st Ave Intersection Improvements              | \$ 1,016,655           | \$ 1,029,871           | 3500                   | \$ 294.25     | 1,034           | 2,466            | 2,219                | \$ 653,056    | 63%        |
| <b>FIXED-COMPLETED PROJECTS</b> |                                                                    |                        |                        |                        |               |                 |                  |                      |               |            |
| 102-0000-224.50-29              | Mullen Road Capacity/Safety Improvements East of Ruddell           | \$ 6,969,945           | \$ 7,060,554           | 4000                   | \$ 1,296.97   | 1,138           | 2,862            | 2,576                | \$ 4,546,644  | 64%        |
| 102-0000-224.50-42              | 6th Avenue / Sleater Kinney Improvements                           | \$ 4,598,571           | \$ 4,658,352           | 3500                   | \$ 1,296.97   | 2,319           | 1,181            | 1,063                | \$ 1,414,675  | 30%        |
| <b>FIXED PROJECTS</b>           |                                                                    |                        |                        |                        |               |                 |                  |                      |               |            |
| 102-0000-224.50-38              | Carpenter Rd from Martin Way to Britton Parkway                    | \$ 20,173,760          | \$ 20,436,019          | 4000                   | \$ 1,296.97   | 295             | 3,705            | 3,335                | \$ 17,035,976 | 83%        |
| 102-0000-224.50-49              | College Street Reconstruction -- Lacey Blvd to 37th Ave            | \$ 39,725,936          | \$ 40,242,373          | 5000                   | \$ 1,296.97   | 2,000           | 3,000            | 2,700                | \$ 21,730,882 | 54%        |
| 102-0000-224.50-39              | Marvin Road-- Britton to Columbia Drive NE                         | \$ 16,414,756          | \$ 16,628,148          | 5000                   | \$ 1,296.97   | 580             | 4,420            | 3,978                | \$ 13,229,355 | 80%        |
| 102-0000-224.50-41              | Yelm Highway Improvements Ruddell Road to East City Limits         | \$ 5,227,459           | \$ 5,295,416           | 4000                   | \$ 1,296.97   | 1,277           | 2,723            | 2,451                | \$ 3,244,369  | 61%        |
| 102-0000-224.50-46              | Hogum Bay Road Improvements                                        | \$ 8,927,646           | \$ 9,043,706           | 3500                   | \$ 1,296.97   | 530             | 2,970            | 2,673                | \$ 6,906,807  | 76%        |
| 102-0000-224.50-51              | 31st Avenue Extension Hogum Bay to Marvin Road                     | \$ 5,471,585           | \$ 5,542,716           | 4000                   | \$ 1,296.97   | 580             | 3,420            | 3,078                | \$ 4,265,120  | 77%        |
| 102-0000-224.50-33              | Martin Way & I-5 Interchange Improvements                          | \$ 45,013,709          | \$ 45,598,888          | 6000                   | \$ 1,296.97   | 3,515           | 2,485            | 2,237                | \$ 16,996,985 | 37%        |
| <b>ACTIVE PROJECTS</b>          |                                                                    |                        |                        |                        |               |                 |                  |                      |               |            |
| 102-0000-224.50-23              | Sleater-Kinney at 14th Ave Improvements                            | \$ 924,086             | \$ 936,099             | 3500                   | \$ 267.46     | 1,448           | 2,052            | 1,847                | \$ 493,939    | 53%        |
| 102-0000-224.50-25              | College Street Extension NE                                        | \$ 3,484,973           | \$ 3,530,278           | 3500                   | \$ 1,008.65   | 1,017           | 2,483            | 2,235                | \$ 2,254,032  | 64%        |
| 102-0000-224.50-28              | Carpenter Road Capacity /Safety Improvements Pacific to Shady Lane | \$ 4,646,630           | \$ 4,707,037           | 4000                   | \$ 1,176.76   | 1,521           | 2,479            | 2,231                | \$ 2,625,467  | 56%        |
| 102-0000-224.50-40              | Rainier Road from Yelm Hwy to City Limits (near Beckonridge)       | \$ 3,020,310           | \$ 3,059,574           | 4000                   | \$ 764.89     | 774             | 3,226            | 2,903                | \$ 2,220,792  | 73%        |
| 102-0000-224.50-47              | Carpenter Rd/Mullen Rd Intersection Improvements                   | \$ 1,183,493           | \$ 1,198,878           | 3500                   | \$ 342.54     | 1,212           | 2,288            | 2,059                | \$ 705,351    | 59%        |
| 102-0000-224.50-52              | Britton Parkway and Carpenter Road Intersection Improvements       | \$ 1,500,000           | \$ 1,519,500           | 4000                   | \$ 379.88     | 412             | 3,588            | 3,229                | \$ 1,226,692  | 81%        |
| 102-0000-224.50-58              | Willamette Drive / Campus Glen Drive Roundabout                    | \$ 1,723,462           | \$ 1,745,867           | 3500                   | \$ 498.82     | 386             | 3,114            | 2,803                | \$ 1,397,991  | 80%        |

| Year      | ENR Construction Index | Residential Cap | Resolution                       |
|-----------|------------------------|-----------------|----------------------------------|
| 2018-2019 | 3.0%                   | \$ 1,982        | Resolution 1061 Passed 7-12-2018 |
| 2019-2020 | 1.6%                   | \$ 2,013        | Resolution 1077 Passed 7-11-2019 |
| 2020-2021 | 1.3%                   | \$ 2,040        | Resolution 1095 Passed 7-09-2020 |



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** Resolution to Join the Nisqually River Council

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**RECOMMENDATION:** Approve Resolution to accept the invitation to join the Nisqually River Council.

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Scott Egger, Public Works Director *SE*  
Peter Brooks, Water Resources Manager *PC-B*  
Julie Rector, Water Quality Analyst *JR*

**ORIGINATED BY:** Water Resources Division/Public Works

**ATTACHMENTS:** 1. [Invitation from Nisqually River Council](#)  
2. [Resolution 1103](#)

**FISCAL NOTE:** There is no fee to join the Committee

**PRIOR REVIEW:** November 2, 2020 - Utilities Committee Meeting

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### BACKGROUND:

The Nisqually River Council (NRC) is a voluntary coordination organization created in 1987 by the State Legislature. Its mission is to create sustainability in the Nisqually River watershed by developing a common culture of environmental, social, and economic balance.

The NRC currently has 24 member agencies representing state, federal, tribal and local governments, as well as an active citizen's advisory committee. The NRC is a forum for planning and collaboration among the governments and community members of the Nisqually Watershed. The actions of the NRC are guided by the Nisqually Watershed Stewardship Plan, which promotes efforts for engaging the public, promoting sustainable businesses, restoring and enhancing fish habitat, and in general promoting a healthy, vibrant watershed for people who live and recreate in the watershed.

The NRC also has close relationships with several programs that help to implement its mission. These include the Nisqually River Foundation, the Nisqually River Education Project, Nisqually Stream Stewards, Nisqually Land Trust, and the Nisqually Community Forest. Each of the NRC committees and its partner programs provide reports at each Council meeting.

The City of Lacey has long been both a formal and informal stakeholder in planning and stewardship processes for the Nisqually Watershed. In particular, Lacey has been actively

participating on the WRIA 11 Planning Unit, which developed the 2004 *Nisqually River Watershed Plan* as well as its 2019 addendum which plans for offsetting instream impacts from new permit exempt wells.

While the WRIA 11 Planning Unit and the NRC have many mutual and overlapping interests, they have been operating separately, under different mandates and funding sources. It was proposed that efficiencies in operation, and better coordination, can be gained by consolidating the Planning Unit under the umbrella of the NRC. In August 2020, the NRC approved moving forward with a proposal to incorporate the WRIA 11 Planning Unit as a permanent standing committee of the NRC. This will further facilitate planning and coordination within the watershed.

Further, it was recognized that not all entities represented on the WRIA 11 Planning Unit were represented on the NRC. To address this, the Chair of the NRC extended invitations to the Cities of Lacey, Olympia, and DuPont, to become members of the NRC. The letter to the City of Lacey is addressed to Mayor Ryder and is provided in **Attachment 1**.

By joining the NRC, the city's designated representative(s) will be the city's liaison with the NRC, and consequently will be expected to attend monthly meetings. The representative will also vote as needed on issues put before the NRC, such as public comment letters, or letters of support for grants and other initiatives that further its goals for a healthy watershed.

When asked to vote, NRC members may choose to approve, not approve, or abstain from any decision. NRC statements may not represent official positions of all member agencies. Members may approve or abstain from commenting on NRC statements that reflect a general consensus of participating individuals, without necessarily endorsing that position as an agency. The NRC does not endorse candidates for public office or positions on ballot measures and does not lobby for or against the passage of legislation.

A Resolution to accept the invitation to join the NRC, and to authorize the designation of a City representative(s) on the NRC, is provided in **Attachment 2**.

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## **ADVANTAGES:**

1. Increased coordination with entities represented on the Nisqually River Council, enhanced opportunities to participate in stewardship in the Nisqually River watershed.

## **DISADVANTAGES:**

1. None.



# Nisqually River Council

620 Old Pacific Highway SE • Olympia WA 98513 • (360) 438-8715

## Council Membership

Pierce County  
Thurston County  
Lewis County  
Cities of Yelm  
Town of Eatonville  
City of Roy  
Tacoma Public Utilities  
Puget Sound Partnership  
UW Pack Forest  
WA Dept. of Natural Resources  
WA Dept. of Fish & Wildlife  
WA Dept. of Ecology  
WA Parks & Recreation Commission  
WA Conservation Commission  
WA Dept. of Agriculture  
WA Dept. of Transportation  
WA Dept. of Commerce  
WA Secretary of State  
Nisqually Indian Tribe  
Department of Defense, Joint Base Lewis-McChord  
Billy Frank Jr. Nisqually National Wildlife Refuge  
Gifford Pinchot National Forest  
Mount Rainier National Park  
Citizens Advisory Committee

Mayor Andy Ryder  
City of Lacey  
420 College St SE  
Lacey, WA 98503

October 6, 2020

Dear Mayor Ryder,

It is my pleasure to invite the City of Lacey to become a member of the Nisqually River Council. Since its creation in 1987, the Nisqually River Council (NRC) has provided a forum for planning and collaboration among governments and community members of the Nisqually Watershed. Its mission is to create sustainability in the Nisqually Watershed for current and future generations by developing a common culture of environmental, social, and economic balance. The NRC recognizes our neighboring cities as important partners in this effort, sharing a recognition that the benefits of a healthy watershed extend beyond the basin's borders. The City of Lacey has long been both a formal and informal stakeholder in planning and stewardship processes for the Nisqually Watershed, and we look forward to continuing to strengthen this relationship through participation in the NRC.

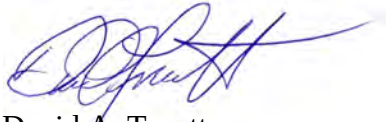
The NRC is a voluntary coordination organization with no independent regulatory or fiduciary authority. The Nisqually Watershed Stewardship Plan provided with the electronic version of this letter establishes membership, governance structure, goals, and initiatives for the NRC. This Plan is regularly reviewed and updated by Council members. We are currently in the process of reviewing a draft update, also attached, to be finalized and adopted this winter. We welcome Lacey's input on this draft. Member governments are expected to designate a representative to attend the NRC's monthly public meetings and to participate as appropriate in committees and initiatives. Financial support is not a current membership requirement, but may be discussed in the future to meet ongoing watershed planning and implementation needs.

Lacey's membership in the NRC will facilitate the implementation of watershed management activities to which the City is already a party. The Cities of Olympia and Lacey are current members of the WRIA 11 Planning Unit and have agreements to support the implementation of adopted Nisqually watershed management plans under RCW 90.82 and 90.94. At its August 21, 2020 meeting, the Nisqually River Council approved moving forward with a proposal to incorporate the Planning Unit under the NRC. This proposal, if also approved by the Planning Unit, would consolidate multiple planning bodies with similar purposes, and make the NRC the permanent administrative home for WRIA 11 management planning and implementation.



The Nisqually Watershed provides tremendous value to its surrounding communities, from clean water and ecosystem services, to environmental education for Lacey students, to economic opportunities for sustainable tourism and to a sense of place and connection for all residents of South Puget Sound. The NRC deeply appreciates the support and partnership our watershed receives from the City of Lacey, and we enthusiastically welcome this opportunity to bring your voice and perspectives into the Council as a member. I am available to discuss our next steps with you and the City Council at your earliest convenience.

Sincerely,



David A. Troutt  
Chair

Attachments (provided electronically):

Nisqually Watershed Stewardship Plan (2011)  
Draft Nisqually Watershed Stewardship Plan (2020 Update)

## RESOLUTION 1103

### CITY OF LACEY

A RESOLUTION ACCEPTING THE INVITATION TO JOIN THE NISQUALLY RIVER COUNCIL AS A VOTING MEMBER AND AUTHORIZING THE DESIGNATION OF A CITY REPRESENTATIVE TO PARTICIPATE ON THE COUNCIL.

**WHEREAS**, the Nisqually River Council (NRC) has been providing a forum for planning and collaboration among governments and community members of the Nisqually Watershed since its creation in 1987. Its mission is to create sustainability in the Nisqually Watershed for current and future generations by developing a common culture of environmental, social, and economic balance; and

**WHEREAS**, the NRC is a voluntary coordination organization with no independent regulatory or fiduciary authority, and its actions are guided by the Nisqually Watershed Stewardship Plan which establishes membership, governance structure, goals, and initiatives for the NRC; and

**WHEREAS**, The NRC recognizes neighboring cities as important partners in this effort, sharing a recognition that the benefits of a healthy watershed extend beyond the basin's borders; and

**WHEREAS**, the City of Lacey has long been both a formal and informal stakeholder in planning and stewardship processes for the Nisqually Watershed, including active participation on the WRIA 11 Planning Unit that oversaw the development of the *Nisqually Watershed Management Plan* (2003), the *Phase IV Nisqually Implementation Plan for Watershed Management in WRIA 11* (2007), and the *Addendum to the Nisqually Watershed Management Plan* (2019); and

**WHEREAS**, Lacey's membership in the NRC will facilitate the implementation of watershed management activities to which the City is already a party; and

**WHEREAS**, at its August 21, 2020 meeting, the Nisqually River Council approved moving forward with a proposal to incorporate the WRIA 11 Planning Unit under the NRC. This proposal, if also approved by the Planning Unit, would consolidate multiple planning bodies with similar purposes, and make the NRC the permanent administrative home for WRIA 11 management planning and implementation; and

**WHEREAS**, in a letter dated October 6, 2020, the Chair of the NRC extended an invitation to the City of Lacey to become a member of the NRC, with the caveat that member

governments are expected to designate a representative to attend the NRC's monthly public meetings and to participate as appropriate in committees and initiatives; and

**WHEREAS**, the City Council finds participation in the Nisqually River Council to be in the public interest.

**NOW, THEREFORE**, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

1. The City of Lacey hereby accepts the invitation of the Nisqually River Council to become a voting member of the Nisqually River Council.
2. The Mayor shall appoint, subject to confirmation by Council, a Councilmember to attend the NRC's monthly public meetings and to participate in committees and initiatives as needed.
3. The City Manager shall assign a staff representative to attend the NRC's monthly public meetings and to participate in committees and initiatives as appropriate.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, this 18<sup>th</sup> day of March, 2021.

CITY COUNCIL

BY: \_\_\_\_\_  
Mayor

Attest:

Approved as to form:

\_\_\_\_\_  
City Clerk

\_\_\_\_\_  
City Attorney



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** 2020 Budget Encumbrance Carryovers

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**RECOMMENDATION:** Upon review and concurrence, adopt proposed ordinance amending the 2021 Budget.

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Troy Woo, Finance Director *TW*

**ORIGINATED BY:** Troy Woo, Finance Department

**ATTACHMENTS:** 1. [Ordinance No. 1586](#)  
2. [Summary for Ordinance](#)

**FISCAL NOTE:** See attached Ordinance [Exhibit "A"](#)

**PRIOR REVIEW:** Finance and Economic Development Committee on February 23, 2021

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### BACKGROUND:

Despite all the extensive budget planning and efforts to complete projects and purchases prior to the year-end closing, staff are not always able to complete all of the projects and purchases. The projects and purchases are expected to be completed during 2021, so it becomes necessary to carryover previously approved budget appropriations into the next year. These proposed amendments are limited to carryover encumbrances and capital projects.

This carryover process relieves concerns that authorized budgets will be exceeded when large carryover projects do not have the authorized appropriations until late into the year. It is the City's practice to amend the budget once per year during September. If the City Council approves these appropriations earlier in the year, the risk of exceeding authorized expenditure levels is minimized.

The encumbrance and capital carryover requests are limited to purchase orders that were initiated in the previous year and capital projects that were authorized in the previous year's budget. The outstanding purchase order carryover requests are limited to significant (over \$2,500) unfilled material, equipment, and supply orders. Capital project carryover requests do not have a dollar threshold. The funds requesting the carryovers must have adequate fund balance before the requests can be granted.

Each fund is detailed separately on the proposed carryover amendment list. There are three columns of dollar values. The first column contains the amount currently authorized for that line item in the 2021 budget. The second column is the amount of the proposed adjustment. The last dollar column shows what the new total of that particular line-item account will be if the amendments are adopted. Total lines are included to illustrate the grand total of the fund before and after the amendments. This is important since the budget is adopted by fund total and not by line-item detail. A brief explanation or description is also provided for each line-item of the form.

It is recommended that City Council review and adopt the ordinance amending the 2021 Budget.

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#### **ADVANTAGES:**

1. The proposed adjustments to the 2021 Budget reflect more accurately the necessary requirements of each fund or adjustments made by City Council action.
2. The proposed adjustments ensure that the proper level of budget appropriations have been authorized to complete prior year projects and purchases.

#### **DISADVANTAGES:**

1. There are no significant disadvantages since there must be adequate fund balance to match the proposed carryover expenditure.

**ORDINANCE NO. 1586**

**CITY OF LACEY**

**AN ORDINANCE AMENDING THE 2021 FISCAL YEAR BUDGET AND ORDINANCE NO. 1574 ADOPTING SAID BUDGET TO RE-APPROPRIATE 2020 BUDGETED AMOUNTS FOR PROJECTS NOT COMPLETED IN 2020 AND ADOPTING A SUMMARY FOR PUBLICATION.**

**WHEREAS**, at the end of the 2020 fiscal year, certain funds which had been appropriated had not been spent because the programs, improvements, contracts or orders had not, as yet, been completed, and

**WHEREAS**, in order to complete such programs, projects and orders, and to pay the cost thereof, it is necessary that such funds be re-appropriated in the 2021 budget, NOW, THEREFORE

**BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, AS FOLLOWS:**

Section 1. The 2021 fiscal year budget and Ordinance No. 1574 adopting said budget are hereby amended in the manner set forth on Exhibit A, which is attached hereto and made a part hereof as though fully set forth at length.

Section 2. The City Clerk and the codifiers of this ordinance are authorized to make necessary corrections to this ordinance including, but not limited to, the correction of scrivener's/clerical errors, references, ordinance numbering, section/subsection numbers and any references thereto.

Section 3. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON,  
on this 18<sup>th</sup> day of March, 2021.

CITY COUNCIL

By: \_\_\_\_\_  
Mayor

Approved as to form:

\_\_\_\_\_  
City Attorney

Attest:

\_\_\_\_\_  
City Clerk



## **SUMMARY FOR PUBLICATION**

### **ORDINANCE NO. 1586**

#### **CITY OF LACEY**

The City Council of the City of Lacey, Washington, passed on March 18, 2021, Ordinance No. 1586 entitled “**AN ORDINANCE AMENDING THE 2021 FISCAL YEAR BUDGET AND ORDINANCE NO. 1574 ADOPTING SAID BUDGET TO RE-APPROPRIATE 2020 BUDGETED AMOUNTS FOR PROJECTS NOT COMPLETED IN 2020 AND ADOPTING A SUMMARY FOR PUBLICATION.**”

A section by section summary of this ordinance is as follows:

Section 1 amends the 2021 fiscal year budget and Ordinance No. 1574, adopting said budget by re-appropriating funds from the 2020 fiscal year budget which were not expended because the programs, projects, contracts and orders were not completed in 2020.

Section 2 provides provisions for corrections.

Section 3 approves this summary.

A copy of the full text of this ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: March 22, 2021

**2021 Budget Amendments - Ordinance No. 1586 Exhibit "A"**

| Account Numbers                                     | Account Description                             | 2021<br>Budget    | Budget<br>Amendment | 2021 Budget<br>as Amended | Comments                                                                                  |
|-----------------------------------------------------|-------------------------------------------------|-------------------|---------------------|---------------------------|-------------------------------------------------------------------------------------------|
| <b>Current Expense Fund</b>                         |                                                 |                   |                     |                           |                                                                                           |
| <b>Revenues</b>                                     |                                                 |                   |                     |                           |                                                                                           |
| 001-0000-308-0000                                   | Beginning Cash                                  | 3,986,473         | 782,988             | 4,769,461                 | Beginning Cash                                                                            |
| 001-0000-333-1422                                   | Dept of HUD/CDBG Dept of Commerce               | -                 | 421,852             | 421,852                   | CDBG - Thurston County 2020 Project List - Lacey                                          |
| 001-0000-334-0420                                   | State Grant/Dept. of Commerce                   | -                 | 662,154             | 662,154                   | Lacey Veterans Services Hub enhancements reimbursement (State Capital Budget)             |
| 001-0000-374-6400                                   | Capital Contributions/Dept. of Veterans Affairs | -                 | 500,000             | 500,000                   | Veteran Affairs Outstation lease tenant improvements reimbursement (Fed. Veteran Affairs) |
| <b>Total Current Expense Fund Revenues</b>          |                                                 | <b>44,213,234</b> | <b>2,366,994</b>    | <b>46,580,228</b>         |                                                                                           |
| <b>Expenditures</b>                                 |                                                 |                   |                     |                           |                                                                                           |
| 001-0401-511-5821                                   | Inter-Governmental                              | 100,000           | 7,375               | 107,375                   | Comcast Franchise Renewal                                                                 |
| 001-0701-516-4103                                   | Professional Services - Consultant              | 45,100            | 25,000              | 70,100                    | Human Resources Legal Consulting Services                                                 |
| 001-0801-565-4101                                   | Professional Services                           | -                 | 46,258              | 46,258                    | Ad Hoc Community Affordable Housing Committee                                             |
| 001-0802-565-4001                                   | Homeless Services                               | 308,000           | 100,000             | 408,000                   | Homeless Encampment Cleanup                                                               |
| 001-0802-565-4001                                   | Homeless Services                               | 408,000           | 50,000              | 458,000                   | Family Support Center - 10-Bed Shelter                                                    |
| 001-0802-565-4001                                   | Homeless Services                               | 458,000           | 100,000             | 558,000                   | Interfaith Works - 90-Bed Shelter                                                         |
| 001-0805-565-3101                                   | Supplies / Office & Operating Supply            | 3,267             | 4,114               | 7,381                     | Mayor's Gala - "Vans for Vets" Program (fuel and volunteer recognition)                   |
| 001-0805-565-3101                                   | Supplies / Office & Operating Supply            | 7,381             | 3,775               | 11,156                    | Mayor's Gala - Emergency Vouchers Program                                                 |
| 001-0805-565-3101                                   | Supplies / Office & Operating Supply            | 11,156            | 203                 | 11,359                    | Mayor's Gala - Volunteer Recognition                                                      |
| 001-0805-565-4801                                   | Repairs & Maintenance / Rep & Maint-Equipment   | 2,000             | 495                 | 2,495                     | Mayor's Gala - "Vans for Vets" Program                                                    |
| 001-0805-565-6001                                   | Capital Outlays - Equipment                     | -                 | 6,048               | 6,048                     | Mayor's Gala - Training and Meeting Room Equipment                                        |
| 001-0805-594-6501                                   | Veterans Services HUB                           | -                 | 662,154             | 662,154                   | Veterans Services Hub Enhancements                                                        |
| 001-0805-594-6501                                   | Veterans Services HUB                           | 662,154           | 421,852             | 1,084,006                 | Veterans Services Hub Enhancements - CDBG Project                                         |
| 001-0805-594-6502                                   | Veterans Affairs Lease Improvements             | -                 | 500,000             | 500,000                   | Veteran Affairs Outstation Lease Improvements                                             |
| 001-2101-521-4101                                   | Professional Services - Other                   | 7,900             | 4,624               | 12,524                    | Police Station Needs Assessment Phase 2                                                   |
| 001-3701-558-4920                                   | Special Projects                                | 270,000           | 20,000              | 290,000                   | Special Projects - Annexation Census Study                                                |
| 001-3701-558-4920                                   | Special Projects                                | 290,000           | 100,000             | 390,000                   | Special Projects - Carbon Reduction Plan Implementation                                   |
| 001-3701-558-4920                                   | Special Projects                                | 390,000           | 19,635              | 409,635                   | Special Projects - Joint Regional Housing Plan                                            |
| 001-3701-558-4920                                   | Special Projects                                | 409,635           | 25,000              | 434,635                   | Special Projects - Food Truck Site Plan                                                   |
| 001-3701-558-4920                                   | Special Projects                                | 434,635           | 4,000               | 438,635                   | Special Projects - IEDC Certification                                                     |
| 001-3701-558-4920                                   | Special Projects                                | 438,635           | 40,000              | 478,635                   | Special Projects - Incubator/Public Market Feasibility                                    |
| 001-3701-558-4920                                   | Special Projects                                | 478,635           | 2,500               | 481,135                   | Business Recruitment Marketing Materials                                                  |
| 001-7401-574-4101                                   | Professional Services - Other                   | 123,220           | 100,000             | 223,220                   | Community Outreach and Engagement Specialist                                              |
| 001-7501-597-1102                                   | Transfer Out 302 fund                           | 9,444             | 123,961             | 133,405                   | Transfer Out - Police Capital                                                             |
| <b>Total Current Expense Fund Expenditures</b>      |                                                 | <b>44,213,234</b> | <b>2,366,994</b>    | <b>46,580,228</b>         |                                                                                           |
| <b>Building Improvement Fund</b>                    |                                                 |                   |                     |                           |                                                                                           |
| <b>Revenues</b>                                     |                                                 |                   |                     |                           |                                                                                           |
| 301-0000-308-0000                                   | Beginning Cash                                  | -                 | 440,226             | 440,226                   | Beginning Cash                                                                            |
| <b>Total Building Improvement Fund Revenues</b>     |                                                 | <b>629,956</b>    | <b>440,226</b>      | <b>1,070,182</b>          |                                                                                           |
| <b>Expenditures</b>                                 |                                                 |                   |                     |                           |                                                                                           |
| 301-0101-514-6004                                   | Capital Outlays / Capital Outlays - Buildings   | -                 | 440,226             | 440,226                   | New Museum Design & Architectural                                                         |
| <b>Total Building Improvement Fund Expenditures</b> |                                                 | <b>629,956</b>    | <b>440,226</b>      | <b>1,070,182</b>          |                                                                                           |

| Account Numbers                                  | Account Description                              | 2021<br>Budget | Budget<br>Amendment | 2021 Budget<br>as Amended | Comments                                                                               |
|--------------------------------------------------|--------------------------------------------------|----------------|---------------------|---------------------------|----------------------------------------------------------------------------------------|
| <b>Capital Equipment Fund</b>                    |                                                  |                |                     |                           |                                                                                        |
| <b>Revenues</b>                                  |                                                  |                |                     |                           |                                                                                        |
| 302-0000-308-0000                                | Beginning Cash                                   | 41,981         | 1,497,290           | 1,539,271                 | Beginning cash                                                                         |
| 302-0000-397-1101                                | Transfer In 001, 003, 005                        | 9,444          | 123,961             | 133,405                   | Transfers In from Fund 001                                                             |
| <b>Total Capital Equipment Fund Revenues</b>     |                                                  | 131,944        | 1,621,251           | 1,753,195                 |                                                                                        |
| <b>Expenditures</b>                              |                                                  |                |                     |                           |                                                                                        |
| 302-0102-519-6404                                | Capital Outlays / Community Relations            | -              | 123,232             | 123,232                   | Enterprise Content Management Solution                                                 |
| 302-0102-519-6404                                | Capital Outlays / Community Relations            | 123,232        | 124,423             | 247,655                   | Enterprise Content Mgmt Implementation                                                 |
| 302-0102-519-6404                                | Capital Outlays / Community Relations            | 247,655        | 58,197              | 305,852                   | Website Design Review and Upgrades                                                     |
| 302-0102-519-6406                                | Capital Outlays / Common Facilities              | -              | 25,000              | 25,000                    | Veteran's Service HUB signage                                                          |
| 302-0102-519-6406                                | Capital Outlays / Common Facilities              | 25,000         | 150,000             | 175,000                   | Affordable Housing - Surplus Property                                                  |
| 302-0102-519-6406                                | Capital Outlays / Common Facilities              | 175,000        | 250,000             | 425,000                   | NTPS Family Resource Center                                                            |
| 302-0102-519-6410                                | Capital Outlays / Police                         | -              | 31,381              | 31,381                    | Replace Vehicle Computers                                                              |
| 302-0102-519-6410                                | Capital Outlays / Police                         | 31,381         | 92,580              | 123,961                   | Startup Equipment for New 2020 Positions                                               |
| 302-0102-519-6410                                | Capital Outlays / Police                         | 123,961        | 50,000              | 173,961                   | Upgrade Security Camera Equipment                                                      |
| 302-0102-519-6410                                | Capital Outlays / Police                         | 173,961        | 177,149             | 351,110                   | Police Vehicle Replacements Upfitting (14)                                             |
| 302-0102-519-6412                                | Capital Outlays / Public Works Parks Maintenance | 9,444          | 35,331              | 44,775                    | Bucket Truck Replacement                                                               |
| 302-0102-519-6415                                | Capital Outlays / Community Development          | -              | 22,888              | 22,888                    | Building Permit System Upgrade                                                         |
| 302-0102-519-6416                                | Capital Outlays / Parks and Recreation           | -              | 8,000               | 8,000                     | Park Rules Signage                                                                     |
| 302-0102-519-6416                                | Capital Outlays / Parks and Recreation           | 8,000          | 9,036               | 17,036                    | Needle Deposit Boxes for Parks Restrooms                                               |
| 302-0104-559-6001                                | Capital Outlays / Economic Development           | -              | 464,034             | 464,034                   | Woodland District                                                                      |
| 302-0104-559-6001                                | Capital Outlays / Economic Development           | 464,034        | 175,000             | 639,034                   | U.S. Dept. of Commerce Economic Development Administration (EDA) CARES Act Grant Match |
| <b>Total Capital Equipment Fund Expenditures</b> |                                                  | 131,944        | 1,621,251           | 1,753,195                 |                                                                                        |

|                                                  |                                        |         |         |         |                                       |
|--------------------------------------------------|----------------------------------------|---------|---------|---------|---------------------------------------|
| <b>Parks &amp; Open Space Fund</b>               |                                        |         |         |         |                                       |
| <b>Revenues</b>                                  |                                        |         |         |         |                                       |
| 303-0000-308-0000                                | Beginning Cash                         | -       | 717,235 | 717,235 | Beginning cash                        |
| <b>Total Parks &amp; Open Space Revenues</b>     |                                        | 17,579  | 717,235 | 734,814 |                                       |
| <b>Expenditures</b>                              |                                        |         |         |         |                                       |
| 303-0106-576-6003                                | Capital Outlays / Capital Improvements | -       | 440,226 | 440,226 | Lacey Museum at the Depot             |
| 303-0106-576-6003                                | Capital Outlays / Capital Improvements | 440,226 | 5,210   | 445,435 | Gold Star Monument                    |
| 303-0106-576-6003                                | Capital Outlays / Capital Improvements | 445,435 | 271,800 | 717,235 | Greg Cuoio Community Park Master Plan |
| <b>Total Parks &amp; Open Space Expenditures</b> |                                        | 17,579  | 717,235 | 734,814 |                                       |

|                                       |                                        |           |         |           |                                         |
|---------------------------------------|----------------------------------------|-----------|---------|-----------|-----------------------------------------|
| <b>RAC Capital Fund</b>               |                                        |           |         |           |                                         |
| <b>Revenues</b>                       |                                        |           |         |           |                                         |
| 307-0000-308-0000                     | Beginning Cash                         | 125,000   | 323,633 | 448,633   |                                         |
| <b>Total RAC Capital Revenues</b>     |                                        | 1,243,819 | 323,633 | 1,567,452 |                                         |
| <b>Expenditures</b>                   |                                        |           |         |           |                                         |
| 307-0106-576-6001                     | Capital Outlays / Capital Equipment    | -         | 177,705 | 177,705   | RAC Fencing (Softball Fields #1 and #2) |
| 307-0106-576-6003                     | Capital Outlays / Capital Improvements | 125,000   | 145,927 | 270,927   | Security Camera System                  |
| <b>Total RAC Capital Expenditures</b> |                                        | 1,243,819 | 323,633 | 1,567,452 |                                         |

| Account Numbers                                                                    | Account Description                                                           | 2021<br>Budget                       | Budget<br>Amendment             | 2021 Budget<br>as Amended            | Comments                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------|---------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water Construction Fund</b>                                                     |                                                                               |                                      |                                 |                                      |                                                                                                                                                                                                                                                                   |
| <b>Revenues</b><br>410-0000-308-0000                                               | Beginning Cash - Construction                                                 | 24,476,001                           | 3,471,835                       | 27,947,836                           | Beginning cash                                                                                                                                                                                                                                                    |
| <b>Total Water Construction Fund Revenues</b>                                      |                                                                               | 33,636,501                           | 3,471,835                       | 37,108,336                           |                                                                                                                                                                                                                                                                   |
| <b>Expenditures</b><br>410-3418-534-9001<br>410-3418-534-9005<br>410-3418-534-9013 | Preliminary Engineering<br>Construction Engineering<br>Construction/Utilities | 4,861,488<br>2,182,688<br>24,990,325 | 639,742<br>217,660<br>2,614,433 | 5,501,230<br>2,400,348<br>27,604,758 | Carry forward preliminary engineering cost various water construction projects<br>Carry forward construction engineering costs various water construction projects<br>Carry forward utility construction costs various water construction projects                |
| <b>Total Water Construction Fund Expenditures</b>                                  |                                                                               | 33,636,501                           | 3,471,835                       | 37,108,336                           |                                                                                                                                                                                                                                                                   |
| <b>Wastewater Construction Fund</b>                                                |                                                                               |                                      |                                 |                                      |                                                                                                                                                                                                                                                                   |
| <b>Revenues</b><br>411-0000-308-0000                                               | Beginning Cash - Construction                                                 | 9,307,624                            | 2,670,048                       | 11,977,672                           | Beginning cash                                                                                                                                                                                                                                                    |
| <b>Total Wastewater Construction Fund Revenues</b>                                 |                                                                               | 11,561,501                           | 2,670,048                       | 14,231,549                           |                                                                                                                                                                                                                                                                   |
| <b>Expenditures</b><br>411-3518-535-9001<br>411-3518-535-9005<br>411-3518-535-9013 | Preliminary Engineering<br>Construction Engineering<br>Construction/Utilities | 2,139,875<br>737,888<br>8,633,738    | 59,007<br>198,191<br>2,412,850  | 2,198,882<br>936,079<br>11,046,588   | Carry forward preliminary engineering cost various wastewater construction projects<br>Carry forward construction engineering costs various wastewater construction projects<br>Carry forward utility construction costs various wastewater construction projects |
| <b>Total Wastewater Construction Fund Expenditures</b>                             |                                                                               | 11,561,501                           | 2,670,048                       | 14,231,549                           |                                                                                                                                                                                                                                                                   |
| <b>Stormwater Construction Fund</b>                                                |                                                                               |                                      |                                 |                                      |                                                                                                                                                                                                                                                                   |
| <b>Revenues</b><br>412-0000-308-0000                                               | Beginning Cash - Construction                                                 | 135,123                              | 104,479                         | 239,602                              | Beginning cash                                                                                                                                                                                                                                                    |
| <b>Total Stormwater Construction Fund Revenues</b>                                 |                                                                               | 1,545,077                            | 104,479                         | 1,649,556                            |                                                                                                                                                                                                                                                                   |
| <b>Expenditures</b><br>412-4218-542-9001<br>412-4218-542-9004<br>412-4218-542-9005 | Preliminary Engineering<br>Storm Drainage<br>Construction Engineering         | 321,563<br>710,175<br>61,763         | 51,664<br>4,102<br>48,713       | 373,227<br>714,277<br>110,476        | Carry forward preliminary engineering cost various stormwater construction projects<br>Carry forward utility construction costs various stormwater construction projects<br>Carry forward construction engineering costs various stormwater construction projects |
| <b>Total Stormwater Construction Fund Expenditures</b>                             |                                                                               | 1,545,077                            | 104,479                         | 1,649,556                            |                                                                                                                                                                                                                                                                   |
| <b>Equipment Rental</b>                                                            |                                                                               |                                      |                                 |                                      |                                                                                                                                                                                                                                                                   |
| <b>Revenues</b><br>501-0000-308-0000                                               | Beginning Cash                                                                | -                                    | 139,669                         | 139,669                              | Beginning cash                                                                                                                                                                                                                                                    |
| <b>Total Equipment Rental Fund Revenues</b>                                        |                                                                               | 3,264,434                            | 139,669                         | 3,404,103                            |                                                                                                                                                                                                                                                                   |
| <b>Expenditures</b><br>501-4801-548-6002                                           | Capital Outlays - Replacement                                                 | 290,321                              | 139,669                         | 429,990                              | Police Vehicles and Bucket Truck Replacements                                                                                                                                                                                                                     |
| <b>Total Equipment Rental Fund Expenditures</b>                                    |                                                                               | 3,264,434                            | 139,669                         | 3,404,103                            |                                                                                                                                                                                                                                                                   |

| Account Numbers                                     | Account Description         | 2021<br>Budget | Budget<br>Amendment | 2021 Budget<br>as Amended | Comments                                                   |
|-----------------------------------------------------|-----------------------------|----------------|---------------------|---------------------------|------------------------------------------------------------|
| <b>Information Services</b>                         |                             |                |                     |                           |                                                            |
| <b>Revenues</b>                                     |                             |                |                     |                           |                                                            |
| 502-0000-308-0000                                   | Beginning Cash              | 288,519        | 112,837             | 401,356                   | Beginning cash                                             |
| <b>Total Information Services Fund Revenues</b>     |                             | 2,335,942      | 112,837             | 2,448,779                 |                                                            |
| <b>Expenditures</b>                                 |                             |                |                     |                           |                                                            |
| 502-1802-518-6001                                   | Capital Outlays - Equipment | 281,236        | 112,837             | 394,073                   | Teleworking Equipment and Scheduled Equipment Replacements |
| <b>Total Information Services Fund Expenditures</b> |                             | 2,335,942      | 112,837             | 2,448,779                 |                                                            |



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** Delegation of Animal License Fees to JASCOM Board.

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**RECOMMENDATION:** Adopt proposed Ordinance 1587 amending Section 7.04.040 of the Lacey Municipal Code to delegate the setting of animal license fees to the JASCOM Board.

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**STAFF CONTACT:** Scott Spence, City Manager   
Dave Schneider, City Attorney   
Sara Hock, Executive Director of Joint Animal Services

**ORIGINATED BY:** City Attorney's Office

**ATTACHMENTS:** 1. [Proposed Ordinance No. 1587](#)

**PRIOR REVIEW:** February 11, 2021 – City Council Worksession

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### BACKGROUND:

The City of Lacey has joined in an Interlocal Agreement with other nearby jurisdictions for the purpose of providing animal services to each member of the agreement. By cooperating in this effort, member jurisdictions enjoy increased efficiency and uniform enforcement of animal regulations.

Currently, all member jurisdictions require licensing fees, which are administered by the Joint Animal Services Commission (JASCOM). Licensing fees are established by formal legislative action in each member jurisdiction independently.

To adjust licensing fees, each jurisdiction must go through its own formal legislative process. A high level of coordination between staff in each jurisdiction is required to ensure that the fees are uniform across all member jurisdictions.

By delegating the setting of license fees to the JASCOM board, the Council can streamline the fee-adjustment process.

Staff recommends amending section 7.04.040 of the Lacey Municipal Code to provide for delegation of animal license fees to the JASCOM board.

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**ADVANTAGES:**

1. The animal license fee update process will be streamlined, reducing delays and ensuring timely uniformity of fees across member jurisdictions.

**DISADVANTAGES:**

1. None.



ORDINANCE NO. 1587

CITY OF LACEY

AN ORDINANCE OF THE CITY OF LACEY RELATING TO ANIMAL LICENSE FEES, AMENDING SECTION 7.04.040 OF THE LACEY MUNICIPAL CODE, AND APPROVING A SUMMARY FOR PUBLICATION.

WHEREAS, the City has entered into an Interlocal Agreement with other local jurisdictions to provide for joint animal services; and

WHEREAS, license fees for animals should be uniform across the jurisdictions involved in the agreement; and

WHEREAS, legislative efficiency and cooperation between jurisdictions will be enhanced by delegation of the license fees to the Joint Animal Services Commission (JASCOM); and

WHEREAS, the City Council finds it in the interests of the citizens of Lacey to delegate the setting of license fees to JASCOM;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

Section 1. Section 7.04.040 of the Lacey Municipal Code is hereby amended as follows:

7.04.040 Licensing and Registration Requirements.

A. Failure to license a dog or cat. Except as otherwise provided in this chapter, it is unlawful for any person to own, keep or have control of any dog or cat in the city of Lacey unless the person has procured a license. Failure to license a pet animal is a civil infraction. If a person is charged with a violation, the person shall not be determined to have committed an infraction if the person produces within fourteen days of the date of issuance proof of licensing or registering of the subject dog or cat under this subsection to either the court clerk or Lacey Violations Bureau. The court or violations bureau at the direction of the court may assess court administrative costs of \$25.00 at the time of dismissal.

B. Issuance of license tag. Animal Services or agents thereof shall provide an appropriate identification tag for each dog or cat licensed to persons applying, upon payment of the appropriate license fee. It shall be the responsibility of the owner of a dog to keep a collar or harness on the animal with the license tag attached if the animal is off the owner's property. For cats only, a microchip may substitute if a collar is considered a hazard.

C. Supplemental identification. Tattooing or microchip implantation are acceptable auxiliary means of identification but do not replace the license.

D. Lack of authorized and current tag. A dog or cat without an authorized and current license tag may be impounded, except as otherwise set forth in this chapter.

E. Annual License Fees. License fees shall be adopted by reference as established annually by the Joint Animal Services Commission (JASCOM)~~resolution of the city council~~.

F. Date due. All licenses granted under this chapter shall be valid for one year. All renewed licenses shall be valid for a period of twelve months following their assigned renewal date, and the renewal date shall be not less than twelve months subsequent to the issuance of the new license.

G. Licenses nontransferable. Licenses shall not be transferable from one pet animal to another.

H. Tag removal unlawful. It is unlawful for any person to remove a tag from any dog or cat, or to obliterate any tattoo or microchip registered under this section without the permission of the owner or issuing authority other than in a medical emergency. A violation of this provision shall be a gross misdemeanor.

I. Kennel or cattery permit. A permit for a kennel or cattery, may be granted for those land use zones where such use is not prohibited.

J. Exotic Animals. Owners of constrictor type reptiles over eight feet in length, venomous reptiles, and primates that are not otherwise prohibited, are required to comply with all state and federal laws for the keeping of such animals and annually register such animals with Animal Services by completing a form provided by Animal Services. Failure to register such animals shall be a misdemeanor and shall subject the animal to immediate impoundment.

Section 2. SEVERABILITY. If any section, sentence, clause or phrase of this ordinance should be held to be invalid by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause or phrase of this ordinance.

Section 3. CORRECTIONS. The City Clerk and the codifiers of this ordinance are authorized to make corrections to this ordinance including, but not limited to, the corrections of scrivener's/clerical errors, references, ordinance numbering, section/subsection number and any references thereto.

Section 4. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, at a regularly-called meeting thereof, held this 18<sup>th</sup> day of March, 2021.

CITY COUNCIL

By: \_\_\_\_\_  
Mayor

Approved as to form:

\_\_\_\_\_  
City Attorney

Attest:

\_\_\_\_\_  
City Clerk

SUMMARY FOR PUBLIC ATION  
ORDINANCE NO 1587  
CITY OF LACEY

The City Council of Lacey, Washington passed on March 18, 2021, Ordinance No. 1587, entitled “AN ORDINANCE OF THE CITY OF LACEY RELATING TO ANIMAL LICENSING FEES, AMENDING SECTION 7.04.040 OF THE LACEY MUNICIPAL CODE, AND APPROVING A SUMMARY FOR PUBLICATION.”

The main points of the Ordinance are described as follows:

1. The Ordinance amends section 7.04.040 of the Lacey Municipal Code to authorize the Joint Animal Services Commission to set animal licensing fees.
2. The Ordinance approves this summary for Publication.

A copy of the full text of this Ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: March 22, 2021



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** WRIA 13 Watershed Restoration and Enhancement Plan

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**RECOMMENDATION:** Motion to authorize Lacey's WRIA 13 representative to approve the final draft of the WRIA 13 Watershed Restoration and Enhancement Plan.

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Scott Egger, Public Works Director *SE*  
Peter Brooks, Water Resources Manager *PB*  
Julie Rector, Water Quality Analyst *JR*

**ORIGINATED BY:** Water Resources Department

**ATTACHMENTS:**

1. [Executive Summary; excerpt from draft Watershed Restoration and Enhancement Plan](#)
2. [Hicks Lake Stormwater Retrofit project description; excerpt from draft Watershed Restoration and Enhancement Plan](#)
3. [Final Draft WRIA 13 Watershed Restoration and Enhancement Plan](#)

**FISCAL NOTE:** Approving the Plan does not create a financial obligation

**PRIOR REVIEW:** February 25, 2021 – City Council Worksession

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### BACKGROUND:

The Streamflow Restoration Act enacted in 2018 requires the development of watershed-scale plans that, when, implemented, will offset instream flow impacts from new permit-exempt wells constructed from 2018 through 2038. As required in the Act, the Washington Department of Ecology convened the WRIA 13 Watershed Restoration and Enhancement Committee (WREC) to develop a plan using a consensus-based process for the area that

covers the Deschutes River watershed and several sub-basins, including the Woodland Creek basin.

Members on the WREC represent a wide range of stakeholders in WRIA 13, which is comprised of the Deschutes River watershed and a number of other sub-basins including the Woodland Creek sub-basin. The City has been active on the committee since its inception in October 2018. Deputy Mayor Pratt is Lacey's designated representative on the WREC and has also participated on its technical sub-committees.

The final draft Plan has just been completed, and the Executive summary is provided in Attachment 1. The Plan must be approved by the stakeholder jurisdictions, and then by the full WREC, before it is sent to Ecology for final approval. Because the law requires Ecology to review and approve the Plan by June 30, 2021, the schedule requires stakeholders to approve the Plan by March, and for the WREC to approve sending the plan to Ecology in April.

As required in the law, the Plan accomplishes the following:

- Identifies the projected number of new permit-exempt domestic groundwater wells within the boundaries of WRIA 13 for the 20-year period of 2018 – 2038;
- Estimates instream flow impacts from the consumptive use of these wells, within the entire basin as well as within defined sub-basins;
- Identifies projects for offsetting the instream flow impacts from these wells
- Quantifies the water offsets to be provided by these projects and provides assurances that implementation will also provide a net ecological benefit to the watershed.

Overall, the WREC estimated a total of 2,616 permit-exempt wells (or new connections to existing wells) will be constructed from 2018-2038. Using conservative estimates for the consumption portion of indoor and outdoor water use, streamflow impacts from these wells is projected to be a total of 0.6 cubic feet per second in WRIA 13.

The Plan identifies several water offset projects as well as habitat restoration projects that are not water offset projects but will provide a Net Ecological Benefit to the watershed. In addition, the Plan includes regulatory and policy recommendations and an adaptive management process that are intended to aid in implementation and further meet the goals of the Plan.

It is anticipated that the City will have a role in implementing the following recommendations:

- Participation on a long-term implementation group that will oversee and track implementation of this Plan. The WREC is referring to this group as the Deschutes River Council.
- A lead role in implementing the Hicks Lake Stormwater Retrofit (see Attachment 2). This project that will upgrade Lacey's existing stormwater facility to provide additional water quality treatment and to incorporate groundwater infiltration which

will provide water offsets. This is the only viable water offset project proposed in the Woodland Creek sub-basin.

- Thurston County will look at their policies for opportunities to promote connections to Group A water systems.

Other policies of interest to the City include:

- Thurston County policy to revisit the current restrictions on the use of reclaimed water within the county.
- Improvements to Ecology's well log database, to clarify details on well construction and improve publicly accessible well log data.
- Creating a position at Ecology for a South Sound water steward.
- Investigate whether changes are needed to the instream flow rules in WRIA 13.

Most of funding for implementation is expected to come from state grants, including Streamflow Restoration grants administered by the Department of Ecology.

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#### **ADVANTAGES:**

1. When implemented, the WREC Plan will enhance stream flow and habitat in WRIA 13.

#### **DISADVANTAGES:**

1. None.



## Executive Summary

In January 2018, the Washington State Legislature passed the Streamflow Restoration law (RCW 90.94) to help support robust, healthy, and sustainable salmon populations while ensuring rural communities have access to water. The law directs the Department of Ecology to chair local planning Committees to develop Watershed Restoration and Enhancement Plans that identify projects necessary to offset potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over the next 20 years (2018 – 2038) and provide a net ecological benefit to the watershed<sup>2</sup>. This Watershed Restoration and Enhancement Plan was written to meet the guidance and policy interpretations as provided by the Department of Ecology.

The Department of Ecology (Ecology) established the Watershed Restoration and Enhancement Committee to collaborate with tribes, counties, cities, state agencies, and other entities and interests in the Deschutes watershed, also known as Water Resource Inventory Area (WRIA) 13. The WRIA 13 Committee met for over 2 years to develop a watershed plan.

As required by the law, and to allow for meaningful analysis of the relationship between new consumptive use and offsets, the WRIA 13 Committee divided the watershed into nine subbasins. Subbasins help describe the location and timing of projected new consumptive water use, the location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects.

This watershed plan projects 2,616 permit exempt (PE) well connections over the 20-year planning horizon. The projects and actions in this watershed plan will address and offset the consumptive water use from those 2,616 PE well connections. The projected new consumptive water use associated with the new PE well connections is 435 acre-feet per year in WRIA 13, which the Committee determined to be the “most likely” estimate. This equates to 0.6 cubic feet per second (cfs) or 388,343 gallons per day (gpd). This watershed plan also presents a higher consumptive use estimate as a goal to achieve through adaptive management and project implementation of 513 acre-feet per year (0.7 cfs or 457,977 gallons per day) in order to support streamflows.

This watershed plan includes projects that provide an anticipated offset of 1,316 acre-feet per year to benefit streamflows and enhance the watershed. Additional projects in the plan include benefits to fish and wildlife habitat, such as several thousand feet of streambed improvements, dozens of acres of restoration and protection, and many miles of riparian restoration across WRIA 13.

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<sup>2</sup> Some members of the WRIA 13 Committee have different interpretations of RCW 90.94.030. Statements from entities and other documents provided in the Compendium provide more information on their interpretations, which apply throughout this plan.

Out of the 9 subbasins identified by the Committee, 4 subbasins have anticipated project offsets that exceed both the most likely and higher consumptive use estimates; 1 subbasin has anticipated project offsets that do not meet either the most likely or the higher consumptive use estimate; and, 4 subbasins do not have any offset projects identified.

To increase the reasonable assurance for plan implementation and tracking progress, this watershed plan includes policy and regulatory recommendations and an adaptive management process. The fifteen policy and regulatory recommendations are included to contribute to the goals of this watershed plan, including streamflow restoration and meeting net ecological benefit. These recommendations enhance water conservation efforts; improve research, monitoring, and data collection; plan for better drought response; and finance plan implementation. The watershed plan describes an adaptive management approach, which identifies the development of an ongoing implementation group (Deschutes Watershed Council) to support implementation, a tracking and reporting structure to assess progress and make adjustments as needed, and a funding mechanism to adaptively manage implementation.

## Hicks Lake stormwater retrofit

### Description

The Ruddell Road Stormwater Facility was constructed by the City of Lacey in 1999, consisting of a pretreatment settling basin that flows to constructed wetlands; ultimately flowing into Hicks Lake. Although the facility is an improvement to the previous, untreated condition, the limited water quality wet pool volume, relatively high inflows, and flow-through design conditions, limit water quality treatment and provides minimal, if any, infiltration benefit. Therefore, the City is investigating the feasibility of an offset infiltration facility as an upgrade to the current system.

The proposed project would provide water offsets and ecological benefit (per RCW 90.94.030) to the Woodland Creek sub-basin. The improvements are expected to provide a significant shallow groundwater recharge component, and augment base flow to Hicks, Pattison, and Long Lakes, ultimately benefitting Woodland Creek, which is currently impaired by low instream flow (303d listing 6169). Proposed upgrades to the facility include a flow splitting manhole, filtration treatment BMP, infiltration gallery and an overflow structure to the existing wetland.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

The delineated basin contributing to the existing stormwater system has an approximate total area of 346.46 acres. Stormwater runoff was modeled for the catchment by characterizing precipitation, soils, impervious surfaces, and land use composition. The proposed infiltration facility was sized according to potential stormwater flows, an assumed soil infiltration rate, and soil characteristics. A range of diversion flows were modeled (1cfs, 2cfs, and 3 cfs) were modeled and resulted in a corresponding range of average annual infiltration of 167, 244, and 296 afy, respectively. All flows, up to 3.5 cfs are expected to be 100% infiltrated, but infiltrating up to 3cfs accounts for reduction in infiltration capacity over time. Therefore, infiltrating up to 3 cfs for an offset benefit of 296 cfs is reasonable.



## Conceptual-level map and drawings of the project and location.

Figure 1 shows the general layout of the proposed infiltration facility, in series with the existing stormwater (water quality) treatment facility. Up to 3 cfs in stormwater flow would be directed to and infiltrated in the proposed facility. Any stormwater not infiltrated would still over into the existing facility, and flow into Hicks Lake.

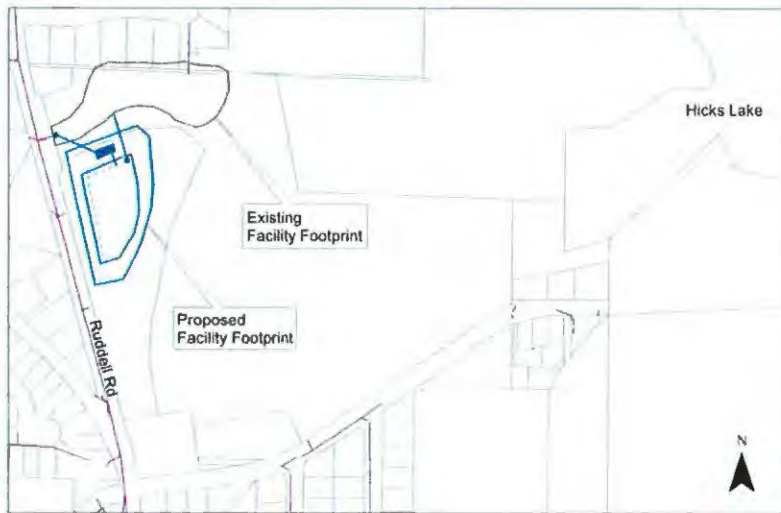


Figure 1. Layout of Proposed Infiltration Facility

## Description of the anticipated spatial distribution of likely benefits

The infiltrated stormwater would seep into Hicks Lake. Hicks Lake is the headwaters of the Woodland Creek watershed. Water in Hicks Lake flows through Pattison Lake, Long Lake, and then into Woodland Creek. Infiltrated stormwater would reduce flood flows and presumably increase base flows in the entire system during non-storm periods.

## Performance goals and measures.

Performance will be measured in terms of infiltration. Stormwater flows and infiltration capacity (or bypass to the water quality BMP) will be measured or observed, for effectiveness.

## Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.

Woodland Creek supports spawning populations of coho, chum, and Chinook salmon (WDF 1975; WDFW 2020). Steelhead trout has documented presence. These salmonids are present from Henderson Inlet to Long Lake. Within this reach, the creek is seasonally dry from Lake Lois to Beatty Springs, north of Martin Way. The watershed is heavily urbanized in the headwaters, contributing to reduced summer flows. This project will contribute to moderating the effects of urban stormwater impacts.

### **Identification of anticipated support and barriers to completion.**

The City supports this project. The project will be on property the City is planning to purchase, and the City does not anticipate any barriers to completion.

### **Potential budget and O&M costs.**

The preliminary OPCC totals approximately \$3.3 million for the proposed facilities as currently envisioned (Attachment A).

### **Anticipated durability and resiliency.**

The project would have lasting benefits as it would be actively managed by City.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

The project sponsor is the City of Lacey. The City is ready to implement this stormwater retrofit project, commensurate with funding.

### **References**

WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and Salmon Utilization, WRIA 13."

WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

**Attachment A - Opinion of Probable Costs of Construction  
(OPCC) - Concept Plan Level**

Note: Preliminary OPCC does not include sales tax, design, CM, property acquisition, legal, and other administrative/legal costs

---

**Total  
OPCC: \$3,295,000**

---

| Item | Description                                                                     | Unit | Unit Cost | Qty | Cost      | Comments                                                                                                      |
|------|---------------------------------------------------------------------------------|------|-----------|-----|-----------|---------------------------------------------------------------------------------------------------------------|
|      | <b><i>General Requirements - Stormwater Facilities</i></b>                      |      |           |     |           |                                                                                                               |
| 1    | Mob/Demob, Survey, Temp Facilities, Utilities Protection, Traffic Control, etc. | ls   | 331,000   | 1   | \$331,000 | 15% of Items below                                                                                            |
|      | <b><i>Flow Splitter at Connection to Existing SD</i></b>                        |      |           |     |           |                                                                                                               |
| 2    | Flow Splitter Vault with Adjustable High Flow Bypass Weir                       | ls   | \$60,000  | 1   | \$60,000  | Precast vault with interior lateral weir wall with alluminum adjustable weir plate - assume 8'X16' vault size |
|      | <b><i>Water Quality Pre-Treatment</i></b>                                       |      |           |     |           |                                                                                                               |
| 3    | Pre-treatment Facilities Prior to Groundwater Discharge                         | cfs  | \$80,000  | 3   | \$240,000 | Pre-settling vault and/or hydrodynamic separator(s) - allowance for 3 cfs capacity                            |
|      | <b><i>Drainage Conveyance System</i></b>                                        |      |           |     |           |                                                                                                               |
| 4    | 12" Dia. Storm Drain (Polypropylene)                                            | lf   | \$60      | 700 | \$42,000  | Collective 12" conveyance SD; 4' - 6' Depth                                                                   |
| 5    | Catch Basin Type 1                                                              | ea   | \$4,000   | 4   | \$16,000  | Collective Type 1 CBs, 5' Std Depth                                                                           |
| 6    | Catch Basin Type 2                                                              | ea   | \$7,000   | 2   | \$14,000  | Collective Type 2 CBs, 6' - 10' Depth                                                                         |

|    |                                                                 |    |          |        |           |                                                                                                   |
|----|-----------------------------------------------------------------|----|----------|--------|-----------|---------------------------------------------------------------------------------------------------|
| 7  | Catch Basin Type 2<br>Emergency Overflow<br>w/Debris Rack       | ea | \$10,000 | 1      | \$10,000  | Overflow spillway from<br>infiltration gallery to existing<br>constructed wetland; debris<br>cage |
| 8  | Trench Excavation Safety<br>Systems                             | ls | \$7,000  | 1      | \$7,000   | All conveyance facilities                                                                         |
|    | <b>Earthwork</b>                                                |    |          |        |           |                                                                                                   |
| 9  | Construction TESC<br>Control and Compliance                     | ls | \$70,000 | 1      | \$70,000  | CSWPPP, TESC, SPCC, Temp<br>Treatment, Discharge, CSGP<br>Monitoring/Compliance                   |
| 10 | Clearing, Grubbing,<br>Disposal                                 | ac | \$14,000 | 3.0    | \$42,000  | Forrested parcel; on-site<br>processing with grinder<br>assumed                                   |
| 11 | Infiltration Facility Pad<br>Excavation Incl Haul,<br>Disposal  | cy | \$20     | 32,000 | \$640,000 | Assumes excess material<br>disposal within 5 mi                                                   |
| 12 | Infiltration Gallery<br>Footprint Excavation,<br>Haul, Disposal | cy | \$24     | 6,500  | \$156,000 | Assumes excess material<br>disposal within 5 mi                                                   |
| 13 | Shoring or Extra<br>Excavation                                  | ls | \$15,000 | 1      | \$15,000  | Temporary shoring for gallery<br>excavation                                                       |
|    | <b>Infiltration Gallery</b>                                     |    |          |        |           |                                                                                                   |
| 14 | Storm HDPE Arch<br>Infiltration Chambers                        | lf | \$40     | 12,000 | \$480,000 | 16" high HDPE arch infiltration<br>chambers                                                       |
| 15 | Crushed Stone - 1.5"<br>Fractured/Washed                        | cy | \$55     | 4,500  | \$247,500 | Infiltration chambers zone<br>backfill                                                            |
| 16 | Geotextile                                                      | sy | \$4      | 5,500  | \$22,000  | Separation geotextile from<br>overlying soils                                                     |
| 17 | Topsoil                                                         | cy | \$40     | 1,100  | \$44,000  | Topsoil above gallery and in<br>disturbed fringe areas                                            |
| 18 | Access Road Restoration<br>- AC Pavement                        | sy | \$36     | 1,200  | \$43,200  | Perimeter 1,100' X 10'W access<br>road and connection to Ruddell<br>Rd                            |
| 19 | Gallery Footprint<br>Restoration Seeding                        | ls | \$5,000  | 1      | \$5,000   | Grass surface restoration above<br>infiltration gallery                                           |
| 20 | Perimeter landscape<br>Plantings and Irrigation                 | ls | \$50,000 | 1      | \$50,000  | Landscaping allowance                                                                             |



|                                                               |                    |
|---------------------------------------------------------------|--------------------|
| <b>Subtotal</b>                                               | <b>\$2,534,700</b> |
| <b>Construction<br/>Contingency (Planning<br/>Level, 30%)</b> | <b>\$760,410</b>   |



# **Watershed Restoration and Enhancement Plan**

**WRIA 13  
Deschutes Watershed**

**Final Draft Plan  
January 28, 2021**

## Publication Information

This document is available on the Department of Ecology's website at:

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<sup>1</sup> [www.ecology.wa.gov/contact](http://www.ecology.wa.gov/contact)

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# Acknowledgements

This watershed plan was written as a collaboration between the Department of Ecology, the WRIA 13 Committee, and the technical consultants. We express our sincere gratitude to those that supported the development of the plan and supplemental materials.

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Thank you to the Committee members that participated in short-term, ad hoc work groups.

Thank you also to Tribal, city and county staff, WRIA 13 Salmon Habitat Recovery Lead Entity Coordinator, DOH, and Thurston PUD 1 for providing resources and presentations throughout this process.

<sup>1</sup>No longer at entity.

<sup>2</sup>No longer on Committee

# Executive Summary

In January 2018, the Washington State Legislature passed the Streamflow Restoration law (RCW 90.94) to help support robust, healthy, and sustainable salmon populations while ensuring rural communities have access to water. The law directs the Department of Ecology to chair local planning Committees to develop Watershed Restoration and Enhancement Plans that identify projects necessary to offset potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over the next 20 years (2018 – 2038) and provide a net ecological benefit to the watershed<sup>2</sup>. This Watershed Restoration and Enhancement Plan was written to meet the guidance and policy interpretations as provided by the Department of Ecology.

The Department of Ecology (Ecology) established the Watershed Restoration and Enhancement Committee to collaborate with tribes, counties, cities, state agencies, and other entities and interests in the Deschutes watershed, also known as Water Resource Inventory Area (WRIA) 13. The WRIA 13 Committee met for over 2 years to develop a watershed plan.

As required by the law, and to allow for meaningful analysis of the relationship between new consumptive use and offsets, the WRIA 13 Committee divided the watershed into nine subbasins. Subbasins help describe the location and timing of projected new consumptive water use, the location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects.

This watershed plan projects 2,616 permit exempt (PE) well connections over the 20-year planning horizon. The projects and actions in this watershed plan will address and offset the consumptive water use from those 2,616 PE well connections. The projected new consumptive water use associated with the new PE well connections is 435 acre-feet per year in WRIA 13, which the Committee determined to be the “most likely” estimate. This equates to 0.6 cubic feet per second (cfs) or 388,343 gallons per day (gpd). This watershed plan also presents a higher consumptive use estimate as a goal to achieve through adaptive management and project implementation of 513 acre-feet per year (0.7 cfs or 457,977 gallons per day) in order to support streamflows.

This watershed plan includes projects that provide an anticipated offset of 1,316 acre-feet per year to benefit streamflows and enhance the watershed. Additional projects in the plan include benefits to fish and wildlife habitat, such several thousand feet of streambed improvements, dozens of acres of restoration and protection, and many miles of riparian restoration across WRIA 13.

---

<sup>2</sup> Some members of the WRIA 13 Committee have different interpretations of RCW 90.94.030. Statements from entities and other documents provided in the Compendium provide more information on their interpretations, which apply throughout this plan.

Out of the 9 subbasins identified by the Committee, 4 subbasins have anticipated project offsets that exceed both the most likely and higher consumptive use estimates; 1 subbasin has anticipated project offsets that do not meet either the most likely or the higher consumptive use estimate; and, 4 subbasins do not have any offset projects identified.

To increase the reasonable assurance for plan implementation and tracking progress, this watershed plan includes policy and regulatory recommendations and an adaptive management process. The fifteen policy and regulatory recommendations are included to contribute to the goals of this watershed plan, including streamflow restoration and meeting net ecological benefit. These recommendations enhance water conservation efforts; improve research, monitoring, and data collection; plan for better drought response; and finance plan implementation. The watershed plan describes an adaptive management approach, which identifies the development of an ongoing implementation group (Deschutes Watershed Council) to support implementation, a tracking and reporting structure to assess progress and make adjustments as needed, and a funding mechanism to adaptively manage implementation.

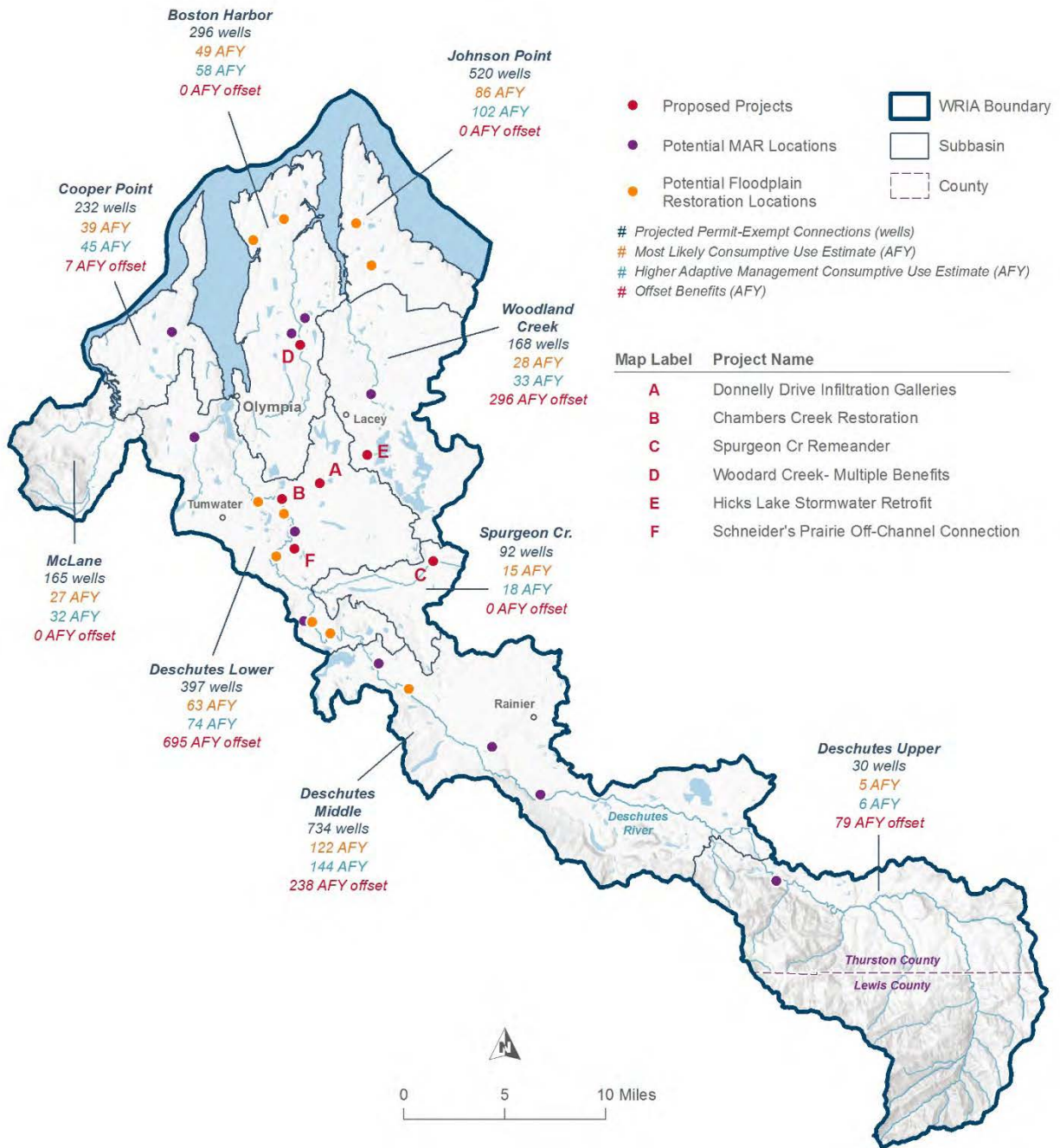


Figure ES 1: Summary of findings of the WRIA 13 Watershed Restoration and Enhancement Plan, including estimates for new domestic permit exempt well growth, consumptive use estimates, and project offset benefits.

# Chapter One: Plan Overview

## 1.1 Plan Purpose and Structure

The purpose of the Water Resource Inventory Area (WRIA) 13 Watershed Restoration and Enhancement Plan is to identify projects and actions necessary to offset the impacts of new domestic permit-exempt wells to streamflows, and provide improved habitat for the recovery of threatened and endangered salmonids. The watershed restoration and enhancement plan is one requirement of RCW 90.94. Watershed restoration and enhancement plans must, at a minimum, identify projects to offset the potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over 20 years (2018-2038), and provide a net ecological benefit to the WRIA. WRIA 13 watershed restoration and enhancement plan (watershed plan) considers priorities for salmon recovery and watershed recovery, while ensuring it meets the provisions of the law.<sup>3</sup>

Pumping from wells can reduce groundwater discharge to springs and streams by capturing water that would otherwise have discharged naturally, reducing flows (Barlow and Leake 2012). Consumptive water use (that portion not returned to the aquifer) reduces streamflow, both seasonally and as average annual recharge. A well pumping from an aquifer connected to a surface water body can either reduce the quantity of water discharging to the river or increase the quantity of water leaking out of the river (Barlow and Leake 2012). Projects to offset consumptive use associated with permit-exempt domestic water use have become a focus to minimize future impacts to instream flows and restore streamflow.

While this watershed plan is narrow in scope and is not intended to address all water uses or related issues within the watershed, it provides a path forward for future water resource planning.

**[Language to be included when appropriate]:** The WRIA 13 Committee, by completing the watershed plan, has developed, and come to agreement on, a path forward for a technically and politically complex issue in water resource management. That success sets the stage for improved coordination of water resources and overall watershed health in our WRIA.

This watershed plan is divided into the following chapters:

1. Plan overview;
2. Overview of the watershed's hydrology, hydrogeology, and streamflow;
3. Summary of the subbasins,
4. Growth projections and consumptive use estimates;

---

<sup>3</sup> Some members of the WRIA 13 Committee have different interpretations of RCW 90.94.030. Statements from entities and other documents provided in the Compendium provide more information on their interpretations, which apply throughout this plan.

5. Description of the recommended actions and projects identified to offset the future permit-exempt domestic water use in WRIA 13;
6. Explanation of recommended policy, monitoring, adaptive management and implementation measures; and
7. Evaluation and consideration of the net ecological benefits.

### **1.1.1 Legal and Regulatory Background for the WRIA 13 Watershed Restoration and Enhancement Plan**

In January 2018, the Washington State Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 (session law 2018 c 1). This law was enacted in response to the State Supreme Court's 2016 decision in *Whatcom County vs. Hirst, Futurewise, et al.* (commonly referred to as the "Hirst decision"). As it relates to this committee's work, the law, now primarily codified as RCW 90.94, clarifies how local governments can issue subdivision approvals and building permits for homes intending to use a permit-exempt well for their domestic water supply. The law also requires local watershed planning in fifteen WRIsAs, including WRIA 13.<sup>4</sup>

### **1.1.2 Domestic Permit-Exempt Wells**

This watershed restoration and enhancement plan, RCW 90.94, and the Hirst decision are all concerned with the effects of new domestic permit-exempt water use on streamflows. Several laws pertain to the management of groundwater permit-exempt wells in WRIA 13 and are summarized in brief here for the purpose of providing context for the WRIA 13 watershed plan.

First and foremost, RCW 90.44.050, commonly referred to as "the Groundwater Permit Exemption," establishes that certain small withdrawals of groundwater are exempt from the state's water right permitting requirements, including small indoor and outdoor water use associated with homes. Although these withdrawals do not require a state water right permit, the water right is still legally established by the beneficial use and is subject to state water law.<sup>5</sup> Even though a water right permit is not required for small domestic uses under RCW 90.44.050, there is still regulatory oversight, including from local jurisdictions. Specifically, in order for an applicant to receive a building permit from their local government for a new home, the

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<sup>4</sup> [ESSB 6091](#) includes the following: "AN ACT Relating to ensuring that water is available to support development; amending RCW 19.27.097, 58.17.110, 90.03.247, and 90.03.290; adding a new section to chapter 36.70A RCW; adding a new section to chapter 36.70 RCW; adding a new chapter to Title 90 RCW; creating a new section; providing an expiration date; and declaring an emergency." (p. 1)

<sup>5</sup> More information on water availability is available on the Department of Ecology's website: <https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability>.

applicant must satisfy the provisions of RCW 19.27.097 for what constitutes evidence of an adequate water supply.

Washington State follows the doctrine of prior appropriation, which means that the first users have rights “senior” to those issued later. This is called “first in time, first in right.” If a water shortage occurs, senior rights are satisfied first and “junior” rights can be curtailed. Seniority is established by priority date — the original date a water right application was filed, or the date that water was first put to beneficial use in the case of claims and the groundwater permit exemption. Although groundwater permit-exempt uses do not require a water right permit, they are always subject to state water law. In some instances, Ecology has had to regulate “junior” permit exempt water users when they interfere with older, “senior” water rights, including [instream flow rules](#).

RCW 90.94.030 adds to the management regime for new homes using domestic permit-exempt well withdrawals in WRIA 13 and elsewhere. For example, local governments must, among other responsibilities relating to new permit-exempt domestic wells, collect a \$500 fee for each building permit and record withdrawal restrictions on the title of the affected properties. Additionally, this law restricts new permit-exempt domestic withdrawals in WRIA 13 to a maximum annual average of up to 950 gallons per day per connection, subject to the five thousand gallons per day and ½-acre outdoor irrigation of non-commercial lawn/garden limits established in RCW 90.44.050. In addition, Ecology may limit these withdrawals to 350 gpd when an emergency drought order is issued. Ecology has published its interpretation and implementation of RCW 19.27.097 and RCW 90.94 in Water Resources POL 2094 (Ecology 2019a). The WRIA 13 Committee directs readers to those laws and policy for comprehensive details and agency interpretations.

### **1.1.3 Planning Requirements Under RCW 90.94.030**

While supplementing the local building permit requirements, RCW 90.94.030(3) goes on to establish the planning criteria for WRIA 13. In doing so, it sets the minimum standard of Ecology’s collaboration with the WRIA 13 Committee in the preparation of this watershed plan. In practice, the process of plan development was one of broad integration, collectively shared work, and a striving for consensus described in the WRIA 13 Committee’s adopted operating principles, which are further discussed below.

In addition to these procedural requirements, the law and consequently this watershed plan, is concerned with the identification of projects and actions intended to offset the anticipated impacts from new permit-exempt domestic groundwater withdrawals over the next 20 years and provide a net ecological benefit<sup>6</sup>. In establishing the primary purpose of this watershed plan, RCW 90.94.030 (3) also details both the required and recommended plan elements. Regarding the WRIA 13 Committee’s approach to selecting projects and actions, the law also

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<sup>6</sup> The planning horizon for planning to achieve a NEB is the 20 year period beginning with January 19, 2018 and ending on January 18, 2038. The planning horizon only applies to determining which new consumptive water uses the plan must address under the law. The projects and actions required to offset the new uses must continue beyond the 20-year period and for as long as new well pumping continues. (Ecology, 2019b; page 7)



speaks to “high and lower priority projects.” The WRIA 13 Committee understands that, as provided in the Final Guidance on Determining Net Ecological Benefit (Ecology 2019b), “use of these terms is not the sole critical factor in determining whether a plan achieves a NEB... and that plan development should be focused on developing projects that provide the most benefits... regardless of how they align with [these] labels” (page 12). It is the perspective of the WRIA 13 Committee that this watershed plan, if fully implemented satisfies the requirements of RCW 90.94.030.

## 1.2 Requirements of the Watershed Restoration and Enhancement Plan

RCW 90.94.030 of the Streamflow Restoration law directs Ecology to establish a watershed restoration and enhancement committee in the Deschutes watershed and develop a watershed restoration and enhancement plan (watershed plan) in collaboration with the WRIA 13 Committee. This resulted in a collective development of the watershed plan, using an open and transparent setting and process that builds on local needs.

At a minimum, the watershed plan must include projects and actions necessary to offset potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on streamflows and provide a net ecological benefit (NEB) to the WRIA.

Ecology issued the Streamflow Restoration Policy and Interpretive Statement (POL-2094) and Final Guidance on Determining Net Ecological Benefit (GUID-2094) in July 2019 to ensure consistency, conformity with state law, and transparency in implementing RCW 90.94. The Final Guidance on

### Streamflow Restoration law RCW 90.94.030(3)

(a) The watershed restoration and enhancement plan should include recommendations for projects and actions that will measure, protect, and enhance instream resources and improve watershed functions that support the recovery of threatened and endangered salmonids. Plan recommendations may include, but are not limited to, acquiring senior water rights, water conservation, water reuse, stream gaging, groundwater monitoring, and developing natural and constructed infrastructure, which includes but is not limited to such projects as floodplain restoration, off-channel storage, and aquifer recharge. Qualifying projects must be specifically designed to enhance streamflows and not result in negative impacts to ecological functions or critical habitat.

