NAPAVINE
P.O. Box 810
Napavine, WA 98565
(360) 262-9344 FAX (360) 262-9199

PERMIT APPLICATION
CLEARING, FILLING OR GRADING

Date Received _____ Reviewed By _____

☐ Permit Approved
☐ Permit Denied Comments _____

Name of Applicant/Owner: Randy Rognlin - Rognlin Properties LLC
Fill Permit #:

Mailing Address: PO Box 307, Aberdeen WA 98520
Phone: (360) 532-5220

Engineer Name / Mailing Address: Chris Aldrich, RLA - PO Box 923 Chehalis WA 98532
(360) 740-8919

Location of Worksite: 0 & 1054 Rush Rd
Parcel #: 018152003000 & 018152004000

Description / Type of Work
Construction of streets & stormwater ponds will include approximately 40,000 CY cut and 45,000 CY 45,000 CY of fill. Most material will be graded onsite and structural base will be from a local DNR approved mining operation.

Estimated Fill Amount:
☐ Less than 50 cubic yards ☐ 50 to 4000 cubic yards ☐ 50 to 500 cubic yards

☒ Over 4000 cubic yards – amount proposed 45,000 CY

PUD # _____

	ATTACHED (Check Box)		
• Site Map	☒ Yes	☐ No	☐ N/A
• Grading Plan or Clearing Plan	☒ Yes	☐ No	☐ N/A
• DNR Forest Practices Application	☐ Yes	☐ No	☒ N/A
• Interim Erosion & Sediment Control Plan	☒ Yes	☐ No	☐ N/A
• Final Erosion & Sediment Control Plan	☒ Yes	☐ No	☐ N/A
• Soil Engineering Report	☒ Yes	☐ No	☐ N/A
• Engineering Geology Report	☒ Yes	☐ No	☐ N/A
• Environmental Checklist	☒ Yes	☐ No	☐ N/A
• SEPA Review (DNS)	☐ Yes	☐ No	☐ N/A
• Work Schedule	☐ Yes	☐ No	☐ N/A
• Other (Specify) _____	☐ Yes	☐ No	☐ N/A

Explain Boxes Checked "No" or "N/A" No DNR permit required.

Applicant Signature | Planning Manager (Title) | 5/24/22 (Date)

This permit is subject to all permit conditions, terms and/or provisions written or printed or attached to this form. The City reserves the right to rescind, alter or amend this permit, or to modify any conditions or requirements.

ROGNLIN'S RUSH RD PLAT

TECHNICAL INFORMATION REPORT (TIR)

APRIL 2022

RB Engineering

DESIGN → PERMIT → MANAGE

Table of Contents

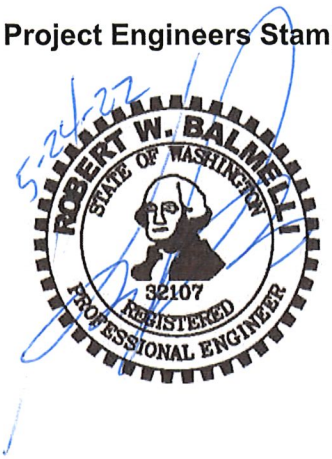
Project Engineer

Prepared by:	RB Engineering, Inc. (RBE) PO Box 923 Chehalis, WA 98532 (360) 740-8919 Robertb@RBEngineers.com
Contact:	Robert W. Balmelli PE
RBE Project:	21118
Prepared for:	Rognlin Properties LLC Randy Rognlin PO Box 307 Aberdeen, WA 98520 (360) 532-5220
Reference:	2019 WSDOE Stormwater Manual

Project Engineers Certification

"I hereby certify that this Drainage and Erosion Control Plan for **Rognlin's Rush Rd Plat** has been prepared by me or under my supervision and meets minimum standards the **Stormwater Management Manual for Western Washington** and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

Project Engineers Stamp



SECTION 1 – PROJECT OVERVIEW

Permit Requested:	Drainage and Grading
Other Permits Required:	Building Permit, NPDES Construction Permit SEPA Checklist Grading/Earthwork Permit Utility Extension Permit
Agency Permit No.:	Pending
Site Address:	1054 Rush Rd Napavine, WA 98565
Total Site Area:	25.21 Acres
Zoning:	R3 Multi-Family
WaterShed:	WRIA 23 – Lewis https://waecy.maps.arcgis.com/apps/webappviewer/index.html?id=996e6b21ae394cc3a3b63c6da0c3aa0a

Project Overall Description

The proposal is to convert the large farm parcel into an 70-lot residential plat with all utilities provided by City of Napavine. Improvements include frontage improvements along Rush Road and interior road, curb, gutter, and street light improvements per City of Napavine Development Standards.

Proposed Flow Control Improvements

The flow control facilities proposed for this project were designed and modeled using the latest edition of the Western Washington Hydrology Manual Continuous Simulation Program. The site will utilize a detention pond for the developments Threshold Discharge Areas (TDA).

Proposed Water Quality Improvements

The water quality improvements for the project site runoff consist of Wetponds for the developments Threshold Discharge Areas (TDA).

Proposed Conveyance System

The proposed conveyance systems will consist of concrete catch basins and PVC pipe in various sizes to collect and convey stormwater to the proposed water quality and flow control ponds. Roof runoff will be tightlined to nearby catch basins for discharge to the stormwater ponds. The proposed conveyance system will be sized to accommodate a minimum of the 25-year storm event.

Proposed Discharge Location

The project site will discharge runoff from the developed areas to the North to an existing deep drainage ditch. The existing ditch then drains south to a tributary ditch system of Allan Creek.

Downstream Condition

The natural drainage leaving the site enters the existing drainage ditch described above and drains to the tributary system of Allan Creek.

Onsite Soils and Geology

An onsite soils report was not completed for this project site.

NRCS Soil Survey

RBE staff reviewed the onsite soils information provided by NRCS. Appendix 3 includes copies of the site map and soil descriptions that make up the property geology. In addition to the NRCS information,

Hydrologic Soil Group:	Lacamas silt loam, 0 to 3% Slope
	Prather silty clay loam, 5 to 15% Slope

Project Topography

Based on the site topography, the grade varies across the site with a south to north grade. Along the south property line is a cut bank and elevation extend up to the Cedar Crest subdivision.

Land Use and Ground Cover

The majority of the site is covered with pastureland and grasses. There is also an existing residential building with associated outbuildings and an old barn.

Natural Drainage Patterns

The site has natural drainage to the existing drainage ditch as described in the sections above.

Tributary and Discharge Points of Flow

The site has drainage into an existing drainage ditch, which drains into a tributary ditch system of Allen Creek. Allen Creek is approximately 1,960 feet downstream of the site.

Historical Drainage Problems

There are no know drainage problems associated with the project site.

Existing Utilities (Storm, Sewer, Water)

The existing utilities available to the site include sanitary sewer, water, and power services.

Erosion Potential

The site has a **medium** erosion potential based on the NRCS Soil Survey. As part of the development plans a detailed Erosion Control Plan and Storm Water Pollution Prevention Plan will be prepared for use during site construction to minimize erosion and migration of sediment within and off the site. A NPDES Stormwater Construction Permit is required by WSDOE for this project.

Critical Areas Onsite

The site includes small wetland areas as shown on the plans. The wetland area will be protected and the site will have no effect on the small existing wetland.

Existing Fuel Storage Tanks

Review of the onsite parcels resulted in no evidence of existing fuel storage tanks above or below ground for this property.

Groundwater Wells

The existing residential home and outbuildings are served by an existing well that will need to be abandoned per WSDOE regulations as part of this project.

Septic Systems

The existing residential home's septic system will be abandoned per Lewis County regulations as part of this project.

Aquifer Recharge Area

The site is not located in an aquifer recharge area.

Wellhead Protection Area

The site is not within any wellhead protection areas.

100-Year Flood Plain

The site is not within any flood plains.

Section 2 – APPLICABLE MINIMUM REQUIREMENTS

Manual Exemptions

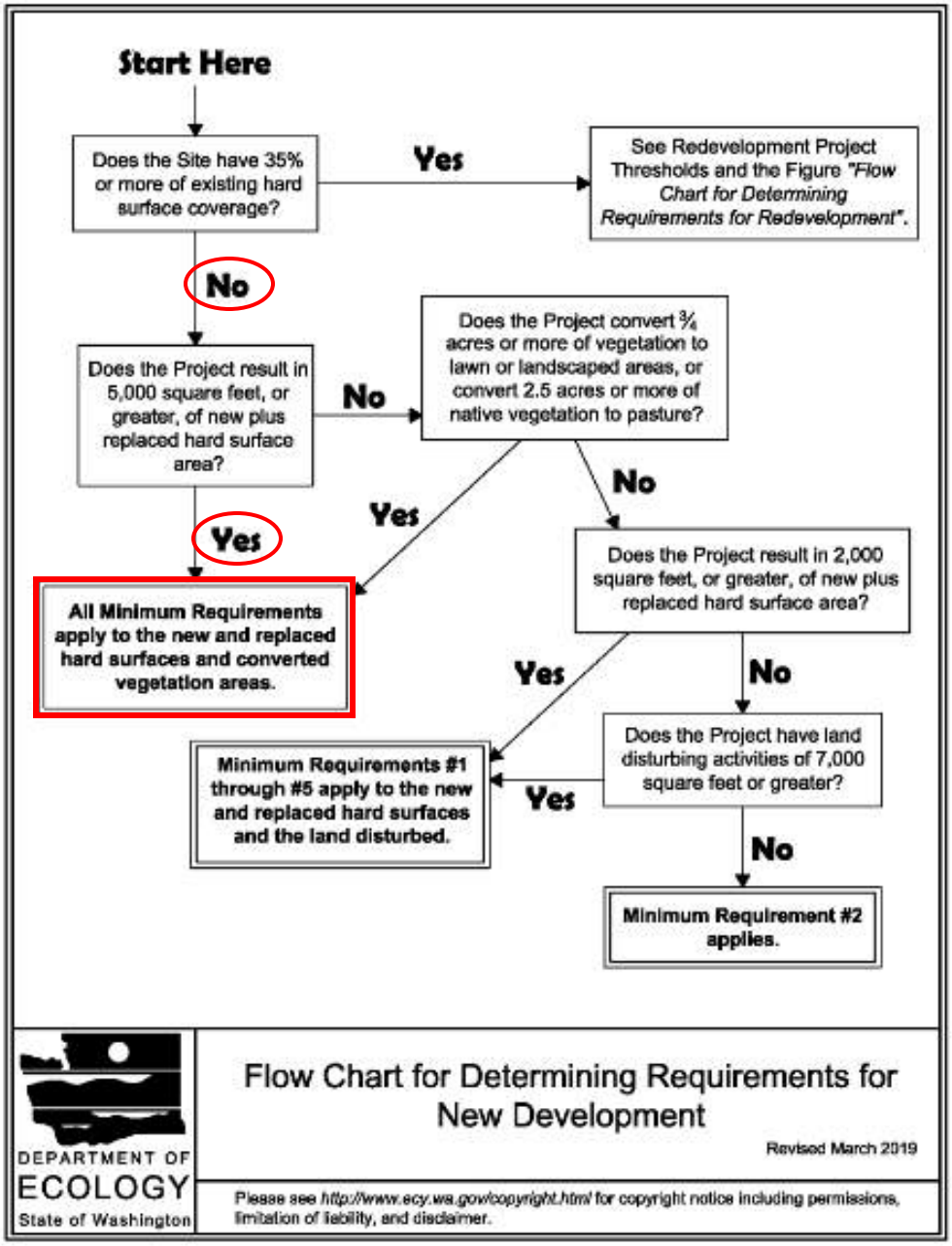
Exemptions	Applicable to Project
Forest Practices (Title 222 WAC)	No
Commercial Agriculture	No
Oil & Gas Field Activities or Operations	No
Pavement Maintenance	No
Underground Utility Projects	No

New Development and Re-Development Review

The minimum requirements for stormwater development and redevelopment sites are listed in Volume I of the 2019 SMMWW. Not all minimum requirements of this section apply to all projects. Determination of applicable minimum requirements is also based in part on Section 1-3 of the Manual. See detailed area calculations in Section 5 of this report.

Applicable Criteria	Areas
Existing Site Impervious Coverage	0.24 AC
New Plus Replaced Impervious Surface	9.75 AC
Vegetation Area Converted to Lawn or Landscaped Area	10.3 AC
Land Disturbing Area	25 AC
Percent of Existing Impervious Surface	1 %

Figure I-3.1: Flow Chart for Determining Requirements for New Development



Section 2.1 – Minimum Requirements

Based on the thresholds given in Figures 1-3.1 of Volume I of the Manual, the proposed project must address or comment on **Minimum Requirements #1 through #9**. These requirements as they apply to the project are discussed in more detail below.

Minimum Requirement (MR) #1 – Stormwater Site Plans:

> All projects meeting the thresholds in I-3.3 Applicability of the Minimum Requirements shall prepare a Stormwater Site Plan for local government review. Stormwater Site Plans shall use site-appropriate development principles, as required and encouraged by local development codes, to retain native vegetation and minimize impervious surfaces to the extent feasible. Stormwater Site Plans shall be prepared in accordance with III-3 Stormwater Site Plans

The proposed project will create over 5,000 square feet of new impervious surfacing, and therefore a Stormwater Site Plan complying with minimum requirements #1 through #9 is required.

MR #2 – Construction Storm Water Pollution Prevention Plan:

> All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters.
>
> Projects which result in 2,000 square feet or more of new plus replaced hard surface area, or which disturb 7,000 square feet or more of land must prepare a Construction Stormwater Pollution Prevention Plan (SWPPP) as part of the Stormwater Site Plan (see I-3.4.1 MR1: Preparation of Stormwater Site Plans).
>
> Projects below those thresholds (listed above) are not required to prepare a Construction SWPPP, but must consider all of the Construction SWPPP Elements (listed below) and develop controls for all Construction SWPPP Elements that pertain to the project site.

The proposed project exceeds the thresholds of Section 2.5 and therefore a Construction Storm Water Pollution Prevention Plan is required for this project. The site **does** disturb more than 1 acre of land and discharges to waters of the state. Therefore, a NPDES stormwater construction permit **is** required. A SWPPP has been created as a standalone document for this project and included in Appendix 6 of this TIR.

MR #3 – Source Control of Pollution:

> All known, available and reasonable Source Control BMPs must be applied to all projects. Source Control BMPs must be selected, designed, and maintained in accordance with this Manual.

All known, available and reasonable source control BMPs shall be applied to the project to limit pollutants coming in contact with stormwater. The Source Control BMPs for this project will be incorporated into the project's Final Operation and Maintenance Plan.

MR #4 – Preservation of Natural Drainage Systems/Outfalls:

Natural drainage patterns shall be maintained, and discharges from the Project Site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the Project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls require energy dissipation.

Proposed stormwater discharges from the project site shall be treated and detained and then released to the original natural drainage location. The natural site drainage outfall will be maintained but will have a reduced flow due to the onsite drainage design facility.

MR #5 – On-Site Stormwater Management:

Projects shall employ Stormwater Management BMPs in accordance with the following thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on site to the extent feasible without causing flooding or erosion impacts.

All projects that require Minimum Requirement #5 (as detailed in I-3.3 Applicability of the Minimum Requirements) must employ Stormwater Management BMPs as detailed below. The compliance options for the project depend on the amount of improvements proposed, the locationof the project, the size of the parcel the project is on, and whether or not the project is Flow Control exempt.

Note that the site may contain multiple parcels. The designer may choose different compliance methods for different parcels, depending on the proposed design and the options for each parcel as detailed below.

Projects that Trigger Only Minimum Requirements #1 - #5
Projects that are not Flow Control exempt that trigger only Minimum Requirements #1 through #5 (per I-3.3 Applicability of the Minimum Requirements) shall either:

Use the LID BMPs from List #1 for all surfaces within each type of surface in List #1; or
Use any Flow Control BMP(s) desired to achieve the LID Performance Standard, and apply BM P T5.13: Post-Construction Soil Quality and Depth.

Projects that Trigger Minimum Requirements #1 - #9
Projects that are not Flow Control exempt that trigger Minimum Requirements #1 through #9 (per I-3.3 Applicability of the Minimum Requirements) have the compliance options shown in Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9.

Projects triggering Minimum Requirements #1 through #9, must meet the requirements in Table I-3.1.

Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or • Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Projects outside the UGA, on a parcel smaller than 5 acres	
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

Flow Control Exempt Projects

Projects qualifying as Flow Control exempt in accordance with the TDA Exemption in I-3.4.7 MR7: Flow Control shall either:

- Use the LID BMPs from List #3 for all surfaces within each type of surface in List #3;

  or

- Use any Flow Control BMP(s) desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.

If the project has multiple TDAs, all TDAs must be Flow Control exempt per the TDA Exemption in I-3.4.7 MR7: Flow Control for the project to use the options listed here.

The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

Figure I-3.3: Flow Chart for Determining MR #5 Requirements

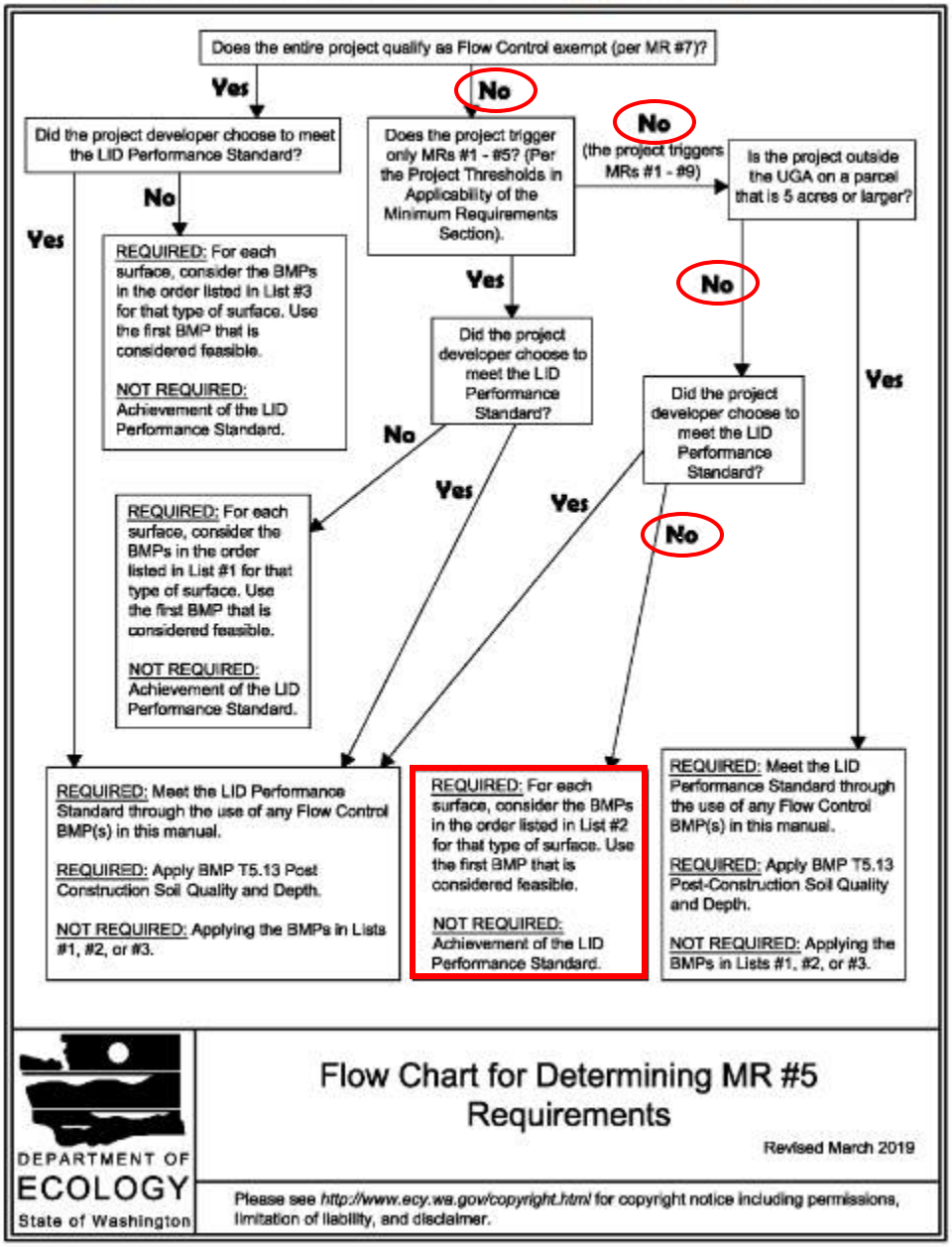


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
	Surface Type: Roofs	
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention	
	4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	

Table I-3.2: The List Approach for MR5 Compliance (continued)

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
ing to it. 2. When the designer encounters BMP T5.15: Permeable Pavements in the List Approach, it is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless BMP T5.30: Full Dispersion is employed.		

Low Impact Development Performance Standard:

The project **has not** chosen to utilize the LID performance standards for this project. The project will match the pre-developed durations for 50% for the 2-year peak flow to full 50-year flow. See MR# 6 and 7 for BMP's utilized for treatment and flow control.

List #2: Onsite Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #9

Lawn and landscape Runoff:

Post construction soil quality BMP T5.13 will be used for disturbed landscape areas.

Roof Runoff:

Where roof downspout controls are planned, the following types must be considered in descending order of preference.

1) **Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V, or Downspout Full Infiltration Systems in accordance with BMP T5.10A in Section 3.1.1 in Chapter 3 of Volume III**

   Full Dispersion/ Infiltration for roof runoff is not possible due to poorly draining, saturated soils.

2) **Bio-retention (See Chapter 7 of Volume V) facilities that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface are drainage to it.**

   A Bio-Retention BMP is not feasible due to poor draining, saturated soils.