(b) At a minimum, the plan must include those actions that the committee determines to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic water use. The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary. Lower priority projects include projects not in the same basin or tributary and projects that replace consumptive water supply impacts only during critical flow periods. The plan may include projects that protect or improve instream resources without replacing the consumptive quantity of water where such projects are in addition to those actions that the committee determines to be necessary to offset potential consumptive impacts to instream flows associated with permit-exempt domestic water use.

(c) Prior to adoption of the watershed restoration and enhancement plan, the department must determine that actions identified in the plan, after accounting for new projected uses of water over the subsequent twenty years, will result in a net ecological benefit to instream resources within the water resource inventory area.

(d) The watershed restoration and enhancement plan must include an evaluation or estimation of the cost of offsetting new domestic water uses over the subsequent twenty years, including withdrawals exempt from permitting under RCW 90.44.050.

(e) The watershed restoration and enhancement plan must include estimates of the cumulative consumptive water use impacts over the subsequent twenty years, including withdrawals exempt from permitting under RCW 90.44.050.

Determining Net Ecological Benefit (hereafter referred to as Final NEB Guidance) establishes Ecology’s interpretation of the term “net ecological benefit.” It also informs planning groups on the standards Ecology will apply when reviewing a watershed plan completed under RCW 90.94.020 or RCW 90.94.030. The minimum planning requirements identified in the Final NEB Guidance include the following (pages 7-8):

1. Clear and Systemic Logic. Watershed plans must be prepared with implementation in mind.
2. Delineate Subbasins. [The committee] must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets.
3. Estimate New Consumptive Water Uses. Watershed plans must include a new consumptive water use estimate for each subbasin, and the technical basis for such estimate.
4. Evaluate Impacts from New Consumptive Water use. Watershed plans must consider both the estimated quantity of new consumptive water use from new domestic permit-exempt wells initiated within the planning horizon and how those impacts will be distributed.
5. Describe and Evaluate Projects and Actions for their Offset Potential. Watershed plans must, at a minimum, identify projects and actions intended to offset impacts associated with new consumptive water use.

The WRIA 13 Committee has developed this watershed plan with the intent to ensure full implementation, either through projects and actions, or adaptive management. The law requires that all members of the WRIA 13 Committee approve the plan prior to submission to Ecology for review for adoption. Ecology must then determine that the plan’s recommended streamflow restoration projects and actions will result in an NEB to instream resources within the WRIA after accounting for projected use of new permit-exempt domestic wells over the 20 year period of 2018-2038.

**RCW 90.94.030 (6).** This section [90.94.030] only applies to new domestic groundwater withdrawals exempt from permitting under RCW [90.44.050](#) in the following water resource inventory areas with instream flow rules adopted under chapters [90.22](#) and [90.54](#) RCW that do not explicitly regulate permit-exempt groundwater withdrawals: 7 (Snohomish); 8 (Cedar-Sammamish); 9 (Duwamish-Green); 10 (Puyallup-White); 12 (Chambers-Clover); 13 (Deschutes); 14 (Kennedy Goldsborough); and 15 (Kitsap) and does not restrict the withdrawal of groundwater for other uses that are exempt from permitting under RCW [90.44.050](#).

## 1.3 Overview of the WRIA 13 Committee

### 1.3.1 Formation

The Streamflow Restoration law instructed Ecology to chair the WRIA 13 Committee, and invite representatives from the following entities in the watershed to participate in the development of the watershed plan:

- Each federally recognized tribal government with reservation land or usual and accustomed harvest area within the WRIA.
- Each county government within the WRIA.
- Each city government within the WRIA.<sup>7</sup>
- Washington State Department of Fish and Wildlife.
- The largest publically-owned water purveyor providing water within the WRIA that is not a municipality.
- The largest irrigation district within the WRIA.<sup>8</sup>

Ecology sent invitation letters to each of the entities named in the law in September of 2018.

The law also required Ecology to invite local organizations representing agricultural interests, environmental interests, and the residential construction industry. Businesses, environmental groups, agricultural organizations, conservation districts, and local governments nominated interest group representatives. Local governments on the WRIA 13 Committee voted on the nominees in order to select local organizations to represent agricultural interests, the residential construction industry, and environmental interests. Ecology invited the selected entities to participate on the WRIA 13 Committee.

The WRIA 13 Committee members are included in Table 1. This list includes all of the members identified by the Legislature that agreed to participate on the WRIA 13 Committee.<sup>9</sup>

Table 1: WRIA 13 Entities and Membership

| Entity Name          | Representing      |
|----------------------|-------------------|
| Squaxin Island Tribe | Tribal government |
| Lewis County         | County government |
| Thurston County      | County government |
| City of Lacey        | City government   |
| City of Olympia      | City government   |

<sup>7</sup> The City of Rainier was not able to participate as an active voting member on the WRIA 13 Committee due to staffing restraints; however, they remained informed of the plan development. The WRIA 13 Committee acknowledges that their participation is welcome for future implementation, and that future opportunities for projects may exist in the area of Rainier.

<sup>8</sup> There are no irrigation districts located in WRIA 13.

<sup>9</sup> All participating entities committed to participate in the process and designated representatives and alternates. The law did not require invited entities to participate, and some chose not to participate on the Committee.

| Entity Name                                                                                      | Representing                                                                    |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| City of Tumwater                                                                                 | City government                                                                 |
| Public Utility District No. 1 of Thurston County                                                 | Largest publicly-owned water purveyor within WRIA 13 that is not a municipality |
| Washington Department of Fish and Wildlife                                                       | State agency                                                                    |
| Washington Department of Ecology                                                                 | State agency                                                                    |
| Thurston Conservation District                                                                   | Agricultural interests                                                          |
| Building Industry Association of Washington (previous participation from Olympia Maser Builders) | Residential construction industry                                               |
| Deschutes Estuary Restoration Team                                                               | Environmental interests                                                         |
| WRIA 13 Salmon Habitat Recovery Lead Entity (ex officio)                                         | n/a                                                                             |
| LOTT Clean Water Alliance (ex officio)                                                           | n/a                                                                             |
| Nisqually Indian Tribe (ex officio)                                                              | n/a                                                                             |
| City of Yelm (ex officio)                                                                        | n/a                                                                             |
| City of Tenino (ex officio)                                                                      | n/a                                                                             |

The WRIA 13 Committee roster with names and alternates is available in Appendix C.

The WRIA 13 Committee invited the WRIA 13 Salmon Habitat Recovery Lead Entity, LOTT Clean Water Alliance, Nisqually Indian Tribe, City of Yelm, and City of Tenino to participate as “ex-officio” members. Although not identified in the law, the ex-officio members provide valuable information and perspective as subject matter experts. The ex-officio members are active but non-voting participants of the WRIA 13 Committee.

The law does not identify a role for the Committee following development of the watershed plan.

### 1.3.2 Committee Structure and Decision Making

The WRIA 13 Committee held its first meeting in October 2018. Between October 2018 and January 2021 [\[UPDATE LAST MEETING DATE, IF NEEDED\]](#), the WRIA 13 Committee held 28 committee meetings open to the public. The WRIA 13 Committee met monthly, and as needed to meet deadlines. In March 2020, the COVID-19 pandemic restricted in-person meetings; from that time on, all Committee and workgroup meetings were held online.

The two and a half years of planning consisted of training, research, and developing plan components. Ecology technical staff, WRIA 13 Committee members, and partners presented on topics to provide context for components of the plan such as hydrogeology, water law, tribal treaty rights, salmon recovery, and planning.

In addition to serving as WRIA 13 Committee chair, Ecology staff provided administrative support and technical assistance, and contracted with consultants to provide facilitation and technical support for the WRIA 13 Committee. The facilitator supported the WRIA 13

Committee's discussions and decision-making, and coordinated recommendations for policy change and adaptive management. The technical consultants developed products that informed WRIA 13 Committee decisions and development of the plan. Examples include working with counties on growth projections, calculating consumptive use based on multiple methods, preparing maps and other tools to support decisions, and researching project ideas. The technical consultants brought a range of expertise to the committee including hydrogeology, GIS analysis, fish biology, engineering and planning. The technical consultants developed all of the technical memorandums referenced throughout this plan.

During the initial WRIA 13 Committee meetings, members developed and agreed to operating principles.<sup>10</sup> The operating principles set forward a process for meeting, participation expectations, procedures for voting, structure of the WRIA 13 Committee, communication, and other needs in order to support the WRIA 13 Committee in reaching agreement on a final plan.

The WRIA 13 Committee established technical, project, and policy workgroups to support planning efforts and to achieve specific tasks throughout plan development. The workgroups were open to all WRIA 13 Committee members as well as non-Committee members that brought capacity or expertise not available on the Committee. The workgroups made no binding decisions, but presented information to the Committee as either recommendations or findings. The WRIA 13 Committee acted on workgroup recommendations, as it deemed appropriate.

This planning process, by statutory design, brought diverse perspectives to the table. As the legislation requires that all members of the WRIA 13 Committee approve the final plan prior to Ecology's review,<sup>11</sup> it was important for the WRIA 13 Committee to identify a clear process for making decisions. The WRIA 13 Committee strived for consensus, and when consensus could not be reached, the chair and facilitator documented agreement and dissenting opinions. All agreements and dissenting opinions were documented in meeting summaries that were reviewed and agreed upon by the Committee. The Committee recognized that flexibility was needed in terms of timeline, and if a compromise failed to reach consensus within the identified timeline, the Committee agreed to allow the process for developing the plan to move forward while the work towards consensus continued. The Committee agreed to revisit decisions where consensus was not reached at a later date. Consensus during the foundational decisions during plan development served as the best indicators of the Committee's progress toward an approved plan.

**[Language to be included when appropriate]:** The WRIA 13 Committee reviewed components of the watershed plan and the draft plan as a whole on an iterative basis. **[Language to be determined]:** Once the WRIA 13 Committee reached initial agreement on the final watershed plan, broader review and approval by the entities represented on the WRIA 13 Committee was

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<sup>10</sup> Agreed upon operating principles can be found on the [WRIA 13 Committee EZ View webpage](#).

<sup>11</sup> RCW 90.94.030[3] "...all members of a watershed restoration and enhancement Committee must approve the plan prior to adoption"

sought as needed. The WRIA 13 Committee reached final agreement on the Watershed Restoration and Enhancement Plan on [XX DATE 2021](#).

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## Chapter Two: Watershed Overview

### 2.1 Brief Introduction to WRIA 13

Water Resource Inventory Areas (WRIAs) are large watershed areas established in chapter 173-500 WAC for the purpose of administrative management and planning. WRIAs encompass multiple landscapes, hydrogeological regimes, levels of development, and variable natural resources. WRIA 13, also referred to as the Deschutes Watershed, is one of the 62 designated major watersheds in Washington State. The 270 square mile Deschutes Watershed is almost entirely within Thurston County, with only the headwaters of the Deschutes River in Lewis County (see Figure 1). The Deschutes River is the major hydrologic basin in WRIA 13, with a number of smaller independent tributaries that drain into four saltwater inlets: Nisqually Reach, Henderson, Budd, and Eld. Other principal streams include Woodard and Woodland Creeks, which are the largest of the major tributaries to Henderson Inlet (Haring et al. 1999). The Black lake catchment drains to both the Black River (WRIA 23) and Percival Creek (WRIA 13); however, for planning purposes, the Black Lake catchment was included in the Chehalis (WRIAs 22 and 23) Watershed Plan Update and not the WRIA 13 Watershed Plan.

#### 2.1.1 Land Use in WRIA 13

Approximately 26 percent of the watershed is within a city or designated urban growth area. Much of the designated Urban Growth Areas for Olympia, Lacey, Tumwater and Rainier, along with agriculture, rural residential areas and commercial timberlands are within WRIA 13.

Rural residential development has primarily occurred in the unincorporated areas of Thurston County. The portion of the Deschutes Watershed that is in Lewis County is entirely comprised of forest land and is assumed to have no rural growth (Figure 1).



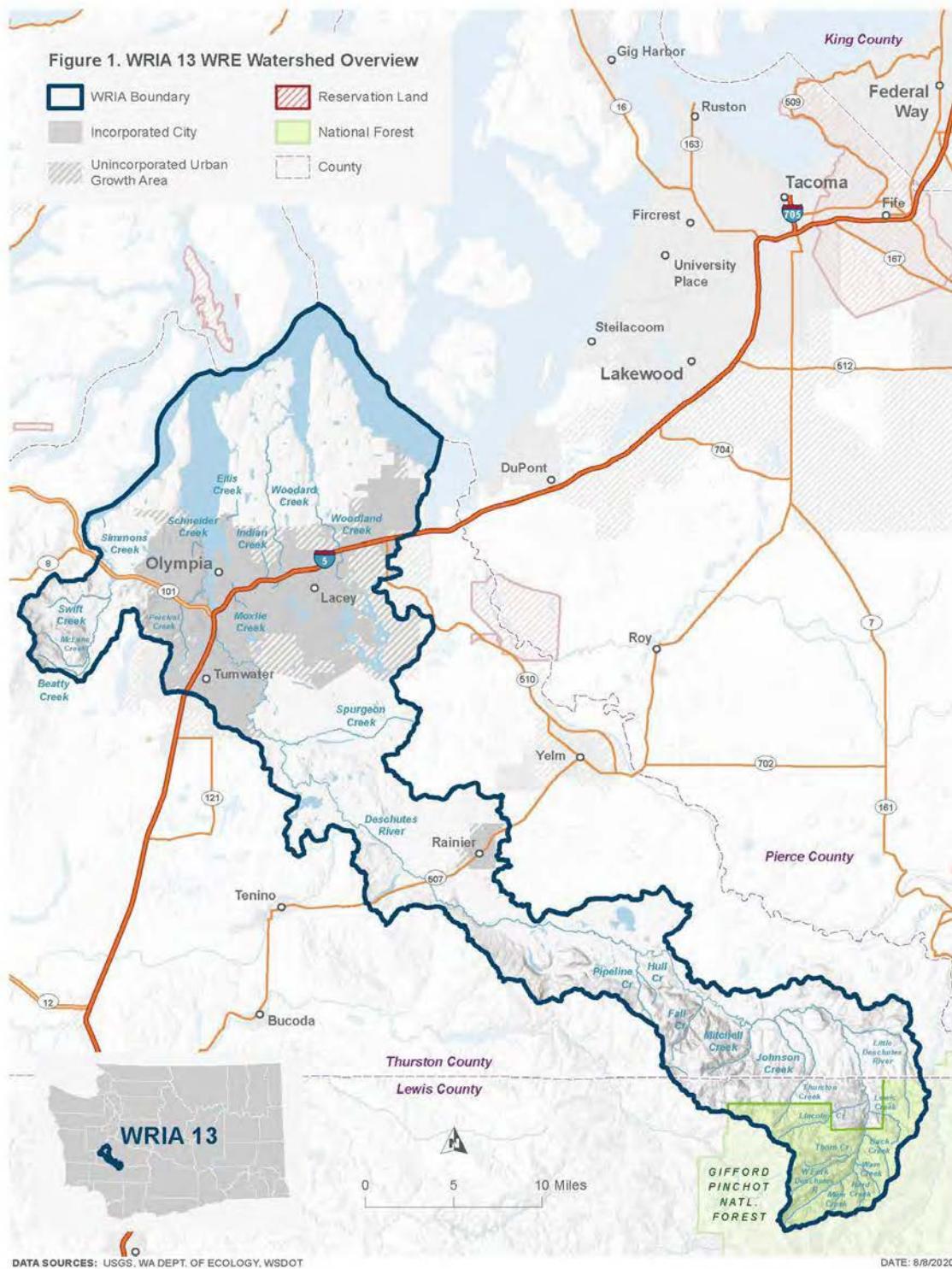


Figure 1: WRIA 13 WRE Watershed Overview

The upper third portion of the Deschutes Watershed is predominantly commercial timber production with some commercial and non-commercial agricultural ventures overlapping in the lower extent. The middle third of the watershed is comprised of commercial and non-commercial agriculture production with rural residences found throughout the mid-watershed and the outer peninsulas. Land use in the lower watershed, near the mouth of the Deschutes River and inner Budd Inlet is mostly urban, with residences along the shoreline of the three inlets (Haring et al. 1999).

### **2.1.2 Tribal Reservations and Usual and Accustomed Fishing Areas**

The Squaxin Island Tribe holds reserved fishing rights in the Deschutes watershed under the 1854 Treaty of Medicine Creek. The Tribe also possesses Treaty-reserved federal water rights in the Deschutes watershed in quantities that are necessary to support healthy salmon populations. These water rights are necessary to carry out the purposes of the Treaty, which include the guarantee of a self-sustaining homeland and sufficient water to support the fishing right. These rights operate outside of the state water rights system and have the most senior priority date. While the water right has not yet been quantified by a court, it likely exceeds the amounts that are established by state instream flow rules. Indian water rights are property rights held in trust by the United States for the benefit of Indian tribes.

### **2.1.3 Salmon Distribution and Limiting Factors**

The Deschutes Watershed is an important and productive system for endangered and threatened salmonids. Anadromous salmonid spawning occurs from Tumwater Falls to Deschutes Falls. The Deschutes River and its tributaries often experience low streamflows during critical migration and spawning time. In addition, culverts, dams, and other flood control measures have further limited habitat along the streams in WRIA 13 (Haring et al. 1999). With changing weather patterns, summer flows are expected to change, causing an additional disruption to the salmon as they migrate, spawn and rear (NWIFC, 2016).

The Deschutes Watershed is one of diverse land uses. Industry, agriculture (including salmon fisheries), commercial facilities, and municipalities compete for a limited water supply, causing a strain on water availability, especially during low seasonal flows in productive salmonid streams. Many people depend on the salmon fishery for commercial, sport, and subsistence harvest. This includes tribes with usual and accustomed fishing areas that overlap with the Deschutes watershed, such as the Squaxin Island Tribe.

The Deschutes WRIA watersheds primarily support Chinook salmon, coho salmon, chum salmon, and winter steelhead (Tables 2 and 3). Chinook salmon, coho salmon, and winter steelhead are all listed as threatened.

Table 2: Anadromous Salmonid Species and Status in WRIA 13

| Common Name             | Scientific Name                 | Population <sup>1</sup>            | Critical Habitat | Regulatory Agency Status     |
|-------------------------|---------------------------------|------------------------------------|------------------|------------------------------|
| Puget Sound             |                                 |                                    |                  |                              |
| <b>Chinook Salmon</b>   | <i>Oncorhynchus tshawytscha</i> | Puget Sound Chinook                | Yes/2005         | NMFS/Threatened/ 1999        |
| <b>Chum Salmon</b>      | <i>Oncorhynchus keta</i>        | Puget Sound Chum                   | No               | Not listed                   |
| <b>Coho Salmon</b>      | <i>Oncorhynchus kisutch</i>     | Puget Sound/Strait of Georgia Coho | No               | NMFS/Species of Concern/1997 |
| <b>Winter Steelhead</b> | <i>Oncorhynchus mykiss</i>      | Puget Sound Steelhead              | Yes/2016         | NMFS/Threatened/ 2007        |

Chinook salmon enter WRIA 13 streams in the late summer and fall and spawn through the fall (Table 3). Incubation occurs through the following winter. Juvenile rearing occurs throughout the spring and early summer, with smolt outmigration occurring shortly thereafter.

Coho salmon enter WRIA 13 streams in the fall and spawn through the winter and fall (Table 3). Incubation occurs through the following April. Juvenile rearing occurs for over a year before smolt outmigration the following spring.

Chum salmon enter WRIA 13 streams in the late fall to early spring (Table 3). Incubation occurs through the late winter. Juvenile rearing and smolt outmigration occurs from that spring to early summer.

Winter steelhead enter WRIA 13 streams in the late fall through the following spring and spawn in the spring (Table 3). Incubation occurs through the following summer. Juvenile rearing occurs for over a year before smolt outmigration the following spring.

Table 3 below lists the run timing and life stages of anadromous salmon and trout present throughout the watershed.

Table 3: Salmonid Presence and Life History Timing in the WRIA 13 Streams and Rivers

| Salmonid Life History Timing in WRIA 13 |                       |     |     |     |     |     |     |     |     |     |     |     |     | Subbasin     |
|-----------------------------------------|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|
| Species                                 | Freshwater Life Phase | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Presence     |
| Chinook (fall)                          | Upstream migration    |     |     |     |     |     |     |     |     |     |     |     |     | Woodland     |
|                                         | Spawning              |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Lower        |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Middle       |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
| Coho                                    | Incubation            |     |     |     |     |     |     |     |     |     |     |     |     | Upper        |
|                                         | Juvenile rearing      |     |     |     |     |     |     |     |     |     |     |     |     | McLane       |
|                                         | Juvenile outmigration |     |     |     |     |     |     |     |     |     |     |     |     | Creek        |
|                                         | Upstream migration    |     |     |     |     |     |     |     |     |     |     |     |     | All          |
|                                         | Spawning              |     |     |     |     |     |     |     |     |     |     |     |     |              |
|                                         | Incubation            |     |     |     |     |     |     |     |     |     |     |     |     |              |
| Chum                                    | Juvenile rearing      |     |     |     |     |     |     |     |     |     |     |     |     | Woodland     |
|                                         | Smolt outmigration    |     |     |     |     |     |     |     |     |     |     |     |     |              |
|                                         | Upstream migration    |     |     |     |     |     |     |     |     |     |     |     |     |              |
|                                         | Spawning              |     |     |     |     |     |     |     |     |     |     |     |     |              |
|                                         | Incubation            |     |     |     |     |     |     |     |     |     |     |     |     |              |
|                                         | Juvenile rearing      |     |     |     |     |     |     |     |     |     |     |     |     |              |
| Steelhead Trout (winter)                | Juvenile outmigration |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
|                                         | Upstream migration    |     |     |     |     |     |     |     |     |     |     |     |     | Lower        |
|                                         | Spawning              |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
|                                         | Incubation            |     |     |     |     |     |     |     |     |     |     |     |     | Middle       |
|                                         | Juvenile rearing      |     |     |     |     |     |     |     |     |     |     |     |     | Deschutes    |
|                                         | Smolt outmigration    |     |     |     |     |     |     |     |     |     |     |     |     | Upper        |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | McLane       |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Creek        |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Boston       |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Harbor       |
|                                         |                       |     |     |     |     |     |     |     |     |     |     |     |     | Cooper Point |

Salmonid habitat limiting factors have been defined by the Washington State Conservation Commission Limiting Factors Analysis (Haring and Konovsky 1999) and the Deschutes River Coho Salmon Biological Recovery Plan (Confluence 2015). Haring and Konovsky (1999) identified specific limiting factors for specific waterbodies, but also provide the following general themes throughout WRIA 13 streams and rivers on a multi-species basis:

- natural stream ecological processes have been significantly altered due to adjacent land management practices and direct actions within the stream corridor,
- fine sediment (<.85 mm) levels in the stream gravels regularly exceed the <12% level identified as representing suitable spawning habitat,
- lack of adequate large woody debris in streams, particularly larger key pieces that are critical to developing pools, log jams, and other habitat components important to salmonids,
- lack of adequate pool frequency and large, deep pools that are important to rearing juvenile salmonids and adult salmonids on their upstream migration,
- naturally high rates of channel movement in this geologically young basin, but further exacerbated rate of streambank erosion and substrate instability due to loss of streambank and riparian integrity, and alteration of natural hydrology,
- loss of riparian function due to removal/alteration of natural riparian vegetation, which affects water quality, lateral erosion, streambank stability, instream habitat conditions, etc.,
- the presence of a significant number of culverts/screens/dams/etc. that preclude unrestricted upstream or downstream access to juvenile and adult salmonids,
- significant alterations to the natural stream hydrology in streams where the uplands have been heavily developed, and the threat of similar impacts to streams that are experiencing current and future development growth, and
- estuarine/marine function is significantly impacted by physical alteration of the natural estuary, by poor water quality in the estuary, and by significant alteration of nearshore ecological function due to shoreline armoring.

#### **2.1.4 Water System Distribution and Impacts in WRIA 13**

Pumping from wells can reduce groundwater discharge to springs and streams by capturing water that would otherwise have discharged naturally. Surface water may be influenced by groundwater pumping such that flows are diminished. Group A and Group B water systems withdraw greater amounts of water and have more impact than PE wells. Group A systems generally have water rights and are regulated by the Department of Health. Group B systems often have permit-exempt wells and are regulated by counties. Within WRIA 13, there are approximately 151 Group A water systems, approximately 205 Group B water systems, and

approximately 16,560 PE wells<sup>12</sup>. Consumptive water use (that portion not returned to the aquifer) reduces streamflow, both seasonally and as average annual recharge. A well pumping from an aquifer connected to a surface water body can either reduce the quantity of water discharging to the river or increase the quantity of water leaking out of the river (Ecology 1995). As required by RCW 90.94, this Plan includes projects and actions chosen by the Committee that are necessary to offset consumptive use associated with permit-exempt domestic water use, to eliminate future impacts to instream flows, and to restore streamflow.

## **2.2 Watershed Planning in WRIA 13**

Citizens and local, state, federal, and tribal governments have collaborated on watershed and water resource management issues in WRIA 13 for decades. The Deschutes Planning Unit completed a draft watershed plan in October 2004, but were unable to reach consensus on the document. A brief summary of broad watershed planning efforts as they relate to the past, present, and future water availability in the Deschutes Watershed is provided in Section 2.2.1.

### **2.2.1 Current Watershed Planning Efforts in WRIA 13**

The WRIA 13 watershed plan is building on many of the past and current efforts, including previous watershed planning efforts under RCW 90.82. Other efforts include the Local Integrating Organization (LIO) Alliance for a Healthy South Sound (AHSS)<sup>13</sup> ecological recovery plan<sup>14</sup>, and salmon recovery planning by the WRIA 13 Salmon Habitat Recovery Lead Entity. The LIOs have completed ecosystem recovery plans as part of the Action Agenda for Puget Sound Recovery and are actively working to implement holistic approaches to recovery including projects on salmon and orca recovery, stormwater runoff, shellfish protection, and forest conservation.<sup>15</sup> The planning process to develop an ecosystem recovery plan is community-based with engagement by local, state and federal agencies. The AHSS has engaged the community in a collaborative planning process to help understand priorities and support the health and sustainability of the watershed.

The WRIA 13 Salmon Habitat Recovery Lead Entity is a collaboration of local governments, state, federal, and tribal partners, and nonprofit organizations focused on protecting and enhancing wild salmon populations. The Salmon Habitat Protection and Restoration Plan for WRIA 13 identifies and prioritizes projects that protect and restore habitat for salmonids that occur in the marine and freshwater environments of WRIA 13.

The AHSS and Salmon Recovery Lead Entity include many of the same organizations and individuals that participate in the WRIA 13 Watershed Restoration and Enhancement

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<sup>12</sup> Estimates at the time of development of the watershed plan based on Ecology's well log database

<sup>13</sup> More information on the AHSS can be found here: <https://www.healthysouthsound.org/>

<sup>14</sup> The AHSS boundaries include WRIA 13, except a small area in Lewis County which is not within a Local Integrating Organization.

<sup>15</sup> More information on local integrating organizations and their efforts to recovery Puget Sound is available here: <https://www.psp.wa.gov/LIO-overview.php>.



Committee. This history of collaborative planning and shared priorities has supported the success of the watershed restoration and enhancement plan development in WRIA 13.

The Squaxin Island Tribe has been leading restoration planning for coho in the Deschutes River (NWIFC, 2016). Restoration planning included modeling coho habitat requirements, evaluation of existing habitat conditions, defining salmon habitat limiting factors, and recommendations for habitat restoration.

The Department of Ecology led an effort to develop a total maximum daily load (TMDL) for the Deschutes Basin to address multiple water quality parameters including temperature, fine sediment, and bacteria.<sup>10</sup> Coordinated efforts to reduce water temperatures and restore low flows in the watershed are directed through the establishment of the TMDL as summarized in the *Deschutes River Watershed Recovery Plan* (Schlenger et al. 2015). Actions to restore low flows are encouraged to increase coho production, in part through the improved water temperatures and instream flows, through efforts that focus on reduction in withdrawals and the establishment of total maximum daily loads. More information on TMDLs in WRIA 13 can be found in section 2.3.4 below.

The Public Water System Coordination Act of 1977<sup>16</sup> requires each water purveyor in a Critical Water Supply Service Areas (CWSSA) to update a water system plan for their service area, with the boundaries being in compliance with the provision of the Act. The Washington State Department of Health is primarily responsible for the water system plan approval; however local governments ensure consistency with local growth management plans and development policies. This Act and the water system plans are important for the WRIA 13 watershed planning process as water system service areas and related laws and policies can set stipulations regarding timely and reasonable service as to whether new homes connect to water systems or rely on new permit-exempt domestic wells.<sup>17</sup>

Thurston County last updated their Coordinated Water System Plan (CWSP) in 1996, as mandated by the Public Water System Coordination Act of 1977. WAC 246-290-100 requires public water systems with more than 1,000 connections submit a water system plan for review and approval by the Department of Health (DOH) every ten years. Within Thurston County, this includes the water systems of Lacey, Tumwater, Olympia, Tanglewilde-Thompson Place, and Pattison.<sup>18</sup> This ensures that water system service areas are consistent with local growth management plans and development policies. Water system service areas and related policies determine whether new homes connect to water systems or rely on new permit-exempt domestic wells. While the CWSP boundary covers the cities in North Thurston County and some surrounding areas, it does not cover most rural areas.

## 2.2.2 Coordination with Existing Plans

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<sup>16</sup> RCW 70.116.070

<sup>17</sup> Thurston County water system planning information is available at:  
<https://www.thurstoncountywa.gov/planning/Pages/comp-plan.aspx>

<sup>18</sup> North Thurston County Coordinated Water System Plan, 1996, WA State DOH Sentry Database



Throughout the development of the watershed plan, Ecology streamflow restoration staff have engaged with staff from the Salmon Habitat Recovery Lead Entity and the Puget Sound Partnership, providing briefings on the streamflow restoration law, scope of the watershed plan, and plan development status updates. The WRIA 13 Committee chair conducted outreach to the WRIA 13 Salmon Habitat Recovery Lead Entity regarding coordination with the WRIA 13 Committee to ensure alignment of salmon recovery priorities and the streamflow planning process. Throughout the planning process, the WRIA 13 Committee has coordinated closely with the lead entity, including inviting the lead entity coordinator to take part as an ex-officio member on the WRIA 13 Committee. The WRIA 13 lead entity participated in the Committee and collaborated by selecting priority streams based on information from the Salmon Recovery Plan, incorporating priority salmon recovery projects in the watershed plan, and reviewing project lists and descriptions.

Development of this plan also involved consideration of the Thurston County Comprehensive Plan, which is guided by the Growth Management Act and the Thurston County County-wide Planning Policies, a framework created in collaboration with the seven cities and towns within Thurston County. The Comprehensive Plan contains goals and policies to govern the unincorporated areas of Thurston County, and in turn, the Plan guides other specialized plans like the Joint plans for Urban Growth Areas, subarea plans, and other functional plans. The Comprehensive Plan also guides Development Regulations, Capital Facilities planning, land use permits, inter-local agreements, and other County programs, all with the main goal of effectively managing the county's physical growth. The committee used the Thurston County Comprehensive Plan as the basis for determining likely areas of future rural growth, conceptual projects, and implementation hurdles.

There are numerous linkages between growth management and water resource management. The GMA addresses water resources through requirements related to water availability as well as ground and surface water protection. Public facilities, which include domestic water systems must be adequate to serve a proposed development at the time the development is available for occupancy. The requirements also call for the protection of the water quality and quantity of groundwater used for public water systems in addition to critical areas including critical aquifer recharge areas. In the rural area, GMA further requires a land use pattern that protects the natural water flows along with recharge and discharge areas for ground and surface waters. As discussed in Sections 1.1.1 and 1.1.2, ESSB 6091 was enacted in response to the State Supreme Court's "Hirst decision" (primarily codified as RCW 90.94, and other statutes) and amended the GMA. In addition to GMA, there are other connections between land use codes, water planning and water systems.

## 2.3 Description of the Watershed - Geology, Hydrogeology, Hydrology, and Streamflow

### 2.3.1 Geologic Setting

Pleistocene glaciation (2.6 million to 11,700 years ago) played an important role in sculpting the landscape of both the Puget Sound Lowlands and the Cascade Mountain Range. Reaching a maximum extent during the Vashon stage of the Fraser Glaciation approximately 13,500 years ago, an ice sheet advanced southward into present day Puget Sound (Drost et al. 1999). Multiple advances and retreats of the ice sheet formed the Puget Sound Lowlands, depositing a complex sequence of glacial and interglacial sediments.

The general geology of WRIA 13 is dominated by a broad drift plain formed from a sequence of unconsolidated glacial and interglacial deposits. These deposits are locally incised by current and former river valleys. The southern terminus of the Pleistocene glacial advance occurs in Thurston County, resulting in thick sediment deposits in the north part of WRIA 13 (over 1,800 feet thick on the Johnson Point peninsula) and progressively thinner sediment deposits to the south and southwest (Drost et al. 1999). WRIA 13 is bounded by the bedrock outcrops of the Bald Hills to the south and the Black Hills west of McLane Creek. Local bedrock knobs (some at land surface and some in the subsurface) also exist, especially in the Tumwater Falls area.

Understanding the geologic setting allows characterization of surface and groundwater flow throughout the basin. Defining the relationships between surface water flow and deeper groundwater are important to understanding how to manage surface water resources and can be helpful in identifying strategies to offset the impacts of pumping from permit-exempt wells.

### 2.3.2 Hydrogeologic setting

The USGS described the hydrology of WRIA 13 in a hydrogeologic framework report based on previous studies and published reports for Thurston County (Drost et al. 1999). The hydrogeologic units of the area are described as being either water-bearing (“aquifer”) and non-water-bearing (“aquitard” or “confining layer”) sediments. Major groundwater aquifers are found in the unconsolidated glacial and interglacial sediments throughout the central and lower regions of the watershed. More recent studies have identified glacial outwash channels that eroded through regional aquitard units, and were then backfilled mostly with sands to form locally distinct aquifer units in the lower Deschutes Valley and along Woodland Creek.<sup>19</sup>

Groundwater in WRIA 13 aquifers generally flow north towards Puget Sound or locally toward the Deschutes River, Woodland Creek, or McLane Creek. Groundwater flow on the northern peninsulas is generally radially outward toward Puget Sound (Drost et al. 1999). Summer base flows in the watershed are sustained by groundwater. Groundwater in the eastern portion of the Deschutes and Woodland Creek watersheds generally move towards the Nisqually flats, in WRIA 11 (See Figure 19 in Drost et al. 1999). Similarly, groundwater in the southwestern portion

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<sup>19</sup> Walsh and others, 2003; Walsh and Logan, 2005; Golder, 2008; PGG, 2010

of the Deschutes River watershed flows to the Black River, in the Chehalis Basin (See Figure 19 in Drost et al. 1999)

The USGS describes the hydrogeology of the watershed as six sedimentary units, typically alternating between aquifer and non-aquifer layers. Four of the six sedimentary units identified are aquifers and are present throughout much of the watershed. This information is summarized in Appendix E: Regional Aquifer Units in WRIA 13, and in Table 1 of Drost et al. (1999). These aquifers are the most likely sources for new permit-exempt wells. The upper two units will also be the main source of direct recharge or baseflow to the surface water system. Aquifer Qc generally does not have surficial expressions except for immediately adjacent to and below sea level in Puget Sound; surficial expressions of TQu only occur below sea level in Puget Sound.

### 2.3.3 Hydrology and Streamflow

WRIA 13 can be characterized by its three primary drainages, each draining into a separate saltwater inlet: Henderson Inlet to the east, Budd Inlet, and Eld Inlet to the West (Figure 1). The Deschutes River which drains into Budd Inlet is the major freshwater basin in WRIA 13. A portion of WRIA 13 drains to the Nisqually Reach.

Henderson Inlet, located in the northeast section of WRIA 13 drains approximately 30,000 acres from the Boston Harbor Peninsula, Johnson Point Peninsula and the Woodland Creek Basin. Woodland and Woodard Creeks are the largest of the main tributaries to Henderson Inlet, draining 80% of the Henderson Inlet watershed. The other streams in the watershed, Dobbs Creek (East Henderson), Meyer Creek (Inlet), and Sleepy Creek (West Henderson), drain small areas of the Dickerson Point and Johnson Point peninsulas.<sup>20,21</sup> Because most of the basin lies at an elevation of less than 200 feet above sea level, groundwater is the primary source of streamflow during low flow months. Groundwater-fed springs maintain year round base flow in Woodard Creek and Woodland Creek.<sup>22</sup> Temperature and low flow impacts are not tempered by glacial melt in late summer and fall in WRIA 13.

The approximately 120,000 acre Budd Inlet/Deschutes River Basin is comprised of 143 identified streams providing over 256 miles of drainage, approximately 84% of WRIA 13. The Budd Inlet/Deschutes River Basin includes the 52 mile-long Deschutes River along with other notable streams (Percival/Black Lake Ditch, Ellis, Moxlie, Indian, Adams, Mission and Schneider Creeks) within the Budd Inlet drainage system. The Deschutes River drops from its highest point within the watershed of 3,870 feet near Cougar Mountain to the lowest point near sea level at the mouth of Capitol Lake. The Deschutes River has a mean annual flow of 254 cubic feet per second (cfs).<sup>23,24</sup> Late summer flows average around 50 cfs near Rainier (USGS Station 12079000) and 100 cfs at the E-Street Bridge in Tumwater (USGS Station 12080010).

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<sup>20</sup> Thurston County Department of Water and Waste Management, 1995

<sup>21</sup> WRIA 13 Planning Committee, 2004

<sup>22</sup> WRIA 13 Draft Bill Watershed Plan, 2004

<sup>23</sup> Measured at USGS stream gage 1207900 near Rainier, WA from 1949 through 2019. The 2019 mean annual flow was 149.3 cfs.

<sup>24</sup> USGS. National Water Information System. Water-Year Summary for Site USGS 1207900.

Streamflows are typically lowest during the late summer and early fall, when precipitation is low and infrequent. Flows are sustained by groundwater during this period. Extreme low flows in these streams can occur during years with relatively low precipitation, because of lower water tables and reduced shallow subsurface flows from a paucity of summer precipitation. Extreme low flows can be characterized in terms of the lowest 7-day running average discharge in a river that occurs on average once every 10 years (7Q10 flows). 7Q10 flows are estimated from 1991 - 2001 to be 21 cfs near Rainier (USGS Station 12079000) and 56 cfs at the E-Street Bridge in Tumwater (USGS Station 12080010) (Ecology, 2012). These extreme low flows have decreased over time at both stations, indicating hydrologic impacts. The Puget Sound Vital Signs program<sup>25</sup> indicates that decreasing low flow trends for the Deschutes River continues to be a concern.

The upper extent of the Deschutes River (river mile (RM) 41 to 52) has a moderately steep gradient and the river drops rapidly over Deschutes Falls at RM 41, forming a complete barrier to fish passage.<sup>26</sup> Much of the upper watershed lies in the transient snow zone of 1100 -3600 feet elevation. This is an area where rain-on-snow precipitation events are relatively common, making estimation of runoff and infiltration more difficult.

The lower 41 miles of drainage is lower gradient along a broad prairie-type valley floor.<sup>27</sup> The mainstem Deschutes River is composed of alternating gaining and losing reaches, ranging from a loss of 1.14 to a gain of 3.61 cfs per river mile, with an overall gain of groundwater of 41.4 cfs, between river miles 42.3 and 0.50, respectively (Ecology 2007a). Groundwater losses occur between RM 42.3 - 28.6, gain between RM 28.6 – 20.5, loss between RM 20.5 – 19.1, gain between RM 19.1 – 9.2, loss between RM 9.2 – 6.8, and gain between RM 6.8 – 0.5.

The Eld Inlet drainage area encompasses approximately 23,220 acres. The primary streams in this drainage area are McLane Creek, its tributaries (including Cedar Flat, Swift and Perkins Creeks) and Green Cove Creek, as well as various unnamed tributaries.<sup>28,29</sup> This drainage area also lies at relatively low elevation. Streamflow is fed primarily from groundwater recharge.

The climate of the region is typical Northwest maritime. Summers are relatively dry and cool while winters are mild, wet and cloudy. Annual precipitation averages about 45 inches<sup>30</sup> in Olympia to over 90 inches in the upper watershed (Miller et al. 1973).

Much of the climate related research in the south sound area has focused on flooding rather than low instream flows (Mauger et al. 2015). Many of the lower elevation drainages to the inlets are characterized by extremely high peak flows that develop quickly during heavy rains and decline rapidly as rain subsides, and prolonged low flow or dry periods in the summer. The

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<sup>25</sup> <https://vitalsigns.pugetsoundinfo.wa.gov/>

<sup>26</sup> River mile delineation is digitized and available from Department of Ecology:  
[https://geo.wa.gov/datasets/fff25ee77f9e43ff9539688ba8ab3af3\\_0](https://geo.wa.gov/datasets/fff25ee77f9e43ff9539688ba8ab3af3_0)

<sup>27</sup> Methodology to a Watershed Based Approach to Clean Water and Natural Resource Management, 2013

<sup>28</sup> WRIA 13 Draft Bill Watershed Plan, 2004

<sup>29</sup> Methodology to a Watershed Based Approach to Clean Water and Natural Resource Management, 2013

<sup>30</sup> Precipitation data is from the weather station at the Olympia Regional Airport

basic water quantity habitat issue of concern is the alteration of the natural hydrologic regime, including:

- alteration of the frequency and magnitude of high flow events (usually associated with increased stormwater runoff from impervious surfaces), and;
- reduction of summer base flows that affect the salmonid rearing capacity of streams (usually associated with reduced infiltration of groundwater, water withdrawals, or excess coarse sediment that can cause the flow to go subsurface).<sup>31</sup>

The Climate Impacts Group has developed numerous downscaled global climate models to forecast streamflow and precipitation changes in the Puget Sound, including WRIA 13. General trends such as increased stream temperatures, earlier streamflow timing, increased winter flooding, and lower summer minimum flows are expected (Mauger et al. 2015). Comparison of August average stream temperatures between 1992 and 2011 with projections of stream temperature from moderate climate forecasts for 2070 – 2099 indicate a rise of approximately 7.2 degrees F. Water temperatures impact salmonid survival, growth and fitness. Higher temperatures are made worse by low stream flow (Anchor Environmental 2008).

Flows typically are lowest in late summer and impact juvenile salmon (coho) and steelhead rearing in the watershed, adult salmon (most likely chinook) migrating and spawning in the river, and resident trout present in the river. Low flows limit the amount of wetted area available to rearing salmonids, and also limit productivity due to increased water temperatures and decreased dissolved oxygen (Haring et al. 1999).

Summer low flows in Woodland Creek are a habitat limiting factor. The reach of Woodland Creek from Lake Lois to below Martin Way typically goes dry during the summer months and summer flows elsewhere in the system are low. For Woodland and Woodard creeks, the largest threat to salmonids is the change in the natural flow regime resulting from the rapid urbanization of the watershed. Increased impervious surface from urban development typically results in increased peak flow storm runoff in the winter and reduced base flows in the summer. Other stream basins in WRIA 13 are also under intense development pressure. Unless the natural flow regime can be restored and maintained in developing basins, salmonid habitat will also be adversely impacted (Haring et al. 1999).

WAC173-513 set minimum instream flows for The Deschutes River, from the confluence of the Deschutes River with Capitol Lake upstream to the Deschutes Falls at river mile 41. This river is closed to new consumptive appropriates between April 15<sup>th</sup> – November 1<sup>st</sup>. Several other streams and their tributaries are closed to further consumptive appropriations, including McLane Creek, Woodland Creek, Woodard Creek, Percival Creek, and unnamed tributaries to Puget Sound.

The background of how instream flows and closures were set are described in the Instream Resources Protection Program (IRPP) for WRIA 13 (Ecology 1980). Instream flows were set for streams where continuous flow records existed or correlations of flow to other stream gages

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<sup>31</sup> WRIA 13 Draft Bill Watershed Plan, 2004

were possible and where average annual flows exceeded five cfs. Streams closed by the WAC were previously closed pursuant to water right recommendations or had average annual flows less than five cfs and a known high value for fish production, aesthetics, and other environmental values.

The IRPP does not describe the instream flow setting technique; instream flows are believed to have been set using a combination of Physical Habitat Simulation (PHABSIM), which is a suite of hydraulic and habitat models that compute an index to habitat suitability and discharge, and the toe-width method to determine a habitat based instream flow recommendation. The instream flow recommendations tended to use the 40-50 percent exceedance as a hydrologic limit to the habitat-based instream flow recommendation (Pacheco 2020).

In establishing instream flows by regulation, Ecology used regulatory flows that were higher than the flows commonly seen in the stream and as such, were not designed to be met 100 percent of the time, nor was there an intent to try to achieve the instream flow on any given day. Instead, the intent of the regulation was to protect streams from further depletion (e.g., through subsequent appropriations) when flows approach or fall below the recommended discharges (Ecology 1981). When streamflows are below the instream flow, Ecology may manage water use by contacting “junior” water users and inform them of the need to curtail water use. Ecology protects instream flows when issuing new water rights, or denies a water right application if mitigation is not provided.

### **2.3.4 Water Quality**

Ecology evaluates surface waters in WRIA 13 every two years with a water quality assessment. Total Maximum Daily Load (TMDL) plans are part of the Federal Clean Water Act; they address water quality concerns by identifying and tracking surface water impaired by pollutants, and create programs to restore them. The assessment evaluates existing water quality data and classified waterbodies into the following categories:

- Category 1: Meets tested standards for clean waters.
- Category 2: Waters of concern; Waters in this category have some evidence of a water quality problem, but not enough to show persistent impairment.
- Category 3: Insufficient Data
- Category 4: Impaired waters that do not require a TMDL
  - Category 4a: already has an EPA-approved TMDL plan in place and implemented.
  - Category 4b: has a pollution control program, similar to a TMDL plan that is expected to solve the pollution problems.
  - Category 4c: is impaired by causes that cannot be addressed through a TMDL plan. Impairments in these water bodies include low water flow, stream channelization, and dams.

- Category 5: Polluted waters that require a water improvement project.

The latest water quality assessment classified many waterbodies in WRIA 13 (Ecology 2020). Category 4 and 5 assessment results are listed in Appendix F. Category 5 listings are based on exceedance of water temperature, dissolved oxygen, pH, bacteria, and total phosphorus water quality standards. Fine sediment is also listed as impaired in the Deschutes River.

Four TMDLs have been completed in WRIA 13 to address water quality impairments, including the Deschutes River Multi-Parameter TMDL Implementation Plan (Ecology 2015 and EPA 2020), the Henderson Inlet Watershed Multi-Parameter TMDL Implementation Plan (2008), the Nisqually Watershed Bacteria and DO TMDL Implementation Plan (2007), and the Totten, Eld, and the Skookum Inlets Tributaries Bacteria TMDL Implementation Plan (2007).<sup>32</sup> The 2015 Deschutes River TMDL was only partially approved by EPA, resulting in EPA submitting replacement TMDLs for those that were disapproved. While EPA replaced certain TMDLs within the Deschutes Watershed, they did not revise the implementation plan and the original 2015 report should be consulted for implementation elements. A TMDL for dissolved oxygen impairment in the marine waters of Budd Inlet is currently in development.

The Deschutes River Multi-Parameter TMDL Implementation Plan addressed water temperature, dissolved oxygen, pH, bacteria, and fine sediment in the Deschutes River, its tributaries, and tributaries to Budd Inlet (Ecology 2015). The dissolved oxygen and pH components of the associated TMDL for the Deschutes River were disapproved and updated by the USEPA (USEPA 2020). The Budd Inlet portion of the TMDL is currently in the process of being updated by Ecology.

The Henderson Inlet Watershed Multi-Parameter TMDL Implementation Plan addressed water temperature, dissolved oxygen, pH, and bacteria in Woodland Creek and other tributaries to Henderson Inlet (Ecology 2008). The Nisqually River Basin Fecal Coliform Bacteria and Dissolved Oxygen Total Maximum Daily Load Implementation Plan (Ecology 2007) and the Totten, Eld, and the Skookum Inlets Tributaries Bacteria TMDL Implementation Plan (Ecology 2007) addressed bacterial contamination in marine waters from freshwater tributaries.

Additionally, there is an ongoing environmental review under SEPA being led by WA Department of Enterprise Services (DES) to investigate options to address multiple water quality and habitat issues in the Deschutes Estuary and Capitol Lake.<sup>33</sup> The draft EIS is expected to be completed in the summer of 2021, and a final EIS issued in 2022 after a public comment period.

Reduced stream flow can lead to degraded water quality. Reduced flows lead to increased pollutant concentrations with the same pollutant load (e.g. bacteria). Reduced stream flow also

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<sup>32</sup> More information on TMDLs in the Deschutes River can be found here: <https://www.epa.gov/tmdl/deschutes-river-tmdls>

<sup>33</sup> More information on the Capitol Lake - Deschutes Estuary Long-Term Management Project can be found here: <https://capitollakedeschutesestuaryeis.org/>



makes the stream flow more slowly, allowing more time for the water to warm up and for periphyton (i.e. algae) to cause dissolved oxygen and pH exceedances. These degraded water quality conditions can impact aquatic life if conditions exceed suitable ranges. Therefore, projects that improve water quality also provide a net ecological benefit.

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# Chapter Three: Subbasin Delineation

## 3.1 Introduction

To allow for meaningful analysis of the relationship between new consumptive use and offsets, per Ecology's Final NEB Guidance,<sup>34</sup> the WRIA 13 Committee divided WRIA 13 into subbasins for the purposes of this watershed plan<sup>35</sup>. This was helpful in describing the location and timing of projected new consumptive water use, the location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. The Committee used the subbasin delineations to set priorities for developing water offset projects close to the location of anticipated impacts. In some instances, subbasins may not correspond with hydrologic or geologic basin delineations (e.g. watershed divides).<sup>36</sup> This chapter is based on the Subbasin Delineation Technical Memorandum (Appendix G).

## 3.2 Approach to Develop Subbasins

The WRIA 13 Committee divided WRIA 13 into nine subbasins for purposes of assessing projections for new PE wells, consumptive use, and project offsets initially using the Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) data as the basis for delineations.<sup>37 38</sup> The basic considerations of the WRIA 13 Committee in delineating subbasin boundaries for this planning process were:

- Distinguishing areas of anticipated rural growth that would include permit-exempt wells or connections;
- Existing planning efforts that have already delineated subbasins;
- Presence of fish-bearing streams of importance within the watershed;
- Direction of surface drainage to different receiving bodies;
- Current level of residential development; and
- In identifying projects the Committee would strive to provide the highest priority recommendations for offset projects in the same time as the impact and in the same basin or tributary.<sup>39</sup>

Other considerations were:

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<sup>34</sup> "Planning groups must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning groups understand and describe location and timing of projected new consumptive water use, location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act." Final NEB Guidance p. 7.

<sup>35</sup> The term "subbasin" is used by the WRIA 13 Committee for planning purposes only and to meet the requirements of RCW 90.94.030 (3)(b).

<sup>36</sup> Washington State Department of Ecology (Ecology), 2019. Final Guidance for Determining Net Ecological Benefit, GUID-2094 Water Resources Program Guidance. Washington State, Department of Ecology, Publication 19-11-079.

<sup>37</sup> This is consistent with Final NEB Guidance that defines subbasins as a geographic subarea within a WRIA. A subbasin is equivalent to the words "same basin or tributary" as used in RCW 90.94.020(4)(b).

<sup>38</sup> HDR, 2019. WRIA 13 Draft Subbasin Delineation. June 26, 2019.

<sup>39</sup> RCW 90.94.030(b)

- Size of the subbasins;
- Development character within the subbasin;
- Distinguishing areas where little rural growth is expected; and
- The location of streams included in the watershed rule (WAC-173-513) with closures or instream flow rule limits.

A more detailed description of the subbasin delineation is in the technical memo available in Appendix F. The WRIA 13 committee acknowledges that surface water drainages were used as a proxy for groundwater basins. While shallow groundwater oftentimes does correspond with surface water drainages, this correspondence does not always occur. For example, groundwater recharge or loss in a given watershed may affect flows in an adjacent watershed or may affect marine seepage instead of stream flows.

### 3.3 Subbasin Map

The WRIA 13 subbasin delineations are shown on Figure 2 and summarized below in Table 4:

Table 4: WRIA 13 Subbasins

| <b>Subbasin Name</b>    | <b>Primary Rivers and Tributaries</b>                                                                                                     | <b>County</b>      |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Boston Harbor</b>    | Ellis Creek, Indian Creek, Moxlie Creek, Woodard Creek                                                                                    | Thurston           |
| <b>Cooper Point</b>     | Simmons Creek, Schneider Creek                                                                                                            | Thurston           |
| <b>Deschutes Lower</b>  | Deschutes River, Percival Creek                                                                                                           | Thurston           |
| <b>Deschutes Middle</b> | Deschutes River                                                                                                                           | Thurston           |
| <b>Deschutes Upper</b>  | Buck Creek, Lincoln Creek, Lewis Creek, Little Deschutes River, Thurston Creek, Johnson Creek, Mitchell Creek, Fall Creek, Pipeline Creek | Thurston and Lewis |
| <b>Johnson Point</b>    | Unnamed tributaries to Henderson inlet and Nisqually Reach                                                                                | Thurston           |
| <b>McLane</b>           | McLane Creek, Swift Creek, Beatty Creek                                                                                                   | Thurston           |
| <b>Spurgeon Creek</b>   | Spurgeon Creek                                                                                                                            | Thurston           |
| <b>Woodland Creek</b>   | Woodland Creek                                                                                                                            | Thurston           |

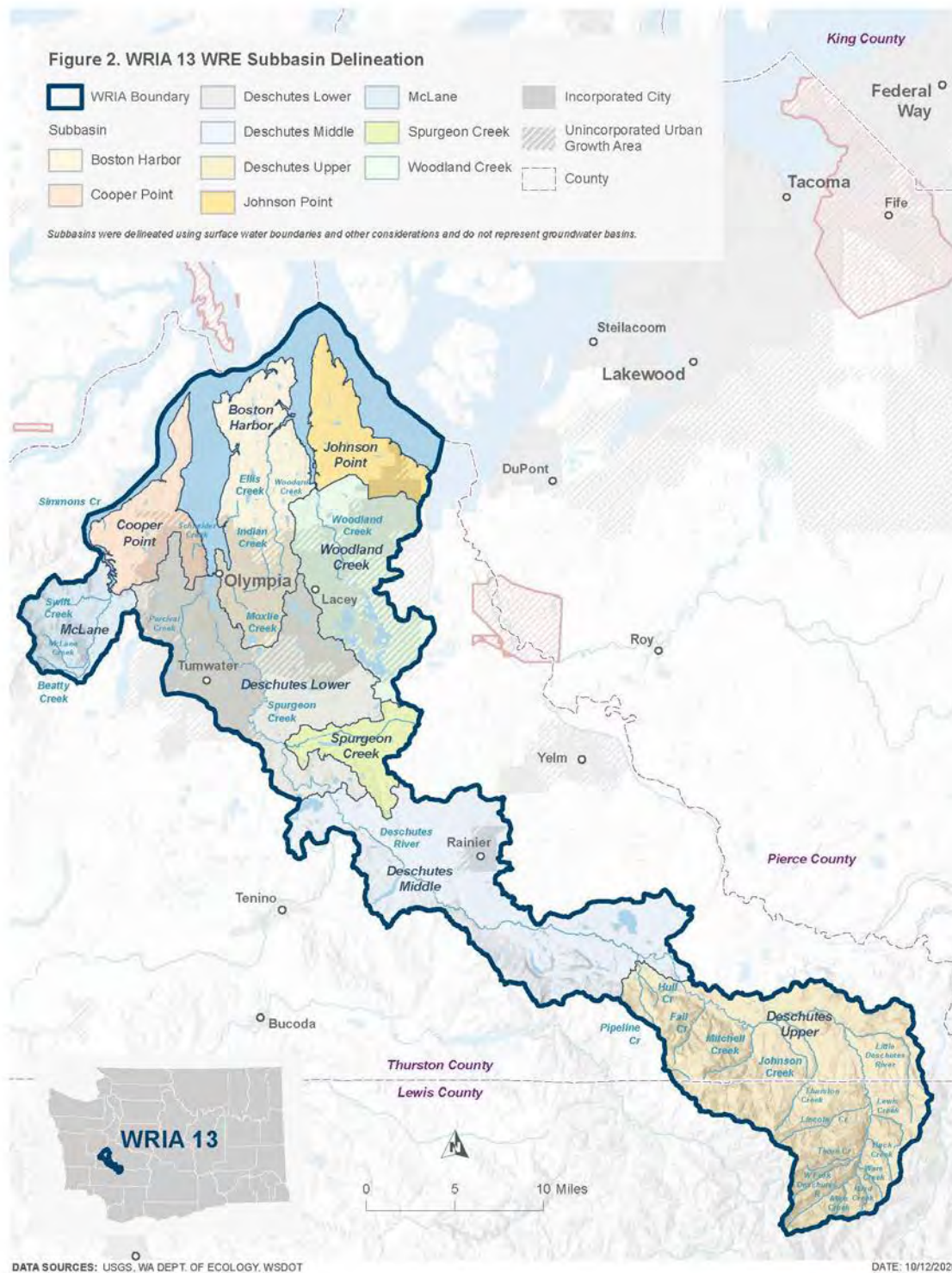


Figure 2: WRIA 13 WRE Subbasin Delineation

# Chapter Four: New Consumptive Water Use Impacts

## 4.1 Introduction to Consumptive Use

The Streamflow Restoration law requires watershed plans to include “estimates of the cumulative consumptive water use impacts over the subsequent twenty years, including withdrawals exempt from permitting under RCW 90.44.050” (RCW 94.030(3)(e)). The Final NEB Guidance states that, “Watershed plans must include a new consumptive water use estimate for each subbasin, and the technical basis for such estimate” (pg. 7). This chapter provides the WRIA 13 Committee’s projections of new domestic permit-exempt well connections (referred to as new PE wells throughout this plan) and their associated consumptive use (CU)<sup>40</sup> for the 20-year planning horizon.<sup>41</sup> This chapter summarizes information from the technical memo (Appendix H) prepared for the Committee.

## 4.2 Projection of Permit-Exempt Well Connections (2018 - 2038)

The WRIA 13 Committee projects 2,616 new PE wells over the planning horizon. Note that Thurston County and Lewis County are both within WRIA 13; however, the Lewis County portion of WRIA 13 is entirely comprised of timberland and thus was not included in the projection for new PE wells. No new PE wells are expected to occur in Lewis County over the 20-year planning horizon. New PE well projections are distributed across the WRIA, with the largest numbers in the Middle and Lower Deschutes subbasins, and the three peninsulas. The fewest new PE wells are projected in the Upper Deschutes and Spurgeon Creek subbasins.

The WRIA 13 Committee developed a methodology that it agreed was appropriate to project the number of new PE wells over the planning horizon in WRIA 13, in order to estimate new consumptive water use. The method is based on recommendations from Appendix A of Ecology’s Final NEB Guidance. The following sections provide the 20-year projections of new PE wells for each subbasin within WRIA 13, the methods used to develop the projections, and the uncertainties associated with the projections.

### 4.2.2 Methodology

The WRIA 13 Committee developed a methodology in collaboration with Thurston County and the Thurston Regional Planning Council (TRPC) for identifying the most appropriate method of

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<sup>40</sup> New consumptive water use in this document is from projected new homes connected to permit-exempt domestic wells associated with building permits issued during the planning horizon. Generally, new homes will be associated with wells drilled during the planning horizon. However, new uses could occur where new homes are added to existing wells serving group systems under RCW 90.44.050. In this document the well use discussed refers to both these types of new well use. PE wells may be used to supply houses, and in some cases other equivalent residential units (ERUs) such as small apartments. For the purposes of this document, the terms “house” or “home” refer to any permit-exempt domestic groundwater use, including other ERUs.

<sup>41</sup> See Chapter 6 policy recommendation #12 which describes a recommendation to collect information on 20 years of consumptive water use in addition to PE wells.

projecting new PE wells within their jurisdiction. Population growth projections for Thurston County are produced by the TRPC every 3 to 5 years. Growth projections represent the expected growth based on currently adopted plans and policies. A detailed description of the TRPC methods is provided in Appendix H<sup>42</sup>. Permit-exempt growth was projected using the following steps to project growth of over the planning horizon:

1. Develop 20-year growth projections based on Office of Financial Management (OFM) medium population growth estimates, and conversion to dwelling units based on assumed people per dwelling unit
2. Develop residential capacity estimates
3. Allocate growth to parcels based on recent residential development and permit trends, where capacity is available
4. Once allocated, estimate the amount of development on permit-exempt connections based on the following criteria provided by Thurston County:
  - a) Incorporated cities: no permit-exempt growth
  - b) Urban growth areas (UGAs): permit-exempt growth is assumed to occur on parcels with no sewer service
  - c) Rural areas outside of water systems: all permit-exempt growth

WRIA 13 Watershed Restoration and Enhancement (WRE) Committee built upon the TRPC methodology by adding permit-exempt growth in rural water systems, assuming that rural water systems may not be able to serve all growth within their service areas. Permit-exempt growth was assumed to be proportional to buildable parcels without water system hookups relative to parcels with water system hookups.

### **4.2.3 Distribution of New PE Wells**

This WRIA 13 watershed plan compiles Thurston County's growth projection data at both the WRIA scale and by subbasin. As mentioned above, no new PE wells are expected to occur in Lewis County over the 20-year planning horizon.

The TRPC allocated growth throughout Thurston County and WRIA 13. The WRIA 13 Committee summed PE well growth by subbasin, and mapped potential locations of new PE wells in the watershed. The resulting map (Figure 3) shows the most likely area where new residential development dependent on PE wells will occur.

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<sup>42</sup> Documentation for TRPC's housing projections is available at <https://www.trpc.org/236>

The TRPC and the WRIA 13 Committee project approximately 2,616 new PE wells within WRIA 13 over the planning horizon.

PE well growth is distributed through all subbasins, with the largest numbers in the Middle and Lower Deschutes subbasins, and the three peninsulas (Table 5 and Figure 3).

Table 5: Number of new PE Wells Projected between 2018 and 2038 per WRIA 13 Subbasins

| Subbasin                | Projected New PE Wells |
|-------------------------|------------------------|
| <b>Boston Harbor</b>    | 296                    |
| <b>Cooper Point</b>     | 232                    |
| <b>Deschutes Lower</b>  | 379                    |
| <b>Deschutes Middle</b> | 734                    |
| <b>Deschutes Upper</b>  | 30                     |
| <b>Johnson Point</b>    | 520                    |
| <b>McLane</b>           | 165                    |
| <b>Spurgeon Creek</b>   | 92                     |
| <b>Woodland Creek</b>   | 168                    |
| <b>Total</b>            | <b>2,616</b>           |



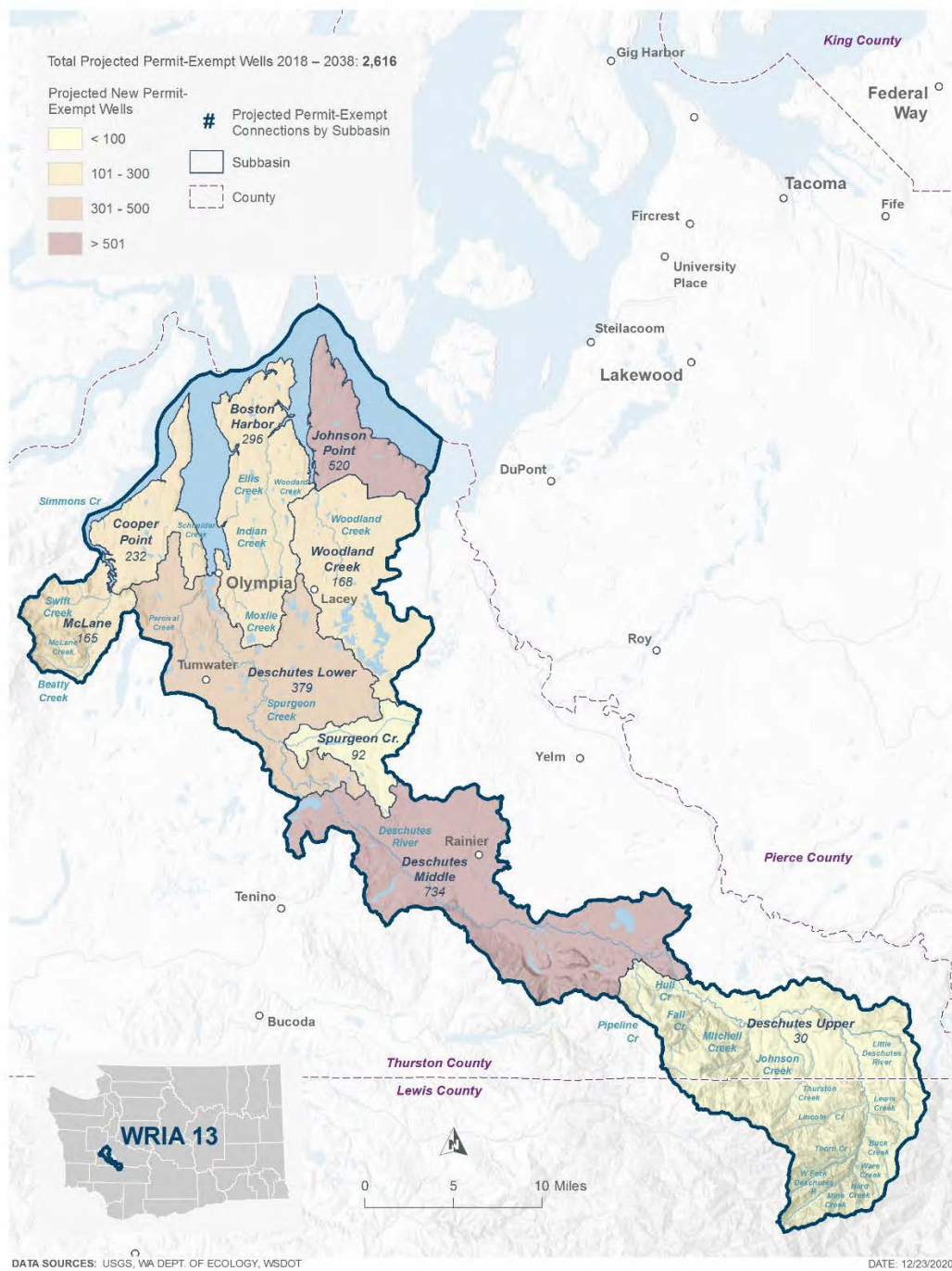


Figure 3: WRIA 13 WRE Distribution of Projected New PE Wells for 2018-2038

#### **4.2.4 Uncertainties and Scenarios**

The methods described above for projected new PE wells include several uncertainties. These uncertainties were discussed with the WRIA 13 Committee and recognized as inherent to the planning process. The uncertainties are shared here to provide transparency in the planning process and deliberations of the Committee.

One limitation is the reliance on historical data. This method assumed that historical growth trends would continue into the future. However, many factors play into homebuilding trends. Additionally, there is some uncertainty in the methodology that may lead to assumptions of where new PE wells are expected to occur. To address this uncertainty, the Committee evaluated additional PE well projection scenarios, and agreed to include in the analysis a methodology to account for some growth in rural water systems. This resulted in the PE well estimate which the Committee agreed was the appropriate analysis for WRIA 13.

An additional example of uncertainty are variations in growth scenarios for each county by OFM. The OFM medium growth scenario was used for this analysis, which is simple mortality and migration rate data collection; however, OFM also provides a high growth scenario, which is not a formal alternative scenario and is based on the likelihood of the counties experiencing a historically high growth rate. The OFM 20-year high growth projection for 2040 is 18.4% higher than the medium growth projection in Thurston County.

This methodology is described in detail in Appendix H

### **4.3 Impacts of New Consumptive Water Use**

The WRIA 13 Committee used a 20-year projection for WRIA 13 of 2,616 new PE wells to estimate the consumptive water use that this watershed plan must address and offset. The WRIA 13 Committee estimates 435 AFY (0.6 cfs) as the “most likely” new consumptive water use in WRIA 13. This watershed plan also includes a higher consumptive use estimate of 513 AFY (0.7 cfs) as a goal to achieve through adaptive management. This section includes an overview of the method used by the WRIA 13 Committee to estimate new consumptive water use (consumptive use), an overview of the anticipated impacts of new consumptive use in WRIA 13 over the planning horizon, and other considerations by the WRIA 13 Committee, such as assumptions and uncertainties. The WRIA 13 Permit-Exempt Growth and Consumptive Use Summary provides a more detailed description of the analysis and alternative scenarios considered (Appendix H).

Consistent with the Final NEB guidance [page 8, Appendix B], the Committee assumed that annual impacts from consumptive use on surface water are steady-state, meaning that impacts on the stream from pumping do not change over time. This assumption is based on the wide distribution of future well locations and depths across varying hydrogeological conditions.

#### **4.3.1 Methodology to estimate indoor and outdoor consumptive water use**

Appendix A of the Final NEB Guidance describes a method (referred to as the Irrigated Area method) that assumes average indoor use per person per day, and reviews aerial imagery to

provide a basis to estimate irrigated area of outdoor lawn and garden areas. Use patterns for indoor uses versus outdoor uses are different. Indoor use is generally constant throughout the year, while outdoor use occurs primarily in the summer months. Also, the portion of water use that is consumptive varies for indoor and outdoor water uses. The Irrigated Area method accounts for indoor and outdoor consumptive use variances by using separate approaches to estimate indoor and outdoor consumptive use.

To develop the consumptive use estimate, the WRIA 13 Committee used the Irrigated Area method and relied on assumptions for indoor use and outdoor use from Appendix A of the Final NEB Guidance (Ecology 2019). This chapter provides a summary of the technical memo, which is available in Appendix H.

To develop consumptive use estimates, the WRIA 13 Committee looked at other methodologies for estimating consumptive use, such as the Water System Data method. The committee determined that the Water System Data method would not provide an accurate depiction of water use in the watershed, but the results are provided in Appendix H. Additionally, to provide context for how the regulatory limits of water use in WRIA 13 compare to that of the irrigated area analysis, the Committee agreed that information should be provided regarding the maximum legal limit of 0.5 acres for outdoor watering for non-commercial lawn or garden<sup>43</sup>, and the maximum annual average PE well withdrawal limit of 950 gallons per day (gpd)<sup>44</sup>. This information is provided in Appendix H. Information referenced from other methodologies is intended to provide context, and is not intended to be used as a comparison for offsets from projects.

### **New indoor consumptive water use**

Indoor water use refers to the water that households use (such as in kitchens, bathrooms, and laundry), and that leaves the house as wastewater, typically into a septic system (Kenny et al., 2012). Based on Ecology's NEB Guidance (Ecology 2019), the WRIA 13 Committee used the Irrigated Area method and Ecology's recommended assumptions for indoor daily water use per person and local data to estimate the average number of people per household, and applied Ecology's recommended consumptive use factor (CUF) to estimate new indoor consumptive water use:

- 60 gallons per day (gpd) per person, as recommended by Ecology.
- 2.5 persons per household assumed for rural portions of WRIA 13<sup>45</sup>
- 10 percent of indoor use is consumptively used (or a CUF of 0.10), based on the assumption that homes on new PE wells are served by onsite sewage systems. Onsite sewage systems return most wastewater back to the immediate water environment; a fraction of that water is lost to the atmosphere through evaporation in the drainfield.

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<sup>43</sup> As defined in RCW 90.44.050

<sup>44</sup> As defined in RCW 90.94.030

<sup>45</sup> Thurston County OFM information can be found here: <https://www.ofm.wa.gov/washington-data-research/county-and-city-data/thurston-county>

The equation used to estimate household consumptive indoor water use is:

$$60 \text{ gpd per person} \times 2.5 \text{ people per house} \times 0.10 \text{ CUF}$$

This results in an indoor consumptive water use of 15 gallons per day per PE well. This equates to an annual average of 5,475 gallons per year (0.017 AFY<sup>46</sup>) (0.00023 cfs<sup>47</sup>) of indoor consumptive water use per PE well.

### **New outdoor consumptive water uses**

Most outdoor water is used to irrigate lawns, gardens, orchards and landscaping, and may include water for livestock. To a lesser extent, households use outdoor water for car and pet washing, exterior home maintenance, pools, and other water-based activities. Water from outdoor use does not enter onsite sewage systems, but instead infiltrates into the ground or is lost to the atmosphere through evapotranspiration (Ecology 2019).

Average outdoor irrigated area in WRIA 13 was estimated using aerial imagery to measure the irrigated areas of 80 randomly selected parcels of a stratified sample served by new PE wells. The average irrigated area for the 80 parcels was 0.06 acres. This analysis returned a large portion of parcels with no visible irrigation, which were given irrigated area values of zero. To account for undetected irrigation or potential outdoor water use other than irrigation, the WRIA 13 Committee replaced the zero values with 0.05 acres. This value of 0.05 acres was used, because that was the lower end (i.e. <10<sup>th</sup> percentile) of measurable irrigated areas in WRIA 13. When using 0.05 acres for parcels with no visible irrigation, the average irrigated area was 0.10 acres. This analysis was determined to result in the most likely outdoor consumptive use estimate for WRIA 13, and will be used as the target offset to compare to offsets from projects. Additionally, the WRIA 13 Committee then conducted a statistical confidence level analysis on the results. The 95 percent upper confidence limit (UCL) yielded an irrigated area of 0.12 acre, representing a conservative estimate of the average irrigation area. This method is further summarized in Appendix H, and is included in the plan as a goal to achieve through adaptive management. The Committee considers this analysis as a way to account for uncertainties such as future growth, and climate change.

The WRIA 13 Committee used the following assumptions, recommended in Appendix A of the Final NEB Guidance, to estimate outdoor consumptive water use:

- Crop irrigation requirements (IR) for turf grass according to the Washington Irrigation Guide (WAIG, Appendix B) (NRCS-USDA 1997): 16.8 inches for the Olympia, Packwood, and Centralia WAIG stations, which is a weighted average used to estimate the amount of water needed to maintain a lawn.

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<sup>46</sup> Acre-foot is a unit of volume for water equal to a sheet of water 1 acre in area and 1 foot in depth. It is equal to 325,851 gallons of water. One acre-foot per year is equal to 893 gallons per day.

<sup>47</sup> Cubic feet per second (cfs) is a rate of the flow in streams and rivers. It is equal to a volume of water 1 foot high and 1 foot wide flowing a distance of 1 foot in 1 second. One cubic foot per second is equal to 646,317 gallons per day.

- An irrigation application efficiency (AE) to account for water that does not reach the turf: 75 percent. This increases the amount of water used to meet the crop's IR by 25 percent.
- Consumptive use factor (CUF) of 0.8, reflecting 80 percent consumption for outdoor use. This means that 20 percent of outdoor water is returned to the immediate water environment.
- Outdoor irrigated area based on existing homes using PE wells: 0.10 acre (0.12 acres was used for the higher consumptive use estimate as a goal to achieve through adaptive management)

The equation used to estimate household outdoor consumptive water use is:

$$\frac{1.4 \text{ feet per year} * 0.10 \text{ acres} * 0.80 \text{ CUF}}{0.75 \text{ AE}}$$

First, the crop IR is multiplied by the average irrigated area to yield acre feet. Next, that volume of water was multiplied by 80 percent to produce the outdoor consumptive water use. Finally, that consumptive use is divided by seventy five percent to adjust for irrigation application efficiency (effectively increasing water use or consumptive use).

This results in 0.15 AFY (133 gallons per day) (48,629 gallons per year) (0.00021 cfs) outdoor consumptive water use per PE well for the WRIA based on 0.10 acres used for the most likely consumptive use estimate. Using 0.12 acres used in the higher adaptive management consumptive use estimate, this results in 0.18 AF per year (58,653 gallons per year) (0.00025 cfs). Multiplying the AFY and cfs per PE well by the new PE well projection of 2,616 PE will arrive at AFY and cfs for outdoor consumption by all PE wells. This will provide the contribution of outdoor consumption to the range provided in Section 4.3. This is an average for the year; however, the committee expects that more water will be used in the summer than in other months. The outdoor consumptive use varies by subbasin because of varying temperature and precipitation across the watershed.

### 4.3.2 Uncertainties and Limitations

Uncertainties and limitations are discussed here to provide transparency in the planning process and deliberations of the committee, and to evaluate the range of outcomes that could occur in the future. The WRIA 13 Committee addressed uncertainty in PE well growth projections with a single growth scenario by incorporating TRPC methods and assuming some PE well growth in rural water systems.

Indoor consumptive use estimates relied on existing data to the extent possible, such as the average number of people per household, or information from other studies that estimate average indoor water use per person. However, the committee recognized that each value in the calculation has uncertainty, and that the method assumes that future indoor water use will not deviate from current water use trends.

The outdoor consumptive use calculation contains more uncertainty than indoor consumptive use calculations, because it is based on four different factors and represents close to 90% of

use. The average outdoor irrigated area analysis was limited to a sample size of 80 parcels distributed by location and property values. Also, the interpretation of irrigated areas from aerial photos is subject to error. Some committee members voiced concern over these uncertainties in the outdoor irrigated area analysis. Uncertainty associated with method detection of irrigated areas in aerial photos was ameliorated by assigning a minimum value of 0.05 acre to the 80 parcels used to calculate the average irrigated area. When this minimum value was applied, the average irrigated area increased to 0.10 acres. Also, the Committee directed the technical consultant to calculate the 95 percent upper confidence of the irrigated area average. The 95 percent upper confidence limit was 0.12 acre. The 95 percent upper confidence limit represents an upper estimate of the mean that has a 95 percent probability of being less than that upper limit (i.e., an overestimate of irrigated area that would likely result in a more conservative consumptive use estimate).

Potential bias in methodology was addressed in a comparability study with another consultant, GeoEngineers (Attachment C of Appendix H). Methods used by GeoEngineers in WRIAs 9 and 10 were compared to HDR's methods (as used in WRIA 13) for the same parcel images. HDR's results were found to be lower than that of GeoEngineers by 0.05 to 0.06 acres. The finding of the comparability study was that while the method is subject to error and the results varied between the two analyses, the variation of the results in the two analyses was inconclusive in terms of accuracy and the differences between analysts were not large enough to warrant any revisions to the estimates. However, since the HDR estimates were low, relative to the GeoEngineers estimates, the Committee used the 95% upper confidence limit of the results of this analysis (estimated by HDR) to develop the higher adaptive management CU estimate to account for uncertainty.

Other factors of uncertainty in the outdoor consumptive use calculation are the assumptions about irrigation amounts and irrigation efficiencies. The calculation assumes that homeowners water their lawns and gardens at the rate needed for commercial turf grass (i.e., watering at rates that meet crop irrigation requirements per the Washington Irrigation Guide). The irrigated area analysis demonstrated that many people irrigate their lawns enough to keep the grass alive through the dry summers, but not at the levels that commercial turf grass requires. The method also assumes that residential irrigation has an efficiency of 75 percent. This assumes that an additional 25 percent of the water needed to grow the lawn turf is used because of watering inefficiency.

An additional source of uncertainty identified by the Committee is that RCW 90.94 allows up to 1/2 acre of land to be irrigated by an exempt well, and in the absence of metering or routine observations of outdoor irrigation, there is no way to accurately calculate how much water is being consumed for outdoor water use.

Another source of uncertainty is that climate change is expected to create longer, hotter, drier growing seasons. This will raise evapotranspiration and increase dry season water demands. A calculation using climate projections by a Committee representative found a 6% increase in

water use over 20 years.<sup>48,49</sup> The WRIA 13 Committee addressed the uncertainties, assumptions, and limitations in this method by using conservative assumptions. This approach means that if the committee implements the projects to offset the consumptive use estimate, the WRIA 13 Committee expects that the plan will also offset actual water use.

### 4.3.3 Summary of Consumptive Use Estimates

Of the methodologies presented to address uncertainty in the calculations of consumptive use, the Committee agreed on two estimates for WRIA 13: a “most likely” estimate and a “higher use” estimate as a goal to achieve through adaptive management. Both are based on the assumption to assign a minimum value of 0.05 acres to the 80 parcels used to calculate the average irrigated area. The most likely estimate is based on an irrigated area of 0.10 acres, while the higher use estimate is based on an irrigated area of 0.12 acres (the 95th percentile value of irrigated acres). These were applied to the calculations to determine indoor, outdoor, and total consumptive use estimates by subbasin (Table 6). The total consumptive use estimates for WRIA 13 are 435 AFY (0.6 cfs) for the most likely estimate, and 513 AFY (0.7 cfs). The total consumptive use estimates for WRIA 13 are calculated as the number of new PE wells projected (see Section 4.2) multiplied by the total indoor and outdoor consumptive use per PE well. Table 6 summarizes the estimated indoor and outdoor consumptive use by subbasin. The highest consumptive use is expected to occur in the subbasin with the most anticipated new PE wells, as presented in Figure 4.

Information on other methodologies including Water System Data, maximum outdoor watering for non-commercial lawn or garden (0.5 acres), and the maximum annual average PE well withdrawal limit (950 gpd) is provided in Table 6 for context.

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<sup>48</sup> This analysis is provided in the Compendium

<sup>49</sup> See <https://climatetoolbox.org/> for more information on climate data.



Table 6: WRIA 13 Estimated PE Well Projections and Indoor and Outdoor Consumptive Use Estimates<sup>50</sup> by Subbasin<sup>51</sup>, 2018-2038

|                  |                        |                 | Assumed Irrigated Acreage of 0.10 Acre ("Most Likely" Estimate) |                     | Assumed Irrigated Acreage of 0.12 Acre (Higher Adaptive Management Estimate) |                     | Water System Data   | Maximum Outdoor Watering Limit (0.5 acres) | Maximum Withdrawal Limit (950 gpd) |
|------------------|------------------------|-----------------|-----------------------------------------------------------------|---------------------|------------------------------------------------------------------------------|---------------------|---------------------|--------------------------------------------|------------------------------------|
| Subbasin         | Projected new PE Wells | Indoor CU (AFY) | Outdoor CU (AFY)                                                | Total CU/year (AFY) | Outdoor CU (AFY)                                                             | Total CU/year (AFY) | Total CU/year (AFY) | Total CU/year (AFY)                        | Total CU/year (AFY)                |
| Boston Harbor    | 296                    | 5               | 44                                                              | 49                  | 53                                                                           | 58                  | 52                  | 226                                        | 217                                |
| Cooper Point     | 232                    | 4               | 35                                                              | 39                  | 42                                                                           | 45                  | 41                  | 177                                        | 170                                |
| Deschutes Lower  | 379                    | 6               | 57                                                              | 63                  | 68                                                                           | 74                  | 67                  | 289                                        | 278                                |
| Deschutes Middle | 734                    | 12              | 110                                                             | 122                 | 132                                                                          | 144                 | 129                 | 560                                        | 539                                |
| Deschutes Upper  | 30                     | 1               | 4                                                               | 5                   | 5                                                                            | 6                   | 5                   | 23                                         | 22                                 |
| Johnson Point    | 520                    | 9               | 78                                                              | 86                  | 93                                                                           | 102                 | 92                  | 397                                        | 382                                |
| McLane           | 165                    | 3               | 25                                                              | 27                  | 30                                                                           | 32                  | 29                  | 126                                        | 121                                |
| Spurgeon Creek   | 92                     | 2               | 14                                                              | 15                  | 16                                                                           | 18                  | 16                  | 70                                         | 68                                 |
| Woodland Creek   | 168                    | 3               | 25                                                              | 28                  | 30                                                                           | 33                  | 30                  | 128                                        | 123                                |
| <b>Total</b>     | <b>2,616</b>           | <b>44</b>       | <b>391</b>                                                      | <b>435</b>          | <b>469</b>                                                                   | <b>513</b>          | <b>461</b>          | <b>1,997</b>                               | <b>1,921</b>                       |

<sup>50</sup> Results are shown in acre feet per year (AFY). 1 acre foot per year is equivalent to 0.0014 cfs, or 892.74 gallons per day

<sup>51</sup> The WRIA 13 Committee has determined that an area of 0.10 irrigated acres result in the most likely outdoor consumptive use estimate for WRIA 13, and will be used as the target offset to compare to offsets from projects. The analysis based on an area of 0.12 irrigated acres is included in the plan as a goal to achieve through adaptive management. Results for consumptive use were rounded to the nearest whole number.

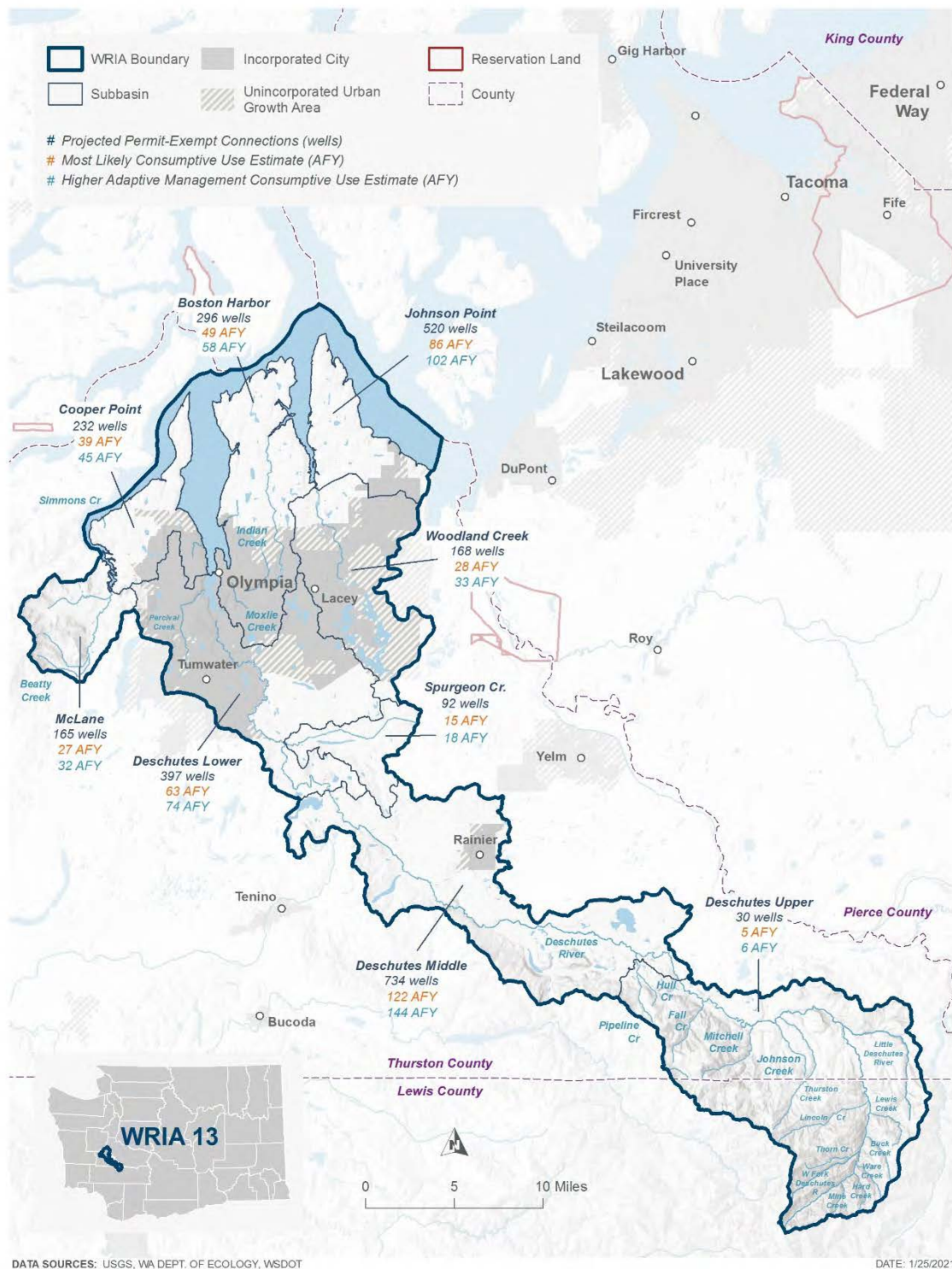


Figure 4: WRIA 13 Estimated Consumptive Use by Subbasin 2018-2038

## Chapter Five: Projects and Actions

### 5.1 Description and Assessment

Watershed plans must identify projects and actions that offset the potential impacts future PE wells will have on streamflows and provide a net ecological benefit to the WRIA.<sup>52</sup> This chapter provides recommendations from the WRIA 13 Committee for projects to offset consumptive use and meet NEB<sup>53</sup> and describes water offset projects and habitat projects. Water offset projects have a quantified streamflow benefit and contribute to offsetting consumptive use. Habitat projects contribute toward achieving NEB by improving the ecosystem function and resilience of aquatic systems, supporting the recovery of threatened or endangered salmonids, and protecting instream resources including important native aquatic species. Habitat projects included in this plan were selected for their potential to result in an increase in streamflow, but the water offset benefits for these projects are difficult to quantify. Therefore, this watershed plan does not rely on habitat projects to contribute toward offsetting consumptive use.

To identify the projects summarized in this chapter, as well as the complete project inventory in Appendix J, Committee members and WRIA 13 partners brought project suggestions forward to the workgroup and committee for discussion. Ecology and the technical consultants also identified projects with potential streamflow benefit from the Puget Sound Action Agenda near term actions, salmon recovery lead entity four-year work plans, streamflow restoration grant applications, and public works programs. The Committee used a project inventory to capture and track all project ideas, no matter their phase of development, throughout the planning process. To receive feedback on projects in alignment with other planning processes and identify any projects of concern for inclusion in the WRE Plan, the WRIA 13 Committee engaged the salmon recovery lead entity in WRIA 13. At any point in the process, Committee members or WRIA 13 partners could identify projects of concern for inclusion in the WRE Plan and recommend removal of the project from the project inventory. Where possible, project sponsors have been identified for projects and were engaged during project development.

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<sup>52</sup> The NEB Guidance defines “projects and actions” as “General terms describing any activities in watershed plans to offset impacts from new consumptive water use and/or contribute to NEB.” (Ecology, 2019b, page 5) This watershed plan uses the term “projects” for simplicity to encompass both projects and actions as defined by the NEB guidance.

<sup>53</sup> In 2015 the State Supreme Court issued a decision on *Foster v. Ecology, City of Yelm, and Washington Pollution Control Hearings Board*. The decision, frequently referred to as the “Foster decision,” reaffirmed and reinforced that instream flows adopted in a rule must be protected from impairment. The Legislature established the Joint Legislative Task Force on Water Resource Mitigation (Task Force) in RCW 90.94.090 to understand impacts of the 2015 Foster decision. In that law, Ecology is authorized to issue permit decisions for up to five water mitigation pilot projects using a stepwise mitigation approach that can include out of kind mitigation. The City of Yelm is one of the entities undertaking a pilot project. As of January 2020, the pilot project work is still ongoing. More information about the Task Force, including their 2019 report to the legislature, can be accessed on their webpage: <http://leg.wa.gov/JointCommittees/WRM/Pages/default.aspx>. (Ecology, 2020b)

Based on initial information available on projects, the committee identified a subset of projects that showed promise for quantitative streamflow benefits, and prioritized these for further analysis. The technical consultants further developed the analysis on the subset of projects, and the committee determined the offset value to attribute to each project. This chapter presents summaries of those projects.

In a separate effort, Ecology contracted with Pacific Groundwater Group (PGG) to support identification of water right acquisition opportunities for WRIA 13. In coordination with the Committee, PGG narrowed down the list of opportunities. The Committee provided input on the revised list of projects for PGG to develop a focused list of water rights for future project opportunities; however no specific water rights were identified for acquisition and no offset is being claimed by the Committee.

For projects that did not provide a quantifiable streamflow benefit, the WRIA 13 Committee chose not to invest the same level of technical consultant resources to further develop the projects during this planning period as they did for the water offset projects. Information presented on these projects is based on available information from WRIA 13 partners. The Committee focused the technical resources and expertise on finding projects that provide quantifiable offset benefits.

The projects identified in this plan are consistent with the project type examples listed in the Final NEB Guidance: (a) water right acquisition offset projects; (b) non-acquisition water offset projects; and (c) habitat and other related projects (Ecology, 2019b). This watershed plan presents projects in the following three categories:

- I. Likely to be implemented and provide quantitative streamflow benefits.
- II. Likely to be implemented and provide habitat benefit and/or unquantifiable streamflow benefits.
- III. Unable to be implemented at this time because the project is highly conceptual or has other constraints.

Projects in Category I and II are presented in this chapter and include detailed project descriptions from the technical consultants in Appendix I. All other projects are presented in the project inventory in Appendix J. The WRIA 13 Committee recommends implementation of projects in this chapter as well as in Appendix J in order to meet the offset need and NEB for WRIA 13.

The Committee recognizes the importance of developing projects with climate resiliency in mind, and the need to assess how climate change may affect project effectiveness. Restoring floodplain connectivity and streamflow regimes, and re-aggrading incised channels are most likely to ameliorate streamflow and temperature changes and increase habitat diversity and population resilience (Beechie et al. 2013).

## 5.2 Category I Projects with Quantifiable Streamflow Benefit

The WRIA 13 Committee set the goal of meeting the offset target for each subbasin. The projects presented below have quantifiable streamflow benefit or habitat improvement. The

committee identified these projects as having the greatest potential for implementation and meeting achieving the required offset need. Detailed descriptions of each of the projects presented in this section are available in Appendix I. A summary of projects and offset benefits by subbasin are presented at the end of this section in Tables 7 - 9.

### **5.2.1 WRIA-wide Projects**

#### **5.2.1.1 Managed Aquifer Recharge Projects in WRIA 13**

Managed aquifer recharge (MAR) projects divert, convey, and infiltrate peak seasonal river flows in engineered facilities that are in connection with the local alluvial aquifer that the donor stream or river is also in connection. MAR potential was estimated in terms of 1) potential locations suitable for MAR projects, 2) flow available for diversion during high flows, and 3) the number of days when diversion is feasible. To ensure that flows would be diverted in quantities that would not reduce habitat suitability for salmonids or reduce habitat forming processes, one of two methods were used to estimate flow rates. If minimum flows have been designated, then the flow rate was estimated as less than two percent of minimum flows. If minimum flows have not been designated, 2% of the average 75th percentile flows during November –April were used. Seepage back into the river would result in attenuation of these flows, increasing base flows across a broader time period, including the late summer and early fall, when flows are typically the lowest, and water demand for consumptive use is the highest. MAR projects are proposed for the Deschutes River and Green Cove Creek. MAR projects may be considered for Percival Creek, Woodard Creek, and Woodland Creek, but are not being proposed for offset credits in this plan.

MAR projects in WRIA 13 have been identified through analysis by the technical consultants to identify potential suitable locations, and are estimated to have a total potential water offset of 811 AFY. Due to uncertainties in the likelihood of projects being built, project performance over time, and the benefits being realized (including the timing of streamflow benefits), the Committee chose to exclude estimates for projects located in basins with instream flow rule closures, and to reduce the estimates for other MAR projects. Consequently, the Committee determined that a reasonable offset estimate to claim for the purposes of this plan is 325 AFY (i.e. forty percent of the estimated 811 AFY total). The Committee supports future feasibility studies within WRIA 13 for MAR projects to further develop this information. Explanation and potential offset quantities for MAR projects in each stream are described in the following subbasin sections.

The WRIA 13 Committee acknowledges that some diversion methods including in-channel structures may pose an impact to fish habitat, and strongly advocates the use of diversion methods that do not include in-channel structures. For example, diverted water could be conveyed through a collector well adjacent to the river (e.g. Ranney Collector well). The WRIA 13 Committee suggests that projects should be specifically designed to enhance streamflows and to avoid a negative impact to ecological functions and/or critical habitat needed to sustain threatened or endangered salmonids.

Thurston County has indicated that they will be the project sponsor of MAR projects, in coordination with project partners and implementation groups, pending feasibility studies.

## **5.2.2 Boston Harbor Subbasin**

### **5.2.2.1 Managed Aquifer Recharge Project in Woodard Creek**

An MAR project (as described in the WRIA-wide Projects section) is proposed for Woodard Creek (Appendix I). Woodard Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location are near zero in the summer and range from 10 –17 cfs in the wet season. If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs. The diversion period is likely around 45 days per year, during the wet season. This would result in an offset of around 18 AFY. However, because of the uncertainty associated with being a closed stream, the Committee is not claiming offset credits for this project.

## **5.2.3 Cooper Point Subbasin**

### **5.2.3.1 Managed Aquifer Recharge Project in Green Cove Creek**

An MAR project (as described in the WRIA-wide Projects section) is proposed for Green Cove Creek (Appendix I). Green Cove Creek is a closed stream (Chapter 173-513 WAC). Measured flows near the potential MAR location are near zero in the summer and range from 7 –11 cfs in the wet season. If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs. The diversion period is likely around 45 days per year, during the wet season. This would result in an offset of around 18 AFY. The Committee has conservatively claimed forty percent of this water offset, or 7 AFY (Table 8).

## **5.2.4 Deschutes Lower Subbasin**

### **5.2.4.1 Schneider's Prairie Off-Channel Storage-and-Release**

The Schneider's Prairie Off-Channel Storage-and-Release Project is located on the east bank of the Deschutes River, west of the Keanland Park Lane SE, in north-central Thurston County. This project will restore hydrologic connectivity between the Deschutes River and Schneider's Prairie. Schneider's Prairie is a depressional feature that contains the Ayer Creek drainage (Appendix H). Paleochannels apparent from aerial photos and LiDAR images show that multiple channels historically connected the Deschutes River with Schneider's Prairie. Reconnecting the Deschutes River with Schneider's Prairie and Ayer Creek would provide rearing habitat and flood refugia for juvenile salmonids, stormflow attenuation, and water infiltration for later-season release to augment flow in the lower Deschutes River.

The project concept is to deepen an existing floodplain paleochannel that would hydrologically connect the Deschutes River to Schneider's Prairie (Appendix I). Schneider's Prairie contains Ayers Pond and Ayers Creek. The deepened paleochannel would be connected to the existing Ayers Creek that runs north and back to the Deschutes River. Ayers Creek would be modified near the confluence with the Deschutes River using biotechnical techniques (e.g. buried logs

and log jams) to maintain grade control at an elevation that would inundate a portion of the off-channel area during high flow events (152 ft NAVD88).

Inflows from the Deschutes River to the off-channel area were compared to the maximum infiltration capacity of the off-channel area (i.e. 52 acres). The smaller of the two values were used as an assumed infiltration quantity. River inflows that exceeded the infiltration capacity were assumed to be retained as ponded water in the Schneider's Prairie feature. This retained inflow volume was assumed to infiltrate during the late spring, when river inflows were no longer occurring.

The seasonal inundation would result in infiltration and subsequent seepage back to the river on the time scale of days to months. Seepage back to the Deschutes River increases over time, because of the cumulative effect of infiltrating additional water. This cumulative increase reaches an asymptote (i.e. additional benefits are minimal) after about 50 years of infiltration. Seepage back to river does not change substantially with season, but slightly more seepage occurs during the May–October period, relative to the November–April period. Streamflow benefits during the May–October period are predicted to be 285, 681, 958, and 1,310 acre-feet per year during the first, fifth, tenth, and fiftieth year of infiltration, respectively.

The WRIA 13 Committee identified project uncertainties from the modeling analysis was not able to account for or where assumptions were made, including:

1. Evapotranspiration
2. Amount of infiltration
3. Climate change
4. Dropping flow trends of the Deschutes
5. Sediment issues in the Deschutes
6. Modeling assumptions including transmissivity of aquifer, and streambed conductance
7. Modeling represents average conditions, not dry year conditions

To account for project uncertainties the Committee chose to recognize 681 AFY of seepage back to the river during the May – October dry season from this project, which represents less than half of the total estimated based on preliminary hydrologic and hydrogeologic modeling (Tables 7 and 8).

#### **5.2.4.2 Donnelly Drive Infiltration Galleries**

Portions of Donnelly Drive SE, and Normandy Drive SE flood during major rainfalls and impacts public property and reduces public safety. Thurston County Roads Maintenance has routinely responded to calls from residents for assistance. It is proposed to install treatment devices and infiltration systems in the Donnelly Drive vicinity to reduce flooding of public streets and promote infiltration to groundwater (Appendix I). There are five locations in the area which see flood issues, and each of these locations are a low point where an existing drywell is located to infiltrate stormwater. These improved infiltration systems has been modeled to increase stormwater infiltration by approximately 14 AFY (Tables 7 and 8). The Committee is claiming 14 AFY for this project, assuming year-round benefits because the stormwater infiltration basin is



over 2,500 feet from Chambers Ditch, and the travel time is likely attenuated into the summer season (Ecology 2020; USGS Circular 1376).

#### **5.2.4.3 Managed Aquifer Recharge Project in Percival Creek**

An MAR project (as described in the WRIA-wide Projects section) is proposed for Percival Creek (Appendix I). Percival Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location are near 3 cfs in the summer and range from 12 –15 cfs in the wet season. If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs. The diversion period is likely around 45 days per year, during the wet season. This would result in an offset of around 18 AFY. However, because of the uncertainty associated with being a closed stream, the committee is not claiming offset credits for this project.

### **5.2.5 Deschutes Middle Subbasin**

#### **5.2.5.1 Managed Aquifer Recharge Project in the Deschutes River**

MAR projects (as described in the WRIA-wide Projects section) are proposed for the Middle Deschutes River (Appendix I). Projects would divert water from the Deschutes River, which then would be infiltrated into the ground for subsequent return flow to the river. To estimate the potential benefits from this project, flow data from measured flows are approximated by the Deschutes River at Rainier gage (USGS Station 12079000) and the Deschutes River at E St Bridge at Tumwater, WA (USGS 12080010). The amount of water available for diversion downstream to the control point (in Tumwater) is approximately 8 cfs during at least 50 days of the year, during the November – April wet season. Potential MAR locations have been identified in both the upper and middle Deschutes River subbasins (Appendix I). If all 8 cfs were diverted for several projects for these days and infiltrated for subsequent return flow to the river, which would equate to approximately 792 AFY of offset benefit. Currently, 6 of the 8 cfs is proposed to be applied to MAR projects in the Deschutes Middle subbasin, equaling 594 AFY. The committee has conservatively claimed forty percent of this water offset, or 238 AFY (Table 8).

### **5.2.6 Deschutes Upper Subbasin**

#### **5.2.6.1 Managed Aquifer Recharge Project in the Deschutes River**

MAR projects (as described in the WRIA-wide Projects section) are proposed for the Upper Deschutes River (Appendix I). As described above for the Deschutes Middle subbasin, 2 of the 8 cfs is currently proposed to be applied to MAR projects in the Deschutes Upper subbasin, equaling 198 AFY. The committee has conservatively claimed forty percent of this water offset, or 79 AFY (Table 8).

## **5.2.7 Woodland Creek Subbasin**

### **5.2.7.1 Hicks Lake Stormwater Retrofit**

The Ruddell Road Stormwater Facility was constructed by the City of Lacey in 1999, consisting of a pretreatment settling basin that flows to constructed wetlands; ultimately flowing into Hicks Lake. Although the facility is an improvement to the previous, untreated condition, the limited water quality wet pool volume, relatively high inflows, and flow-through design conditions, limit water quality treatment and provides minimal, if any, infiltration benefit. Therefore, the City is investigating the feasibility of an offset infiltration facility as an upgrade to the current system.

The proposed project would provide water offsets and an ecological benefit (per RCW 90.94.030) to the Woodland Creek sub-basin. The improvements are expected to provide a significant shallow groundwater recharge component, and augment base flow to Hicks, Pattison, and Long Lakes, ultimately benefitting Woodland Creek, which is currently impaired by low instream flow (303d listing 6169). Proposed upgrades to the facility include a flow splitting manhole, filtration treatment BMP, infiltration gallery and an overflow structure to the existing wetland.

A range of diversion flows (1cfs, 2cfs, and 3 cfs) were modeled and resulted in a corresponding range of average annual infiltration of 167, 244, and 296 AFY, respectively. All flows, up to 3.5 cfs are expected to be 100% infiltrated, but infiltrating up to 3 cfs accounts for a reduction in infiltration capacity over time (i.e. from clogging of the infiltration basin from fine materials). Therefore, infiltrating up to 3 cfs for an offset benefit of 296AFY is the estimate of stormwater infiltration (Tables 7 and 8). The Committee is claiming 296 AFY for this project, assuming year-round benefits because the stormwater infiltration basin is over 1,000 feet from Hicks Lake, and the travel time is likely attenuated into the summer season (Ecology 2020; USGS Circular 1376). Also, Hicks Lake is the headwaters of the Woodland Creek watershed. Water seeping into Hicks Lake from this project must travel through a wetland into Pattison Lake, and into another wetland into Long Lake, before that water reaches the beginning of Woodland Creek.

### **5.2.7.2 Managed Aquifer Recharge Project in Woodland Creek**

An MAR project (as described in the WRIA-wide Projects section) is proposed for Woodland Creek (Appendix H). Woodland Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location average 14 cfs in the late summer and range from 24 – 51 cfs in the wet season. If an MAR project were to occur at this location, it could be small-scale, approximately 0.7 cfs diversion when flows exceed 36 cfs. The diversion period is likely around 45 days per year, during the wet season. This would result in an offset of around 62 AFY. However, because of the uncertainty associated with being a closed stream, the committee is not claiming offset credits for this project.

1 Table 7: Category I Projects in WRIA 13 with Quantifiable Streamflow Benefit

| Project Name                               | Project Type and Description                                                                   | Subbasin        | Estimated Water Offset (AFY) <sup>54</sup> | Estimated Water Offset (AFY) During Critical Flow Period <sup>55</sup> | Offset Claimed by WRIA 13 Committee (AFY) <sup>56</sup> | Timing of Benefits | Project Sponsor | Estimated Project Cost <sup>57</sup> | Readiness to Proceed |
|--------------------------------------------|------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------|--------------------|-----------------|--------------------------------------|----------------------|
| Schneider's Prairie Off-Channel Connection | Off-channel reconnection and infiltration                                                      | Lower Deschutes | 681                                        | 681                                                                    | 681                                                     | May-Oct            | Thurston county | \$4.93 M                             | High                 |
| Hicks Lake Stormwater Retrofit             | Stormwater infiltration in series with existing stormwater treatment                           | Woodland        | 296                                        | 148                                                                    | 296                                                     | Year-round         | City of Lacey   | \$3.3 M                              | High                 |
| Donnelly Drive Infiltration                | Improve neighborhood stormwater infiltration, avoiding surcharge and runoff to Chambers ditch. | Lower Deschutes | 14                                         | 7                                                                      | 14                                                      | Year-round         | Thurston County | \$6.31 M                             | High                 |

<sup>54</sup> 1 acre foot per year is equivalent to 0.0014 cfs, or 892.74 gallons per day

<sup>55</sup> The WRIA 13 Committee agreed that for the purposes of this watershed plan, the critical flow period will be defined as May-October.

<sup>56</sup> The WRIA 13 Committee agreed to indicate offset claimed for the purposes of the NEB evaluation.

<sup>57</sup> Costs are based on order of magnitude estimates.

| Project Name                                                       | Project Type and Description                                                                                                                        | Subbasin                                                                                            | Estimated Water Offset (AFY) <sup>54</sup> | Estimated Water Offset (AFY) During Critical Flow Period <sup>55</sup> | Offset Claimed by WRIA 13 Committee (AFY) <sup>56</sup> | Timing of Benefits | Project Sponsor                                                   | Estimated Project Cost <sup>57</sup> | Readiness to Proceed |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------|--------------------|-------------------------------------------------------------------|--------------------------------------|----------------------|
| Deschutes/<br>Chambers<br>MAR                                      | Several candidate locations for MAR of diverted Deschutes River water from high flow periods, exceeding instream minimum flows or ecological flows. | Upper Deschutes<br>Middle Deschutes<br>Lower Deschutes<br>Woodland<br>Boston Harbor<br>Cooper Point | 811                                        | Not calculated                                                         | 325                                                     | Year-round         | Thurston County and WRIA 13 Implementation Partners <sup>58</sup> | \$2.8 M                              | High                 |
| <b>WRIA 13 Total Water Offset</b>                                  |                                                                                                                                                     |                                                                                                     | <b>1,802</b>                               | <b>836</b>                                                             | <b>1,316</b>                                            |                    |                                                                   |                                      |                      |
| <b>WRIA 13 Consumptive Use Estimate</b>                            |                                                                                                                                                     |                                                                                                     | <b>435</b>                                 |                                                                        |                                                         |                    |                                                                   |                                      |                      |
| <b>WRIA 13 Higher Adaptive Management Consumptive Use Estimate</b> |                                                                                                                                                     |                                                                                                     | <b>513</b>                                 |                                                                        |                                                         |                    |                                                                   |                                      |                      |

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<sup>58</sup> The WRIA 13 Committee supports the development of an implementation group to further develop projects

Table 8: Water Offsets claimed by the WRIA 13 committee, summed by subbasin. All values are in acre-feet/year.<sup>59</sup>

| Subbasin            | WRIA 13<br>Most<br>Likely CU<br>Estimate | WRIA 13<br>Higher<br>Adaptive<br>Mgmt CU<br>Estimate | MAR        | Schneider's<br>Prairie | Hicks Lake<br>SW Retrofit | Donnelly<br>Drive<br>Infiltration | Total        |
|---------------------|------------------------------------------|------------------------------------------------------|------------|------------------------|---------------------------|-----------------------------------|--------------|
| Boston Harbor       | 49                                       | 58                                                   | 0          | 0                      | 0                         | 0                                 | 0            |
| Cooper Point        | 39                                       | 45                                                   | 7          | 0                      | 0                         | 0                                 | 7            |
| Deschutes Lower     | 63                                       | 74                                                   | 0          | 681                    | 0                         | 14                                | 695          |
| Deschutes<br>Middle | 122                                      | 144                                                  | 238        | 0                      | 0                         | 0                                 | 238          |
| Deschutes Upper     | 5                                        | 6                                                    | 79         | 0                      | 0                         | 0                                 | 79           |
| Johnson Point       | 86                                       | 102                                                  | 0          | 0                      | 0                         | 0                                 | 0            |
| McLane              | 27                                       | 32                                                   | 0          | 0                      | 0                         | 0                                 | 0            |
| Spurgeon Creek      | 15                                       | 18                                                   | 0          | 0                      | 0                         | 0                                 | 0            |
| Woodland Creek      | 28                                       | 33                                                   | 0          | 0                      | 296                       | 0                                 | 296          |
| <b>Total</b>        | <b>435</b>                               | <b>513</b>                                           | <b>325</b> | <b>681</b>             | <b>296</b>                | <b>14</b>                         | <b>1,316</b> |

<sup>59</sup> 1 acre foot per year is equivalent to 0.0014 cfs, or 892.74 gallons per day

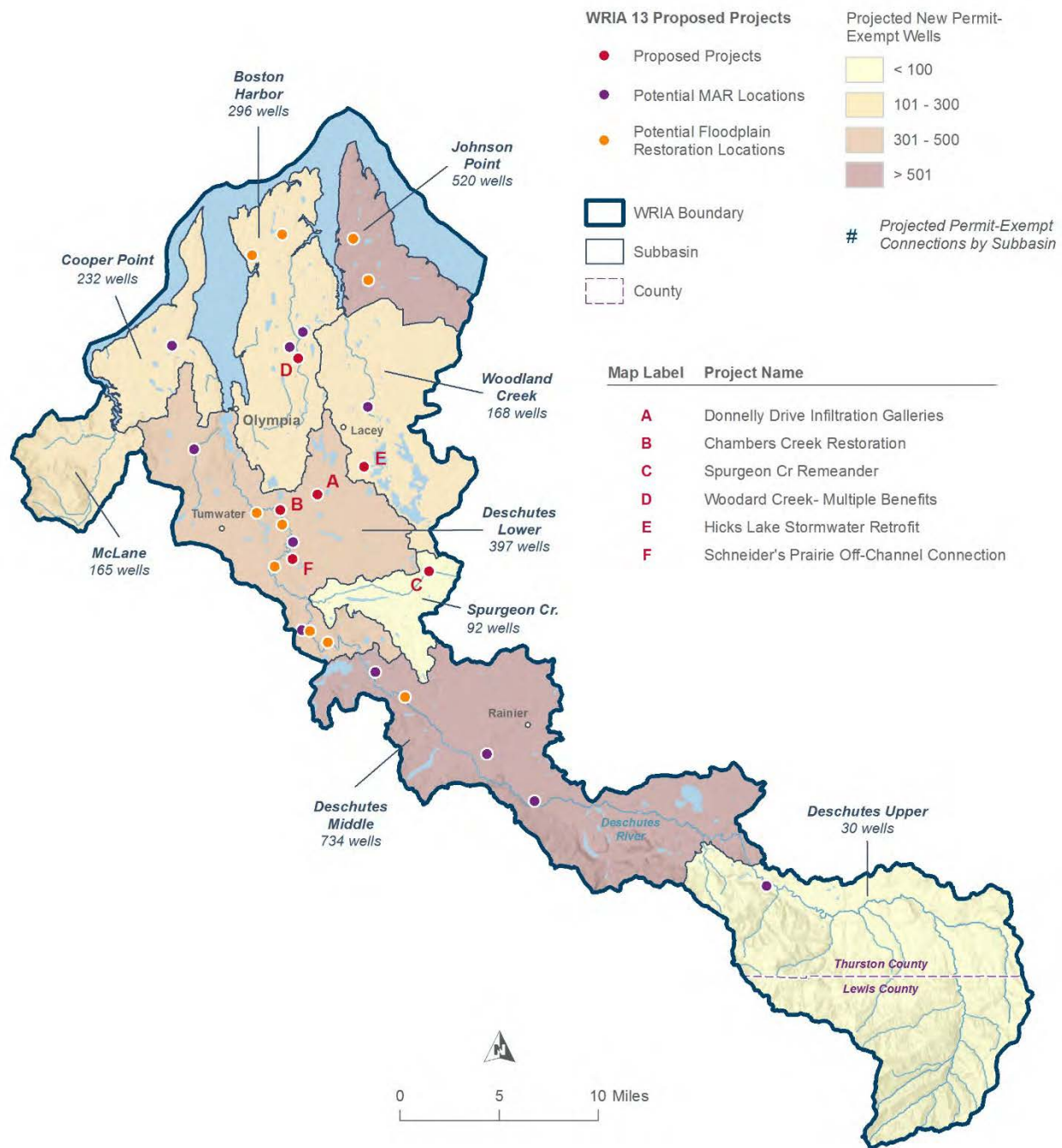


Figure 5: WRIA 13 Projects by Subbasin

### 5.3 Category II Projects that Primarily Provide Habitat Improvements

A number of habitat restoration projects, or projects with unquantifiable streamflow benefit were identified in WRIA 13. While several of these projects may produce a marginal offset benefit by increasing seasonal storage, the benefits were too small or too complex to estimate. In general, these projects increase stream complexity, reconnect floodplains, promote fish passage, and enhance natural processes that had been lost to the benefit of salmonids and other aquatic species. Projects defined in Table 8 have been developed to the concept level. Additional projects identified by the WRIA 13 committee are defined in Appendix H and could be completed during plan implementation. Projects are described in Table 9, and detailed project descriptions are included in Appendix I.



Table 9: Category II Projects in WRIA 13 that Primarily Provide Habitat Improvements

| Project Name              | Description                                                                                          | Subbasin        | Anticipated Ecological Benefit                          | Sponsor         | Estimated Cost <sup>60</sup> | Readiness to Proceed |
|---------------------------|------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------|-----------------|------------------------------|----------------------|
| Spurgeon Creek Re-meander | Channel re-alignment to increase channel length and sinuosity                                        | Spurgeon        | Floodplain connectivity;<br>Instream habitat complexity | Thurston County | \$<1M                        | High                 |
| Chambers Creek            | Channel re-alignment to increase channel length and sinuosity at the confluence with Chambers Ditch. | Lower Deschutes | Floodplain connectivity;<br>Instream habitat complexity | Thurston County | \$<1M                        | Medium               |
| Woodard Creek             | Add LWD and riparian vegetation                                                                      | Boston Harbor   | Floodplain connectivity;<br>Instream habitat complexity | Thurston County | \$<1M                        | Low                  |

<sup>60</sup> Costs are based on order of magnitude estimates

## 5.4 Categorical Projects and Prospective Projects

In addition to the projects described above, the plan identifies categorical projects and prospective projects that provide additional streamflow or habitat throughout the WRIA. These categorical projects do not have specific locations, but are supported by the Committee for future development.

### 5.4.1 Water Right Opportunities

In addition to the projects described in this chapter, the WRIA 13 Committee supports projects and actions that achieve the following goals:

1. Opportunities to address irrigation efficiencies and other conservation measures for water right holders. This may be accomplished through education, outreach, or incentive programs.
2. Acquisitions of water rights to increase streamflows and offset the impacts of PE wells. Water rights should be permanently and legally held by Ecology in the Trust Water Rights Program to ensure that the benefits to instream resources are permanent.
3. The WRIA 13 Committee acknowledges that all water rights transactions rely on willing sellers and willing buyers. The WRIA 13 Committee supports acquisition of all types of water rights, including municipal water rights. The WRIA 13 Committee recognizes the importance of water availability for farmers and the limited available water supply. The WRIA 13 Committee supports the acquisition of irrigation water rights if the properties underlying the water rights have access to an alternative water source that can be reliably supplied to the properties at rates no greater than that for the current irrigation occurring, or are otherwise agreeable to the property owner.
4. The WRIA 13 Committee recommends that opportunities for the above mentioned projects and actions be addressed through future feasibility studies, water right investigations, etc.
5. Prioritize subbasins where the highest needs for projects exist.

The WRIA 13 Committee acknowledges the need for project sponsors, technical assistance to manage complex studies, and future funding to adequately implement projects. Due to the uncertainties regarding the acquisition of water rights, the committee chose not to count the potential offsets from acquisitions during the plan analysis.

### 5.4.2 Forest Stand Age

The committee is interested in voluntary projects that involve forest conservation, forest land acquisition, carbon sequestration that can be demonstrated to have a streamflow benefit. If a project can demonstrate a streamflow benefit, it can be considered for providing an offset and

NEB benefit under the plan.<sup>61</sup> Due to uncertainties regarding forest management projects, the committee chose not to count the potential offset from this project during the plan analysis.

#### 5.4.3 Floodplain Restoration

The Committee is interested in restoring stream floodplain function, where appropriate. WRIA 13 floodplain restoration projects would address loss of groundwater storage, low flows and water quality conditions. The specific actions proposed for any given project would be specific to the restoration opportunity and habitat capacity of that location. The goal of any given project would be to rehabilitate natural hydrologic and geomorphic processes that are provided by floodplain connectivity. More detailed objectives pursuant to this goal would be specific to each respective project.

Projects will vary depending on the stream setting, habitat capacity, the impact that has occurred, and the corresponding opportunities for restoration. Potential floodplain restoration actions include the following:

- Channel re-alignment (i.e. re-meander),
- Removing bank protection,
- Installation of large wood to promote hyporheic and floodplain water storage
- Removal of fill or creation of inset floodplain (i.e. excavation of terraces),
- Side channel and off-channel feature reconnections, creation or enhancement.

Potential floodplain restoration locations were identified based on being unconfined, within a flood zone, and being vacant. Secondary considerations were given to locations that were on public land, and near tributary inflow (and therefore potentially prone to flooding).

A detailed project description is included in Appendix I. Due to uncertainties regarding floodplain restoration projects, the Committee chose not to count the potential offset from this project during the plan analysis.

#### 5.4.4 Small-scale LID Project Development

The Committee is interested in a programmatic project to strategically concentrate small-scale LID retrofit work in urbanized settings, partnering with residential and commercial community members to redirect runoff away from stormwater conveyance systems and into green stormwater infiltration facilities. In rural settings, efforts can explore additional opportunities to slow and infiltrate stormwater runoff that would otherwise rapidly discharge into nearby streams.

Thurston Conservation District has taken a leadership role on this project, and is committed to working with partners to identify and implement retrofit projects to benefit groundwater recharge. Project locations will be determined during implementation.

Potential benefits include recharge of shallow groundwater areas where other large-scale projects are not feasible, and water quality benefits to nearby streams which would otherwise receive untreated runoff. Additionally, these projects would directly engage residential and commercial partners to contribute to streamflow preservation. Due to uncertainties regarding these types of projects, the Committee chose not to count the potential offset from this project during the plan analysis.

## **5.5 Project Implementation Summary**

### **5.5.1 Summary of Projects and Benefits**

As specified in Chapter 4, this plan aims to offset 435 AFY of consumptive use from new PE wells over the planning horizon based on the “most likely” consumptive use estimate. This watershed plan also provides a higher consumptive use estimate of 513 AFY as a goal to achieve through adaptive management. The projects included in Table 7 provide an estimated offset of at least 1,346 acre-feet per year and exceed the consumptive use estimate. The projects included in Table 7 provide an estimated offset of 1,316 AFY and exceed both the “most likely” and higher adaptive management consumptive use estimates.

Out of the 9 subbasins identified by the Committee, 4 subbasins have anticipated project offsets that exceed both the most likely and higher consumptive use estimates; 1 subbasin has anticipated project offsets that do not meet either the most likely or the higher consumptive use estimate; and, 4 subbasins do not have any offset projects identified. However, to address a lack of projects in some subbasins, and to increase the likelihood of plan implementation and tracking progress, this watershed plan includes policy and regulatory recommendations and an adaptive management process (see Chapter 6).

Many habitat projects have been identified by the Committee for habitat benefits (Appendix H). Four of these projects have been described and are included in Table 9. Ecological benefits associated with these projects include floodplain restoration, wetland reconnection, availability of off-channel habitat for juvenile salmonids, increase in groundwater levels and baseflow, and increase in channel complexity. While many of these projects were selected by the Committee for their likelihood to provide potential streamflow benefits, this plan does not account for the water offset from habitat projects. The ecological and streamflow benefits from habitat projects are supplemental to the quantified water offsets.

### **5.5.2 Cost Estimate for offsetting new domestic water use over 20 Year Planning Horizon**

Per RCW 90.94.030(3)(d), this watershed plan must include an evaluation or estimation of the cost of offsetting consumptive use from new domestic PE wells over the subsequent twenty

years. To satisfy this requirement, this plan includes planning-level cost estimates for each of the water offset projects listed in Table 7. The plan also includes costs estimates for habitat projects in Table 8.

The total estimated cost for implementing the water offset projects listed and described in this chapter range is \$17.34 million, with projects ranging from \$2.8 million to \$6.31 million.

The total estimated cost for implementing the habitat projects listed and described in this chapter is \$3 million.

### **5.5.3 Certainty of Implementation**

The WRIA 13 Committee selected projects a likelihood of implementation and have support from project sponsors. As described in Chapter 6, the WRIA 13 Committee supports the development of an implementation group (see the Deschutes Watershed Council in section 6.1.10) to further develop projects. Additionally, Chapter 6 includes “assurance of implementation” language provided by many entities on the Committee. Priorities of this group may include working with project sponsors on project implementation, providing guidance for project monitoring, supporting development of feasibility studies, and supporting adaptive management. Additionally, this plan includes other adaptive management and policy recommendations to increase reasonable assurance that the projects and actions in the plan will be implemented.

# Chapter Six: Policy Recommendations, Adaptive Management, and Implementation

## 6.1 Policy and Regulatory Recommendations

RCW 90.94 lists optional elements committees may consider including in the plan to manage water resources for the WRIA or a portion of the WRIA (RCW 90.94.030(3)(f)). The WRIA 13 Committee included what they have termed “policy and regulatory recommendations” in the plan to show support for projects, programs, policies, and regulatory actions that would contribute to the goal of streamflow restoration. When similar concepts arose from multiple Watershed Restoration and Enhancement Committees, the WRIA 13 Committee coordinated with those other Committees to put forward common language for inclusion in the watershed plans, when appropriate. Coordination also occurred for jurisdictions that cross multiple watersheds. All projects and actions the WRIA 13 Committee intended to count toward the required consumptive use offset or Net Ecological Benefit are included in Chapter 5: Projects and Actions.<sup>62</sup> As recommended by the NEB Guidance, the WRIA 13 Committee prepared this watershed plan with the intention that it be implemented.<sup>63</sup>

The WRIA 13 Committee initially identified a list of potential policy and regulatory recommendations<sup>64</sup>. After iterative rounds of discussion, the Committee narrowed the recommendations in this section to those that both supported the goal of streamflow restoration and had the support of the full Committee. Unless otherwise specified, the proposed implementing entity is not obligated by this plan to implement the recommendation; however, the WRIA 13 Committee supports the recommendations and their implementation by the appropriate entity. Committee members identified as the implementing entity for each recommendation have indicated that they are committed to investigating the feasibility of the recommendation.<sup>65</sup> Additional information on assurance of implementation has been provided by many entities in section 6.3.2.

The Committee recommends that Lewis County be exempt from policy recommendations at this time because of the lack of PE well growth in the Lewis County portion of WRIA 13.

The WRIA 13 Committee supports the following recommendations, which are not listed in order of priority:

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<sup>62</sup> “New regulations or amendments to existing regulations adopted after January 19, 2018, enacted to contribute to the restoration or enhancement of streamflows may count towards the required consumptive use offset and/or providing NEB.” Streamflow Restoration Policy and Interpretive Statement, POL-2094

<sup>63</sup> Ecology’s interpretation, as articulated in the Streamflow Restoration Policy and Interpretive Statement (POL-2094), is that “RCW 90.94.020 and 90.94.030 do not create an obligation on any party to ensure that plans, or projects and actions in those plans or associated with rulemaking, are implemented.” (Ecology 2019a)

<sup>64</sup> Policy and adaptive management proposals provided by Committee members are included in the plan compendium. This chapter represents the recommendations that were agreed to by consensus.

<sup>65</sup> The identification and listing of these policy and regulatory recommendations is directly from the WRIA 13 Committee members and is not endorsed or opposed by the Washington State Department of Ecology.

# **1. Water Conservation and Drought Adaptation Education and Outreach**

## **Proposed implementing entity:**

Thurston Conservation District, potentially with support from WSU Extension and Thurston County.

## **Recommendations:**

- Develop educational materials and workshops for new or existing homeowners.
- Work with local nurseries to stock and label low water use native species for xeriscaping.
- Develop Irrigation Water Management Plans for agricultural producers and gardeners.
- Support development of a program to compensate agriculture producers for not using their full water rights, with conserved water to be temporarily placed into Trust Water Rights program.
- Support development of incentive program to upgrade outdated or inefficient irrigation systems.
- Include drought tolerance/water use efficiency as a factor in recommended tree lists.

## **Purpose:**

Promote water conservation in residential and agricultural sectors. Reduced leaching of nutrients into streams and water bodies due to over watering.

## **Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2

# **2. Drought Response Limits**

## **Proposed implementing entity:**

## **Ecology, Thurston County, and other organizations. Recommendations:**

Research the use of water from permit exempt wells during drought periods, and whether upon the issuance of a drought emergency order under RCW 43.83B.405, consider a language change to state that the withdrawal of groundwater exempt from permitting under RCW 90.44.050 “will” be limited to no more than 350 gallons per day per connection for indoor use only, instead of “may”. Consider including new exemptions for growing food, maintaining a fire control buffer, or supporting an environmental restoration project. Engage local stakeholders in considering this change. Consider developing or enhancing a County-wide drought response plan.

## **Purpose:**



Build resilience against climate change impacts (e.g., extreme heat, low precipitation, low flows). Protect Tribal Treaty rights and senior water rights. Support NEB goals for streamflow restoration.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2 Other possible sources of funding include funding allotted to Ecology under RCW 90.94 and potential reassignment of existing or future staff.

### **3. County Policies to Promote Connections to Group A Systems**

**Proposed implementing entity:**

Thurston County

**Recommendations:**

Research and review existing plans, policies, and ordinances to determine if there are opportunities to limit PE wells when Group A service is available.

**Purpose:**

Reduce the number of projected new PE wells, thereby reducing groundwater consumptive use and providing an offset safety factor.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2

### **4. Revolving Loan & Grant Fund for Small Public Water Systems**

**Proposed implementing entity:**

Ecology and Thurston County

**Recommendations:**

Investigate the feasibility of establishing and operating a revolving loan/grant fund to offset the costs of connecting to Group A public water systems. Funding would be available when the increased cost of connecting to a Group A system (instead of constructing a PE well) creates an economic barrier for applicants. Feasibility would be determined by criteria set for the provider and applicant (such as the availability of a sufficient water right; consistency with the relevant Water System Plan).

**Purpose:**

Reduce barriers to connecting to Group A systems, thereby reducing the number of projected new PE wells, reducing groundwater consumptive use, and providing an offset safety factor.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

## **5. South Sound Water Steward**

**Proposed implementing entity:**

Ecology, local governments, and other entities as appropriate.

**Recommendations:**

Ecology creates a new position of “South Sound Water Steward,” whose duties include:

- Monitoring instream flows, wells, and other relevant water bodies to support implementation of the watershed plans and compliance with state rules.
- Conducting ongoing education, outreach, and technical support for permit-exempt wells owners and water rights holders (especially as part of drought response).
- Providing technical advisement to Ecology during water rights decisions in the South Sound.
- Investigating and enforcing illegal water use issues, in accordance with current regulations for enforcement, in accordance with current regulations for enforcement.

As appropriate, the position would include legal authorities consistent with both a Water Master and a Ground Water Supervisor (RCW 90.03.060; 90.03.070; RCW 90.44.200; WAC Chapter 508-12). Duties would not conflict with existing Water Master staff at Department of Ecology Southwest Regional Office, but may build upon them for specific duties at the discretion of the Water Resources Southwest Regional Manager.

**Purpose:**

Supports compliance with water resources laws/regulations and Tribal Treaty rights. Consistent and effective implementation of watershed plans. Gives Ecology a visible and clear role for supporting plan implementation and compliance with state laws and regulations.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, reassignment of existing or future staff or other means. More funding information is available in Section 6.2.

## **6. Upgrade Well Reporting**

**Proposed implementing entity:**

Ecology

**Recommendations:**

- Develop interactive web-based well mapping and reporting tool for drillers.
- Require well coordinates on reports.
- Increase capacity for the Well Construction and Licensing Office at Ecology to vet well reports.

**Purpose:**

Improve well location data and access to it. Accurate well data is critical for monitoring and management of shared water resources throughout Washington. Streamline data collection process.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

**Additional information or resources:**

The full policy proposal is included in Appendix K.

## **7. Instream Flow Rules**

**Proposed implementing entities:**

Ecology; Washington State Legislature; local governments.

**Recommendations:**

- Investigate the WRIA 13 salmon streams and determine needed revisions to the WRIA 13 Instream Flow (ISF) Rule (WAC 173-513). Streams under review for instream flow revisions will be clearly represented to the public through maps in an accessible manner. Consider need to close streams in WRIA 13 with summer salmonid habitat (which could include: Upper Deschutes River, Middle Deschutes River, Lower Deschutes River, McLane Creek, Green Cove, Woodland Creek, Woodard Creek, Percival Creek, Adams Creek, and other associated tributaries and small coastal streams with salmonid habitat) annually in the low flow season (typically from June through October) and what effect it would have on growth in the watershed. This would apply to water rights that have a priority date after any changes made to the instream flow rule.
- Review other salmon streams without existing ISF between November and May and consider setting ISF levels using current methodology.
- Use the latest ISF assessment methodology to reassess ISF values for the Deschutes River below Deschutes Falls.
- Revise and add any other conditions consistent with the final watershed plan to the ISF rule.

**Purpose:**

Greater protection of aquatic resources, streamflows, Tribal Treaty water rights, and senior water rights from future water demands.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

## **8. Permit Exempt Well Withdrawal Limits**

**Proposed implementing entity:**

Ecology

**Recommendations:**

Research water use in WRIA 13 and PE well limits.

- Investigate actual indoor and outdoor domestic water use and compare to current legal limits and determine if a lower limit is appropriate. Consider allowing exceedance of limits if the outdoor water use is for food production, fire protection, or an environmental restoration project.

**Purpose:**

Benefits: reduces potential impact of new permit-exempt domestic wells. Limitations provide a “safety factor” by setting limits on PE well use based on good water conservation practices. This improves the net benefits of offset projects as they are completed to restore streamflows and protect senior water rights.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

## **9. Salmon Recovery Portal Project Tracking**

**Proposed implementing entity:**

WDFW in collaboration with Ecology, RCO, University of Washington data stewards, and WRIA 13 Committee.

**Recommendations:**

Pilot the [Salmon Recovery Portal](#), currently managed by Washington State Recreation and Conservation Office (RCO), for tracking streamflow restoration projects and new PE wells. WDFW would coordinate this effort—in collaboration with Ecology and the WRIA 13

Committee—and consult Lead Entity Coordinators prior to initial data uploads. University of Washington data stewards would perform data entry, quality assurance, and quality control.

**Purpose:**

- Coordinate streamflow restoration with ongoing salmon recovery efforts.
- Improve capacity to monitor implementation of streamflow restoration projects and actions.
- Build grant funding opportunities and track costs associated with streamflow restoration.
- Provide a template for adaptively managing emergent restoration needs.

**Funding source:**

WDFW, additional funding may be required.

**Additional information or resources:**

<https://srp.rco.wa.gov/>

## **10. Deschutes Watershed Council (DWC)**

**Proposed implementing entities:**

Deschutes Estuary Restoration Team (DERT); Tribes; local governments; other stakeholders (i.e. agricultural, residential construction, environmental interest representatives).

Interested members of the WRIA 13 Watershed Restoration and Enhancement Committee would reconvene to initiate the DWC, such as DERT, City of Tumwater, City of Olympia, City of Lacey, Thurston County, Thurston Conservation District, and the WRIA 13 Salmon Habitat Recovery Lead Entity Coordinator, and others.

**Recommendations:**

Convene a collaborative partnership that builds on successful models in other watersheds, uses science-based tools with demonstrated effectiveness, and stresses collaborative solutions that reduce conflict and avoid litigation Responsibilities could include:

- Formally implementing Plan recommendations.
- Identifying and implementing water quantity and quality management solutions on a regional scale that increase regional self-reliance, reduce conflict, and manage water to concurrently achieve social, environmental, and economic objectives.
- Incorporating adaptive management techniques to address climate change and other impacts.

**Purpose:**

The WRIA 13 Committee recommends creating a Deschutes Watershed Council (DWC) to (1) implement the plan; (2) provide a structure for collaboration on projects; (3) identify, recommend, and implement actions to offset impacts from new water right applications,

transfers, and changes, and other water use that impact streamflows; and (4) address water quality issues.

**Funding sources:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

**Additional information or resources:**

[Ecology – Deschutes River, Percival Creek, & Budd Inlet Tributaries TMDL Improvement Projects](#)

## **11. County Planning Study – Streamflow Restoration Effectiveness**

**Proposed implementing entity:**

Ecology or other department would contract a consultant to perform work.

**Recommendations:**

Conduct a study to compare planning and permitting policies/programs among Kitsap County, Pierce County, Thurston County, Mason County, and King County. Determine how effectively these policies/programs support protection and enhancement of streamflow restoration (e.g., through protection and enhancement of groundwater recharge). Evaluate (1) how and why county programs have been effective, and (2) gaps or areas where planning has been less effective. Propose strategies for improving rules to promote recharge enhancement and streamflow restoration.

**Purpose:**

Inform decision-making and improve planning/permitting to promote streamflow restoration.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

## **12. Water Supply Data for Comprehensive Water Planning**

**Proposed implementing entity:**

Ecology with support from counties, Department of Health, and potentially consultants.

**Recommendations:**

Collect, estimate, and/or project the following data and include in a future update of WRIA 13's Watershed Plan:

- Number of existing permit exempt domestic water wells and their water use

- All projected water usage for the next 20 years (i.e., PE wells, inchoate rights, new water rights).
- Number of municipal water supply connections expected in the next 20 years, by subbasin.
- Total number of existing PE wells by county.

Within the first five years of WRIA 13's Watershed Plan implementation, collect, estimate, and/or project the following for each subbasin:

- Total existing (2018 and earlier) connections in service using (1) unmitigated inchoate water rights; (2) mitigated inchoate water rights; or (3) PE wells.
- Total connections expected to be put into service in the next 20 years using (1) unmitigated inchoate water rights; (2) mitigated inchoate water rights; or (3) PE wells.

**Purpose:**

Provide robust information base for comprehensive water planning. Provide context for the Watershed Plan and its goals.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

### 13. Rainwater Collection - Education & Incentives

**Proposed implementing entity:**

Thurston Conservation District

**Recommendations:**

- Assurance from regulatory entities at all levels that rainwater collection is allowed under current DOE policy (Policy #1017).
- Rainwater collection design support at multiple scales of capacity, but only at scales allowed under current DOE policy. Design support through this policy is intended for PE well users only.\*
- Financial assistance for rainwater harvesting infrastructure, intended for PE well users only.\*

*\* The proposed limitations regarding eligible assisted community members would only apply to work performed as part of this policy and would not restrict the work of individual partners to provide support for rainwater collection across WRIA 13.*

**Purpose:**

Education and support around allowed uses of rainwater collection. Could help minimize flashy flows in some locations. Could reduce PE well usage, although reduction volumes are likely



minimal. Encourages a shift towards viewing water as a finite resource. Provides community members with a tangible—and practical—action to support water conservation efforts in their communities.

**Funding source:**

Funding is needed either through legislative appropriations, grants, pooling of resources by committee members and other stakeholders, or other means. More funding information is available in Section 6.2.

**Additional information or resources:**

Ecology’s clarification of rainwater collection with basic planning resources:

<https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-recovery-solutions/Rainwater-collection>

## **14. Water Conservation Statewide Policy**

**Proposed implementing entities:**

Ecology, Conservation Commission, Conservation Districts, and counties, with direction from legislature.

**Recommendations:**

The legislature consider authorizing and funding a statewide program of WRIA-based water conservation measures for domestic PE wells in unincorporated areas of the state during drought events. Measures would focus on Voluntary methods for efficient outdoor water use.

**Purpose:**

Reduce domestic PE well water usage across the state, and especially during drought declarations in affected WRIsAs. Reduce impacts on stream flows. Increase climate change resilience. Provide offset safety factor. Support NEB goals.

**Funding source:**

Potential funding sources could include: legislative budget line item providing additional allocations to Ecology and the Conservation Commission, to pass through to Conservation Districts and Counties.

## **15. Revise Thurston County Critical Areas Code Regarding Reclaimed Water Use**

**Proposed implementing entity:**

Thurston County

**Recommendations:**

- Consider changes to the Thurston County Critical Areas Ordinance, specifically the Critical Aquifer Recharge Areas regulations under TCC 24.10.190, 24.30.085, and

24.25.080, to allow for additional uses of reclaimed water. Thurston County's Critical Areas Ordinance currently does not permit large-scale infiltration of reclaimed water (defined as "application to the land's surface above agronomic rates").

- Review additional information from the Regional Groundwater Recharge Scientific Study (now known as LOTT's Reclaimed Water Infiltration Study) and other sources. Thurston County could reconsider this limitation in light of new state-level guidance and information from LOTT's pending study, which will be completed in 2021.

#### **Purpose:**

Allowing additional uses of reclaimed water would increase options for mitigating streamflows in unincorporated Thurston County, along with other potential benefits, by replenishing groundwater, augmenting streamflows, enhancing wetlands and other habitat, and offsetting the quantity of water that is withdrawn for other purposes.

#### **Funding:**

Funding is undetermined and needed through either grants, committee resources, Thurston County general funds, or other potential funding methods.

## **6.2 Plan Implementation and Adaptive Management**

The WRIA 13 Committee supports an adaptive management process for implementation of the WRIA 13 Watershed Plan. Adaptive management will help address uncertainty and provide more reasonable assurance for plan implementation.

The WRIA 13 Committee recommends tracking the growth of new PE wells and the total number of new building permits requiring a water connection in the watershed, as well as the projects and policies that were planned to offset the impacts of these PE wells. This data will allow the Committee to determine whether planning assumptions were accurate and whether adjustments to plan implementation are needed.

The WRIA 13 Committee makes the following recommendations:

### **6.2.1 Oversight**

The WRIA 13 Committee recommends creating a **Deschutes Watershed Council (DWC)** to (1) implement the watershed plan; (2) provide a structure for collaboration on projects; and (3) identify, recommend, and implement actions to offset impacts from new water right applications, transfers, and changes, and other water use that impact streamflows. The DWC would comprise of representatives interested in protecting, conserving, and restoring the Deschutes Watershed. For example, this would include the Squaxin Island Tribe; local governments; special purpose districts (taxing authority); businesses; non-profit conservation, land trust organizations, agricultural representatives, environmental interests, residential

construction industry; and other entities that participated in the WRIA 13 ]Committee; and key involvement from a diverse range of community members from across WRIA 13."

The DWC could address water quality and quantity issues by:

- Providing a **structure for collaboration** on projects to offset impacts to streamflow and changes in water quality.
- **Inventorying** existing (1) water quantity and quality regulations and (2) incentive-based and/or voluntary water protection and conservation programs.
- Identifying and implementing **regional water management solutions** that increase self-reliance, reduce conflict, and manage water to concurrently achieve social, environmental, and economic objectives.
- Evaluating and pursuing legislation for the development of **mitigation banks** to be used to offset impacts of future development of either permit-exempt wells or permit-required wells.
- Partner with Stream Team, or engage **community-based volunteer and education programs** to initiate a sense of place, ownership, and responsibility for the future of the Deschutes watershed.
- Specific tasks for DWC could include:
  - Support for review, revision, and prioritization for grant applications, to ensure consistency with the overall approach of the Plan
  - Tracking of offsets and the number of exempt well developments authorized by the counties, both by WRIA and by subbasin.
  - Reporting of Plan progress to Ecology, Committee members and the public.
  - Identification and development of long-term stable funding. The Plan proposes funding to provide capacity to the Lead Organization or Committee. The funding strategy is described in a separate proposal.
  - Development of a multi-party agreement that establishes membership, operating principles, and administration of the DWC.
  - Developing and maintaining the institutional knowledge needed to provide a continuing approach to implement over the long-term.
  - The long-term responsibility for Plan implementation.

## 6.2.2 Project Tracking

Counties should continue to track permit-exempt well construction. The WRIA 13 Committee also recommends tracking streamflow restoration projects to: (1) track status of implementation, including projects and other recommendations; (2) build grant funding

opportunities; (3) track project costs; and (4) provide a template for adaptively managing emergent restoration needs.

The WRIA 13 Committee recommends piloting the Washington State Recreation and Conservation Office's (RCO) [Salmon Recovery Portal \(SRP\)](#) to track Watershed Plan projects through planning and implementation phases. As a statewide tool administered by RCO in partnership with salmon recovery Lead Entities, the SRP provides a dynamic platform to track project offsets. SRP can set goals, create project hierarchy tiers, include supplemental information, and generate automated reports.

To support the implementation of the above pilot program for tracking projects under 90.94.030 RCW, the Washington Department of Fish & Wildlife (WDFW) has initiated pilot projects in two 90.94.020 RCW basins: the Nisqually River Basin (WRIA 11) and the Chehalis River Basin (WRIAs 22/23). These pilots are coordinated by WDFW in conjunction with RCO, Ecology, local Lead Entity Coordinators, and the Planning Units for WRIA 11 and WRIA 22/23. Intended as a proof of concept, these pilots are planned to explore the capacity and effectiveness of the SRP to track streamflow restoration projects.

Tracking of projects will begin with **two primary data entry phases**, shown in Table 9 below.

Table 10: Phases of Project Tracking Data Entry

| <b>Tasks:</b>          | <b>Phase 1:</b> Upload required project information for each project in Watershed Plan. | <b>Phase 2:</b> Upload/update all funded projects, project reports, and completed projects annually.       |
|------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Coordinator</b>     | WDFW                                                                                    | WDFW                                                                                                       |
| <b>Funding</b>         | WDFW, and other entities TBD.                                                           | WDFW, and other entities TBD.                                                                              |
| <b>Data entry</b>      | University of Washington data stewards in collaboration with RCO and Ecology            | University of Washington data stewards in consultation with RCO, Ecology Grant Management staff, and WDFW. |
| <b>Quality control</b> | University of Washington data stewards                                                  | University of Washington data stewards                                                                     |

Local salmon recovery Lead Entity Coordinators will be consulted prior to initial data uploads. At a minimum, the Committee recommends tracking the following **data points for each project**:

- WRIA
- Sub-basin
- Estimated cost
- Funding source
- Project description
- Target implementation date
- Project status (e.g., not started; in progress; completed)
- Project proponent (if applicable)
- Project spatial boundaries or coordinates
- Estimated water offset and/or habitat benefits

## 6.2.3 Monitoring and Research

In addition to monitoring project implementation as described above, the WRIA 13 Committee proposes the DWC plans and coordinates additional monitoring and research to improve water planning data, reduce uncertainty, and inform decision-making as the Plan is implemented. This additional information will support adjustments to the Watershed Plan to focus limited resources on the most significant problems and best solutions. Additional monitoring and research initiatives could include:

- Developing an overarching **Monitoring and Research Plan** as part of implementation.
- Monitoring all streams with Instream Flow Rule provisions.
- Improving regional groundwater data, maps, and models.
- Developing a program to monitor habitat and net ecological benefit (NEB).
- Monitoring of project implementation and effectiveness.

### Existing Monitoring Data

Multiple jurisdictions have operated, and continue to operate, monitoring and data collection programs throughout WRIA 13. The USGS operates gages on the Deschutes River at Rainier (since 1949) and at Tumwater (since 1938). Thurston County operates a weather network (11 stations), groundwater network (10 wells) and stream gaging network (7 gages) in the WRIA, some with continuous data extending back to the 1980s. The County also managed a volunteer lake level monitoring program that was active from 1990 through 2012 on Ward, Hewitt, Chambers, Hicks, Pattison, Long, Offut, Lawrence, and Summit lakes. The Stream Team (a cross-jurisdictional effort between Lacey, Olympia, Tumwater, and Thurston County) has collected volunteer Benthic Index of Biotic Integrity data on streams throughout the region since 1990.

A monitoring and research plan can include these sources of data, as well as any other credible sources of data. Surface water monitoring data in WRIA 13 is available from Thurston County, Ecology, and other entities.

### Annual Reporting & Adaptive Management

Using annual reports to identify trends and indicators, the Committee recommends that DWC take an adaptive management approach to implementing the WRIA 13 Watershed Plan.<sup>66</sup> The adaptive management provisions outlined below will also help determine whether projects are functioning as designed under climate change conditions and allow for course corrections as needed.

The Committee recommends requiring the following annual reports:

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<sup>66</sup> Adaptive Management is defined in the Net Ecological Benefit (NEB) Guidance as ‘an interactive and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions.’

- Counties provide reports to Ecology and DWC on PE well construction and connections, as well as the total number of new water connections.
- Project sponsors provide report to DWC on project status and estimated project offset amounts of completed projects.

The WRIA 13 Committee also recommends that Ecology's Streamflow Restoration grant guidance be revised to include a requirement that funded projects provide annual reports to Ecology.

Beginning the fifth year of implementation, DWC will compare the following by subbasin and summarize in a report to Ecology:

- Estimated consumptive use for permit exempt wells constructed during year (using the methodology designated in the WRIA 13 Watershed Plan).
- Estimated annual project offset amounts by subbasin.
- If sufficient project information is not available within the fifth year of implementation, reporting will be adjusted to accommodate project needs.

If the comparison report indicates that total project offset amounts are less than the cumulative total of new permit exempt well consumptive use amounts described in Chapter 4, the Committee recommends:

- DWC identifies opportunities to accelerate completion of offset projects in progress and includes an associated timeline for completion in report to Ecology.
- DWC works with local jurisdictions to consider additional strategies and actions.
- Ecology considers appropriate actions to protect senior water rights and support implementation of the plan

If the comparison report indicates that project offset amounts are exceeding the consumptive use offset targets identified in Chapter 4 as a higher estimate(513 AFY) to achieve through adaptive management (on an annual prorated basis), or if PE well growth is lower than predicted, Ecology could relax restrictions and make reporting cycles less frequent (e.g., every other year).

## 6.2.4 Funding

Funding is critical to implementing the WRIA 13 Watershed Plan and achieving its goals. Based on funding estimates from other watershed groups, the Committee recommends that an amount not exceeding \$200,000 annually could be needed to establish and maintain the Deschutes Watershed Council (which will implement tasks described in sections 1-4 above). Funding described in this section is for oversight, monitoring, and tracking of implementation and does not reflect funding needs for implementation of projects discussed in Chapter 5. Recommended investigation of funding strategies include:

- **Increase permit exempt well fees.** Consider an equitable approach to increasing the existing well fee based on impact to groundwater and needs of plan.
- **Request sustainable funding from the Washington State Legislature.** Funding would be available statewide to WRIAs with a plan or Rule under RCW 90.94. Activities prioritized for funding could include oversight; monitoring and research; education, outreach, and technical assistance; and reporting. The Committee recommends a dedicated fee (e.g., an annual fee on permit exempt wells as part of annual property tax assessments) rather than reliance on the general fund.
- **Other funding methods.** Research additional options for funding to implement the WRIA 13 plan that could include programs, optional mitigation, or other funding methods.

Additional sources of funding could include grants, DWC member cost-sharing or fees, and/or DWC service revenues.

## 6.3 Other Issues

### 6.3.1 Summary of Legislative Requests

Legislative funding is requested for all recommendations except 6.1.9.

### 6.3.2 Assurance of Plan Implementation

WRIA 13 Committee members and participating entities strongly advocate for implementation of the watershed plan. Members of the Committee provided the following statements of assurance of their commitment to plan implementation.

- **Department of Ecology**
  - Ecology follows NEB Guidance and RCW 90.94.030 provisions in reviewing the watershed plan and considering plan adoption.
  - Ecology administers the 90.94 Grant Program, giving priority evaluation points to projects included in WRIA plans, and updating grant guidance as needed to better support plan implementation.
  - Ecology considers watershed plan recommendations and investigates the feasibility of actions and recommendations where Ecology is identified as the lead.
  - Ecology reports to the legislature on the status of the watershed plan implementation in 2020 and 2027.
- **Squaxin Island Tribe**
  - The Squaxin Island Tribe supports and participates in implementation activities as staff capacity allows, including:



- Participating in implementation group meetings.
  - Coordination between meetings, including:
    - Supporting project development and seeking project opportunities
    - Seeking and supporting funding opportunities to achieve implementation
    - Tracking implementation and identifying areas for improvement
- **Lewis County**
  - Lewis County adopts this watershed plan by resolution, formalizing our support of the plan contents.
  - This watershed plan becomes one of the guiding project implementation plans.
  - Lewis County supports and participates in implementation activities as staff capacity allows, including:
    - Participating in implementation group meetings.
    - Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
- **Thurston County**
  - Thurston County will adopt this watershed plan by resolution, formalizing our support of the plan contents once the plan has been approved by Ecology.
  - This watershed plan will become one of the guiding documents for Thurston County community planning work, including implementation of the Comprehensive Plan and related plans.
  - Thurston County will evaluate the relationship of identified projects within the watershed plan with the Thurston County Capital Improvement Program, seeking potential for overlap in funding opportunities.
  - Thurston County supports and participates in implementation activities as staff capacity allows, including:
    - Participating in implementation group meetings.
    - Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
      - Tracking implementation and identifying areas for improvement
- **Thurston PUD**
  - Thurston PUD supports and participates in implementation activities as staff capacity allows, including:
    - Participating in Implementation meetings
    - Communications with internal and external stakeholders

- o Support project development and management
- **Thurston Conservation District**
  - The Thurston Conservation District supports and participates in implementation activities as staff capacity allows, including:
    - o Participating in implementation group meetings.
    - o Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
- **Building Industry Association of Washington (BIAW)**
  - BIAW supports and participates in implementation activities as staff capacity allows, including:
    - o Participating in implementation group meetings.
    - o Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
      - Tracking implementation and identifying areas for improvement
- **City of Lacey**
  - The City of Lacey supports and participates in implementation activities as staff capacity allows, including:
    - o Participating in implementation group meetings.
    - o Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
      - Tracking implementation and identifying areas for improvement
  - The City of Lacey adopts this watershed plan by resolution, formalizing our support of the plan contents.
- **City of Olympia**
  - The City of Olympia supports and participates in implementation activities as staff capacity allows, including:
    - o Participating in implementation group meetings.
    - o Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
      - Tracking implementation and identifying areas for improvement
  - The City of Olympia participates on the Nisqually Watershed Council and intends to participate on the Deschutes Watershed Council when formally established.

- The City of Olympia engages in regional water resource management activities when consistent with the City’s authority and regulations, and jurisdictional interests, thereby providing support to other entities’ efforts when appropriate.
  
- **City of Tumwater**
  - The City of Tumwater supports and participates in implementation activities as staff capacity allows, including:
    - Participating in implementation group meetings.
    - Coordination between meetings, including:
      - Supporting project development and seeking project opportunities
      - Seeking and supporting funding opportunities to achieve implementation
      - Tracking implementation and identifying areas for improvement
  - The City of Tumwater intends to participate on the Deschutes Watershed Council when formally established.
  - The City of Tumwater engages in regional water resource management activities when consistent with the City’s authority and regulations, and jurisdictional interests, thereby providing support to other entities’ efforts when appropriate.
  
- **Deschutes Estuary Restoration Team (DERT)**
  - DERT supports and participates in implementation activities as staff capacity allows, including:
    - Inform other interested and affected environmental organizations in WRIA 13 of its provisions, and the extent to which the plan conforms to the letter and spirit of the legislation;
    - Advocate at the Legislature for authorization and funding for the Deschutes Watershed Council;
    - Participate in the activities of the Deschutes Watershed Council, including implementation of projects and policies contained in the Plan;
    - Advocate with Ecology for adoption of rule revisions for WRIA 13 if recommended in the Plan;
    - Advocate with Ecology and the Legislature for greater prioritization in Ecology's grant program for priority projects identified in the Plan;
    - Work with the Squaxin Tribe and other representatives to the WREC, to ensure better information and collaborative efforts for restoration of the watershed; and
    - Consistent with DERT's mission for the past ten years, and as a Puget Soundkeeper Affiliate, work for restoration of the Deschutes Estuary, and for improvement of both water quantity and water quality conditions in the Deschutes Watershed.

# Chapter Seven: Net Ecological Benefit

## 7.1 Introduction to NEB

Watershed Restoration and Enhancement Plans must identify projects and actions to offset the potential consumptive impacts of new permit-exempt (PE) domestic groundwater withdrawals on instream flows over 20 years (2018-2038), and provide a net ecological benefit (NEB) to the WRIA. The WRIA 13 Committee chose to include an NEB evaluation to reflect the local expertise of the partners who contributed to developing this watershed plan. Upon approval of a watershed plan, Ecology must then determine that the plan's recommended streamflow restoration projects and actions will result in an NEB to instream resources within the WRIA after accounting for projected use of new permit-exempt domestic wells over the 20 year period of 2018-2038.<sup>67</sup>

The Final NEB Guidance establishes Ecology's interpretation of the term "net ecological benefit" as "the outcome that is anticipated to occur through implementation of projects and actions in a [watershed] plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary" (Ecology 2019).

The Final NEB Guidance sets Ecology's expectation for the NEB evaluation:

- "Planning groups are expected to include a clearly and systematically articulated NEB evaluation in the watershed plan" (Ecology 2019).
- "A watershed plan that includes a NEB evaluation based on this [Final NEB] guidance significantly contributes to the reasonable assurances that the offsets and NEB within the plan will occur. Ecology will review any such [watershed] plan with considerable deference in light of the knowledge, insights, and expertise of the partners and stakeholders who influenced the preparation of their [watershed] plan. Ecology will make the NEB determination as part of this review" (Ecology 2019).

The WRIA 13 Committee completed a NEB evaluation for this watershed plan; the results of that evaluation are included in this chapter.

## 7.2 Consumptive Use and Water Offsets

This plan uses medium population growth forecasts for Thurston County to project a total of 2,616 new PE wells installed within WRIA 13 during the planning horizon.

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<sup>67</sup> RCW 90.94.030(3)(c) states that "prior to adoption of the watershed restoration and enhancement plan, the department must determine that actions identified in the plan, after accounting for new projected uses of water over the subsequent twenty years, will result in a net ecological benefit to instream resources within the water resource inventory area".

The WRIA 13 Committee has determined that an area of 0.10 irrigated acres result in the most likely outdoor consumptive use estimate of 435 AFY (0.6 cfs) for WRIA 13, and will be used as the target offset to compare to offsets from projects. A higher consumptive use estimate to achieve through adaptive management of 513 AFY (0.7 cfs) was also established by the Committee and was developed assuming an average irrigated area of 0.12 acres per well. More information on methods to estimate the number of new PE wells and consumptive use can be found in Chapter 4 and Appendix H.