3) **Downspout Dispersion Systems in accordance with BMP T5.10B in Section 3.1.2 in Chapter 3 of Volume III**

   BMP T5.10B is not feasible due to poor draining, saturated soils.

4) **Perforated Stub-out Connections in accordance with BMP T5.10C in Section 3.1.3 in Chapter 3 of Volume III**

   BMP T5.10C is not feasible due to poor draining, saturated soils.

Other Hard Surfaces:

1) **Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V.**

   Full Dispersion per BMP T5.30 is not feasible due BMP Area requirements.

2) **Permeable pavement in accordance with BMP T5.15 in chapter 5 of Volume V.**

   Permeable pavement per BMP T5.15 is not feasible due to poor draining, saturated soils.

3) **Bioretention BMP's (See chapter 7, Volume V of the SMMWW) that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.**

A Bio-retention facility is not feasible due to poor draining, saturated soils.

4) **Sheet Flow Dispersion in accordance with BMP T5.12, or Concentrated Flow Dispersion in accordance with BMP T5.11 in Chapter 6 of Volume V.**

Sheet flow and concentrated sheet flow dispersion are not feasible due to inadequate flow lengths of natural grass or vegetation.

The site will utilize a detention pond to control all onsite runoff.

MR #6 – Runoff Treatment:

Projects shall employ Runoff Treatment BMPs in accordance with the following thresholds, standards, and requirements to remove pollutants from stormwater runoff.

The following require construction of stormwater treatment facilities:

1) **Projects in which the total of, pollution-generating hard surface (PGHS) is 5,000 square feet or more in a threshold discharge area of the project, or**

   The proposed project **will** develop more than 5,000 square feet of openly exposed pollution generating impervious surface and therefore meets the threshold requirements of this section. See Chapter 5.2 for selected water quality treatment method.

2) **Projects in which the total of pollution-generating pervious surfaces (PGPS) – not including permeable pavements – is three quarters (3/4) of an acre or more in a threshold discharge area, and from which there will be a surface discharge in a natural or manmade conveyance system form the site.**

   The site does have a surface discharge to a natural or manmade conveyance.

Determine the Receiving Waters/Pollutants of Concern Based on Offsite Analyses

Pollutants of Concern

Step 2: Oil Control Facility

This project will require oil control facility based on the analysis below.

Oil Control Determination Chart	
ADT 100 Vehicles or Greater per 1000 SF Building Area	Yes or **No**
Site Subject to Petroleum Storage or Transfer Greater than 1500 Gallons per year.	Yes or **No**
Site have Parking, Storage or maintenance of 25 or more vehicles over 25 Tons gross weight. (Trucks, Buses, Trains, Heavy Equipment)	Yes or **No**
Road Intersection with measured ADT of 25000 vehicles or more on main roadway and 15000 vehicles or more on intersection roadway.	Yes or **No**

Step 3: Is Infiltration Practicable for pollutant removal?

No

Step 4: Phosphorus Control Required

Oil Control Determination Chart	
Local Government Require Phosphorus control	Yes or **No**

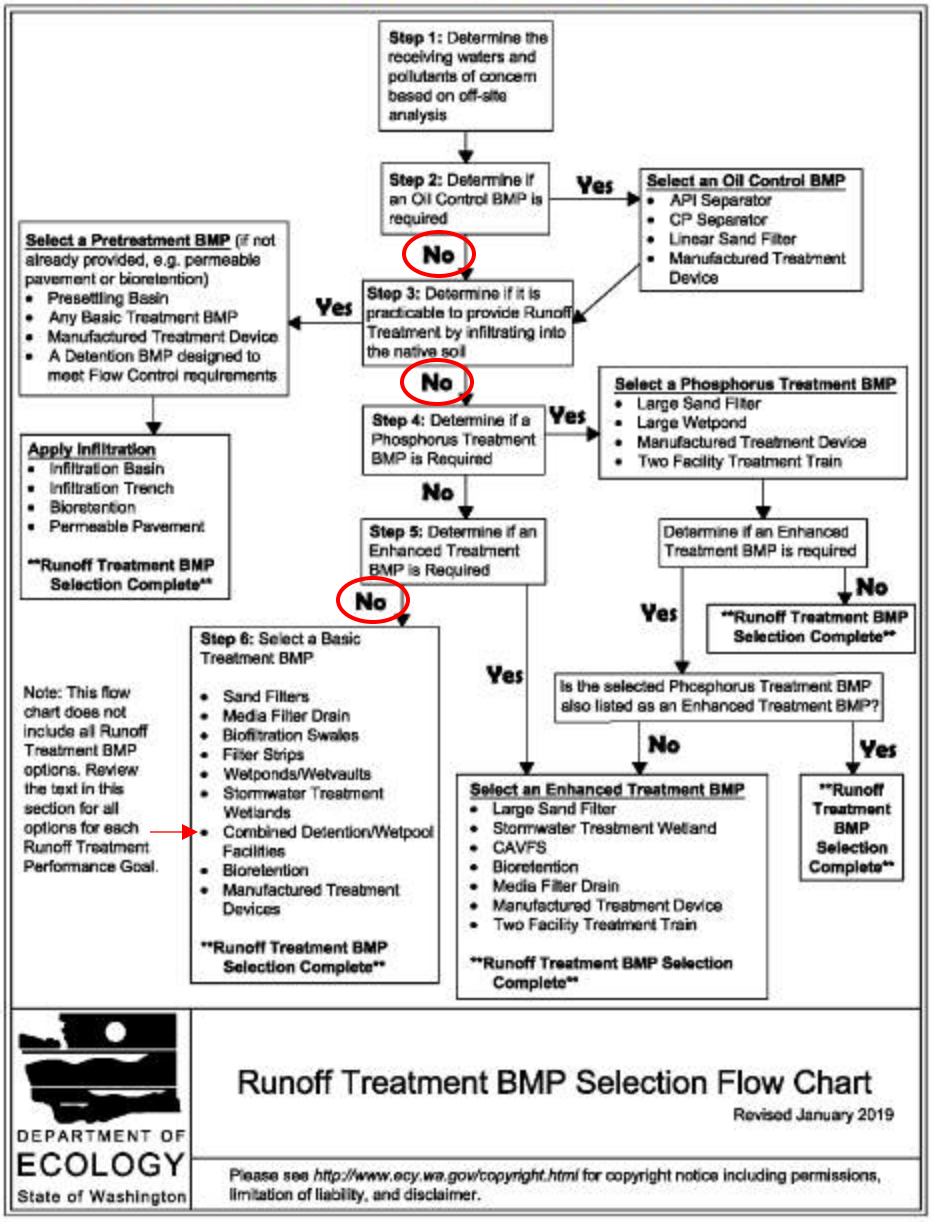
Step 5: Enhanced Treatment Required

Oil Control Determination Chart	
Site discharge directly to fresh waters or conveyance systems tributary to fresh waters?	Yes or **No**
Site uses infiltration strictly for flow control and the discharge is within 1.4 mile of fresh water designate for aquatic life?	Yes or **No**
Site an industrial project site?	Yes or **No**
Site a commercial project site?	Yes or **No**
Site a multi-family residential project site	Yes or **No**
UGA – Fully controlled and partially controlled limited access highways with AADT 15000 or greater	No
UGA - All other roads with and AADT of 7500 or greater.	No
Outside UGA - Roads with and AADT of 15,000 or greater unless discharging to a Strahler order Stream or large	No
Outside UGA - Road with an AADT of 30,000 or greater if discharging to a 4th Strahler order stream or larger.	No

Step 6: Select Basic/Enhanced Treatment Facility

Based on the above determinations, the treatment BMP's selected for this project were determined from figure III-1.1 on the following page.

Figure III-1.1: Runoff Treatment BMP Selection Flow Chart



Water Quality BMP's

The drainage basins delineated for this project will have openly exposed pollution generating hard surfaces. These tributary areas will be treated using the BMP technologies identified on Figure III-1.1: Runoff Treatment BMP Selection Flow Chart located on the previous page. A summary of the selected BMP's per the associated TDA is listed below.

Basin ID / TDA	BMP Used	Treatment Level
D1/TDA1	Combo Detention/Wetpool	Basic
D2/TDA1	Combo Detention/Wetpool	Basic

Underground Injection Control (UIC) Program

Depending on the type and size of the proposed project, different combinations of the Minimum Requirements or UIC Program regulations apply. Information on the UIC program regulations can be found at Section I-4 UIC of the Manual.

Project UIC Compliance:

This project does not use infiltration for stormwater control.

MR #7 – Flow Control:

Projects shall employ Flow Control BMPs in accordance with the following thresholds, stand ards, and requirements to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.

Flow Control is not required for TDAs that discharge directly to, or indirectly through an MS4 to a water listed in Appendix I-A of the WSDOE
Manual: Flow Control Exempt Receiving Waters, subject to all of the fol-lowing restrictions.

TDA Threshold

When assessing a TDA against the following thresholds, only consider the types of surfaces (e.g. new hard surfaces, replaced hard surfaces, converted vegetation areas) that are subject to Minimum Requirement #7, per the Project Thresholds in I-3.3 Applicability of the Minimum Requirements.

The following circumstances require achievement of the standard flow control requirement for western Washington:

Projects in which the total of effective impervious surfaces is10,000 square feet or more in a threshold discharge area, or

This project **does** create more than 10,000 square feet of effective impervious surface in its threshold discharge area.

Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drain-age system. Impervious surfaces are considered ineffective if:

1. The runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30: Full Dispersion;

2. Residential roof runoff is infiltrated in accordance with BMP T5.10A: Downspout Full Infiltration; or

3. Approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated

Basin ID / TDA	BMP Used	Effective Impervious Surface Area
D1/TDA1	Combo Detention/Wetpool	4.69 Acres
D2/TDA1	Combo Detention/Wetpool	5.06 Acres

Standard Flow Control Requirement
The project **will** provide flow control as outlined in Section 5.1 of this report.

MR #8 – Wetlands Protection:

Projects shall employ Stormwater Management BMPs in accordance with the following thresholds, standards, and requirements to reduce the impacts of stormwater runoff to wetlands.

Wetlands have been identified onsite. A copy of the wetland report is included in Appendix 3 of this TIR. Below is a summary of the onsite wetlands and level of protection provided by this project.

TDA Wetland Protection Summary Table

Wetland Identification	Level of Protection
Wetland A Basin D1	General Protection

MR #9 – Operation & Maintenance:

An operation and maintenance manual that is consistent with the provisions in Volume V shall be provided for proposed Runoff Treatment and Flow Control BMPs. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. At private facilities, a copy of the operation and maintenance manual shall be retained.

A Stormwater Maintenance Agreement and Operation and Maintenance Manual will be included at Final TIR preparation.

Section 2.2 - Additional Protective Measures (APM)

Facility agreements and financial guarantees when required will be reviewed by the applicant and executed at the appropriate time determined by the reviewing agency.

APM1 - Financial Liability

Performance Bonding for this project's stormwater facility improvements (**is or is not)** required by the jurisdiction.

APM2 – Offsite Analysis and Mitigation

The initial qualitative analysis shall extend along the flow path from the project site to the receiving water, for a distance up to one mile. If the receiving water is within one-quarter mile from the project site, the analysis shall extend within the receiving water to one-quarter mile from the project site. The analysis shall extend one-quarter mile beyond any improvements proposed as mitigation. The analysis must extend upstream form the project site to a point where there are no backwater effects created by the project, and the designer can determine all areas contributing run-on to the project. Impacts to be evaluated should include:

1. Conveyance System Capacity Problems

2. Localized Flooding

3. Erosion, including landslide hazards and erosion along streambanks and at the outfall location

4. Violations of surface water quality standards as identified in the Basin Plan or a TMDL, or violations of ground water quality standards in a wellhead protection area.

The objective of the off-site analysis report is to identify, evaluate, and determine measures to prevent off-site water quality, erosion, slope stability, and drainage impacts that may be caused or aggravated by the proposed project. "Aggravated" shall mean increasing the frequency of occurrence and /or severity of a problem.

Qualitative Analysis

The site currently drains to an existing drainage ditch in Rush Road and offsite in a natural swale in the NE corner of the site, runoff will eventually reach part of the Allan Creek tributary system. Onsite stormwater runoff will be detained and released at a rate matching the pre-developed conditions, and will be released in the existing drainage location.

Mitigation Measures

The offsite analysis for this project **did not** yield any mitigation for this project.

Section 2.3 – Adjustments and Exceptions/Variances to the MRs

Adjustments to the Minimum Requirements may be granted prior to permit approval and construction. The jurisdiction may grant an adjustment provided that written findings of fact are prepared that address the following:

1. The adjustment provides substantially equivalent environmental protection and

2. Based on sound Engineering practices, the objectives of safety, function, environmental protection, and facility maintenance are met.

Adjustments:

No adjustments have been requested for this project.

Exceptions and Variances:

No exceptions or variances have been requested for this project.

SECTION 3 – SOURCE CONTROL BMPS

The following permanent source control BMPs that apply to all sites:

IV – 1 Source Control BMPs Applicable to All Sites:

S410 BMPs for Correcting Illicit Discharges to Storm Drains.
S453 BMPs for Formation of a Pollution Prevention Team.
S545 BMPs for Preventive Maintenance / Good Housekeeping.
S455 BMPs for Spill Prevention and Cleanup.
S457 BMPs for Inspections.
S458 BMPs for Record Keeping – Vol. IV – Page 503.

The following permanent source control BMPs will be utilized for this project and will be included in the final Operation and Maintenance Manual submitted prior to final project acceptance by the Review Agency.

IV-2 – Cleaning or Washing Source Control BMPs

S410 BMPs for Correcting Illicit Discharges to Storm Drains.

IV-3 – Roads, Ditches, and Parking Lot Source Control BMP's

S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems.

IV-4 – Soil Erosion, Sediment Control and Landscaping

S411 BMPs for Landscaping and Lawn/Vegetation Management.

SECTION 4 – SITE SUITABILITY CRITERIA (SSC)

This section outlines the criteria used to help select the stormwater type of flow control and treatment facility for this project. Based on our review of the criteria below we have selected the following type of facilities for this project.

Basin ID / TDA	Flow Control	Water Quality
D1/TDA1	Detain and Release	Wetpond
D2/TDA1	Detain and Release	Wetpond

Infiltration SSC Review if Applicable

Infiltration is not feasible and will not be used for stormwater control, therefore no further investigation was required.

PART 5 – PERMANENT STORMWATER CONTROL PLAN

Existing Site Hydrology

Existing site hydrology is based on our site investigation, field topographic survey, aerial topographic mapping and completed soils review for the subject project. The site consists of the basins outlined below.

Pre-developed Basin (P#)

Existing site is open land covered with field grass and some trees. Also, on the site exists a residential building, outbuildings, and an old barn. All existing structures will be removed before construction.

TDA No. 1 Basin ID	Land Use Assumptions and Site Parameters				
	Land Use Cover	Slope	Acres	Hydrologic Group	Comments
P1	Forested	Flat	9.96	Saturated	Hydric Soils
P2	Forested	Flat	15.36	Saturated	Hydric Soils

Developed Site Hydrology (D#)

The developed site will be a 70-lot residential plat with residential buildings, paved access roads, sidewalks, and driveways. Undeveloped areas will be converted to lawns, and open spaces will be available for residential use. 2 of the 70 lots will be used for commercial lots and also contain parking areas.

Basin Summary

TDA No. 1 Basin ID	Land Use Assumptions and Site Parameters				
	Land Use Cover	Slope	Acres	Hydrologic Group	Comments
D1	Lawn	Flat	5.28	Saturated	
	Roads	Flat	1.27		
	Roof	Flat	1.14		1,500sf / residential 9,000sf / commercial
	Driveways	Flat	0.19		384sf / residential
	Parking	Flat	1.99		43,363 sf / commercial
Total Area			9.96		
D2	Lawn	Flat	10.29	Saturated	
	Roads	Flat	2.39		
	Roof	Flat	1.65		1,500sf / residential
	Driveways	Flat	0.42		384sf / residential
	Sidewalks	Flat	0.6		
Total Area			15.36		

Basin Maps
The following figures are included in Appendix 1 of this report:

Pre/ Post-Developed Basin Map

PART 5.1 – FLOW CONTROL

Flow Control System Design & Analysis

The proposed stormwater facility was designed using the latest version of the WWHM stormwater model created for WSDOE. A copy of the WWHM Data Output Report is included in Appendix 2 of this TIR.

Flow Control for TDA No. 1

Basin D1 - Detention Pond (DP) DP No. 1

The auto-pond function in WWHM was used to size the detention pond facility. That model passed resulted in the following pond parameters:

Bottom Pond Area (sf)	Pond Storage Depth (ft)	Free Board Provided (ft)	Side Slopes	Control Structure Type
8,164	6	1 ft	2:1	Wier/Orifice

The following detention pond facility designed meets or exceeds the modeled pond parameters:

Bottom Pond Area Provided (sf)	Pond Storage Depth (ft)	Free Board Provided (ft)	Side Slopes	Control Structure Type
9,948	6	1 ft	2:1	Wier/Orifice

Detention Pond Stage Storage Summary

Pond Stage Storage	Elevation (ft)	Detention Volume (ac-ft)
Emergency Overflow	292	
Design Water Surface	291	1.73 ac-ft
Bottom Live Storage	285	0 ac-ft
WWHM Required Storage		1.53 ac-ft

The new pond will be constructed with an impervious clay or synthetic membrane liner to prevent infiltration in the pond.

WWHM Outlet Control Structure Summary

Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.180 ft.
Notch Height: 1.397 ft.
Orifice 1 Diameter: 1.369 in. **Elevation:** 0 ft

Basin D2 - Detention Pond (DP) DP No. 2

The auto-pond function in WWHM was used to size the detention pond facility. That model passed resulted in the following pond parameters:

Bottom Pond Area (sf)	Pond Storage Depth (ft)	Free Board Provided (ft)	Side Slopes	Control Structure Type
9,272	5	1 ft	3:1	Wier/Orifice

The following detention pond facility designed meets or exceeds the modeled pond parameters:

Bottom Pond Area Provided (sf)	Pond Storage Depth (ft)	Free Board Provided (ft)	Side Slopes	Control Structure Type
10,020	5	1 ft	3:1	Wier/Orifice

Detention Pond Stage Storage Summary

Pond Stage Storage	Elevation (ft)	Detention Volume (ac-ft)
Emergency Overflow	276	
Design Water Surface	275	1.58 ac-ft
Bottom Live Storage	270	0 ac-ft
WWHM Required Storage		1.48 ac-ft

The new pond will be constructed with an impervious clay or synthetic membrane liner to prevent infiltration in the pond.

WWHM Outlet Control Structure Summary

Discharge Structure
Riser Height: 5 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.227 ft.
Notch Height: 1.598 ft.
Orifice 1 Diameter: 1.848 in. **Elevation:** 0 ft.

PART 5.2 – WATER QUALITY DESIGN

Water Quality System Design & Analysis

The drainage basins delineated for this project will have openly exposed pollution generating impervious surfaces. These tributary areas will be treated using the following treatment technologies listed under the associated drainage basins.

WWHM Modeling data is included in Appendix 2 of this report.

TDA No. 1

Basin D1 - BMP T10.10 – Wetponds - Basic and Large

RBE has selected this treatment method for water quality control for the new PGIS associated with the project. Below is the Wetpond design summary, which matches or exceeds the requirements determined by the WWHM model.

Pond Stage Storage	Depth (ft)	Detention Volume (ac-ft)
Cell #1	7	0.22 ac-ft
Cell #2	7	0.34 ac-ft
Total WQ Storage		0.56 ac-ft
WWHM Required Treatment Volume		0.55 ac-ft

Basin D2 - BMP T10.10 – Wetponds - Basic and Large

RBE has selected this treatment method for water quality control for the new PGIS associated with the project. Below is the Wetpond design summary, which matches or exceeds the requirements determined by the WWHM model.