The projects identified in this plan are consistent with the project type examples listed in the Final NEB Guidance: (a) water right acquisition offset projects; (b) non-acquisition water offset projects; and (c) habitat and other related projects (Ecology 2019b). Offset projects focus on stormwater infrastructure and infiltration, off-channel reconnection, water right acquisition, and Managed Aquifer Recharge (MAR).

This plan estimates a total potential water offset of 1,900 AFY from five water offset projects or project types (described in Chapter 5 and listed in Table 11). However, to account for uncertainty in the likelihood of projects being built and the estimated benefits being realized (including the timing of streamflow benefits), the Committee chose to exclude estimates of water offsets for some projects, and to reduce the estimates for other projects, resulting in a more conservative potential water offset of 1,316 AFY. This more conservative estimate suggests a WRIA-wide surplus offset of 881 AFY above the consumptive use offset target and a surplus of 803 AFY above the adaptive management goal set by the Committee.

Table 11: Summary of WRIA 13 Water Offset Projects included in NEB analysis

| Project Name                                                       | Subbasin(s)                                                                            | Project Short Description                                                                                                                                      | Estimated Offset Benefits (AFY) | Offset Claimed by WRIA 13 Committee (AFY) | Timing of Benefits <sup>68</sup> | Project Stage |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------|----------------------------------|---------------|
| Schneiders Prairie Off-Channel Connection                          | <b>Deschutes Lower</b>                                                                 | Off-channel reconnection and infiltration                                                                                                                      | 681                             | 681                                       | May-October                      | Conceptual    |
| Donnelly Drive Infiltration Galleries                              | <b>Deschutes Lower</b>                                                                 | Improve neighborhood stormwater infiltration, avoiding surcharge and runoff to Chambers Ditch.                                                                 | 14                              | 14                                        | Year-round                       | Conceptual    |
| Deschutes/ Chambers MAR Projects                                   | <b>Deschutes Lower, Deschutes Middle, Deschutes Upper, Cooper Point, Boston Harbor</b> | Several candidate locations for MAR by diverting Deschutes River water during high flow periods when minimum instream flows and ecological flows are exceeded. | 909                             | 325                                       | Year-round                       | Conceptual    |
| Hicks Lk Water Stormwater Retrofit                                 | <b>Woodland Creek</b>                                                                  | Retrofit surface water facility for infiltration and additional stormwater treatment - flow attenuation                                                        | 296                             | 296                                       | Year-round                       | Conceptual    |
| <b>WRIA 13 Total Water Offset</b>                                  |                                                                                        |                                                                                                                                                                | <b>1,900</b>                    | <b>1,316</b>                              |                                  |               |
| <b>WRIA 13 “Most Likely” Consumptive Use Estimate</b>              |                                                                                        |                                                                                                                                                                | <b>435</b>                      |                                           |                                  |               |
| <b>WRIA 13 Higher Adaptive Management Consumptive Use Estimate</b> |                                                                                        |                                                                                                                                                                | <b>513</b>                      |                                           |                                  |               |

<sup>68</sup> The WRIA 13 Committee agreed that for the purposes of this watershed plan, the critical flow period will be defined as May-October.

Projected future consumptive water use and the estimated project water offset quantities that the Committee agreed to use during the NEB evaluation are compared at the subbasin scale in Table 12. When compared to both the most likely and higher adaptive management consumptive use estimates, a surplus water offset is achieved in four subbasins (Lower, Middle and Upper Deschutes; and Woodland Creek) and a deficit in water offset in the other five subbasins (Boston Harbor, Cooper Point, Johnson Point, McLane, and Spurgeon Creek).

Chapter 90.94 RCW allows for an uneven distribution of the offset project amounts relative to anticipated consumptive water use, provided the plan overall will lead to a NEB. As is evident in Table 12, the benefits associated with offset projects far exceeds the most likely consumptive use in the Deschutes (Upper, Middle, Lower) and Woodland subbasins, and the surplus water offsets are large (between 74 – 632 AFY). Among the subbasins with water offset deficits, Johnson point had the largest predicted water deficit of -86 AFY and no water offset projects have been identified. The remaining subbasins had much smaller deficits than the surpluses in all surplus subbasins.

The subbasins in surplus and deficits are the same when compared to the higher consumptive use estimate described in this watershed plan as a goal to achieve through adaptive management at the WRIA-scale, shown in Table 12. The benefits associated with offset projects far exceeds the anticipated consumptive use in the Deschutes (Upper, Middle, Lower) and Woodland subbasins, and the surplus water offsets are large (between 73 – 621 AFY). Among the subbasins with water offset deficits, Johnson point had the largest predicted water deficit of -102 AFY and no water offset projects have been identified. The remaining subbasins had much smaller deficits than the surpluses in all surplus subbasins

The water offset projects listed in Table 12 provide additional benefits to instream resources beyond those necessary to offset the impacts from new consumptive water use within the WRIA. For the project types planned in WRIA 13, additional benefits could include the following:

- Schneiders Prairie Off-Channel Connection: Off-channel habitat for juvenile salmonids and other aquatic life will be restored and made accessible, with fish ingress and egress. Off-channel habitat will be particularly beneficial to coho salmon. Increased groundwater seepage into the Deschutes River from this project will increase flow and provide cool water during the critical period (i.e. late summer and early fall), benefitting multiple species.
- habitat improvements during key seasonal periods; increased hydration of wetlands and headwaters; increased groundwater recharge; reduction in summer/fall stream temperature; increased groundwater availability to riparian and near-shore plants; and/or contribution to flood control. Improvements to water quality may also occur as a result of infiltration.



Table 12: Subbasin Water Offset Totals Compared to Permit-Exempt Well Consumptive Use Estimate

| Subbasin             | Offset Project Totals Claimed by the Committee (AFY) <sup>69</sup> | Permit-Exempt Well Most Likely Consumptive Use (AFY) | Surplus/Deficit from Most Likely CU Estimate (AFY) <sup>70</sup> | Higher Adaptive Management Consumptive Use Estimate (AFY) | Surplus/Deficit from Higher Adaptive Management CU Estimate (AFY) |
|----------------------|--------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------|
| Boston Harbor        | 0                                                                  | 49                                                   | -49                                                              | 58                                                        | -58                                                               |
| Cooper Point         | 7                                                                  | 39                                                   | -32                                                              | 45                                                        | -38                                                               |
| Deschutes Lower      | 695                                                                | 63                                                   | +632                                                             | 74                                                        | +621                                                              |
| Deschutes Middle     | 238                                                                | 122                                                  | +116                                                             | 144                                                       | +94                                                               |
| Deschutes Upper      | 79                                                                 | 5                                                    | +74                                                              | 6                                                         | +73                                                               |
| Johnson Point        | 0                                                                  | 86                                                   | -86                                                              | 102                                                       | -102                                                              |
| McLane               | 0                                                                  | 27                                                   | -27                                                              | 32                                                        | -32                                                               |
| Spurgeon Creek       | 0                                                                  | 15                                                   | -15                                                              | 18                                                        | -18                                                               |
| Woodland Creek       | 296                                                                | 28                                                   | +268                                                             | 33                                                        | +263                                                              |
| <b>WRIA 13 Total</b> | <b>1,316</b>                                                       | <b>435</b>                                           | <b>+881</b>                                                      | <b>513</b>                                                | <b>+803</b>                                                       |

<sup>69</sup> 1 acre foot per year is equivalent to 0.0014 cfs, or 892.74 gallons per day

<sup>70</sup> Surplus water offset is associated with a positive value and a deficit in water offset is associated with a negative value. This column represents the difference between the project offset total and the offset target (estimated consumptive use in the subbasin).

## 7.3 Habitat Benefits

The WRIA 13 plan includes an inventory of additional projects to meet the offset needs and NEB for the watershed. Table 13 summarizes the benefits of five habitat improvement projects as shown in Figure 5, Chapter 5 and described in further detail in Chapter 5 and Appendix I. While several of these projects may produce a marginal offset benefit by increasing seasonal storage, the benefits were too small and too complex to estimate. In general, these projects increase stream complexity, reconnect floodplains, improve fish passage, and enhance natural processes that had been lost to the benefit of salmonids and other aquatic species. Additional habitat projects that are less developed are listed in the Project Inventory in Appendix J.

WRIA 13 provides an important and productive system for endangered and threatened Puget Sound salmonids. All of the subbasins in the WRIA support some life phase of one or more species. Anadromous salmonid spawning occurs from Tumwater Falls to Deschutes Falls. The habitat projects in Table 13 address many of the salmonid limiting factors described in Chapter 2.1.3, including:

- natural stream ecological processes have been significantly altered due to adjacent land management practices and direct actions within the stream corridor,
- fine sediment (<.85 mm) levels in the stream gravels regularly exceed the <12% level identified as representing suitable spawning habitat,
- lack of adequate large woody debris in streams, particularly larger key pieces that are critical to developing pools, log jams, and other habitat components important to salmonids,
- lack of adequate pool frequency and large, deep pools that are important to rearing juvenile salmonids and adult salmonids on their upstream migration,
- naturally high rates of channel movement in this geologically young basin, but further exacerbated rate of streambank erosion and substrate instability due to loss of streambank and riparian integrity, and alteration of natural hydrology,
- loss of riparian function due to removal/alteration of natural riparian vegetation, which affects water quality, lateral erosion, streambank stability, instream habitat conditions, etc.,
- significant alterations to the natural stream hydrology in streams where the uplands have been heavily developed, and the threat of similar impacts to streams that are experiencing current and future development growth.

The Schneider's Prairie project would provide off-channel rearing habitat during the winter period, when the inlet channel and wetland area is inundated. This habitat would primarily

benefit coho salmon. Seepage back to the Deschutes River during the summer and early fall would benefit all fish species by providing cool water and increasing flows.

The Woodard Creek, Chambers Creek, and Spurgeon Creek projects will provide similar ecological benefits. Improvements to riparian condition will increase shade, bank stability, large woody debris loading, and fish cover. Increasing shade will lessen warming of stream water temperatures. Lower water temperatures have a greater saturation potential for dissolved oxygen, which is beneficial for salmonids, in general. Improving bank stability will reduce bank erosion and substrate embeddedness, which increases suitability for salmonid spawning habitat and macroinvertebrate communities (salmonid prey items). Increased bank stability, increased large woody debris loading, and reduced fine sediment inputs will all contribute to increased pool frequency and quality. Increased floodplain connectivity will attenuate flood flows and store water in the floodplain soils for slow release back to the stream over the course of days to months. This local storage will contribute to improving the flow regime and flow quantity.

Table 13: Summary of WRIA 13 Habitat Improvement Projects included in NEB Analysis

| Project Name and Brief Description                                                                                                                                                                                                                                           | Subbasin        | Anticipated Ecological Benefit(s)                                                                                                                               | Project Stage |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Woodard Creek – Additional of large woody debris and riparian vegetation, and floodplain reconnection along middle Woodard Creek.                                                                                                                                            | Boston Harbor   | Floodplain connectivity, instream habitat complexity                                                                                                            | Conceptual    |
| Spurgeon Creek Remeander Project - Restore wetland conditions to upper Spurgeon Creek by filling ditch, creating microtopography, installing large wood and planting area with native species. Spurgeon Creek is a priority tributary to the Deschutes. Funded by PSAR 2016. | Spurgeon Creek  | Floodplain connectivity, instream habitat complexity                                                                                                            | Design        |
| Chambers Creek Channel realignment to increase channel length and sinuosity at confluence with Chambers Ditch                                                                                                                                                                | Lower Deschutes | Floodplain connectivity, instream habitat complexity                                                                                                            | Conceptual    |
| General floodplain reconnection/restoration projects – Identify project opportunities in WRIA 13                                                                                                                                                                             | All             | Increase floodplain function and connectivity and local aquifer storage; increase usable aquatic habitat area; increase fish cover; increase habitat complexity | Conceptual    |

## 7.4 Uncertainty and Adaptive Management

The Committee identified a number of challenges related to plan implementation, described in Chapter 6. These challenges include uncertainty in growth projections, uncertainty in consumptive use estimates, uncertainty in offset quantities associated with specific project types, uncertainties associated with project implementation, future effects of climate change, and other factors. The Committee has recommended adaptive management measures in Chapter 6 of the plan for the purpose of addressing uncertainty in plan implementation. Adaptive management measures include PE well tracking, offset and habitat project implementation tracking, and periodic watershed plan implementation reporting, with recommended adjustments to the plan.

These measures, in addition to the project portfolio and associated benefits described in Chapter 5, increase the resiliency of the plan and increase the certainty that sufficient additional water from projects is available to achieve NEB. The Committee supports focusing implementation efforts on projects identified in this plan, as well as where there is the most need for offsets by subbasin.

Conservative estimates of PE well growth and consumptive use have been applied at multiple levels in this plan as a precaution, and to add certainty that the project portfolio is adequate to meet offset targets and address factors limiting salmonid survival in the watershed. Furthermore, the Committee has discounted the estimates of calculated offset benefits for projects in the project portfolio. The conservative estimates of both consumptive use and estimated project offsets also help ensure that streams will see flow benefits despite uncertainties associated with project implementation.

## 7.5 NEB Evaluation Findings

This watershed plan provides projects that, if implemented, can offset 435 AFY as the “most likely” estimate of new consumptive water use in WRIA 13, and can offset a higher consumptive use estimate as a goal to achieve through adaptive management of 513 AFY. This watershed plan sets goals of achieving offsets through a total of four projects or project types with estimated offset quantities (one project includes eight quantified MAR offsets) with a cumulative offset projection of 1,316 AFY, WRIA-wide. This projected total water offset yields a surplus offset of 881 AFY above the most likely consumptive use estimate of 435 AFY in WRIA 13, and a surplus of 803 AFY above the higher consumptive use estimate as a goal to achieve through adaptive management.

The surplus offsets, additional habitat restoration projects, adaptive management measures, and the conservative approach to estimating both project offsets and consumptive use offset targets increase the certainty that sufficient additional water from projects is available to achieve NEB by protecting, restoring and enhancing streamflows in WRIA 13.

Although the project portfolio will meet offset targets on a WRIA-scale, much of the water offset projects in WRIA 13 will benefit the Deschutes Lower, Deschutes Middle, Deschutes Upper, and Woodland Creek subbasins. Water offsets in the upper and middle subbasins will also benefit the lower subbasin. The Hicks Lake stormwater retrofit project will provide water offsets to Hicks Lake, which is the headwaters to Woodland Creek. This project will benefit the entire tri-lakes and Woodland Creek system. The Johnson Point subbasin has the largest offset deficit of 86 AFY and does not have any offset projects identified for the subbasin. However, there are a very limited number of salmon-bearing streams in the Johnson Point subbasin, and the significant benefits in several of the other subbasins and at the WRIA-scale outweigh the deficit.

At the WRIA-scale, the consumptive use impact has been met with water offsets, with a large surplus. However, additional water offsets are desirable in the Boston Harbor, Cooper Point, Johnson Point, McLane, and Spurgeon Creek subbasins, because there are water offset deficits in these subbasins. These water offsets may be met by projects defined during plan implementation. For example, suitable water right acquisition, MAR, stormwater retrofit, or floodplain restoration projects may be identified and developed to meet these deficits that are currently defined.

Within this plan, water offset projects are complimented by a total of four habitat improvement projects, which provide numerous additional benefits to aquatic habitat. While many of these habitat improvement projects have potential streamflow benefits, the Committee excluded any associated water offset from the plan's accounting. Additional programmatic actions as described in Chapters 5 and 6 are dependent on funding and include exploration of water right opportunities, a Water Conservation and Drought Education and Outreach Program, drought response limits, Thurston County policies to promote connections to Group A Systems, a recommendation to update the Ecology Well Log Database, a new Ecology staff position serving as South Sound Water Steward, instream flow rule revisions, permit-exempt well withdrawal limits, Salmon Recovery Portal project tracking, a collaborative Deschutes Watershed Council, and the potential establishment of a revolving loan and grant fund to offset costs of connecting to Group A public water systems. These programmatic actions could result in some water offsets, if they were developed during plan implementation.

The Committee has additionally recommended adaptive management measures, as described above and in Chapter 6, to provide reasonable assurance that the plan will adequately address new consumptive use impacts anticipated during the planning horizon, despite inevitable challenges that will arise during project implementation, operation, and maintenance.

This WRIA 13 watershed plan describes projects, which if implemented as intended, can offset the anticipated new consumptive use over the planning horizon and achieve NEB. The WRIA 13 Committee developed the WRIA 13 watershed plan to the best of the Committee's ability given the

limitations of the timeline and resources. The Committee developed the watershed plan to meet NEB, and as this chapter describes, the watershed plan provides ecological benefits in many ways. The WRIA 13 Committee is leaving the final NEB determination to Ecology.



# Appendices

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## WRIA 13 Deschutes Watershed

Final Draft Plan  
January 2021

## Appendix A – References

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## Appendix B – Glossary

| Acronym | Definition                                 |
|---------|--------------------------------------------|
| AE      | Application Efficiency                     |
| AFY     | Acre-Feet per Year                         |
| CFS     | Cubic Feet per Second                      |
| CU      | Consumptive Use                            |
| CUF     | Consumptive Use Factor                     |
| GPD     | Gallons per Day                            |
| GIS     | Geographic Information System              |
| IR      | Irrigation Requirements                    |
| LID     | Low Impact Development                     |
| LIO     | Local Integrating Organization             |
| MAR     | Managed Aquifer Recharge                   |
| NEB     | Net Ecological Benefit                     |
| PE      | Permit-Exempt                              |
| RCW     | Revised Code of Washington                 |
| WDFW    | Washington Department of Fish and Wildlife |
| WRIA    | Water Resource Inventory Areas             |

**Acre-feet (AF):** A unit of volume equal to the volume of a sheet of water one acre in area and one foot in depth. ([USGS](#))

**Adaptive Management:** An iterative and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions. ([NEB](#))

**Annual Average Withdrawal:** [RCW 90.94.030](#) (4)(a)(vi)(B) refers to the amount of water allowed for withdrawal per connection as the annual average withdrawal. As an example, a homeowner could withdraw 4,000 gallons on a summer day, so long as they did not do so often enough that their annual average exceeds the 950 gpd.

**Beaver Dam Analogue (BDA):** BDAs are man-made structures designed to mimic the form and function of a natural beaver dam. They can be used to increase the probability of successful beaver translocation and function as a simple, cost-effective, non-intrusive approach to stream restoration. ([From Anabran Solutions](#))

**Critical Flow Period:** The time period of low streamflow (generally described in bi-monthly or monthly time steps) that has the greatest likelihood to negatively impact the survival and recovery of threatened or endangered salmonids or other fish species targeted by the planning group. The planning group should discuss with Ecology, local tribal and WDFW biologists to determine the critical flow period in those reaches under the planning group's evaluation. ([NEB](#))

**Cubic feet per second (CFS):** A rate of the flow in streams and rivers. It is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second (about the size of one archive file box or a basketball). ([USGS](#))

**Domestic Use:** In the context of Chapter [90.94 RCW](#), "domestic use" and the withdrawal limits from permit-exempt domestic wells include both indoor and outdoor household uses, and watering of a lawn and noncommercial garden. ([NEB](#))

**ESSB 6091:** In January 2018, the Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 in response to the Hirst decision. In the [Whatcom County vs. Hirst, Futurewise, et al. decision](#) (often referred to as the "Hirst decision"), the court ruled that the county failed to comply with the Growth Management Act requirements to protect water resources. The ruling required the county to make an independent decision about legal water availability. ESSB 6091 addresses the court's decision by allowing landowners to obtain a building permit for a new home relying on a permit-exempt well. ESSB 6091 is codified as Chapter [90.94 RCW](#). ([ECY](#))

**Evolutionarily Significant Unit (ESU):** A population of organisms that is considered distinct for purposes of conservation. For Puget Sound Chinook, the ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound and the Strait of Georgia. Also, Chinook salmon from 26 artificial propagation programs. ([NOAA](#))

**Foster Pilots and Foster Task Force:** To address the impacts of the 2015 Foster decision, Chapter [90.94 RCW](#) established a Task Force on Water Resource Mitigation and authorized the Department



of Ecology to issue permit decisions for up to five water mitigation pilot projects. These pilot projects will address issues such as the treatment of surface water and groundwater appropriations and include management strategies to monitor how these appropriations affect instream flows and fish habitats. The joint legislative Task Force will (1) review the treatment of surface water and groundwater appropriations as they relate to instream flows and fish habitat, (2) develop and recommend a mitigation sequencing process and scoring system to address such appropriations, and (3) review the Washington Supreme Court decision in *Foster v. Department of Ecology*. The Task Force is responsible for overseeing the five pilot projects. ([ECY](#))

**Four Year Work Plans:** Four year plans are developed by salmon recovery lead entities in Puget Sound to describe each lead entity's accomplishments during the previous year, to identify the current status of recovery actions, any changes in recovery strategies, and to propose future actions anticipated over the next four years. Regional experts conduct technical and policy reviews of each watershed's four year work plan update to evaluate the consistency and appropriate sequencing of actions with the Puget Sound Salmon Recovery Plan. ([Partnership](#))

**Gallons per day (GPD):** An expression of the average rate of domestic and commercial water use. 1 million gallons per day is equivalent to 1.547 cubic feet per second.

**Group A public water systems:** Group A water systems have 15 or more service connections or serve 25 or more people per day. Chapter [246-290 WAC](#) (Group A Public Water Supplies), outlines the purpose, applicability, enforcement, and other policies related to Group A water systems. (WAC)

**Group B public water systems:** Group B public water systems serve fewer than 15 connections and fewer than 25 people per day. Chapter [246-291 WAC](#) (Group B Public Water Systems), outlines the purpose, applicability, enforcement, and other policies related to Group B water systems. (WAC)

**Growth Management Act (GMA):** Passed by the [Washington Legislature](#) and enacted in 1990, this act guides planning for growth and development in Washington State. The act requires local governments in fast growing and densely populated counties to develop, adopt, and periodically update comprehensive plans.

**Home:** A general term referring to any house, household, or other Equivalent Residential Unit. ([Policy and Interpretive Statement](#))

**Hydrologic Unit Code (HUC):** Hydrologic unit codes refer to the USGS's division and sub-division of the watersheds into successively smaller hydrologic units. The units are classified into four levels: regions, sub-regions, accounting units, and cataloging units, and are arranged within each other from the largest geographic area to the smallest. Each unit is classified by a unit code (HUC) composed of two to eight digits based on the four levels of the classification in the hydrologic unit system (two digit units are largest and eight digits are smallest). ([USGS](#))

**Impact:** For the purpose of streamflow restoration planning, impact is the same as new consumptive water use (see definition below). As provided in Ecology WR POL 2094 "Though the statute requires the offset of 'consumptive impacts to instream flows associated with permit-

exempt domestic water use' (RCW 90.94.020(4)(b)) and 90.94.030(3)(b)), watershed plans should address the consumptive use of new permit-exempt domestic well withdrawals. Ecology recommends consumptive use as a surrogate for consumptive impact to eliminate the need for detailed hydrogeologic modeling, which is costly and unlikely feasible to complete within the limited planning timeframes provided in chapter [90.94 RCW](#). " ([NEB](#))

**Instream Flows and Instream Flow Rule (IFR):** Instream flows are a specific flow level measured at a specific location in a given stream. Seasonal changes cause natural stream flows to vary throughout the year, so instream flows usually vary from month to month rather than one flow rate year-round. State law requires that enough water in streams to protect and preserve instream resources and uses. The Department of Ecology sets flow levels in administrative rules. Once instream flow levels are established in a rule, they serve as a water right for the stream and the resources that depend on it. Instream flow rules do not affect pre-existing, or senior, water rights; rather, they protect the river from future withdrawals. Once an instream flow rule is established, the Department of Ecology may not issue water rights that would impair the instream flow level. ([ECY](#))

**Instream Resources Protection Program (IRPP):** The IRPP was initiated by the Department of Ecology in September 1978 with the purpose of developing and adopting instream resource protection measures for Water Resource Inventory Areas (WRIAs) (see definition below) in Western Washington as authorized in the Water Resources Act of 1971 (RCW 90.54), and in accordance with the Water Resources Management Program ([WAC 175-500](#)).

**Instream Resources:** Fish and related aquatic resources. ([NEB](#))

**Large woody debris (LWD):** LWD refers to the fallen trees, logs and stumps, root wads, and piles of branches along the edges of streams, rivers, lakes and Puget Sound. Wood helps stabilize shorelines and provides vital habitat for salmon and other aquatic life. Preserving the debris along shorelines is important for keeping aquatic ecosystems healthy and improving the survival of native salmon. ([King County](#))

**Lead Entities (LE):** Lead Entities are local, citizen-based organizations in Puget Sound that coordinate salmon recovery strategies in their local watershed. Lead entities work with local and state agencies, tribes, citizens, and other community groups to adaptively manage their local salmon recovery chapters and ensure recovery actions are implemented. ([Partnership](#))

**Listed Species:** Before a species can receive the protection provided by the [Endangered Species Act](#) (ESA), it must first be added to the federal lists of endangered and threatened wildlife and plants. The [List of Endangered and Threatened Wildlife \(50 CFR 17.11\)](#) and the [List of Endangered and Threatened Plants \(50 CFR 17.12\)](#) contain the names of all species that have been determined by the U.S. Fish and Wildlife Service (Service) or the National Marine Fisheries Service (for most marine life) to be in the greatest need of federal protection. A species is added to the list when it is determined to be endangered or threatened because of any of the following factors: the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; the inadequacy

of existing regulatory mechanisms; or other natural or manmade factors affecting its survival. ([USFWS](#))

**Local Integrating Organizations (LIO):** Local Integrating Organizations are local forums in Puget Sound that collaboratively work to develop, coordinate, and implement strategies and actions that contribute to the protection and recovery of the local ecosystem. Funded and supported by the Puget Sound Partnership, the LIOs are recognized as the local expert bodies for ecosystem recovery in nine unique ecosystems across Puget Sound. ([Partnership](#))

**Low Impact Development (LID):** Low Impact Development (LID) is a stormwater and land-use management strategy that tries to mimic natural hydrologic conditions by emphasizing techniques including conservation, use of on-site natural features, site planning, and distributed stormwater best management practices (BMPs) integrated into a project design. ([ECY](#))

**Managed Aquifer Recharge (MAR):** Managed aquifer recharge projects involve the addition of water to an aquifer through infiltration basins, injection wells, or other methods. The stored water can then be used to benefit stream flows, especially during critical flow periods. ([NEB](#))

**National Pollutant Discharge Elimination System (NPDES):** The NPDES permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the United States. Created by the Clean Water Act in 1972, the EPA authorizes state governments to perform many permitting, administrative, and enforcement aspects of the program. ([EPA](#))

**Net Ecological Benefit (NEB):** Net Ecological Benefit is a term used in ESSB 6091 as a standard that watershed plans (see below for definition) must meet. The outcome that is anticipated to occur through implementation of projects and actions in a plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary. See *Final Guidance for Determining Net Ecological Benefit - Guid-2094 Water Resources Program Guidance*. ([NEB](#))

**Net Ecological Benefit Determination:** Occurs solely upon Ecology's conclusion after its review of a watershed plan submitted to Ecology by appropriate procedures, that the plan does or does not achieves a NEB as defined in the Net Ecological Benefit guidance. The Director of Ecology will issue the results of that review and the NEB determination in the form of an order. ([NEB](#))

**Net Ecological Benefit Evaluation:** A planning group's demonstration, using NEB Guidance and as reflected in their watershed plan, that their plan has or has not achieved a NEB. ([NEB](#))

**New Consumptive Water Use:** The consumptive water use from the permit-exempt domestic groundwater withdrawals estimated to be initiated within the planning horizon. For the purpose of RCW 90.94, consumptive water use is considered water that is evaporated, transpired, consumed by humans, or otherwise removed from an immediate water environment due to the use of new permit-exempt domestic wells. ([NEB](#))

**Office of Financial Management (OFM):** OFM is a Washington state agency that develops official state and local population estimates and projections for use in local growth management planning. ([OFM](#))

**Offset:** The anticipated ability of a project or action to counterbalance some amount of the new consumptive water use over the planning horizon. Offsets need to continue beyond the planning horizon for as long as new well pumping continues. ([NEB](#))

**Permit exempt wells:** The Groundwater Code ([RCW 90.44](#)), identified four “small withdrawals” of groundwater as exempt from the permitting process. Permit-exempt groundwater wells often provide water where a community supply is not available, serving single homes, small developments, irrigation of small lawns and gardens, industry, and stock watering.

**Permit-exempt uses:** Groundwater permit exemptions allow four small uses of groundwater without a water right permit: domestic uses of less than 5,000 gallons per day, industrial uses of less than 5,000 gallons per day, irrigation of a lawn or non-commercial garden, a half-acre or less in size, or stock water. Although exempt groundwater withdrawals don’t require a water right permit, they are always subject to state water law. ([ECY](#))

**Planning groups:** A general term that refers to either initiating governments, in consultation with the planning unit, preparing a watershed plan update required by Chapter 90.94.020 RCW, or a watershed restoration and enhancement committee preparing a plan required by Chapter 90.94.030 RCW. ([NEB](#))

**Planning Horizon:** The 20-year period beginning on January 19, 2018 and ending on January 18, 2038, over which new consumptive water use by permit-exempt domestic withdrawals within a WRIA must be addressed, based on the requirements set forth in Chapter 90.94 RCW. ([NEB](#))

**Projects and Actions:** General terms describing any activities in watershed plans to offset impacts from new consumptive water use and/or contribute to NEB. ([NEB](#))

**Puget Sound Acquisition and Restoration (PSAR) fund:** This fund supports projects that recover salmon and protect and recover salmon habitat in Puget Sound. The state legislature appropriates money for PSAR every 2 years in the Capital Budget. PSAR is co-managed by the Puget Sound Partnership and the Recreation and Conservation Office, and local entities identify and propose PSAR projects. ([Partnership](#))

**Puget Sound Partnership (Partnership):** The Puget Sound Partnership is the state agency leading the region’s collective effort to restore and protect Puget Sound and its watersheds. The organization brings together hundreds of partners to mobilize partner action around a common agenda, advance Sound investments, and advance priority actions by supporting partners. ([Partnership](#))

**Puget Sound Regional Council (PSRC):** PSRC develops policies and coordinates decisions about regional growth, transportation and economic development planning within King, Pierce, Snohomish and Kitsap counties. ([PSRC](#))

**[RCW 90.03 \(Water Code\)](#):** This chapter outlines the role of the Department of Ecology in regulating and controlling the waters within the state. The code describes policies surrounding surface water and groundwater uses, the process of determining water rights, compliance measures and civil penalties, and various legal procedures.

[RCW 90.44](#) **(Groundwater Regulations)**: RCW 90.44 details regulations and policies concerning groundwater use in Washington state, and declares that public groundwaters belong to the public and are subject to appropriation for beneficial use under the terms of the chapter. The rights to appropriate surface waters of the state are not affected by the provisions of this chapter.

[RCW 90.44.050](#) **(Groundwater permit exemption)**: This code states that any withdrawal of public groundwaters after June 6, 1945 must have an associated water right from the Department of Ecology. However, any withdrawal of public groundwaters for stock-watering purposes, or for the watering of a lawn or of a noncommercial garden not exceeding one-half acre in area, or for single or group domestic uses in an amount not exceeding five thousand gallons a day, or for an industrial purpose in an amount not exceeding five thousand gallons a day, is exempt from the provisions of this section and does not need a water right.

[RCW 90.54](#) **(Water Resources Act of 1971)**: This act set the stage for the series of rules that set instream flow levels as water rights, as well as a compliance effort to protect those flows.

[RCW 90.82](#) **(Watershed Planning)**: Watershed Planning was passed in 1997 with the purpose of developing a more thorough and cooperative method of determining what the current water resource situation is in each water resource inventory area of the state and to provide local citizens with the maximum possible input concerning their goals and objectives for water resource management and development.

[RCW 90.94](#) **(Streamflow Restoration)**: This chapter of the Revised Code of Washington codifies ESSB 6091, including watershed planning efforts, streamflow restoration funding program and the joint legislative task force on water resource mitigation and mitigation pilot projects (Foster task force and pilot projects).

**Reasonable Assurance**: Explicit statement(s) in a watershed plan that the plan’s content is realistic regarding the outcomes anticipated by the plan, and that the plan content is supported with scientifically rigorous documentation of the methods, assumptions, data, and implementation considerations used by the planning group. ([NEB](#))

**Revised Code of Washington ([RCW](#))**: The revised code is a compilation of all permanent laws now in force for the state of Washington. The RCWs are organized by subject area into Titles, Chapters, and Sections.

**Salmon Recovery Funding Board (SRFB)**: Pronounced “surf board”, this state and federal board provides grants to protect and restore salmon habitat. Administered by a 10-member State Board that includes five governor-appointed citizens and five natural resource agency directors, the board brings together the experiences and viewpoints of citizens and the major state natural resource agencies. For watersheds planning under Section 203, the Department of Ecology will submit final draft WRE Plans not adopted by the prescribed deadline to SRFB for a technical review ([RCO](#) and [Policy and Interpretive Statement](#)).

**Section 202 or Section 020**: Refers to Section 202 of ESSB 6091 or [Section 020 of RCW 90.94](#) respectively. The code provides policies and requirements for new domestic groundwater

withdrawals exempt from permitting with a potential impact on a closed water body and potential impairment to an instream flow. This section includes WRIAs 1, 11, 22, 23, 49, 59 and 55, are required to update watershed plans completed under RCW 90.82 and to limit new permit-exempt withdrawals to 3000 gpd annual average.

**Section 203 or Section 030:** Refers to Section 203 of ESSB 6091 or [Section 030 of RCW 90.94](#) respectively. The section details the role of WRE committees and WRE plans (see definitions below) in ensuring the protection and enhancement of instream resources and watershed functions. This section includes WRIAs 7, 8, 9, 10, 12, 13, 14 and 15. New permit-exempt withdrawals are limited to 950 gpd annual average.

**SEPA and SEPA Review:** SEPA is the State Environmental Policy Act. SEPA identifies and analyzes environmental impacts associated with governmental decisions. These decisions may be related to issuing permits for private projects, constructing public facilities, or adopting regulations, policies, and plans. SEPA review is a process which helps agency decision-makers, applications, and the public understand how the entire proposal will affect the environment. These reviews are necessary prior to Ecology adopting a plan or plan update and may be completed by Ecology or by a local government. ([Ecology](#))

**Subbasins:** A geographic subarea within a WRIA, equivalent to the words “same basin or tributary” as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b). In some instances, subbasins may not correspond with hydrologic or geologic basin delineations (e.g. watershed divides). ([NEB](#))

**Trust Water Right Program:** The program allows the Department of Ecology to hold water rights for future uses without the risk of relinquishment. Water rights held in trust contribute to streamflows and groundwater recharge, while retaining their original priority date. Ecology uses the Trust Water Right Program to manage acquisitions and accept temporary donations. The program provides flexibility to enhance flows, bank or temporarily donate water rights. ([ECY](#))

**Urban Growth Area (UGA):** UGAs are unincorporated areas outside of city limits where urban growth is encouraged. Each city that is located in a GMA fully-planning county includes an urban growth area where the city can grow into through annexation. An urban growth area may include more than a single city. An urban growth area may include territory that is located outside of a city in some cases. Urban growth areas are under county jurisdiction until they are annexed or incorporated as a city. Zoning in UGAs generally reflect the city zoning, and public utilities and roads are generally built to city standards with the expectation that when annexed, the UGA will transition seamlessly into the urban fabric. Areas outside of the UGA are generally considered rural. UGA boundaries are reviewed and sometimes adjusted during periodic comprehensive plan updates. UGAs are further defined in [RCW 36.70](#).

**[WAC 173-566 \(Streamflow Restoration Funding Rule\)](#):** On June 25, 2019 the Department of Ecology adopted this rule for funding projects under RCW 90.94. This rule establishes processes and criteria for prioritizing and approving grants consistent with legislative intent, thus making Ecology’s funding decision and contracting more transparent, consistent, and defensible.



**Washington Administrative Code (WAC):** The WAC contains the current and permanent rules and regulations of state agencies. It is arranged by agency and new editions are published every two years. ([Washington State Legislature](#))

**Washington Department of Ecology (DOE/ECY):** The Washington State Department of Ecology is an environmental regulatory agency for the State of Washington. The department administers laws and regulations pertaining to the areas of water quality, water rights and water resources, shoreline management, toxics clean-up, nuclear and hazardous waste, and air quality.

**Washington Department of Fish and Wildlife (WDFW):** An agency dedicated to preserving, protecting, and perpetuating the state's fish, wildlife, and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities. Headquartered in Olympia, the department maintains six regional offices and manages dozens of wildlife areas around the state, offering fishing, hunting, wildlife viewing, and other recreational opportunities for the residents of Washington. With the tribes, WDFW is a co-manager of the state salmon fishery. ([WDFW](#))

**Washington Department of Natural Resources (WADNR or DNR):** The department manages over 3,000,000 acres of forest, range, agricultural, and commercial lands in the U.S. state of Washington. The DNR also manages 2,600,000 acres of aquatic areas which include shorelines, tidelands, lands under Puget Sound and the coast, and navigable lakes and rivers. Part of the DNR's management responsibility includes monitoring of mining cleanup, environmental restoration, providing scientific information about earthquakes, landslides, and ecologically sensitive areas. ([WADNR](#))

**Water Resources (WR):** The Water Resources program at Department of Ecology supports sustainable water resources management to meet the present and future water needs of people and the natural environment, in partnership with Washington communities. ([ECY](#))

**Water Resources Advisory Committee (WRAC):** Established in 1996, the Water Resources Advisory Committee is a forum for issues related to water resource management in Washington State. This stakeholder group is comprised of 40 people representing state agencies, local governments, water utilities, tribes, environmental groups, consultants, law firms, and other water stakeholders. ([ECY](#))

**Watershed Plan:** A general term that refers to either: a watershed plan update prepared by a WRIA's initiating governments, in collaboration with the WRIA's planning unit, per RCW 90.94.020; or a watershed restoration and enhancement plan prepared by a watershed restoration and enhancement committee, per RCW 90.94.030. This term does not refer to RCW 90.82.020(6). ([NEB](#))

**Watershed Restoration and Enhancement Plan (WRE Plan):** The Watershed Restoration and Enhancement Plan is directed by [Section 203 of ESSB 6091](#) and requires that by June 30, 2021, the Department of Ecology will prepare and adopt a watershed restoration and enhancement plan for WRIAs 7, 8, 9, 10, 12, 13, 14 and 15, in collaboration with the watershed restoration and enhancement committee. The plan should, at a minimum, offset the consumptive impact of new permit-exempt domestic water use, but may also include recommendations for projects and actions that will measure, protect, and enhance instream resources that support the recovery of threatened and endangered salmonids. Prior to adoption of an updated plan, Department of Ecology must determine that the actions in the plan will result in a "net ecological benefit" to



instream resources in the WRIA. The planning group may recommend out-of-kind projects to help achieve this standard.

**WRIA:** Water Resource Inventory Area. WRIAs are also called basins or watersheds. There are 62 across the state and each are assigned a number and name. They were defined in 1979 for the purpose of monitoring water availability. A complete map is available here:

<https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up>

## Appendix C – Committee Roster

| <b>Entity Representing</b>                                           | <b>Representative Name</b>      | <b>Alternate Representative Name(s)</b> |
|----------------------------------------------------------------------|---------------------------------|-----------------------------------------|
| Lewis County                                                         | Lee Napier                      | John Kliem                              |
| Thurston County                                                      | Joshua Cummings                 | Kaitlynn Nelson, Brad Murphy            |
| City of Lacey                                                        | Deputy Mayor Cynthia Pratt      | Julie Rector                            |
| City of Olympia                                                      | Donna Buxton                    | Jesse Barham                            |
| City of Tumwater                                                     | Councilmember Charlie Schneider | Dan Smith                               |
| Squaxin Island Tribe                                                 | Jeff Dickison                   | Paul Pickett                            |
| Department of Ecology                                                | Angela Johnson                  | Mike Noone, Rebecca Brown               |
| Department of Fish and Wildlife                                      | Noll Steinweg                   | Tristan Weiss, Megan Kernan             |
| Public Utility District 1 of Thurston County                         | John Weidenfeller               | Ruth Clemens, Julie Parker              |
| Deschutes Estuary Restoration Team                                   | Sue Patnude                     | Dave Monthie, Dave Peeler               |
| Building Industry Association of Washington                          | Josie Cummings                  |                                         |
| Thurston Conservation District                                       | Sarah Moorehead                 | Adam Peterson, Karin Strelioff          |
| WRIA 13 Salmon Habitat Recovery Lead Entity Coordinator (ex officio) | Amy Hatch-Winecka               |                                         |
| LOTT Clean Water Alliance (ex officio)                               | Wendy Steffensen                |                                         |
| Nisqually Indian Tribe (ex officio)                                  | George Walter                   |                                         |
| City of Tenino (ex officio)                                          | John Millard                    |                                         |
| City of Yelm (ex officio)                                            | Grant Beck                      | Michael Grayum, Chad Bedlington         |

# Appendix D – Operating Principles

## Operating Principles and Charter

Watershed Restoration Enhancement  
Committee Water Resource Inventory Area  
(WRIA) 13

Originally approved March 27, 2019

Revised and Approved September 23, 2020

### SECTION 1: PURPOSE

The purpose of the operating principles and charter is to establish the watershed restoration and enhancement committee, as authorized under RCW 90.94.030, for the purpose of developing a watershed restoration and enhancement plan. The document sets forward a process for meeting, participation expectations, procedures for decision-making, structure of the Committee, communication, and other topics to support the Committee in reaching agreement on a final plan.

### SECTION 2: AGREEMENT AND AMENDMENTS TO THE OPERATING PRINCIPLES

The operating principles are established when all members of the watershed restoration and enhancement committee (Committee) approve them. Participants will work in good faith to participate productively in the development of the operating principles. By approving the operating principles, members of the Committee agree to uphold the principles as outlined in this document. Each entity participating on the Committee will be asked to document their approval of the operating principles in writing by signing a final document.

The Committee may review the operating principles periodically. Any member of the Committee may bring forward a recommendation for an amendment to the operating principles. Amendments will be brought for discussion when a quorum is present and take effect only if there is consensus by the full Committee for inclusion.

The chair may revise Appendix A (Committee membership) and Appendix B (timeline) without requiring a decision by the Committee. Any new appendices, or changes to other appendices will be approved by the Committee in advance of the changes being made. The chair will notify the Committee of any changes to Appendices A and B.

Nothing contained herein or in any amendment developed under the Agreement shall prejudice the legal claims of any party hereto, nor shall participation in this planning process

abrogate any party's authority or the reserved or other rights of tribal governments, except where the obligation has been accepted in writing.

### SECTION 3: PARTICIPATION EXPECTATIONS AND GROUND RULES

#### PARTICIPATION EXPECTATIONS

Each entity invited by Ecology to participate on the Committee, and which has responded indicating their commitment to participate, shall identify a representative and up to two alternates to participate on the Committee. Committee members will, in good faith and using their best professional judgement:

- o Actively participate in Committee meetings throughout the planning process;
- o Review materials in preparation for the meetings;
- o Review materials following the meetings;
- o Engage in workgroups (if applicable);
- o Come prepared for discussions and to make decisions (when applicable); and
- o Commit to implementing the Committee ground rules (see below).

The chair will consult with the Committee to ensure that adequate time is given for review of materials. Meeting materials will be provided at least 7 days before meetings, with a minimum 14 day review period for documents intended for decision-making or that require feedback. The chair also understands that members may need to discuss decisions with their organizations and will work with committee members to establish reasonable review time for materials prior to calling for a decision.

When possible, Committee members will provide the chair reasonable notice if additional review time is needed prior to a decision.

Committee meetings will take place on a monthly basis for an initial period, with the interval of meetings being modified as needed to meet the deadlines (either more or less frequently). The chair will hold meetings at a convenient location in the watershed. Meetings are expected to last for approximately 4 hours, with the length modified as needed to meet deadlines.

The chair or facilitator will attempt to contact Committee members that did not send a representative or alternate to the meeting. If a Committee member does not participate for 3 consecutive meetings (through sending the representative or alternate), the chair or facilitator will contact the Committee member to ask if they will continue to participate or forfeit their seat. Committee members will be asked to provide written acknowledgement when forfeiting their seat.

## REMOTE PARTICIPATION

It is the expectation that Committee representatives shall attend all meetings in person. In person participation is essential to efficiency, clarity, and honest communication. Although it should not be routine, remote participation can be accommodated when necessary to facilitate Committee member participation. If there are difficulties with technology, the priority will be to continue the meeting with the in-person participants and not delay the meeting to address technology challenges. Representatives participating remotely may take place in decision-making. Representatives are strongly encouraged to attend in-person.

The Committee chair will allow for remote participation (e.g. via phone, web, and video conference) if:

- Notice is provided to the chair or facilitator at least 1 week in advance of the meeting, AND
- Representative and alternates are not available to attend in person, AND
- Meeting room accommodates remote participation.

If extraordinary events, such as a pandemic or natural disaster, require the committee to meet remotely, all meetings will be held remotely and the operating procedures will remain in force, except portions that assume in-person versus remote participation.

## GROUND RULES

Water management is inherently complicated and the Committee must work together effectively to develop the watershed restoration and enhancement plan. Therefore, given the range of members' diverse perspectives, the Committee has established the following ground rules to ensure good faith and productive participation amongst its members:

- Be Respectful
- Listen when others are speaking. Do not interrupt and do not participate in side conversations. One person speaks at a time.
- Recognize the legitimacy of the concerns and interests of others, whether or not you agree with them.
- Cooperate with the facilitator to ensure that everyone is given equitable time to state their views. Present your views succinctly and try not to repeat or rephrase what others have already said.

- Silence cell phones and refrain for using laptops during the meeting, except to take notes.
- Respect other communication styles and needs.
- Be Constructive
- Participate in the spirit of giving the same priority to solving the problems of others as you do to solving your own problems.
- Share comments that are solution focused. Avoid repeating past discussions.
- Do not engage in personal attacks or make slanderous statements. Do not give ultimatums.
- Ask for clarification if you are uncertain of what another person is saying. Ask questions rather than make assumptions.
- Work towards consensus. Identify areas of common ground and be willing to compromise.
- Minimize the use of jargon and acronyms. Attempt to use language observers and laypersons will understand.
- It is okay to disagree, but strive to reach common ground.
- Be Productive
- Adhere to the agenda. Respect time constraints and focus on the topic being discussed.
- Bring a Sense of Humor and Have Fun.

#### CONFLICT RESOLUTION

In the event a conflict arises amongst members or established workgroups of the Committee, the following steps should be taken by individuals:

Communicate directly with the person or persons whose actions are the cause of the conflict.

If the circumstance is such that the person with a conflict is unable or unwilling to communicate directly with the person or persons whose actions are the cause of the conflict, the person shall speak with the Committee chair and facilitator.

The conflict should first be brought up verbally. If this does not lead to satisfactory resolution, the conflict should be described in writing to the chair.

If such matters are brought to the chair and facilitator, the chair in consultation with the facilitator, will address the conflict as appropriate and may seek outside or independent assistance as needed.

## SECTION 4: MEMBERSHIP

### ALTERNATES

Committee members shall provide to the chair, in writing, names and contact information for a primary representative and up to two designated alternates from their organization or government. Committee members shall inform the chair in writing of any changes to the primary representative or alternates. If the primary representative cannot attend a meeting, they should, if possible, send a designated alternate and notify the Committee chair and the facilitator as early as possible. It is the responsibility of the primary representative to brief the alternate on previous meetings and key topics arising for discussion in order for the alternate to participate productively. Alternates may participate in decision-making in lieu of the primary representative.

Representatives may call on alternates that attend the meeting at any time to speak. Only one representative from each government or entity shall sit at the table and participate in decision-making at any given meeting.

If the primary representative and alternates are no longer able to attend (staffing change, ongoing scheduling conflicts, etc.), the government or organization shall work with the chair to quickly identify alternative representation from the same government or organization. If no alternative representative is available from the same government or organization, an alternate entity that can represent the same interest is allowed and shall be brought forward to the chair for approval. Replacement members are subject to the following provisions:

- The entity cannot veto, request a new decision, or revisit items previously decided on by the Committee;
- The entity signs an intent to participate and provides primary and alternate Committee members;
- The entity agrees to and abides by the operating principles; and
- The entity joins the Committee and participates in meetings for a minimum of six months leading up to the final decision on the plan.

### EX-OFFICIO AND AD-HOC MEMBERS

The Committee may decide to invite an additional entity to join the Committee as an ex officio non-voting member. Ex Officio members are invited to sit at the Committee table and participate actively in discussions and review of documents, but shall not participate in



Committee decision-making.<sup>71</sup> Ex- officio members shall adhere to the operating procedures.

The Committee may decide to invite an individual or organization to participate in select meetings or agenda items where additional expertise or perspective is desired. Ad hoc members will be invited by the chair to sit at the Committee table, participate actively in discussions, and review of documents for the specified agenda items. They shall not participate in Committee decision-making.

#### WORKGROUPS AND ADVISORY GROUPS

The Committee may establish workgroups or subcommittees as it sees fit. Workgroups may be temporary, established to achieve a specific purpose within a finite time frame, or a standing workgroup addressing the goals of the Committee. The decision to form a workgroup is a procedural decision, as it is not required by the legislature, and may be developed at the discretion of the Committee or the chair in order to support Committee decision-making. All Committee workgroups are workgroups of the whole, meaning their role is to support the efforts of the Committee and all Committee members are welcome to participate in any workgroup formed by the Committee. The chair or Committee may also engage established workgroups in the watershed or invite non-Committee members to participate on the workgroups if they bring capacity or expertise not available on the Committee. No binding decisions will be made by the workgroups; all issues discussed by workgroups shall be communicated to the Committee as either recommendations or findings as appropriate. The Committee may, or may not, act on these workgroup outcomes as it deems appropriate.

#### LATECOMERS

Ecology has invited all governments and organization identified in 90.94.030 to participate on the Committee. Invited entities who originally decided not to participate on the Committee (per written acknowledgement) are allowed to join the Committee at a later date under the following conditions:

- The entity cannot veto, request a new decision, or revisit items previously decided on by the Committee;
- The entity signs an intent to participate, provides a primary and alternate Committee member;

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<sup>71</sup> Ecology leadership has determined that only entities specified in the legislation will participate in Committee decision-making. However, the Committee may decide to include non-decision-making members if they choose.

- The entity agrees to and abides by the operating principles; and
- The entity joins the Committee and participates in meetings starting no later than September 1, 2020.

#### REMOVAL FROM THE COMMITTEE

Entities must participate in the committee process after September 1, 2020 to retain membership on the committee. If an entity does not attend at least one committee or workgroup meeting over any three-month period it will be assumed they have withdrawn from the committee and will be removed as members, unless the member provides a written explanation and requests to remain on the committee. The Chair, via electronic communication, will inform any committee member who has not been participating for two months with this information to provide a minimum of one-month notice before removal.

#### RESIGNATION FROM THE COMMITTEE

If an entity no longer wishes to participate in the committee process or the final plan approval, they should send written notice (electronic or mailed notice) to the chair as early as possible prior to their resignation. Advance notice will support the chair and facilitator in managing consensus building and voting procedures.

#### SECTION 5: ROLE OF THE CHAIR AND COMMITTEE SUPPORT

RCW 90.94.030 (2b) states that “The department shall chair the watershed restoration and enhancement committee...” Ecology’s streamflow restoration implementation lead chairs the Committee on behalf of the agency. The chair shall participate in Committee decision-making.<sup>72</sup> The role of the chair is to help the Committee complete the plan with the goal to attain full agreement from the Committee members. If full agreement cannot be obtained, the chair shall ensure all opinions inform future decision-making for the final plan. In the event that the chair is unable to attend a scheduled meeting due to illness or other unanticipated absence, Ecology will designate an interim chair to avoid cancelling the meeting. The interim chair may participate in Committee decision-making.

The chair, with assistance from Ecology technical staff, contractors, members of the Committee, and/or workgroups, shall prepare the watershed restoration and enhancement plan for the Committee’s review, comment, and approval.

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<sup>72</sup> RCW 90.94 (3) states that “the department shall prepare and adopt a watershed restoration and enhancement plan for each watershed listed under subsection (2)(a) of this section, in collaboration with the watershed restoration and enhancement committee. Except as described in (h) of this subsection, all members of a watershed restoration and enhancement committee must approve the plan prior to adoption.” Based on input from the Attorney General’s office, because Ecology is a member of the Committee and must ultimately decide whether or not to approve the plan, Ecology shall participate in decisions on all items coming before the Committee.

Ecology may provide the Committee a facilitator. The role of the facilitator is to focus on process and support the Committee in productive discussions and decision-making. Ecology will provide administrative support for the Committee as well as technical assistance through Ecology staff and consultants. Ecology will seek input from the Committee on consultant selection prior to entering into contract.

## SECTION 6: DECISION MAKING

### QUORUM

A quorum is constituted when two-thirds of the entities represented on the Committee are present (either in person or on the phone). A quorum of current membership must be present for decision-making to occur. Even if both a primary representative and alternates are present, each entity of the Committee counts only once for purposes of determining a quorum.

### CONSENSUS

This planning process, by statutory design, brings a diversity of perspectives to the table. It is therefore important the Committee identifies a clear process for how it will make decisions. The Committee has elected to make decisions by consensus.<sup>73</sup> The Committee made this choice in part because the authorizing legislation requires that the final plan must be approved by all members of the Committee prior to Ecology's review (RCW 90.94.030[3] "...all members of a watershed restoration and enhancement committee must approve the plan prior to adoption"). Therefore it follows that consensus during the foundational decisions upon which the plan is constructed will serve as the best indicators of the Committee's progress toward an approved plan.

Ideally, consensus represents whole-hearted agreement and support by all Committee members; however, it can be achieved with less than this level of enthusiasm. For example, some members might disagree with all or part of a decision, but based on listening to everyone else's input might agree to let the decision go forward because it is the best decision the entire group can achieve at the current time. For purposes of this effort, consensus is defined as an outcome all Committee members can at least "live with" and

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<sup>73</sup> Definition of Consensus: Consensus is a group process where the input of everyone is carefully considered and an outcome is crafted that best meets the needs of the group as a whole. The root of consensus is the word consent, which means to give permission to. When members consent to a decision, they are giving permission to the group to go ahead with the decision. Some members may disagree with all or part of the decision, but based on listening to everyone else's input, all members agree to let the decision go forward because the decision is the best one the entire group can achieve at the current time.

agree not to block or oppose during implementation, even if it is not their preferred choice.

The Committee recognizes four levels of consensus:

- I can say an unqualified "yes"!
- I can accept the decision.
- I can live with the decision.
- I do not fully agree with the decision; however, I will not block or oppose it now or during implementation.

Consensus will be assessed by polling committee members either in person at meetings or electronically by email. Ecology staff and the facilitator will record when consensus is achieved and will document any relevant background or context for the decision, including when a Committee member is consenting to something even though it is not their preferred choice. Abstentions and the reasons for them also will be described. During in person polling the following protocol will be used:

- Thumbs up – consent
- Thumbs sideways – consent with reservation but can live with and will not block or oppose now or during implementation
- Thumbs down – do not consent
- Five fingers – abstain

In recognition that consensus can take time to achieve and in some cases decisions will need to be made quickly to stay on track to meet the plan deadline, the Committee may continue moving forward with deliberations even if it has not reached consensus on all interim decisions leading up to the final plan (e.g. growth scenarios, inclusion of individual projects, etc.). This is intended to keep the process moving, and is put forth with the recognition that these differences will need to be resolved before the end of the process to have a plan all Committee members can approve. Ecology staff and the facilitator will clearly document where there is consensus and where there is not consensus on all interim decisions. Where there is not consensus, care will be taken to describe the different perspectives and reasons for them. Differing parties with Ecology staff, the facilitator, and other Committee members will make a plan to try to resolve differences and reach consensus in time for the final plan approval. A “parking lot” may be used to capture ideas that the group cannot agree on or would like to return to at a later date for further discussion. However, this will not jeopardize meeting deadlines by postponing issues which must be resolved so deliberations can move forward. Committee members will work together to establish schedules and deadlines to ensure that final plans can be completed on time.

## ELECTRONIC DECISION-MAKING

In the case a decision is needed prior to the next Committee meeting, the chair can request an electronic decision via email or survey. This approach will only be used for time-critical items or when a quorum was not present at the Committee meeting where the issue was to be decided. The Department of Ecology will allow a minimum of 3 working days for responses to requests for an electronic decision. A non-response is considered an “abstention.”<sup>74</sup>

The result of an electronic decision will be reported at the next Committee meeting and the chair or facilitator may request confirmation to reaffirm the electronic decision.

## INFORMAL STRAW POLLING

From time to time, the chair or the facilitator may take a straw poll to gather information on Committee needs and perspectives. Straw polling will be used solely for information-gathering and will not result in a decision.

## LETTERS OF SUPPORT FOR PROJECTS

The Committee may choose to submit a letter of support for streamflow restoration projects applying for funding through Ecology Streamflow Restoration Funding program or other sources. If the Committee decides not to submit a letter of support for a project, individual Committee representatives are not prohibited from submitting letters of support from their entity or government.

## FINAL PLAN APPROVAL

RCW 90.94 (3) states that “... all members of a watershed restoration and enhancement committee must approve the plan prior to adoption.” Approval will be achieved if all Committee members consent to the final plan. To ensure no confusion on this issue, each entity participating on the Committee will be asked to document their consent to the final plan in writing (e.g., by responding to an email or signing a final document).

The facilitator will poll for and document consensus. Written and verbal votes will be shared with all Committee members. If consensus is not reached on the plan, the facilitator/note-taker will document which plan elements (if any) there is consensus on and which there is not consensus on and will describe the full range of different perspectives where there is not

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<sup>74</sup> If an ‘out of office’ message is received for the primary representative, the alternate representative(s) will be contacted. The chair and facilitator will make at least 3 points of contact with each Committee member before marking them as an abstention (e.g. phone, email, text).

consensus. To ensure their perspectives are also available in their own words, each entity will have the opportunity to append a letter describing their views.

The final plan approval may also be given verbally in a Committee meeting, or in writing when in-person participation is not possible:

- Approve
- Disapprove

## SECTION 7: PUBLIC COMMENTS AND PUBLIC MEETING NOTICE

The agenda will provide time for public comment at each meeting. In general, members of the public may only speak during public comment; although the chair and facilitator may make exceptions on a case-by-case basis. The chair and facilitator will determine the time and extent of the public comment period based on the agenda for each meeting, with input from the Committee. While the Committee is not explicitly required to follow the requirements of the Open Public Meetings Act, reasonable efforts will be made to post information and materials on the pertinent website in a timely manner to keep the public informed.

## SECTION 8: COMMITTEE AND MEDIA COMMUNICATION

To support clear communication with the Committee, Ecology will:

- Operate a list serve for Committee members and interested parties
- Develop and manage a website for members of the Committee to access documents such as agendas, meeting summaries, technical reports, calendar, and other items as requested by the Committee

The facilitator and Ecology shall prepare a written meeting summary for each Committee meeting within 10 business days of the last Committee meeting. The chair will distribute the meeting summary to the Committee via an email and the facilitator or Ecology will post the summary on the Committee webpage. The summary, at a minimum, will include a list of attendees, decisions, discussion points, assignments, and action items. If comments are cited in such summaries, each speaker will be identified. Meeting summaries will capture areas of agreement and disagreement within the group. The Committee will review and accept (or revise) meeting summaries at the following meeting.

## COMMUNICATION WITH THE MEDIA

When speaking to the media or other venues, the Committee members will clearly identify any opinions expressed as their personal opinions and not necessarily those of the other Committee members or the Committee as a whole. The Committee members will not attempt to speak for other members of the group or to characterize the positions of other

members to the media or other venues. Comments to the media will be respectful of other Committee members.

Following significant accomplishments, the Committee may request Ecology to issue formal news releases or other media briefing materials. All releases and information given to the media will accurately represent the work of the Committee. Ecology will make every effort to provide the Committee with materials in advance for input, recognizing that media timelines may not allow for adequate review by the Committee.



## Appendix E – Regional Aquifer Units within WRIA 13

| Aquifer<br>(DNR<br>Nomenclature<br>in<br>Parentheses) | Description                                                                                                                                                                                                                                                           | Typical Thickness                                                                                                                                                                 |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Qvr<br/>(Qgo/Qgos)</b>                             | Often present at land surface, this aquifer primarily consists of stratified silt, sand, and gravel deposits of Vashon recessional outwash of the Frasier glaciation.                                                                                                 | 10 feet to about 40 feet thick; locally exceeds 150 feet. Where saturated, the unit represents a water-table aquifer and is often in direct continuity with surface-water bodies. |
| <b>Qva (Qga)</b>                                      | This aquifer is mainly composed of deposits from the Vashon advance outwash. The deposits are poorly- to moderately-well sorted gravel in a sand matrix. This unit is generally confined by the overlying glacial till (Qvt or Qgt).                                  | 10 to 45 feet; locally exceeds 100 feet. Thin on northern peninsulas, greater thicknesses in Lacey area.                                                                          |
| <b>Qc (Qpg)</b>                                       | Sometimes called the “sea-level aquifer” due its coincident elevation, this unit is usually coarse sand and gravel deposits of pre-Vashon age glacial drift. Confined by the overlying Kitsap formation (Qf or Qpf).                                                  | 15 to 70 feet thick in most places in the area. Generally absent south of Rainier, though present near Lake Lawrence.                                                             |
| <b>TQu</b>                                            | Composed of unconsolidated and undifferentiated sedimentary deposits from the early Quaternary and late Tertiary period. Mainly consists of deposits of silt, sand, and gravel. Water bearing units are irregularly distributed and local aquitard units are present. | Thickness can exceed 1,000 feet and is poorly constrained. Greater thicknesses in the northern portion of watershed, where it is an important water bearing unit.                 |

## Appendix F – Surface Water Quality Assessment Category 4 and 5 Listings in WRIA 13

| <b>WATERBODY</b>            | <b>CURRENT CATEGORY</b> | <b>PARAMETER NAME</b>   | <b>TMDL NAME</b>                              | <b>MEDIUM NAME</b> |
|-----------------------------|-------------------------|-------------------------|-----------------------------------------------|--------------------|
| ADAMS CREEK                 | 5                       | Bacteria                | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | pH                      | Deschutes River Multiparameter TMDL           | Water              |
| AYER (ELWANGER) CREEK       | 5                       | pH                      | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | Temperature             |                                               | Water              |
| BARNES LAKE                 | 5                       | Total Phosphorus        |                                               | Water              |
| BLACK LAKE DITCH            | 5                       | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | Temperature             |                                               | Water              |
|                             |                         | pH                      | Deschutes River Multiparameter TMDL           | Water              |
| BUDD INLET (INNER)          | 5                       | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | Bacteria                |                                               | Water              |
| BUDD INLET (OUTER)          | 5                       | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water              |
|                             |                         | Bacteria                |                                               | Water              |
| CAPITOL LAKE                | 4C                      | Invasive Exotic Species |                                               | Habitat            |
|                             | 5                       | Total Phosphorus        |                                               | Water              |
|                             |                         | Bacteria                |                                               | Water              |
| CASE INLET AND DANA PASSAGE | 5                       | Dissolved Oxygen        |                                               | Water              |
| COLLEGE CREEK               | 4A                      | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL | Water              |

|                   |    |                    |                                               |         |
|-------------------|----|--------------------|-----------------------------------------------|---------|
|                   |    | Dissolved Oxygen   | Henderson Inlet Watershed Multiparameter TMDL | Water   |
|                   |    | pH                 | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| DESCHUTES RIVER   | 4C | Instream Flow      |                                               | Habitat |
|                   |    | Large Woody Debris |                                               | Habitat |
|                   | 5  | Fine Sediment      | Deschutes River Multiparameter TMDL           | Habitat |
|                   |    | Temperature        | Deschutes River Multiparameter TMDL           | Water   |
|                   |    | pH                 | Deschutes River Multiparameter TMDL           | Water   |
|                   |    | Dissolved Oxygen   | Deschutes River Multiparameter TMDL           | Water   |
|                   |    | Bacteria           |                                               | Water   |
|                   |    | Temperature        |                                               | Water   |
| DOBBS CREEK       | 4A | Bacteria           | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| EAGLE CREEK       | 4A | Bacteria           | Henderson Inlet Watershed Multiparameter TMDL | Water   |
|                   |    | Dissolved Oxygen   | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| ELLIS CREEK       | 5  | Bacteria           | Deschutes River Multiparameter TMDL           | Water   |
| ELLIS CREEK, N.F. | 5  | Bacteria           | Deschutes River Multiparameter TMDL           | Water   |
| FLEMING CREEK     | 4A | Bacteria           | Henderson Inlet Watershed Multiparameter TMDL | Water   |
|                   |    | pH                 | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| FOX CREEK         | 4A | Bacteria           | Henderson Inlet Watershed Multiparameter TMDL | Water   |

|                     |    |                         |                                                           |         |
|---------------------|----|-------------------------|-----------------------------------------------------------|---------|
|                     |    | Dissolved Oxygen        | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
| HENDERSON INLET     | 5  | Dissolved Oxygen        |                                                           | Water   |
|                     | 4A | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
|                     |    | Dissolved Oxygen        | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
|                     |    | pH                      | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
|                     |    | Temperature             | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
| HICKS LAKE          | 4C | Invasive Exotic Species |                                                           | Habitat |
| HUCKLEBERRY CREEK   | 5  | Temperature             | Deschutes River Multiparameter TMDL                       | Water   |
|                     |    | Dissolved Oxygen        | Deschutes River Multiparameter TMDL                       | Water   |
| INDIAN CREEK        | 5  | Bacteria                | Deschutes River Multiparameter TMDL                       | Water   |
| JOHNSON CREEK       | 5  | Temperature             | Deschutes River Multiparameter TMDL                       | Water   |
| JORGENSEN CREEK     | 4A | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL             | Water   |
| LAKE LAWRENCE CREEK | 5  | Dissolved Oxygen        | Deschutes River Multiparameter TMDL                       | Water   |
| LAWRENCE LAKE       | 5  | Total Phosphorus        |                                                           | Water   |
| LOIS LAKE           | 4C | Invasive Exotic Species |                                                           | Habitat |
| LONG LAKE           | 4C | Invasive Exotic Species |                                                           | Habitat |
|                     | 5  | Total Phosphorus        |                                                           | Water   |
| MCLANE CREEK        | 4A | Bacteria                | Totten, Eld, and Skookum Inlets Tributaries Bacteria TMDL | Water   |
|                     |    |                         |                                                           |         |
|                     | 5  | Dissolved Oxygen        |                                                           | Water   |
|                     |    | Temperature             |                                                           | Water   |
|                     |    | Bacteria                |                                                           | Water   |

|                                 |    |                         |                                               |         |
|---------------------------------|----|-------------------------|-----------------------------------------------|---------|
| MISSION CREEK                   | 5  | Bacteria                | Deschutes River Multiparameter TMDL           | Water   |
| MITCHELL CREEK                  | 5  | Temperature             | Deschutes River Multiparameter TMDL           | Water   |
| MOXLIE CREEK                    | 5  | Bacteria                | Deschutes River Multiparameter TMDL           | Water   |
| MUNN LAKE                       | 4C | Invasive Exotic Species |                                               | Habitat |
| MYER CREEK                      | 4A | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| NISQUALLY REACH/DRAYTON PASSAGE | 4A | Bacteria                | Nisqually Watershed Bacteria and DO TMDL      | Water   |
|                                 |    |                         |                                               | Water   |
|                                 | 5  | Dissolved Oxygen        |                                               | Water   |
| PALM CREEK                      | 4A | Bacteria                |                                               | Water   |
|                                 |    |                         |                                               |         |
|                                 |    | Bacteria                |                                               | Water   |
|                                 |    | Dissolved Oxygen        |                                               | Water   |
|                                 |    |                         |                                               |         |
| PATTISON LAKE                   | 5  | Total Phosphorus        |                                               | Water   |
| PERCIVAL CREEK                  | 5  | Temperature             | Deschutes River Multiparameter TMDL           | Water   |
|                                 |    | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water   |
| QUAIL CREEK                     | 4A | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL | Water   |
| REICHEL CREEK                   | 5  | Bacteria                | Deschutes River Multiparameter TMDL           | Water   |
|                                 |    | Dissolved Oxygen        | Deschutes River Multiparameter TMDL           | Water   |
|                                 |    | Temperature             | Deschutes River Multiparameter TMDL           | Water   |
| SCHNEIDER CREEK                 | 5  | Bacteria                | Deschutes River Multiparameter TMDL           | Water   |
| SLEEPY CREEK                    | 4A | Bacteria                | Henderson Inlet Watershed Multiparameter TMDL | Water   |

|                                         |    |                  |                                                           |       |
|-----------------------------------------|----|------------------|-----------------------------------------------------------|-------|
|                                         |    | pH               | Henderson Inlet Watershed Multiparameter TMDL             | Water |
|                                         | 5  | Dissolved Oxygen |                                                           | Water |
| SPURGEON CREEK                          | 5  | Bacteria         | Deschutes River Multiparameter TMDL                       | Water |
| SQUAXIN, PEALE, AND PICKERING PASSAGES  | 5  | Dissolved Oxygen |                                                           | Water |
| SWIFT CREEK                             | 4A | Bacteria         | Totten, Eld, and Skookum Inlets Tributaries Bacteria TMDL | Water |
| TEMPO LAKE OUTLET                       | 5  | Temperature      | Deschutes River Multiparameter TMDL                       | Water |
| THURSTON CREEK                          | 5  | Temperature      | Deschutes River Multiparameter TMDL                       | Water |
| UNNAMED CREEK (TRIB TO DOBBS CREEK)     | 5  | Bacteria         |                                                           | Water |
| UNNAMED CREEK (TRIB TO ELD INLET)       | 5  | Bacteria         |                                                           | Water |
| UNNAMED CREEK (TRIB TO HENDERSON INLET) | 4A | Bacteria         | Henderson Inlet Watershed Multiparameter TMDL             | Water |
| UNNAMED CREEK (TRIB TO MCLANE CREEK)    | 5  | Bacteria         |                                                           | Water |
| UNNAMED CREEK (TRIB TO WOODARD CREEK)   | 5  | Dissolved Oxygen |                                                           | Water |
|                                         |    | Temperature      |                                                           | Water |
|                                         |    | Bacteria         |                                                           | Water |
| WOODARD CREEK                           | 4A | Bacteria         | Henderson Inlet Watershed Multiparameter TMDL             | Water |
|                                         |    | Dissolved Oxygen | Henderson Inlet Watershed Multiparameter TMDL             | Water |

|                   |    |                  |                                                     |         |
|-------------------|----|------------------|-----------------------------------------------------|---------|
| WOODLAND<br>CREEK | 4A | Temperature      | Henderson Inlet<br>Watershed<br>Multiparameter TMDL | Water   |
|                   | 4C | Instream Flow    |                                                     | Habitat |
|                   | 4A | Bacteria         | Henderson Inlet<br>Watershed<br>Multiparameter TMDL | Water   |
|                   | 5  | Temperature      | Henderson Inlet<br>Watershed<br>Multiparameter TMDL | Water   |
|                   | 4A | Dissolved Oxygen | Henderson Inlet<br>Watershed<br>Multiparameter TMDL | Water   |
|                   | 5  | Dissolved Oxygen |                                                     | Water   |



# Appendix G – Subbasin Delineation Memo

## Technical Memorandum



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To: Angela Johnson (Ecology) Washington State Department of Ecology  
From: Chad Wiseman (HDR)  
Copy:  
Date: June 05, 2019  
Subject: WRIA 13 Subbasin Delineation Alternatives

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## 1.0 Purpose and Background

RCW 90.94.030(3)(b) requires that Watershed Restoration and Enhancement plans (WRE plans) include actions to offset new consumptive use impacts associated with permit-exempt domestic water use. RCW 90.94.030(3)(b) states “The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary.” Therefore, the WRIA 13 committee will work to identify projects to offset impacts from new permit-exempt domestic wells within the same subbasin. This memo is intended to summarize the rationale for the two subbasin delineations alternatives currently proposed and to inform the selection of a preferred alternative.

## 2.0 Initial Delineation

The WRIA 13 WRE committee defined a draft subbasin delineation. The initial data was provided by Thurston County based on Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) data. Members of the workgroup refined the delineations based on fish bearing streams of importance and other factors. The initial delineation had the following characteristics:

- The Deschutes River watershed was trisected into upper, middle, and lower subbasins. The lower subbasin generally corresponds to the cities of Lacey, Olympia, and Tumwater, and their urban growth areas (UGA). The middle subbasin is primarily rural residential areas and the City of Rainier. The upper subbasin is a mix of rural residential and forestland.
- Spurgeon Creek was defined as its own subbasin, because of its unique value to fish and its relatively cold water from groundwater contribution.
- McLane Creek was defined as its own subbasin, because of its unique value to fish. McLane Creek supports multiple salmonid species.
- The land surrounding Puget Sound in the northern portion of WRIA 13 was delineated into subbasins based on 1) direction of surface drainage to different inlets and 2) on the current level of development that is assumed to be correlated with the quality of localized stream health.
  - The Cooper Point peninsula was delineated into the “Eld Inlet” and “Budd Inlet West” subbasins.

- o The Boston Harbor peninsula was delineated into the “Budd Inlet East” and “Henderson West” subbasins.
- o The Johnson Point peninsula was delineated into the “Henderson East” and “Nisqually Reach” subbasins. The “Henderson East” subbasin includes the Woodland Creek watershed.

### 3.0 Proposed Alternatives

During the May 21, 2019 WRIA 13 workgroup meeting, the Squaxin Island Tribe proposed two changes to the initial delineation. The proposed changes were to 1) modify the border between the lower and middle Deschutes subbasins, and to 2) delineate the Woodland Creek watershed as a separate subbasin. The workgroup decided not to modify the border between the lower and middle Deschutes subbasins. However, the workgroup agreed to delineate the Woodland Creek watershed as a separate subbasin. The rationale was that Woodland Creek is a relatively large watershed in WRIA 13, and the northern portion has development pressure that includes permit-exempt wells or connections. The workgroup also agreed to combine the remainder of “Henderson East” with “Nisqually Reach” subbasin, and re-name it “Johnson Point” because the development character of the remainder of “Henderson East” was similar to the “Nisqually Reach”. These changes to the initial delineation are reflected in the Alternative #1 delineation (Figure 1).

The workgroup also discussed combining the remaining inlet subbasins for the Boston Harbor and Cooper Point peninsulas, respectively. This potential change is reflected in the Alternative #2 delineation (Figure 1). Alternatives #1 and #2 may be compared in terms of the benefits of splitting (Alternative #1) or combining (Alternative #2) the Cooper Point and Boston Harbor peninsulas.

The benefits can be considered in terms of targeting stream management units with existing low flow limitations and closures for protection, protection of unique aquatic habitat or fish, hydrogeology, residential development potential, and overall WRE planning efficiency. These factors are briefly discussed and summarized in Table 1.

Stream management units under Chapter 173-513 WAC include an unnamed stream draining to Eld Inlet, an unnamed stream draining to Gull Harbor, and Woodward Creek, draining to Woodward Bay. Protection of these stream management units may be more targeted under Alternative #1, because the subbasins that contain them are smaller. On the other hand, offset opportunities may still be targeted to be protective of these streams with larger subbasins under both Alternatives #1 and #2.

Stream and wetland habitat is likely to be similar on each respective peninsula, regardless of whether the waterbodies drain to Eld, Budd, or Henderson Inlets. Streams entering the inlets will have limited fish use and function as pocket estuaries. The stream habitat in the southern portions of each peninsula are more developed and therefore, the stream habitat is generally more degraded.

The hydrogeology of the Cooper Point and Boston Harbor peninsulas is complex and the impact of new permit-exempt domestic well consumptive use will be partly a function of well depth. The delineation of the peninsulas into separate subbasins (as in Alternative #1) does not necessarily reflect the groundwater flow direction divides that would be affected by new permit-exempt domestic well consumptive use.

Residential development potential, as defined by the Thurston Regional Planning Council (TRPC), is similar in the northern portions of the Cooper Point and Boston Harbor peninsulas, but varies in potential in the southern portions. The Cooper Point peninsula has a greater parcel density on the east side. Similarly, the Boston Harbor peninsula has a greater parcel density on the west side. This was part of the rationale for dividing the peninsulas into “east-west” subbasins, as represented by Alternative #1. There may be a benefit to this delineation, in terms of accounting for consumptive use and offsets separately in the more high developed areas. However, if the subbasins were to be combined, as reflected in Alternative #2, the same distribution of offsets could be defined.

WRE planning would be slightly more efficient for Alternative #2, because there would be two fewer subbasins requiring accounting and evaluation, in terms of NEB.

Table 1. Comparison of Alternatives.

| Attribute                            | Alternative #1          | Alternative #2          |
|--------------------------------------|-------------------------|-------------------------|
| Stream Management Units              | More spatially targeted | Less spatially targeted |
| Habitat/Fish                         | Similar habitat         | Similar habitat         |
| Hydrogeology                         | No clear benefit        | No clear benefit        |
| Development Potential                | Some benefit            | No clear benefit        |
| WRE Efficiency (i.e. # of subbasins) | 11 Subbasins            | 9 Subbasins             |

## 4.0 Final Delineation

Ultimately the WRIA 13 Committee agreed that the approach for Alternative #2 reflected the needs of the Committee, and chose to move forward with that delineation.



# Appendix H –Permit-Exempt Growth and Consumptive Use Summary Technical Memo

Technical Memorandum DRAFT



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To: Angela Johnson, Washington State Department of Ecology  
From: Chad Wiseman, HDR  
Copy:  
Date: July 14, 2020  
Subject: WRIA 13 Permit-Exempt Growth and Consumptive Use Summary  
(Work Assignment 2, Tasks 2 and 3)

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## 1.0 Introduction

HDR is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) committees for WRIA 13. This memorandum provides a summary of the analytical methods used for Work Assignment 2 Task 2: Consumptive Use (CU) Estimates, and the final estimates of CU per WRIA.

Under RCW 90.94, consumptive water use by permit-exempt connections occurring over the planning horizon must be estimated to establish the water use that watershed restoration plans and plan updates are required to address and offset. This memorandum summarizes permit-exempt connections and related CU of groundwater that is projected to impact WRIA 13 over the planning horizon.

This memorandum includes:

- A summary of WRIA 13 initial permit-exempt growth and an alternative scenario of permit-exempt growth.
- A summary of WRIA 13 initial and alternative scenario consumptive use using two different methods.