Pond Stage Storage	Depth (ft)	Detention Volume (ac-ft)
Cell #1	5	0.21 ac-ft
Cell #2	5	0.43 ac-ft
Total WQ Storage		0.64 ac-ft
WWHM Required Treatment Volume		0.63 ac-ft

PART 5.3 – CONVEYANCE SYSTEM DESIGN

Pipe Conveyance Design

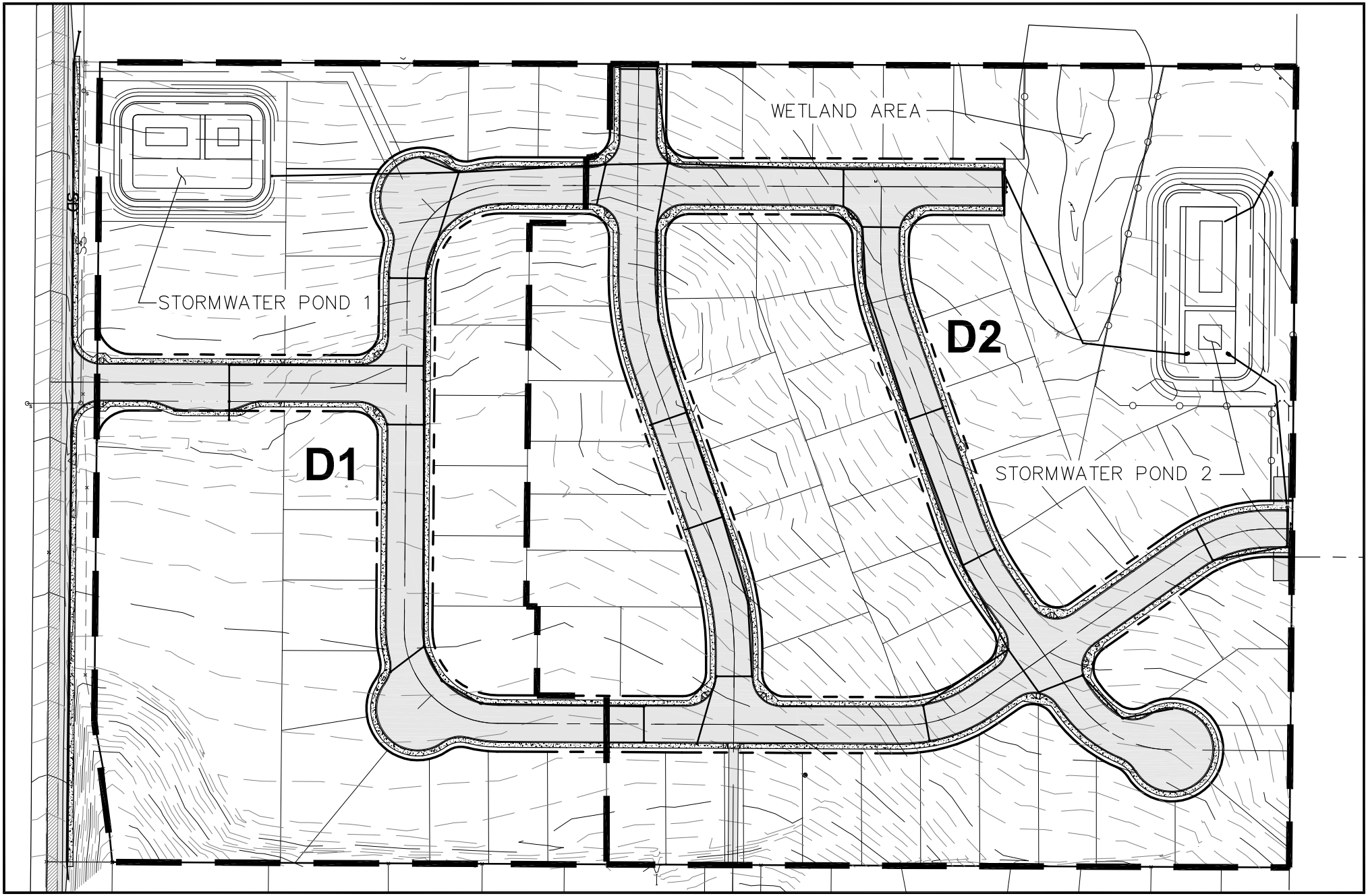
All onsite storm conveyance systems will be sized to accommodate the 25-year storm flows. All proposed onsite storm drain pipe will vary from 8 to 24 inches in diameter and the minimum slope shall not be less than 0.5%.

A full conveyance system analysis will be provided in the final drainage report.

APPENDIX 1 – MAP SUBMITTALS

TDA No. 1

Pre/ Post-Developed Basin Map



RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919

ROGNLIN'S RUSH RD PLAT

BASIN MAP

JOB NUMBER 21118

DRAWING NAME 21118_BM

FIGURE BM

APPENDIX 2 – DRAINAGE DESIGN CALCULATIONS AND MODELING

TDA No. 1

Basin D1 WWHM Flow Control and Water Quality Modeling
Basin D2 WWHM Flow Control and Water Quality Modeling

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	21118_WWHM_PHASE1
Site Name:	Roglins Rush Rd Plat
Site Address:	1054 Rush Rd
City:	Chehalis
Report Date:	4/21/2022
Gage:	Longview
Data Start:	1955/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.857
Version Date:	2021/08/18
Version:	4.2.18

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Flat	9.96
Pervious Total	9.96
Impervious Land Use	acre
Impervious Total	0
Basin Total	9.96

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SAT, Lawn, Flat	5.27
Pervious Total	5.27

Impervious Land Use	acre
ROADS FLAT	1.27
ROOF TOPS FLAT	1.14
DRIVEWAYS FLAT	0.19
SIDEWALKS FLAT	0.1
PARKING FLAT	1.99
Impervious Total	4.69
Basin Total	9.96

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 157.05 ft.
Bottom Width: 52.35 ft.
Depth: 7 ft.
Volume at riser head: 1.5262 acre-feet.
Side slope 1: 2 To 1
Side slope 2: 2 To 1
Side slope 3: 2 To 1
Side slope 4: 2 To 1
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.180 ft.
Notch Height: 1.397 ft.
Orifice 1 Diameter: 1.369 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

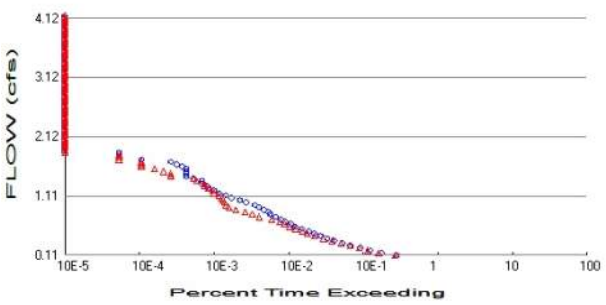
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.188	0.000	0.000	0.000
0.0778	0.190	0.014	0.014	0.000
0.1556	0.191	0.029	0.020	0.000
0.2333	0.193	0.044	0.024	0.000
0.3111	0.194	0.059	0.028	0.000
0.3889	0.196	0.074	0.031	0.000
0.4667	0.197	0.090	0.034	0.000
0.5444	0.199	0.105	0.037	0.000
0.6222	0.200	0.121	0.040	0.000
0.7000	0.202	0.136	0.042	0.000
0.7778	0.203	0.152	0.044	0.000
0.8556	0.205	0.168	0.047	0.000
0.9333	0.207	0.184	0.049	0.000
1.0111	0.208	0.200	0.051	0.000
1.0889	0.210	0.217	0.053	0.000
1.1667	0.211	0.233	0.054	0.000
1.2444	0.213	0.250	0.056	0.000
1.3222	0.214	0.266	0.058	0.000
1.4000	0.216	0.283	0.060	0.000
1.4778	0.218	0.300	0.061	0.000
1.5556	0.219	0.317	0.063	0.000
1.6333	0.221	0.334	0.065	0.000
1.7111	0.222	0.351	0.066	0.000
1.7889	0.224	0.369	0.068	0.000
1.8667	0.225	0.386	0.069	0.000
1.9444	0.227	0.404	0.070	0.000
2.0222	0.229	0.422	0.072	0.000
2.1000	0.230	0.439	0.073	0.000
2.1778	0.232	0.457	0.075	0.000
2.2556	0.234	0.476	0.076	0.000
2.3333	0.235	0.494	0.077	0.000
2.4111	0.237	0.512	0.079	0.000

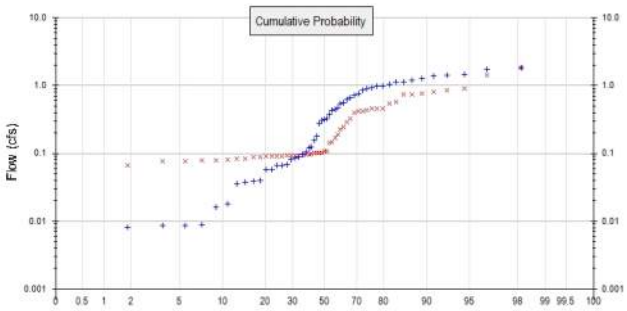
2.4889	0.238	0.531	0.080	0.000
2.5667	0.240	0.549	0.081	0.000
2.6444	0.242	0.568	0.082	0.000
2.7222	0.243	0.587	0.083	0.000
2.8000	0.245	0.606	0.085	0.000
2.8778	0.247	0.625	0.086	0.000
2.9556	0.248	0.645	0.087	0.000
3.0333	0.250	0.664	0.088	0.000
3.1111	0.252	0.683	0.089	0.000
3.1889	0.253	0.703	0.090	0.000
3.2667	0.255	0.723	0.091	0.000
3.3444	0.257	0.743	0.093	0.000
3.4222	0.258	0.763	0.094	0.000
3.5000	0.260	0.783	0.095	0.000
3.5778	0.262	0.803	0.096	0.000
3.6556	0.263	0.824	0.097	0.000
3.7333	0.265	0.845	0.098	0.000
3.8111	0.267	0.865	0.099	0.000
3.8889	0.269	0.886	0.100	0.000
3.9667	0.270	0.907	0.101	0.000
4.0444	0.272	0.928	0.102	0.000
4.1222	0.274	0.950	0.103	0.000
4.2000	0.276	0.971	0.104	0.000
4.2778	0.277	0.992	0.105	0.000
4.3556	0.279	1.014	0.106	0.000
4.4333	0.281	1.036	0.107	0.000
4.5111	0.283	1.058	0.108	0.000
4.5889	0.284	1.080	0.108	0.000
4.6667	0.286	1.102	0.119	0.000
4.7444	0.288	1.125	0.141	0.000
4.8222	0.290	1.147	0.170	0.000
4.9000	0.291	1.170	0.204	0.000
4.9778	0.293	1.192	0.241	0.000
5.0556	0.295	1.215	0.280	0.000
5.1333	0.297	1.238	0.322	0.000
5.2111	0.298	1.261	0.366	0.000
5.2889	0.300	1.285	0.411	0.000
5.3667	0.302	1.308	0.457	0.000
5.4444	0.304	1.332	0.504	0.000
5.5222	0.306	1.356	0.551	0.000
5.6000	0.307	1.379	0.599	0.000
5.6778	0.309	1.404	0.656	0.000
5.7556	0.311	1.428	0.716	0.000
5.8333	0.313	1.452	0.779	0.000
5.9111	0.315	1.476	0.843	0.000
5.9889	0.317	1.501	0.908	0.000
6.0667	0.318	1.526	1.192	0.000
6.1444	0.320	1.551	1.788	0.000
6.2222	0.322	1.576	2.557	0.000
6.3000	0.324	1.601	3.422	0.000
6.3778	0.326	1.626	4.308	0.000
6.4556	0.328	1.652	5.139	0.000
6.5333	0.330	1.677	5.848	0.000
6.6111	0.331	1.703	6.393	0.000
6.6889	0.333	1.729	6.774	0.000
6.7667	0.335	1.755	7.131	0.000
6.8444	0.337	1.781	7.439	0.000
6.9222	0.339	1.807	7.733	0.000

7.0000	0.341	1.834	8.015	0.000
7.0778	0.343	1.860	8.286	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 9.96
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 5.27
Total Impervious Area: 4.69

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.221714
5 year	0.81717
10 year	1.522227
25 year	2.82877
50 year	4.12385
100 year	5.700474

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.174476
5 year	0.401952
10 year	0.650895
25 year	1.12787
50 year	1.641217
100 year	2.331341

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	1.448	0.750
1957	0.931	0.094
1958	1.135	0.090
1959	0.627	0.323
1960	1.439	0.806
1961	1.710	0.546
1962	1.043	0.106
1963	1.859	1.435
1964	1.378	0.766
1965	0.713	0.227

1966	0.124	0.092
1967	0.086	0.089
1968	0.038	0.083
1969	0.320	0.093
1970	0.180	0.102
1971	0.450	0.567
1972	0.658	0.242
1973	0.080	0.145
1974	0.854	0.391
1975	0.977	0.289
1976	0.088	0.102
1977	0.039	0.078
1978	0.464	0.845
1979	0.551	0.096
1980	0.057	0.093
1981	0.309	0.093
1982	1.133	0.437
1983	0.276	0.103
1984	0.900	0.108
1985	0.156	0.076
1986	0.978	1.817
1987	0.066	0.168
1988	0.016	0.092
1989	0.038	0.064
1990	0.436	0.750
1991	0.105	0.079
1992	0.018	0.076
1993	0.058	0.091
1994	0.036	0.088
1995	0.122	0.452
1996	1.184	0.894
1997	0.760	0.451
1998	1.257	0.101
1999	0.068	0.191
2000	0.067	0.097
2001	0.006	0.066
2002	0.009	0.080
2003	0.009	0.091
2004	0.009	0.084
2005	0.008	0.149
2006	0.095	0.098
2007	0.543	0.462
2008	0.326	0.416
2009	0.379	0.422

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.8590	1.8166
2	1.7099	1.4353
3	1.4478	0.8937
4	1.4387	0.8447
5	1.3779	0.8060
6	1.2567	0.7663
7	1.1842	0.7505
8	1.1349	0.7496
9	1.1326	0.5674
10	1.0431	0.5461

11	0.9780	0.4617
12	0.9774	0.4515
13	0.9313	0.4513
14	0.8996	0.4371
15	0.8537	0.4217
16	0.7599	0.4156
17	0.7131	0.3914
18	0.6576	0.3232
19	0.6269	0.2895
20	0.5505	0.2420
21	0.5431	0.2270
22	0.4635	0.1910
23	0.4498	0.1678
24	0.4359	0.1486
25	0.3791	0.1446
26	0.3257	0.1081
27	0.3195	0.1064
28	0.3092	0.1030
29	0.2758	0.1024
30	0.1805	0.1020
31	0.1564	0.1008
32	0.1236	0.0979
33	0.1218	0.0968
34	0.1049	0.0956
35	0.0949	0.0944
36	0.0876	0.0934
37	0.0857	0.0930
38	0.0798	0.0929
39	0.0677	0.0924
40	0.0667	0.0918
41	0.0656	0.0908
42	0.0582	0.0907
43	0.0572	0.0905
44	0.0394	0.0891
45	0.0384	0.0876
46	0.0377	0.0843
47	0.0359	0.0831
48	0.0179	0.0798
49	0.0160	0.0788
50	0.0088	0.0779
51	0.0087	0.0763
52	0.0086	0.0759
53	0.0081	0.0663
54	0.0062	0.0637

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1109	5287	5016	94	Pass
0.1514	3319	3022	91	Pass
0.1919	2333	2178	93	Pass
0.2325	1710	1660	97	Pass
0.2730	1263	1261	99	Pass
0.3135	977	951	97	Pass
0.3541	776	731	94	Pass
0.3946	617	558	90	Pass
0.4351	503	420	83	Pass
0.4757	415	338	81	Pass
0.5162	347	289	83	Pass
0.5567	286	237	82	Pass
0.5973	233	196	84	Pass
0.6378	200	167	83	Pass
0.6784	170	144	84	Pass
0.7189	147	112	76	Pass
0.7594	126	76	60	Pass
0.8000	107	61	57	Pass
0.8405	101	49	48	Pass
0.8810	88	37	42	Pass
0.9216	75	30	40	Pass
0.9621	67	27	40	Pass
1.0026	51	26	50	Pass
1.0432	42	25	59	Pass
1.0837	32	24	75	Pass
1.1242	27	22	81	Pass
1.1648	22	19	86	Pass
1.2053	19	18	94	Pass
1.2458	16	16	100	Pass
1.2864	15	14	93	Pass
1.3269	13	14	107	Pass
1.3675	13	11	84	Pass
1.4080	10	10	100	Pass
1.4485	8	5	62	Pass
1.4891	8	5	62	Pass
1.5296	8	4	50	Pass
1.5701	8	3	37	Pass
1.6107	7	2	28	Pass
1.6512	6	2	33	Pass
1.6917	5	2	40	Pass
1.7323	2	1	50	Pass
1.7728	1	1	100	Pass
1.8133	1	1	100	Pass
1.8539	1	0	0	Pass
1.8944	0	0	0	Pass
1.9349	0	0	0	Pass
1.9755	0	0	0	Pass
2.0160	0	0	0	Pass
2.0566	0	0	0	Pass
2.0971	0	0	0	Pass
2.1376	0	0	0	Pass
2.1782	0	0	0	Pass
2.2187	0	0	0	Pass

2.2592	0	0	0	Pass
2.2998	0	0	0	Pass
2.3403	0	0	0	Pass
2.3808	0	0	0	Pass
2.4214	0	0	0	Pass
2.4619	0	0	0	Pass
2.5024	0	0	0	Pass
2.5430	0	0	0	Pass
2.5835	0	0	0	Pass
2.6240	0	0	0	Pass
2.6646	0	0	0	Pass
2.7051	0	0	0	Pass
2.7457	0	0	0	Pass
2.7862	0	0	0	Pass
2.8267	0	0	0	Pass
2.8673	0	0	0	Pass
2.9078	0	0	0	Pass
2.9483	0	0	0	Pass
2.9889	0	0	0	Pass
3.0294	0	0	0	Pass
3.0699	0	0	0	Pass
3.1105	0	0	0	Pass
3.1510	0	0	0	Pass
3.1915	0	0	0	Pass
3.2321	0	0	0	Pass
3.2726	0	0	0	Pass
3.3131	0	0	0	Pass
3.3537	0	0	0	Pass
3.3942	0	0	0	Pass
3.4348	0	0	0	Pass
3.4753	0	0	0	Pass
3.5158	0	0	0	Pass
3.5564	0	0	0	Pass
3.5969	0	0	0	Pass
3.6374	0	0	0	Pass
3.6780	0	0	0	Pass
3.7185	0	0	0	Pass
3.7590	0	0	0	Pass
3.7996	0	0	0	Pass
3.8401	0	0	0	Pass
3.8806	0	0	0	Pass
3.9212	0	0	0	Pass
3.9617	0	0	0	Pass
4.0022	0	0	0	Pass
4.0428	0	0	0	Pass
4.0833	0	0	0	Pass
4.1239	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.549 acre-feet
On-line facility target flow:	0.7427 cfs.
Adjusted for 15 min:	0.7427 cfs.
Off-line facility target flow:	0.4067 cfs.
Adjusted for 15 min:	0.4067 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
Trapezoidal Pond 1 POC	☐	624.11			☐	0.00			
Total Volume Infiltrated		624.11	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

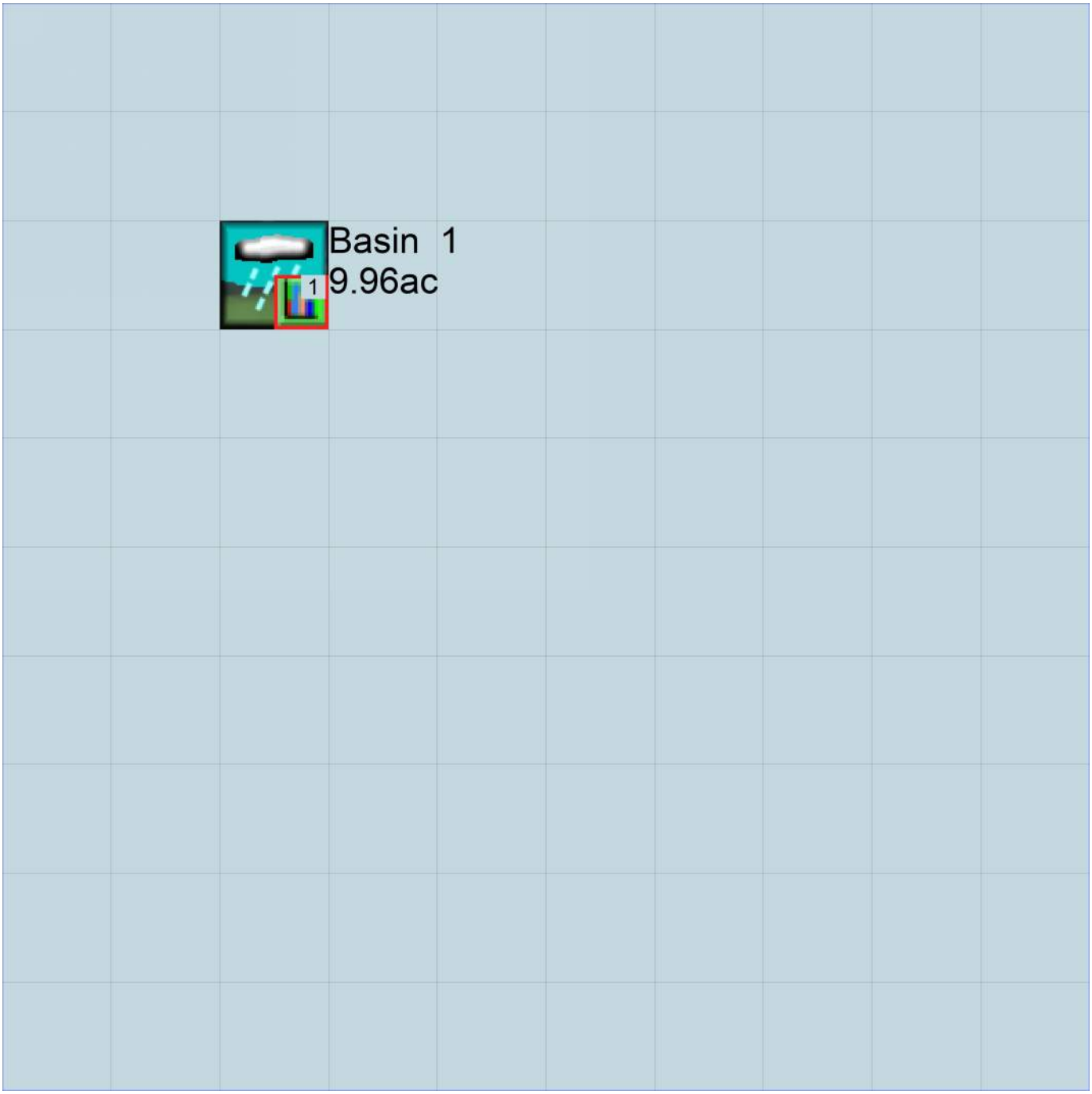
PERLND Changes

No PERLND changes have been made.