## 2.0 WRIA 13 Permit-Exempt Growth Projection Methods

Permit-exempt growth over the planning horizon was projected using methods at the county scale and then combined at the WRIA scale. Thurston County (working with the Thurston Regional Planning Council) provided methods and results for Thurston County. Note that Thurston County and Lewis County are both within WRIA 13; however, the Lewis County portion is entirely comprised of timberland and so was not included in the projection for new PE wells.

HDR worked with the WRIA 13 workgroup and WRIA 13 committee (the Committee) to define one alternative growth scenario that allowed for some permit-exempt growth in rural water system boundaries based on the proportion of parcels not currently served by their respective water system.

## 2.1 Thurston County Methods

The Thurston County initial permit-exempt growth projections were developed by the Thurston Regional Planning Council (TRPC) (Appendix A). The following is a summary of the TRPC methods:

- 1) Develop 20-year growth projections based on OFM medium population growth estimates, and conversion to dwelling units based on assumed people per dwelling unit (TRPC).
- 2) Develop residential capacity estimates (TRPC).
- 3) Allocate growth to parcels based on recent residential development and permit trends, where capacity is available (TRPC).
- 4) Once allocated, define permit-exempt connections based on the following criteria:
  - a) Growth in rural areas, outside of water systems, is assumed to be permit-exempt growth.
  - b) Growth in incorporated cities is assumed to connect to a municipal water system
  - c) Water systems within UGAs; permit-exempt growth is assumed to occur on parcels with no sewer service.
  - d) Rural water systems; assumed no new permit-exempt growth

An alternative permit-exempt growth projection scenario was developed by assuming that some permit-exempt growth will occur in the rural water system areas (i.e. water systems outside of the urban growth areas). It was assumed growth in each respective rural water system will be proportional to buildable parcels without water system hookups relative to parcels with water system hookups, which changes the assumption in 4b above.

The following methods were applied on top of the initial methods:

1. Define total buildable parcels in GIS, using Department of Health (DOH) service area polygons and county parcel data.
2. Define total approved water system connections (active + available) and active water system connections using the DOH Sentry database (DOH 2019).
3. Buildable parcels with water system hookup = total approved minus active water system connections.
4. Buildable parcels without water system hookup = total buildable parcels minus total approved water system connections.
5. Define proportion of projected permit-exempt growth within each water system by dividing the number of buildable parcels without water system hookups by the total number of buildable parcels.
6. Multiply the proportion of permit-exempt growth within each respective water system by total growth projected to occur in that water system.
7. Sum the additional permit-exempt growth by subbasin and add to the initial permit-exempt growth projection.



This alternative permit-exempt growth projection scenario was accepted by the Committee for consumptive use estimation.

The original permit-exempt growth projections were provided to Ecology and the Committee in 2019 (HDR 2019). In 2020, an error in the TRPC results was identified: 116 permit-exempt wells or connections were projected to occur in the Silver Hawk water system service area, when the water system had adequate connections to accommodate all predicted growth. Therefore, these connections were removed from the original projection (Appendix A). These results were organized by subbasin. The WRIA 13 Committee cited this as an example of uncertainty in the assumptions made in the analysis of where new PE wells are expected to occur.

### 3.0 WRIA 13 Consumptive Use Methods

Under RCW 90.94, consumptive water use (consumptive use) by permit-exempt connections that are forecast to be installed over the planning horizon must be estimated to establish the water offsets required under the Streamflow Restoration law. The following definitions from the *Final Guidance for Determining Net Ecological Benefit - ESSB 6091 - Recommendations for Water Use Estimates* (Ecology's Final NEB Guidance) are used in this memorandum as a guide to estimate consumptive water use by permit-exempt connections (Ecology 2019).

- Consumptive use: water that evaporates, transpires, is consumed by humans, or otherwise removed from an immediate water environment.
- Domestic Use: includes both indoor and outdoor household uses, and watering of a lawn and noncommercial garden.
- New Consumptive Water Use: The consumptive water use from the permit-exempt domestic groundwater withdrawals estimated to be initiated within the 20 year planning horizon (2018 – 2038) (planning horizon).
- Net Ecological Benefit: The outcome that is anticipated to occur through implementation of projects and actions in a plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary.
- Water Offsets: Projects that put water back into aquifers or streams that offset new consumptive water use. Ecology's Final NEB Guidance defines offset as the anticipated ability of a project or action to counterbalance some amount of the new consumptive water use over the next 20 years (2018-2038). Offsets need to continue beyond the 20-year period for as long as new well pumping continues (Ecology 2019).

Ecology has provided guidance for estimating indoor and outdoor consumptive water use in Ecology's Final NEB Guidance (Ecology 2019).

Consumptive use estimates are divided into two components: the indoor and outdoor portions of use. The use patterns and consumptive portions of indoor versus outdoor use associated with permit-exempt connections are different; therefore, separate approaches within each method that account for these differences are used to estimate consumptive use.



Ecology’s indoor consumptive water use guidance includes literature-based assumptions on per-capita indoor water use and the consumptive proportion. Outdoor consumptive water use guidance includes methods for the estimation of irrigated area, assumed irrigation requirements, irrigation efficiency, and the consumptive proportion. Ecology’s guidance also recommends local corroboration using water system meter data for both indoor and outdoor estimates (Ecology 2018; Ecology 2019). For purposes of this technical memorandum, Ecology’s method for estimating consumptive use is called the Irrigated Area method, and estimation of consumptive use using local water system meter data is called the Water System Data method.

Consistent with the Final NEB guidance, the Committee assumed impacts from consumptive use on surface water are steady-state, meaning impacts to the stream from pumping groundwater do not change over time. This assumption is based on the wide distribution of future well locations and depths across varying hydrogeological conditions.

Consumptive use of water from projected permit-exempt connection growth was estimated using two different methods; 1) the Irrigated Area Method and 2) the Water System data Method.

### 3.1 Methods for Indoor and Outdoor Consumptive Use Estimates

Based on Ecology’s Final NEB Guidance (Ecology 2019), estimating indoor and outdoor consumptive water use included literature-based assumptions for both the per capita indoor water use and indoor and outdoor use proportions.

#### 3.1.1 Per Capita Indoor Consumptive Use

The following assumptions were used to estimate indoor consumptive water use by occupants of a dwelling unit (Ecology 2018; 2019):

- 60 gallons per day per person within a household
- 2.5 persons per household (or as otherwise defined by the Counties)
- 10 percent of indoor use is consumptively used

Most homes served by a permit-exempt connection use septic systems for wastewater (Ecology 2019). This method assumes 10 percent of water entering the septic system will evaporate out of the septic drain field and the rest will be returned to the groundwater system.

Assuming that there is one permit-exempt connection per dwelling unit, a “per permit-exempt connection” consumptive use factor was applied to the growth projections forecast in each subbasin to determine total indoor consumptive use per subbasin. This method is summarized by the following equation:

$$HCIWU (AFY) = 60 \text{ gpd} \times 2.5 \text{ people per household} \times 365 \text{ days} \times 10\% \text{ CUF}$$

or

$$\begin{aligned} HCIWU (afy) &= 60 \text{ gpd} \times 2.5 \text{ people per house} \times 365 \text{ days} \times 0.00000307 \text{ AF/gallon} \\ &\quad \times 10\% \text{ CUF} \end{aligned}$$

Where:

HCIWU = Household Consumptive Indoor Water Use (gpd)

CUF= Consumptive use factor

This estimate of indoor consumptive water use per household is 15 gpd and can be annualized and converted to acre-feet per year (AFY) or cubic feet per second (cfs).

### **3.1.2 Outdoor Consumptive Use – Irrigated Area Method**

Ecology (2018; 2019) recommends estimating future outdoor water use based on an evaluation of the average outdoor irrigated area for existing dwelling units served by permit-exempt connections. To calculate the consumptive portion of total outdoor water required per connection, Ecology recommends:

- Estimating the average irrigated lawn area (pasture/turf grass) per parcel,
- Applying crop irrigation requirements,
- Correcting for application efficiency (75 percent efficiency recommended by Ecology guidance) to determine the total outdoor water required over a single growing season, and
- Applying a percentage of outdoor water that is assumed to be consumptive. This method assumes 80 percent of outdoor domestic water use is consumed by evaporation and transpiration.

Future outdoor water use may be based, in part, on an estimate of the average outdoor irrigated area for existing homes served by PE domestic wells (Ecology 2018; 2019). HDR estimated the average irrigated lawn area for WRIA 13 by delineating the apparent irrigated area in 80 parcels identified as containing a dwelling unit served by a permit-exempt well in WRIA 13, and averaging them (Appendix B). The irrigated areas were delineated using one technician and a standard method. The average irrigated area per PE connection in WRIA 13 was estimated to be 0.06 acres. The majority of the parcels evaluated did not have an apparent irrigated area (i.e. most parcels had zero irrigated area).

Bias in the irrigated area delineation methods was evaluated by doing a side-by-side comparison study with another consulting firm, who was providing similar technical support for the WRIAs 7, 8, and 9 WRE plans (Appendix C). This comparability study concluded that there was no inherent bias in the methods. Overall method bias was also evaluated by comparing the CU calculated with this irrigated area method to specific parcels with meter records (Appendix D). The irrigated area method overestimated overall water use, relative to the actual metered use.

Because of the high proportion of zero irrigated acreage measurements contributing to the 0.06 irrigated acreage average, and because of the large variability in the results (e.g. large standard deviation), HDR proposed a range of alternatives to mitigate that uncertainty:

- To account for uncertainty of detecting small areas of irrigation, the Committee could impute the zero values with a “minimum detection” irrigated area of 0.05 acres – which would result in a 0.10 acre average irrigated area size.
- HDR completed an irrigated area comparability study (Attachment C) for the irrigated area parcel analysis, and determined that an additional way to account for uncertainty in “human error” could be done using a “correction factor” – which would result in a 0.09 acre average irrigated area size.
- HDR has completed a statistical analysis of their data, and has determined that using the 95% Upper Confidence Limit of the data (based on initial analysis with 0 values) could be an additional way to account for uncertainty – which would result in a 0.12 acre average irrigated area size.

The Committee decided to move forward with all three of these alternatives as “working numbers”. Consumptive use based on all three acreages were evaluated and compared to the consumptive use calculated from the Water System Data Method. Later, the Committee agreed to include the consumptive use estimate based on the 0.10 acre average irrigated area as the “most likely” estimate, and the consumptive use estimate based on the 0.12 acre average irrigated area as a higher goal to achieve through adaptive management.

Crop irrigation requirements, irrigation efficiency and outdoor use assumptions were also made to estimate outdoor CU. An average crop irrigation requirement of 16.8 inches per year was estimated for pasture/turf grass from nearby stations as provided in the Washington Irrigation Guide, Appendix B (NRCS-USDA, 1997). Irrigation application efficiency (i.e. the percent of water used that actually reaches the turf) was assumed to be 75%, consistent with Ecology (2018; 2019) recommendations. Finally, the consumptive portion of total amount of water used for outdoor use was assumed to be 80 percent. The Committee chose not to modify the irrigation efficiency or indoor and outdoor consumptive factors used in the Irrigation Area Method.

This method is summarized in the following equation:

$$HCOWU (afy) = A (acres) * IR(feet) * AE * CUF$$

Where:

HCOWU = Household Consumptive Outdoor Water Use (gpd)

A = Irrigated Area (acres)

IR = Irrigation Requirement over one irrigation season (feet)

AE = Application efficiency; assumed to be 75% (factor expressed as 1/0.75)

CUF= Consumptive use factor; assumed to be 80% (factor expressed as 0.80)

This estimate of outdoor consumptive water use per household per day can be annualized and converted to gallons per minute (gpm) or cubic feet per second (cfs).

Conversion Factors:

$$\text{gpm} = \text{AFY} * 0.61996$$

$$\text{cfs} = \text{AFY} * 0.00138128$$

This estimate of outdoor consumptive use per household per day is 0.15 AFY (assuming average irrigated area of 0.09 acres), 0.17 AFY (assuming average irrigated area of 0.10 acres) and 0.20 AFY (assuming average irrigated area of 0.12 acres) and can be annualized and converted to acre-feet per year or cubic feet per second.

Seasonal consumptive use was estimated on a monthly basis by allocating total outdoor consumptive use proportional to the monthly irrigation requirement. The monthly irrigation requirement was defined by the Washington Irrigation Guidance.

## 4.0 Water System Data Method

Consumptive use by permit-exempt connections may also be estimated using metered connections from water systems. Water systems required to plan per WAC 246-290 must install meters on all customer connections. Smaller water systems that do not have state planning requirements may choose to meter their customer connections if the system bills based on a tiered rate structure (i.e., increasing costs per unit of water consumed coincident with higher total use in the billing period).

Some systems bill customers a flat rate (i.e., same bill every month regardless of consumption). The lack of a tiered rate structure reduces the financial incentive to conserve water, which may result in consumption patterns more similar to those observed on a permit-exempt connection. These systems may or may not choose to meter their customers if meters are not required by law. In WRIA 13, the Thurston PUD provided data for the Prairie Ridge water system from 2007 – 2010, which billed at a flat rate during that time period.

### 4.1 Indoor Use

Average daily use in December, January, and February is representative of year-round daily indoor use. Average daily system-wide use is divided by the number of permit-exempt connections (assuming all connections are residential), to determine average daily indoor use per permit-exempt connection. Similar to that used in the Ecology Irrigated Area method, a 10 percent consumptive use factor was applied to the average daily use in the winter months to determine the consumptive portion of indoor water use per connection.

### 4.2 Annual Outdoor Water Use

Average daily indoor use was multiplied by the number of days in a year to estimate total annual indoor use. Total annual indoor use was then subtracted from total annual use by a water system to estimate total annual outdoor use. Similar to that used in the Ecology Irrigated Area Method, an 80 percent consumptive factor was applied to determine the consumptive portion of outdoor use.

### 4.3 Seasonal Outdoor Water Use

Outdoor consumptive use was also estimated on a seasonal basis. The Washington Irrigation Guide reports irrigation requirements between the months of April and September for representative weather stations in WRIA 13, therefore seasonal outdoor water use was assumed to occur over a period of six months (April through September). Average daily indoor use was multiplied by the

number of days in the irrigation season to calculate total indoor use for the irrigation season. Total irrigation season indoor use was then subtracted from total season use to determine total outdoor use for the irrigation season. The value was proportionally allocated to each month in the irrigation season using the requirements from the Washington Irrigation Guide. An 80 percent consumptive factor was applied to determine the consumptive portion of outdoor use.

## 5.0 Results

### 5.1 Permit-Exempt Connection Growth

Initial permit-exempt connection growth is projected to be 2,309 connections (Table 1). The alternative Revised Permit-Exempt Connection Growth scenario is projected to have 307 additional connections, for a total of 2,616 permit-exempt connections. Permit-exempt connection growth is expected to be greatest in the “Deschutes Middle” subbasin. The Revised Permit-Exempt Connection Growth scenario was selected by the Committee for use in consumptive use estimates.

Table 1. WRIA 13 Alternative Growth Projection Scenarios.

| Subbasin         | Initial Growth Estimate | Revised Growth Estimate Including Water System Service Areas |
|------------------|-------------------------|--------------------------------------------------------------|
| Boston Harbor    | 236                     | 296                                                          |
| Cooper Point     | 171                     | 232                                                          |
| Deschutes Lower  | 341                     | 379                                                          |
| Deschutes Middle | 715                     | 734                                                          |
| Deschutes Upper  | 29                      | 30                                                           |
| Johnson Point    | 412                     | 520                                                          |
| McLane           | 163                     | 165                                                          |
| Spurgeon Creek   | 88                      | 92                                                           |
| Woodland Creek   | 154                     | 168                                                          |
| Totals           | 2309                    | 2616                                                         |

### 5.2 Consumptive Use

The WRIA-wide consumptive use estimates using the Irrigated area method were 0.55 cfs (average irrigated area of 0.09 acres), 0.60 cfs (average irrigated area of 0.10 acres), and 0.71 cfs (average irrigated area of 0.12 acres) (Tables 2- 4).

The water system data analysis for WRIA 13 was conducted using consumption data averaged between years 2007 – 2010 from the Prairie Ridge Water System, managed by the Thurston PUD. Consumptive use was projected to be 0.64 cfs (Tables 2 - 4). The Prairie Ridge Water System charges a flat rate for water service and services homes with large lawns that customers heavily irrigate. While some households on permit-exempt connections may exhibit this type of behavior, several members of the Committee have expressed concern that this may not be representative of the “average” household on a permit-exempt connection.

Estimates of consumptive use using the Irrigated Area method are greater than or less than the water system data estimates, depending on the assumed average irrigated area. The Committee selected the irrigated area method for a consumptive use estimate.

- 1 Table 2. Annualized Average Outdoor Consumptive Use Estimates for WRIA 13 (20 year planning horizon) – 0.09 acres average  
 2 irrigated area (correction factor).<sup>75</sup>

| Subbasin         | Projected No.<br>Permit-exempt<br>Connection | Annual Consumptive Use:<br>Water System Estimate |            |             | Annual Consumptive Use:<br>Irrigated Area Estimate (per Ecology Guidance) |            |             |
|------------------|----------------------------------------------|--------------------------------------------------|------------|-------------|---------------------------------------------------------------------------|------------|-------------|
|                  |                                              | AFY                                              | GPM        | CFS         | AFY                                                                       | GPM        | CFS         |
| Boston Harbor    | 296                                          | 52                                               | 32         | 0.07        | 45                                                                        | 28         | 0.06        |
| Cooper Point     | 232                                          | 41                                               | 25         | 0.06        | 35                                                                        | 22         | 0.05        |
| Deschutes Lower  | 379                                          | 67                                               | 41         | 0.09        | 57                                                                        | 36         | 0.08        |
| Deschutes Middle | 734                                          | 129                                              | 80         | 0.18        | 111                                                                       | 69         | 0.15        |
| Deschutes Upper  | 30                                           | 5                                                | 3          | 0.01        | 5                                                                         | 3          | 0.01        |
| Johnson Point    | 520                                          | 92                                               | 57         | 0.13        | 79                                                                        | 49         | 0.11        |
| McLane           | 165                                          | 29                                               | 18         | 0.04        | 25                                                                        | 15         | 0.03        |
| Spurgeon Creek   | 92                                           | 16                                               | 10         | 0.02        | 14                                                                        | 9          | 0.02        |
| Woodland Creek   | 168                                          | 30                                               | 18         | 0.04        | 25                                                                        | 16         | 0.04        |
| <b>Totals</b>    | <b>2616</b>                                  | <b>461</b>                                       | <b>286</b> | <b>0.64</b> | <b>396</b>                                                                | <b>245</b> | <b>0.55</b> |

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<sup>75</sup> Outdoor consumptive water use estimates were rounded to the nearest whole number.



- 1 Table 3. Annualized Average Outdoor Consumptive Use Estimates for WRIA 13 (20 year planning horizon) – 0.10 acres average
- 2 irrigated area (minimum detection value of 0.05 irrigated acres).<sup>76</sup>

| Subbasin         | Projected No.<br>Permit-exempt<br>Connection | Annual Consumptive Use:<br>Water System Estimate |            |             | Annual Consumptive Use:<br>Irrigated Area Estimate (per Ecology Guidance) |            |             |
|------------------|----------------------------------------------|--------------------------------------------------|------------|-------------|---------------------------------------------------------------------------|------------|-------------|
|                  |                                              | AFY                                              | GPM        | CFS         | AFY                                                                       | GPM        | CFS         |
| Boston Harbor    | 296                                          | 52                                               | 32         | 0.07        | 49                                                                        | 30         | 0.07        |
| Cooper Point     | 232                                          | 41                                               | 25         | 0.06        | 39                                                                        | 24         | 0.05        |
| Deschutes Lower  | 379                                          | 67                                               | 41         | 0.09        | 63                                                                        | 39         | 0.09        |
| Deschutes Middle | 734                                          | 129                                              | 80         | 0.18        | 122                                                                       | 76         | 0.17        |
| Deschutes Upper  | 30                                           | 5                                                | 3          | 0.01        | 5                                                                         | 3          | 0.01        |
| Johnson Point    | 520                                          | 92                                               | 57         | 0.13        | 86                                                                        | 54         | 0.12        |
| McLane           | 165                                          | 29                                               | 18         | 0.04        | 27                                                                        | 17         | 0.04        |
| Spurgeon Creek   | 92                                           | 16                                               | 10         | 0.02        | 15                                                                        | 9          | 0.02        |
| Woodland Creek   | 168                                          | 30                                               | 18         | 0.04        | 28                                                                        | 17         | 0.04        |
| <b>Totals</b>    | <b>2616</b>                                  | <b>461</b>                                       | <b>286</b> | <b>0.64</b> | <b>435</b>                                                                | <b>269</b> | <b>0.60</b> |

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<sup>76</sup> Outdoor consumptive water use estimates were rounded to the nearest whole number.

1 Table 4. Annualized Average Outdoor Consumptive Use Estimates for WRIA 13 (20 year planning horizon) – 0.12 acres average  
 2 irrigated area 95% Upper Confidence Limit).<sup>77</sup>

| Subbasin         | Projected No.<br>Permit-exempt<br>Connection | Annual Consumptive Use:<br>Water System Estimate |            |             | Annual Consumptive Use:<br>Irrigated Area Estimate (per Ecology Guidance) |            |             |
|------------------|----------------------------------------------|--------------------------------------------------|------------|-------------|---------------------------------------------------------------------------|------------|-------------|
|                  |                                              | AFY                                              | GPM        | CFS         | AFY                                                                       | GPM        | CFS         |
| Boston Harbor    | 296                                          | 52                                               | 32         | 0.07        | 58                                                                        | 36         | 0.08        |
| Cooper Point     | 232                                          | 41                                               | 25         | 0.06        | 45                                                                        | 28         | 0.06        |
| Deschutes Lower  | 379                                          | 67                                               | 41         | 0.09        | 74                                                                        | 46         | 0.10        |
| Deschutes Middle | 734                                          | 129                                              | 80         | 0.18        | 144                                                                       | 89         | 0.20        |
| Deschutes Upper  | 30                                           | 5                                                | 3          | 0.01        | 6                                                                         | 4          | 0.01        |
| Johnson Point    | 520                                          | 92                                               | 57         | 0.13        | 102                                                                       | 63         | 0.14        |
| McLane           | 165                                          | 29                                               | 18         | 0.04        | 32                                                                        | 20         | 0.04        |
| Spurgeon Creek   | 92                                           | 16                                               | 10         | 0.02        | 18                                                                        | 11         | 0.02        |
| Woodland Creek   | 168                                          | 30                                               | 18         | 0.04        | 33                                                                        | 20         | 0.05        |
| <b>Totals</b>    | <b>2616</b>                                  | <b>461</b>                                       | <b>286</b> | <b>0.64</b> | <b>513</b>                                                                | <b>318</b> | <b>0.71</b> |

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<sup>77</sup> Outdoor consumptive water use estimates were rounded to the nearest whole number.

## 6.0 Seasonal Use

Monthly outdoor water use was calculated as part of the consumptive use analysis for the Irrigated Area method. Seasonal water use by month is reported by subbasin and consumptive use scenario (Table 5 - 7). The month of July has the highest irrigation requirement, resulting in the highest monthly consumptive use impact. This information may be used when evaluating projects designed to offset subbasin- and season-specific impacts.

1 Table 5: WRIA 13 Monthly Outdoor Consumptive Water Use- 0.09 acres average irrigated area (correction factor)

| Subbasin         | Projected No. Permit-exempt Connections | Consumptive Use by Month (cfs) |        |        |        |        |        |        |        |        |        |        |        |
|------------------|-----------------------------------------|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                  |                                         | Jan                            | Feb    | March  | April  | May    | June   | July   | Aug    | Sept   | Oct    | Nov    | Dec    |
| Boston Harbor    | 296                                     | 0.0028                         | 0.0028 | 0.0028 | 0.0243 | 0.0956 | 0.1390 | 0.1983 | 0.1385 | 0.0764 | 0.0028 | 0.0028 | 0.0028 |
| Cooper Point     | 232                                     | 0.0022                         | 0.0022 | 0.0022 | 0.0190 | 0.0749 | 0.1089 | 0.1555 | 0.1086 | 0.0598 | 0.0022 | 0.0022 | 0.0022 |
| Deschutes Lower  | 379                                     | 0.0035                         | 0.0035 | 0.0035 | 0.0311 | 0.1224 | 0.1779 | 0.2539 | 0.1774 | 0.0978 | 0.0035 | 0.0035 | 0.0035 |
| Deschutes Middle | 734                                     | 0.0068                         | 0.0068 | 0.0068 | 0.0603 | 0.2371 | 0.3446 | 0.4918 | 0.3435 | 0.1893 | 0.0068 | 0.0068 | 0.0068 |
| Deschutes Upper  | 30                                      | 0.0003                         | 0.0003 | 0.0003 | 0.0025 | 0.0097 | 0.0141 | 0.0201 | 0.0140 | 0.0077 | 0.0003 | 0.0003 | 0.0003 |
| Johnson Point    | 520                                     | 0.0048                         | 0.0048 | 0.0048 | 0.0427 | 0.1680 | 0.2441 | 0.3484 | 0.2433 | 0.1341 | 0.0048 | 0.0048 | 0.0048 |
| McLane           | 165                                     | 0.0015                         | 0.0015 | 0.0015 | 0.0135 | 0.0533 | 0.0775 | 0.1106 | 0.0772 | 0.0426 | 0.0015 | 0.0015 | 0.0015 |
| Spurgeon Creek   | 92                                      | 0.0009                         | 0.0009 | 0.0009 | 0.0076 | 0.0297 | 0.0432 | 0.0616 | 0.0431 | 0.0237 | 0.0009 | 0.0009 | 0.0009 |
| Woodland Creek   | 168                                     | 0.0016                         | 0.0016 | 0.0016 | 0.0138 | 0.0543 | 0.0789 | 0.1126 | 0.0786 | 0.0433 | 0.0016 | 0.0016 | 0.0016 |
| Totals           | 2,616                                   | 0.02                           | 0.02   | 0.02   | 0.21   | 0.85   | 1.23   | 1.75   | 1.22   | 0.67   | 0.02   | 0.02   | 0.02   |

2 Table 6: WRIA 13 Monthly Outdoor Consumptive Water Use – 0.10 acres average irrigated area (minimum detection value of 0.05  
3 irrigated acres)

| Subbasin         | Projected No. Permit-exempt Connections | Consumptive Use by Month (cfs) |        |        |        |        |        |        |        |        |        |        |        |
|------------------|-----------------------------------------|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                  |                                         | Jan                            | Feb    | March  | April  | May    | June   | July   | Aug    | Sept   | Oct    | Nov    | Dec    |
| Boston Harbor    | 296                                     | 0.0028                         | 0.0028 | 0.0028 | 0.0267 | 0.1059 | 0.1541 | 0.2201 | 0.1536 | 0.0845 | 0.0028 | 0.0028 | 0.0028 |
| Cooper Point     | 232                                     | 0.0022                         | 0.0022 | 0.0022 | 0.0209 | 0.0830 | 0.1208 | 0.1725 | 0.1204 | 0.0663 | 0.0022 | 0.0022 | 0.0022 |
| Deschutes Lower  | 379                                     | 0.0035                         | 0.0035 | 0.0035 | 0.0342 | 0.1357 | 0.1973 | 0.2818 | 0.1967 | 0.1082 | 0.0035 | 0.0035 | 0.0035 |
| Deschutes Middle | 734                                     | 0.0068                         | 0.0068 | 0.0068 | 0.0662 | 0.2627 | 0.3822 | 0.5457 | 0.3809 | 0.2096 | 0.0068 | 0.0068 | 0.0068 |
| Deschutes Upper  | 30                                      | 0.0003                         | 0.0003 | 0.0003 | 0.0027 | 0.0107 | 0.0156 | 0.0223 | 0.0156 | 0.0086 | 0.0003 | 0.0003 | 0.0003 |
| Johnson Point    | 520                                     | 0.0048                         | 0.0048 | 0.0048 | 0.0469 | 0.1861 | 0.2707 | 0.3866 | 0.2698 | 0.1485 | 0.0048 | 0.0048 | 0.0048 |
| McLane           | 165                                     | 0.0015                         | 0.0015 | 0.0015 | 0.0149 | 0.0591 | 0.0859 | 0.1227 | 0.0856 | 0.0471 | 0.0015 | 0.0015 | 0.0015 |
| Spurgeon Creek   | 92                                      | 0.0009                         | 0.0009 | 0.0009 | 0.0083 | 0.0329 | 0.0479 | 0.0684 | 0.0477 | 0.0263 | 0.0009 | 0.0009 | 0.0009 |
| Woodland Creek   | 168                                     | 0.0016                         | 0.0016 | 0.0016 | 0.0152 | 0.0601 | 0.0875 | 0.1249 | 0.0872 | 0.0480 | 0.0016 | 0.0016 | 0.0016 |
| Totals           | 2,616                                   | 0.02                           | 0.02   | 0.02   | 0.24   | 0.94   | 1.36   | 1.94   | 1.36   | 0.75   | 0.02   | 0.02   | 0.02   |

4

1 Table 7: WRIA 13 Monthly Outdoor Consumptive Water Use - -- 0.12 acres average irrigated area 95% Upper Confidence Limit)

| Subbasin         | Projected No. Permit-exempt Connections | Consumptive Use by Month (cfs) |        |        |        |        |        |        |        |        |        |        |        |
|------------------|-----------------------------------------|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                  |                                         | Jan                            | Feb    | March  | April  | May    | June   | July   | Aug    | Sept   | Oct    | Nov    | Dec    |
| Boston Harbor    | 296                                     | 0.0028                         | 0.0028 | 0.0028 | 0.0315 | 0.1266 | 0.1844 | 0.2635 | 0.1838 | 0.1009 | 0.0028 | 0.0028 | 0.0028 |
| Cooper Point     | 232                                     | 0.0022                         | 0.0022 | 0.0022 | 0.0247 | 0.0992 | 0.1445 | 0.2065 | 0.1440 | 0.0791 | 0.0022 | 0.0022 | 0.0022 |
| Deschutes Lower  | 379                                     | 0.0035                         | 0.0035 | 0.0035 | 0.0403 | 0.1621 | 0.2361 | 0.3374 | 0.2353 | 0.1292 | 0.0035 | 0.0035 | 0.0035 |
| Deschutes Middle | 734                                     | 0.0068                         | 0.0068 | 0.0068 | 0.0781 | 0.3139 | 0.4572 | 0.6535 | 0.4557 | 0.2502 | 0.0068 | 0.0068 | 0.0068 |
| Deschutes Upper  | 30                                      | 0.0003                         | 0.0003 | 0.0003 | 0.0032 | 0.0128 | 0.0187 | 0.0267 | 0.0186 | 0.0102 | 0.0003 | 0.0003 | 0.0003 |
| Johnson Point    | 520                                     | 0.0048                         | 0.0048 | 0.0048 | 0.0553 | 0.2224 | 0.3239 | 0.4630 | 0.3228 | 0.1772 | 0.0048 | 0.0048 | 0.0048 |
| McLane           | 165                                     | 0.0015                         | 0.0015 | 0.0015 | 0.0176 | 0.0706 | 0.1028 | 0.1469 | 0.1024 | 0.0562 | 0.0015 | 0.0015 | 0.0015 |
| Spurgeon Creek   | 92                                      | 0.0009                         | 0.0009 | 0.0009 | 0.0098 | 0.0393 | 0.0573 | 0.0819 | 0.0571 | 0.0314 | 0.0009 | 0.0009 | 0.0009 |
| Woodland Creek   | 168                                     | 0.0016                         | 0.0016 | 0.0016 | 0.0179 | 0.0718 | 0.1047 | 0.1496 | 0.1043 | 0.0573 | 0.0016 | 0.0016 | 0.0016 |
| Totals           | 2,616                                   | 0.02                           | 0.02   | 0.02   | 0.28   | 1.12   | 1.63   | 2.33   | 1.62   | 0.89   | 0.02   | 0.02   | 0.02   |

2

## 3 7.0 References

- 4 Ecology. 2018. *Recommendations for Water Use Estimates*. Washington State Department of Ecology, Publication 18-11-007.
- 5 Ecology. 2019. Final Guidance for Determining Net Ecological Benefit. Washington State Department of Ecology, Publication 19-11-079.
- 6
- 7 Natural Resource Conservation Service, 1997. Washington Irrigation Guide (WAIG). U.S. Department of Agriculture.

## Attachment A

### Estimation of Average Irrigated Area

#### Methods

1. 80 parcels representing an existing dwelling served by a permit-exempt well or connection was defined.
  - a. A pool of parcels with an existing dwelling served by a permit-exempt well or connection was defined.
  - b. The selection pool was classified by property value. The classes were 1) Under \$350,000, 2) \$350,000 – \$600,000, and 3) over \$600,000.
  - c. 80 parcels were randomly drawn from the selection pool, weighted by the proportion of property value class membership.
  - d. Additional parcels were randomly selected as alternates, in case any of the primary (80) samples were able to be interpreted to irrigated area.
  - e. All parcels were provided in a Google Earth .kmz file.
2. The irrigated area in each parcel was delineated according to the following procedure:
  - a. Used a single technician to minimize operator variability.
  - b. Irrigated area delineations were made using Google Earth aerial imagery taken during drier summer months (i.e., July and August). Unirrigated lawns (pasture/turf) go dormant in the dry summer months and turn brown. As such, areas that remain green in the summer imagery were considered irrigated.
  - c. Aerial imagery from winter months was reviewed alongside summer imagery to reveal which lawn areas change from green to brown. Those areas that do not change color, or moderately change color but remain green, were considered irrigated.
  - d. If available, multiple years of aerial imagery were used to corroborate the irrigated area delineation.
  - e. Landscaped shrub/flower bed areas within a larger irrigated footprint were included. Shrub and flower bed areas outside of the irrigated footprint were excluded.
  - f. If the irrigated area extended beyond the parcel boundary, those areas were included.
  - g. Parcels with no visible signs of irrigation were assumed to have zero irrigated acres.
  - h. Areas that appeared to be native forest or unmaintained grass were not included in the irrigated footprint.

- 1           i.   Parcels with homes or ADUs under construction in the most recent Google Earth
- 2           imagery were excluded from the analysis, and an alternate parcel was evaluated.
- 3   Figures B-1 through B-4 illustrate some example delineations.





1  
2 Figure B-1. No irrigated areas visible in most recent google earth aerial imagery.



3  
4 Figure B-2. Area in white includes maintained grass. Residence constructed between June  
5 2017 and July 2018. Therefore, historical irrigation of property is unavailable in GoogleEarth  
6 imagery



1

2

3

Figure B-3. Irrigated area includes landscaped area in driveway, maintained yard around residence, garden area, and maintained grass near garden area.



4

5

6

7

8

Figure B-4. No irrigated area. Assumption that green vegetation on southern portion of parcel is due to proximity to Spurgeon Creek since clear delineation of irrigated area is not present on aerial. Green area near residence appears to be tree and shrubs, not maintained landscaping and is excluded.



## Results

Eighty parcels were evaluated for irrigated acreage (Figure B-5). Average irrigated acreage was 0.15 acres (Table B-1). In all WRIs evaluated, most of the parcels had zero irrigated acres (Figure B-6). The distribution of irrigated acreages for all WRIs were skewed, because of the large percentage of parcels that had zero irrigated acres. Some parcels had an irrigated area nearly an order of magnitude larger than the mean, resulting in a large standard deviation. The 95% upper confidence limit of the mean could only be fit with a non-parametric distribution and was about two times the quantity of the calculated arithmetic mean.

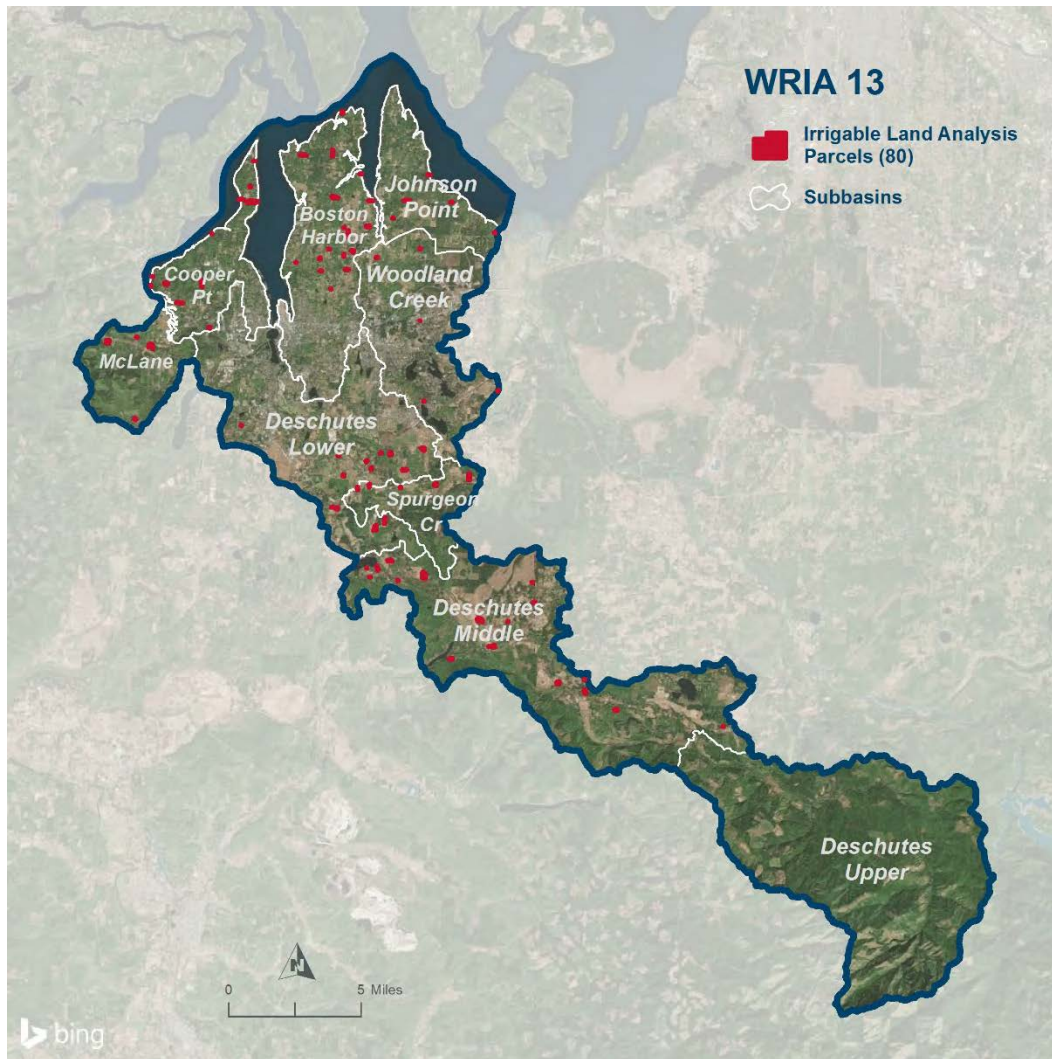
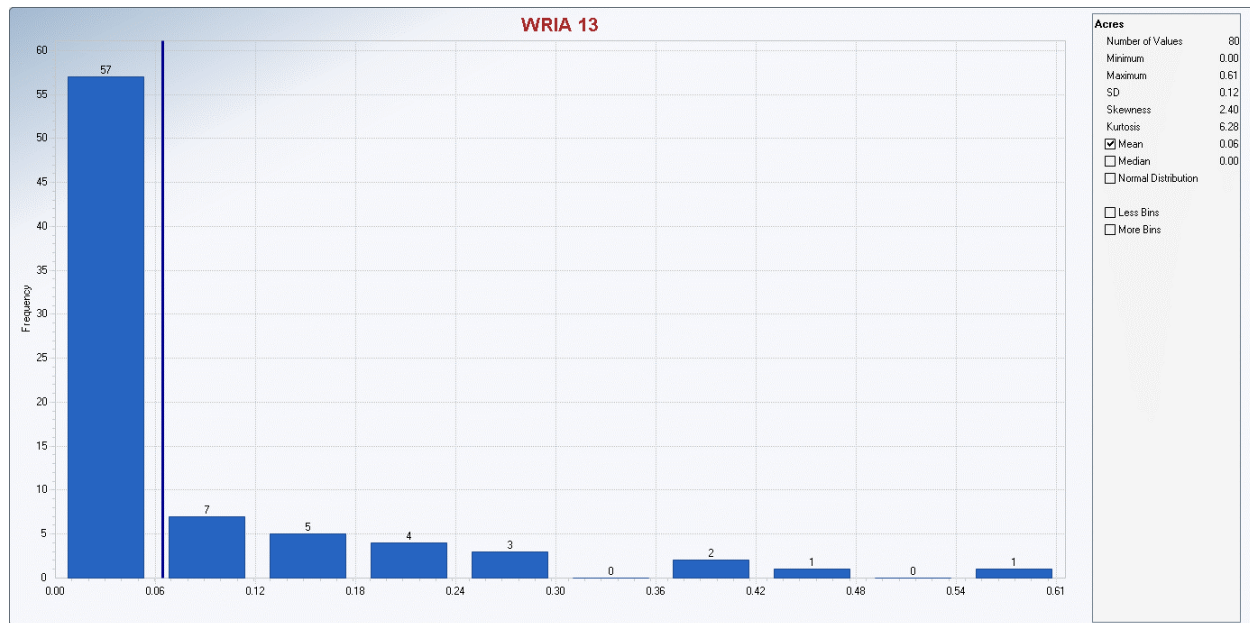


Figure B-5. Parcels selected in WRIA 13 with existing PE connections that were delineated for apparent irrigated areas.

1 Table B-1. Irrigated acreage delineation results.

| Statistic                              | WRIA 13 |
|----------------------------------------|---------|
| PE Parcel Sample Pool                  | 7,271   |
| Sample Size                            | 80      |
| Mean (acres)                           | 0.06    |
| Mean with 0.05 minimum acreage (acres) | 0.10    |
| Standard Deviation (acres)             | 0.12    |
| 95% UCL (acres)                        | 0.12    |

2



3

4 Figure 2. Histogram of WRIA 13 irrigated acreage delineation results

## Attachment C

### Consumptive Use Corroboration Analysis

Thurston, Mason, and Kitsap PUDs provided water consumption data for several systems with a small number of connections. These systems were analyzed using both consumptive use estimation methods. All parcels in each system were analyzed for irrigated area, providing a direct comparison between the water estimated using the Irrigated Area method and the actual measured consumption by the water system. Table 13 contains the results of the corroboration analysis.

Table 13: Annual and Seasonal Consumptive Use Corroboration Analysis

| WRIA – Water System        | Annual Consumptive Use (gpd per household) |                       |                                 | Seasonal Consumptive Use (gpd per household) |                       |                                 |                   |                       |                                 |
|----------------------------|--------------------------------------------|-----------------------|---------------------------------|----------------------------------------------|-----------------------|---------------------------------|-------------------|-----------------------|---------------------------------|
|                            | Water System Data                          | Irrigated Area Method | Percent Difference <sup>1</sup> | Summer                                       |                       |                                 | Winter            |                       |                                 |
|                            |                                            |                       |                                 | Water System Data                            | Irrigated Area Method | Percent Difference <sup>1</sup> | Water System Data | Irrigated Area Method | Percent Difference <sup>1</sup> |
| WRIA 12 – Whiskey Hollow   | 53.6                                       | 181.1                 | 238                             | 85.8                                         | 346.3                 | 304                             | 11.2              | 15.0                  | 34                              |
| WRIA 13 – Rich Road        | 52.6                                       | 113.2                 | 115                             | 86.8                                         | 210.8                 | 143                             | 7.3               | 15.0                  | 107                             |
| WRIA 14 – Canyonwood Beach | 29.3                                       | 86.4                  | 195                             | 51.2                                         | 157.4                 | 207                             | 7.2               | 15.0                  | 107                             |
| WRIA 15 – Echo Valley      | 76.7                                       | 75.5                  | -2                              | 137.9                                        | 135.7                 | -2                              | 15.2              | 15.0                  | -1                              |

<sup>1</sup>Change in consumptive use from the Water System Data Method to the Irrigated Area Method.

The Irrigated Area method estimated consumptive use values at least double those estimated from the Water System Data method in WRIAs 12, 13, and 14. This is true for both indoor and outdoor use. The exception is winter consumptive use in the Whiskey Hollow system, which suggests customers purchasing water from Whiskey Hollow use indoor water at a rate similar to that assumed in the Irrigated Area method (i.e. 60 gpd per person). The Echo Valley system in WRIA 15 has a slight decrease in estimated consumptive use in the Irrigated Area method compared to the Water System Data method. Customers in this system may heavily irrigate their lawns, or the estimate of total irrigated area in the system may be biased low. No small water system data were provided in WRIA 10.

## **Appendix I – Detailed Project Descriptions**

- 1) Chambers Creek Habitat Project
- 2) Donnelley Drive Infiltration Galleries
- 3) Floodplain Restoration
- 4) Forest Stand-Age
- 5) Hicks Lake SW Retrofit
- 6) Managed Aquifer Recharge Projects in WRIA 13
- 7) Schneider’s Prairie Off-Channel Storage and Release
- 8) Small-Scale LID Project Development
- 9) Spurgeon Creek Remeander Habitat Project
- 10) Water Right Opportunities
- 11) Woodard Creek

# Chambers Creek Habitat Project

## Project Description

### Description

Chambers Creek is a tributary of the Deschutes River in Thurston County and is listed as high priority for restoration (SIT 2015). Thurston County is proposing to re-meander a series of ditched channels through the adjacent wet fields south of Yelm Highway and east of Rich Road (Figure 1). The proposed project is intended to improve aquatic and salmonid habitat. The project has the potential to provide a connection to existing Coho Salmon spawning habitat in the lower basin.

The goal of the project is to improve fish productivity and survival within Chambers Creek by enhancing the quality and quantity of instream habitat within the project reach. Habitat within Chambers Creek is currently impaired, by lack of riparian vegetation and large woody debris, simplification of instream habitats, poor floodplain connectivity, channel incision and poor water quality.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

The Chambers Creek restoration project is located at the confluence with Chambers Ditch, in Thurston County. At the project location, Chambers Creek, Chambers Ditch, and an unnamed tributary converge, and are ditched through a wet field (Figure 1). The proposed project area is both in designated wetland and floodplain. Thurston County will work with the landowners to recreate the natural stream sinuosity and the surrounding wetland. Additionally, wood structures will be added that offer refuge from predators and opportunities for salmon to feed, while the wetland offers slower water during high flow events. Native plants will be planted throughout the  $\frac{3}{4}$ -acre project area that will recruit wood and provide shade into the future.

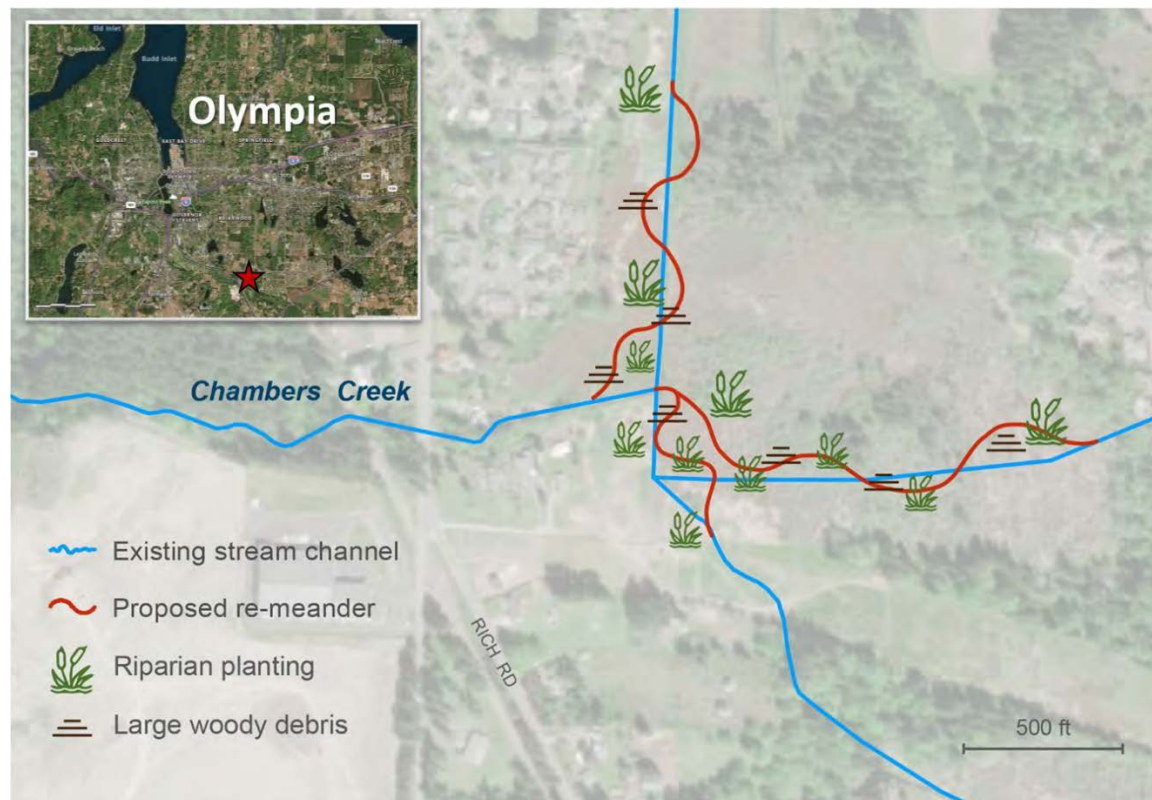
Chambers Creek is a lowland tributary to the Deschutes River and a critical contributor of cold water. Overall, the Chambers Creek basin is composed of 8,323 acres that drain to Chambers, Little Chambers, Smith Lake, Chambers Ditch, and Chambers Creek. Chambers/Little Chambers Lake complex is the largest waterbody in the basin. It does not have a feeder system, but Little Chambers Lake does form the headwaters for Chambers Ditch. Smith Lake is a 12-acre, groundwater-fed lake (Thurston County, 1995). Chambers Ditch is a seasonal stream that was ditched for most of its length early in the century. Chambers Ditch flows from Chambers Lake south to its juncture with Chambers Creek and the South Tributary upstream of Rich Road. Chambers Creek is a natural stream with year-round flow through most of its length. Chambers Creek flows into the Deschutes River. The South Tributary is a network of natural channels, artificial ditches, and poorly defined wetlands, which flows intermittently and remains dry most of the year (Thurston County, 1995).



The proposed project is intended to improve water quality and increase salmon rearing habitat for juvenile Coho Salmon. The system is modeled as habitat for Fall Chinook, Coho and Chum Salmon. Specifically, the project will designed to accomplish the following:

- Increase stream length by at least 1/8 miles.
- Restore at least 1/3 mile of creek.
- Increase instream shading.
- Increase instream complexity by adding Large Woody Debris (LWD).
- Increase community involvement.

### Conceptual-level map and drawings of the project and location.



**Figure 1. Location of proposed Chambers Creek re-meander project in Thurston County.**

## **Description of the anticipated spatial distribution of likely benefits**

The proposed project site is approximately 3 acres. Within that footprint, the length of Chambers Creek is expected to be increased by increasing the sinuosity. The new channel alignment will have improved instream habitat, floodplain connectivity (i.e. local flooding from increased sinuosity channel roughness elements), and increased groundwater storage (i.e. in terms of saturated soils from increased local flooding).

## **Performance goals and measures.**

The performance goals are to increase channel sinuosity and length, increase instream habitat complexity, and channel roughness. Specific metrics and measures will be defined when during feasibility and design.

## **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Washington Department of Fish and Wildlife has identified that Coho Salmon and Fall Chinook are present in Chambers Creek and that Coho Salmon and Fall Chinook have access to Chambers Creek (WDFW Salmonscape 2020). WDFW (2020) documents spawning in Chambers Creek and small areas in the lowermost reaches (WDFW 2020). The Washington Stream Catalog indicates that both Coho, Chum, and Chinook salmon were historically present in Chambers Creek which is identified as an important tributary to the Deschutes River (WDF 1975). Chambers Creek also provides habitat for reticulate sculpin, Olympic mudminnow, wood duck, and waterfowl overwintering.

Chambers Creek has inadequate spawning gravel and low summer flows (Haring and Konovsky, 1999). Chambers Creek offers three types of coho habitat. The segment near the mouth contains a few spawning sites. The lower section provides year-round rearing habitat from the springs below Rich Road to the mouth. The portion from the springs below Rich Road up to a point below Yelm Highway provides winter habitat as long as the creek is flowing. The area near the mouth of Chambers Creek is the best remaining habitat for anadromous fish in the basin with relatively clean gravel, large trees, and a well-developed understory near the creek that provides shading. Upstream from the mouth, the habitat quality declines. The riparian cover gives way to open fields south of the creek below Rich Road (Thurston County, 1995). The lower quarter mile of the South Tributary upstream of Rich Road contains viable seasonal habitat for migrating fish, with fair overhanging cover and in-stream woody debris. However, upstream, it has been channelized through agricultural lands, and disappears frequently in the wetlands. There is poor substrate and very little large organic debris in the channel (Thurston County, 1995).

## **Identification of anticipated support and barriers to completion.**

Thurston County has indicated support for this project. The primary barrier to completion is likely to be land acquisition or obtaining conservation easements. The proposed project area includes privately owned parcels.

## **Potential budget and O&M costs.**

The total costs of construction, engineering, permitting, and cultural assessments are estimated to be <\$1 million, based on an order of magnitude estimate (includes engineering and construction costs).

**Anticipated durability and resiliency.**

The project would have lasting benefits as it would be actively managed by Thurston County or their future project partner. The restored stream section would be designed to be compatible with natural ecological processes to be self-sustaining and resilient to perturbations to minimize long-term maintenance costs.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

The project sponsor is Thurston County and is ready to implement the project. Implementation would require an evaluation of feasibility.

## References

- Haring, D. and J. Konovsky. 1999. Salmon Habitat Limiting Factors Final Report. Water Resource Inventory Area 13. Washington State Conservation Commission.
- Thurston County Storm and Surface Water Program. (1995a). Chambers/Ward/Hewitt Comprehensive Drainage Basin Plan. Prepared for the City of Olympia and Thurston County.
- Squaxin Island Tribe (SIT). 2015. Deschutes River Coho Salmon Biological Recovery Plan. Prepared by Confluence Environmental Company and Shane Cherry Consulting. <http://blogs.nwifc.org/psp/files/2017/12/Deschutes-Coho-Recovery-Plan.pdf>. September 2015.
- WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).
- WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

## Donnelly Drive Infiltration Galleries

**To:** Angela Johnson (Ecology and Kaitlynn Nelson (Thurston County)  
**From:** HDR  
**Date:** May 20, 2020  
**Subject:** Donnelly Drive Infiltration Gallery Analysis

### Background

Portions of Donnelly Drive SE, and Normandy Drive SE flood during major rainfalls and impacts public property and reduces public safety. Thurston County Roads Maintenance has routinely responded to calls from residents for assistance. It is proposed to install treatment devices and infiltration systems in the Donnelly Drive vicinity to reduce flooding of public streets and promote infiltration to groundwater. There are five locations in the area which see flood issues as shown on Figure 1. Each of these locations are a low point where an existing drywell is located to infiltrate stormwater.

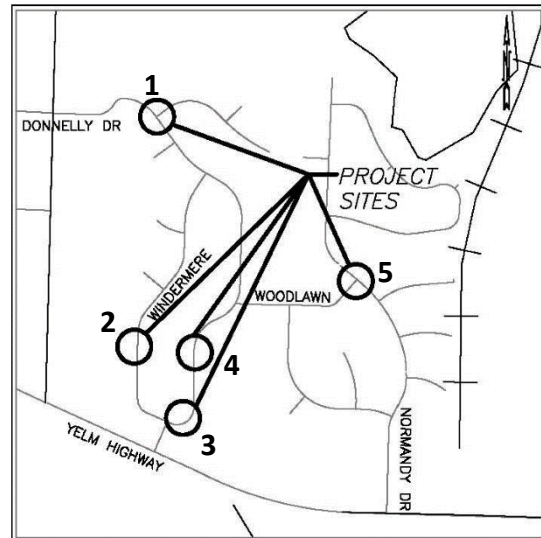


Figure 6. Flooding areas

At Location 1 (at the intersection of Donnelly Drive SE and Glendale Drive SE) is a single drywell installed at some point after the original neighborhood was built.

At location 2 (along Windermere Drive SE) are two drywells installed on either side of the roadway. The drywells are original to the initial construction of the neighborhood.

At location 3 (at the intersection of Donnelly Drive SE and Windemere Drive SE near Yelm Highway), are three drywells installed on all sides of the intersection, all of which were installed at some point after the original neighborhood was built.

At location 4 (along Donnelly Drive SE) are two drywells installed on either side of the roadway. The drywells are original to the initial construction of the neighborhood.

At location 5 (intersection of Woodlawn Drive SE and Normandy Drive SE), are three inlet inlets. Two of these are located on the west side of the intersection and one is located on the south side of the intersection. It is unclear how many of these are drywells.

### Analysis and Results

#### Site Visit

During the rainfall event, it was observed that the drywells at Locations 2 and 4 were fully surcharged and bypassing all flow reaching them with negligible infiltration.

At Location 5, the northern most inlet was surcharged while the inlet on the west side of the intersection had a water surface elevation approximately 2-inches below the rim. The southern

inlet was surcharges with flow slightly greater in the curb downstream of the inlet than upstream. A slow rise of particles was seen out of the inlet indicating flow was coming out of the inlet. If this inlet/drywell is connected to the inlet on the other side of the street, this may indicate that the flow to the combined structures exceeded the infiltration capacity and is surcharging. If not connected, this may indicate groundwater coming up out of the inlet.

Locations 1 and 3 were not surcharging during the May 2, 2020 rainfall event and fully infiltrating.

### **Basin Delineation**

The contributing stormwater basins to each flooding area was delineating by using topography data from the 2011 Thurston County LiDAR survey and verified with a site visit during a rainfall event occurring on May 2, 2020. Five basins were delineated and shown on Figure 2 with each basin flowing towards one of the flooding areas.

For determining basin areas for sizing infiltration galleries, only the directed connected impervious area of the roadway and driveways was considered.

### **Assumed Infiltration Rate**

According to the NRCS Web Soil Survey, the soils in the area consist primarily of sandy loams. Table A.1 of the Thurston County Drainage Manual lists the estimated design (long-term) infiltration rate for sandy loam as 0.25 inches per hour. Past project experience in this area also has found infiltration rates similar to 0.25 inches per hour. The analysis looks into sizing assuming a 0.25 inch per hour infiltration rate as well as 0.5 inches per hour.

### **Infiltration Gallery Sizing**

The required infiltration gallery size was determined using the Western Washington Hydrology Model (WWHM). The model assumed an infiltration gallery cross-section similar to what was installed at Husky Way which had a width of 8 feet, height of 4 feet, and a 24-inch diameter perforated pipe.

The required length of infiltration gallery for each basin is given in Table 1 for three different scenarios these include:

- Infiltration rate of 0.25 inches per hour and sized to infiltrate for all but the two largest storms
- Infiltration rate of 0.25 inches per hour and sized for 100 percent infiltration
- Infiltration rate of 0.50 inches per hour and sized to infiltrate for all but the two largest storms

The reason for sizing for all but the two largest storms is that getting to 100 percent infiltration causes the galleries to be unfeasibly large (approximately 67 percent larger). An example of the stage height seen in each infiltration gallery when not sized for 100 percent infiltration is shown on Figure 2.



Figure 2. Drainage basins

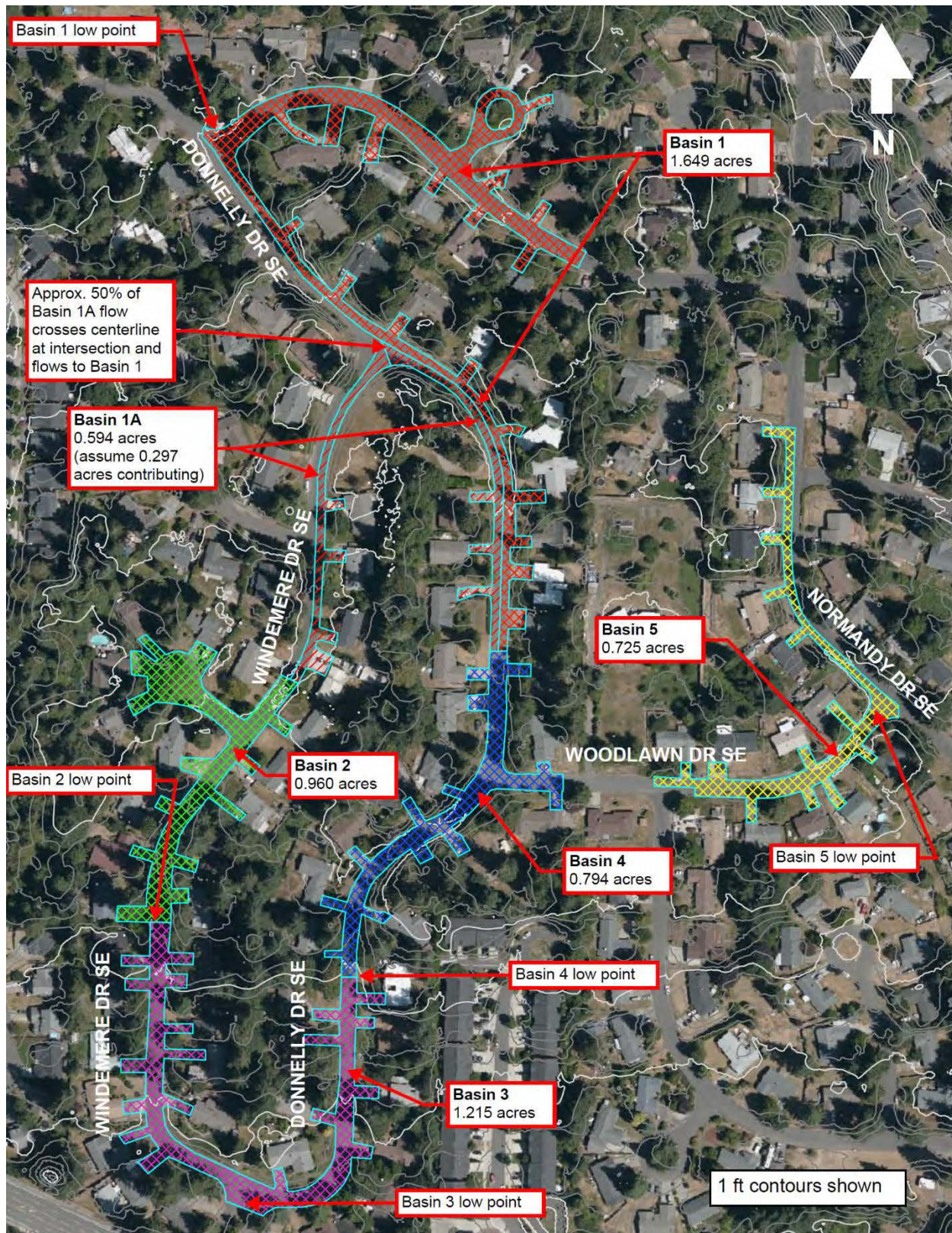




Figure 3.

Table 14. Infiltration gallery length

| Basin | Calculated infiltration gallery length (feet) |                                    |               |
|-------|-----------------------------------------------|------------------------------------|---------------|
|       | 0.25 inch/hour                                | 0.25 inch/hour – 100% infiltration | 0.5 inch/hour |
| 1     | 1,800                                         | 3,000                              | 1,450         |
| 2     | 900                                           | 1,500                              | 725           |
| 3     | 1,150                                         | 1,900                              | 900           |
| 4     | 750                                           | 1,250                              | 600           |
| 5     | 675                                           | 1,150                              | 550           |
| TOTAL | 5,275                                         | 8,800                              | 4,225         |

Figure 7. Drainage basins

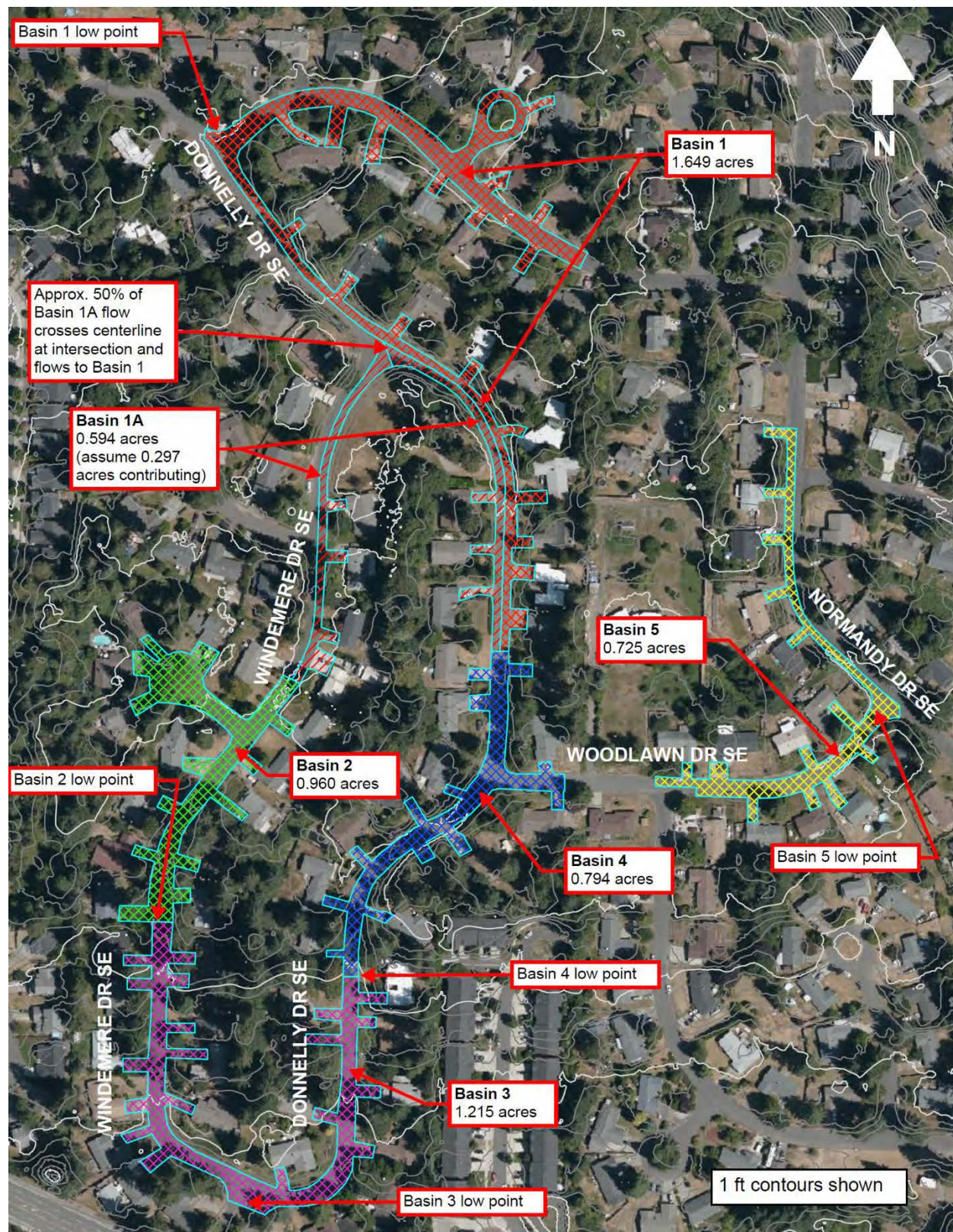
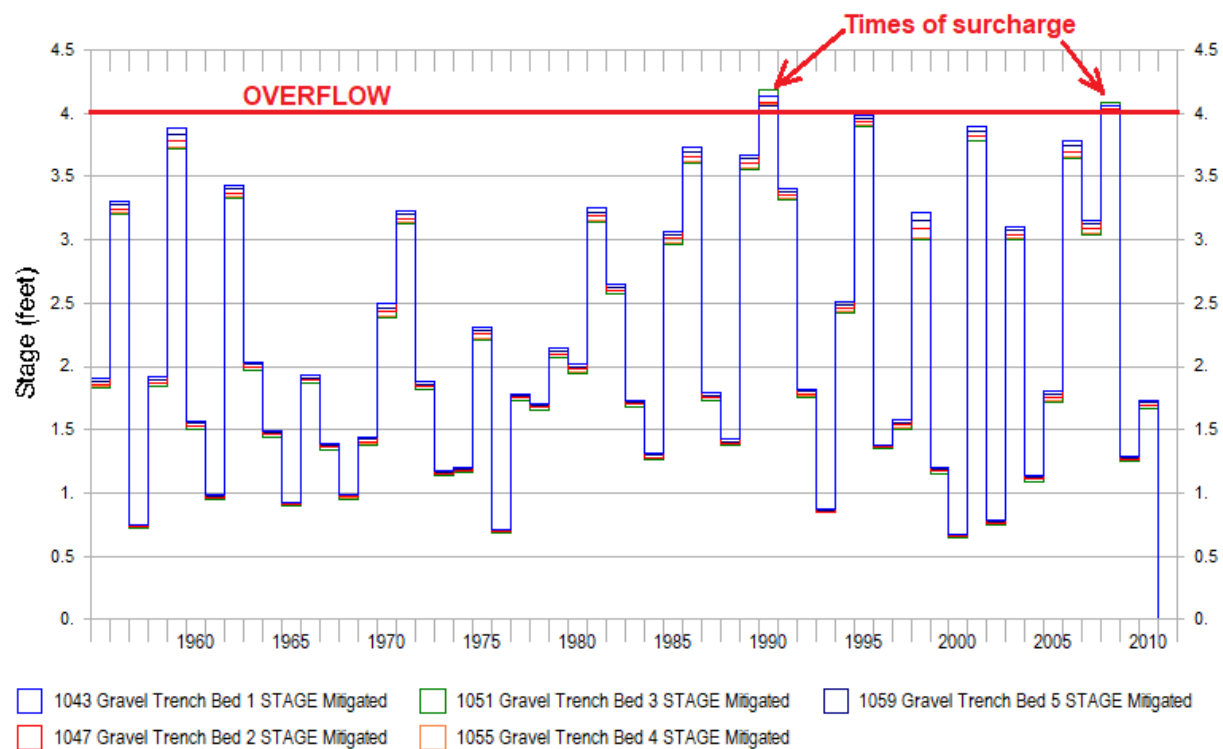




Figure 8. Times of surcharge across WWHM model run



If the infiltration rate were to increase to 0.5 inches per hour from 0.25 inches per hour, the length of infiltration gallery needed would decrease by approximately 20 percent.

### Stormwater Infiltration Volume

The Donnelly Drive project is being considered to not only reduce the flood nuisance but to also provide additional groundwater recharge for mitigation purposes. WWHM was used to estimate the increase in volume infiltrated.

Table 15. Stormwater infiltration volume

| Scenario                                                         | Annual average infiltrated volume (acre-feet) | Increase in annual average infiltrated volume over existing (acre-feet) |
|------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------|
| Existing                                                         | 5.53                                          | 0                                                                       |
| Galleries sized to infiltrate for all but the two largest storms | 19.31                                         | 13.78                                                                   |
| Galleries sized for 100% infiltration                            | 19.35                                         | 13.82                                                                   |

### Opinion of Probable Construction Cost

The Husky Way infiltration gallery project was used as a basis to estimate the linear foot construction cost of an infiltration gallery. The engineers estimate, done in 2012, for Husky Way had a construction cost of \$166,757 to build 335 feet of infiltration gallery, excluding tax. Inflated to today's dollars and including tax, this corresponds to a cost of approximately \$684 per foot of infiltration gallery.

On top of the construction cost the cost estimate also includes the following costs based on a percentage of the construction cost: (1) 30 percent contingency; (2) 15 percent for geotechnical investigation; (3) 15 percent for engineering; (4) 10 percent for administrative costs; (5) 5 percent for permitting.

Due to the low infiltration rates expected in the area, a substantial area is needed for infiltration with infiltration galleries running along the length of most of the streets within the basins. To further design, additional geotechnical investigation should be completed to verify infiltration rates as infiltration rates higher than what is assumed could substantially lower the cost of the project by reducing the length of infiltration gallery needed.

Table 3 provides a summary of opinion of probable construction costs by project scenario.

Table 16. Opinion of probable construction cost

| Cost item          | Costs by scenario |                                      |                |
|--------------------|-------------------|--------------------------------------|----------------|
|                    | 0.25 inch/hour    | 0.25 inch/hour for 100% infiltration | 0.50 inch/hour |
| Construction Cost  | \$3,608,043       | \$6,019,105                          | \$2,889,855    |
| Contingency (30%)  | \$1,082,413       | \$1,082,413                          | \$1,082,413    |
| Geotechnical (30%) | \$541,206         | \$541,206                            | \$541,206      |
| Engineering (15%)  | \$541,206         | \$541,206                            | \$541,206      |
| Admin (10%)        | \$360,804         | \$360,804                            | \$360,804      |
| Permitting (5%)    | \$180,402         | \$180,402                            | \$180,402      |
| Total Cost         | \$6,310,000       | \$8,730,000                          | \$5,600,000    |

# Floodplain Restoration

## General Project Description for Opportunities in WRIA 13

### **Narrative description, including goals and objectives.**

The Deschutes River originates on Cougar Mountain in Lewis County and flows 57 miles, mostly within Thurston County, with several smaller independent tributaries that drain into three saltwater inlets: Henderson, Budd, and Eld. Other principal streams include Woodard and Woodland Creeks which are the largest of the major tributaries to Henderson Inlet. Key limiting factors for salmonid habitat and productivity in Water Resource Inventory Area (WRIA) 13 were identified in Haring & Konovsky (1999), Thurston Conservation District (2004), and Confluence Environmental (2015).

- Natural stream processes have been significantly altered due to adjacent land uses including timber harvest, agricultural uses, and residential and commercial development,
- Fine sediment (<.85 mm) levels are high, reducing spawning habitat quality,
- Lack of large wood in streams, particularly larger key pieces that are stable and most capable in forming pools and other instream habitats and retaining sediment and smaller wood,
- Lack of adequate pool frequency and particularly a lack of large, deep pools that are key habitats for rearing juvenile salmonids and adult salmonids on their upstream migration,
- Naturally high rates of channel migration occur in this geologically young basin with easily erodible glacial outwash soils, but exacerbated rates of streambank erosion and substrate instability due to intermittent bank armoring and removal of forested riparian vegetation and subsequent loss of bank strength and stability,
- Loss of riparian function due to removal/alteration of natural riparian vegetation, which affects water quality, cover, shading, instream habitat conditions, sediment deposition, and wildlife habitat,
- The presence of a significant number of fish passage barriers that inhibit upstream or downstream access to juvenile and adult salmonids,
- Significant alterations to the natural hydrology in streams where the uplands have been heavily developed, which has led to increased peak flows and decreased low flows that cause bed scour, bank erosion, and reduced water quality; and the threat of similar impacts to streams that are experiencing current and future development growth, and
- Estuarine habitat quantity and quality is significantly impacted by physical alteration of the natural estuary, such as by the dam and creation of Capitol Lake that dramatically reduced the area of estuarine habitat, dredging, fill, poor water quality in the estuary, and by significant alteration of nearshore ecological function due to shoreline armoring.

WRIA 13 restoration projects would address functional loss of water storage, low flows and water quality within the Deschutes River and other streams and rivers throughout WRIA 13. The specific actions proposed for any given project would be specific to the restoration opportunity and

habitat capacity of that location. The goal of any given project would be to rehabilitate lost processes and functions that are provided by floodplain connectivity. More detailed objectives pursuant to this goal would be specific to each respective project.

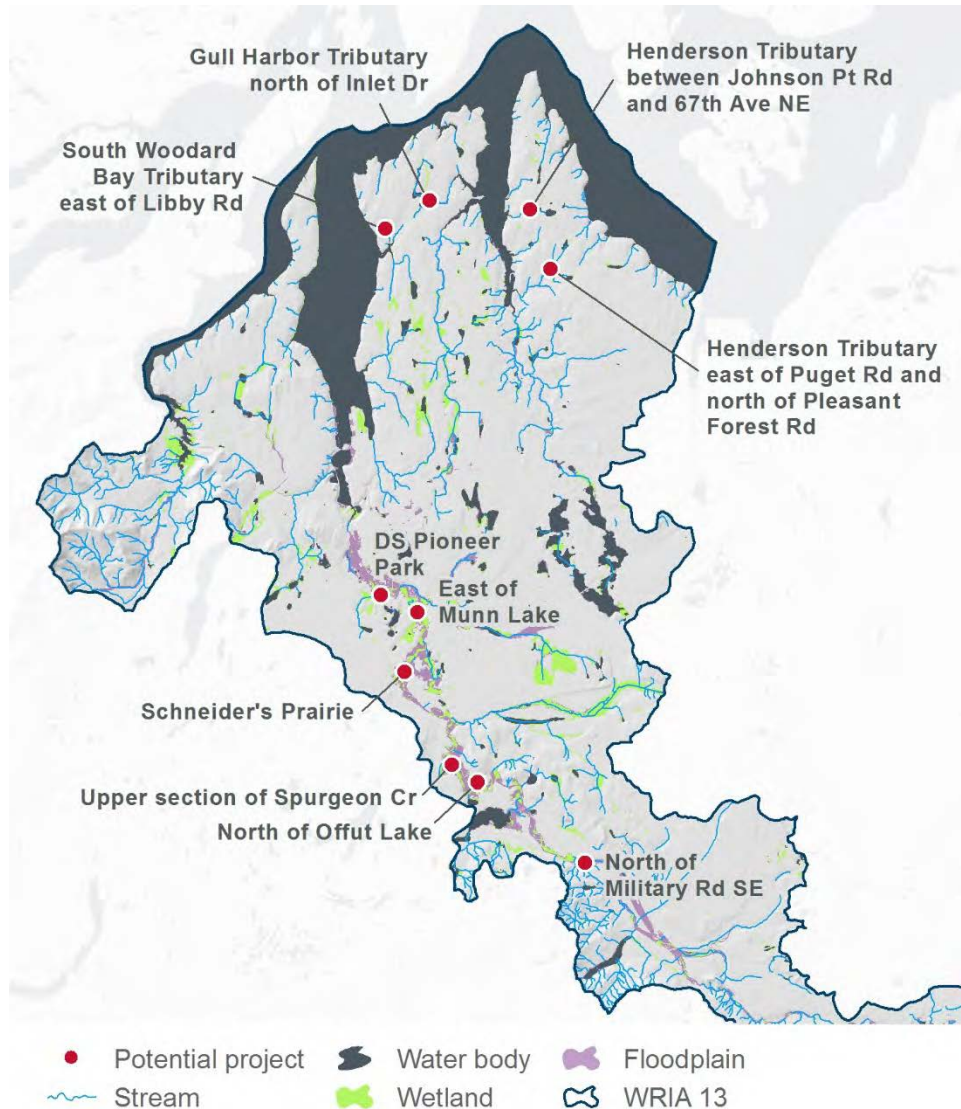
### **Qualitative assessment of how the project will function.**

Projects will vary depending on the stream setting, habitat capacity, the impact that has occurred, and the corresponding opportunities for restoration. Potential floodplain restoration actions include the following:

- Channel re-alignment (i.e. re-meander),
- Removing bank protection,
- Installation of large wood to promote hyporheic and floodplain water storage
- Removal of fill or creation of inset floodplain (i.e. excavation of terraces),
- Side channel and off-channel feature reconnections, creation or enhancement.