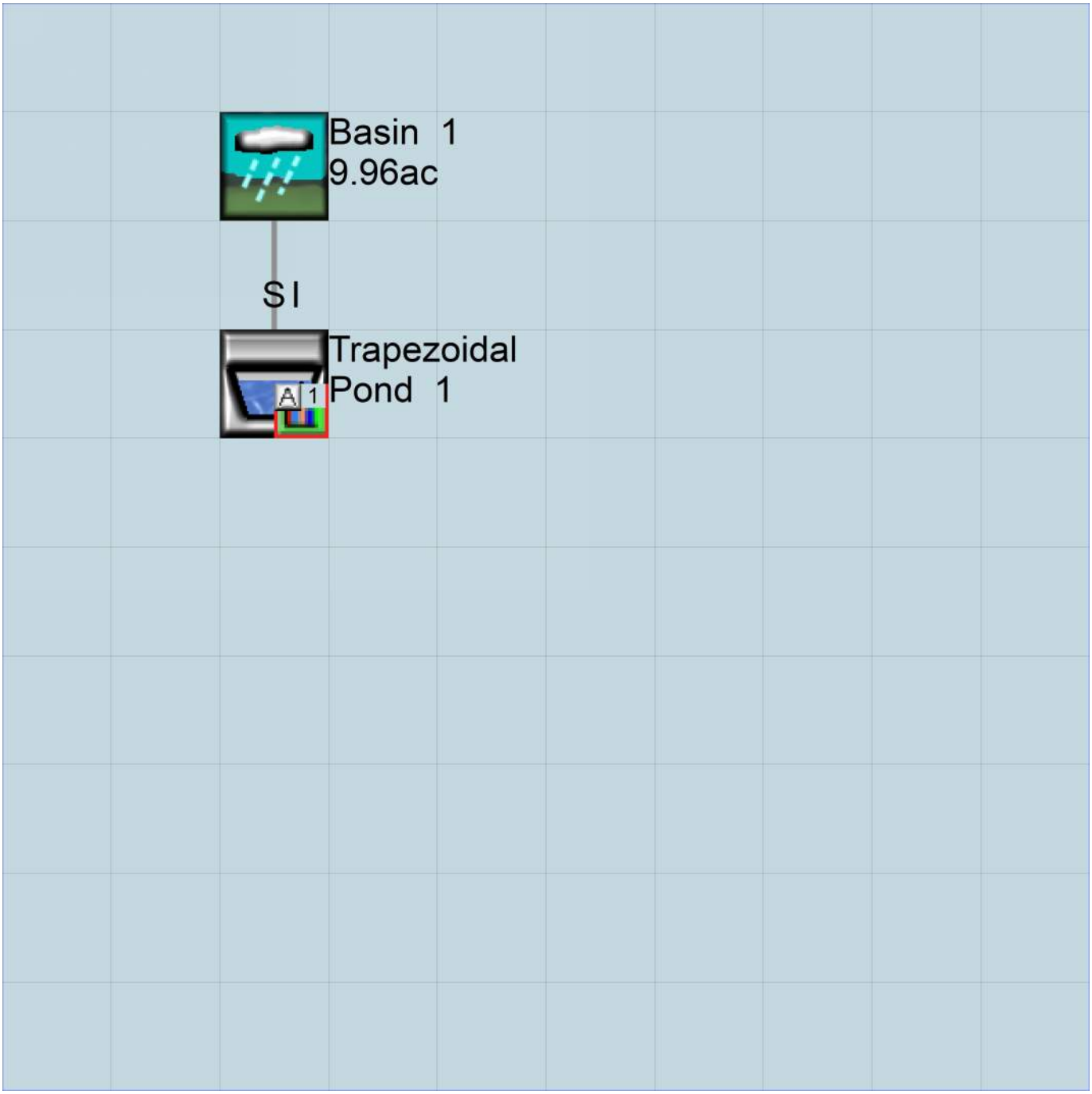
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2009 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   21118_WWHM_PHASE1.wdm
MESSU       25   Pre21118_WWHM_PHASE1.MES
            27   Pre21118_WWHM_PHASE1.L61
            28   Pre21118_WWHM_PHASE1.L62
            30   POC21118_WWHM_PHASE11.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      19
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  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
    #    # 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           ***
   19     SAT, 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 ***
   19         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  *********
   19         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 ***
   19         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
   19              0         4         2       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   19             0         0        10         2         0         0       0.7
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   19           0.2         3       0.5         1       0.7       0.8
  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
   19             0         0         0         0       4.2         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
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  19                       9.96     COPY   501     12
PERLND  19                       9.96     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    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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>                <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
  WWHM4 model simulation
  START       1955 10 01        END    2009 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   21118_WWHM_PHASE1.wdm
MESSU       25   Mit21118_WWHM_PHASE1.MES
            27   Mit21118_WWHM_PHASE1.L61
            28   Mit21118_WWHM_PHASE1.L62
            30   POC21118_WWHM_PHASE11.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      25
      IMPLND       1
      IMPLND       4
      IMPLND       5
      IMPLND       8
      IMPLND      11
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  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
    #    # 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            ***
   25     SAT, 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 ***
   25         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  *********
   25         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 ***
   25         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
   25              0         4         1       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   25              0         0        10         2         0         0      0.35
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   25            0.1         3       0.5         1       0.7       0.4
  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
   25              0         0         0         0       4.2         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
    5      DRIVEWAYS/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
    4         0    0    1    0    0    0
    5         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
    4         0    0    4    0    0    0    1    9
    5         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
    4         0    0    0    0    0
    5         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
    4            400      0.01       0.1       0.1
    5            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
    4              0         0
    5              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
    4              0         0
    5              0         0
    8              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  25                      5.27     RCHRES   1      2
PERLND  25                      5.27     RCHRES   1      3
IMPLND   1                      1.27     RCHRES   1      5
IMPLND   4                      1.14     RCHRES   1      5
IMPLND   5                      0.19     RCHRES   1      5
IMPLND   8                       0.1     RCHRES   1      5
IMPLND  11                      1.99     RCHRES   1      5

******Routing******
PERLND  25                      5.27     COPY     1     12
IMPLND   1                      1.27     COPY     1     15
IMPLND   4                      1.14     COPY     1     15
IMPLND   5                      0.19     COPY     1     15
IMPLND   8                       0.1     COPY     1     15
IMPLND  11                      1.99     COPY     1     15
PERLND  25                      5.27     COPY     1     13
RCHRES   1                         1     COPY   501     16
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                              ***
    1     Trapezoidal Pond-005    1    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
  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
  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  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      0.03       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  0.0  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
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.188739  0.000000  0.000000
  0.077778  0.190236  0.014738  0.014184
  0.155556  0.191739  0.029592  0.020059
  0.233333  0.193245  0.044564  0.024567
  0.311111  0.194756  0.059653  0.028368
  0.388889  0.196272  0.074860  0.031716
  0.466667  0.197792  0.090184  0.034743
  0.544444  0.199316  0.105627  0.037527
  0.622222  0.200845  0.121189  0.040118
  0.700000  0.202378  0.136870  0.042551
  0.777778  0.203916  0.152671  0.044853
  0.855556  0.205458  0.168591  0.047042
```

0.933333	0.207005	0.184631	0.049134
1.011111	0.208556	0.200792	0.051141
1.088889	0.210112	0.217073	0.053071
1.166667	0.211672	0.233476	0.054934
1.244444	0.213236	0.250000	0.056735
1.322222	0.214805	0.266646	0.058481
1.400000	0.216378	0.283414	0.060177
1.477778	0.217956	0.300305	0.061826
1.555556	0.219538	0.317319	0.063432
1.633333	0.221125	0.334456	0.064998
1.711111	0.222716	0.351716	0.066528
1.788889	0.224312	0.369101	0.068023
1.866667	0.225912	0.386609	0.069486
1.944444	0.227516	0.404243	0.070919
2.022222	0.229125	0.422001	0.072324
2.100000	0.230738	0.439884	0.073701
2.177778	0.232356	0.457894	0.075054
2.255556	0.233978	0.476029	0.076382
2.333333	0.235605	0.494290	0.077688
2.411111	0.237236	0.512679	0.078972
2.488889	0.238871	0.531194	0.080236
2.566667	0.240511	0.549837	0.081480
2.644444	0.242156	0.568607	0.082705
2.722222	0.243805	0.587506	0.083913
2.800000	0.245458	0.606532	0.085103
2.877778	0.247116	0.625688	0.086277
2.955556	0.248778	0.644973	0.087435
3.033333	0.250445	0.664387	0.088578
3.111111	0.252116	0.683931	0.089706
3.188889	0.253791	0.703605	0.090821
3.266667	0.255471	0.723410	0.091922
3.344444	0.257156	0.743345	0.093010
3.422222	0.258845	0.763412	0.094085
3.500000	0.260538	0.783610	0.095148
3.577778	0.262236	0.803940	0.096199
3.655556	0.263938	0.824403	0.097239
3.733333	0.265644	0.844998	0.098268
3.811111	0.267356	0.865725	0.099287
3.888889	0.269071	0.886586	0.100295
3.966667	0.270791	0.907581	0.101293
4.044444	0.272515	0.928710	0.102281
4.122222	0.274244	0.949972	0.103260
4.200000	0.275978	0.971370	0.104229
4.277778	0.277715	0.992902	0.105190
4.355556	0.279458	1.014570	0.106142
4.433333	0.281204	1.036374	0.107086
4.511111	0.282955	1.058313	0.108021
4.588889	0.284711	1.080389	0.108948
4.666667	0.286471	1.102602	0.119429
4.744444	0.288235	1.124952	0.141886
4.822222	0.290004	1.147439	0.170711
4.900000	0.291777	1.170063	0.204124
4.977778	0.293555	1.192826	0.241068
5.055556	0.295337	1.215728	0.280803
5.133333	0.297124	1.238768	0.322757
5.211111	0.298915	1.261947	0.366468
5.288889	0.300711	1.285266	0.411546
5.366667	0.302510	1.308725	0.457654
5.444444	0.304315	1.332323	0.504495
5.522222	0.306124	1.356063	0.551804
5.600000	0.307937	1.379943	0.599337
5.677778	0.309755	1.403964	0.656907
5.755556	0.311577	1.428127	0.716919
5.833333	0.313404	1.452432	0.778956
5.911111	0.315235	1.476879	0.842955
5.988889	0.317070	1.501468	0.908855
6.066667	0.318910	1.526201	1.192807
6.144444	0.320755	1.551077	1.788903
6.222222	0.322603	1.576096	2.557653
6.300000	0.324457	1.601260	3.422760

```
  6.377778  0.326314  1.626568  4.308567
  6.455556  0.328177  1.652020  5.139156
  6.533333  0.330043  1.677617  5.848038
  6.611111  0.331914  1.703360  6.392954
  6.688889  0.333790  1.729249  6.774174
  6.766667  0.335670  1.755283  7.131193
  6.844444  0.337554  1.781464  7.439098
  6.922222  0.339443  1.807792  7.733151
  7.000000  0.341336  1.834267  8.015071
  END FTABLE  1
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    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 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        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       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       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	21118_WWHM_PHASE2
Site Name:	Roglins Rush Rd Plat
Site Address:	1054 Rush Rd
City:	Chehalis
Report Date:	4/21/2022
Gage:	Longview
Data Start:	1955/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.857
Version Date:	2021/08/18
Version:	4.2.18

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
SAT, Forest, Flat	15.36
Pervious Total	15.36
Impervious Land Use	acre
Impervious Total	0
Basin Total	15.36

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SAT, Lawn, Flat	10.3
Pervious Total	10.3

Impervious Land Use	acre
ROADS FLAT	2.39
ROOF TOPS FLAT	1.65
DRIVEWAYS FLAT	0.42
SIDEWALKS FLAT	0.6
Impervious Total	5.06
Basin Total	15.36

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 166.79 ft.
Bottom Width: 55.60 ft.
Depth: 6 ft.
Volume at riser head: 1.4817 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 5 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.227 ft.
Notch Height: 1.598 ft.
Orifice 1 Diameter: 1.848 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

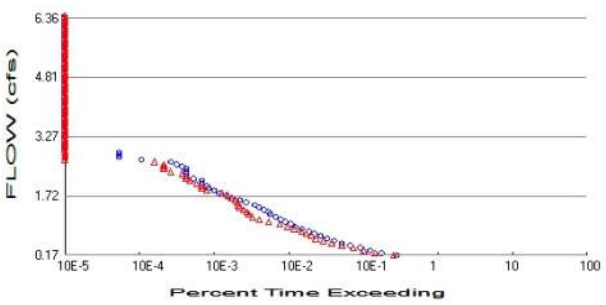
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.212	0.000	0.000	0.000
0.0667	0.214	0.014	0.023	0.000
0.1333	0.217	0.028	0.033	0.000
0.2000	0.219	0.043	0.041	0.000
0.2667	0.221	0.057	0.047	0.000
0.3333	0.223	0.072	0.053	0.000
0.4000	0.225	0.087	0.058	0.000
0.4667	0.227	0.102	0.063	0.000
0.5333	0.229	0.117	0.067	0.000
0.6000	0.231	0.133	0.071	0.000
0.6667	0.233	0.148	0.075	0.000
0.7333	0.235	0.164	0.079	0.000
0.8000	0.237	0.180	0.082	0.000
0.8667	0.240	0.196	0.086	0.000
0.9333	0.242	0.212	0.089	0.000
1.0000	0.244	0.228	0.092	0.000
1.0667	0.246	0.244	0.095	0.000
1.1333	0.248	0.261	0.098	0.000
1.2000	0.250	0.278	0.101	0.000
1.2667	0.253	0.294	0.104	0.000
1.3333	0.255	0.311	0.107	0.000
1.4000	0.257	0.328	0.109	0.000
1.4667	0.259	0.346	0.112	0.000
1.5333	0.261	0.363	0.114	0.000
1.6000	0.264	0.380	0.117	0.000
1.6667	0.266	0.398	0.119	0.000
1.7333	0.268	0.416	0.122	0.000
1.8000	0.270	0.434	0.124	0.000
1.8667	0.272	0.452	0.126	0.000
1.9333	0.275	0.470	0.128	0.000
2.0000	0.277	0.489	0.131	0.000
2.0667	0.279	0.507	0.133	0.000

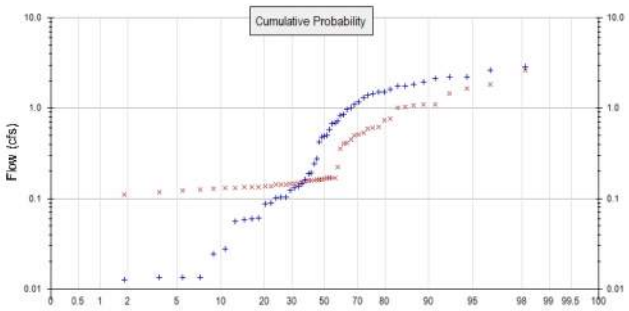
2.1333	0.282	0.526	0.135	0.000
2.2000	0.284	0.545	0.137	0.000
2.2667	0.286	0.564	0.139	0.000
2.3333	0.288	0.583	0.141	0.000
2.4000	0.291	0.602	0.143	0.000
2.4667	0.293	0.622	0.145	0.000
2.5333	0.295	0.642	0.147	0.000
2.6000	0.298	0.661	0.149	0.000
2.6667	0.300	0.681	0.151	0.000
2.7333	0.302	0.701	0.153	0.000
2.8000	0.305	0.722	0.155	0.000
2.8667	0.307	0.742	0.156	0.000
2.9333	0.309	0.763	0.158	0.000
3.0000	0.312	0.783	0.160	0.000
3.0667	0.314	0.804	0.162	0.000
3.1333	0.317	0.825	0.164	0.000
3.2000	0.319	0.847	0.165	0.000
3.2667	0.321	0.868	0.167	0.000
3.3333	0.324	0.890	0.169	0.000
3.4000	0.326	0.911	0.170	0.000
3.4667	0.329	0.933	0.184	0.000
3.5333	0.331	0.955	0.209	0.000
3.6000	0.333	0.977	0.239	0.000
3.6667	0.336	1.000	0.274	0.000
3.7333	0.338	1.022	0.313	0.000
3.8000	0.341	1.045	0.354	0.000
3.8667	0.343	1.068	0.398	0.000
3.9333	0.346	1.091	0.444	0.000
4.0000	0.348	1.114	0.492	0.000
4.0667	0.351	1.137	0.541	0.000
4.1333	0.353	1.161	0.591	0.000
4.2000	0.356	1.184	0.641	0.000
4.2667	0.358	1.208	0.693	0.000
4.3333	0.361	1.232	0.744	0.000
4.4000	0.363	1.256	0.796	0.000
4.4667	0.366	1.280	0.858	0.000
4.5333	0.368	1.305	0.923	0.000
4.6000	0.371	1.330	0.990	0.000
4.6667	0.373	1.354	1.058	0.000
4.7333	0.376	1.379	1.128	0.000
4.8000	0.378	1.405	1.200	0.000
4.8667	0.381	1.430	1.616	0.000
4.9333	0.384	1.456	1.715	0.000
5.0000	0.386	1.481	1.816	0.000
5.0667	0.389	1.507	2.091	0.000
5.1333	0.391	1.533	2.591	0.000
5.2000	0.394	1.559	3.225	0.000
5.2667	0.397	1.586	3.946	0.000
5.3333	0.399	1.612	4.706	0.000
5.4000	0.402	1.639	5.457	0.000
5.4667	0.405	1.666	6.152	0.000
5.5333	0.407	1.693	6.751	0.000
5.6000	0.410	1.720	7.230	0.000
5.6667	0.413	1.748	7.584	0.000
5.7333	0.415	1.775	7.845	0.000
5.8000	0.418	1.803	8.171	0.000
5.8667	0.421	1.831	8.431	0.000
5.9333	0.423	1.859	8.681	0.000

6.0000	0.426	1.888	8.923	0.000
6.0667	0.429	1.916	9.157	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 15.36
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 10.3
Total Impervious Area: 5.06

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.34192
5 year	1.260214
10 year	2.347531
25 year	4.362441
50 year	6.359672
100 year	8.791092

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.256212
5 year	0.579925
10 year	0.937871
25 year	1.633289
50 year	2.393069
100 year	3.429025

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	2.233	1.648
1957	1.436	0.152
1958	1.750	0.142
1959	0.967	0.170
1960	2.219	1.109
1961	2.637	1.039
1962	1.609	0.170
1963	2.867	1.847
1964	2.125	1.016
1965	1.100	0.360

1966	0.191	0.143
1967	0.132	0.137
1968	0.059	0.126
1969	0.493	0.154
1970	0.278	0.145
1971	0.694	0.763
1972	1.014	0.447
1973	0.123	0.166
1974	1.317	0.619
1975	1.507	0.531
1976	0.135	0.157
1977	0.061	0.131
1978	0.715	1.085
1979	0.849	0.159
1980	0.088	0.136
1981	0.477	0.143
1982	1.747	0.732
1983	0.425	0.162
1984	1.387	0.413
1985	0.241	0.122
1986	1.508	2.649
1987	0.101	0.220
1988	0.025	0.147
1989	0.058	0.101
1990	0.672	1.091
1991	0.162	0.135
1992	0.028	0.118
1993	0.090	0.146
1994	0.055	0.127
1995	0.188	0.406
1996	1.826	1.434
1997	1.172	0.603
1998	1.938	0.169
1999	0.104	0.170
2000	0.103	0.157
2001	0.010	0.109
2002	0.013	0.134
2003	0.013	0.134
2004	0.014	0.131
2005	0.012	0.163
2006	0.146	0.161
2007	0.838	0.506
2008	0.502	0.588
2009	0.585	0.505

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	2.8668	2.6489
2	2.6370	1.8474
3	2.2328	1.6480
4	2.2187	1.4344
5	2.1249	1.1086
6	1.9381	1.0910
7	1.8263	1.0855
8	1.7502	1.0390
9	1.7466	1.0157
10	1.6087	0.7632

11	1.5082	0.7322
12	1.5073	0.6186
13	1.4363	0.6034
14	1.3873	0.5877
15	1.3166	0.5311
16	1.1718	0.5061
17	1.0997	0.5051
18	1.0141	0.4474
19	0.9668	0.4131
20	0.8490	0.4056
21	0.8376	0.3597
22	0.7149	0.2203
23	0.6937	0.1702
24	0.6722	0.1700
25	0.5846	0.1698
26	0.5024	0.1685
27	0.4928	0.1664
28	0.4769	0.1631
29	0.4254	0.1622
30	0.2783	0.1612
31	0.2412	0.1594
32	0.1906	0.1573
33	0.1879	0.1568
34	0.1617	0.1537
35	0.1463	0.1523
36	0.1352	0.1473
37	0.1322	0.1455
38	0.1231	0.1454
39	0.1044	0.1429
40	0.1029	0.1428
41	0.1011	0.1425
42	0.0898	0.1372
43	0.0882	0.1355
44	0.0607	0.1347
45	0.0591	0.1341
46	0.0582	0.1341
47	0.0554	0.1313
48	0.0277	0.1307
49	0.0246	0.1271
50	0.0135	0.1258
51	0.0133	0.1221
52	0.0133	0.1177
53	0.0125	0.1092
54	0.0096	0.1012

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1710	5273	4836	91	Pass
0.2335	3317	2732	82	Pass
0.2960	2327	1941	83	Pass
0.3585	1708	1386	81	Pass
0.4210	1247	966	77	Pass
0.4835	974	714	73	Pass
0.5460	776	551	71	Pass
0.6085	617	437	70	Pass
0.6711	502	383	76	Pass
0.7336	414	326	78	Pass
0.7961	347	282	81	Pass
0.8586	285	228	80	Pass
0.9211	233	182	78	Pass
0.9836	200	143	71	Pass
1.0461	169	102	60	Pass
1.1086	147	76	51	Pass
1.1712	126	62	49	Pass
1.2337	107	55	51	Pass
1.2962	101	52	51	Pass
1.3587	88	47	53	Pass
1.4212	75	42	56	Pass
1.4837	67	40	59	Pass
1.5462	51	39	76	Pass
1.6087	42	36	85	Pass
1.6713	32	32	100	Pass
1.7338	27	29	107	Pass
1.7963	22	24	109	Pass
1.8588	19	15	78	Pass
1.9213	16	13	81	Pass
1.9838	15	13	86	Pass
2.0463	13	11	84	Pass
2.1088	13	9	69	Pass
2.1714	10	8	80	Pass
2.2339	8	8	100	Pass
2.2964	8	7	87	Pass
2.3589	8	5	62	Pass
2.4214	8	4	50	Pass
2.4839	7	4	57	Pass
2.5464	6	4	66	Pass
2.6089	5	3	60	Pass
2.6714	2	0	0	Pass
2.7340	1	0	0	Pass
2.7965	1	0	0	Pass
2.8590	1	0	0	Pass
2.9215	0	0	0	Pass
2.9840	0	0	0	Pass
3.0465	0	0	0	Pass
3.1090	0	0	0	Pass
3.1715	0	0	0	Pass
3.2341	0	0	0	Pass
3.2966	0	0	0	Pass
3.3591	0	0	0	Pass
3.4216	0	0	0	Pass