### **Conceptual-level map of the project and location.**

- A mapping utility was used to solicit WRIA 13 floodplain project recommendations from the WRIA 13 committee. The following data and reasoning was used to select candidate sites in WRIA 13:
- Identify reaches that are unconfined with Lidar hillshade. Unconfined reaches have wider valleys and floodplains.
- Identify reaches in flood zones
- Identify land that is vacant, and therefore potentially available for acquisition and restoration.
- Identify land that is public and potentially easier to acquire for restoration.
- Identify areas of tributary inflow, because they are often areas of biological importance and habitat complexity. They may also be areas more prone to intermittent flooding.



**Figure 1. Potential floodplain restoration project locations.**

**Project locations identified by the committee include the following:**

- Tributary to Woodard Bay, east of Libby Road
- Tributary to Gull Harbor, north of Inlet Drive
- Tributary to Henderson Inlet, between Johnson Point Road and 67<sup>th</sup> Avenue NE
- Tributary to Henderson Inlet, east of Puget Road and north of Pleasant Forest Road



- Deschutes River, downstream of Pioneer Park
- Deschutes River, east of Munn Lake
- Deschutes River, Schneider's Prairie
- Upper Spurgeon Creek
- Deschutes River, north of Offut Lake
- Deschutes River, North of Military Rd SE

**All project locations would be subject to evaluation of feasibility during plan implementation. Other locations may be identified by committee members or other project sponsors during plan implementation.**

### **Performance goals and measures.**

Performance goals and measures will vary depending on the project. In general, the goals will be to implement the restoration actions with their intended quantity and purpose. The measures will be directly measurable elements such as acres of floodplain, wetland, or riparian habitats restored, stream-miles enhanced, predicted quantity of baseflow volume restored, predicted reduction of temperature, etc..

### **Description of the anticipated spatial distribution of likely benefits.**

The Deschutes River watershed (WRIA 13) contains the Deschutes River and its tributaries, along with 22 independent drainages that enter Henderson, Budd, and Eld inlets. The primary independent drainages are McLane, Woodward, and Woodland creeks.

Potential floodplain restoration projects have been identified in the upper reaches of several small tributaries to Budd and Henderson inlets that historically had more extensive wetlands in their headwaters. Restoring floodplain connectivity, along with riparian and wetland habitats could benefit up to 5 miles of these tributaries and their associated tributaries by storing direct precipitation as well as stormwater runoff in the headwaters and floodplain areas, contributing additional flows during low flow periods.

Potential floodplain restoration projects have been identified in multiple floodplain reaches of the Deschutes River and one potential project in the upper reaches of Spurgeon Creek (primary tributary to the Deschutes River). Restoring floodplain connectivity, along with instream, riparian, and wetland habitats could benefit up to 16 miles of the Deschutes River, plus up to 5 miles in Spurgeon Creek by storing direct precipitation as well as stormwater and flood storage in floodplain areas that could contribute additional flows during low flow periods. The Deschutes River has been noted for low summer/fall flows for decades (WDF 1975) and

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Washington Department of Fish and Wildlife (WDFW 2020a) has identified that fall Chinook, coho, and chum salmon, and winter steelhead trout are present in the Deschutes River and the independent drainages in WRIA 13. Chinook salmon are hatchery origin, but the other species are wild or of mixed origin (WDFW 2020b).

Increased floodplain habitats and improved riparian and instream habitat conditions would primarily benefit juvenile salmonid rearing habitats by providing increased area and quality of summer rearing habitats. This would improve both productivity and survival of juveniles, particularly coho and steelhead. The restoration of floodplain processes and functions could also improve summer/fall base flows and reduce water temperatures. This would improve both juvenile and adult migration conditions. The alteration of natural stream hydrology has been identified as a high priority limiting factor in WRIA 13 (Haring & Konovsky 1999; Confluence Environmental 2015) and the restoration and reconnection of floodplain habitats and riparian enhancements provide shading, food web support, and flood and sediment attenuation functions.

### **Identification of anticipated support and barriers to completion.**

No specific projects have been identified.

### **Potential budget and O&M costs (order of magnitude costs).**

No specific projects have been identified.

### **Anticipated durability and resiliency.**

Floodplain reconnection projects are durable as they restore natural processes to a reach of the river, allowing flooding and channel migration to occur unimpeded, contributing to flood storage, groundwater recharge, recruitment of large wood, and creation of habitats. Floodplain reconnection projects that provide the river with more room to meander and more ways to hold water in the hyporheic zone and porous floodplain soils are important solutions to restore watershed processes and to provide resiliency from a changing climate.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

No specific projects have been identified.

## **References**

Confluence Environmental Company. 2015. *Deschutes River Coho Salmon Biological Recovery Plan*. Prepared for the Squaxin Island Tribe Natural Resources Department, September 2015.

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Thurston CD, 2004. *Salmon Habitat Protection and Restoration Plan for Water Resource Inventory Area 13, Deschutes*. Prepared by the Thurston Conservation District Lead Entity.

WDFW, 2020a. Salmonscape. Available at: <http://apps.wdfw.wa.gov/salmonscape/map.html>

WDFW, 2020b. Salmon Conservation and Reporting Engine. Available at:  
[https://fortress.wa.gov/dfw/score/score/maps/map\\_details.jsp?geocode=wria&geoarea=WRIA13\\_Deschutes](https://fortress.wa.gov/dfw/score/score/maps/map_details.jsp?geocode=wria&geoarea=WRIA13_Deschutes)

# Forest stand age and flow restoration

Concept paper Paul J. Pickett

For the Squaxin Island Tribe

January 21, 2021

## Background

Technical appendix G of the Nisqually Watershed Plan Addendum (Nisqually Indian Tribe, 2019) provided a detailed technical analysis of a Community forest project designed to manage forest stand age to improve stream flows. Excerpts from that document describe some of the technical background for this project concept:

*A significant body of field evidence, research and important new modeling indicates that large streamflow benefits can accrue from increasing forest stand age through Managed Forestry:*

- *Perry and Jones (2016) used paired forest stands comparable to those in the Nisqually River watershed to show that after a forest stand age of 40 years, re-growing forests contribute significantly to streamflow.*
- *Abdelnour et al (2011 and 2013) confirm that the findings of Perry and Jones (2016) can be reproduced using numerical modeling with the VELMA model code.*
- *McKane et al (2018) has modeled the Mashel River sub-basin using the VELMA model. Preliminary results indicate that streamflows increase substantially when forest stand ages increase.*
- *Managed Forest practices are already being implemented in the Nisqually Community Forest, which include over 1,900 acres already purchased and under protection. This ongoing program (limited only by funding) indicates the viability of the long-term managed forest concept.*

*The work of Perry and Jones (2016) is critical to the understanding of the streamflow benefits of Managed Forests. Figure 6b is extracted below for reference from their paper, Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA:*

*In this figure, streamflows are compared between pairs of test basins: one cut and the other uncut. Their streamflows are expressed as the percent difference between the reference (uncut) streamflow and the clear-cut basin streamflow – over a test period of 35 to 45 years.*

- *Initially, streamflows rise rapidly in the cut basin, relative to the uncut partner basin.*
- *Streamflows then decline rapidly as vegetation re-growth uses more water relative to the uncut partner basin.*
- *In forests older than 35-40 years, streamflows then stabilize at 50% to 70% lower than in the uncut partner basin.*

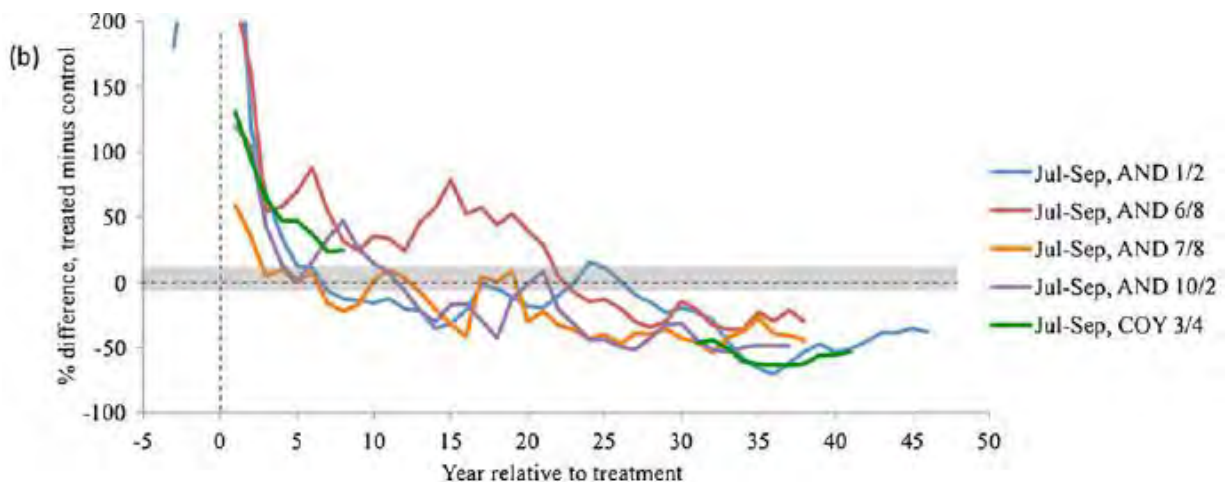


Figure 6b, (excerpted from Perry and Jones (2016).

Computer modeling using the VELMA modeling software (McKane et al) was able to reproduce this sequence – both the hydrology and forest cover changes – for the Mashel River sub-shed (McKane et al, 2018) – at 10 reach locations. Reach 0 at the west end of the model domain represents the simulation of USGS gage 12087000:

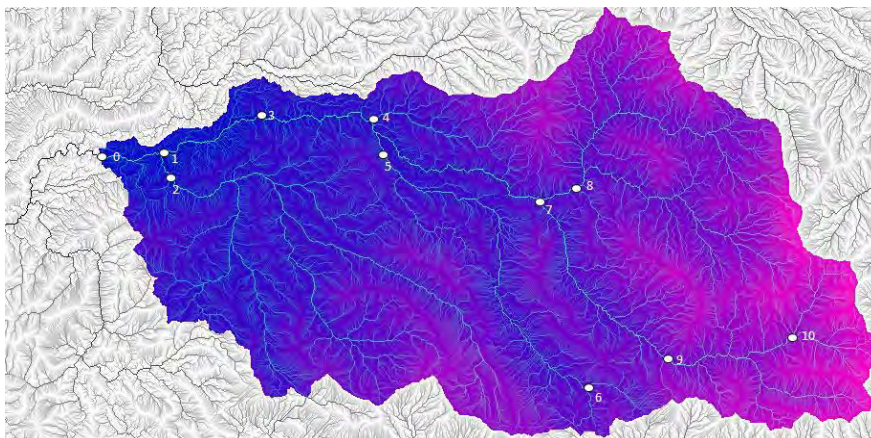


Figure: VELMA model domain for the Mashel Sub-basin showing the stream network, simulated gages at key reaches and boundary view (reproduced from McKane et al, 2018).

The VELMA modeling made a good approximation of the actual discharge in the Mashel River. Three other scenarios were simulated in the modeling: 1 year after clear-cut, 40 years after clear-cut and 240 years after clear-cut. The streamflow from the 240-year old forest stand is reported to be nearly indistinguishable at the streamflow from a 100-year-old forest stand (McKane, 2018; Abdelnour 2011; Abdelnour 2013). Lowest modeled streamflows were found at 40 years after clear-cut, while from 40 to 100 years, streamflows returned, approaching un-cut old-growth streamflows in the 100-year-old stand age modeling.

A recent study by Coble et al. (2020)<sup>1</sup> describes studies of the effect of forest stand age on stream low flows. A summary of effects from Coble et al (2020) and others describes a general pattern observed in response to clearcut:

1. Initial response: increased stream flow compared to pre-harvest (mature forest)
2. Regenerating stands: small, mixed, or variable responses (modern cutting programs may provide some improved recharge compared to historic clearcut methods)
3. Continued growth: decline in low flows
4. Mature forest: low flows return to pre-harvest conditions

The graph in Figure 1 summarizes the results from 19 catchments from a variety of studies. Flow reductions in Hydrologic period 3 were found in 17 of 19 studies.

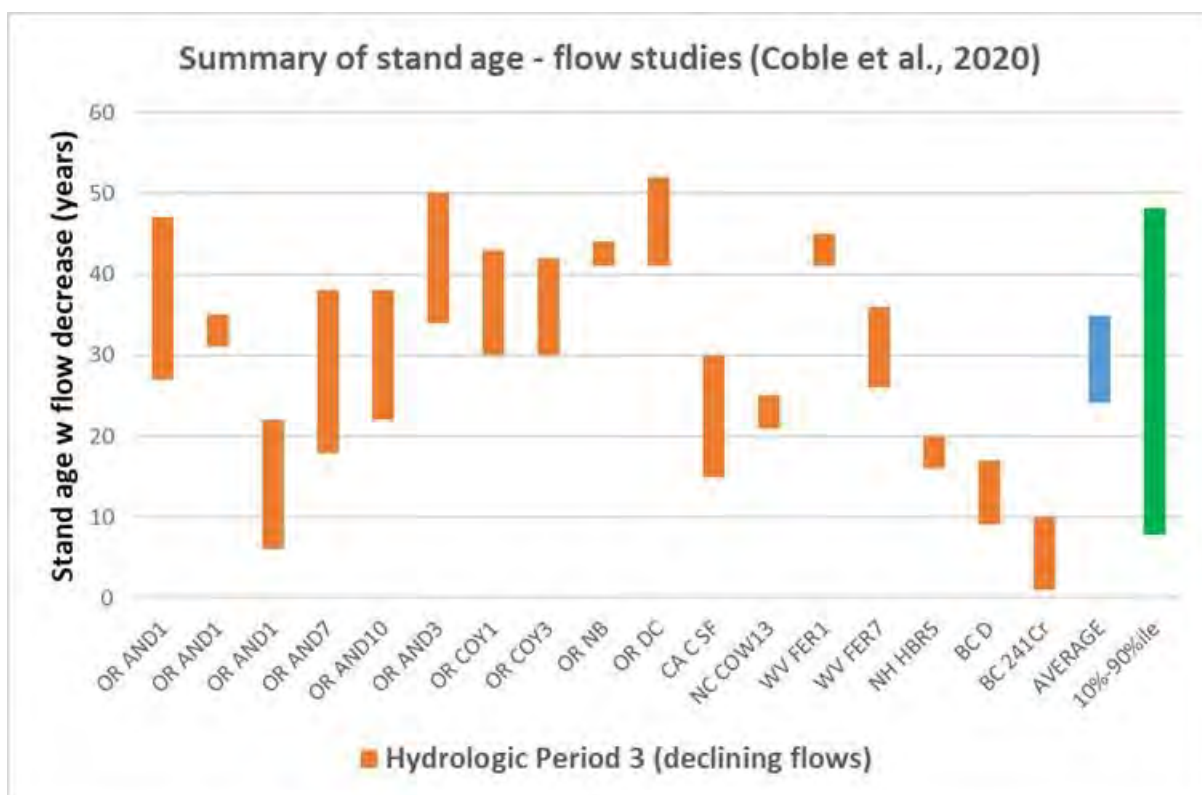


Figure 1. Summary of stand age studies (Coble et al., 2020)

This graph illustrates the effect of stand age. Study results indicate that stream flows decrease with stand ages from 10 to 50 years (10<sup>th</sup> percentile of onset year to 90<sup>th</sup> percentile of final year), and on the average between 25 and 35 years (average onset year to average final year). Commercial cut rotations tend to occur between 40 and 60 years. ). In most cases, stream flows rebound to pre-harvest conditions at 35 to 50 years.

<sup>1</sup> Long-term hydrological response to forest harvest during seasonal low flow: Potential implications for current forest practices. Science of the Total Environment 730 (2020) 138926

Bob McKane from the EPA Corvallis Laboratory has developed a method to model the flow effects of stand age using the VELMA model. He applied this model to a study of the Nisqually Community Forest.<sup>2</sup> Figure 2 compares streamflows at 40- and 100-year forest stand ages.

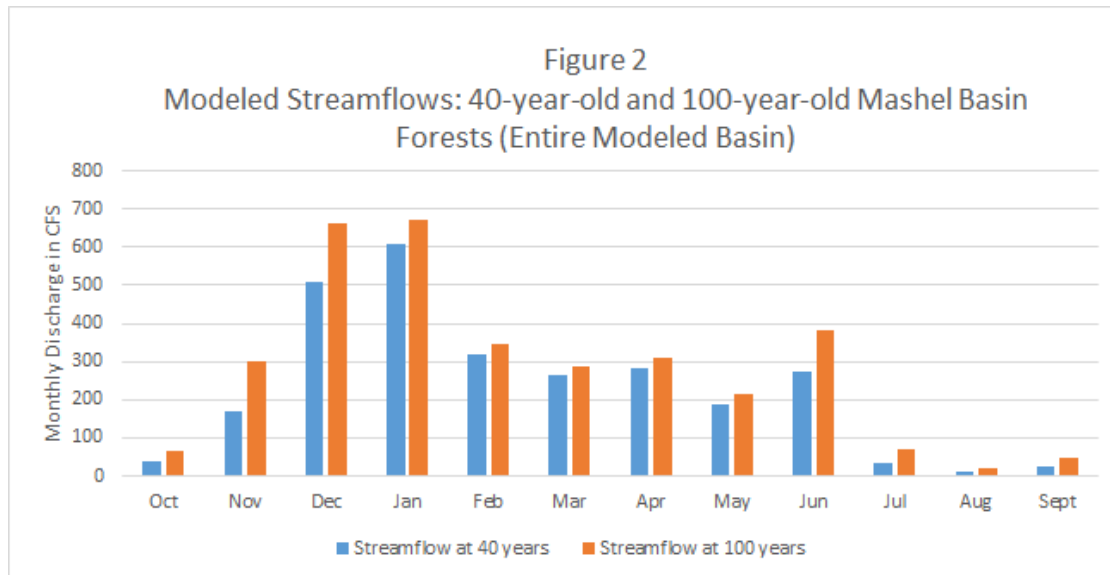


Figure 2. Modeled streamflows in the Mashel River basin (Nisqually Indian Tribe, 2019)

Using these assumptions, differences between monthly flows in the 40-year-old and 100-year-old VELMA simulations can be used to determine a unit acre of per-year streamflow increase that can be reasonably achieved for new Managed Forestry lands added to the potentially protected forest.

The uncertainties in this analysis must be acknowledged. Forest stand age affects hydrology through a complex variety of factors, which include:

- Geophysical and climate factors across any specific watershed, such as: latitude, climate, local weather patterns; watershed elevation, slope, and aspect; soils; and underlying geology.
- Average stand age, tree species composition, and parcel-scale cut patterns across the watershed.
- Patterns of forest harvest, such as the extent of clear-cut, patchy cutting strategies, riparian areas left intact, and management of debris.
- Other factors such as soil compaction and roads.

There are also possible differences between the effects in research study areas and effects in working forests subject to regional regulation, such as Washington's Forests & Fish program and Habitat Conservation Plans.



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<sup>2</sup> [https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?Lab=CPHEA&dirEntryId=348155](https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CPHEA&dirEntryId=348155)

## Project concept

To meet the requirement of a project under RCW 90.94, a project just provide benefits indefinitely. From the research cited above, this suggests that protecting a forest stand so that it either: 1) remains uncut; or 2) is cut in a rotation of 80 years or more, could provide baseflow benefits. EPA's VELMA modeling tool could help to quantify those benefits.

Funding is limited for streamflow restoration, so directly funding fee-simple forest land acquisition is possible, but difficult. However, there may be opportunities to leverage acquisition for multiple purposes using a combination of Streamflow Restoration grants and other funding sources. Note that the focus of this proposal is projects with the voluntary cooperation of a landowner, and is not intended to address legal or regulatory issues.

Several kinds of forest protection projects appear to be viable for this kind of synergy: setting aside an area as conservation or community forest; habitat protection; and carbon sequestration. A project such as these that provides permanent protection for forest lands might meet Ecology criteria for a water offset if the benefits could be quantified. Another window of opportunity could be a project that would protect forest with low timber value, and where a project is on the borderline for water offset – but might be a candidate for funding with habitat or carbon sequestration funding. By adding in Streamflow Restoration grant funding, a project may be realized that would otherwise not reach financial viability.

With this in mind, a forest stand age project might include these elements:

- Project would need to be an area currently managed for timber harvest.
- Stand age management for streamflow protection can be either forest protection (total elimination of harvest), or management to an average stand age of 80 years or more.
- A project could access supplemental Streamflow Restoration funding to support permanent forest protection or stand age management, and also conduct the offset analysis to quantify benefits.
- If a project is funded through other sources and provides permanent forest protection or stand age management, only an offset analysis would be needed to quantify baseflow enhancement benefits.

Several factors would need to be evaluated as part of a feasibility study:

- Whether the project is in a basin with baseflow enhancement needs, including tributaries where perennial flows are threatened.
- Whether the project is large enough to provide significant baseflow enhancement downstream. Specific project areas could be of any size, but the greater the coverage of a tributary watershed, the more the presumed benefits.
- The ability to selectively harvest trees for a longer cut rotation. The literature suggests other methods could enhance streamflow, such as selective patchy cutting.
- Evaluation of the effect of site-specific factors through a spatial and modeling analysis.
- The economic implications for lengthening harvest or taking timber out of production, including

reduced employment and local revenues.

- There are corollary environmental and economic benefits from longer cut rotations that could be evaluated and quantified.

## Next steps

- Include a categorical project that would allow for future specific projects, or support further research into this type of project to more clearly define the availability, structure, and suitability of potential projects, including assessing the potential social, economic, and environmental positive and negative impacts to the watershed and local communities.
- Identify specific opportunities that could be put forward for a suitable project.

## References

Abdelnour, A., Stieglitz, M., Pan, F., & McKane, R. (2011). Catchment hydrological responses to forest harvest amount and spatial pattern. *Water Resources Research*, 47(9).

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Kennedy, R. E., et al. (2018). An empirical, integrated forest biomass monitoring system. *Environmental Research Letters*, 13(2), 025004.

Coble, Ashley A., Barnard, H., Du, E., Johnson, S., Jones, J., Keppeler, E., Kwon, H., Link, T., Penaluna, B., Reiter, M., River, M., Puettmann, K., and Wagenbrenner, J. 2020. Long-term hydrological response to forest harvest during seasonal low flow: Potential implications for current forest practices. *Science of the Total Environment* 730 (2020) 138926  
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G. Webster, M., Hodgson, S., Ellings, C., Benson, L., and Stonington, D. 2018. Nisqually Community Forest VELMA modeling to evaluate effects of forest management scenarios on streamflow and salmon habitat. U.S. Environmental Protection Agency. Pers. Comm. draft May 31<sup>st</sup> 2018.

Nisqually Indian Tribe, 2019. Nisqually Watershed Response to the 2018 Streamflow Restoration Act (RCW 90.94) – Addendum Appendices. Prepared for the Nisqually Indian Tribe and Nisqually Watershed Planning Unit, January 16, 2019

Perry, T. D., & Jones, J. A. (2017). Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. *Ecohydrology*, 10(2).

## Hicks Lake stormwater retrofit

### Description

The Ruddell Road Stormwater Facility was constructed by the City of Lacey in 1999, consisting of a pretreatment settling basin that flows to constructed wetlands; ultimately flowing into Hicks Lake. Although the facility is an improvement to the previous, untreated condition, the limited water quality wet pool volume, relatively high inflows, and flow-through design conditions, limit water quality treatment and provides minimal, if any, infiltration benefit. Therefore, the City is investigating the feasibility of an offset infiltration facility as an upgrade to the current system.

The proposed project would provide water offsets and ecological benefit (per RCW 90.94.030) to the Woodland Creek sub-basin. The improvements are expected to provide a significant shallow groundwater recharge component, and augment base flow to Hicks, Pattison, and Long Lakes, ultimately benefitting Woodland Creek, which is currently impaired by low instream flow (303d listing 6169). Proposed upgrades to the facility include a flow splitting manhole, filtration treatment BMP, infiltration gallery and an overflow structure to the existing wetland.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

The delineated basin contributing to the existing stormwater system has an approximate total area of 346.46 acres. Stormwater runoff was modeled for the catchment by characterizing precipitation, soils, impervious surfaces, and land use composition. The proposed infiltration facility was sized according to potential stormwater flows, an assumed soil infiltration rate, and soil characteristics. A range of diversion flows were modeled (1cfs, 2cfs, and 3 cfs) were modeled and resulted in a corresponding range of average annual infiltration of 167, 244, and 296 afy, respectively. All flows, up to 3.5 cfs are expected to be 100% infiltrated, but infiltrating up to 3cfs accounts for reduction in infiltration capacity over time. Therefore, infiltrating up to 3 cfs for an offset benefit of 296 cfs is reasonable.

## Conceptual-level map and drawings of the project and location.

Figure 1 shows the general layout of the proposed infiltration facility, in series with the existing stormwater (water quality) treatment facility. Up to 3 cfs in stormwater flow would be directed to and infiltrated in the proposed facility. Any stormwater not infiltrated would still over into the existing facility, and flow into Hicks Lake.



**Figure 1. Layout of Proposed Infiltration Facility**

## Description of the anticipated spatial distribution of likely benefits

The infiltrated stormwater would seep into Hicks Lake. Hicks Lake is the headwaters of the Woodland Creek watershed. Water in Hicks Lake flows through Pattison Lake, Long Lake, and then into Woodland Creek. Infiltrated stormwater would reduce flood flows and presumably increase base flows in the entire system during non-storm periods.

## Performance goals and measures.

Performance will be measured in terms of infiltration. Stormwater flows and infiltration capacity (or bypass to the water quality BMP) will be measured or observed, for effectiveness.

## Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.

Woodland Creek supports spawning populations of coho, chum, and Chinook salmon (WDF 1975; WDFW 2020). Steelhead trout has documented presence. These salmonids are present from Henderson Inlet to Long Lake. Within this reach, the creek is seasonally dry from Lake Lois to Beatty Springs, north of Martin Way. The watershed is heavily urbanized in the headwaters, contributing to reduced summer flows. This project will contribute to moderating the effects of urban stormwater impacts.

### **Identification of anticipated support and barriers to completion.**

The City supports this project. The project will be on property the City is planning to purchase, and the City does not anticipate any barriers to completion.

### **Potential budget and O&M costs.**

The preliminary OPCC totals approximately \$3.3 million for the proposed facilities as currently envisioned (Attachment A).

### **Anticipated durability and resiliency.**

The project would have lasting benefits as it would be actively managed by City.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

The project sponsor is the City of Lacey. The City is ready to implement this stormwater retrofit project, commensurate with funding.

### **References**

WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and Salmon Utilization, WRIA 13."

WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>



## Attachment A - Opinion of Probable Costs of Construction (OPCC) - Concept Plan Level

Note: Preliminary OPCC does not include sales tax, design, CM, property acquisition, legal, and other administrative/legal costs

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**Total  
OPCC: \$3,295,000**

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| Item | Description                                                                     | Unit | Unit Cost | Qty | Cost      | Comments                                                                                                     |
|------|---------------------------------------------------------------------------------|------|-----------|-----|-----------|--------------------------------------------------------------------------------------------------------------|
|      | <b><i>General Requirements - Stormwater Facilities</i></b>                      |      |           |     |           |                                                                                                              |
| 1    | Mob/Demob, Survey, Temp Facilities, Utilities Protection, Traffic Control, etc. | ls   | 331,000   | 1   | \$331,000 | 15% of Items below                                                                                           |
|      | <b><i>Flow Splitter at Connection to Existing SD</i></b>                        |      |           |     |           |                                                                                                              |
| 2    | Flow Splitter Vault with Adjustable High Flow Bypass Weir                       | ls   | \$60,000  | 1   | \$60,000  | Precast vault with interior lateral weir wall with aluminum adjustable weir plate - assume 8'X16' vault size |
|      | <b><i>Water Quality Pre-Treatment</i></b>                                       |      |           |     |           |                                                                                                              |
| 3    | Pre-treatment Facilities Prior to Groundwater Discharge                         | cfs  | \$80,000  | 3   | \$240,000 | Pre-settling vault and/or hydrodynamic separator(s) - allowance for 3 cfs capacity                           |
|      | <b><i>Drainage Conveyance System</i></b>                                        |      |           |     |           |                                                                                                              |
| 4    | 12" Dia. Storm Drain (Polypropylene)                                            | lf   | \$60      | 700 | \$42,000  | Collective 12" conveyance SD; 4' - 6' Depth                                                                  |
| 5    | Catch Basin Type 1                                                              | ea   | \$4,000   | 4   | \$16,000  | Collective Type 1 CBs, 5' Std Depth                                                                          |
| 6    | Catch Basin Type 2                                                              | ea   | \$7,000   | 2   | \$14,000  | Collective Type 2 CBs, 6' - 10' Depth                                                                        |

|    |                                                                 |    |          |        |           |                                                                                                   |
|----|-----------------------------------------------------------------|----|----------|--------|-----------|---------------------------------------------------------------------------------------------------|
| 7  | Catch Basin Type 2<br>Emergency Overflow<br>w/Debris Rack       | ea | \$10,000 | 1      | \$10,000  | Overflow spillway from<br>infiltration gallery to existing<br>constructed wetland; debris<br>cage |
| 8  | Trench Excavation Safety<br>Systems                             | ls | \$7,000  | 1      | \$7,000   | All conveyance facilities                                                                         |
|    | <b>Earthwork</b>                                                |    |          |        |           |                                                                                                   |
| 9  | Construction TESC<br>Control and Compliance                     | ls | \$70,000 | 1      | \$70,000  | CSWPPP, TESC, SPCC, Temp<br>Treatment, Discharge, CSGP<br>Monitoring/Compliance                   |
| 10 | Clearing, Grubbing,<br>Disposal                                 | ac | \$14,000 | 3.0    | \$42,000  | Forrested parcel; on-site<br>processing with grinder<br>assumed                                   |
| 11 | Infiltration Facility Pad<br>Excavation Incl Haul,<br>Disposal  | cy | \$20     | 32,000 | \$640,000 | Assumes excess material<br>disposal within 5 mi                                                   |
| 12 | Infiltration Gallery<br>Footprint Excavation,<br>Haul, Disposal | cy | \$24     | 6,500  | \$156,000 | Assumes excess material<br>disposal within 5 mi                                                   |
| 13 | Shoring or Extra<br>Excavation                                  | ls | \$15,000 | 1      | \$15,000  | Temporary shoring for gallery<br>excavation                                                       |
|    | <b>Infiltration Gallery</b>                                     |    |          |        |           |                                                                                                   |
| 14 | Storm HDPE Arch<br>Infiltration Chambers                        | lf | \$40     | 12,000 | \$480,000 | 16" high HDPE arch infiltration<br>chambers                                                       |
| 15 | Crushed Stone - 1.5"<br>Fractured/Washed                        | cy | \$55     | 4,500  | \$247,500 | Infiltration chambers zone<br>backfill                                                            |
| 16 | Geotextile                                                      | sy | \$4      | 5,500  | \$22,000  | Separation geotextile from<br>overlying soils                                                     |
| 17 | Topsoil                                                         | cy | \$40     | 1,100  | \$44,000  | Topsoil above gallery and in<br>disturbed fringe areas                                            |
| 18 | Access Road Restoration<br>- AC Pavement                        | sy | \$36     | 1,200  | \$43,200  | Perimeter 1,100' X 10'W access<br>road and connection to Ruddell<br>Rd                            |
| 19 | Gallery Footprint<br>Restoration Seeding                        | ls | \$5,000  | 1      | \$5,000   | Grass surface restoration above<br>infiltration gallery                                           |
| 20 | Perimeter landscape<br>Plantings and Irrigation                 | ls | \$50,000 | 1      | \$50,000  | Landscaping allowance                                                                             |

|                                                               |                    |
|---------------------------------------------------------------|--------------------|
| <b>Subtotal</b>                                               | <b>\$2,534,700</b> |
| <b>Construction<br/>Contingency (Planning<br/>Level, 30%)</b> | <b>\$760,410</b>   |

# Managed Aquifer Recharge Projects in WRIA 13

## Description

The WRIA 13 WRE committee has identified managed aquifer recharge (MAR) projects as a viable approach to offsetting the consumptive use associated with permit exempt well growth. MAR projects may include many water sources, such as stormwater, Class A reclaimed water, and peak flows in rivers and streams. This general project is limited to MAR projects that divert, convey, and infiltrate peak seasonal river flows in engineered facilities that are in connection with the local alluvial aquifer that the donor stream or river is also in connection. Flows would be diverted in quantities that would not reduce habitat suitability for salmonids and that do not reduce habitat forming processes. Seepage back into the river would result in attenuation of these flows, increasing base flows across a broader time period, including the late summer and early fall, when flows are typically the lowest, and water demand for consumptive use is the highest.

This project description describes candidate MAR locations, potential methods for diversion and conveyance, potential diversion quantities, typical infiltration basins that would infiltrate those diversion quantities, and the associated offset benefits. Detailed feasibility analysis is not included in this project description and would occur during plan implementation for each specific location.

The total potential offset from all project locations is 909 acre-feet/year (AFY); however, the Committee acknowledged that potential projects located in streams with year-round closures (Chapter 173-513 WAC) should be removed from the overall total, resulting in a potential offset of 811 AFY.

**Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

### Potential MAR Locations

Potential MAR locations were determined based on a screening process (Attachment A). Areas in WRIA 13 with the following features were considered for candidate locations:

- Favorable soils and surficial geology-
  - o Soils mapped in hydrologic groups A and B with all soil layers having a permeability greater than 2 inches per hour.
  - o Surficial geology primarily composed of sand and/or gravel.
  - o Exclude areas with low permeability surficial geology (i.e. silt, clay, bedrock).
  - o Exclude wetlands, lakes, and high groundwater areas.

- Depth and thickness of aquifer
  - Depth to water of 8 feet or greater.
  - Surficial aquifer saturated thickness of 10 feet or greater.
- Distance to potential water source
  - Favorable MAR locations were defined as those within 0.25 and 0.5 miles from a potential donor stream or river.

This screening resulted in favorable areas and specific locations for consideration during WRE Plan implementation (Figure 1; Table 1). Tier 1 locations are favorable in terms of land ownership, property size, and relative net ecological benefit (i.e. significant use by anadromous salmonids). Tier 2 locations are either located farther than 0.5 miles from a stream or are near a source water closed to further appropriation. At the WRIA 13 committee's request, potential locations were identified on the Cooper Point, Boston Harbor, and Johnson Point, and Woodland Creek subbasins with less restrictive criteria (Appendix A). Many tier 2 locations were identified that do not have nearby source waters. These sites may be considered for future stormwater infiltration projects.

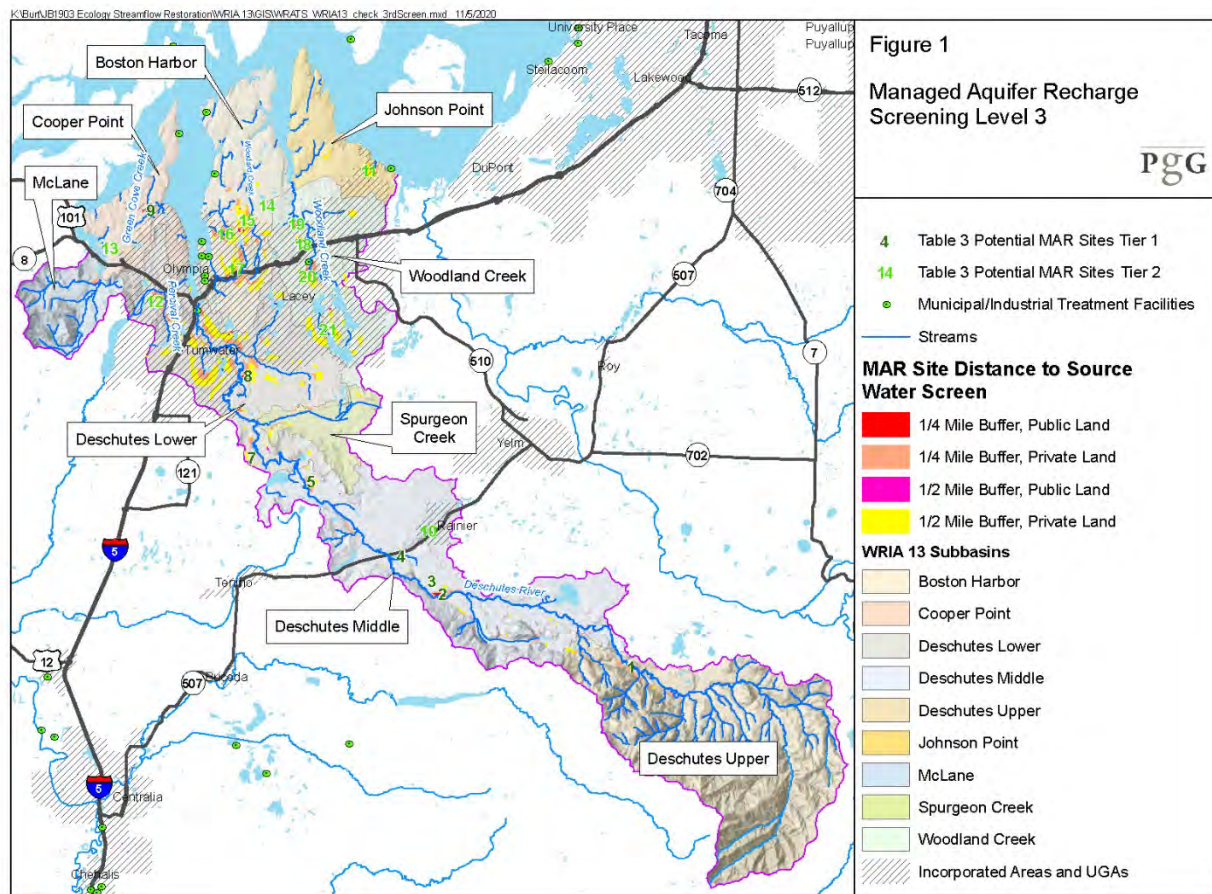


Figure 1. Areas favorable for MAR locations and potential MAR sites.

Table 1. Potential managed aquifer recharge locations.

| Tier | Site # | Subbasin         | Location                                         | Source Stream    |
|------|--------|------------------|--------------------------------------------------|------------------|
| 1    | 1      | Deschutes Upper  | South of Clear Lake                              | Deschutes River  |
| 1    | 2      | Deschutes Middle | Rainier View Park                                | Deschutes River  |
| 1    | 3      | Deschutes Middle | North of Rainier View Park                       | Deschutes River  |
| 1    | 4      | Deschutes Middle | Route 507, SW of Raymond                         | Deschutes River  |
| 1    | 5      | Deschutes Middle | East of Offut Lake                               | Deschutes River  |
| 1    | 6      | Deschutes Lower  | Thurston County Roads Gravel Pit, Waldrick Rd SE | Deschutes River  |
| 1    | 7      | Deschutes Lower  | Middle Deschutes Property                        | Deschutes River  |
| 1    | 8      | Deschutes Lower  | Alpine Sand and Gravel, Rixie Road               | Deschutes River  |
| 1    | 9      | Cooper Point     | Cooper Point                                     | Green Cove Creek |
| 2    | 12     | Deschutes Lower  | Lower Percival Creek, SPSCC                      | Percival Creek   |
| 2    | 14     | Boston Harbor    | Former borrow pit                                | Woodard Creek    |
| 2    | 15     | Boston Harbor    | Private                                          | Woodard Creek    |
| 2    | 16     | Boston Harbor    | Mission creek                                    | Mission creek    |
| 2    | 17     | Boston Harbor    | Near 4th Avenue E and Interstate 5               | Indian Creek     |
| 2    | 18     | Woodland Creek   | Property with kettle pond on 15th Avenue NE      | Woodland Creek   |
| 2    | 19     | Woodland Creek   | Near Pleasant Glade Road                         | Woodland Creek   |
| 2    | 20     | Woodland Creek   | Near Dept. of Ecology Headquarters               | Woodland Creek   |

Additional candidate locations may be proposed during plan implementation. Additional candidate locations are likely to be within these favorable areas but may also be demonstrated as suitable for MAR based on an independent site-specific analysis.

Source Water Availability and MAR Facility Sizing

Potential streams that could be part of MAR projects are those that have a flow record adequate for an assessment of flow diversion quantities and infiltration facility design. Diversion flows and the number of days when flows may be diverted were determine in two different ways, depending on whether the stream has minimum instream flows or not.

Diversion flows were proposed based on maintaining minimum instream flows and habitat forming processes (i.e. ecological flows). Diversion flows in streams and rivers with minimum instream flows (i.e. the Deschutes River) were set at 2 percent of wet season (November – April) minimum flows (e.g. 2% of 400 cfs equals 8 cfs for the Deschutes River). Diversion of flow to an MAR facility could



occur during days when flows exceed minimum instream flows. These days were tallied for each day in the flow record and summed by month. These “diversion days” were summed across the wet season (November – April) for each water year in the flow record. The average and minimum number of diversion days were calculated across all water years in the flow record.

When a stream or river does not have minimum instream flows, the 75<sup>th</sup> percentile flows for each month across the entire flow period of record was calculated. Diversion flows were proposed based on 2% of the average 75% percentile flows during November – April. Diversion of flow to an MAR facility could occur during days when flows exceed 75<sup>th</sup> percentile flows. Flows would exceed 75% percentile flows 25% of the time (i.e. 45 days during the November – April wet season).

The minimum and average volume of water that could be diverted to one or more MAR facilities in each stream was calculated by multiplying the diversion flow by the number of diversion days, and transforming the volume to acre-feet/ year.

### Deschutes Upper and Middle

Water availability in the upper to middle Deschutes may be approximated by flows the USGS 12079000 gage near Rainier, WA (Figure 2). The Deschutes River is closed to consumptive appropriations between April 15 – October 15 (Chapter 173-513 WAC). From October 16 – April 14, there are variable minimum flows, with the greatest minimum flow of 400 cfs, as measured at the downstream control point, the USGS 12080010 gage at Tumwater, WA.

The capacity and appropriateness of potential MAR projects in the Upper and Middle Deschutes should be guided by local flows, but the maximum quantity of potential MAR diversion flows is based on meeting minimum instream flows at the downstream control point, the USGS 12080010 gage at Tumwater, WA (see Deschutes Lower Section).

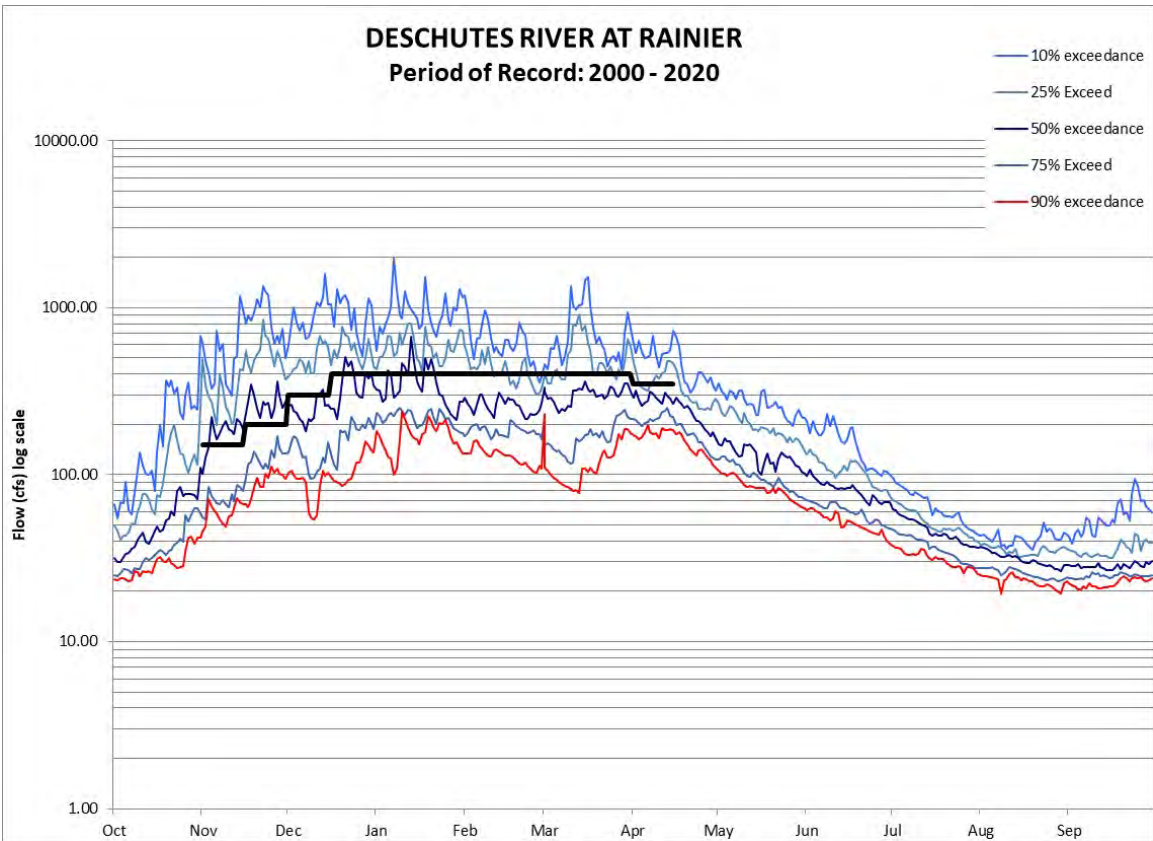


Figure 2. Deschutes River at Rainier (USGS Station 12079000) daily flow exceedances, from 2000 – 2020.

## Deschutes Lower

Water availability in the Lower Deschutes may be approximated by flows the USGS 12080010 gage at Tumwater, WA (Figure 3). The Deschutes River is closed to consumptive appropriations between April 15 – October 15 (Chapter 173-513 WAC). From October 16 – April 14, there are variable minimum flows, with the greatest minimum flow of 400 cfs.

Potential diversion flows for the Deschutes River is two percent of maximum wet season minimum flows (400 cfs), or approximately 8 cfs. Potential diversion days range from 50 – 108 days per year (Table 2). Diverting 8 cfs for 50 – 108 days, would equal 792 – 1,712 afy of water diverted and infiltrated for subsequent seepage into the river throughout the year. These flows could be diverted and conveyed to one or more MAR facilities. A scenario of splitting the 8 cfs among four MAR sites is depicted in Table 5.

In the Lower Deschutes subbasin, a potential MAR location was also identified near Percival Creek (Figure 1; Table 1). Percival Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location are near zero in the summer and range from 11 - 15 cfs in the wet season (Table 3). If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs (Table 5). The diversion period is likely around 45 days per year. This would result in an offset of around 18 afy (Table 5).

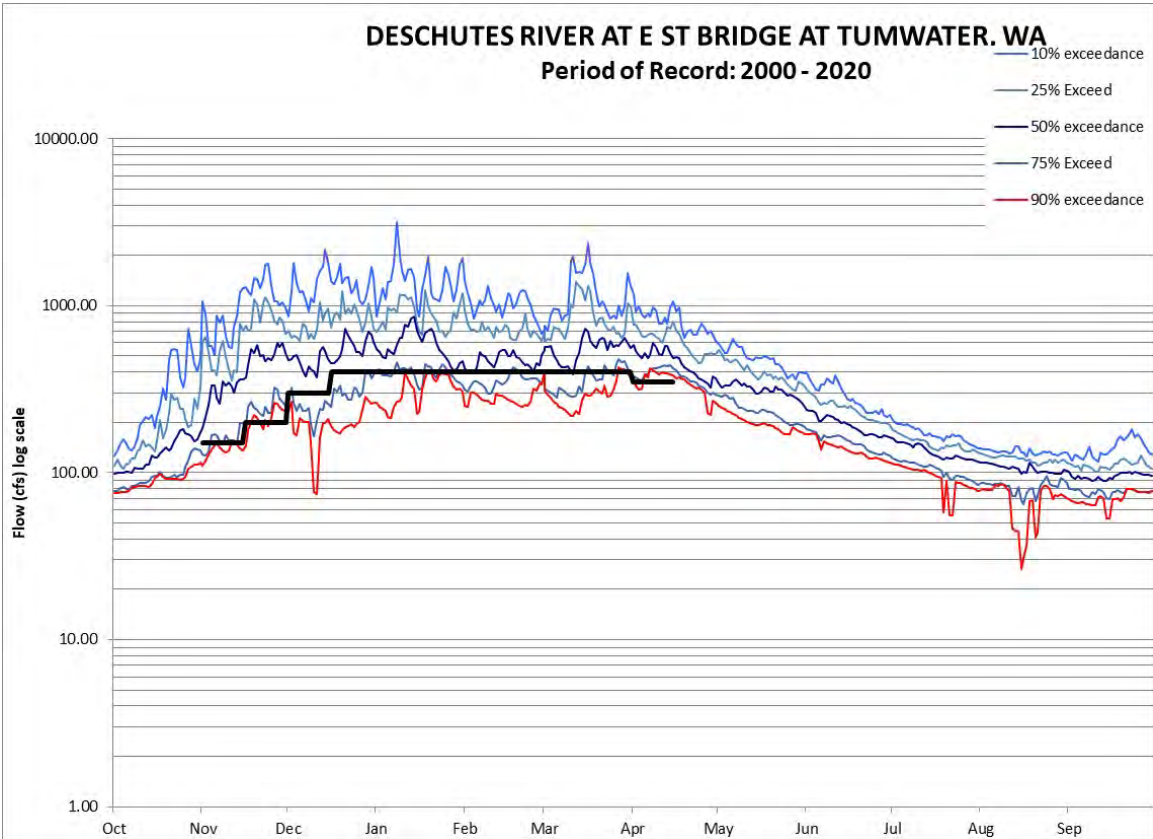


Figure 3. Deschutes River at Tumwater (USGS Station XXX) daily flow exceedances, from 2000 – 2020.

Table 2. Number of days when flows are at least five percent greater than minimum flows during the wet season (November – April). Deschutes River At E St Bridge at Tumwater, WA (USGS 12080010).

| Month     | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| January   | 25   | 0    | 31   | 17   | 21   | 8    | 31   | 29   | 25   | 25   | 26   | 29   | 22   | 20   | 11   | 22   | 31   | 12   | 31   | 16   | 30   |
| February  | 27   | 2    | 28   | 16   | 20   | 0    | 21   | 13   | 22   | 1    | 10   | 11   | 29   | 15   | 19   | 12   | 27   | 24   | 26   | 13   | 21   |
| March     | 30   | 0    | 29   | 24   | 6    | 5    | 0    | 31   | 25   | 16   | 9    | 31   | 31   | 24   | 31   | 17   | 31   | 31   | 20   | 3    | 2    |
| April     | 6    | 3    | 9    | 15   | 0    | 15   | 0    | 15   | 15   | 15   | 15   | 15   | 15   | 12   | 14   | 15   | 15   | 15   | 10   | 9    | 6    |
| May       | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| June      | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| July      | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| August    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| September | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| October   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| November  | 6    | 22   | 1    | 15   | 17   | 26   | 27   | 19   | 22   | 30   | 30   | 26   | 30   | 29   | 30   | 30   | 30   | 26   | 19   | 0    | 7    |
| December  | 2    | 31   | 10   | 26   | 10   | 13   | 31   | 30   | 4    | 13   | 31   | 8    | 29   | 7    | 24   | 30   | 29   | 21   | 22   | 9    | 0    |
| Sum       | 96   | 58   | 108  | 113  | 74   | 67   | 110  | 137  | 113  | 100  | 121  | 120  | 156  | 107  | 129  | 126  | 163  | 129  | 128  | 50   | 66   |
| Min       | 50   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Avg       | 108  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

## Cooper Point

In the Cooper Point subbasin, a potential MAR location was identified near Green Cove Creek (Figure 1; Table 1). Green Cove Creek does not have any instream flow closures or minimum flows (Chapter 173-513 WAC). Measured flows near the potential MAR location are near zero in the summer and range from 7 – 11 cfs in the wet season (Table 3). If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs (Table 5). The diversion period is likely around 45 days per year. This would result in an offset of around 18 afy (Table 5).

## Boston Harbor

In the Boston Harbor subbasin, potential MAR locations were identified near Woodard Creek (Figure 1; Table 1). Woodard Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location are near zero in the summer and range from 10 – 17 cfs in the wet season (Table 3). If an MAR project were to occur at this location, it could be small-scale, approximately 0.2 cfs diversion when flows exceed 10 cfs (Table 4). The diversion period is likely around 45 days per year. This would result in an offset of around 18 afy (Table 5).

Potential MAR locations were also identified near Mission Creek and Indian Creek (Figure 1; Table 1). However, flow in these streams are very small during all seasons (Table 3) and also have very little value for anadromous salmonids. Therefore, diverting water from these streams for MAR infiltration may not be feasible.

## Woodland Creek

In the Woodland Creek subbasin, potential MAR locations were identified near Woodland Creek (Figure 1; Table 1). Woodland Creek is a closed stream (Chapter 173-513 WAC). However, diverting water from the stream for MAR infiltration may be feasible with a rule change to accommodate these flow restoration projects. Measured flows near the potential MAR location are near zero in the summer and range from 10 – 17 cfs in the wet season (Table 3). If an MAR project were to occur at this location, it could be small-scale, approximately 0.7 cfs diversion when flows exceed 48 cfs (Table 4). The diversion period is likely around 45 days per year. This would result in an offset of around 62 afy (Table 5).

If fully implemented, the total quantity of water potentially diverted and infiltrated at MAR sites in WRIA 13 range from 909 – 1,830 afy (Table 5).

Table 3. Average measured monthly flow at Green Cove, Indian, Mission, Percival, Woodard, and Woodland Creeks.

| Month     | Green Cove<br>Creek @ 36th<br>Avenue NW | Indian Creek<br>Mouth @<br>Quince Street<br>SE | Mission Creek<br>@ Boston<br>Harbor Road | Percival Creek<br>@ Pedestrian<br>Footbridge | Woodard<br>Creek @ 36th<br>Ave NE | Woodland<br>Creek @<br>Pleasant Glade<br>Road | Woodland<br>Creek @<br>Desmond<br>Drive Ecology<br>HQ |
|-----------|-----------------------------------------|------------------------------------------------|------------------------------------------|----------------------------------------------|-----------------------------------|-----------------------------------------------|-------------------------------------------------------|
| January   | 10.9                                    | 6.0                                            | 2.2                                      | 11.8                                         | 13.9                              | 44.8                                          | 12.8                                                  |
| February  | 7.2                                     | 5.2                                            | 1.2                                      | 15.1                                         | 12.9                              | 45.7                                          | 9.4                                                   |
| March     | 10.1                                    | 7.1                                            | 1.6                                      | 11.9                                         | 16.6                              | 51.2                                          | 8.0                                                   |
| April     | 4.7                                     | 3.3                                            | 0.8                                      | 9.0                                          | 12.7                              | 44.3                                          | 17.9                                                  |
| May       | 2.5                                     | 2.9                                            | 0.6                                      | 8.7                                          | 10.0                              | 34.1                                          | 8.6                                                   |
| June      | 1.0                                     | 2.0                                            | 0.4                                      | 6.7                                          | 7.3                               | 24.4                                          | 4.1                                                   |
| July      | 0.3                                     | 1.4                                            | 0.5                                      | 3.3                                          | 5.4                               | 17.8                                          | 2.0                                                   |
| August    | 0.2                                     | 1.2                                            | 0.3                                      | 2.7                                          | 4.4                               | 14.6                                          | 1.4                                                   |
| September | 0.6                                     | 1.1                                            | 0.3                                      | 3.3                                          | 4.7                               | 14.3                                          | 0.5                                                   |
| October   | 2.1                                     | 2.4                                            | 0.9                                      | 6.4                                          | 6.2                               | 16.0                                          | 0.1                                                   |
| November  | 7.6                                     | 4.5                                            | 0.4                                      | 14.1                                         | 10.2                              | 24.5                                          | 1.0                                                   |
| December  | 11.2                                    | 5.8                                            | 1.9                                      | 11.6                                         | 12.4                              | 35.3                                          | 5.5                                                   |

Table 4. Seventy-Fifth percentile of monthly flows during the period of record at Green Cove, Woodland, and Woodard Creek and monthly average flows for Percival Creek.

| <b>Month</b>        | <b>Green Cove<br/>Creek at Bulter<br/>Cove FS</b> | <b>Woodland<br/>Creek at<br/>Pleasant Glade<br/>Rd.</b> | <b>Woodard Creek<br/>at 36th Ave NE</b> | <b>Percival Creek<br/>at SPSCC</b> |
|---------------------|---------------------------------------------------|---------------------------------------------------------|-----------------------------------------|------------------------------------|
| Period of<br>Record | 2009 - 2020                                       | 2008 - 2020                                             | 2008 - 2020                             | 2009 - 2015                        |
| January             | 15.9                                              | 51.9                                                    | 14.9                                    | 11.8                               |
| February            | 9.0                                               | 52.3                                                    | 14.9                                    | 15.1                               |
| March               | 12.4                                              | 56.7                                                    | 18.7                                    | 11.9                               |
| April               | 5.5                                               | 53.8                                                    | 14.7                                    | 9.0                                |
| May                 | 3.1                                               | 40.8                                                    | 11.1                                    | 8.7                                |
| June                | 1.8                                               | 28.6                                                    | 8.2                                     | 6.7                                |
| July                | 0.6                                               | 21.1                                                    | 6.0                                     | 3.3                                |
| August              | 0.2                                               | 16.2                                                    | 4.4                                     | 2.7                                |
| September           | 0.3                                               | 16.3                                                    | 4.7                                     | 3.3                                |
| October             | 1.5                                               | 19.1                                                    | 5.8                                     | 6.4                                |

|                       |             |             |             |             |
|-----------------------|-------------|-------------|-------------|-------------|
| November              | 8.1         | 30.8        | 10.8        | 14.1        |
| December              | 11.6        | 44.3        | 13.8        | 11.6        |
| <b>Average</b>        | <b>10.4</b> | <b>48.3</b> | <b>14.6</b> | <b>12.3</b> |
| <b>Diversion</b>      | <b>0.2</b>  | <b>0.7</b>  | <b>0.2</b>  | <b>0.2</b>  |
| <b>Diversion Days</b> | <b>45</b>   | <b>45</b>   | <b>45</b>   | <b>45</b>   |



Table 5. Potential MAR site locations, facility sizes, and water offsets.

| Subbasin         | Stream           | Location                            | Facility Size (sq ft) | Diverstion Flow (cfs) | Minimum Days Exceeding Minimum Flows (Nov - Apr) |                            |                            | Average Days Exceeding Minimum Flows (Nov - Apr) |                            |                            |
|------------------|------------------|-------------------------------------|-----------------------|-----------------------|--------------------------------------------------|----------------------------|----------------------------|--------------------------------------------------|----------------------------|----------------------------|
|                  |                  |                                     |                       |                       | Total Days of Diversion                          | Total Water Per Year (cfy) | Total Water Per Year (afy) | Total Days of Diversion                          | Total Water Per Year (cfy) | Total Water Per Year (afy) |
| Deschutes Upper  | Deschutes River  | South of Clear Lake                 | 12,400                | 2                     | 50                                               | 8,640,000                  | 198                        | 108                                              | 18,662,400                 | 428                        |
| Deschutes Middle | Deschutes River  | Rainier View Park                   | 12,400                | 2                     | 50                                               | 8,640,000                  | 198                        | 108                                              | 18,662,400                 | 428                        |
| Deschutes Middle | Deschutes River  | North of Rainier View Park          | 12,400                | 2                     | 50                                               | 8,640,000                  | 198                        | 108                                              | 18,662,400                 | 428                        |
| Deschutes Middle | Deschutes River  | Route 507, SW of Raymond            | 12,400                | 2                     | 50                                               | 8,640,000                  | 198                        | 108                                              | 18,662,400                 | 428                        |
| Deschutes Middle | Deschutes River  | East of Offut Lake                  | Reserve               |                       | Reserve                                          |                            |                            | Reserve                                          |                            |                            |
| Deschutes Lower  | Deschutes River  | TC Roads Gravel Pit, Waldrick Rd SE | Reserve               |                       | Reserve                                          |                            |                            | Reserve                                          |                            |                            |
| Deschutes Lower  | Deschutes River  | Middle Deschutes Property           | Reserve               |                       | Reserve                                          |                            |                            | Reserve                                          |                            |                            |
| Deschutes Lower  | Deschutes River  | Alpine Sand and Gravel, Rixie Road  | Reserve               |                       | Reserve                                          |                            |                            | Reserve                                          |                            |                            |
| Cooper Point     | Green Cove Creek | Cooper Point                        | 1,240                 | 0.2                   | 45                                               | 777,600                    | 18                         | 45                                               | 777,600                    | 18                         |
| Deschutes Lower  | Percival Creek   | Lower Percival Creek, SPSCC         | 1,240                 | 0.2                   | 45                                               | 777,600                    | 18                         | 45                                               | 777,600                    | 18                         |

|                |                |                                             |                 |     |                 |           |     |                 |           |       |
|----------------|----------------|---------------------------------------------|-----------------|-----|-----------------|-----------|-----|-----------------|-----------|-------|
| Boston Harbor  | Woodard Creek  | Former borrow pit                           | 1,240           | 0.2 | 45              | 777,600   | 18  | 45              | 777,600   | 18    |
| Boston Harbor  | Woodard Creek  | Private                                     | Reserve         |     | Reserve         |           |     | Reserve         |           |       |
| Boston Harbor  | Mission creek  | Mission creek                               | Inadequate Flow |     | Inadequate Flow |           |     | Inadequate Flow |           |       |
| Boston Harbor  | Indian Creek   | Near 4th Avenue E and Interstate 5          | Inadequate Flow |     | Inadequate Flow |           |     | Inadequate Flow |           |       |
| Woodland Creek | Woodland Creek | Property with kettle pond on 15th Avenue NE |                 | 0.7 | 45              | 2,721,600 | 62  | 45              | 2,721,600 | 62    |
| Woodland Creek | Woodland Creek | Near Pleasant Glade Road                    | Reserve         |     | Reserve         |           |     | Reserve         |           |       |
| Woodland Creek | Woodland Creek | Near Dept. of Ecology Headquarters          | Reserve         |     | Reserve         |           |     | Reserve         |           |       |
| Total          |                |                                             |                 |     |                 |           | 909 | Total           |           | 1,830 |

## **Diversion**

Capture and recovery methods would vary by water source but would likely include some combination of a screened gravity diversion/bypass, a screened water lift and/or pump system, or a series of below ground infiltration galleries/collector pipes (e.g. Raney wells) adjacent to source streams. All of these methods would need to be evaluated based on a number of factors including operation and maintenance, fish passage performance, permitting, reliability, public safety, construction and lifecycle cost, and available funding mechanisms (HDR 2017) in order to determine the best fit for the water source. Screened water gravity diversions require the most extensive infrastructure but would need the least amount of effort to get water into conveyance structures. Screened water lift and/or pump systems would require less infrastructure than a screened water gravity diversion however the risk of damage would be greater.

The WRIA 13 Committee acknowledges that some diversion methods including in-channel structures may pose an impact to fish habitat, and strongly advocates the use of diversion methods that do not include in-channel structures. For example, diverted water could be conveyed through a collector well adjacent to the river (e.g. Ranney Collector well). The WRIA 13 Committee suggests that projects should be specifically designed to enhance streamflows and to avoid a negative impact to ecological functions and/or critical habitat needed to sustain threatened or endangered salmonids.

## **Conveyance**

After capture and recovery, water would be transported to the MAR site through a conveyance system which would be some combination of open canals/ditches, surface and subsurface closed piping, tunnels, and trenches (e.g. lined and unlined). Conveyance can be facilitated through gravity fed structures or strategic pumping throughout the system. Once constructed or modified, maintenance –including repair, leakage control, preventing recontamination, and the operation of pumping stations where gravity pressure is not enough– has to be ensured. Ideally, source streams and MAR sites would be in close proximity to minimize the complexity of the conveyance system.

## **Storage and Infiltration**

MAR sites (e.g. shallow aquifer recharge sites) are expected to consist of one or more small storage reservoirs (ideally less than 10 AF in volume or less than 6 feet in height). After water is captured during periods of excessive river flow, water will be conveyed into storage reservoirs and allowed to infiltrate into the local water table over time. Infiltration sites must be chosen carefully and evaluated for potential infiltration rates and volumes as well as anticipated hydrologic and water quality effects resulting from the project. Suitable sites would have permeable material at the surface and a water-table deep enough to allow levels to rise without causing problems, such as flooding.

## **Description of the anticipated spatial distribution of likely benefits**

The benefits will vary depending on the Creek, fish use. MAR seepage back to any of the proposed creeks would target benefits to the low-flow summer and early fall period. This would benefit rearing for yearling salmonids such as coho, steelhead, and coastal cutthroat trout.

## **Performance goals and measures.**

Performance goals would be the quantity of water diverted and infiltrated. This goal could be measured by metering the conveyance pipe flow and the water depth of the MAR infiltration basin. Secondly, water table elevations between the MAR and receiving waters, flow in the receiving waters, and seepage observations could be done, as an indication of flow benefits.

## **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

These MAR projects would increase flow during the summer and early fall periods, increasing usable aquatic habitat, overall.

## **Identification of anticipated support and barriers to completion.**

Thurston County will likely support and implement these projects, with potential support from other partners and an implementation group.

## **Potential budget and O&M costs.**

The estimated costs for MAR projects are based on an assumption of ~\$3,443/acre-foot of estimated offset. For the total 811 AFY estimated as potential offset for WRIA 13 (does not include streams closed year-round this would equate to ~\$2.8 million.

## **Anticipated durability and resiliency.**

The project would require regular operation and maintenance.

## **Project sponsor(s) (if identified) and readiness to proceed/implement.**

Thurston County has indicated that they will take a lead role in implementing these projects. However, other project partners and sponsors may occur and would benefit implementation.

## **Sources of Information**

WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

## **Attachment A**

### **Favorable MAR Areas and Potential Locations**

# Technical Memorandum

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**To:** Department of Ecology WRIA 13 Watershed Restoration and Enhancement Committee  
**From:** Glenn Mutti-Driscoll, LHG Pacific Groundwater Group  
**Re:** Managed Aquifer Recharge Assessment Methodology  
**Date:** December 18, 2020

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This technical memorandum documents the methodology used to identify properties that appear to have characteristics favorable for Managed Aquifer Recharge (MAR) in Water Resources Inventory Area (WRIA) 13, Deschutes. MAR project sites potentially can support watershed restoration and enhancement projects within the WRIA. This work was completed by Pacific Groundwater Group (PGG) on behalf of the WRIA 13 Watershed Restoration and Enhancement (WRE) Committee (Committee) and the Department of Ecology (Ecology). This work was performed under Ecology Contract Number C1700029, Work Assignment PGG104.

Under RCW 90.94.030, Ecology has the responsibility to convene WRE committees and prepare WRE plans for eight WRIs in the Puget Sound and Hood Canal areas. The general purpose of the plans is to document potential offsets to projected depletion of instream flows resulting from new, permit-exempt domestic well uses in the WRIs over the next 20 years.

To support development of the WRE plan for WRIA 13, PGG used regional data to assist the Committee in selecting properties within WRIA 13 that appear to have favorable infiltration characteristics and a close enough proximity to water so that MAR may occur. MAR projects could potentially offset the impacts of permit exempt wells on WRIA 13 streams. This memorandum outlines the methodology used to identify potentially favorable MAR project sites.

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## PROCEDURE

Regional soils, geologic, and hydrologic data coverages were compiled for WRIA 13 using Geographic Information System (GIS) software. A series of screening criteria were then applied to identify sites that appear most favorable.

### Screening Level 1- Soils and Surficial Geology

The initial screen focused on areas where regionally mapped soil and geologic units appear favorable for infiltration. The following criteria were applied:

- Soils types mapped on the County level by NRCS (Pringle, 1990) were reviewed and only soils in hydrologic groups A and B where all layers within the mapped soil type had a permeability

greater than or equal to 2 inches per hour were retained as favorable for infiltration. **Table 1** lists these soils.

- Surficial geologic maps were reviewed and geologic units primarily composed of sand and/or gravel were identified as favorable for infiltration, while low permeability units (with higher silt and/or clay contents or bedrock) were excluded. 1:24,000 geologic maps by the Washington State Department of Natural Resources (DNR) exist for most of WRIA 13 (including Logan and others (2003); Logan and others (2009); Walsh and others (2003); and Walsh and others (2005)), in areas of the upper watershed where 1:24,000 geologic mapping does not exist a regional 1:100,000 map by DNR was used (Schasse, 1987). **Table 2** lists geologic units identified as favorable for MAR.
- Wetlands, lakes, and high groundwater areas as mapped by Thurston County were excluded from favorable infiltration areas.

Areas that meet the Level 1 screening criteria are shown in **Figure 1**.

### **Screening Level 2 – Depth and Thickness of Aquifer**

The second screen focused on removing areas with potentially shallow groundwater or a thin aquifer that may prevent it from transmitting infiltrated water away from a MAR facility. Thurston County provided output from its county-wide groundwater flow model<sup>78</sup> for use in assessing the water-table depth and the surficial aquifer saturated thickness. No regional-scale piezometric surface map exists for the surficial aquifer, and therefore output from Thurston County's groundwater model is considered the best available data source<sup>79</sup>. The following screening criteria were applied to areas identified as having favorable infiltration characteristics from the first level screen:

- A depth-to-water in the surficial aquifer of eight feet or greater was assumed necessary for MAR to be feasible. This depth was selected to allow a groundwater mound of at least five to develop under an infiltration trench or basin, with the uppermost three feet assumed necessary for basin/trench construction and to provide a vadose zone between the base of the infiltration facility and the top of the groundwater mound. This assumed eight foot depth-to-water screening value is somewhat arbitrary (in actuality groundwater mounding beneath a MAR site will be dependent on local soil and aquifer permeabilities), but was applied to screen out areas having marginal vadose zone thickness that most likely could not support long-term concentrated infiltration.
- A surficial aquifer saturated thickness of 10 feet or greater was assumed necessary for MAR to be feasible. The surficial aquifer saturated thickness was calculated using layer thicknesses and

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<sup>78</sup> Head data from groundwater flow model version 186 and layer thicknesses from model version 169 were used for this analysis. It should be noted that Thurston County's groundwater flow model continues to be locally improved and calibrated, therefore water level and aquifer thickness values applied for this analysis may differ from values obtained from a later version of the model.

<sup>79</sup> Though the Thurston County groundwater model is the best available data source for county-wide water level data, considerable uncertainty is present in modeled shallow aquifer water levels due to limited calibration data (most water supply wells are installed in deeper aquifers than the water table aquifer).



simulated water table elevations from the Thurston County groundwater flow model. Generally the surficial aquifer saturated thickness equaled the saturated thickness of model Layer 1 (representing Vashon recessional outwash or alluvium), but in areas where the Layer 2 aquitard (Vashon till) was absent, the saturated thickness was calculated using the combined saturated thickness of model Layers 1, 2, and 3 (including representation of Vashon advance outwash). The 10-foot saturated thickness screening criteria applied is also somewhat arbitrary (local hydraulic conductivity values will have a significant impact on aquifer transmissivity), but is intended to remove areas where the aquifer transmissivity may be too low efficiently transmit infiltrated water away from the MAR facility.

Areas that meet the Level 2 screening criteria are shown in **Figure 2**.

### **Screening Level 3- Distance to Potential Source Water**

The third screen focused on identifying areas in close proximity to potential MAR source waters. The following screening criteria were applied to areas identified as having favorable infiltration characteristics from the second level screen:

- Favorable MAR areas were defined as those within  $\frac{1}{4}$  and  $\frac{1}{2}$  mile from a potential source water.
- Locations within  $\frac{1}{4}$  and  $\frac{1}{2}$  mile from a potential source waters were subdivided into publicly or land-trust owned lands and privately owned lands. Public and land-trust lands potentially are more likely to be developed into MAR sites based on the conservation goals of those entities, and therefore were specifically identified where applicable.
- Potential source water locations included streams and municipal or industrial wastewater treatment plants (WWTPs). In addition to envisioned MAR approaches for stream and water treatment plant source waters, other potential source waters and guiding concepts were considered but not analyzed, as listed below.
  - For stream sources MAR would occur in the wet season (roughly November to mid-April) when instream flow requirements are met on the Deschutes River and its tributaries. Optimally, stream water recharged in the wet season would return to the stream during periods of water scarcity (e.g. summer and fall). Both distance-to-stream and aquifer properties control the timing for seasonal recharge to reach targeted streams.
  - For WWTP sources, treated effluent would be used for infiltration. In practice no potentially favorable sites reliant on treated water were identified, but if a site is identified in the future, a site-specific review of effluent and aquifer water quality criteria would be necessary.
  - Existing and planned reclaimed water pipelines were not included in this analysis as LOTT is not currently producing excess reclaimed water. However, changes in reclaimed water production, demand, and the construction of future conveyance pipelines could make reclaimed water be a more viable MAR source water in the future.

- Stormwater was not included in this analysis as no potential future projects were identified in the areas of interest by the Committee. However, this does not preclude runoff generated from future stormwater projects being used as a source water in areas with favorable soils and geology.
- Source water from wells pumping deeper aquifers was not considered as part of this analysis because water right acquisition would likely be required.
- A MAR approach that was not investigated but could be pursued in the future for glacial till areas is the injection of water through wells into the underlying Vashon advance outwash, which has significantly higher permeability than glacial till. Underground Injection Control regulations and source water quality criteria would need close review as part of this analysis.

Areas meeting the Level 3 screening criteria are shown in **Figure 3**. PGG also identified potential Tier 1 MAR sites based on the above screening criteria along with consideration of land ownership, property size, and relative net ecological benefit (NEB). Potential Tier 1 MAR sites are numbered on **Figure 3** and listed in **Table 3**. **Table 3** notes whether target receiving streams are salmon-bearing, if gopher soils are present on the site, associated flow restriction periods for the source water, and other relevant observations.

**Figure 3** and **Table 3** also identify potential Tier 2 MAR sites. Tier 2 sites are either located farther than ½ mile from a stream or WWTP or are near a source water closed to further appropriation. The relative NEB for these sites will vary from relatively low (for sites located far from streams) to very high (for sites located by streams closed to further appropriation). At the Committee's request PGG reviewed the Deschutes Middle, Johnson Point, Cooper Point, Boston Harbor, and Woodland Creek subbasins to identify potential Tier 2 MAR sites. MAR at Tier 2 sites likely could occur with the identification of other non-stream/WWTP source waters. Tier 2 MAR sites are good potential candidates for future stormwater infiltration projects.

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## FUTURE STEPS

Site specific feasibility analyses for Tier 1 properties listed on **Table 3** should be pursued, and possibly for Tier 2 sites as well. Initial feasibility considerations will include ownership (and if the owners would consider selling, leasing, or permitting easements on their property to allow MAR) and the relative cost and complexity of providing source water to the site. Different sites will likely have different conveyance requirements that could include pumps, pipelines with significant elevation gain, long-distance subsurface pipelines, and pipeline easements for each property crossed by the conveyance line. For sites that remain favorable following initial owner outreach and conveyance considerations, a site specific hydrogeologic evaluation should be performed to identify local soil and aquifer hydrologic properties, depth to groundwater, and groundwater flow direction and gradient. Groundwater mound height and return flow travel time estimates would be included in this evaluation, as well as potential water quality or treatment concerns (such as the removal of particulate matter) prior to infiltration.

Sites listed on **Table 3** are specific properties that have been identified as likely having favorable MAR characteristics. It is likely that favorable MAR sites exist elsewhere in WRIA 13 but were not identified in this analysis based on the regional nature of the available data and the focus of surficial infiltration (and not subsurface injection). Though **Figure 3** is the best approximation of favorable surficial infiltration MAR sites in WRIA 13 using available data, the lack of local water level and geologic data most likely has caused areas with favorable MAR characteristics to not be identified. The set of regional screening maps (**Figures 1 – 3**) can and should be used for the future evaluation of properties, but results from any local or site specific hydrogeologic studies should generally be deferred to over the findings of this regional inventory. Local soil or geologic heterogeneities are generally not reflected in regional data sets, and observed depth to groundwater data will be more accurate than the regionally modeled depths used for this analysis. PGG (2019) presents a more localized infiltration analysis based on observed water levels in portions of the Deschutes Lower and Deschutes Middle subbasins that should also be referred to if future identified sites are within the report study area.

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## REFERENCES

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- Walsh, T. J., Logan, R.L., Schasse, H.W., and M. Polenz, 2003. Geologic Map of the Tumwater 7.5 Minute Quadrangle, Thurston County, Washington. Washington Division of Geology and Earth Resources, Open File Report 2003-25.

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# Schneider's Prairie Off-Channel Storage-and-Release

(Thurston County ID 122)

## PROJECT DESCRIPTION

### Description

The Schneider's Prairie Off-Channel Storage-and-Release Project (Project) is located on the east (right) bank of the Deschutes River, west of the Keanland Park Lane SE, in north-central Thurston County (Figure 1), Deschutes River (Mainstem Lower) draft management unit. The Project includes Ayers Spring/Pond and Ayer Creek within Schneider's Prairie (Figure 2).

This project will restore hydrologic connectivity between the Deschutes River and Schneider's Prairie. Schneider's Prairie is a depressional feature that contains the Ayer Creek drainage. Paleochannels apparent from aerial photos and LiDAR images show that multiple channels historically connected the Deschutes River with Schneider's Prairie. Reconnecting the Deschutes River with Schneider's Prairie and Ayer Creek would provide rearing habitat and flood refugia for juvenile salmonids, stormflow attenuation, and water infiltration for later-season release to augment flow in the lower Deschutes River.