3.4841	0	0	0	Pass
3.5466	0	0	0	Pass
3.6091	0	0	0	Pass
3.6716	0	0	0	Pass
3.7342	0	0	0	Pass
3.7967	0	0	0	Pass
3.8592	0	0	0	Pass
3.9217	0	0	0	Pass
3.9842	0	0	0	Pass
4.0467	0	0	0	Pass
4.1092	0	0	0	Pass
4.1717	0	0	0	Pass
4.2343	0	0	0	Pass
4.2968	0	0	0	Pass
4.3593	0	0	0	Pass
4.4218	0	0	0	Pass
4.4843	0	0	0	Pass
4.5468	0	0	0	Pass
4.6093	0	0	0	Pass
4.6718	0	0	0	Pass
4.7344	0	0	0	Pass
4.7969	0	0	0	Pass
4.8594	0	0	0	Pass
4.9219	0	0	0	Pass
4.9844	0	0	0	Pass
5.0469	0	0	0	Pass
5.1094	0	0	0	Pass
5.1719	0	0	0	Pass
5.2345	0	0	0	Pass
5.2970	0	0	0	Pass
5.3595	0	0	0	Pass
5.4220	0	0	0	Pass
5.4845	0	0	0	Pass
5.5470	0	0	0	Pass
5.6095	0	0	0	Pass
5.6720	0	0	0	Pass
5.7345	0	0	0	Pass
5.7971	0	0	0	Pass
5.8596	0	0	0	Pass
5.9221	0	0	0	Pass
5.9846	0	0	0	Pass
6.0471	0	0	0	Pass
6.1096	0	0	0	Pass
6.1721	0	0	0	Pass
6.2346	0	0	0	Pass
6.2972	0	0	0	Pass
6.3597	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.626 acre-feet
On-line facility target flow:	0.8534 cfs.
Adjusted for 15 min:	0.8534 cfs.
Off-line facility target flow:	0.4631 cfs.
Adjusted for 15 min:	0.4631 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
Trapezoidal Pond 1 POC	☐	730.01			☐	0.00			
Total Volume Infiltrated		730.01	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

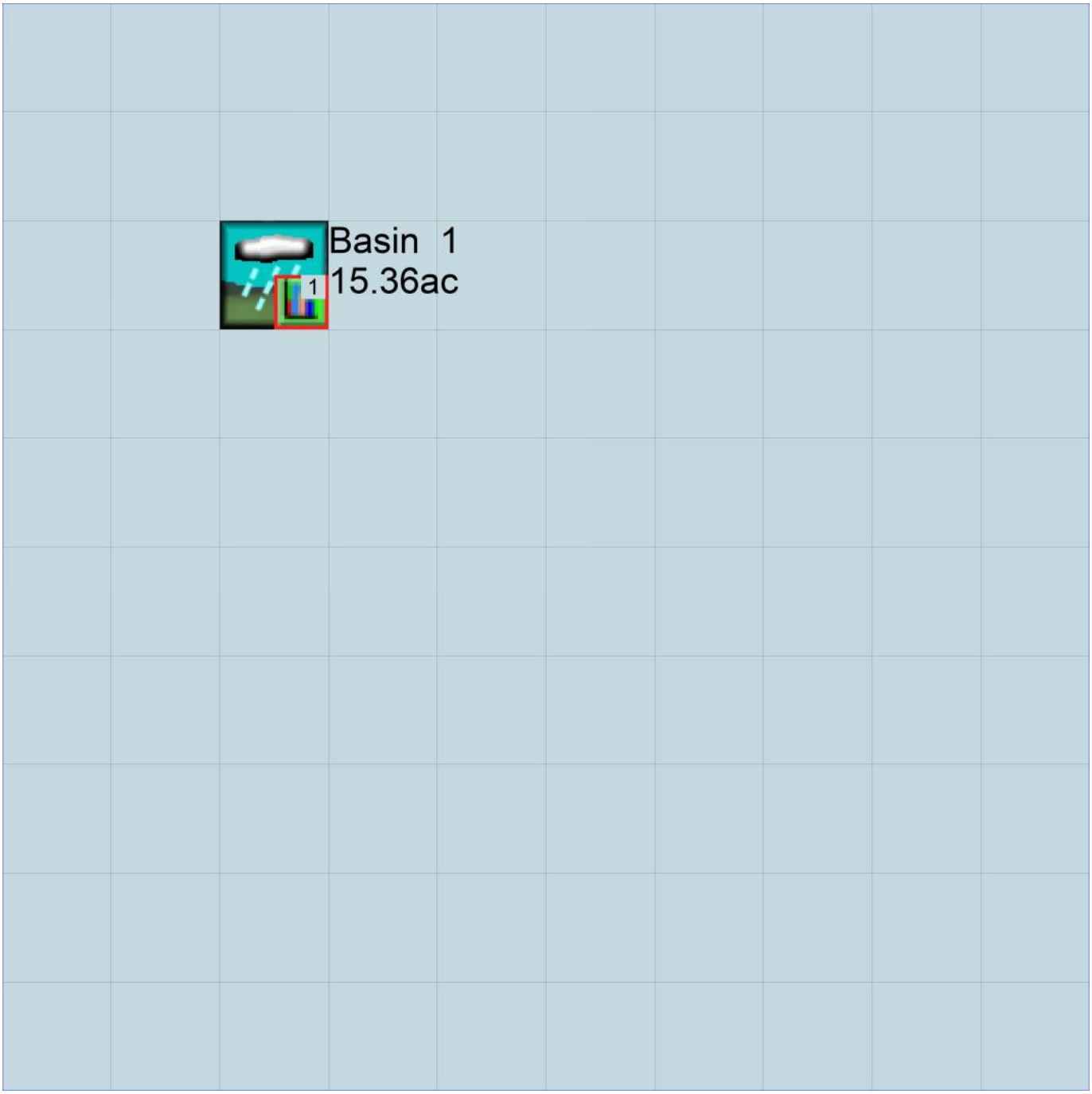
PERLND Changes

No PERLND changes have been made.

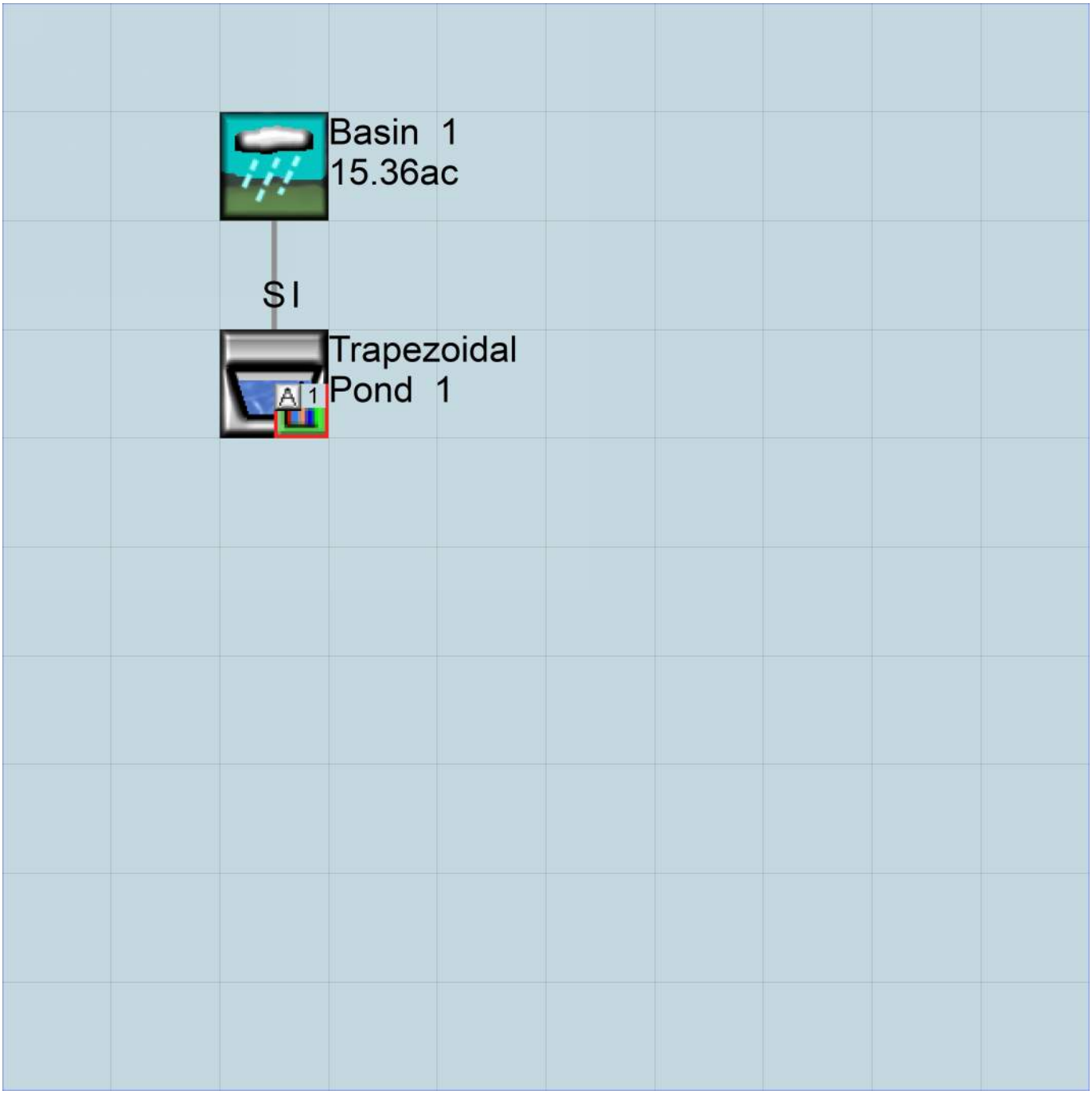
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2009 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   21118_WWHM_PHASE2.wdm
MESSU       25   Pre21118_WWHM_PHASE2.MES
            27   Pre21118_WWHM_PHASE2.L61
            28   Pre21118_WWHM_PHASE2.L62
            30   POC21118_WWHM_PHASE21.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      19
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  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
    #    # 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           ***
   19     SAT, 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 ***
   19         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  *********
   19         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 ***
   19         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
   19             0         4         2       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   19             0         0        10         2         0         0       0.7
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   19          0.2         3       0.5         1       0.7       0.8
  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
   19             0         0         0         0       4.2         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
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  19                       15.36     COPY   501     12
PERLND  19                       15.36     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>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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>                <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
  WWHM4 model simulation
  START       1955 10 01        END    2009 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   21118_WWHM_PHASE2.wdm
MESSU       25   Mit21118_WWHM_PHASE2.MES
            27   Mit21118_WWHM_PHASE2.L61
            28   Mit21118_WWHM_PHASE2.L62
            30   POC21118_WWHM_PHASE21.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      25
      IMPLND       1
      IMPLND       4
      IMPLND       5
      IMPLND       8
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  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
    #    # 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           ***
   25     SAT, 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 ***
   25         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  *********
   25         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 ***
   25         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
   25              0         4         1       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   25              0         0        10         2         0         0      0.35
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   25            0.1         3       0.5         1       0.7       0.4
  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
   25              0         0         0         0       4.2          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
    5      DRIVEWAYS/FLAT         1    1    1   27    0
    8      SIDEWALKS/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
    4         0    0    1    0    0    0
    5         0    0    1    0    0    0
    8         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
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
    8         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
    4         0    0    0    0    0
    5         0    0    0    0    0
    8         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
    4            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
    5              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
    5              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  25                        10.3     RCHRES   1      2
PERLND  25                        10.3     RCHRES   1      3
IMPLND   1                        2.39     RCHRES   1      5
IMPLND   4                        1.65     RCHRES   1      5
IMPLND   5                        0.42     RCHRES   1      5
IMPLND   8                         0.6     RCHRES   1      5

******Routing******
PERLND  25                        10.3     COPY     1     12
IMPLND   1                        2.39     COPY     1     15
IMPLND   4                        1.65     COPY     1     15
IMPLND   5                        0.42     COPY     1     15
IMPLND   8                         0.6     COPY     1     15
PERLND  25                        10.3     COPY     1     13
RCHRES   1                           1     COPY   501     16
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                             ***
    1     Trapezoidal Pond-005    1    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
  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
  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  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      0.03       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  0.0  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
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.212871  0.000000  0.000000
  0.066667  0.214917  0.014260  0.023929
  0.133333  0.216970  0.028656  0.033840
  0.200000  0.219031  0.043189  0.041446
  0.266667  0.221098  0.057860  0.047857
  0.333333  0.223174  0.072669  0.053506
  0.400000  0.225256  0.087617  0.058613
  0.466667  0.227346  0.102704  0.063309
  0.533333  0.229443  0.117930  0.067680
  0.600000  0.231548  0.133296  0.071786
  0.666667  0.233660  0.148803  0.075669
  0.733333  0.235779  0.164451  0.079362
  0.800000  0.237905  0.180241  0.082891
  0.866667  0.240039  0.196172  0.086276
  0.933333  0.242181  0.212246  0.089533
  1.000000  0.244329  0.228463  0.092675
  1.066667  0.246485  0.244824  0.095714
  1.133333  0.248648  0.261328  0.098660
  1.200000  0.250819  0.277977  0.101520
  1.266667  0.252997  0.294771  0.104302
  1.333333  0.255182  0.311710  0.107012
  1.400000  0.257375  0.328795  0.109655
```

```
1.466667  0.259575  0.346027  0.112235
1.533333  0.261782  0.363406  0.114757
1.600000  0.263997  0.380932  0.117226
1.666667  0.266219  0.398605  0.119643
1.733333  0.268449  0.416428  0.122012
1.800000  0.270685  0.434399  0.124337
1.866667  0.272929  0.452519  0.126618
1.933333  0.275181  0.470790  0.128859
2.000000  0.277440  0.489210  0.131062
2.066667  0.279706  0.507782  0.133229
2.133333  0.281979  0.526505  0.135361
2.200000  0.284260  0.545379  0.137459
2.266667  0.286548  0.564406  0.139526
2.333333  0.288844  0.583586  0.141563
2.400000  0.291147  0.602919  0.143572
2.466667  0.293457  0.622406  0.145552
2.533333  0.295775  0.642047  0.147506
2.600000  0.298100  0.661843  0.149434
2.666667  0.300432  0.681794  0.151338
2.733333  0.302771  0.701901  0.153218
2.800000  0.305118  0.722164  0.155075
2.866667  0.307473  0.742583  0.156910
2.933333  0.309834  0.763160  0.158724
3.000000  0.312203  0.783895  0.160518
3.066667  0.314580  0.804788  0.162292
3.133333  0.316963  0.825839  0.164046
3.200000  0.319354  0.847050  0.165782
3.266667  0.321753  0.868420  0.167500
3.333333  0.324158  0.889950  0.169201
3.400000  0.326571  0.911641  0.170884
3.466667  0.328992  0.933493  0.184746
3.533333  0.331420  0.955507  0.209099
3.600000  0.333855  0.977683  0.239598
3.666667  0.336297  1.000021  0.274662
3.733333  0.338747  1.022523  0.313331
3.800000  0.341204  1.045188  0.354922
3.866667  0.343669  1.068017  0.398908
3.933333  0.346141  1.091010  0.444862
4.000000  0.348620  1.114169  0.492426
4.066667  0.351106  1.137493  0.541288
4.133333  0.353600  1.160984  0.591175
4.200000  0.356101  1.184640  0.641843
4.266667  0.358610  1.208464  0.693069
4.333333  0.361126  1.232455  0.744652
4.400000  0.363649  1.256614  0.796404
4.466667  0.366180  1.280942  0.858838
4.533333  0.368718  1.305439  0.923541
4.600000  0.371263  1.330105  0.990126
4.666667  0.373816  1.354940  1.058539
4.733333  0.376376  1.379947  1.128732
4.800000  0.378943  1.405124  1.200659
4.866667  0.381518  1.430473  1.616874
4.933333  0.384100  1.455993  1.715805
5.000000  0.386689  1.481686  1.816874
5.066667  0.389286  1.507552  2.091947
5.133333  0.391890  1.533591  2.591084
5.200000  0.394501  1.559804  3.225442
5.266667  0.397120  1.586192  3.946152
5.333333  0.399746  1.612754  4.706190
5.400000  0.402380  1.639491  5.457205
5.466667  0.405020  1.666405  6.152356
5.533333  0.407668  1.693494  6.751843
5.600000  0.410324  1.720761  7.230176
5.666667  0.412987  1.748205  7.584752
5.733333  0.415657  1.775826  7.845541
5.800000  0.418335  1.803626  8.171346
5.866667  0.421019  1.831604  8.431445
5.933333  0.423712  1.859762  8.681760
6.000000  0.426411  1.888099  8.923321
END FTABLE  1
```

```
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    0.857          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.857          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   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 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        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       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       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

APPENDIX 3 – SPECIAL REPORTS AND STUDIES

1. NRCS Soil Survey Data
2. Geotechnical Report

Map Scale: 1:2,150 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 21, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2019—May 10, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
118	Lacamas silt loam, 0 to 3 percent slopes	C/D	6.9	28.7%
169	Prather silty clay loam, 15 to 30 percent slopes	C	1.1	4.6%
194	Scamman silty clay loam, 5 to 15 percent slopes	C/D	16.0	66.6%
Totals for Area of Interest			**24.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Lewis County Area, Washington

118—Lacamas silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2h8l
Elevation: 250 to 1,200 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 125 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Lacamas, drained, and similar soils: 60 percent
Lacamas, undrained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lacamas, Drained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F001XC003OR - Mesic Aquic Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Description of Lacamas, Undrained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F001XC003OR - Mesic Aquic Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Minor Components

Klaber

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Prather

Percent of map unit: 3 percent
Hydric soil rating: No

Scamman

Percent of map unit: 2 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 21, Aug 31, 2021

Lewis County Area, Washington

169—Prather silty clay loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2hbf
Elevation: 200 to 1,000 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Prather and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Prather

Setting

Landform: Mountain slopes, ridges
Parent material: Glacial drift

Typical profile

H1 - 0 to 14 inches: silty clay loam
H2 - 14 to 26 inches: silty clay
H3 - 26 to 51 inches: silty clay
H4 - 51 to 60 inches: clay

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Sloping to Steep Soils (G002XV702WA)
Other vegetative classification: Sloping to Steep Soils (G002XV702WA)
Hydric soil rating: No

Minor Components

Scamman

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 21, Aug 31, 2021

Lewis County Area, Washington

194—Scamman silty clay loam, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2hcb
Elevation: 150 to 2,000 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Scamman and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scamman

Setting

Landform: Terraces
Parent material: Residuum from outwash and sedimentary rocks

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 13 inches: silty clay loam
H3 - 13 to 23 inches: silty clay loam
H4 - 23 to 60 inches: silty clay

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Minor Components

Prather
Percent of map unit: 5 percent
Hydric soil rating: No

Lacamas
Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 21, Aug 31, 2021

APPENDIX 4 – OPERATION AND MAINTENANCE MANUAL

The O&M Plan will be prepared for this project at final civil design.

APPENDIX 5 – CONSTRUCTION SWPPP

All new development and redevelopment shall comply with Construction SWPPP Elements #1 through #12 outlined in the Manual. The project's SWPPP is a standalone document included in this appendix.

CONSTRUCTION SWPPP

All new development and redevelopment shall comply with Construction SWPPP Elements #1 through #12 listed below. The suggested BMPs underlined and in **bold** are proposed for use in all phases of construction. Copies of the details for each of the recommended BMPs are included.

Element 1: Mark Clearing Limits

- Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area. These shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.
- Plastic, metal, or stake wire fence may be used to mark the clearing limits.
- Suggested BMPs:

  BMP C101: Preserving Natural Vegetation
  BMP C102: Buffer Zones
  BMP C103: High-Visibility Fence
  BMP C233: Silt Fence

Element 2: Establish Construction Access

- Construction vehicle access and exit shall be limited to one route if possible, or two for linear projects such as roadways where one access is necessary for large equipment maneuvering.
- Access points shall be stabilized with quarry spall or crushed rock to minimize the tracking of sediment onto public roads.
- Wheel wash or tire baths should be located onsite, if applicable.
- Roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner.
- Street wash wastewater shall be controlled by pumping back onsite or otherwise be prevented from discharging into systems tributary to state surface waters.

- Construction access restoration shall be equal to or better than the pre-construction condition.
- Suggested BMPs:

  BMP C105: Stabilized Construction Access
  BMP C106: Wheel Wash
  BMP C107: Construction Road/Parking Area Stabilization

Element 3: Control Flow Rates

- Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site, as required by local plan approval authority.
- Downstream analysis is necessary if changes in offsite flows could impair or alter conveyance systems, streambanks, bed sediment, or aquatic habitat.
- Where necessary to comply with Minimum Requirement #7, stormwater detention facilities shall be constructed as one of the first steps in grading. Detention facilities shall be functional prior to construction of site improvements (e.g. impervious surfaces).
- Suggested BMPs:

  BMP C203: Water Bars
  BMP C207: Check Dams
  BMP C209: Outlet Protection
  BMP C235: Wattles
  BMP C240: Sediment Trap
  BMP C241: Sediment Pond (Temporary)
  See also, V-12 Detention BMPs

Element 4: Install Sediment Controls

- The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable.
- Prior to leaving a construction site or prior to discharge to an infiltration facility, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Element #3, bullet #1. Full stabilization means concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or vegetative cover in a manner that will fully prevent soil erosion. The local permitting authority shall inspect and approve areas fully stabilized by means other than pavement or quarry spalls.
- BMPs intended to trap sediment on site shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.
- Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing indicated in Element #5.

- BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.
- Suggested BMPs

  BMP C231: Brush Barrier
  BMP C232: Gravel Filter Berm
  BMP C233: Silt Fence
  BMP C234: Vegetated Strip
  BMP C235: Wattles
  BMP C240: Sediment Trap
  BMP C241: Sediment Pond (Temporary)
  BMP C250: Construction Stormwater Chemical Treatment
  BMP C251: Construction Stormwater Filtration

Element 5: Stabilize Soils

- Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind.
- 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. This stabilization requirement applies to all soils on site, whether at final grade or not. These time limits may be adjusted by the local permitting authority if it can be shown that the average time between storm events justifies a different standard.
- Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.
- Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.
- Selected soil stabilization measures shall be appropriate for the time of year, site conditions, estimated duration of use, and the water quality impacts that stabilization agents may have on downstream waters or ground water.
- Soil stockpiles must be stabilized and protected with sediment trapping measures.
- Linear construction activities such as right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and re-stabilize the disturbed soils so that:

– from October 1 through April 30 no soils shall remain exposed and unworked for more than 2 days and

– from May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days.

- Suggested BMPs:

  BMP C120: Temporary and Permanent Seeding
  BMP C121: Mulching
  BMP C122: Nets and Blankets
  BMP C123: Plastic Covering
  BMP C124: Sodding
  BMP C125: Topsoiling / Composting
  BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection
  BMP C130: Surface Roughening
  BMP C131: Gradient Terraces
  BMP C140: Dust Control

Element 6: Protect Slopes

- Design, construct, and phase cut and fill slopes in a manner that will minimize erosion.
- Consider soil type and its potential for erosion.
- Reduce slope runoff velocities by reducing continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.
- Divert upslope drainage and run-on waters with interceptors at top of slope. Stormwater from off site should be handled separately from stormwater generated on the site. Diversion of offsite stormwater around the site may be a viable option. Diverted flows shall be redirected to the natural drainage location at or before the property boundary.
- Contain downslope collected flows in pipes, slope drains, or protected channels. Check dams shall be used within channels that are cut down a slope.
- Provide drainage to remove ground water intersecting the slope surface of exposed soil areas.
- Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.
- Stabilize soils on slopes, as specified in Element #5.
- Suggested BMPs

  BMP C120: Temporary and Permanent Seeding
  BMP C121: Mulching
  BMP C122: Nets and Blankets
  BMP C123: Plastic Covering
  BMP C124: Sodding
  BMP C130: Surface Roughening
  BMP C131: Gradient Terraces
  BMP C200: Interceptor Dike and Swale
  BMP C201: Grass-Lined Channels
  BMP C203: Water Bars
  BMP C204: Pipe Slope Drains

BMP C205: Subsurface Drains
BMP C206: Level Spreader
BMP C207: Check Dams
BMP C208: Triangular Silt Dike (TSD)

Element 7: Protect Drain Inlets

- Storm drain 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.

- Approach roads shall be kept clean. Sediment and street wash water shall not be allowed to enter storm drains without prior and adequate treatment unless treatment is provided before the storm drain discharges to waters of the state.

- Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced before six inches of sediment can accumulate.

- Suggested BMPs:

  BMP C220: Inlet Protection

Element 8: Stabilize Channels and Outlets

- Temporary onsite conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected flow velocity of a 2-year, 24-hour frequency storm for the developed condition.
- Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.
- Suggested BMPs:

  BMP C122: Nets and Blankets
  BMP C202: Riprap Channel Lining
  BMP C207: Check Dams
  BMP C209: Outlet Protection

Element 9: Control Pollutants

- 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.
- Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste).

- Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed onsite using temporary plastic placed beneath and, if raining, over the vehicle.
- Wheel wash or tire bath wastewater shall be discharged to a separate onsite treatment system or to the sanitary sewer.
- Application of agricultural chemicals including fertilizers and pesticides shall be conducted in a manner and at application rate that will not result in loss of chemicals to stormwater runoff. Manufacturer recommendations for application rates and procedures shall be followed.
- BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause a violation of the water quality standard for pH in the receiving water.
- Suggested BMPs:

  BMP C151: Concrete Handling
  BMP C152: Sawcutting and Surfacing Pollution Prevention
  BMP C153: Material Delivery, Storage, and Containment
  BMP C154: Concrete Washout Area
  BMP C250: Construction Stormwater Chemical Treatment
  BMP C251: Construction Stormwater Filtration
  BMP C252: Treating and Disposing of High pH Water
  Also see, the Source Control BMPs detailed in Volume IV

Element 10: Control De-Watering

- Foundation, vault, and trench de-watering water shall be discharged into a controlled conveyance system prior to discharge to a sediment pond. Channels must be stabilized, as specified in Element #8.
- Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to state surface waters, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.
- 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.
- Other disposal options, depending on site constraints, may include:

1. infiltration,

2. transport off site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters,

3. onsite treatment using chemical treatment or other suitable treatment technologies,

4. sanitary sewer discharge with local sewer district approval, or

5. use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

- Suggested BMPs:

  BMP C203: Water Bars
  BMP C236: Vegetative Filtration

Element 11: Maintain BMPs

- Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs.
- Sediment control BMPs shall be inspected weekly or after a runoff-producing storm event during the dry season and daily during the wet season. The inspection frequency for stabilized, inactive sites shall be determined by the local permitting authority based on the level of soil stability and potential for adverse environmental impacts.
- Temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

- Suggested BMPs:

  BMP C150: Materials on Hand
  BMP C160: Certified Erosion and Sediment Control Lead

Element 12: Manage the Project

- Phasing of Construction

  Development projects shall be phased where feasible in order to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

  Clearing and grading activities for development shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance and compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements,

or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

- 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 the transport of sediment from the construction site to receiving waters will be prevented through a combination of the following:

  1. Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
  2. Limitations on activities and the extent of disturbed areas; and
  3. Proposed erosion and sediment control measures.

  Based on the information provided and local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance. The local permitting authority shall take enforcement action - such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

- If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard; or

- If clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained.

  Local governments may restrict clearing and grading activities where site conditions may present a significant risk of impact to property or critical areas. Contact the local government permitting authority for information on specific site restrictions.

  The following activities are exempt from the seasonal clearing and grading limitations:

  1. Routine maintenance and necessary repair of erosion and sediment control BMPs,
  2. 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
  3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

- Coordination with Utilities and Other Contractors

  The primary project proponent shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.

- Inspection and Monitoring

  All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function.

A certified professional in erosion and sediment control shall be identified in the Construction SWPPP and shall be onsite or on-call at all times.

Sampling and analysis of the stormwater discharges from a construction site may be necessary on a case-by-case basis to ensure compliance with standards. The local permitting authority may establish monitoring and reporting requirements when necessary.

Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, the SWPPP shall be modified, as appropriate, in a timely manner.

- Maintenance of the Construction SWPPP

  The Construction SWPPP shall be retained onsite or within reasonable access to the site. The Construction SWPPP shall be modified whenever there is a significant change in the design, construction, operation, or maintenance of any BMP.

- Suggested BMPs:

  BMP C150: Materials on Hand
  BMP C160: Certified Erosion and Sediment Control Lead
  BMP C162: Scheduling

Element #13: Protect Low Impact Development BMPs

Municipal Stormwater Permits Requirements

Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMP so their fully functioning condition if they accumulate sediment during construction. Re-storing the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.

Prevent compacting Bioretention and rain garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements.

Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures from the local stormwater manual or the manufacturer's procedures.

Keep all heavy equipment off existing soils under LID facilities that have been excavated

to final grade to retain the infiltration rate of the soils.

Additional Guidance

See Chapter 5: Precision Site Preparation, Construction & Inspection of LID Facilities in the LID Technical Guidance Manual for Puget Sound (2012) for more detail on pro-tecting LID integrated management practices.

Note that the LID Technical Guidance Manual for Puget Sound (2012) is for additional informational purposes only. You must follow the guidance within this manual if there are any discrepancies between this manual and the LID Technical Guidance Manual for Puget Sound 2012).

- Suggested BMPs:

BMP C102: Buffer Zones
BMP C103: High-Visibility Fence
BMP C200: Interceptor Dike and Swale
BMP C201: Grass-Lined Channels
BMP C207: Check Dams
BMP C208: Triangular Silt Dike (TSD)
BMP C231: Brush Barrier
BMP C233: Silt Fence
BMP C234: Vegetated Strip

Project Specific Construction BMPs

BMP C105: Stabilized Construction Access
BMP C120: Temporary and Permanent Seeding
BMP C140: Dust Control
BMP C209: Outlet Protection
BMP C220: Inlet Protection
BMP C233: Silt Fence

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

Buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zone BMPs to protect natural swales and they can incorporate them into the natural landscaping of an area.

Do not use critical-areas buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

The types of buffer zones can change the level of protection required as shown below:

Designated Critical Area Buffers - buffers that protect Critical Areas, as defined by the Washington State Growth Management Act, and are established and managed by the local permitting authority. These should not be disturbed and must protected with sediment control BMPs to prevent impacts. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Vegetative Buffer Zones - areas that may be identified in undisturbed vegetation areas or managed vegetation areas that are outside any Designated Critical Area Buffer. They may be utilized to provide an additional sediment control area and/or reduce runoff velocities. If being used for preservation of natural vegetation, they should be arranged in clumps or strips. They can be used to protect natural swales and incorporated into the natural landscaping area.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by

burying and smothering vegetation.

- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately. Remove all materials located in the buffer area that may impede the ability of the vegetation to act as a filter.

BMP C103: High-Visibility Fence

Purpose

High-visibility 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 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 four 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 six 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 lbs/ft using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233: Silt Fence to act as high-visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 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 Access

Purpose

Stabilized construction accesses are established to reduce the amount of sediment transported onto paved roads outside the project site by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for project sites.

Conditions of Use

Construction accesses 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 subdivision construction sites, provide a stabilized construction access for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized accesses 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.

Design and Installation Specifications

See Figure II-3.1: Stabilized Construction Access for details. Note: the 100' minimum length of the access shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction accesses 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. Do not use crushed concrete, cement, or calcium chloride for construction access stabilization because these products raise pH levels in stormwater and concrete discharge to 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 standards listed in Table II-3.2: Stabilized Construction Access Geotextile Standards.

Table II-3.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.

Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized access. Also consider the installation of excess concrete as a stabilized access. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction access.
- Whenever possible, the access shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction accesses should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction access 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.

Alternative Material Specification

WSDOT has raised safety concerns about the Quarry Spall rock specified above. WSDOT observes that the 4-inch to 8-inch rock sizes can become trapped between Dually truck tires, and then released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the Stabilized Construction Access remains effective. To remain effective, the BMP must prevent sediment from migrating off site. To date, there has been no performance testing to verify operation of this new specification. Jurisdictions may use the alternative specification, but must perform increased off-site inspection if they use, or allow others to use, it.

Stabilized Construction Accesses may use material that meets the requirements of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Section 9-03.9(1) (WSDOT, 2016) for ballast except for the following special requirements.

The grading and quality requirements are listed in Table II-3.3: Stabilized Construction Access Alternative Material Requirements.

Table II-3.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½″	99-100
2″	65-100
¾″	40-80
No. 4	5 max.
No. 100	0-2
% Fracture	75 min.

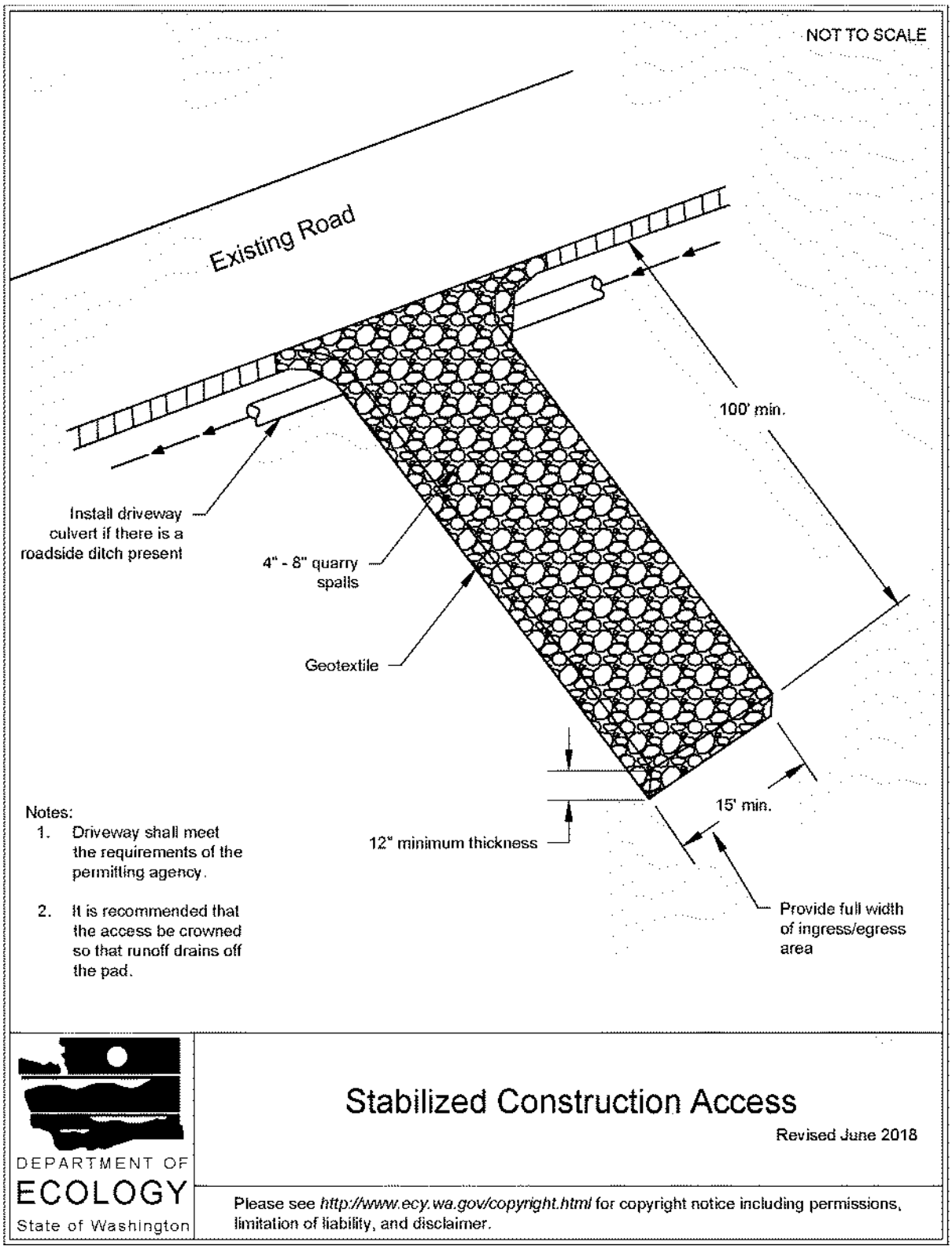
- All percentages are by weight.
- The sand equivalent value and dust ratio requirements do not apply.
- The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the access 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 access, or the installation of BMP C106: 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 shall be considered. 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 because this creates dust and throws soils into 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 access(es), BMP C103: High-Visibility Fence 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.

Figure II-3.1: Stabilized Construction Access



Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover 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 or an erosion control blanket until 75 percent grass cover is established.

Review 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) which will prevent erosion. See BMP T5.13: Post-Construction Soil Quality and Depth.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over the top of 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 top of hydromulch and erosion con- trol blankets.
- Confirm the installation of all required surface water control measures to prevent seed from washing away.

- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- 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 BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 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:
    - Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
    - Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:
    - Installing the mulch, seed, fertilizer, and tackifier in one lift.
    - Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
    - 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 Bon- ded Fiber Matrix/ Mechanically Bonded Fiber Matrix (BFM/MBFMs) (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 Table II-3.4: Temporary and Permanent Seed Mixes include recommended mixes for both temporary and permanent seeding.
- Apply these mixes, with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.

- Consult the local suppliers or the local conservation district for their recommendations. 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 local authority may be used, depending on the soil type and hydrology of the area.

Table II-3.4: Temporary and Permanent Seed Mixes

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	75-80	98	90

Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba or Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				

Table II-3.4: Temporary and Permanent Seed Mixes (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix 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. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade 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 per- formance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
- In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
- There are numerous products available that take 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 provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils. Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.
- Install products per manufacturer's instructions.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 75 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such

as sodding, mulching, nets, or blankets.

- 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 run-off.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

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 are a 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 should be used:

- For less 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,
- or 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.

Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Recycled cellulose may contain polychlorinated biphenyl (PCBs). Ecology recommends that products should be evaluated for PCBs prior to use.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

Any mulch or tackifier product used shall be installed per the manufacturer's instructions.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table II-3.6: Mulch Standards and Guidelines. Consult with the local supplier or the local conservation district for their recommendations. Increase the application rate until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness 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 should be a coarse compost that meets the size gradations listed in Table II-3.5: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B found in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Table II-3.5: Size Gradations of Compost as Mulch Material

Sieve Size	Percent Passing
3"	100%
1"	90% - 100%
3/4"	70% - 100%
1/4"	40% - 100%

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Maintenance Standards

The thickness of the mulch 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.

Table II-3.6: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	**Quality Standards**	Air-dried; free from undesirable seed and coarse material.
	Application Rates	2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre
	Remarks	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	**Quality Standards**	No growth inhibiting factors.
	Application Rates	Approx. 35-45 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre
	Remarks	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 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.
Compost	**Quality Standards**	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.
	Application Rates	2" thick min.; approx. 100 tons per acre (approx. 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". 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: Topsoiling / Composting or BMP T5.13: Post-Construction Soil Quality and Depth. 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	**Quality Standards**	Gradations from fines to 6 inches in length for texture, variation, and interlocking properties. Include a mix of various sizes so that the average size is between 2- and 4- inches.

Site Vegetation	**Application Rates**	2" thick min.;

Table II-3.6: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
	Remarks	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% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If permanent seeding or planting is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. Note: thick application of this material over existing grass, herbaceous species, and some groundcovers could smother and kill vegetation.
Wood-Based Mulch	**Quality Standards**	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.
	Application Rates	2" thick min.; approx. 100 tons per acre (approx. 750 lbs. per cubic yard)
	Remarks	This material is often called "wood straw" or "hog 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	**Quality Standards**	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.
	Application Rates	2" thick min.
	Remarks	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 1/16 and 1/2-inches. 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. [Specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, or BMP C124: Sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure II-3.5: Surface Roughening by Tracking and Contour Furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

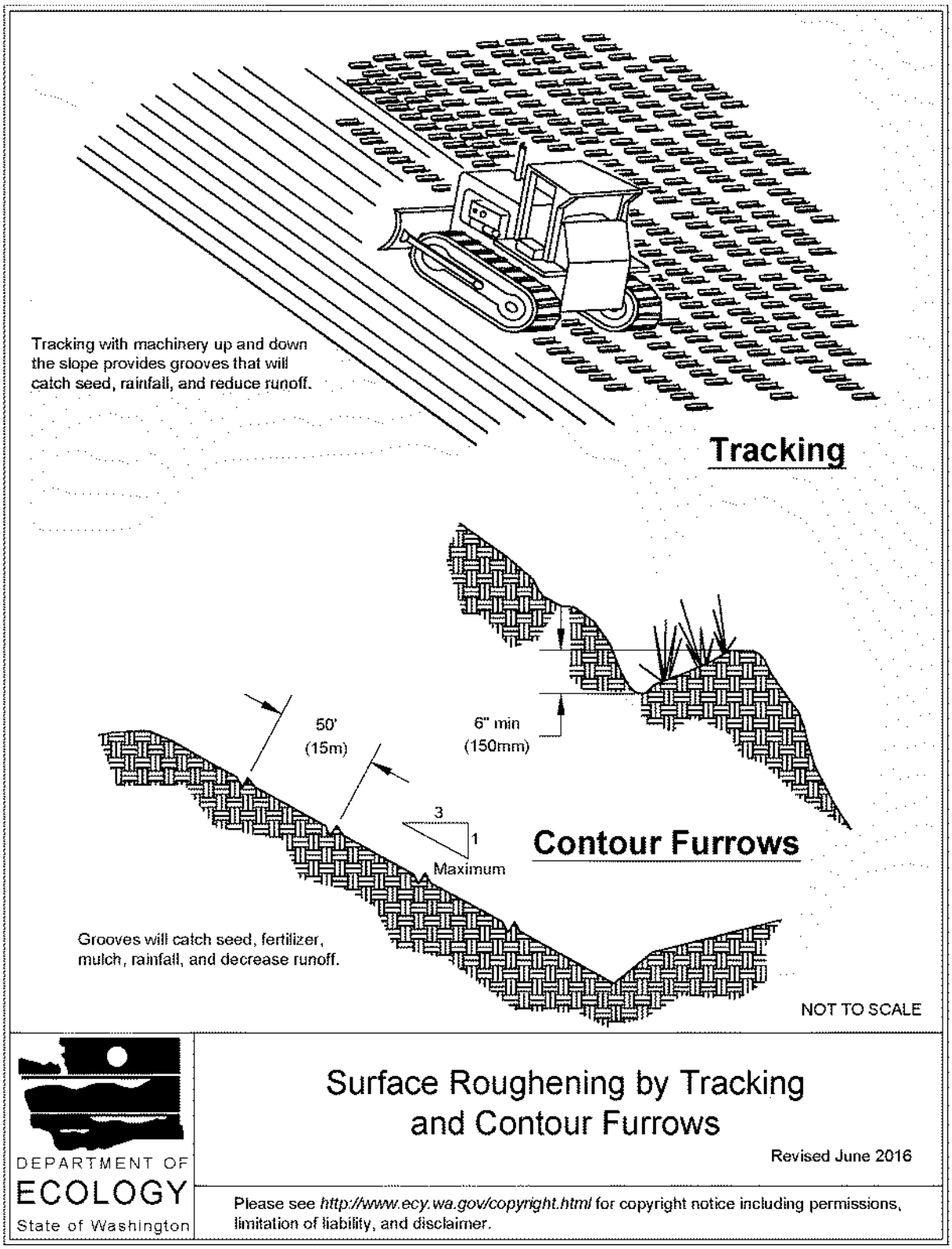
- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.

- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are surface roughened should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-roughened and re-seeded immediately.

Figure II-3.5: Surface Roughening by Tracking and Contour Furrows



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

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or 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 the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, refer to BMP C105: Stabilized Construction Access and BMP C106: Wheel Wash.
- 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. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection) 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 reduce the quantity of water needed for dust control. Note that the application rate specified here applies to this BMP, and is not the same application rate that is specified in BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection, but the downstream protections still apply.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

- Contact your local Air Pollution Control Authority for guidance and training on other dust con-

trol measures. Compliance with the local Air Pollution Control Authority constitutes

compliance with this BMP.

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- 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 .075 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.
    - 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.
    - Limit dust-causing work on windy days.
    - Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

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 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 project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.
    - 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 as allowed in BMP C154: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration fea-

ture will be installed.

- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of 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 repair 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 waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing 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:

- 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 ground water 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 of process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose of 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/or vacuumtrucks.

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants from concrete waste to stormwater by conducting washout off-site, or performing on-site washout in a designated area.

Conditions of Use

Concrete washout areas are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete truck drums are washed on-site.

Note that auxiliary concrete truck components (e.g. chutes and hoses) and small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheel- barrows) may be washed into formed areas awaiting concrete pour.

At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.

Design and Installation Specifications

Implementation

- Perform washout of concrete truck drums at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete onto non-formed areas, or into storm drains, open ditches, streets, or streams.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas as allowed above.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over

above-grade structures because they are less prone to spills and leaks.

- Self-installed above-grade structures should only be used if excavation is not practical.
- Concrete washout areas shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for the contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each concrete washout area to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate concrete washout areas at least 50 feet from sensitive areas such as storm drains, open ditches, water bodies, or wetlands.
- Allow convenient access to the concrete washout area for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access the concrete washout area, prevent track-out with a pad of rock or quarry spalls (see BMP C105: Stabilized Construction Access). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of concrete washout areas you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, concrete washout areas should be placed in multiple locations for ease of use by concrete truck drivers.

Concrete Truck Washout Procedures

- Washout of concrete truck drums shall be performed in designated concrete washout areas only.

- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated concrete washout areas or properly disposed of off-site.

Concrete Washout Area Installation

- Concrete washout areas should be constructed as shown in the figures below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
- Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Lath and flagging should be commercial type.
- Liner seams shall be installed in accordance with manufacturers' recommendations.
- Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout areas are in place prior to the commencement of concrete work.
- Once concrete wastes are washed into the designated washout area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste reg- ulations. Dispose of hardened concrete on a regular basis.
- During periods of concrete work, inspect the concrete washout areas daily to verify continued performance.
    - Check overall condition and performance.
    - Check remaining capacity (% full).
    - If using self-installed concrete washout areas, verify plastic liners are intact and sidewalls are not damaged.
    - If using prefabricated containers, check for leaks.
- Maintain the concrete washout areas to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Concrete washout areas must be cleaned, or new concrete washout areas must be constructed and ready for use once the concrete washout area is 75% full.
- If the concrete washout area is nearing capacity, vacuum and dispose of the waste material in an approved manner.
    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.

    - Do not discharge to the sanitary sewer without local approval.
    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.
    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from a self-installed concrete washout area, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Concrete Washout Areas

- When concrete washout areas are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct concrete washout areas shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the concrete washout areas shall be backfilled, repaired, and stabilized to prevent erosion.

Figure II-3.7: Concrete Washout Area with Wood Planks

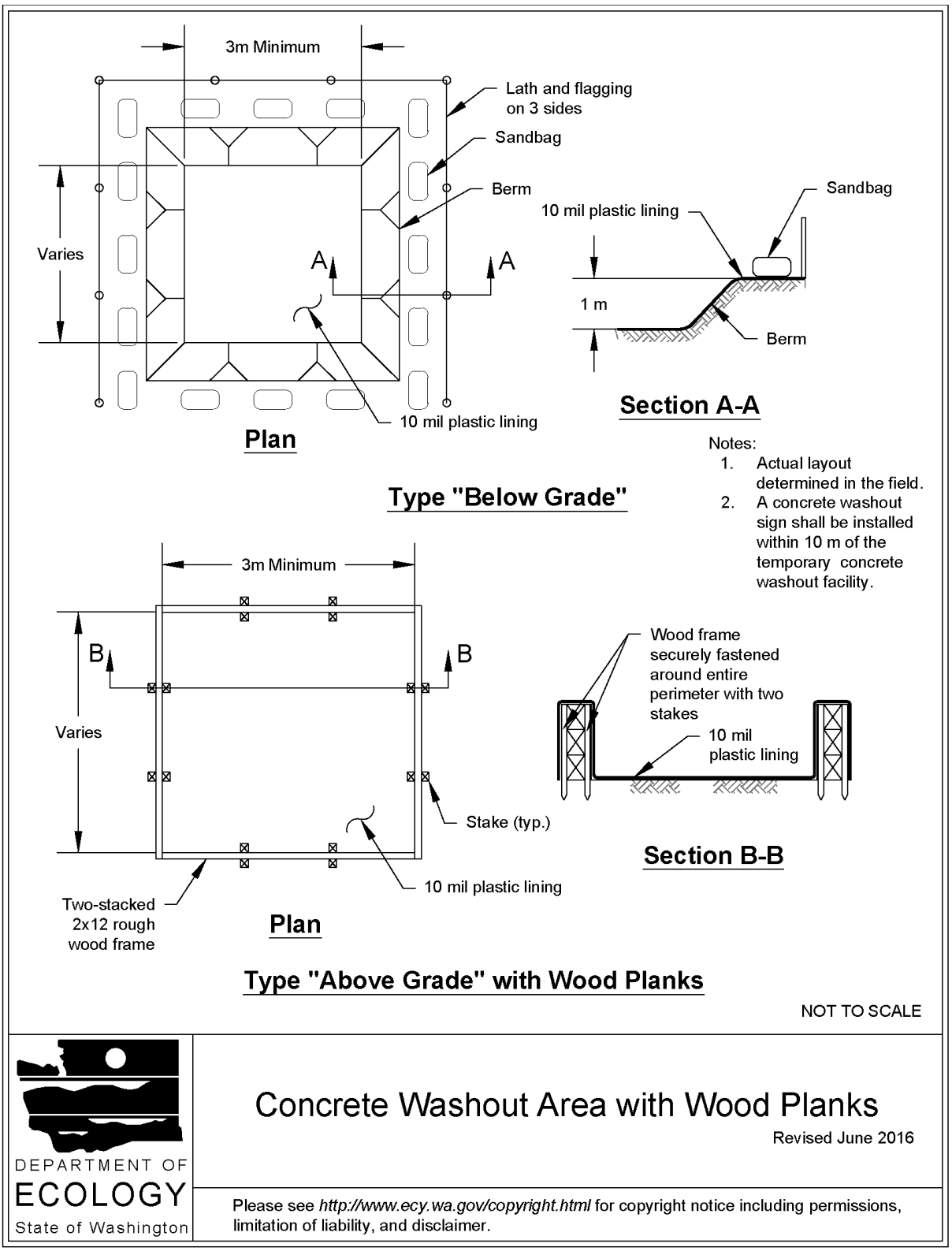


Figure II-3.8: Concrete Washout Area with Straw Bales

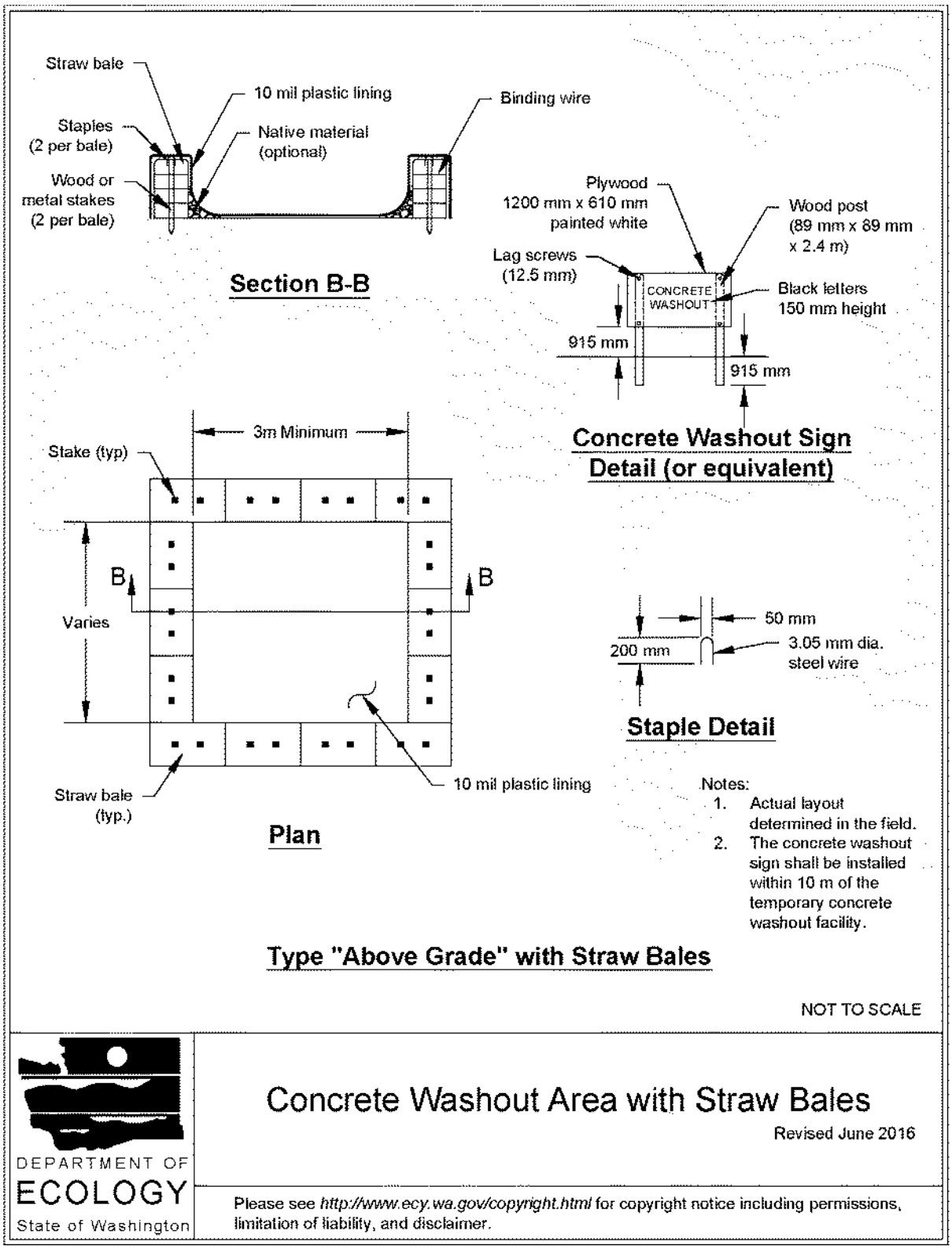
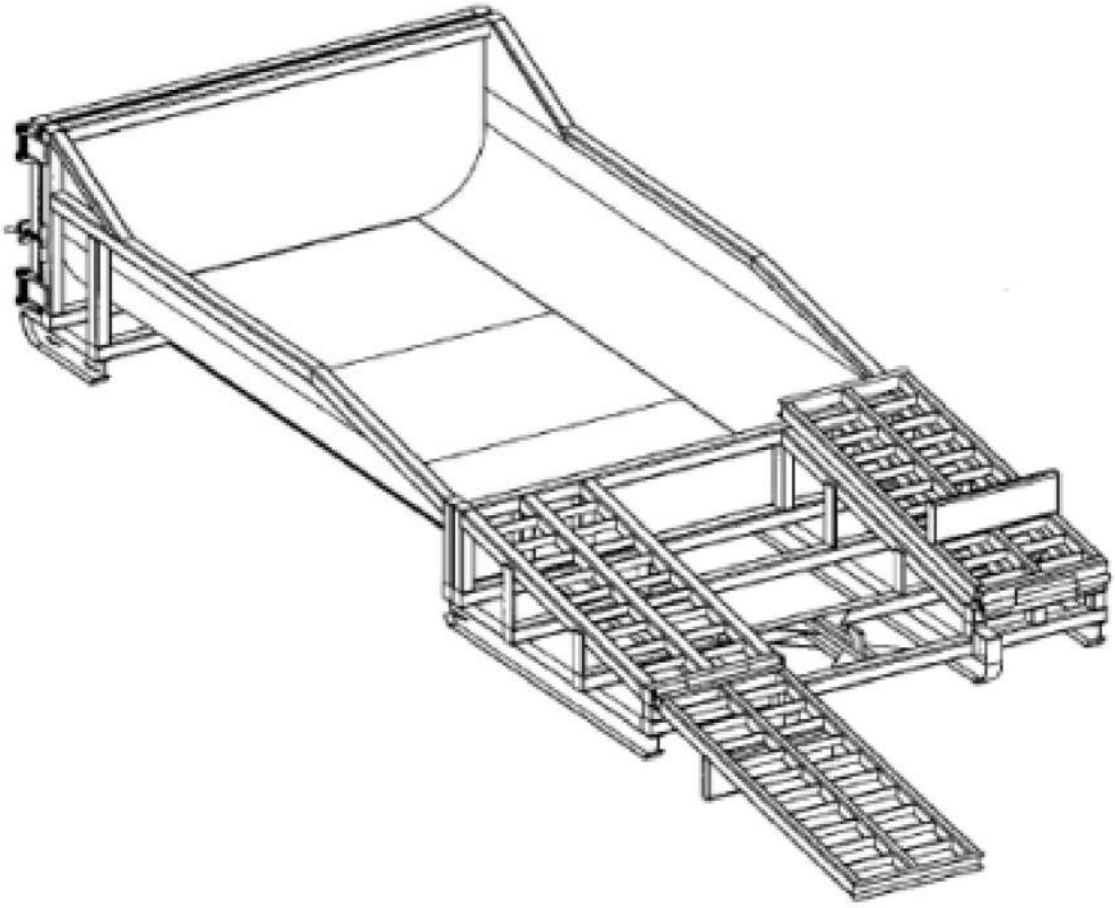


Figure II-3.9: Prefabricated Concrete Washout Container w/Ramp



NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Prefabricated Concrete Washout Container w/Ramp

Revised June 2016

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC), and water quality protection. The designated person shall be responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements. Construction sites one acre or larger that discharge to waters of the State must designate a Certified Erosion and Sediment Control Lead (CESCL) as the responsible representative.

Conditions of Use

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections.

The CESCL shall:

- Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology.

Ecology has provided the minimum requirements for CESCL course training, as well as a list of ESC training and certification providers at:

https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Certified-erosion-sed- iment-control

OR

- Be a Certified Professional in Erosion and Sediment Control (CPESC). For additional information go to:

http://www.envirocertintl.org/cpesc/

Specifications

- CESCL certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or project proponent and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL. See II-2 Construction Stormwater Pollution Prevention Plans (Construction SWPPPs).
- A CESCL may provide inspection and compliance services for multiple construction projects

in the same geographic region, but must be on site whenever earthwork activities are

occurring that could generate release of turbid water.

- Duties and responsibilities of the CESCL shall include, but are not limited to the following:
    - Maintaining a permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
    - Directing BMP installation, inspection, maintenance, modification, and removal.
    - Updating all project drawings and the Construction SWPPP with changes made.
    - Completing any sampling requirements including reporting results using electronic Discharge Monitoring Reports (WebDMR).
    - Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.
    - Keeping daily logs, and inspection reports. Inspection reports should include:
        - Inspection date/time.
        - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
        - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
        - Any water quality monitoring performed during inspection.
        - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
        - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
            1. Locations of BMPs inspected.
            2. Locations of BMPs that need maintenance.
            3. Locations of BMPs that failed to operate as designed or intended.
            4. Locations of where additional or different BMPs are required.

BMP C200: Interceptor Dike and Swale

Purpose

Provide a dike of compacted soil or a swale at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Use an interceptor dike or swale where runoff from an exposed site or disturbed slope must be conveyed to an erosion control BMP which can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering the disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct it to a sediment BMP (e.g. BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary)).

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Steep grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at the top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Contributing area for an individual dike or swale should be one acre or less.
- Design the dike and/or swale to contain flows calculated by one of the following methods:
    - Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm for the worst-case land cover condition.

OR

    - Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step for the worst-case land cover condition.

Worst-case land cover conditions (i.e., producing the most runoff) should be used for analysis (in most cases, this would be the land cover conditions just prior to final landscaping).

Interceptor Dikes

Interceptor dikes shall meet the following criteria:

- Top Width: 2 feet minimum.
- Height: 1.5 feet minimum on berm.
- Side Slope: 2H:1V or flatter.
- Grade: Depends on topography, however, dike system minimum is 0.5%, and maximum is 1%.
- Compaction: Minimum of 90 percent ASTM D698 standard proctor.
- Stabilization: Depends on velocity and reach. Inspect regularly to ensure stability.
- Ground Slopes <5%: Seed and mulch applied within 5 days of dike construction (see BMP C121: Mulching).
- Ground Slopes 5 - 40%: Dependent on runoff velocities and dike materials. Stabilization should be done immediately using either sod or riprap, or other measures to avoid erosion.
- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall

occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment trapping facility.

- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.
- See Table II-3.8: Horizontal Spacing of Interceptor Dikes Along Ground Slope for recommended horizontal spacing between dikes.

Table II-3.8: Horizontal Spacing of Interceptor Dikes Along Ground Slope

Average Slope	Slope Percent	Flowpath Length
20H:1V or less	3-5%	300 feet
(10 to 20)H:1V	5-10%	200 feet
(4 to 10)H:1V	10-25%	100 feet
(2 to 4)H:1V	25-50%	50 feet

Interceptor Swales

Interceptor swales shall meet the following criteria:

- Bottom Width: 2 feet minimum; the cross-section bottom shall be level.
- Depth: 1-foot minimum.
- Side Slope: 2H:1V or flatter.
- Grade: Maximum 5 percent, with positive drainage to a suitable outlet (such as BMP C241: Sediment Pond (Temporary)).
- Stabilization: Seed as per BMP C120: Temporary and Permanent Seeding, or BMP C202: Riprap Channel Lining, 12 inches thick riprap pressed into the bank and extending at least 8 inches vertical from the bottom.

Maintenance Standards

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.
- Check outlets and make timely repairs as needed to avoid gully formation. When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C207: Check Dams

Purpose

Construction of check dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use

Use check dams where temporary or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

- Check dams may not be placed in streams unless approved by the State Department of Fish and Wildlife.
- Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to ensure that there is no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.

Design and Installation Specifications

- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (do not dump the rock to form the dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The check dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the check dam rather than falling directly onto the ditch bottom.
- Before installing check dams, impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams combined with sumps work more effectively at slowing flow and retaining sediment than a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.

- The maximum spacing between check dams shall be such that the downstream toe of the

upstream dam is at the same elevation as the top of the downstream dam.

- Keep the maximum height at 2 feet at the center of the check dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.
- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones.
- See Figure II-3.16: Rock Check Dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each rainfall that produces runoff. Sediment shall be removed when it reaches one half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel. See BMP C202: Riprap Channel Lining.

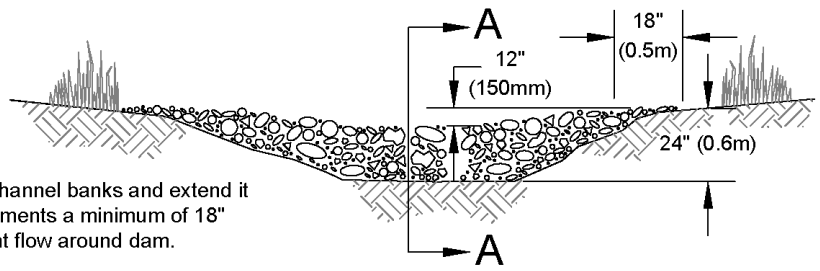
Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

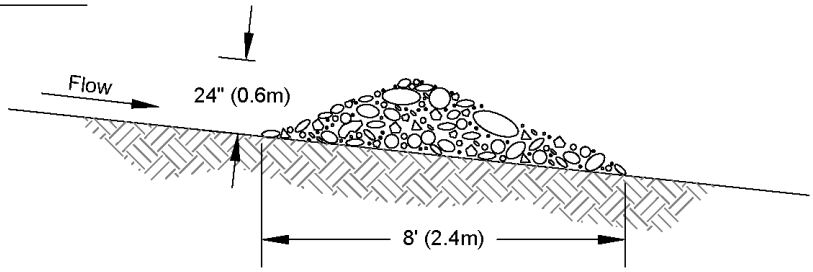
Figure II-3.16: Rock Check Dam

View Looking Upstream



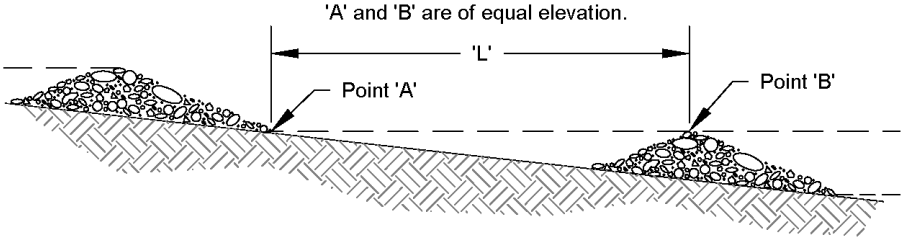
Note:
Key stone into channel banks and extend it beyond the abutments a minimum of 18" (0.5m) to prevent flow around dam.