The project concept is to deepen an existing floodplain paleochannel that would hydrologically connect the Deschutes River to Schneider's Prairie (Figure 2). Schneider's Prairie contains Ayers Pond and Ayers Creek. The deepened paleochannel would be connected to the existing Ayers Creek that runs north and back to the Deschutes River. The paleochannel and Ayers Creek would be roughened with large woody debris (LWD) and beaver dams (analogous and beaver introduction) to flood adjacent floodplain habitat and pond creek flow. Ayers Creek would be realigned with a meander pattern (correcting historical ditching). Ayers Creek would be modified near the mouth using biotechnical techniques (e.g. buried logs and log jams) to maintain grade control at an elevation that would inundate a portion of the off-channel area during high flow events (152 ft NAVD88). The seasonal inundation would result in infiltration and subsequent seepage back to the river on the time scale of days to months.

The existing paleochannel will be deepened to convey water from the Deschutes River to Ayers Creek, within the off-channel feature. The connection point of the paleochannel to the Deschutes River will be through an abandoned oxbow that fills with river water from the downstream end during moderate and high flows. Connecting the paleochannel to the Deschutes River through the oxbow is expected to provide a stable, low-energy connection to the river, and it appears that the paleochannel naturally connects there. The deepened paleochannel could have an invert elevation of 155 ft (NAVD88) that would convey water from

the river to the off-channel feature when Deschutes River flows are above 400 cfs. In this design scenario, when the river is flowing above 400 cfs, the channel would begin conveying water to the off-channel feature.

Schneider's Prairie is a broad depressional off-channel feature that contains an extensive wetland, including Ayers Springs and Ayers Creek. Diverted floodwaters would inundate about 52 acres of this feature, below an elevation of 152 ft (NAVD 88 datum), frequently during the months of November – April, and infrequently during the shoulder months of May, June, September, and October. Ponded water will infiltrate and seep back into the Deschutes River over time.

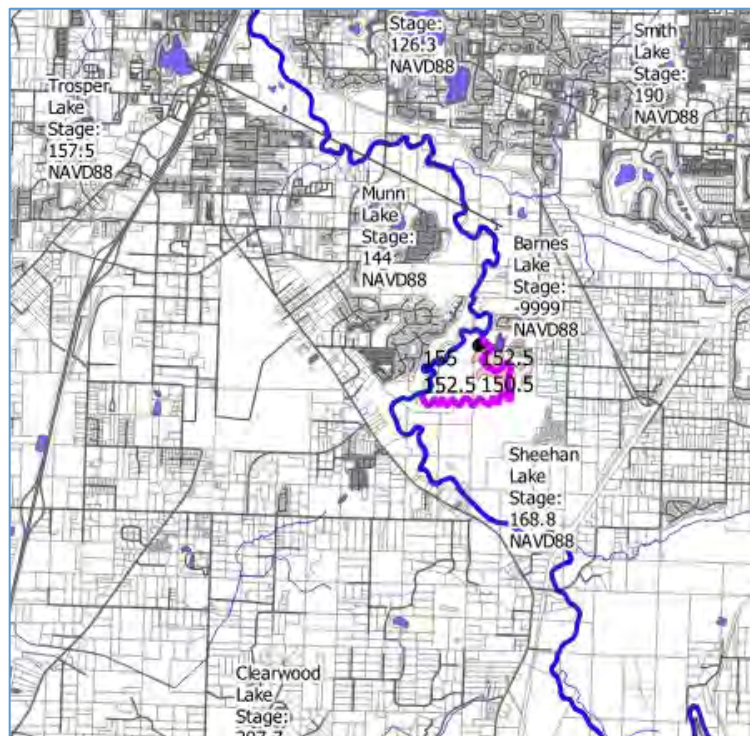


Figure 1. Site Location

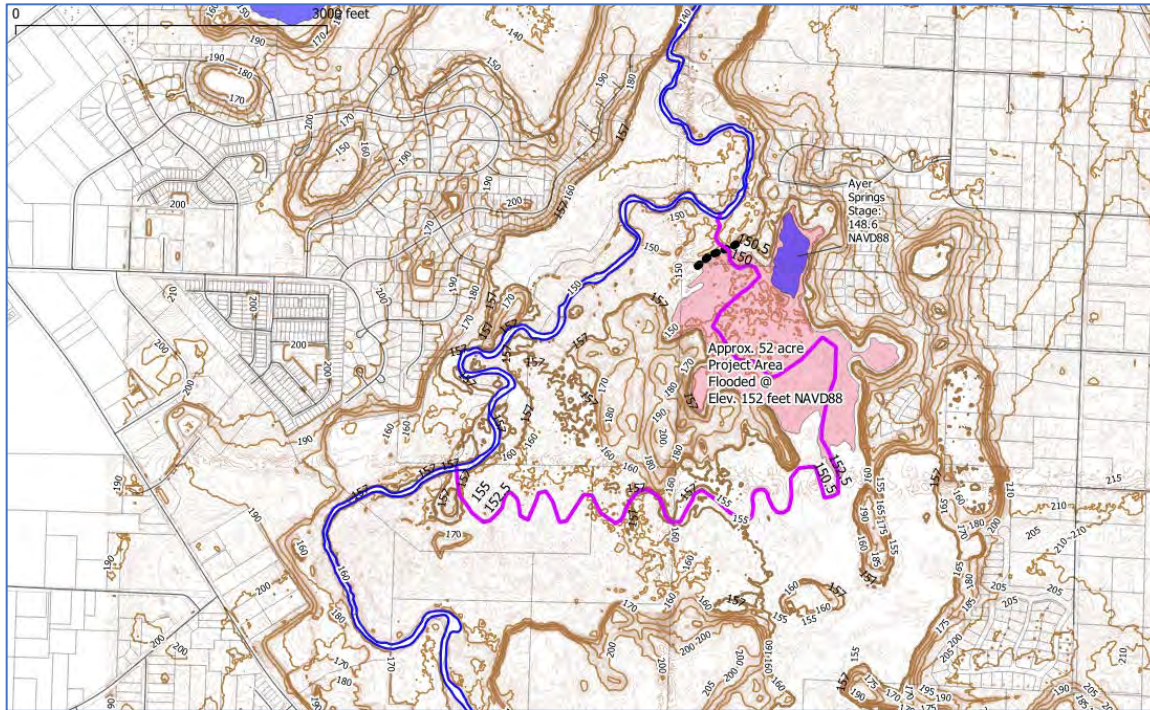


Figure 2. Project Area showing conceptual off-channel storage area and new stream channel.



**Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

Water offset benefits were calculated by estimating inlet flows into the Schneider's Prairie off-channel feature, inundation extent and depth, and seepage back to the Deschutes River.

Inflows from the Deschutes River to the Schneider's Prairie off-channel area were estimated on a cumulative monthly basis during November – April season (Table 1). Monthly inflows were developed based on assumed inlet channel geometry, daily river flow values river at the USGS E Street Gage in Tumwater, WA (USGS Gage 12080010) and corresponding river elevations derived from the HEC-RAS hydrologic model developed by FEMA for the Deschutes River. Only River flow values greater than 400 cfs caused inflows into the Schneider's Prairie off-channel area, and inflows were restricted to the November – April season.

The inlet channel was added to the existing HEC-RAS model using a standard channel geometry. The surface of the banks and floodplain were built from LiDAR data. Using the 2011 LiDAR terrain contours, a storage area of about 52 acres was considered practical for seasonal inundation – see flooded area polygon (Figure 2). Water depths of 1 to 3 feet were considered potentially obtainable using either surface roughness (natural) or a low dike to retain water, at an elevation of 152 (NAVD88 datum). Modifications to the mouth of Ayers Creek with grade control at 152 feet may be required but would require fish passage for both adult and juvenile salmonids.

Inflows from the Deschutes River were compared to the maximum infiltration capacity of the off-channel area (i.e. 52 acres). Maximum infiltration capacity was estimated using Darcy's Law calculations. The smaller of the two values were used as an assumed infiltration quantity (Table 1). River inflows that exceeded the infiltration capacity were assumed to be retained as ponded water in the Schneider's Prairie feature. This retained inflow volume was assumed to infiltrate during the late spring, when river inflows were no longer occurring.

These monthly infiltration quantities were used to model streamflow benefits (i.e. seepage back to the Deschutes River) over time. Seepage was modeled using STRMDPLT08. Seepage back to the Deschutes River increases over time, because of the cumulative effect of infiltrating additional water. This cumulative increase reaches an asymptote (i.e. additional benefits are minimal) after about 50 years of infiltration (Table 2). Seepage back to river does not change substantially with season, but slightly more seepage occurs during the May – October period, relative to the November – April period. Streamflow benefits during the May – October period are predicted to be 285, 681, 958, and 1,310 acre-feet per year during the first, fifth, tenth, and fiftieth year of infiltration, respectively.



Table 1. Maximum Infiltration and Diversion quantities.

| Month               | Monthly Deschutes River Inflow (acre-ft) | Maximum Monthly Volume Capacity (acre-ft) | Uninfiltrated Water Remaining (acre-ft) | Remaining Water Infiltrated (Acre-ft) | Monthly Volume Infiltrated (acre-ft) |
|---------------------|------------------------------------------|-------------------------------------------|-----------------------------------------|---------------------------------------|--------------------------------------|
| January             | 717                                      | 435                                       | 282                                     |                                       | 435                                  |
| February            | 568                                      | 393                                       | 175                                     |                                       | 393                                  |
| March               | 505                                      | 435                                       | 70                                      |                                       | 435                                  |
| April               | 229                                      | 421                                       | 0                                       | 192                                   | 421                                  |
| May                 | 0                                        | 435                                       | 0                                       | 435                                   | 435                                  |
| June                | 0                                        | 421                                       | 0                                       | 175                                   | 175                                  |
| July                | 0                                        | 435                                       | 0                                       |                                       | 0                                    |
| August              | 0                                        | 435                                       | 0                                       |                                       | 0                                    |
| September           | 0                                        | 421                                       | 0                                       |                                       | 0                                    |
| October             | 0                                        | 435                                       | 0                                       |                                       | 0                                    |
| November            | 415                                      | 421                                       | 0                                       |                                       | 415                                  |
| December            | 709                                      | 435                                       | 274                                     |                                       | 435                                  |
| <b>Total Annual</b> | <b>3,143</b>                             | <b>4,683</b>                              | <b>802</b>                              | <b>802</b>                            | <b>3,143</b>                         |

Table 2. Modeled streamflow benefits over time.

| <b>Modeled Benefit<br/>by Year After<br/>Project Start</b> | <b>Total Water<br/>Year Benefit<br/>acre-feet</b> | <b>Percent of<br/>Diversion</b> | <b>May - October<br/>Benefit (acre-ft)</b> | <b>Percent of<br/>Diversion</b> |
|------------------------------------------------------------|---------------------------------------------------|---------------------------------|--------------------------------------------|---------------------------------|
| Year 1                                                     | 316                                               | 10%                             | 285                                        | 9%                              |
| Year 5                                                     | 1,235                                             | 39%                             | 681                                        | 22%                             |
| Year 10                                                    | 1,824                                             | 58%                             | 958                                        | 30%                             |
| Year 50                                                    | 2,537                                             | 81%                             | 1,310                                      | 42%                             |

Notes:

Transmissivity = 1,400 ft<sup>2</sup>/d

Streambed Conductance = 1 ft/d

Wetlands Hydraulic Conductivity = 0.20 ft/day

Total Annual Diversion Applied to Groundwater Recharge = 3,143 acre-feet

The attenuation of these high river flows to increased and steady seepage back to the river will increase flow between flooding events, benefitting fish and overall ecological function. Increased base flow during the summer will increase usable aquatic habitat for fish and would also reduce temperatures and effects of eutrophication on dissolved oxygen and pH.

Finally, off-channel fish habitat will be created in the paleochannel and in the inundated floodplain area in Schneider's Prairie. The inlet and outlet will be designed to be low energy with fish cover and habitat complexity. The inlet and outlet channels will allow for fish ingress and egress. It is expected that this would likely improve habitat for Coho salmon and numerous other species, as well as capturing silt and nutrients. Habitat and water offsets may be improved by increasing channel roughness. For example, beaver habitat/ponding, woody structures in the channels/floodplain, or mature forest land cover would slow down and spread out flow entering and flowing through the off-channel feature. These elements would also increase habitat value for juvenile salmonid rearing.

#### **Description of the anticipated spatial distribution of likely benefits**

Streamflow benefits would occur in the Deschutes River adjacent to the Project area, to the confluence with Capital Lake. Off-channel rearing benefits would occur within the inlet channel, within the off-channel area, Ayers Creek, and in the Deschutes River, downstream of the confluence with Ayer Creek. The length of additional wetted channel and volume of water offset would require calculation during the Feasibility Study process.

In addition, Ayers Creek currently has TMDLs proposed by the USEPA for water temperature, dissolved oxygen, and pH. Surface water connectivity to the river and increased seepage during the critical period may improve water quality.

#### **Uncertainties and Assumptions**

The WRIA 13 Committee identified project uncertainties from the modeling analysis was not able to account for or where assumptions were made, including:

1. Evapotranspiration
2. Amount of infiltration
3. Climate change
4. Dropping flow trend of the Deschutes
5. Sediment issues in the Deschutes
6. Modeling assumptions including transmissivity of aquifer, and streambed conductance
7. Modeling represents average conditions, not dry year conditions

#### **Performance goals and measures.**

Streamflow and groundwater level monitoring may be required, subject to the refined concept, feasibility study, and design.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

This Project would provide off-channel rearing habitat during the winter period, when the inlet channel and wetland area is inundated. This habitat would primarily benefit coho salmon. Seepage back to the Deschutes River during the summer and early fall would benefit all fish species by providing cool water and increasing flows.

**Identification of anticipated support and barriers to completion.**

Capitol Land Trust owns part of the project area. Other water offset and habitat protection projects have been envisioned nearby, including Allen Creek Restoration Project (Habitat Work Schedule project ID 12-1109) by Wild Fish Conservancy but encountered land development pressures. This project would be an element of a larger “Floodplains by Design” grant proposal and concept design.

This area is already under consideration by other entities water, protection and habitat improvement projects. Capitol Land Trust owns part of the project area. The WRIA 13 Salmon Lead Entity is organizing potential partners for a larger Deschutes River project encompassing this area. Because of these efforts, this water offset project is best conceived as one component of the larger effort to protect this part of the lower Deschutes River, an area of substantial ecological and hydrologic value.

**Potential budget and O&M costs.**

Potential (Class V, order of magnitude) capital costs, including design, permitting, property acquisition, and construction, are approximately \$5,000,000.

**Anticipated durability and resiliency.**

The project would require regular operation and maintenance.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

Thurston County and WRIA 13 implementation partners

**Sources of Information**

- 1 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish distribution.
- 2 Available at: <http://apps.wdfw.wa.gov/salmonscape/>
- 3
- 4
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## Small-scale LID Project Development/Implementation for WRIA 13

**Sponsor: Thurston Conservation District**

**Problem:**

In undeveloped landscapes, most rainfall typically soaks into the ground, recharging shallow groundwater. As development occurs, stormwater runoff is generated in areas where compacted soils, impervious roofs, driveways and parking lots concentrate surface flow that can no longer infiltrate into the ground. These impervious surfaces concentrate rainfall and it often flows as stormwater runoff into conveyance systems, whether roadside ditches or buried pipes. Recent adoption of Low Impact Development (LID) practices for new development begins to address this issue. However, in all urbanized areas of WRIA 13 a significant legacy of conventional development continues to generate large volumes of runoff flowing untreated into stormwater systems, and this water ends up in treatment facilities or is discharged – untreated - into local streams and into Puget Sound.

**Project Description/Solution:** By strategically concentrating small-scale LID retrofit work in urbanized settings and by partnering with residential and commercial community members to redirect runoff away from stormwater conveyance systems and into green stormwater infiltration facilities, this work will help to conserve in-stream flow. In rural settings, efforts can explore additional opportunities to slow and infiltrate stormwater runoff that would otherwise rapidly discharge into nearby waterways.

Thurston Conservation District will work with partners to identify and implement retrofit projects to benefit groundwater recharge. Creative partnerships with local jurisdictions could result in incentive programs and a focus on areas of interest that will benefit stormwater programs as well as in-stream flow. Given short-term uncertainties about project development and measurable benefits, small-scale LID retrofit projects won't be counted towards initial offsets in the plan. However, long-term benefits will be quantified and tracked as projects are developed and implemented in regions with appropriate soils, willing partners, and waterways that can benefit from this work. The use of small-scale LID retrofit projects is an important tool to integrate into long-term planning for in-stream flow preservation. Construction of numerous, clustered infiltration facilities including rain gardens and biofiltration swales will eventually result in a measurable impact and benefit.

**Project Benefits:** Infiltrating stormwater runoff into strategic, well-planned and concentrated clusters of LID retrofit projects offers an important opportunity to recharge shallow groundwater in areas where MARs or other large-scale projects are unlikely or infeasible. Small-scale LID retrofits can also (importantly) directly engage residential and commercial partners to contribute to in-stream flow preservation. This work will also immediately benefit water quality in nearby streams, which would otherwise receive untreated runoff and continue to experience flashy flow events along with the input of concentrated pollution.

# Spurgeon Creek Remeander Habitat Project

## PROJECT DESCRIPTION

### Description

Spurgeon Creek is the largest lowland tributary of the Deschutes River in Thurston County and is listed as high priority for restoration (SIT 2015). The South Puget Sound Salmon Enhancement Group (SPSSEG) is currently proposing to re-meander a ditched channel through the adjacent wet fields just south of a private driveway and north of and below the Fox Hill development (Figure 1). The proposed project is intended to improve water quality as well as salmonid, aquatic, and riparian habitat by increasing habitat area and floodplain activity. The project also has the potential to provide salmon viewing and educational opportunities to local residents and the public at large.

The goal of the project is to improve fish productivity and survival within Spurgeon Creek by enhancing the quality and quantity of instream habitat within the project reach. Habitat within Spurgeon Creek is currently impaired, particularly within the lower portion of the project reach, by lack of riparian vegetation and large woody debris, simplification of instream habitats, poor floodplain connectivity, channel incision and poor water quality.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

The Spurgeon Creek restoration project is located near the head waters of Spurgeon Creek in Thurston County. At the project location, the creek is currently ditched through a field (Figure 1). The South Puget Sound Salmon Enhancement Group has been working with the landowners to recreate the natural stream sinuosity through a wetland. Additionally, wood structures would be added that offer refuge from predators and opportunities for salmon to feed, while the wetland offers slower water during high flow events. Native plants would be planted throughout the ¾-acre project area that will recruit wood and provide shade into the future.

Spurgeon Creek is the largest lowland tributary to the Deschutes River and a critical contributor of cold water. The proposed project is intended to improve water quality and increase salmon rearing habitat for juvenile Coho Salmon. Specifically, the project will designed to accomplish the following:

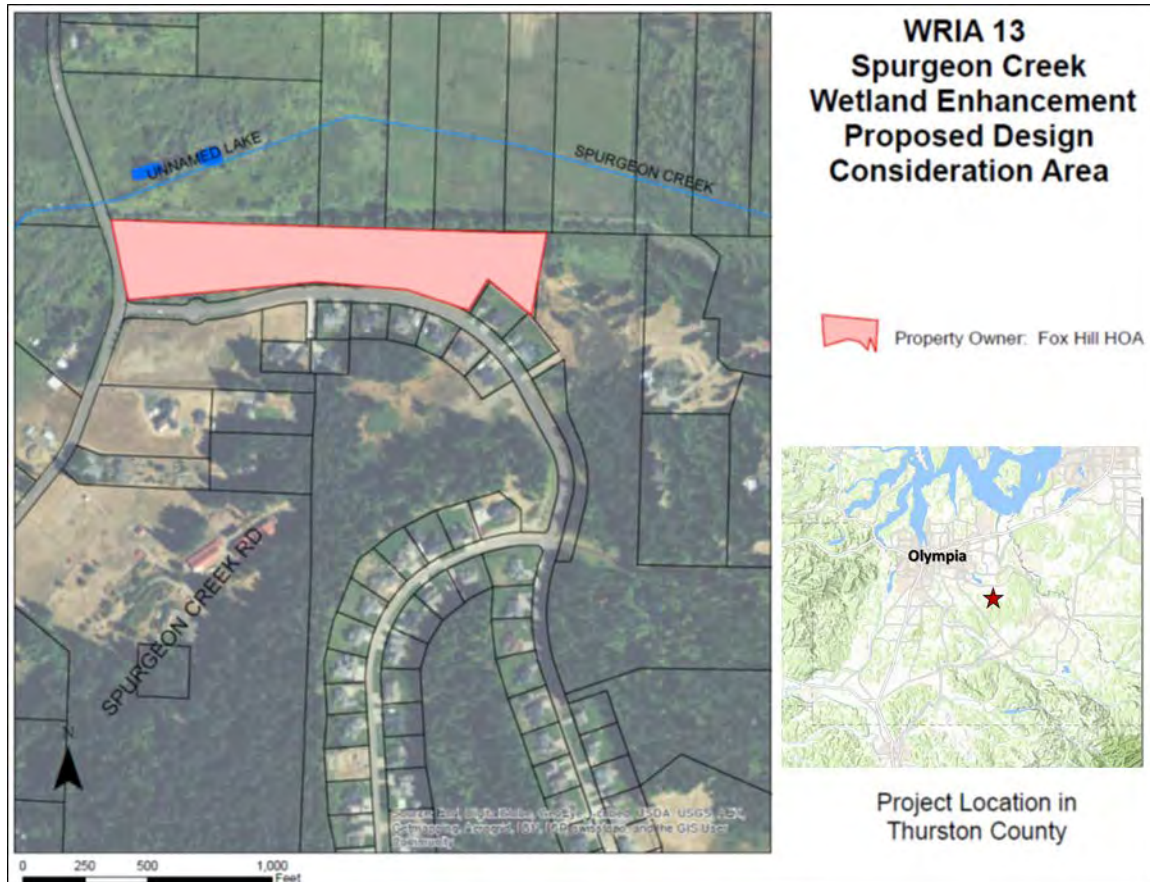
- Increase stream length by 1/8 miles.
- Restore 1/3 mile of creek.
- Increase instream shading by 20%.
- Increase instream complexity by adding Large Woody Debris (LWD).



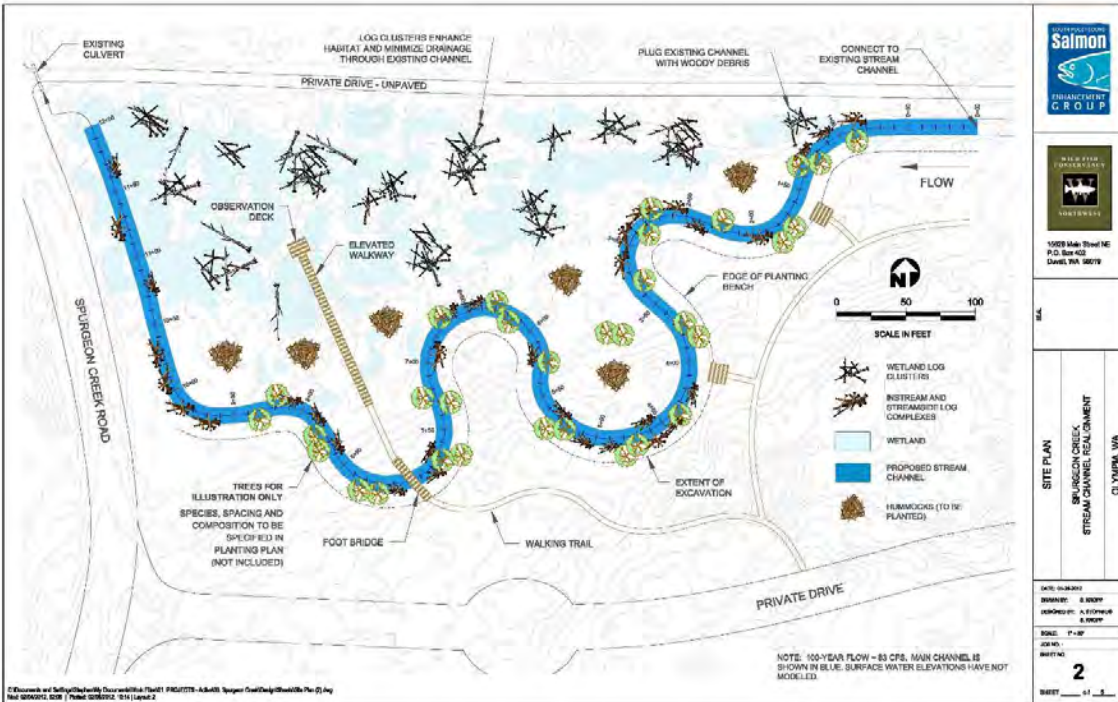
- Increase community involvement.

## Conceptual-level map and drawings of the project and location.

Figures 1-2 show the location of the proposed project.



**Figure 1. Location of proposed Spurgeon Creek remeander project in Thurston County.**



**Figure 2. Conceptual drawing of Spurgeon Creek remainder project from 30% site plan (January 2012).**

## Description of the anticipated spatial distribution of likely benefits

The proposed project site is approximately  $\frac{3}{4}$  of an acre. Within that footprint, Spurgeon Creek is expected to be increased by  $\frac{1}{8}$  miles, effectively restoring  $\frac{1}{3}$  of the creek. Water quality benefits will extend 2 miles downstream of the restoration site.

## Performance goals and measures.

The performance goals are to increase stream length by  $\frac{1}{8}$  miles, restore  $\frac{1}{3}$  mile of creek, increase instream complexity by adding LWD, increase instream shading by 20%, and increase community involvement. Water quality benefits will extend 2 miles downstream of the restoration site.

## Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.

The Washington Department of Fish and Wildlife has identified that Coho Salmon and Fall Chinook are present in Spurgeon Creek and that Chum Salmon and winter steelhead have access to Spurgeon Creek (WDFW Salmonscape 2020). WDFW (2015) documents spawning in Spurgeon Creek and small areas in the lowermost reaches of a limited number of other middle and lower tributaries are shown as supporting spawning (WDFW 2002, cited in Anchor 2008). The Washington Stream Catalog indicates that both Coho, Chum, and Chinook Salmon were historically present in Spurgeon Creek which is identified as an important tributary to the

Deschutes River (WDF 1975). Spurgeon Creek also provides habitat for reticulate sculpin, Olympic mudminnow, wood duck, and waterfowl overwintering.

The portion of Spurgeon Creek proposed for restoration has the potential to provide rearing and foraging habitat for the aforementioned salmon and trout populations year round. Increased base streamflow, improved water quality, and reduced water temperatures would primarily benefit juvenile salmonid rearing habitats by providing increased area and quality of summer stream rearing habitat. This would improve both productivity and survival of juveniles. The alteration of natural stream hydrology has been identified as a high priority limiting factor and streamflow is important for supporting riparian vegetation and wetlands that provide shading, food web support, and flood and sediment attenuation functions (NOAA 2007).

### **Identification of anticipated support and barriers to completion.**

The actions included in this project are recommended by the WRIA 13 Four-Year Work Plan and the Squaxin Island Tribe Natural Resources Deschutes Coho study (SIT 2015). This project has support from the Fox Hill Homeowners Association, the Washington Department of Fish and Wildlife, and the Squaxin Island Tribe. Spurgeon Creek is a high a priority for restoration based on the Deschutes River Coho Salmon Biological Recover Plan and would help address water temperature issues for protecting salmonid spawning and rearing.

The proposed project area lies in the transition between wetland soils and glacial till which may limit the ability to create and effectively sustain wetland habitat due to drainage issues. The soils present onsite are adequate for growing coniferous trees, but not for supporting wetland creation and enhancement (Winecka 2019). The project design envisions moving the creek out of its confined channel on the eastern extent of the HOA property, and re-engaging wetlands and expanding Coho rearing opportunities. However, property boundary issues, existing property disputes, and less than full support from neighboring, non-HOA parcels may limit the ability to move Spurgeon Creek out of its confined channel to recreate natural stream sinuosity (Walley 2019).

The main barrier to completion is adjacent landowner concerns at the project site.

### **Potential budget and O&M costs.**

The total costs of construction, engineering, permitting, and cultural assessments are estimated to be \$1,000,000 (includes engineering and construction costs).

### **Anticipated durability and resiliency.**

The project would have lasting benefits as it would be actively managed by the South Puget Sound Salmon Enhancement Group. The restored stream section would be designed to mimic natural fluvial and ecological processes to be self-sustaining and resilient to perturbations to minimize long-term maintenance costs.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

The project sponsor is currently the South Puget Sound Salmon Enhancement Group. A 30% plan set was completed by the South Puget Sound Salmon Enhancement Group and the Wild Fish Conservancy. In addition, stakeholder coordination and public involvement was performed

1 and there is general support for this project. The project team will also engage with watershed  
2 partners based on their level of interest and ability to be involved with the study. Potential  
3 Project partners who have indicated their interest include: The Fox Hill Homeowners  
4 Association, the Washington Department of Fish and Wildlife, and the Squaxin Island Tribe.  
5  
6

## References

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# Water Right Opportunities in WRIA 13

## Technical Memorandum

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**To:** Department of Ecology WRIA 13 Watershed Restoration and Enhancement Committee  
**From:** Glenn Mutti-Driscoll, LHG Pacific Groundwater Group  
Burt Clothier, LHG Pacific Groundwater Group  
**Re:** Water Right Screening Methodology  
**Date:** December 18, 2020

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This technical memorandum documents the methodology used to screen and select water rights for potential use to support watershed restoration and enhancement projects in the Deschutes River Watershed, Water Resources Inventory Area (WRIA) 13. This work was completed by Pacific Groundwater Group (PGG) on behalf of the WRIA 13 Watershed Restoration and Enhancement (WRE) Committee (Committee) and the Department of Ecology (Ecology). This work was performed under Ecology Contract Number C1700029, Work Assignment PGG104.

Under RCW 90.94.030, Ecology has the responsibility to convene WRE committees and prepare WRE plans for eight WRIsAs in the Puget Sound and Hood Canal areas. The general purpose of the plans is to document potential offsets to projected depletion of instream flows resulting from new, permit-exempt domestic well uses in the WRIsAs over the next 20 years.

To support development of the WRE plan for WRIA 13, PGG assisted the Committee in selecting a focused set of water rights for further review to assess potential benefits and their suitability in offsetting impacts from permit-exempt wells on instream flows. This memorandum outlines the methodology used to develop the focused list of water rights.

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## PROCEDURE

Ecology staff queried their Water Rights Tracking System (WRTS) database and provided tables and associated GIS data of all active water rights within WRIA 13. Inactive water rights (e.g., previously approved changes, cancelled or withdrawn applications) were excluded from the data provided by Ecology. Water right claims and pending applications for new water rights or water right changes were also removed during the screening process.

The provided GIS data included the mapped place of use and point(s) of diversion or withdrawal locations, where available. Where Ecology did not have detailed location information for points of diversion or withdrawal (or such information has not yet been added to their GIS dataset), the default location is generally the nearest quarter or quarter-quarter section, based on the water right file information.

1 WRIA 13 permit exempt (PE) well growth projections were then compared by subbasin in addition  
2 to potential mitigation and habitat restoration projects, managed aquifer recharge projects, and the  
3 presence of priority salmon streams. From this evaluation, subbasins with the greatest projected  
4 PE well growth and consumptive use (Deschutes Middle with 122 acft/yr from 734 wells and  
5 Johnson Point with 86 acft/yr from 520 wells) were identified as having relatively few mitigation  
6 and restoration projects relative to expected PE well impacts. Therefore, water rights primarily  
7 within these subbasins were prioritized to identify potential rights that could be acquired,  
8 relinquished to trust, or whose owners could be engaged regarding implementation of water saving  
9 or conservation practices.

10 Over 850 active water right files were identified in the Deschutes Middle and Johnson Point  
11 subbasins. Following consultation with the Committee, PGG limited the water rights under  
12 consideration to certificates and permits<sup>80</sup> that included commercial and industrial (CI), irrigation  
13 (IR), and domestic multiple (DM) uses. DM water rights were included within the query since  
14 nearby municipal water systems (Lacey for the Johnson Point subbasin and Raymond for  
15 Deschutes Middle subbasin) potentially could have capacity to supply smaller Group A or B water  
16 systems. All other domestic categories (domestic single and domestic general) and municipal  
17 rights were excluded from the query based on the expectation that these rights would be  
18 unavailable for mitigation or small.

19 The list of active permits and certificates with CI, IR, and/or DM uses was reduced again based on  
20 authorized annual (Qa) quantities. For the Deschutes Middle and Johnson Point subbasin, rights  
21 with a Qa of less than 10 acft/yr were removed. This arbitrary cut-off rate was intended to focus  
22 on higher-value possibilities and provide a more manageably sized list. In general, larger water  
23 rights are considered higher value since they will provide greater flow benefits to a stream.  
24 Although not used for filtering, it's worth noting that surface water rights are considered higher  
25 value mitigation rights than groundwater rights since they will have an immediate, direct, and  
26 easily quantifiable benefit to a stream.

27 This list was further refined with Committee input regarding the inclusion/exclusion of specific  
28 rights, and rights from the neighboring Woodland Creek and Deschutes Lower subbasins were  
29 added based on input that they may be acquirable. Rights specifically identified by the Committee  
30 did not have the 10 acft/yr general screening criteria applied.

31 **Table 1** lists the identified WRIA 13 water rights that could potentially be converted, purchased,  
32 or retired as mitigation water, while **Table 2** is a general summary of the focused water right list.  
33 These rights have been identified as having the greatest potential benefit to instream flows in the  
34 Johnson Point and Deschutes Middle subbasin vicinities by applying the criteria outlined above.  
35 However, this list should not preclude the Committee from pursuing specific water rights in other  
36 subbasins that could be identified in the future by other means. Therefore, moving forward, the  
37 Committee should investigate the availability of rights in the focused study area as well as in the  
38 broader WRIA if specific rights are identified.

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<sup>80</sup> This includes certificates, certificates of change, permits, and superseding permits.



1

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2 **POTENTIAL FUTURE PROJECTS**

3 Multiple conservation and water-right related offshoot projects were identified through the water  
4 right screening process and discussion with the Committee. Potential future opportunities for  
5 further study are listed below, all of which could potentially provide Net Ecological Benefit  
6 (NEB). Most projects listed provide hydrologic benefit through water offsets (as is noted below)  
7 since increases in streamflow generally provide greater NEB than habitat restoration projects.

- 8 • Outreach and potential quantification of water saved by implementing Best Management  
9 Practices (BMPs) for improving irrigation efficiencies at golf courses and on irrigated lands.  
10 Opportunities to improve irrigation efficiencies could be analyzed on a water right or project  
11 area scale to assess if hydrologic benefit and/or NEB is likely to occur<sup>81</sup>. Projects that result in  
12 NEB would be incentivized as feasible.
- 13 • Outreach and potential quantification of water saved through the repair of leaky water system  
14 pipes. A review of water system plans for public water systems within the WRIA could be  
15 pursued to identify systems with the greatest leakage losses, and if infrastructure repair appears  
16 to provide hydrologic benefit and/or NEB<sup>2</sup>, incentives could be provided to systems that chose  
17 to upgrade.
- 18 • Incentivize off channel storage projects during the wet season for agricultural water right  
19 holders. Hydrologic benefit potentially can occur if impacts of summer pumping are offset by  
20 increases in summer streamflow.
- 21 • Create a water bank or other structure to track water quantities voluntarily conserved by  
22 agricultural water right holders. Some of the conserved quantities could be leased for other  
23 agricultural uses, while some would remain unused or put into temporary trust to provide  
24 hydrologic benefit and increase instream flows.
- 25 • Connect small water systems to nearby municipal water systems. The transfer of small-system  
26 water users to larger municipal water systems would be accommodated by the municipal  
27 system as part of its growth projections, while the smaller water system right would be  
28 relinquished or permanently donated to trust (providing hydrologic benefit).
- 29 • Partial or full relinquishment of water rights into permanent trust for hydrologic benefit.
- 30 • Outreach to golf courses, particularly those on salmon bearing streams or in close proximity to  
31 Puget Sound, regarding the Salmon Safe Certification program and BMPs. This project would  
32 primarily result in habitat benefits.

33

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<sup>81</sup>Projects improving water management efficiencies will need to show how consumptive use is reduced through the upgrade. Upgrades that result in decreased recharge to the shallow aquifer (which would be a decrease in non-consumptive use) are unlikely to result in significant hydrologic benefit.

# Woodard Creek Project

## PROJECT DESCRIPTION

### Description

Woodard Creek basin is located in central Thurston County; it includes a mix of urban and rural areas and is crossed by Interstate-5, a major transportation corridor in the region (Figure 1). Woodard Creek flows into Henderson Inlet. The hydrology of the area has been extensively modified by development in the upstream (southern) portion of the basin, resulting in stormwater impacts.

*In 2014, a study done on Woodard Creek basin identified and ranked two potential stormwater retrofit sites that would have a positive impact on the Woodard Creek water quality (AHBL 2014a; 2014b). Since 2014, two sites have been completed, 1 site has been dropped because of issues, and the two remaining sites are in the process of being completed. All of the proposed sites identified in AHBL (2014a; 2014b) address water quality and do not address any flow control issues.*

The goal of the Woodard Creek Project (Project) is to address the water quantity impacts of stormwater by attenuating flood flows by increasing stream bed roughness and restoring the channel sinuosity. This would increase floodplain connectivity and overall floodplain storage capacity. Increasing streambed roughness with biotechnical techniques (e.g. large woody debris) would also enhance the quality and quantity of instream habitat within the project reach. Habitat within Woodard Creek is currently impaired, particularly within the northern portion of the project reach, by lack of riparian vegetation and large woody debris, simplification of instream habitats, poor floodplain connectivity, channel incision and poor water quality. Therefore, the focus of this project is increase stream length, increase water transit time, and increase habitat complexity by modifying portions of stream in the northern end of the basin.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

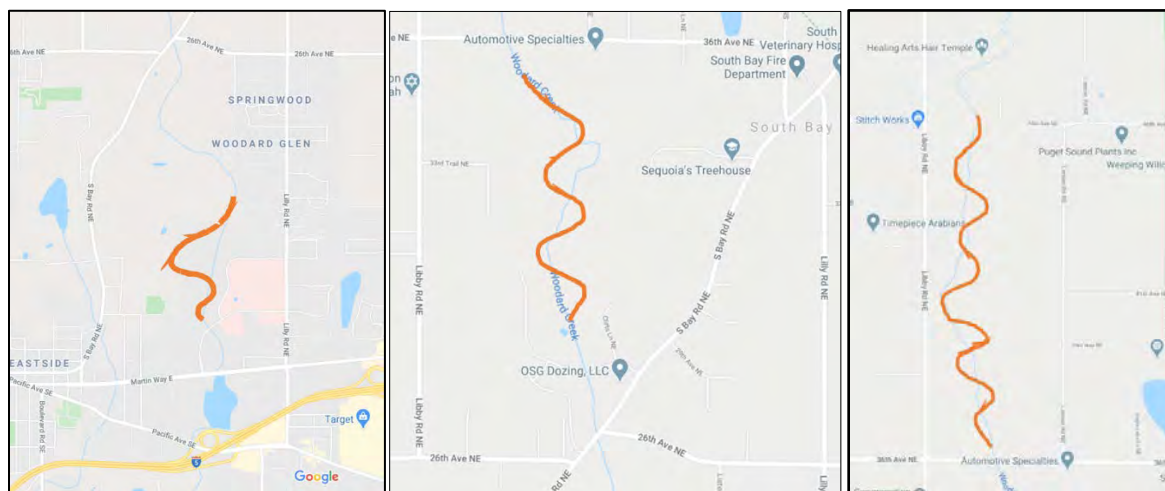
The Project is composed of a number of candidate locations or stream reaches. The Project sponsor will work with the landowners to identify reaches available for restoration. Restoration reaches will have large woody debris added to suitable or reference densities. The LWD will provide fish cover, hydraulic complexity, and will increase pool density and depth. Coho will benefit from increased pool density, in terms of juvenile rearing and adult holding. Riparian vegetation will be planted, as necessary throughout the restoration reaches that will recruit wood and provide shade into the future.

### **Conceptual-level map and drawings of the project and location.**

Figures 1-2 show the location of the proposed project.



**Figure 1. Location of Woodard Creek basin in Thurston County. Potential project locations are outlined by red boxes (A-C).**



**Figure 2. Conceptual drawing of Woodard Creek project locations at sites A, B, and C.**

## **Description of the anticipated spatial distribution of likely benefits**

The proposed stream restoration will benefit Woodard Creek. The benefits will be reach-specific..

## **Performance goals and measures.**

The performance goals are to increase channel sinuosity and length, increase instream habitat complexity, and channel roughness. Specific metrics and measures will be defined when during feasibility and design.

## **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

Although portions of the area have been highly urbanized, Woodard Creek basin supports a variety of wildlife. Many species of fish utilize the creek, including coho, chum, steelhead, and cutthroat trout, and Olympic mudminnow have been noted in the creek near the I-5 interchange, though high winter flows and low summer flows in the river have reduced the usability of this habitat (Thurston County 2015). There are a number of bald eagle nesting sites within the basin, as well as a purple martin breeding area. There are several large wetland areas in the basin, including along Ensign and South Bay Roads.

Woodard Creek has historically supported native runs of coho, chum, cutthroat, and winter steelhead (Thurston County 2015). Limiting factors identified for the creek include alteration of the natural flow regime from increased impervious surfaces, lack of large woody debris (LWD), and barriers to fish passage. The riparian corridor has been impaired by the removal of vegetation in some areas, a lack of conifers in the remaining vegetation, and direct animal access to the stream. Fine sediment may also be a naturally occurring barrier.

The Washington Department of Fish and Wildlife has identified that Coho Salmon, Chum Salmon, Winter steelhead are present in Woodard Creek and that Fall Chinook Salmon have access to Woodard Creek (WDFW Salmonscape 2020). WDFW (2020) documents spawning in Woodard Creek (WDFW 2020). The Washington Stream Catalog indicates that both Coho, Chum, and Chinook Salmon were historically present in Woodard Creek (WDF 1975). Woodard Creek also provides habitat for reticulate sculpin, Olympic mudminnow, wood duck, and waterfowl overwintering.

The reaches of Woodard Creek proposed for restoration has the potential to provide rearing and foraging habitat for the aforementioned salmon and trout populations year round.

## **Identification of anticipated support and barriers to completion.**

Thurston County has indicated support for this project. The primary barrier to completion is likely to be land acquisition or obtaining conservation easements. The proposed project area includes privately owned parcels.

## **Potential budget and O&M costs.**

1 The total costs of construction, engineering, permitting, and cultural assessments are estimated  
2 to be <\$1 million, based on an order of magnitude estimate (includes engineering and  
3 construction costs).

4 **Anticipated durability and resiliency.**

5 The project would have lasting benefits as it would be actively managed by Thurston County or  
6 their future project partner. The restored stream section would be designed to be compatible  
7 with natural ecological processes to be self-sustaining and resilient to perturbations to  
8 minimize long-term maintenance costs.

9 **Project sponsor(s) (if identified) and readiness to proceed/implement.**

10 The project sponsor is Thurston County and is ready to implement the project. Implementation  
11 would require an evaluation of feasibility.

## References

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## Appendix J – Project Inventory

### **WRIA 13 Project Inventory for Inclusion in the Watershed Restoration and Enhancement Plan**

CATEGORIES (does not reflect prioritization)

- I. Likely to be implemented and provides quantitative offset value (see Chapter 5).
- II. Likely to be implemented and provides habitat benefit and/or un-quantifiable streamflow benefit (See Chapter 5)
- III. Unable to be implemented at this time because the project is highly conceptual or has other constraints.



| Category | Project Name                                         | Type of Project         | Project Location                     | Project Description                                                                                                                                                                                                                                                                                                                                           | Estimated Water Offset Amount (af/year) | Subbasin      | Existing Sponsor                                                                                                                       | Potential Sponsor (Where No Existing Sponsor Exists) | Project Stage                                                                                                    | Estimated Project Cost | Existing Funding                                             |
|----------|------------------------------------------------------|-------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------|
|          | <b>Boston Harbor</b>                                 |                         |                                      |                                                                                                                                                                                                                                                                                                                                                               |                                         |               |                                                                                                                                        |                                                      |                                                                                                                  |                        |                                                              |
| III      | Accelerating Riparian Restoration in Thurston County | Habitat and Other       |                                      | BIBI2.1: Provide education and incentives for legacy retrofits, LDC3.1: Develop and implement outreach, education, and/or incentive programs, LDC3.3: Implement plans and priorities to restore habitat. *Concept for WREC would be to implement projects that are identified from this program - implement X amount of riparian habitat that are identified* |                                         | Boston Harbor | Thurston County                                                                                                                        |                                                      | Conceptual                                                                                                       |                        |                                                              |
| III      | Lilly & 26th Ave NE Stormwater Reroute               | Non Water Rights Offset | Vicinity of Lilly Rd and 26th Ave NE | 26 <sup>th</sup> Ave NE, Woodland to Woodard Stormwater Reroute. This project involves re-routing stormwater from the Woodland Creek basin to the Woodard Creek basin to improve groundwater recharge. The work would construct a stormwater conveyance system along 26 <sup>th</sup> Ave NE in the vicinity of Lilly Rd NE.                                  | 100-120                                 | Boston Harbor | City of Olympia in partnership with Thurston County (given adjacent jurisdictional boundaries) and other organizations, as applicable. |                                                      | Conceptual (uncertainties with surface outflow, wetland type, infiltration capacity, landowner willingness, etc) | TBD                    | This project will be funded mostly through grants and loans. |
| III      | Plum Street Water Quality Retrofit                   | Non Water Rights Offset |                                      | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, SHELL1.9: Improve water quality to prevent downgrades and achieve upgrades of shellfish harvesting areas, TIF2.1: Address stormwater treatment.                                                                                                                      |                                         | Boston Harbor | City of Olympia                                                                                                                        |                                                      | Design                                                                                                           | \$800,000              | \$200,000                                                    |
| III      | Union Avenue Water Quality Retrofit                  | Non Water Rights Offset |                                      | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, SHELL1.9: Improve water quality to prevent downgrades and achieve upgrades of shellfish harvesting areas, TIF2.1: Address stormwater treatment.                                                                                                                      |                                         | Boston Harbor | City of Olympia                                                                                                                        |                                                      | Design                                                                                                           | \$600,000              | \$150,000                                                    |
| III      | Sleepy Creek Restoration                             | Non Water Rights Offset |                                      | Parkland, including stream restoration, beaver reintroduction, woody debris, and floodplain reconnection along middle Woodard Creek. Undeveloped CLT lot.                                                                                                                                                                                                     |                                         | Boston Harbor |                                                                                                                                        | Thurston County, Capital Land Trust                  | Conceptual                                                                                                       | \$50K - \$350K         |                                                              |
| III      | West Bay Habitat Improvement                         | Habitat and Other       | West Bay                             | Assist with habitat improvement efforts in collaboration with City of Olympia and the Squaxin Island Tribe.                                                                                                                                                                                                                                                   |                                         | Boston Harbor | City of Olympia, Squaxin Island Tribe, LOTT                                                                                            |                                                      |                                                                                                                  |                        |                                                              |
| II       | Woodard Creek - Multiple Benefits                    | Habitat and Other       | Libby Rd NE                          | Beaver reintroduction, woody debris and floodplain reconnection along middle Woodard Creek. Requires further review prior to landowner contact. ~100 acres. Mapping to follow.                                                                                                                                                                                |                                         | Boston Harbor |                                                                                                                                        | Thurston County                                      | Conceptual                                                                                                       | \$50K - \$350K         |                                                              |
|          | <b>Cooper Point</b>                                  |                         |                                      |                                                                                                                                                                                                                                                                                                                                                               |                                         |               |                                                                                                                                        |                                                      |                                                                                                                  |                        |                                                              |
| III      | Brawne Avenue Basin Water Quality Retrofit           | Non Water Rights Offset |                                      | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, SHELL1.9: Improve water quality to prevent downgrades and achieve upgrades of shellfish harvesting areas, TIF2.1: Address stormwater treatment.                                                                                                                      |                                         | Cooper Point  | City of Olympia                                                                                                                        |                                                      | Design                                                                                                           | \$800,000              | \$200,000                                                    |
| II       | Green Cove Creek                                     | Habitat and Other       | Evergreen                            | Green Cove Creek Basin Restoration. Multi phase large project incorporating land purchases, floodplain restoration, habitat improvements, and barrier removal. ~241 acres                                                                                                                                                                                     |                                         | Cooper Point  |                                                                                                                                        | Olympia, Evergreen College, and SIT                  | Feasibility                                                                                                      |                        |                                                              |

|                        |                                                                                                                               |                                    |                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |                 |                                |                               |                                                                                                                      |                |           |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|--------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|-----------|
| III                    | Green Cove Basin Schools Partnership: Marshall Middle School Green Stormwater Infrastructure Retrofit (infiltration /habitat) | potential non-water rights offset? | ex. Green Cove SB: Hansen Elementary, Marshall MS | Explore opportunities for partnering with schools to model green stormwater infrastructure practices etc. - retrofit where beneficial; Marshall Middle School retrofit to include infiltration of stormwater using LID tools like biofiltration and cisterns to harvest water for restoration plant propagation nursery; reforestation of parts of the campus. Consider expansion to Hansen Elementary in future phases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Pending WREC determination |                 | Bob Barnes (TCD support)       |                               | conceptual / preliminary conversations with partners resulted in interest in further exploration of offset potential |                |           |
| III                    | Snyder Creek/ Bushoowahalee Point Bulkhead Removal                                                                            | Non Water Rights Offset            | Evergreen                                         | Improvements to new channel from Snyder Creek fish passage project completed in 2007. Explore ditch removal, floodplain, woody debris, and beaver reintroduction. Mapping to follow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            | Cooper Point    |                                | Evergreen and Thurston County | Conceptual                                                                                                           | \$50K - \$350K |           |
| <b>Deschutes Lower</b> |                                                                                                                               |                                    |                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |                 |                                |                               |                                                                                                                      |                |           |
| I                      | Schneiders Prairie                                                                                                            | Non Water Rights Offset            |                                                   | Off-channel reconnection and infiltration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 681                        | Deschutes Lower |                                | Thurston County               | Conceptual                                                                                                           | TBD            |           |
| III                    | Henderson RW Recharge                                                                                                         | Non Water Rights Offset            |                                                   | The Budd Inlet Reclaimed Water Plant (BIRWP) has a current capacity of 1.5 mgd of RW during the irrigation season, and serves existing customers primarily for irrigation. The volume of reclaimed water production is based primarily on demand, with production curtailed in winter months when high-volume irrigation uses are not active. LOTT could ramp up production of reclaimed water at its existing BIRWP during the winter, and potentially make roughly 0.75 MGD available to a groundwater infiltration site or other offset project during that time. An additional 1.5 mgd of production capacity may be added in the future, and is currently demand-driven. LOTT has a "Henderson Conveyance and Recharge" project on its six-year CIP to extend the reclaimed water pipeline two miles from the RW storage tank in Tumwater across the Deschutes River to Pioneer Park, in order to coordinate with a City of Tumwater trails project that will traverse the river. That would bring the pipeline one step closer to LOTT's Henderson North property and other properties to the south that might eventually be used for groundwater recharge. |                            | Deschutes Lower |                                | Thurston County               | Conceptual                                                                                                           |                |           |
| III                    | Capitol Way Water Quality Retrofit                                                                                            | Non Water Rights Offset            |                                                   | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, TIF2.1: Address stormwater treatment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            | Deschutes Lower | City of Olympia                |                               | Design                                                                                                               | \$650,000      | \$162,500 |
| III                    | Fones Road Bioretention Retrofit                                                                                              | Non Water Rights Offset            |                                                   | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, SHELL1.9: Improve water quality to prevent downgrades and achieve upgrades of shellfish harvesting areas, TIF2.1: Address stormwater treatment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            | Deschutes Lower | City of Olympia                |                               | Design                                                                                                               | \$350,000      | \$87,500  |
| III                    | Deschutes RM 8 Restoration and Enhancement                                                                                    | Habitat and Other                  | Deschutes River                                   | A restoration project off of highway 99 on the Deschutes River at mile 8 (S13-T17N-R2W) involved installation of 3 engineered log jams and riparian planting to reduce bank erosion. The project was completed by TCD in the early 2000s. Potential additional restoration work at the site can be explored to benefit instream flow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            | Deschutes Lower | Thurston Conservation District |                               | Conceptual                                                                                                           |                |           |

|     |                                                                                                                        |                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |                 |                  |                          |             |                                                                                                                            |  |
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| III | Tumwater Valley Regional Facility (+ mitigation) and East Linwood Basin. Stormwater Retrofits - 2 constructed wetlands | Adaptive Management/Implementation | City of Tumwater - off Capitol Blvd between M and E Street | Overall, the designed project would treat runoff from 91.5 acres of impervious surfaces within the 200-acre drainage basin. The project will update the design and initiate the permitting process to retrofit a stormwater drainage outfall from the East Linwood basin. The basin is made up of a direct tributary area of approximately 73.7 acres, of which, about 28 acres are impervious. Stormwater currently discharges from this outfall untreated into the Deschutes River, a 303(d) listed water body.                                              |    | Deschutes Lower | City of Tumwater |                          | Design      | TVRF: Design: \$212,852<br>Construction: \$1,830,000<br>East Linwood Basin: Design: \$169,720<br>Construction: \$1,693,000 |  |
| III | Pioneer Park Restoration                                                                                               | Habitat and Other                  | City of Tumwater - Pioneer Park                            | The City of Tumwater applied for the Department of Ecology Centennial Clean Water Program Grant funding in 2021 to finish the design and permitting of this project.<br>The City of Tumwater is seeking funding to design a riparian restoration project to stabilize the slope and improve riparian conditions along the Deschutes River at River Mile 2.0. in Pioneer Park. Currently, the roughly 1,000-foot section of unstabilized bank produces over 2,380 cubic yards of fine sediment every year into the Deschutes River, a 303(d) listed water body. |    | Deschutes Lower | City of Tumwater |                          | Design      | Design: \$118,450<br>Construction: \$500,000                                                                               |  |
| I   | Donnelly Drive Infiltration Galleries                                                                                  | Non Water Rights Offset            | Off Yelm hwy on Donnelly drive, Olympia UGA                | Expand existing infiltration galleries. This would be beyond NPDES sizing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 14 | Deschutes Lower |                  | Thurston County          | Conceptual  | \$6.3M                                                                                                                     |  |
| III | Enhance wetland hydrology with reclaimed water                                                                         | Non Water Rights Offset            | not specified                                              | Construct a wetland or augment an existing wetland using reclaimed water, with potential added benefits of improving wetland/river connectivity, creating habitat, and/or increasing in-stream flow.                                                                                                                                                                                                                                                                                                                                                           |    | Deschutes Lower | LOTT             |                          | Conceptual  |                                                                                                                            |  |
| III | Lower Deschutes Habitat Acquisition, project #36                                                                       | Habitat and Other                  |                                                            | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    | Deschutes Lower |                  |                          |             |                                                                                                                            |  |
| III | Deschutes River Conservation Acquisition - Phase 3                                                                     | Non Water Rights Offset            | Ayers Springs                                              | Acquire land along middle Deschutes River and provide improvements with multiple habitat and water offset projects near and surrounding the important cold-water Ayers Creek/Spring. Capital Land Trust owns some land. See WRIA 13 Lead entity prior to contacting land owners. ~577 acres                                                                                                                                                                                                                                                                    |    | Deschutes Lower |                  | Thurston County and CLT  | Acquisition |                                                                                                                            |  |
| III | Perry Creek Upper Basin Restoration                                                                                    | Habitat and Other                  | Either side of State Hwy 8                                 | Managed forestry project in conjunction with parkland and habitat restoration. Acquisition of older forest stands that can contribute water to Perry Creek. CLT, Squaxin Island Tribe, and WRIA 14 Lead Entity participation to be considered. ~2,145 acres. Mapping to follow                                                                                                                                                                                                                                                                                 |    | Deschutes Lower |                  | Thurston County          | Conceptual  |                                                                                                                            |  |
| III | Reclaimed Water for Sod Farm Irrigation                                                                                | Non Water Rights Offset            |                                                            | Reclaimed water for sod farm irrigation. Major project to extend reclaimed water pipeline from Martin Way RW plant to sod farm on Yelm Highway. Probably requires expansion of RW production capacity. RW allowed for irrigation in rural county.                                                                                                                                                                                                                                                                                                              |    | Deschutes Lower |                  | Thurston County and LOTT | Conceptual  |                                                                                                                            |  |
| III | Lower Deschutes Major Project                                                                                          |                                    |                                                            | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    | Deschutes Lower |                  |                          |             |                                                                                                                            |  |
|     | <b>Deschutes Middle</b>                                                                                                |                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |                 |                  |                          |             |                                                                                                                            |  |

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| III                    | Lower Lake Lawrence Restoration                           | Habitat and Other        |                                                           | Continue restoration work as outlined within the restoration plan [JR: please discuss this with the property owners.]; Expand water offset project at Smith Ranch, near Deschutes mainstem at Lawrence Lake. ~196 acres Expand water offset project at Smith Ranch, near Deschutes mainstem at Lawrence Lake. Partner between Lacey, SIT, Yelm, and Olympia.                                                                                                                                                                                                                                                                                                                                                             |  | Deschutes Middle | SPSSEG             | Lacey, Olympia, SIT, and Yelm         | Design     | \$600,000      |  |
| III                    | Shermer Lane Restoration                                  | Habitat and Other        |                                                           | 22 acres under PSA with CLT, on an oxbow on the Deschutes, just past Nelson ranch. Instream LWD placement, sediment reduction, riparian planting with a minimum of 100' buffer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | Deschutes Middle | Capitol Land Trust |                                       | Design     | \$75,000       |  |
| III                    | Vicinity of Rainier Conservation/MAR/Acquisition          | Water Rights Acquisition |                                                           | Source changes or supplementation or conservation, managed aquifer recharge... in or around City of Rainier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Deschutes Middle |                    |                                       |            |                |  |
| n/a                    | Spooner Farms                                             | Water Rights Acquisition |                                                           | Project was evaluated by Committee for potential water right acquisition. It was determined that the City of Olympia plans to continue use of the water right and it is not available for relinquishment at this time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Deschutes Middle |                    |                                       |            |                |  |
| III                    | Middle Deschutes Water Offsets and/or Habitat Restoration | Habitat and Other        | Middle Deschutes below Offut Lake - properties identified | Work with willing agricultural landowners to explore potential projects on their land, including water rights retirement, conservation easements, habitat restoration, managed aquifer recharge using Deschutes flood water or reclaimed water, and/or transfer of development rights.                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                  |                    | Thurston County, Squaxin Island Tribe |            |                |  |
| III                    | Restore Route 507 Deschutes Tributary                     | Habitat and Other        | Route 507                                                 | Restore Deschutes Tributary at Route 507 ~428 acres. This project seeks to restore the aquatic habitats on approximately 750 linear feet of river channel in the reach by increasing the amount of large woody debris, re-establishing native riparian forest and creating in-stream complexity. The design propose to install flow deflecting ELI that will redirect the majority of the rivers flow into the stable historic channel, while allowing some flow into the LWD roughened oxbow for much needed off channel habitat. Project has funding for implementation, but there could be opportunities to expand on the project - SPSSEG has reach-scale designs, could draw more info from that. Mapping to follow |  | Deschutes Middle | SPSSEG?            |                                       | Other      |                |  |
| <b>Deschutes Upper</b> |                                                           |                          |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |                  |                    |                                       |            |                |  |
| III                    | Upper Deschutes River off-channel wetlands                | Non Water Rights Offset  |                                                           | Upper Deschutes off-channel wetlands activation with increasing mainstem bed roughness. River mile 34.5 SPSSEG - first project has funding for design and implementation, more opportunities in this area for similar projects but still need to be identified and need to work with Weyerhaeuser to gain access to land. This project seeks to restore the aquatic habitats on approximately 1,500 linear feet of river channel in the reach by increasing the amount of large woody debris, re-establishing native riparian forest and creating in-stream complexity.                                                                                                                                                  |  | Deschutes Upper  |                    |                                       | Conceptual | \$50K - \$350K |  |
| I                      | Managed Aquifer Recharge in the upper Deschutes River     | Non Water Rights Offset  |                                                           | MAR projects could occur in the Upper Deschutes River or tributaries; pump or passive flow during high flows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Deschutes Upper  |                    |                                       | Conceptual | \$1.1M         |  |

|                      |                                                      |                         |                             |                                                                                                                                                                                                                                                                                                                 |  |                 |     |                                |                                                                                     |                |  |
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| III                  | Forest stand age preservation                        | Non Water Rights Offset |                             | Increase stand age in upper Deschutes River (Vail Tree Farm ~6,000 acres); older trees use less groundwater; could be lease or purchase. Vail Tree Farm - Project description in HWS for an area on Weyerhaeuser land.                                                                                          |  | Deschutes Upper |     |                                | Conceptual                                                                          |                |  |
| III                  | Large-Scale Forestry                                 | Habitat and Other       |                             | Large scale managed forestry. Purchase or easements across much of Vail Tree Farm - mostly Weyerhaeuser. Numerous water offset projects possible; TMDL, parkland, habitat protections. Similar to Los Angeles, New York, and Seattle upper watershed projects. Mapping to follow                                |  | Deschutes Upper |     | Thurston County                | Conceptual                                                                          |                |  |
| <b>Johnson Point</b> |                                                      |                         |                             |                                                                                                                                                                                                                                                                                                                 |  |                 |     |                                |                                                                                     |                |  |
| III                  | Zittle's Marina Pocket Estuary Land Acquisition      | Habitat and Other       |                             | Acquire land around the south end of Baird Inlet                                                                                                                                                                                                                                                                |  | Johnson Point   |     |                                | Conceptual                                                                          |                |  |
| III                  | LOTT Hawks Prairie Infiltration                      | Other                   | Hogum Bay Rd, Hawks Prairie | Expand existing facility                                                                                                                                                                                                                                                                                        |  | Johnson Point   |     | LOTT                           | Conceptual                                                                          |                |  |
| <b>McLane</b>        |                                                      |                         |                             |                                                                                                                                                                                                                                                                                                                 |  |                 |     |                                |                                                                                     |                |  |
| III                  | Watershed Assessment on McLane creek and tributaries | Monitoring              |                             | Goal to understand water issues (going sub-surface in the summer, continually perched culverts). Determine physical reasons for low instream flow and develop projects and landowner outreach to remedy. At this time, no specific project information - would need to identify what the analysis would entail. |  | McLane          |     |                                | Conceptual                                                                          | \$75,000       |  |
| III                  | McLane Creek agricultural areas                      | Habitat and Other       |                             | Remeander, connect wetlands, riparian planting.                                                                                                                                                                                                                                                                 |  | McLane          |     | Thurston Conservation District |                                                                                     |                |  |
| III                  | Beatty Creek MAR                                     | Non Water Rights Offset |                             | Managed aquifer recharge with floodplain reconnection, BDA, or constructed. Creek named in McLane Creek action plan to augment baseflows - prepared for SPSSEG by Squaxin Island Tribe.                                                                                                                         |  | McLane          |     |                                |                                                                                     |                |  |
| III                  | Swift Creek MAR                                      | Non Water Rights Offset |                             | Managed aquifer recharge with floodplain reconnection, BDA, or constructed. Creek named in McLane Creek action plan to augment baseflows - prepared for SPSSEG by Squaxin Island Tribe.                                                                                                                         |  | McLane          |     |                                |                                                                                     |                |  |
| III                  | Perkins Creek MAR                                    | Non Water Rights Offset |                             | Managed aquifer recharge with floodplain reconnection, BDA, or constructed. Creek named in McLane Creek action plan to augment baseflows - prepared for SPSSEG by Squaxin Island Tribe.                                                                                                                         |  | McLane          |     |                                |                                                                                     |                |  |
| III                  | McLane Creek wetland/side channel restoration        | Habitat and Other       | McLane Creek                | Explore opportunities for wetland expansion, farm and habitat improvements along creek including side channels, reforestation etc                                                                                                                                                                               |  | McLane          | TCD |                                | Conceptual. Initial landowner interest confirmed / no funds for project development |                |  |
| III                  | Beatty/McLane Creeks Upper Basin Restoration         | Habitat and Other       |                             | Beatty/McLane Creeks upper basin restoration. Floodplain reconnection, woody debris, managed forestry, possible beaver reintroduction. Largely owned by Dept of Natural Resources. ~1,568 acres. Mapping to follow                                                                                              |  | McLane          |     | Thurston County                | Conceptual                                                                          | \$50K - \$350K |  |
| <b>Spurgeon</b>      |                                                      |                         |                             |                                                                                                                                                                                                                                                                                                                 |  |                 |     |                                |                                                                                     |                |  |
| II                   | Spurgeon Creek Remeander Project                     | Habitat and Other       |                             | Restore wetland conditions to upper Spurgeon Creek by filling ditch, creating microtopography, installing large wood and planting area with native species. Spurgeon Creek is a priority tributary to the Deschutes. Funded by PSAR 2016                                                                        |  | Spurgeon Creek  |     |                                | Design                                                                              | \$1M           |  |
| III                  | Upper Spurgeon wetland restoration                   | Habitat and Other       |                             | Remeander, connect wetlands, riparian planting.                                                                                                                                                                                                                                                                 |  | Spurgeon Creek  |     |                                |                                                                                     |                |  |
| III                  | Spurgeon Creek Wetland/side channel restoration      | Habitat and Other       | Spurgeon Creek              | Explore opportunities for wetland expansion, habitat improvements along creek including side channels, reforestation etc                                                                                                                                                                                        |  | Spurgeon Creek  | TCD |                                | Conceptual. Initial landowner interest confirmed / no funds for project development |                |  |

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| III              | Investigate already present beavers in Spurgeon                                     | Habitat and Other        |                                                                | Determine beaver presence and how it relates to increasing streamflow at the Thurston County gaging site                                                                                                                                                                                                                                                                     |     | Spurgeon Creek |                                                |                                                          |                                                                                     |                |           |
| <b>Woodland</b>  |                                                                                     |                          |                                                                |                                                                                                                                                                                                                                                                                                                                                                              |     |                |                                                |                                                          |                                                                                     |                |           |
| III              | Martin Way at Mary Elder Water Quality Retrofit                                     | Non Water Rights Offset  |                                                                | CHIN2.5: Address and manage water quality parameters, including excess nutrient loading, SHELL1.9: Improve water quality to prevent downgrades and achieve upgrades of shellfish harvesting areas, TIF2.1: Address stormwater treatment.                                                                                                                                     |     | Woodland Creek | City of Olympia                                |                                                          | Design                                                                              | \$550,000      | \$137,500 |
| I                | Hicks Lk water quality and flow retrofit                                            | Non Water Rights Offset  |                                                                | retrofit SW facility for more WQ treatment and attenuation of flow.                                                                                                                                                                                                                                                                                                          | 296 | Woodland Creek | City of Lacey                                  |                                                          | Conceptual                                                                          | \$3.3M         |           |
| III              | Martin Way/Tanglewilde stormwater facility                                          | Non Water Rights Offset  |                                                                | Address stormwater outfall ID'd in Henderson TMDL. Would involve replacing conveyance pipe, property easement/acquisition, facility design and construction                                                                                                                                                                                                                  |     | Woodland Creek | City of Lacey                                  |                                                          | Conceptual                                                                          | \$500K - \$1M  |           |
| III              | Chambers Creek Wetland Restoration                                                  | Habitat and Other        | Chambers Creek                                                 | Study feasibility & options for wetland restoration and enhancement; potential stormwater infiltration at perimeters; acquisition etc.                                                                                                                                                                                                                                       |     | Woodland Creek | TCD                                            |                                                          | Conceptual. Initial landowner interest confirmed / no funds for project development |                |           |
| I                | Chambers Creek MAR                                                                  |                          |                                                                | MAR projects could occur in Chambers Creekpump or passive flow during high flows.                                                                                                                                                                                                                                                                                            |     |                |                                                |                                                          |                                                                                     |                |           |
| III              | Chambers Creek Restoration                                                          | Non Water Rights Offset  |                                                                | Add large woody debris and riparian vegetation                                                                                                                                                                                                                                                                                                                               |     | Woodland Creek |                                                | Thurston County                                          | Conceptual                                                                          | \$50K - \$350K |           |
| <b>WRIA-Wide</b> |                                                                                     |                          |                                                                |                                                                                                                                                                                                                                                                                                                                                                              |     |                |                                                |                                                          |                                                                                     |                |           |
| I                | General MAR projects                                                                | Non Water Rights Offset  |                                                                | WRIA-wide MAR projects                                                                                                                                                                                                                                                                                                                                                       | 811 | WRIA-Wide      |                                                | Thurston County                                          | Conceptual                                                                          | \$1.1 m        |           |
| II               | General floodplain reconnection projects                                            | Habitat and Other        |                                                                | Identify floodplain reconnection project opportunities in WRIA 14                                                                                                                                                                                                                                                                                                            |     | WRIA-Wide      |                                                | Thurston County, Squaxin Island Tribe, Thurston CD, etc. | Conceptual                                                                          |                |           |
| III              | Water Right Opportunities                                                           | Water Rights Acquisition |                                                                | Identify opportunities for future water right acquisition and/or irrigation efficiencies.                                                                                                                                                                                                                                                                                    | 0   | WRIA-Wide      |                                                | Thurston County, Squaxin Island Tribe, Thurston CD, etc. |                                                                                     |                |           |
| II               | Forest Stand Age                                                                    |                          |                                                                | Identify opportunities for managed forestry to increase forest stand age, providing streamflow benefit.                                                                                                                                                                                                                                                                      |     |                |                                                | Thurston County, Squaxin Island Tribe, Thurston CD, etc. |                                                                                     |                |           |
| III              | PE Well conversion to group A systems                                               | Non Water Rights Offset  |                                                                | Establish Group A systems in areas of high density PE wells; Group A will would be in deep confined aquifer.                                                                                                                                                                                                                                                                 |     | WRIA-Wide      |                                                |                                                          | Conceptual                                                                          |                |           |
| II               | Fund hook-up fees for existing PE wells to convert to Group A systems               | Non Water Rights Offset  |                                                                | Fund hook-up fees for existing wells to convert to City water                                                                                                                                                                                                                                                                                                                |     | WRIA-Wide      |                                                |                                                          | Conceptual                                                                          |                |           |
| III              | Simulate Summer Streamflows in Response to Groundwater Pumping and Climatic Effects | Monitoring               |                                                                | CHIN2.1: Protect and restore instream flows to levels necessary for salmon recovery                                                                                                                                                                                                                                                                                          |     | WRIA-Wide      | U.S. Geological Survey                         |                                                          | Design                                                                              |                | 0         |
| III              | Property Conservation - 7 potential acquisitions and/or easements                   | Habitat and Other        | Deschutes River Watershed, Budd Inlet, WRIA-wide opportunities | 7 property acquisition or conservation easement projects as identified in the 11-20-19 Collaborative Framework between LOTT and Squaxin Island Tribe. Need to assess whether there are any permit exempt wells or wells with water rights on these properties that could be considered as direct water offsets. May be overlap with other 4YWP projects on project inventory |     | WRIA-Wide      | LOTT, Squaxin Island Tribe, Capitol Land Trust |                                                          | Scoping                                                                             |                |           |
| III              | Agricultural buffers                                                                | Habitat and Other        |                                                                | Provide match funding for fencing projects to restrict livestock access to rivers.                                                                                                                                                                                                                                                                                           |     | WRIA-Wide      |                                                |                                                          |                                                                                     |                |           |
| III              | Well replacement - deeper into lower aquifer                                        | Non Water Rights Offset  |                                                                | TBD                                                                                                                                                                                                                                                                                                                                                                          |     | WRIA-Wide      |                                                |                                                          |                                                                                     |                |           |
| III              | Develop water conservation projects for partial WR acquisition                      | Water Rights Acquisition |                                                                | TBD                                                                                                                                                                                                                                                                                                                                                                          |     | WRIA-Wide      |                                                |                                                          |                                                                                     |                |           |
| III              | Beaver analog and beaver reintroduction                                             | Habitat and Other        |                                                                | Will be serious issues with landowner participation.                                                                                                                                                                                                                                                                                                                         |     | WRIA-Wide      |                                                |                                                          |                                                                                     |                |           |

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| III | Water Banking                                                                        | Non Water Rights Offset |                                | The report done for Steven's County determined the feasibility of a water bank to maintain and protect existing water rights, discourage the downstream transfer of water rights out of the watershed by providing a local market, develop a bank of water rights to increase future options for rural domestic uses, and identify opportunities to provide water for development of projects in tributaries currently closed by rule. PAG concluded that a water bank would work in most WRIA 59 subbasins. |  | WRIA-Wide |                                | Thurston County | Conceptual |  |  |
| II  | Water-wise Landscaping and Gardening/Irrigation Efficiencies (Residential/HOA scale) | Non Water Rights Offset | WRIA-wide                      | Provide outreach, support, and education for water-wise landscaping (i.e. xeriscaping) and water-wise and drought-wise gardening practices. Additionally, support Irrigation Water Management Planning for residential/HOA communities to reduce water demand/consumption                                                                                                                                                                                                                                    |  | WRIA-Wide | TCD (welcome willing partners) |                 | conceptual |  |  |
| III | Ag. Irrigation efficiencies/Ag Water Rights Rental Program                           |                         | WRIA-wide or focus areas       | Support Irrigation Water Management Planning for agricultural producers across the WRIA.                                                                                                                                                                                                                                                                                                                                                                                                                     |  | WRIA-Wide | TCD                            |                 | conceptual |  |  |
| III | Water Harvesting Innovation (multiple scales)                                        |                         | Rural/Ag focus areas           | Explore innovative ideas for stormwater collection and storage during high-flow periods, and infiltration or reuse for ag/irrigation later in the year.                                                                                                                                                                                                                                                                                                                                                      |  | WRIA-Wide | TCD                            |                 | conceptual |  |  |
| III | Education: Water Conservation/Drought Adaptation                                     |                         | WRIA-wide                      | Workshops/updates to water conservation guidance for landowners/ag/residential; create culture of water conservation and encourage behavior change relative to water use.                                                                                                                                                                                                                                                                                                                                    |  | WRIA-Wide | TCD (welcome willing partners) |                 | conceptual |  |  |
| III | Community Stormwater/LID Retrofits                                                   |                         | WRIA-wide in appropriate areas | Explore opportunities for partnering with community members (residential and other) to implement green stormwater infrastructure practices like bioretention and rain gardens; retrofit where beneficial; incorporate xeriscaping, lawn reduction, reforestation and other GSI practices to increase onsite infiltration of stormwater runoff.                                                                                                                                                               |  | WRIA-Wide | TCD                            |                 | conceptual |  |  |



# Appendix K – Policy Recommendation Proposals

**Name:** Upgrade Well Reporting

**Entity:** Squaxin Island Tribe

**Type of policy idea** (see list below): Information process improvement

**Description of policy idea** (a short abstract):

1. *Identify the potential implementers and other key players.*
  - a. Ecology
2. *Describe proposed actions (including current policies or codes, existing programs and their limitations, problems to be corrected, etc.).*
  - a. See attached document “Proposed Improvements to the Department of Ecology’s Well Reporting Processes”
3. *Identify who the action impacts (if different than primary implementer).*
  - a. Well drillers, all users of well database information
4. *Describe benefits and challenges/obstacles.*
  - a. Benefits: better well location data; streamlined data collection and uploading; improved data access
  - b. Challenges: requires resources for development, roll-out, and training.

**Description of purpose:**

1. *How would this recommendation enhance the WRIA 13 plan? Describe the desired result and its purpose in this plan (we want to be clear how this relates to offsetting impacts from PEW OR be explicit that this is a benefit to the watershed even if not directly related to PEW impacts).*
  - a. Accurate well data is critical for all parties to make water management decisions that are protective of the environment and beneficial to communities. Improvements in the quality of well data in Washington State are essential for monitoring and management of shared water resources in the State of Washington. This supports the goals of the Plan.
  - b.

**Description of concerns:**

1. *What, if any, concerns with this policy idea have WRIA 13 members expressed or that you anticipate?*
  - a. None anticipated, other than perhaps the allocation of limited resources.
2. *If you have discussed this with concerned members, what was the result of those discussions?*
  - a. Concept has been discussed, with general support.
3. *Are there other potential downsides or objections to the proposal that you anticipate?*
  - a. None anticipated.

4. *In what ways does your proposal address those concerns?*
  - a. Proposal stands by itself. Investment in this improvement in the short term will have long-term benefits.

**Cost and funding sources:**

1. *What elements of the proposal are likely to require funding?*
  - a. Platform development, testing, roll-out, and user training and support
2. *Provide a rough cost estimate (if known) and discuss potential funding sources and whether funding is one time or ongoing.*
  - a. Not yet known.
3. *Explain costs to other affected parties besides implementing regulators (for example: costs will increase for well drilling or new requirements on homeowners/home builders).*
  - a. There may be a small cost to well drillers for technology.

# **Proposed Improvements to the Department of Ecology’s Well Reporting Processes: The “Upgrade Well Reporting” Proposal**

**Developed by the Squaxin Island Tribe in consultation with Ecology’s Well Construction and Licensing Office**

**Contributors: Ecology - Joe Witczak, Scott Malone, and Tara Roberts  
Squaxin Island Tribe - Erica Marbet**

**Final Draft May 28, 2020**

## **Purpose:**

Accurate well data is critical for all parties to make water management decisions that are protective of the environment and beneficial to communities. The quality of well data in Washington State can be improved with changes to how the State collects information from drillers. These improvements are essential for monitoring and management of shared water resources in the State of Washington.

## **Background:**

In 2018, at the request of the Squaxin Island Tribe, Ecology assigned staff to assess the accuracy of water well location reporting in Mason County. The project checked 187 water well reports (2.1% of the 8,910 water well reports from the county). Ecology uses the Public Land Survey system (PLS) to record well locations by township, range, section, quarter and quarter-quarter. Currently wells are mapped by 40-acre quarter-quarter centroids on the State Well Report Viewer. The results showed that 79% of well locations could be verified with the information on the report. Of those that could be verified, 33% had incorrectly reported PLS locations. Ecology performed a similar, statewide assessment of well location data and found a 24% error rate for all types of regulated wells.

As Tribes utilize Ecology’s well report database frequently, tribal staff would benefit by improving well location data management and processes. In discussions between Ecology, Squaxin, and Mason County, all agreed that improvements to Ecology’s well reporting processes could help reduce the error in water well location reporting.

Ecology is eager to expand their web-based well reporting options. In 2019, Ecology surveyed well drillers to determine their preferences regarding format and features. Of 133 respondents, 63% placed a high importance on a new well location mapping tool that would use recent aerial imagery to determine a well’s PLS location and coordinates. Only 6% responded that this effort would be of low importance. These results showed drillers preferred to submit well reports from a web form in the current well report format.

We propose the following changes to Ecology’s well data processes:

### **1. New well location mapping tool for drillers**

An interactive web-based mapping tool that provides an intuitive means of determining PLS location has been implemented in Oregon recently. Ecology is interested in developing their own web tool which provides the PLS and coordinates location (latitude/longitude) for a new well automatically. The Notice of Intent web form would shell into a new GIS application utilizing recent aerial imagery, a parcel overlay, and a tool that updates the quarter-quarter and coordinates on the NOI. The well driller need only click on the interactive map to generate a well location. When a driller finishes a well report, they can utilize the same tool to refine their coordinates and PLS location.

### **2. Require coordinates on well reports**

Coordinates can perfectly describe a well location within a parcel. Adding latitude and longitude on well reports will serve to verify a well's location on the ground accurately and easily. Ecology intends to require well coordinates on reports, though a WAC change may eventually be needed.

### **3. New web-based well reporting application**

- Ecology is determining the best approach for implementing a new web-based well reporting application. According to a recent survey of drillers and their support staff, a web-form mimicking the current well report forms that uploads directly to Ecology's database is desired. The benefits of using a web-based well reporting process are numerous:
  - 
  - Less backlog of scanning and data entry - more time for Ecology staff to vet well reports
  - Legible text, fewer written responses
  - Digitizing all well report data, not just the fields that were captured by Ecology staff during the scanning process
  - A smart form format can eliminate out-of-range entries
  -
- By capturing digitized well location data, it would be feasible in the future to automate the process of verifying well locations and water right information. Tracking well location and permit-exempt wells is a need of users who download geospatial datasets from Ecology's GIS data page (<https://ecology.wa.gov/Research-Data/Data-resources/Geographic-Information-Systems-GIS/Data>)

The Well Construction and Licensing Office at Ecology needs more capacity to vet well reports. Automation from web-based reporting would free up staff to do more vetting, because the office's staff would not have to do as much scanning of paper documents and manual entry of data fields for each report. They need more automation, not FTEs.

<https://apps.wa.gov/ecology/wellconstruction/Wells/NoticeOfIntentForm.aspx?form=noiwaterwellform>

[Laws, Regs and Rules](#)

[Notice of Intent Forms](#)

[Contact Us](#)

## Well Construction and Licensing Search Tools

### Step 1 of 3: Enter Information

An asterisk (\*) designates the field as required.

## Notice of Intent Form to Construct a Water Well

### Property Owner Contact Information

\*An organization name or the first and last property owner name is required.

Organization Name\*  (e.g. Daisy Farms LLC)

OR

Last Name\*

First Name\*

Email Address\*

Confirm Email Address\*

Mailing Address\*

City\*

State\*

Zip\*

Phone (  )

International customers cannot submit online. [Contact us](#) for assistance.

### Consulting Firm Contact Information

Firm Name

### Well Location

Township\*

Range\*

Section\*

\*Quarter-Quarter Section:

|    |    |    |    |
|----|----|----|----|
| NW | NE | NW | NE |
| SW | SE | SW | SE |
| NW | NE | NW | NE |
| SW | SE | SW | SE |

Well Street Address

Well City

Well Zip Code

Tax Parcel Number

County\*

Latitude

Longitude

Add interactive map to automatically identify township, range, section, latitude, and longitude.



Make Optional

Make Mandatory

## WATER WELL REPORT

**DEPARTMENT OF  
ECOLOGY**  
State of Washington

**Type of Work:**  
☐ Construction  
☐ Decommission  $\Rightarrow$  Original installation NOI No. \_\_\_\_\_

**Proposed Use:**    ☐ Domestic    ☐ Industrial    ☐ Municipal  
                          ☐ Dewatering    ☐ Irrigation    ☐ Test Well    ☐ Other \_\_\_\_\_

**Construction Type:**                      **Method:**  
☐ New well    ☐ Alteration                      ☐ Driven    ☐ Jetted    ☐ Cable Tool  
☐ Deepening    ☐ Other \_\_\_\_\_                      ☐ Dug    ☐ Air-    ☐ Mud-Rotary

**Dimensions:** Diameter of boring \_\_\_\_\_ in., to \_\_\_\_\_ ft.  
 Depth of completed well \_\_\_\_\_ ft.

**Construction Details:**

| Casing                   | Liner                    | Diameter  | From  | To    | Wall Thickness | Steel                    | PVC                      | Welded                   | Thread                   |
|--------------------------|--------------------------|-----------|-------|-------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | _____ in. | _____ | _____ | _____ in.      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | _____ in. | _____ | _____ | _____ in.      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | _____ in. | _____ | _____ | _____ in.      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | _____ in. | _____ | _____ | _____ in.      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Perforations:**    ☐ Yes    ☐ No                      Type of perforator used \_\_\_\_\_  
 No. of perforations \_\_\_\_\_                      Size of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
 Perforated from \_\_\_\_\_ ft. to \_\_\_\_\_ ft. below ground surface

**Screens:**    ☐ Yes    ☐ No                      ☐ K-Packer  $\Rightarrow$  Depth \_\_\_\_\_ ft.  
 Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_                      Model No. \_\_\_\_\_  
 Diameter \_\_\_\_\_ in.    Slot size \_\_\_\_\_ in. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Diameter \_\_\_\_\_ in.    Slot size \_\_\_\_\_ in. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Sand/Filter rack:**    ☐ Yes    ☐ No                      Size of rack material \_\_\_\_\_ in.

Notice of Intent No. \_\_\_\_\_

Unique Ecology Well ID Tag No. \_\_\_\_\_

Site Well Name (if more than one well) \_\_\_\_\_

Water Right Permit/Certificate No. \_\_\_\_\_

Property Owner Name \_\_\_\_\_

Well Street Address \_\_\_\_\_

City \_\_\_\_\_ County \_\_\_\_\_

Tax Parcel No. \_\_\_\_\_

Was a variance approved for this well?    Yes ☐ No ☐

If yes, what was the variance for? \_\_\_\_\_

Location (see instructions on page 2):                      ☐ WWM or ☐ EWM  
 \_\_\_\_\_ 1/4-1/4 of the \_\_\_\_\_ 1/4; Section \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_

Latitude (Example: 47.12345) \_\_\_\_\_

Longitude (Example: -120.12345) \_\_\_\_\_

**Driller's Log/Construction or Decommission Procedure**  
 Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each layer penetrated, with at least one entry for each change of information. Use additional sheets if necessary.

| Material | From | To |
|----------|------|----|
|          |      |    |
|          |      |    |
|          |      |    |
|          |      |    |

Make  
Mandatory

Add interactive map  
to automatically  
identify township,  
range, section,  
latitude, and



Change this water well report into a web form.



## LACEY CITY COUNCIL MEETING March 18, 2021

**SUBJECT:** Transit Signal Priority Interlocal Agreement

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**RECOMMENDATION:** Motion to authorize the City Manager to sign the Interlocal Agreement (ILA) with Intercity Transit for Transit Signal Priority (TSP)

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Scott Egger, Director of Public Works *SE*  
Roger Schoessel, City Engineer *RAS*  
Martin Hoppe, Transportation Manager *MH*

**ORIGINATED BY:** Public Works Department

**ATTACHMENTS:** 1. [Interlocal Agreement](#)

**FISCAL NOTE:** Sufficient funds have been budgeted for this work

**PRIOR REVIEW:** March 2, 2021 – Transportation Committee

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### BACKGROUND:

The Thurston Regional Planning Council Smart Corridor grant, which replaced many of the signal cabinets and controllers in the City, included a transit signal priority (TSP) component. All of the traffic signals in the City were purchased with the hardware and software to accommodate TSP implementation.

The Interlocal Agreement between the City and Intercity Transit provides clarification on responsibilities of each jurisdiction regarding the management of the equipment, changes, and monitoring of system performance, and coordination of the field implementation of equipment including operations to support TSP implementation.

The City Attorney has reviewed and approved the form of this Interlocal Agreement.

The Transportation Committee reviewed the Interlocal Agreement at their March 2, 2021, meeting, and recommend Council approval.



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**ADVANTAGES:**

1. Provides the ability to implement TSP for transit vehicles.

**DISADVANTAGES:**

1. None.

**INTERLOCAL AGREEMENT BETWEEN  
THE CITY OF LACEY AND INTERCITY TRANSIT FOR  
TRANSIT SIGNAL PRIORITY**

**Whereas,** RCW 39.34.010 permits local governmental units to make the most efficient use of their powers by enabling them to cooperate with other localities on a basis of mutual advantage and thereby to provide services and facilities in a manner and pursuant to forms of governmental organization that will accord best with geographic, economic, population and other factors influencing the needs and development of local communities; and

**Whereas,** pursuant to RCW 39.34.080, each party is authorized to contract with any one or more other public agencies to perform any governmental service, activity, or undertaking which each public agency entering into the contract is authorized by law to perform: provided, that such contract shall be authorized by the governing body of each party to the contract and shall set forth its purposes, powers, rights, objectives and responsibilities of the contracting parties; and

**Whereas,** Thurston Regional Planning Council awarded federal Congestion Mitigation and Air Quality (CMAQ) Improvement Program funds that created the Smart Corridors signal upgrade and transit signal priority project collaboration; and

**Whereas,** Intercity Transit's system of bus service includes routes on the City of Lacey's roadway system and the City of Lacey's Comprehensive Plan encourages public transportation use within the City, and

**Whereas,** the equipment provided by Intercity Transit under this agreement in support of the Smart Corridors project has been purchased with federal funds and is subject to Federal Transit Administration (FTA) requirements; and

**Whereas,** Intercity Transit and the City of Lacey agree to adhere to all applicable federal grant funding requirements including continuing control during the lifecycle of equipment purchased with federal funds coordinated through this Interlocal Agreement; and

**Whereas,** City of Lacey provides traffic signal maintenance services for signalized intersection owned by Thurston County under a separate agreement and noting in this agreement is intended to modify or amend the agreement between the City of Lacey and Thurston County; and

**Whereas,** any future TSP work at signalized intersections owned by Thurston County are subject to approval and processes established under a separate agreement between Thurston County and Intercity Transit;

NOW, THEREFORE, in consideration of the mutual promises contained herein, the City of Lacey (CITY) and Intercity Transit (TRANSIT) agree as follows:

**I. Purpose/Objectives**

The purpose of this Agreement is to allow the CITY to operate and maintain a Transit Signal Priority system with TRANSIT to grant transit buses conditional priority at CITY traffic signals.

**II. Definitions**

In this Agreement, the following words shall have the meanings set forth below:

Transit Signal Priority (TSP): Traffic signal operational concept that uses sensors to detect TRANSIT vehicles approaching intersections and alters signal timing based on pre-determined criteria to improve transit performance.

TSP Intersection: A CITY signalized intersection where TSP is implemented under this agreement.

TSP Component: Electronic equipment for bus priority request detection installed within the CITY's traffic signal systems, including discriminators, cabling, antennas and any related equipment and materials needed to operate and maintain TSP function.

TSP Routine Operation and Maintenance: Thirty (30) minute check, during annual preventative maintenance of CITY traffic signal systems, that TSP Components are on, connected to power supply, receiving TSP requests by radio communication signals, and sending priority requests to traffic signal controller.

TSP Non-Routine Operation and Maintenance: Any work requested by TRANSIT that the CITY deems not to be included in Exhibit A and is subject to the procedures outlined in Exhibit E of this agreement.

COUNTY or STATE TSP Intersection: A signalized intersection maintained and/or operated by CITY under separate agreement where TSP implementation work must be confirmed under separate agreement with TRANSIT.

**III. Scope of Agreement/Work**

Functional responsibilities of CITY and TRANSIT shall be as outlined in Exhibit A, *Transit Signal Priority Detailed Scope of Work/Agreement*. TSP Intersections covered by this agreement are listed in Exhibit B, *City of Lacey Intersections*; TSP Intersections may be added to this agreement following procedures in Exhibit C, *Transit Signal Priority Intersection Assignment*, or removed from this agreement following procedure in Exhibit D, *Transit Signal Priority Intersection Assignment Deletion*.

Additional functional responsibilities under this agreement may be approved by both

parties. TRANSIT may request additional functional responsibilities through a request for services. Each request for services pursuant to this agreement shall be submitted in writing by the TRANSIT official identified in Section XIV and in accordance with

Exhibit E, *Request for Services*. The request shall specify the particular service required, the amounts and type of labor, equipment and material required, the location of the work, the estimated cost of the work prepared according to the example format for cost estimate in Attachment A -Request for Services: Rates and Estimated Costs, when the work is to be performed and other information pertinent to the request. Upon receipt of the request, the CITY official identified in Section XIV shall have sole discretion to accept the request or not. If the request is accepted, it will be signed and returned to TRANSIT. Each accepted request for service shall be incorporated into and become a part of this Agreement and shall be posted or filed with the original.

#### IV. Payment

TRANSIT agrees to pay for all TSP Components necessary to operate and maintain TSP at the intersections listed in Exhibit B, *City of Lacey Intersections*, as modified by agreement of both parties following procedures of Exhibits C, *Transit Signal Priority Intersection Assignment*, and Exhibit D, *Transit Signal Priority Signal Assignment Deletion*.

TRANSIT agrees to pay for labor and equipment to provide TSP Non-Routine Operation and Maintenance, which may include CITY staff time, shop time, equipment and related incidental costs as necessary to provide estimates, review or calculate times, program, install and inspect installation or replacement of TSP Components, to be provided by TRANSIT's contractor or CITY staff, as Outlined in Exhibit E, *Request for Services*.

TRANSIT requests for TSP support services will include a request to the CITY for the estimated cost to provide the service formatted as shown in Attachment A to Exhibit E, prior to TRANSIT authorizing CITY to perform TSP support services. TRANSIT shall reimburse the CITY for actual direct and related indirect costs, based on the current labor and equipment rates effective at the time of service, provided those costs are outlined in writing accompanying each service request prior to such work being performed. Upon request of the CITY, TRANSIT shall make payments to cover costs incurred. These payments are not to be more frequent than one per month. Any such payment will not constitute agreement as to the appropriateness of any item. TRANSIT shall not pay the CITY for any work in advance of performance. Amount payable for work to be performed under this Agreement shall follow procedures described in Exhibit E, and **shall not exceed \$25,000 per calendar year**. Should the estimated cost to provide any proposed support service exceed \$25,000, said service is subject to separate review and approvals by TRANSIT and CITY in accordance with agency policies and procedures.

**V. Federal Grant Requirements and Ownership**

TRANSIT will retain ownership of the TSP Components that they purchased. with federal grant funds. City will provide Transit with inventory and location of the equipment provided by Transit to the City under this agreement. Future amendments to this agreement that include transfer of ownership of TSP Components purchased by TRANSIT are subject to all FTA requirements, which would include ownership, access to, continuing use, control, and disposal of TSP Components in compliance with all federal regulations during the lifecycle of the equipment as defined by the Federal Transit Administration (FTA).

**VI. Method of Payment**

A. Lacey will invoice TRANSIT on an as needed basis.

B. Upon completion of the work set forth in the invoice, payment will be made by TRANSIT within thirty (30) days of receipt of an invoice from the CITY.

**VII. Indemnification & Insurance**

A. TRANSIT agrees to defend, indemnify and hold the CITY, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including reasonable attorney fees, arising out of or in connection with TRANSIT's performance of the Agreement, except to the extent such injuries and damages are caused by the negligence of the CITY.

B. The CITY agrees to defend, indemnify and hold TRANSIT, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including reasonable attorney fees, arising out of or in connection with the CITY's performance of this Agreement, except to the extent such injuries and damages are caused by the negligence of TRANSIT.

**VIII. Joint Board**

This Agreement creates no Joint Board and no separate legal entity.

**IX. Duration of Agreement**

This Agreement shall be effective until it is terminated in the manner described under the termination section of this Agreement.

**X. Termination of Agreement**

This Agreement may be terminated upon one hundred eighty (180) days' notice to the other party using the method of notice provided for in this Agreement.

**XI. Entire Agreement**

This Agreement, including the exhibits and any additions as provided for in Section III herein, sets forth all terms and conditions agreed upon by the CITY and TRANSIT, and supersedes any and all prior agreements oral or otherwise with respect to the subject matter addressed herein.

**XII. Recording**

Prior to its entry into force, this Agreement shall be filed with the Thurston County Auditor's Office or posted upon the websites or other electronically retrievable public source as required by RCW 39.34.040.

**XIII. Employment relationship**

Employees of each agency shall remain at all times under the direction and control of their employing agency and the performance of work for any other agency pursuant to this Interlocal Agreement shall not change that relationship for any purpose. Neither agency shall be deemed to have agreed to pay the other agency's employees any wages or benefits afforded to its own employees. Further, each agency's responsibilities to its own employees for work place injuries shall remain unchanged by this Interlocal Agreement.

**XIV. Notice and Delegated Authority**

Any notice required under this Agreement shall be to the party at the address listed below and shall become effective three days following the date of deposit in the United States Postal Service.

|                  |                                                                                                                                          |                                                                                                                                      |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Mailing Address  | CITY OF LACEY<br>Attn: Transportation<br>Manger Re: TSP Agreement<br>with INTERCITY TRANSIT<br>420 College St SE<br>Lacey, WA 98503-1238 | INTERCITY TRANSIT<br>Attn: Development Director<br>Re: TSP Agreement with<br>CITY OF LACEY<br>P.O. Box 659<br>Olympia, WA 98507-0659 |
| Telephone Number | (360) 491-5600                                                                                                                           | (360) 705-5885                                                                                                                       |

Each party hereby delegates authority to those staff members who hold the positions designated in this section to authorize amendments to this agreement and its exhibits to: update list of Lacey Intersections (Exhibit B); add TSP Intersections (Exhibit C); remove TSP Intersections (Exhibit D); create and approve requests for services (Exhibit E); and amend labor and equipment rates (Attachment A). Each amendment

shall be in written form, signed by the authorized party for each entity, dated, filed with each entity prior to taking effect, and properly recorded in compliance with RCW 39.34.040. In the event such representatives are changed, the party making the change shall notify the other party.

**XV. Records**

Each party shall maintain its own public records, and, as to such record shall be solely responsible for responding to records requests received about the subject matter of this Interlocal Agreement to the extent that the records in its possession are responsive to the request. Any public records request addressed to the group as if this Interlocal Agreement created a separate legal entity, shall be deemed to be a request received by each member individually. Each member shall respond separately, unless agreed to otherwise in writing and properly documented.

**XVI. Interpretation and Venue**

This Agreement shall be governed by the laws of the State of Washington as to interpretation and performance. The parties hereby agree that venue for enforcement of this agreement shall be the Superior Court of Thurston County.

**XVII. Effective Date**

This Agreement shall take effect as of the date of filing or posting as required by RCW 39.34.040.

**CITY OF LACEY**

**INTERCITY TRANSIT**

\_\_\_\_\_  
Scott Spence, City Manager

\_\_\_\_\_  
General Manager

Date:\_\_\_\_\_

Date:\_\_\_\_\_

Approved as to form:

Approved as to form:

\_\_\_\_\_  
City of Lacey Attorney

\_\_\_\_\_  
Intercity Transit Attorney



## **Exhibit A -Transit Signal Priority Detailed Scope of Work/Agreement**

### **INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY DETAILED SCOPE OF WORK/AGREEMENT**

#### **1. Responsibilities of the CITY shall be as follows:**

- a. Cooperate with TRANSIT in the implementation and ongoing operation, maintenance, and monitoring of Transit Signal Priority (TSP) technology.
- b. Provide on-going TSP Routine Operation and Maintenance for TSP Components at each TSP Intersection identified in Exhibit B, *City of Lacey Intersections*, or added under this agreement through the procedures shown in Exhibit C, *Transit Signal Priority Intersection Assignment*, unless the TSP Intersection is removed from this agreement following procedures shown in Exhibit D, *Transit Signal Priority Intersection Assignment Deletion*. The CITY may provide additional TSP operation, maintenance, design, monitoring and inspection of installation work, and installation services if agreed with INTERCITY TRANSIT, following procedures shown in Exhibit E, *Request for Services*.
- c. Provide readily available data from traffic signal controllers at TSP Intersections to TRANSIT.
- d. Make reasonable accommodations to implement effective TSP timing and configuration parameters that balance the transit and traffic operational objectives of the Parties.
- e. Approve design of the TSP system (including but not limited to component selection and specifications, interface with other traffic signal components, communications, and power supply).
- f. Approve TSP system timing parameters, settings, and timings of roadside TSP equipment.
- g. Monitor and report TSP performance as required for ongoing maintenance or troubleshooting purposes.
- h. Host TSP components within an existing secure, weatherproof traffic signal cabinet at each intersection and support integration of TSP Components with traffic control equipment, housings, cabling, and power supply.
- i. Approve changes or modifications to the TSP design, Components, or configuration before allowing any specific TSP design, configuration, or equipment modifications.
- j. Maintain maximum practical availability and operation of the TSP system as part of normal traffic signal controller operations, and ideally notify TRANSIT of TSP system outages anticipated to last more than twenty-four (24) hours. Notify TRANSIT of proposed modifications to traffic signal timing parameters, settings, configurations, or components that impact the TSP system prior to implementation.

- k. Maintain jurisdiction and responsibility for access to traffic signal control cabinets; TRANSIT shall not be permitted independent access to traffic signal control cabinets for any purpose. All work or modifications to traffic controller cabinets and equipment shall be under the jurisdiction and responsibility of the CITY's Traffic Engineer or designee, in cooperation with TRANSIT.
- l. Make reasonable accommodations to schedule, coordinate, monitor and perform TSP installation and maintenance work so as to minimize adverse impacts on either party, traffic operations or safety, the public welfare and convenience, or concurrent work impacting the intersections.
- m. Approve TSP Component installation, operation, and maintenance to ensure safe and reliable operation of the existing traffic signal systems, and the existing emergency vehicle pre-emption systems installed at the CITY's traffic signals.
- n. Disable or disconnect TSP Components and provide prompt notice to TRANSIT, should a condition be discovered that is detrimental to the safe and reliable operation of the existing traffic signal systems or existing emergency vehicle pre-emption systems.
- o. Provide prompt notification to TRANSIT in the event of any known condition, outage, or failure that may compromise the effective operation of the TSP system. Notice should be provided within twenty-four (24) hours of discovery of the condition, or not later than 5:00 pm on the next business day.
- p. Provide technical representatives with responsibility for day-to-day coordination and technical oversight necessary to implement this Agreement and to design, implement, operate, and maintain the TSP system while this Agreement is in effect.

**2. Responsibilities of TRANSIT shall be as follows:**

- a. Cooperate with the CITY in the implementation and ongoing operation, maintenance, and monitoring of TSP technology.
- b. Provide TSP Components at TSP Intersections identified in Exhibit B, *City of Lacey Intersections*, or added under this agreement through the procedures shown in Exhibit C, *Transit Signal Priority Intersection Assignment*, unless the TSP Intersection is removed from this agreement following procedures shown in Exhibit D, *Transit Signal Priority Intersection Assignment Deletion*. INTERCITY TRANSIT may request TSP design and installation services from the CITY following procedures shown in Exhibit E, *Request for Services*.
- c. Make reasonable accommodations to implement effective TSP timing and configuration parameters that balance the transit and traffic operational objectives of the Parties.
- d. Provide funding and personnel for design of the TSP system (including but not limited to component selection and specifications, interface with other traffic signal components, communications, and power supply).
- e. Monitor and report TSP performance as required for ongoing performance monitoring,

- maintenance, or troubleshooting purposes.
- f. Retain ownership of TRANSIT TSP Components at the intersections where TSP is implemented, supply necessary equipment and materials to operate and maintain the system, and pay for costs of acquisition, installation, maintenance, warranty coverage, and replacement of TSP components.
  - g. If TSP Components cannot be installed in an existing City signal cabinet then TRANSIT will bear the cost to provide and install a new or additional cabinet at the intersection.
  - h. Seek approval from the CITY for any proposed changes or modifications to the TSP design, Components, or configuration prior to implementation.
  - L. Arrange for all work or modifications to traffic controller cabinets and equipment to be done under the jurisdiction and responsibility of the CITY's Traffic Engineer or designee, in cooperation with TRANSIT; TRANSIT shall not be permitted independent access to traffic signal control cabinets for any purpose.
  - J. Make reasonable accommodations to schedule, coordinate, and perform TSP installation and maintenance work so as to minimize adverse impacts on either party, traffic operations or safety, the public welfare and convenience, or concurrent work impacting the intersections.
  - k. Compensate the CITY for work performed by the CITY's personnel or representatives for training, design, installation, testing, configuration, and monitoring, beyond Routine Operation or Maintenance of the TSP system, if agreed with INTERCITY TRANSIT following procedures shown in Exhibit E, *Request for Services*. The estimated level of effort shall be approved by the Parties prior to performance of the work. Compensation for labor, materials, and equipment shall be at prevailing rates agreed by the Parties, subject to annual escalation. Labor and equipment rates will be actual rates at time of Request for Services.
  - 1. Collaborate with the CITY to design a mutually agreeable TSP system that ensures safe and reliable operation of the traffic signal systems and accommodates the existing emergency vehicle pre-emption systems installed at the CITY's traffic signals.
  - m. Provide prompt notification to the CITY in the event of any known condition, outage, or failure that may compromise the effective operation of the TSP system. Notice should be provided within twenty-four (24) hours of discovery of the condition, or not later than 5:00 pm on the next business day.
  - n. Provide technical representatives with responsibility for day-to-day coordination and technical oversight necessary to implement this Agreement and to design, implement, operate, and maintain the TSP system while this Agreement is in effect.
  - o. Provide the CITY with equipment needed to send test TSP request to TSP Components at TSP Intersections.

## **Exhibit B –City of Lacey Intersections**

### **Smart Corridor/TSP Study Intersections**

| Assignment Number | Location                                                         |
|-------------------|------------------------------------------------------------------|
|                   | Martin Way and College Street                                    |
|                   | Martin Way and Martin Village Entrance                           |
|                   | Martin Way and Desmond Drive                                     |
|                   | Martin Way and Galaxy Drive                                      |
|                   | Martin Way and Marvin Road                                       |
|                   | Martin Way and Costco Entrance                                   |
|                   |                                                                  |
|                   | Other Lacey intersections as determined from Smart Corridors/TSP |
|                   |                                                                  |
|                   |                                                                  |
|                   |                                                                  |

### **Transit Signal Priority (TSP) Intersections**

| Assignment Number | Location                                |
|-------------------|-----------------------------------------|
|                   | List will be added later, under the ILA |
|                   |                                         |
|                   |                                         |
|                   |                                         |
|                   |                                         |
|                   |                                         |
|                   |                                         |

CITY will maintain a record of TSP Component(s) installed at each intersection including serial numbers.

CITY will provide notice to TRANSIT of any TSP equipment changes required to keep tracking current as required to meet FTA requirements.

**Exhibit C -Transit Signal Priority Intersection Assignment**  
[Use to add TSP Intersections to Interlocal Agreement]

INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY  
TRANSIT FOR TRANSIT SIGNAL PRIORITY  
INTERSECTION ASSIGNMENT NO.

This Transit Signal Priority Intersection Assignment, made and entered into this \_\_\_\_\_ day of \_\_\_, 20\_\_\_, is by and between the City of Lacey (CITY) and Intercity Transit (TRANSIT).

WHEREAS, INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY, dated \_\_\_\_\_, 20\_\_\_, is incorporated and by this reference, made a part of this Transit Signal Priority (TSP) Intersection Assignment as if fully set forth within.

NOW THEREFORE, it is mutually agreed as follows:

1. The work proposed under this Transit Signal Priority Intersection Assignment includes the maintenance of TSP Components which will be installed at intersection of \_\_\_ and \_\_\_ (enter street names) and managed for the mutual benefit of traffic using both the CITY and TRANSIT facilities.
2. The CITY will maintain and operate such TSP Components described above in accordance with INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY.
3. The effective date to start this Transit Signal Priority Intersection Assignment work by the CITY is \_\_\_\_\_ 20\_\_\_.
4. Payment and requests for work beyond normal maintenance and operation of the TSP Components for this Transit Signal Priority Intersection Assignment must be submitted to the CITY as described in the INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY, including Exhibit E, Request for Services.
5. Miscellaneous: (Additional items, clauses, conditions, provisions, etc. that are not inconsistent with INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY)

IN WITNESS WHEREOF, the parties hereto have executed this Transit Signal Priority Intersection Assignment as of the day and year first above written.

Intercity Transit

City of Lacey

By: \_\_\_\_\_  
Development Director

By: \_\_\_\_\_  
Transportation Manager

**Exhibit D - Transit Signal Priority Intersection Assignment Deletion**

[Use to remove TSP Intersections from Interlocal Agreement]

INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY  
TRANSIT FOR TRANSIT SIGNAL PRIORITY  
INTERSECTION ASSIGNMENT DELETION NO.

This Transit Signal Priority Intersection Assignment Deletion, made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ , is by and between the City of Lacey (CITY) and Intercity Transit (TRANSIT).

WHEREAS, INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY, dated \_\_\_\_\_, 20\_\_, is incorporated and by this reference, made a part of this Transit Signal Priority (TSP) Intersection Assignment Deletion as if fully set forth within.

NOW THEREFORE, it is mutually agreed as follows:

1. The work under Transit Signal Priority Intersection Assignment Deletion No. \_\_\_\_ which includes maintenance of TSP Components at intersection of \_\_\_\_\_ and \_\_\_\_\_ (enter street names) and managed for the mutual benefit of traffic using both the CITY and INTERCITY TRANSIT facilities is hereby terminated as per this Intersection Assignment Deletion, and the unused TSP Components will be removed from the traffic signal cabinet and returned to INTERCITY TRANSIT.
2. The CITY will no longer maintain such TSP Components described above in accordance with INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY.
3. The effective date to start this Transit Signal Priority Intersection Assignment Deletion is \_\_\_\_\_, 20 \_\_\_\_ .
4. Miscellaneous: (Additional items, clauses, conditions, provisions, etc. that are not inconsistent with INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY)

IN WITNESS WHEREOF, the parties hereto have executed this Transit Signal Priority Intersection Assignment Deletion as of the day and year first above written.

Intercity Transit

City of Lacey

By: \_\_\_\_\_  
Development Director

By: \_\_\_\_\_  
Transportation Manager

## **Exhibit E - Request for Services**

[Use to request TSP Non-Routine Operation and Maintenance services, accompanied by cost estimate prepared according to the example format for cost estimate in Attachment A -Request for Services: Rates and Estimated Costs]

### **Authority**

Interlocal Agreement for Transit Signal Priority between the City of Lacey (CITY) and Intercity Transit (TRANSIT) executed \_\_\_\_\_ 20 \_\_\_\_ .

### **Scope of Services**

[TRANSIT and CITY staff shall discuss and provide here a description, schedule, and cost of TSP Non-Routine Operation and Maintenance services requested of CITY staff]

### **Duration**

The Request for Services shall remain in effect for the duration of the Interlocal Agreement for Transit Signal Priority between the CITY and TRANSIT.

### **Responsibility of TRANSIT**

TRANSIT shall reimburse the CITY costs for approved provision, installation, monitoring and inspection of installation work, maintenance, and operation of transit signal priority components, including actual direct and related indirect costs for labor, materials, equipment, and contract costs if applicable. CITY labor and equipment rates will reflect actual rates in effect at the time the request for services is made. Cost for services will be estimated in manner similar to the example in Attachment A, and agreed upon by the CITY and TRANSIT, prior to the CITY performing any work.

### **Responsibility of the CITY**

The CITY shall monitor and inspect or perform approved installation, maintenance, and operation work on transit signal priority components as requested by TRANSIT under this working agreement, and provide invoice(s) for such work to TRANSIT, when the CITY has adequate manpower to accomplish the work. Prior to commencing any work, the CITY shall obtain written approval from TRANSIT

### **Payment**

TRANSIT agrees to pay the CITY for approved Transit Signal Priority component work within 30 days of receipt of the CITY's invoice.



## Emergency Contact

CITY Public Works Dispatch, Monday-Friday, 3:30 PM to 7:00 AM (360) 704-2740  
TRANSIT Dispatch, all hours, 360-705-5890

## Administration

The following individuals are designated as representatives of the respective parties. The representatives shall be responsible for administration of this Agreement, authorizing work, and coordinating and monitoring performance under this Agreement. In the event such representatives are changed, the party making the change shall notify the other party in writing.

The CITY' s contract administration representative shall be Transportation Manager, 420 College St SE, Lacey WA 98503, (360) 491-5600.

INTERCITY TRANSIT' s contract administration representative shall be Development Director, P.O. Box 659, Olympia WA 98507-0659, (360) 705-5885.

Wherever written notice is required under this service request, such notice shall be provided to the representatives designated above.

This Request for Services is made a part of the Interlocal Agreement for Transit Signal Priority between the CITY and TRANSIT and is hereby accepted by the following individuals who represent they have the authority to execute this document.

INTERCITY TRANSIT

LACEY

\_\_\_\_\_  
Development Director

\_\_\_\_\_  
Transportation Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

### **Attachment A -Request for Services: Rates and Estimated Costs**

[Example format for cost estimate to attach to Exhibit E Request for Services, showing labor and equipment quantities and rates required to provide the requested TSP Non- Routine Operation and Maintenance services]

#### City of Lacey Non-Routine TSP Operations and Maintenance Rates and Estimated Costs

| Item                                        | Unit | Quantity | Rate    | Total   |
|---------------------------------------------|------|----------|---------|---------|
| Labor-Traffic Signal Technician (JL)        | Hour | x        | \$XX.XX | \$XX.XX |
| Labor – Traffic Signal Technician (ST)      | Hour | x        | \$XX.XX | \$XX.XX |
| Equipment -Traffic Signal Maintenance Truck | Hour | x        | \$XX.XX | \$XX.XX |
| Total Estimated Cost for Requested Services |      |          | \$XX.XX | \$XX.XX |

Disclaimer; This agreement does not override the current signal maintenance agreement between Lacey and Thurston County.



## LACEY CITY COUNCIL MEETING

March 18, 2021

**SUBJECT:** Amended Intergovernmental Agreement for Joint Animal Services Operations

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**RECOMMENDATION:** Motion to authorize the City Manager to sign the Amended Intergovernmental Agreement between the cities of Lacey, Olympia, and Tumwater, and Thurston County for Joint Animal Services Operations

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Shannon Kelley-Fong, Assistant City Manager *SKF*  
Sarah Hock, Executive Director of Animal Services *SH*

**ORIGINATED BY:** Animal Services Department

**ATTACHMENTS:** [Animal Services Intergovernmental Agreement – Final Version](#)

**FISCAL NOTE:** None

**PRIOR REVIEW:** City Council Worksession – February 11, 2021

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### BACKGROUND:

The Joint Animal Services Commission (JASCOM) recommends the adoption of the amendments to the Intergovernmental Agreement, the document that regulates the operation of Joint Animal Services. The last time the document was updated was in 2014.

In November 2020, JASCOM reviewed and recommended changes to the Intergovernmental Agreement. It is important to note that the basic document is unchanged except for updates to language and revisions necessary to reflect the changes recommended to ensure Animal Services operations are optimal.

There are four changes of note in this agreement:

1. **Section 3 (a) (5)** - In reference to the members of the governing body known as JASCOM.

One optional member selected by a nonprofit organization based in Thurston County with shared animal welfare priorities. Such nonprofit shall be selected by members of the commission.

2. **Section 3. (f) (6)** – In reference to powers and duties of the commission.

License fees shall be established by JASCOM.

3. **Section 7 (c) and Section 11** – In reference to the jurisdictions responsibility to pay off the loan obtained for the current shelter facility.

This section was removed. The loan for the building and renovation has been repaid.

4. **Section 8** – In reference to the commission's ability to contract with other parties to provide services.

Animal Services can provide services to nonmembers through a contract. Revenue received for such services cannot be less than the cost to provide such services. JASCOM shall approve all nonmember contracts related to additional services.

The Intergovernmental Agreement has been approved by the cities of Olympia and Tumwater and is in review with Thurston County.

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#### **ADVANTAGES:**

1. Amendments would allow JASCOM to add a member from the nonprofit community to provide an additional voice and perspective to Joint Animal Services activities.
2. Having JASCOM set fees rather than the jurisdictions is more efficient and would allow for JASCOM to assess fees annually.
3. Since the jurisdictions have repaid the loan for the building, it removes unnecessary language.
4. Revisions will allow JASCOM to contract with other parties to provide animal sheltering and humane law enforcement services.

#### **DISADVANTAGES:**

1. None foreseen.

# **INTERGOVERNMENTAL AGREEMENT FOR JOINT ANIMAL SERVICES OPERATIONS**

THIS AGREEMENT is made and executed on the date of the last authorizing signature thereto, by and between the City of Lacey, Washington; the City of Olympia, Washington; the City of Tumwater, Washington; and Thurston County, Washington; all of which are organized under the laws of the State of Washington, witnesseth:

WHEREAS, the parties hereto have determined it would be to the benefit of the residents within their respective jurisdictions to continue the joint operation of an animal shelter and the conduct of animal protection and control activities pursuant to a new agreement; and

WHEREAS, the Interlocal Cooperation Act contained in RCW 39.34 authorizes local governments such as the parties to this Agreement to contract for the joint conduct of activities which each of the parties is authorized to perform;

NOW, THEREFORE, it is hereby agreed between the parties as follows:

1. Purpose of Agreement.

The purposes of this Agreement are:

- a. To formalize a process whereby animal protection and control activities can be provided for the parties.
- b. To establish the mechanism whereby joint operation of animal shelter facilities can proceed in a cost effective manner.
- c. To establish a policy making body called Joint Animal Services Commission.

2. Basic Services.

Services to be provided include, but are not limited to, the following:

- a. Operation and maintenance of animal shelter and impound facilities for all dogs, cats, and other pet animals as defined in RCW 16.70.020 and other animals that require humane care. The service will be for animals brought to the shelter by their owners or caretakers for humane disposition as well as for animal protection and control actions authorized or ordered by the parties to this Agreement.

Shelter operations shall also include the adoption of animals, spay/neuter of adopted animals, and public education related to pet ownership.

- b. Additional services rendered to individual parties to this Agreement may also include:
  - (1) Humane enforcement of animal control laws;
  - (2) Licensing of animals; and
  - (3) Securing aid for injured animals.

3. Joint Animal Services Commission.

- a. This Agreement establishes a policy-making body to be known as the Joint Animal Services Commission (hereinafter “JASCOM”), which shall consist of the following members:
  - (1) One member of the Board of County Commissioners of Thurston County or designated alternate;
  - (2) One elected official of each of the cities of Olympia, Lacey, and Tumwater or designated alternate;
  - (3) One member who is a licensed veterinarian residing or practicing veterinary medicine within Thurston County. Such member shall be appointed by the other members of JASCOM;
  - (4) One member selected by the Thurston County Humane Society from the membership of its Board; and
  - (5) One optional member selected by a nonprofit organization based in Thurston County with shared animal welfare priorities. Such nonprofit shall be selected by members of JASCOM.
- b. Voting. Each member on JASCOM shall have one vote and a voice in all JASCOM business except budget matters. Only the representatives of parties to this Agreement shall vote on budget matters.
- c. Officers. JASCOM members shall select the chair and such other officers as deemed necessary for the efficient conduct of business.
- d. Meetings. JASCOM shall be responsible to fix a time and place for its meetings.

- e. Rules and Procedures. JASCOM shall adopt the rules and procedures it deems required for the proper and efficient conduct of its business.
- f. Powers and Duties. JASCOM shall have the following powers and duties:
  - (1) Set policy for the management and operation of the animal shelter and animal protection and control activities.
  - (2) Submit budget recommendations to the participating jurisdictions for action.
  - (3) If a participating jurisdiction is unable to pay its full share of the budget, JASCOM will consider the following:
    - (a) The field services provided to that jurisdiction shall be reduced for such jurisdiction to a level commensurate with its payments, or
    - (b) The assessment for each participating member shall be proportionately reduced, or
    - (c) The remaining jurisdictions may choose to pay proportionately more than their share to assure that all programs will be funded.
    - (d) JASCOM shall recommend to the jurisdictions which option shall be followed.
    - (e) In any case, the proportionate share of the budget for shelter services as set forth in Section 5b (1) (b) shall be paid by each member.
  - (4) Ensure that the budget appropriation approved by each jurisdiction is submitted to the City of Lacey for inclusion in that City's annual budget.
  - (5) Set fees and charges for services related to the animal shelter and animal protection and control activities.
  - (6) License fees shall be established by JASCOM.
  - (7) Consult with and advise the City of Lacey in the City's appointment, management review, discipline and termination of the Director.



4. Administrative Services.

The City of Lacey is hereby designated as the agency with authority and responsibility for providing any and all administrative services required, that are related to the operation of the animal shelter and the provision of animal protection and control services. The administrative services to be performed by the City of Lacey include but are not limited to the following:

- a. Act as custodian of the Joint Animal Services Fund created by this Agreement.
- b. Incorporate in its annual budget the budget for the Joint Animal Services Fund as approved by the parties to this Agreement.
- c. Maintain accounting for all activities of the animal shelter and animal control services in accordance with the requirements of the Washington State Auditor.
- d. Provide general and automobile liability insurance covering the operation of the animal shelter and the conduct of all animal protection and control activities. Such insurance shall, at a minimum, be for one million dollars (\$1,000,000.00) per incident. The City of Lacey shall further indemnify and hold harmless the other parties and defend any claims for personal injury or property damage arising out of the City of Lacey's management of the animal shelter and conduct of animal protection and control activities. However, the City of Lacey shall not indemnify, hold harmless, or defend against any claims arising out of the negligence of another party to this Agreement or out of activities solely within such party's control. The City of Lacey may fulfill its obligation to insure by participating in the Washington Cities Insurance Association.
- e. Be responsible for recruitment, hiring, evaluation, setting of salary, discipline and termination of the Director. The City of Lacey shall consider the advice of JASCOM in performing this responsibility.
- f. In consultation with the Director, recruit, hire, discipline and terminate Animal Services employees.
- g. Provide direction to and monitor performance of the Director to assure compliance with policies of JASCOM and the City of Lacey.
- h. Maintain the Director and other Animal Services employees as employees of the City of Lacey.
- i. Be responsible for administration of all appeals of potentially dangerous and/or dangerous dog declarations, including the hiring, supervising,

scheduling and setting of compensation for the animal services hearing examiner.

5. Finance.

In order to provide funds for the acquisition of the joint facilities and the operation and maintenance of such facilities and the providing of animal protection and control services within the boundaries of governmental jurisdictions which are parties to this Agreement, it is agreed as follows:

- a. There shall be maintained a special fund of the City of Lacey, known as the Joint Animal Services Fund, into which revenues received from the parties to this Agreement shall be deposited. This fund shall be part of the City of Lacey annual budget and administered in accordance with City budget regulation and guidelines. Expenditures from the fund shall be made only for animal shelter and animal protection and control activities, including the actual administrative costs and overhead of the City incurred pursuant to its obligations and set forth herein.
- b. Each of the parties to this Agreement shall pay into the Joint Animal Services Fund for animal shelter and animal protection and control activities as follows:
  - (1) Each party will pay an assessment to cover the costs of the animal shelter and animal protection and control activities based upon the following criteria:
    - (a) Animal protection and control activities (field services) shall be funded as follows:
      - (i) Field services shall be borne by the party by a per-capita basis. If a jurisdiction is unable to pay on a per-capita basis, then said jurisdiction shall pay for the actual cost of field services based upon the number of field services personnel, equipment, materials, and supplies allocated to said jurisdiction's field service needs as agreed to by jurisdiction and JASCOM.
      - (ii) Remaining jurisdictions shall be responsible for the remainder of the field services program costs, calculated after said jurisdiction(s)'s field service expense is deducted from the total field services program. The expense shall be distributed among the remaining jurisdictions on a per capita basis.

- (b) The cost of general services, shelter activities, and the licensing program shall be borne by the parties on a per capita basis.
  - (c) The cost of any loan repayment shall be borne on a per-capita basis by the jurisdictions. Debt will not be incurred without consent of the legislative bodies of the signed agreement.
  - (d) Per capita calculations shall be determined by using the most current population records published by the Washington State Office of Financial Management.
  - (e) Units of special services for pet shop inspection and enforcement will be charged to the jurisdiction in which service is provided.
- (2) Each party shall receive credit for revenue received from the sale of licenses, redemption of animals and adoption of animals. This credit shall be reflected when calculating annual assessments for service.
  - (3) In the event that more revenue is received during a fiscal period than was planned to be available, the additional amount shall be deposited into the Joint Animal Services Fund. JASCOM shall develop policies and procedures to allocate revenue within the fund.
  - (4) Each party shall pay one-twelfth of the annual assessment to the City of Lacey for deposit into the Joint Animal Services Fund within 30 days of receiving a request for payment from the Lacey Finance Department.

6. Access to records.

Duly authorized representatives of the parties to this Agreement shall have the right to inspect the records of the JASCOM and the books of accounts and records relating to animal protection and control and the Joint Animal Services Fund of the City of Lacey at any reasonable time.

7. Joint Use of Property.

- a. All property and/or equipment presently owned and all property and/or equipment hereinafter acquired with the approval of JASCOM to be used for animal shelter or control purposes, shall be considered joint facilities,

the title to which shall be held by the City of Lacey for the benefit of and on behalf of all parties to this Agreement.

- b. Upon termination of this Agreement by all parties, each party may recover the portion of the existing joint facilities in an amount which represents its contribution to the purchase of property and/or equipment used for the purposes for which this Agreement is promulgated.

8. Addition to Services to Nonmembers.

Animal Services can provide services to nonmembers through a contract. Revenue received for such services cannot be less than the cost to provide such services. JASCOM shall approve all nonmember contracts related to additional services.

9. Terms for Default.

In the event that one party to this Agreement fails to perform any of the obligations or provisions hereof, then the other parties to this Agreement may, by written notice, terminate, in whole or in part, the defaulting party's participation in this Agreement.

10. Arbitration.

In the event of a dispute between any of the parties to this Agreement relating to the construction of this Agreement or animal control or animal shelter services rendered pursuant to this Agreement, such dispute shall be settled by arbitration in conformity with the provisions of Chapter 7.04 RCW.

11. Term.

The term of this Agreement shall continue until the parties by unanimous agreement vote to terminate it. Provided, however, withdrawal may be allowed upon unanimous agreement of all parties, which agreement shall provide the means by which any such outstanding loans are to be paid and the necessary covenants and commitments therefor. The withdrawal of one party from this Agreement shall not terminate the Agreement.

12. Severability.

If any term or condition of this Agreement or the application thereof to any person(s) or circumstances is held invalid, such invalidity shall not affect other terms, conditions or applications which can be given effect without the invalid term, condition or application; to this end the terms and conditions of this contract are declared severable.

13. Review of Agreement.

The terms and conditions of this Agreement shall be reviewed periodically by JASCOM for appropriateness and currency.

14. Amendments.

Any addition, deletion or change to the terms and conditions of this Agreement shall be in the form of a written amendment approved by each of the parties.

15. Governing Law.

This contract shall be governed in all aspects by the laws and statutes of the State of Washington. The venue of any action hereunder shall be in the Superior Court for Thurston County, Washington.

16. Supersedes Prior Agreements.

This Agreement supersedes all prior agreements between these parties on the same subject matter.

**CITY OF OLYMPIA**

By: \_\_\_\_\_  
Dated: \_\_\_\_\_

Approved as to form:

\_\_\_\_\_  
Olympia City Attorney

**CITY OF TUMWATER**

By: \_\_\_\_\_  
Dated: \_\_\_\_\_

Approved as to form:

\_\_\_\_\_  
Tumwater City Attorney

**CITY OF LACEY**

By: \_\_\_\_\_  
Dated: \_\_\_\_\_

Approved as to form:

\_\_\_\_\_  
Lacey City Attorney

**THURSTON COUNTY**

By: \_\_\_\_\_  
Dated: \_\_\_\_\_

Approved as to form:

\_\_\_\_\_  
Thurston County Legal Counsel



## STAFF REPORT

March 18, 2021

**SUBJECT:** Capitol City Golf Course – West, Water & Wastewater Improvements

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**RECOMMENDATION:** Motion to award Lacey Contract Number PW 2020-30 to low bidder Active Construction, Inc. from Puyallup, Washington in the amount of \$7,724,291.57

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**STAFF CONTACT:** Scott Spence, City Manager *SS*  
Scott Egger, Public Works Director *SE*  
Peter Brooks, Water Resources Manager *PB*  
Tyson Poeckh, Project Administrator *TP*  
Teri O'Neal, Senior Utility Engineer *TO*  
Jason Kashani, Utility Engineer *JSK*

**ORIGINATED BY:** Public Works Department

**ATTACHMENTS:** Attachment #1 [Bid Tab Summary](#)  
Attachment #2 [Project Site Map](#)

**FISCAL NOTE:** Capitol City Golf Course – West, Water & Wastewater Improvements was bid as the second phase of a two phase project. Each utility has a separate fund code to pay for that portion of the project. The water portion is provided under the fund code WA20CC and the wastewater portion is funded under WW20CC through fund sources 410-3418-535.90-01 and 411-3518-535.90-01. The project includes stormwater improvements that are funded under the fund code WA20S4.

**PRIOR REVIEW:** Council approved the 2021 Wastewater Capital Funds as part of the 2021 Budget. The Capitol City Golf Course – West and Well S04 are listed as 2021 Water & Wastewater Capital Fund projects.

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### BACKGROUND:

Capitol City Golf Club Estates is a community located in the City of Lacey UGA that began development in the late 1960's. It is zoned low density and has approximately 4 single family homes per acre with individual septic systems. The City has a well located within the neighborhood of Capitol City Golf Club Estates. Due to the density of the surrounding

septic systems, there is a concern of contaminants being transmitted from the drain fields into the aquifer which the existing well is drawing from.

The second phase of the project extends new sewer service to 235 lots, of which, 231 will be connected and have their septic systems decommissioned. The project also replaces aging undersized water infrastructure throughout the neighborhood to meet current fire flow requirements. There will also be stormwater improvements constructed, paid for by the both the City and HOA. These improvements will both reduce localized flooding in some areas as well as provide a conveyance system for well water discharge and watermain flushing. The new utility improvements consist of approximately 12,400 LF of new 8" gravity main sewer main, approximately 12,000 LF of new 12", 8", and 4" water main.

The improvements will also include approximately 1,700 LF of 12" and 15" stormwater lines with 2 new drywell systems for this phase of the project. There is a lack of drainage infrastructure available nearby to manage flow of raw water when performing well pump tests and potable water when flushing water lines for cleaning. The majority of these new stormwater lines will provide a way to convey water produced during water system operation and maintenance thus avoiding property damage to neighboring parcels.

The project was advertised for three weeks and bids were opened March 4, 2021. Seven (7) bids were received. The 7 bids ranged from a low of \$7,724,291.57 to a high of \$12,387,090.73. Active Construction, Inc. from Maple Valley, Washington, is the low bidder at \$7,724,291.57. The Engineer's Estimate is \$8,304,456.61. A Bid Summary Sheet is attached.

The apparent low bidder, PAMF Excavating's bid varied from the requirements of the bid invitation. The City rejected their bid because the specifications require the bid bond be signed and the title of the person must accompany the signature. The bid bond provided by PAMF Excavating was unsigned and therefore varied from the specifications. Cities have the authority to waive an immaterial variance if the variance does not give the bidder an advantage over other bidders. However, in this instance the failure to furnish a signed bid bond makes the bid bond unenforceable, which would allow the apparent low bidder to elect not to enter into a contract without the risk of forfeiting the bid bond.

City staff consulted with the City Attorney and came to the conclusion that the failure to sign the bid bond was a material variance. This leaves the city with the choice of rejecting all bids, or to reject PAMF Excavating's bid as nonresponsive and award the bid to the second bidder, Active Construction Inc., who is both responsive and responsible.

Active Construction, Inc. is qualified and capable of performing the work. Project start date is anticipated in May 2021 with 260 working days allotted to complete the work. The project is expected to be completed by the end of summer 2022.

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## **ADVANTAGES:**



1. This project addresses fire flow deficiencies at the neighborhood of Capitol City Golf Club Estates and surrounding areas.
2. Provides a sustainable solution for wastewater management in a densely developed area.
3. Will drastically reduce the impact of contaminants on the groundwater/aquifers in the area.

**DISADVANTAGES:**

1. None noted.

**Attachment #1**  
**BID SUMMARY:**

**CITY OF LACEY  
CAPITOL CITY GOLF COURSE WEST WATER WASTEWATER  
IMPROVEMENTS  
PW 2020-30**

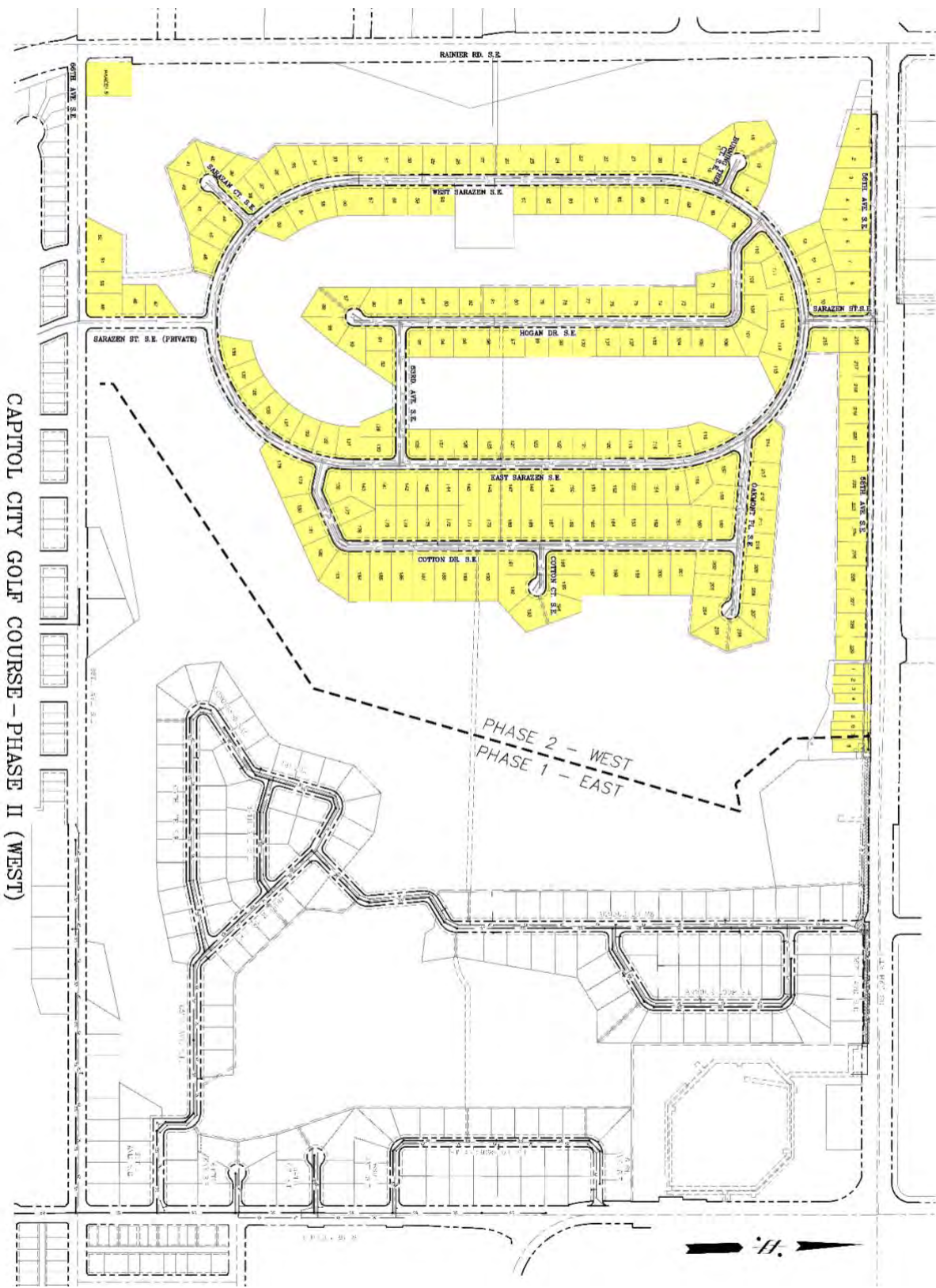
[illegible]

\*Rejected Bid

3/5/2021

### Apparent Lows

**Attachment #2**  
**PROJECT SITE MAP:**



FINANCE & ECONOMIC DEVELOPMENT COMMITTEE MINUTES

FEBRUARY 23, 2021

8:30 A.M. – 9:22 A.M.

REMOTE ONLY

COUNCIL PRESENT: MAYOR RYDER (CHAIR), DEPUTY MAYOR PRATT, COUNCILMEMBER GREENSTEIN

STAFF PRESENT: SCOTT SPENCE, RICK WALK, TROY WOO, WESLEY NGUYEN, ELISSA FONTAINE

ACTION: APPROVE FINANCE & ECONOMIC DEVELOPMENT COMMITTEE AGENDA

MOTION: MOTION MADE, SECONDED, AND CARRIED BY COUNCILMEMBER GREENSTEIN AND DEPUTY MAYOR PRATT

**2021 BUDGET AMENDMENT UPDATE**

STAFF: TROY WOO, FINANCE DIRECTOR

ACTION: INFORMATION ONLY

Throughout the year, adjustments to the budget become necessary due to City Council actions, activity levels that were not anticipated during budget development, and grant awards (or other receipts of outside funding). Historically, the budget has been amended once per year immediately prior to the development of the next year's proposed budget document. It is staff's practice to communicate significant budget amendments leading up to the annual budget amendment process. The annual budget amendment ordinance adoption is scheduled for September. The following are significant budget amendments that have been identified since the adoption of the 2021 Budget.

**Current Expense Fund (General Fund)**

- \$491,852 is requested for the Veterans Services Hub First Floor Tenant Improvements project. The project is funded by \$421,852 from the City's Community Development Block Grant and \$70,000 from assigned reserves.
- The Veteran Affairs Outstation Center lease tenant improvements requires an additional \$35,000 to complete.

- A late 2020 audit and reconciliation of the City's liability, property, machinery, and auto insurance coverage resulted in an overall \$68,430 increase. compared to the 2021 Budget projection. This affects multiple budget funds.
- The Strategic Communications Plan project requires an additional \$40,000 for completion.

#### Arterial Street Fund

- College Street and 7th Avenue (Mid-Town) Pedestrian Crossing preliminary analysis requires \$40,000. City Council committed reserves for the project will be transferred into the Arterial Street Fund.

#### Building Improvement Fund

- The adopted 2021 Budget includes \$500,000 for Police Station enhancements and the funding for the project is the City Council designated committed reserve for the Police Station project. It is requested that the original budget appropriation be changed to equipment from building improvements and the funding source be changed to a more appropriate reserve, because equipment and technology does not meet the intent of the Police Station committed reserve.
- Front counter glass structures will be installed in City Hall to provide additional security and social distancing improvements. The estimated cost of the project is \$102,575.
- Well decommissioning, soil cleanup, and the Department of Archaeology and Historic Preservation (DAHP) assessment is recommended for the Lacey Museum and Civic Center site \$208,227. The Washington State Department of Ecology directed the removal of monitor wells and soil replacement. The DAHP assessment is recommended to occur concurrently to limit the disruption of the property.

#### Water Capital Fund

- Budget amendments are needed for the completion of the following water capital projects:
  - Hawks Prairie Sister Standpipe - \$115,000

- TCOMM911 Radio System Facilities (Hawks Prairie Sister Standpipe) - \$50,324

The final approval of the proposed amendments will be considered by the full City Council in September.

#### **2020 BUDGET CARRYOVERS**

STAFF: TROY WOO, FINANCE DIRECTOR  
ACTION: RECOMMEND THE PROPOSED CARRYOVER AMENDMENT ORDINANCE AND FORWARD TO FULL CITY COUNCIL FOR ADOPTION  
MOTION: MOVED AND SECONDED BY DEPUTY MAYOR PRATT AND COUNCILMEMBER GREENSTEIN. MOTION CARRIED.

Troy Woo, Finance Director, reviewed the proposed carryover amendment ordinance. The projects and purchases discussed are expected to be completed during 2021, so it becomes necessary to carryover previously approved budget appropriations into the next year. The proposed amendments are limited to carryover encumbrances and capital projects.

This carryover process relieves concerns that authorized budgets will be exceeded when large carryover projects do not have the authorized appropriations until late into the year. It is the City's practice to amend the budget once per year during September. If the City Council approves these appropriations earlier in the year, the risk of exceeding authorized expenditure levels is minimized.

The encumbrance and capital carryover requests are limited to purchase orders that were initiated in the previous year and capital projects that were authorized in the previous year's budget. The outstanding purchase order carryover requests are limited to significant (over \$2,500) unfilled material, equipment, and supply orders. Capital project carryover requests do not have a dollar threshold. The funds requesting the carryovers must have adequate fund balance before the requests can be granted.

#### **4<sup>TH</sup> QUARTER 2020 INVESTMENT REPORT**

STAFF: TROY WOO, FINANCE DIRECTOR  
ACTION: INFORMATION ONLY

The City's adopted investment policy requires quarterly reporting to the City Manager and annual reporting to the City Council. The Finance and Economic Development

Committee issued a standing request to extend extra review of the reports to semi-annually.

The 2020 fourth quarter report has been prepared by the City's investment advisor Government Portfolio Advisors (GPA). The three main components of the quarterly report include the following:

1. The report opens with a market commentary, market outlook, and recommendations for the City's investment strategy.
2. An analysis to ensure the portfolio complies with the City's investment policy in terms of maturity constraints and allocation diversification.
3. A summary of the City's total invested funds including information relating to types, maturities, and investment activity, investment earnings and accruals that occurred during the report period.

In summary, Lacey's core fund portfolio outperformed the investment strategy benchmarks. The core fund net total return for the quarter was 0.10 percent. The benchmark total return for the period was 0.04 percent.

- The Federal Reserve updated its outlook in December. The projection includes an expectation of a policy rate of zero through at least 2023. This is consistent with the Federal Reserve's previous expectations the economy will take several years to recover.
- 2020 GDP is projected to have declined 3.5 percent. If confirmed, this would be the lowest economic growth level since 1946 when the economy was winding down from wartime spending.
- Book yields are expected to continue to decline as reinvestments take place because of the current rate environment.
- The core fund portfolio yield decreased from 1.04 percent to 0.93 percent.
- At the end of 2020, the portfolio duration was 1.29 years, which is lower than the benchmark duration of 1.40 years. Future reinvestments will look to provide extended durations to add diversity to the portfolio's maturity profile and meet the benchmark duration.



## **FOOD TRUCK COURT PROPOSAL – LACEY DEPOT DISTRICT**

STAFF: RICK WALK, COMMUNITY & ECONOMIC DEVELOPMENT DIRECTOR  
WESLEY NGUYEN, ECONOMIC DEVELOPMENT COORDINATOR  
ACTION: INFORMATION ONLY

Rick Walk, Community & Economic Development Director introduced Lacey's new Economic Development Coordinator, Wesley Nguyen and provided the following background and proposal regarding a Food Truck Court for the Lacey Depot District.

At the 2012 City Council Retreat, the Council discussed the need to develop a vision for the area along and adjacent to the Lacey Boulevard and Pacific Avenue "one-way couplet." The conversation focused on the opportunity to create a sub-area that recognizes the history of Lacey and create stronger identity for the neighborhoods that border the one-way couplet, the Lacey Downs commercial center, and Saint Martin's University. Ideas that built off the proposed museum project to create a stronger civic focal point included potential concepts such as food trucks, pop-up markets and entertainment type activities.

Building off the 2012 City Council Retreat, the Community & Economic Development Department started preliminary work on the Depot District Sub-Area concept in 2013 and provided briefings and updates to the Planning Commission. In 2017, the Depot District Sub-Area project was placed on the work program and the Department received budget approval to contract with Studio Cascade to conduct a community-based visioning process for the Depot District Sub-Area. Studio Cascade facilitated interviews with City officials, community leaders, stakeholders, neighborhood groups and business owners, and held a week-long design charrette in a city-owned building adjacent to Lacey Boulevard, known as the 5700 Building.

On August 2018, the City of Lacey completed a Depot District Subarea Plan. The Plan was created to articulate a realistic, yet compelling vision for Lacey's "Depot District." It outlines strategies to achieve this vision, fostering transformation appropriate to the area including scale, rate of change, and location of new investment. Transformation envisioned for the Depot District is fully consistent with the comprehensive plan.

Key concepts envisioned for the district include:

1. An enriched pedestrian experience - focusing first on the segment between the Carpenter/Pacific intersection and the future museum and the connections between the island and Saint Martin's University.

2. Development of the future museum, including multi-use options for the site and adjacent City-owned sites, activating the eastern end of the couplet island, capturing significant energies from the future Reserve development and adjacent neighborhoods, and boosting infill/redevelopment prospects for nearby commercial properties.

#### City-Owned Properties:

The City is taking the lead on introducing civic and cultural uses into the Depot District with the proposed museum and depot projects. The City-owned site will house the new Lacey Historic Museum and will likely become a multi-purpose “anchor” feature for the entire district.

The Depot District Plan also reinforced the ideas to develop community gathering activities such as an indoor/outdoor farmers market, rentals for trail users, event space, catering facilities, a food truck park and more. Staff is moving forward with the food truck park as one of the first steps in implementing the Depot District Subarea Plan. At the July 27, 2020, Finance and Economic Development Committee meeting, the Community & Economic Development Department introduced the Depot Plaza Concept. This concept showed a hardscape plaza on City-owned property between Holman Drive and the round-about that could potentially accommodate food trucks and “pop-up” market. This concept would take time to develop, work through site development conflicts/challenges and require a substantial budget.

In the interim, staff is proposing to launch a “temporary” food truck court on the graveled parcel adjacent to Lebanon Street between Lacey Boulevard and the Lacey Depot. This will allow less time to get the food truck court concept established at minimal cost and more importantly test the market for a food truck court in this location.

Staff highlighted the anticipated steps to prepare the site. Staff have also reached out to multiple food truck vendors and the Washington State Food Truck Association to partner on this project. Operationally, the temporary food truck area will be open and available to 4-6 trucks, one day a week to serve lunch at the start of the launch. Depending on future demand, the lot might be available for more hours and more days. The project target it is to establish the temporary food truck court in April 2021.

GENERAL GOVERNMENT & PUBLIC SAFETY COMMITTEE  
FEBRUARY 23, 2021  
9:30 A.M. –10:30 A.M.  
REMOTE ONLY

COUNCIL PRESENT: DEPUTY MAYOR PRATT (CHAIR), MAYOR RYDER, COUNCILMEMBER GREENSTEIN

STAFF PRESENT: SCOTT SPENCE, ROBERT ALMADA, TOM PALMATEER, PERI EDMONDS

ACTION: APPROVE THE GENERAL GOVERNMENT & PUBLIC SAFETY COMMITTEE AGENDA

MOTION: MOTION MADE, SECONDED, AND CARRIED BY COUNCILMEMBER GREENSTEIN AND DEPUTY MAYOR PRATT

**LACEY POLICE DEPARTMENT 2020 IN REVIEW - PRELIMINARY DATA**

STAFF: ROBERT ALMADA, INTERIM POLICE CHIEF

ACTION: INFORMATION ONLY

Staff presented the 2020 Lacey Police Department statistics, preliminary crime data, use of force incidents and analysis, and racial data comparisons.

In 2020, the Police Department responded to 38,786 incidents, which is a decrease of 16.7%. The number of DUI arrests, tickets written, fields interviews, and arrests also decreased from the previous year.

The 2020 preliminary crime data shows a decrease of 17.5% compared to 2019, and violent crimes were down 26.7%.

The Police Department is committed to de-escalation using the least amount of force necessary, and thoroughly documenting and reviewing all uses of force. In 2020, the use of force was used in less than 3% of all arrests.

The racial composition of the City's population and Police Department staff members were presented, as well as traffic tickets, arrests, and field interviews.

## **HICKS LAKE 2020 ANNUAL REPORT**

STAFF: TOM PALMATEER, MANAGEMENT ANALYST

ACTION: INFORMATION ONLY

The Hicks Lake Management District was formed by the City Council in October 2015 after a supermajority of supportive votes from the property owners in the district. In 2016, a Lake Management Plan was developed and aquatic vegetation treatments began in 2017 by Northwest Aquatics Eco-Systems. Treatments have been completed annually during the spring through fall months.

The Hicks Lake Annual Report outlines the actions taken in 2020 and the progress made in the last four years.

Staff introduced Ken Callaghan, the newly-elected president of Hicks Lake Management District.

LAND USE COMMITTEE  
FEBRUARY 23, 2021  
10:30 A.M. – 10:56 A.M.

COUNCIL PRESENT: COUNCILMEMBER COX (CHAIR), DEPUTY MAYOR PRATT,  
COUNCILMEMBER GREENSTEIN

STAFF PRESENT: SHANNON KELLEY-FONG, RYAN ANDREWS, JESSICA BRANDT,  
PERI EDMONDS

**SHORELINE MASTER PROGRAM – PERIODIC UPDATE**

STAFF: JESSICA BRANDT, ASSOCIATE PLANNER  
ACTION: INFORMATION ONLY

The City's Shoreline Master Program (SMP) has been on the Community and Economic Development work plan since last year per a state-mandated periodic review. Washington State law requires cities with areas designated as "Shorelines of the State" periodically update their SMP in accordance with the Washington State Shoreline Management Act (SMA) and the State Shoreline Master Programs Guidelines.

The City adopted its first SMP in 1972 with a first major update in 2011 with other background documents including a Shoreline Restoration Plan and the Cumulative Impacts Analysis for Lacey's Shorelines. The City completed a minor update in 2015 to comply with state changes to wetlands regulations.

The SMA requires that cities and counties review and revise their SMP, if needed, on an eight-year schedule established by the State Legislature. This review ensures that the City's SMP stays current with changes in state laws and rules, remains consistent with Lacey's Plan and regulations, and is responsive to changed circumstances, new information, and improved data. The City has started a periodic review of its SMP.

Washington State Department of Ecology provided grant funding to complete this update. The full amount of the grant is being used to pay for contracted support from The Watershed Company, awarded through the City's competitive process. The City is leading the public participation process.

Due to the unavailability of in-person meetings and events as planned, a virtual open house was held April 22, 2020, to kick-off community outreach on the SMP update. A joint public hearing and formal comment period with the Washington State Department of Ecology was held in October 2020. Public comments were minimal and did not result in the need to make substantive changes to the proposed amendments.

The City Council will consider the Planning Commission's recommendation to adopt the SMP and associated regulations at the March 18, 2021, Council meeting. If adopted, the SMP will be submitted to the Department of Ecology for approval.

**COMMUNITY RELATIONS & PUBLIC AFFAIRS COMMITTEE MINUTES**

MARCH 1, 2021

11:00 A.M. – 11:23 A.M.

REMOTE ONLY

COUNCIL PRESENT: COUNCILMEMBERS STEADMAN (CHAIR) AND KUNKEL

COUNCIL ABSENT: COUNCILMEMBER COX

STAFF PRESENT: SCOTT SPENCE, JEN BURBIDGE, SUE FALASH, JEANNETTE SIELER,  
JENNY WILSON, PERI EDMONDS

ACTION: APPROVE COMMUNITY RELATIONS & PUBLIC AFFAIRS COMMITTEE  
AGENDA

MOTION: MOTION MADE, SECONDED AND CARRIED BY COUNCILMEMBERS KUNKEL  
AND STEADMAN

**UPDATE FROM LACEY PARKS, CULTURE & RECREATION DEPARTMENT**

STAFF: JEN BURBIDGE, LACEY PARKS, CULTURE & RECREATION DIRECTOR  
JEANNETTE SIELER, RECREATION SUPERVISOR  
SUE FALASH, RECREATION MANAGER

ACTION: INFORMATION ONLY

Staff provided an update on upcoming programs, events, and activities available. Programs continue to be modified to meet safety requirements as the City receives direction and guidance from the Governor's Office and Thurston County Public Health.

The Spring 2021 Newsletter will be available March 16, with registration open March 31 for online and over the phone only. The Summer 2021 Newsletter will be available May 19 and registration will open May 26. The typical registration schedule is running three to four weeks behind due to COVID.

The 2021 Cultural Celebration will be held virtually this year on March 27. Virtual booths will be live for 30 days after the event. Visitors can create virtual booths, submit performance records, or share a demonstration about their heritage.

Staff continue to work on multiple scenarios for summer events, such as Lacey Intune and 3<sup>rd</sup> of July Fireworks.



### **LONG LAKE BEACH LIFEGUARDS UPDATE**

PRESENTER: JEN BURBIDGE, LACEY PARKS, CULTURE & RECREATION DIRECTOR  
JENNY WILSON, AQUATICS SUPERVISOR

ACTION: INFORMATION ONLY

The staff shortage of lifeguards continues to be a challenge for 2021. Parks currently has six certified lifeguards on staff, but only a few have enough experience to work at Long Lake. They would need the equivalent of 10.5 FTEs to cover Long Lake seven days per week.

In 2020, the lake was not staffed with lifeguards due to lack of certified staff and inability to certify new staff due to COVID. There were no reported injuries in 2020. The Police Department staffed officers at the Park during high-peak hours from late June to early September. A review of police contact made at the Park included smoking/vaping, alcohol use, dogs in the water and on the beach, and unsupervised children.

The Parks Department will not be able to hire enough qualified lifeguards to staff Long Lake Park this summer.

## **TRANSPORTATION COMMITTEE MINUTES**

MARCH 2, 2021

12:03 P.M. – 12: 41 P.M.

REMOTE ONLY

COUNCIL PRESENT: COUNCILMEMBERS COX (CHAIR), STEADMAN, AND MILLER

STAFF PRESENT: SCOTT SPENCE, SCOTT EGGER, ROGER SCHOESSEL, MARTIN HOPPE, AUBREY COLLIER, ELISSA FONTAINE

ACTION: APPROVE TRANSPORTATION COMMITTEE AGENDA

MOTION: MOTION MADE, SECONDED AND CARRIED BY COUNCILMEMBERS STEADMAN AND MILLER

### **ELECTION OF COMMITTEE CHAIR**

PRESENTER: COUNCILMEMBER STEADMAN

ACTION: APPOINT COUNCILMEMBER MILLER AS CHAIR OF THE TRANSPORTATION COMMITTEE

MOTION: MOVED AND SECONDED BY COUNCILMEMBERS STEADMAN AND COX. MOTION CARRIED.

Councilmember Steadman nominated Councilmember Miller as Chair for the Transportation Committee. Councilmember Miller will begin as chair at the next committee meeting.

### **TRANSPORTATION COMMITTEE MEETING SCHEDULE**

PRESENTER: COUNCILMEMBER COX

ACTION: ADJUST THE TRANSPORTATION COMMITTEE MEETING SCHEDULE TO REFLECT 11:00 A.M.-12:00 P.M. ON THE FIRST TUESDAY OF THE MONTH.

MOTION: MOVED AND SECONDED BY COUNCILMEMBERS STEADMAN AND MILLER. MOTION CARRIED.

Councilmember Cox outlined the current meeting schedule and opened the discussion for a new meeting time that is accommodating for both staff and committee members.

### **MARTIN WAY TRAFFIC SIGNAL MODIFICATIONS**

STAFF: SCOTT EGGER, PUBLIC WORKS DIRECTOR  
ROGER SCHOESSEL, CITY ENGINEER  
MARTIN HOPPE, TRANSPORTATION MANAGER

ACTION: INFORMATION ONLY

Staff briefed the committee on upcoming traffic signal modifications on Martin Way, detailing a protected/permissive left-turn.

Parts for the traffic signal have been ordered and are expected to be installed within the next two months.

### **INTERCITY TRANSIT INTERLOCAL AGREEMENT – TRANSIT SIGNAL PRIORITY**

STAFF: MARTIN HOPPE, TRANSPORTATION MANAGER  
ACTION: RECOMMEND APPROVAL OF THE INTERLOCAL AGREEMENT WITH INTERCITY TRANSIT FOR TRANSIT SIGNAL PRIORITY TO THE FULL CITY COUNCIL  
MOTION: MOVED AND SECONDED BY COUNCILMEMBERS STEADMAN AND MILLER.  
MOTION CARRIED.

Martin Hoppe, Transportation Manager, reviewed the Interlocal Agreement with Intercity Transit relating to Transit Signal Priority (TSP).

The Thurston Regional Planning Council Smart Corridor grant, which replaced many of the signal cabinets and controllers in the City, included a transit signal priority component. All of the traffic signals in the City were purchased with the hardware and software to accommodate TSP implementation. The Interlocal Agreement between the City and Intercity Transit provides clarification on responsibilities of each jurisdiction regarding the management of the equipment, changes, and monitoring of system performance, and coordination of the field implementation of equipment including operations to support TSP implementation.

### **ADOPT-A-HIGHWAY CLEANUP PROGRAM**

STAFF: SCOTT EGGER, PUBLIC WORKS DIRECTOR  
ACTION: INFORMATION ONLY

Scott Egger, Public Works Director, provided an overview of the Adopt-a-Highway litter pick up programs groups.

Currently, volunteer programs are suspended due to COVID-19 pandemic. However, businesses or groups can hire state approved contractors to pick up litter on their Adopt-a-Highway section under the sponsorship process.

A contract for litter pick up includes:

- \$525 Initiation Fee + \$304 per month
- Litter Pickup twice a month
- Total cost of \$7,821 for a 2-year term

The City has reviewed the section between mileposts 108-109 to sponsor for the Adopt-a-Highway program. The program consists of litter pickup northbound only, and includes off ramps.

The City currently has its own adopt-a-street program that Transportation Maintenance oversees. The program is for litter pick up and not homeless clean up.

### **2021 CITY PAVING PLAN**

STAFF: AUBREY COLLIER, DESIGN & CONSTRUCTION MANAGER

ACTION: INFORMATION ONLY

Aubrey Collier, Design & Construction Manager, provided an update on the 2021 paving programs:

#### **Carpenter Road overlay project:**

- Total project cost of \$2.0M

#### **2021 Overlay**

- Orion Drive total project cost of \$700K
- Marvin Road & Willamette Drive total project cost of \$950K
- Franz Street total project cost of \$200K\* contingent on proposed water project

#### **2021 Slurry Seal Project**

- Total project cost of \$550K
- Neighborhood list includes:
  - Emerald Heights
  - Lake Hills
  - Strawberry Fields
  - Pattison Park
  - Echo Glen
  - Sterling Pointe
  - Lakepointe
  - Thornbury Meadows
  - Sunset View Estates

Total cost for all projects is \$4.4M