Section A-A



Spacing Between Check Dams

'L' = the distance such that points 'A' and 'B' are of equal elevation.



NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Rock Check Dam

Revised June 2016

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

Use outlet protection at the outlets of all ponds, pipes, ditches, or other conveyances that discharge to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

- The receiving channel at the outlet of a pipe shall be protected from erosion by 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 pipes larger than 18 inches in diameter, the outlet protection lining of the channel shall be four times the diameter of the outlet pipe.
- Standard wingwalls, tapered outlets, and paved channels should also be considered when appropriate for permanent culvert outlet protection (WSDOT, 2015).
- BMP C122: Nets and Blankets or BMP C202: Riprap Channel Lining provide suitable options for lining materials.
- With low flows, BMP C201: Grass-Lined Channels can be an effective alternative for lining material.
- The following guidelines shall be used for outlet protection with riprap:
    - If the discharge velocity at the outlet is less than 5 fps, use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
    - For 5 to 10 fps discharge velocity at the outlet, use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
    - For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), use an engineered energy dissipator.
    - Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion. See BMP C122: Nets and Blankets.
- Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife. See I-2.11 Hydraulic Project Approvals.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipator if sediment builds up.

BMP C220: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters 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. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-3.10: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to plug and require a high frequency of maintenance. Limit contributing drainage areas for an individual inlet to one acre or less. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table II-3.10: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/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	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.

- Clear the area of all debris.

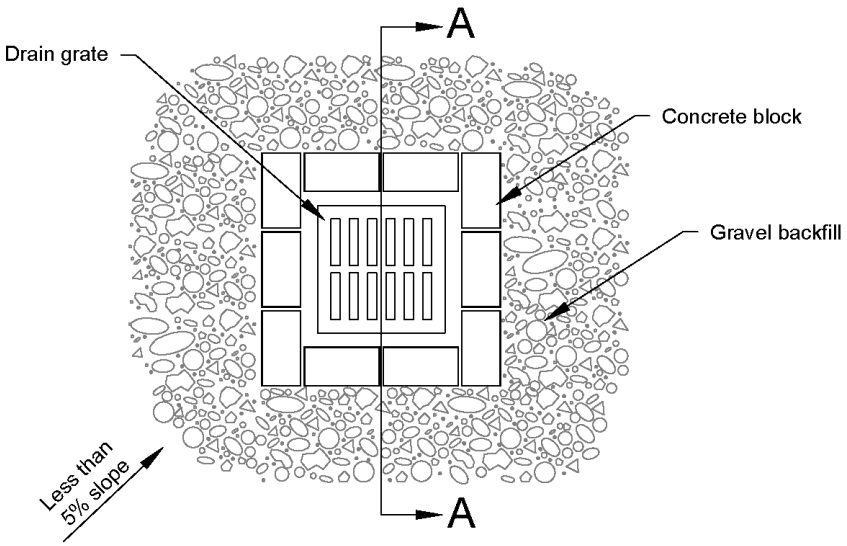
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

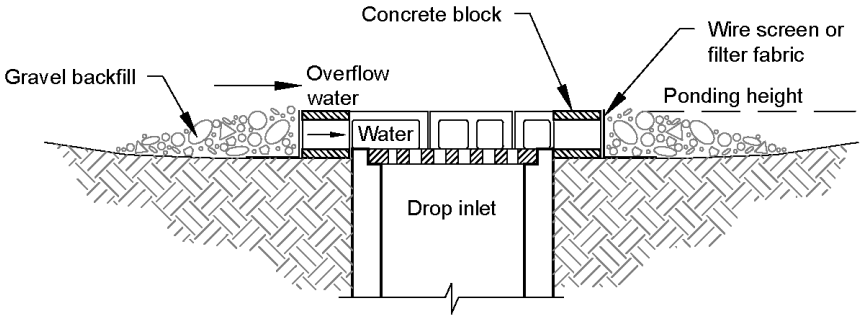
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-3.17: Block and Gravel Filter. Design and installation specifications for block gravel fil- ters include:

- Provide a height of 1 to 2 feet above the inlet.
- Recess the first row of blocks 2-inches into the ground for stability.
- Support subsequent courses by placing a pressure treated wood 2x4 through the block open- ing.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot wide level stone area between the gravel berm and the inlet.
    - Use stones 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel ½- to ¾-inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-3.17: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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DEPARTMENT OF ECOLOGY
State of Washington

Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
    - 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 aggregate over the entire inlet opening and extend at least 18-inches on all sides.

Catch Basin Filters

Catch basin filters are 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. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- 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

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

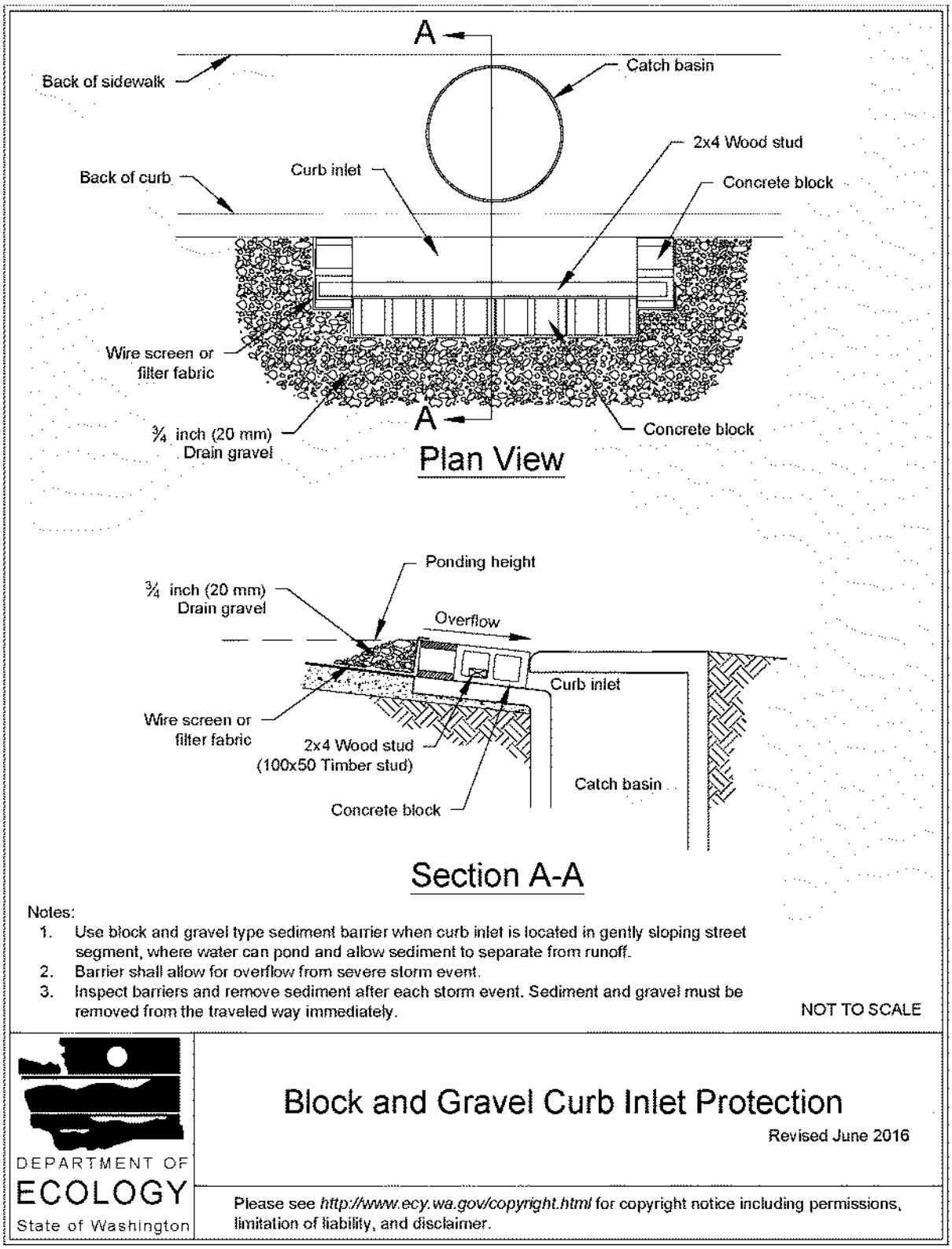
- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-3.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with ½-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 2x4 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.

Figure II-3.18: Block and Gravel Curb Inlet Protection



Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Block and Gravel Curb Inlet Protection

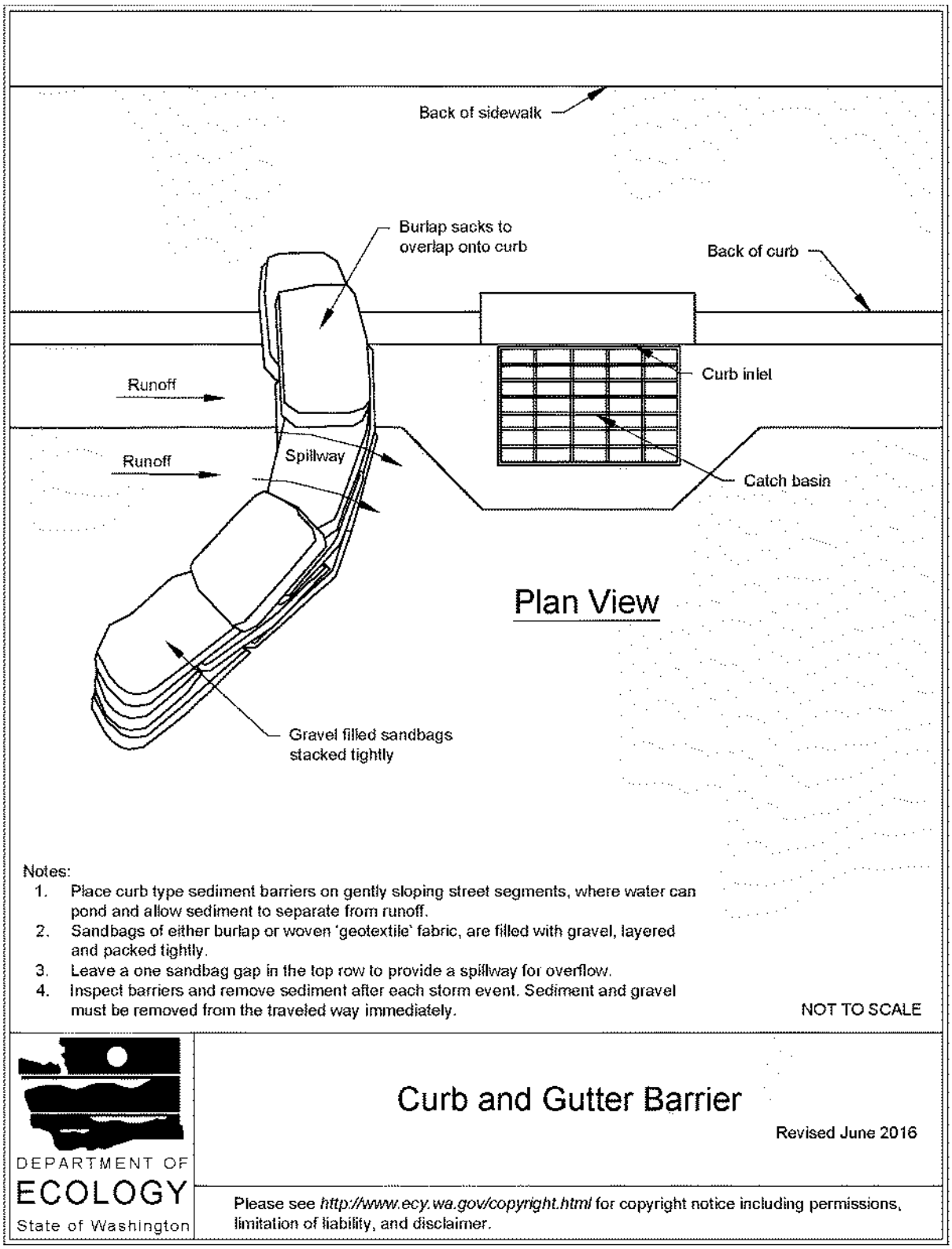
Revised June 2016

Curb and Gutter Sediment Barrier

Curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-3.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barrier include:

- 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 upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

Figure II-3.19: Curb and Gutter Barrier



Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull away the rocks from the inlet and clean or replace. An alternative approach would be to use the clogged rock as fill and put fresh rock 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 Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C233: Silt Fence

Purpose

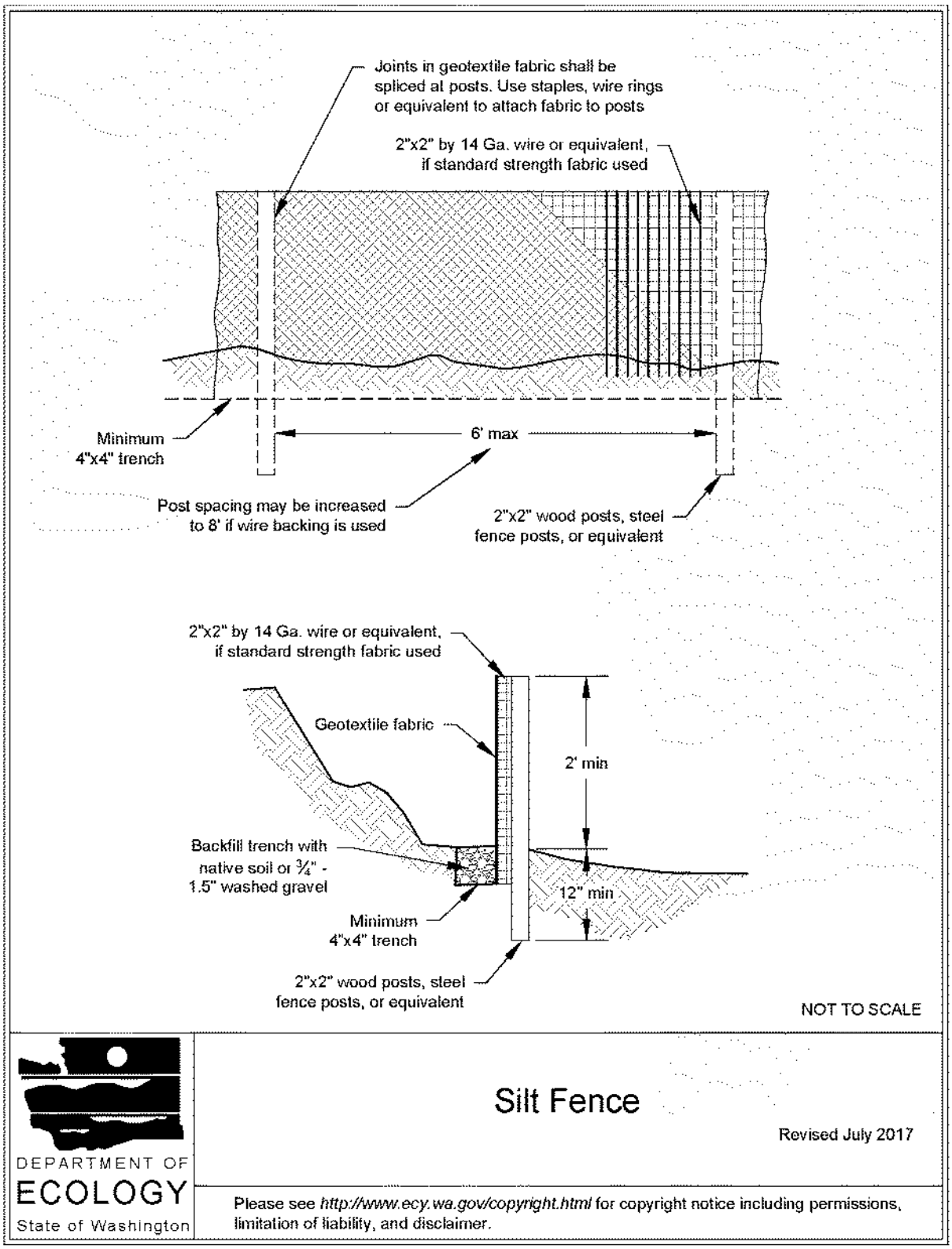
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Figure II-3.22: Silt Fence



Design and Installation Specifications

- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- Use geotextile fabric that meets the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table II-3.11: Geotextile Fabric Standards for Silt Fence):

Table II-3.11: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-3.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

    1. The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
    2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those

activities.

3. The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.

4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

5. Attach the geotextile fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.

6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the geotextile fabric up-slope of the mesh.

7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.

8. Bury the bottom of the geotextile fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.

9. Drive or place the silt fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.

10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:

    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.

11. Locate silt fences on contour as much as possible, except at the ends of the fence,

where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

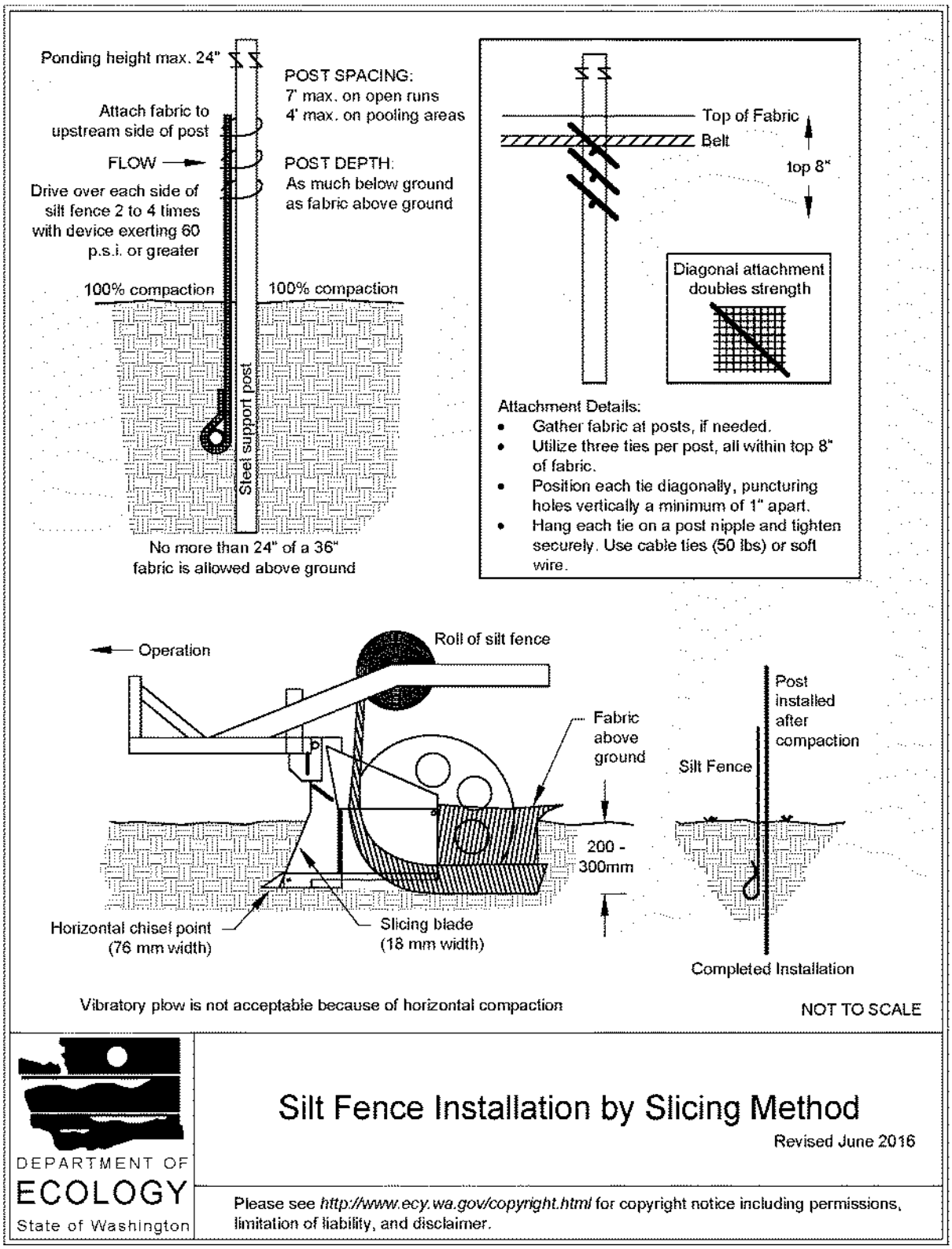
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

    - Check dams shall be approximately 1-foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-3.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:

    1. The base of both end posts must be at least 2- to 4-inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
    3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8-inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6-inches of the geotextile fabric around the end posts and secure with 3 ties.
    7. No more than 24-inches of a 36-inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck the fabric deeper into the ground if necessary.

Figure II-3.23: Silt Fence Installation by Slicing Method



Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment trapping BMP.
- Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in netting made of natural plant fiber or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

Conditions of Use

- Wattles shall consist of cylinders of plant material such as weed-free straw, coir, wood chips, excelsior, or wood fiber or shavings encased within netting made of natural plant fibers unaltered by synthetic materials.
- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - On exposed soils during the period of short construction delays, or over winter months.
    - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, wattles are effective for one to two seasons.
- Prevent rilling beneath wattles by entrenching and overlapping wattles to prevent water from passing between them.

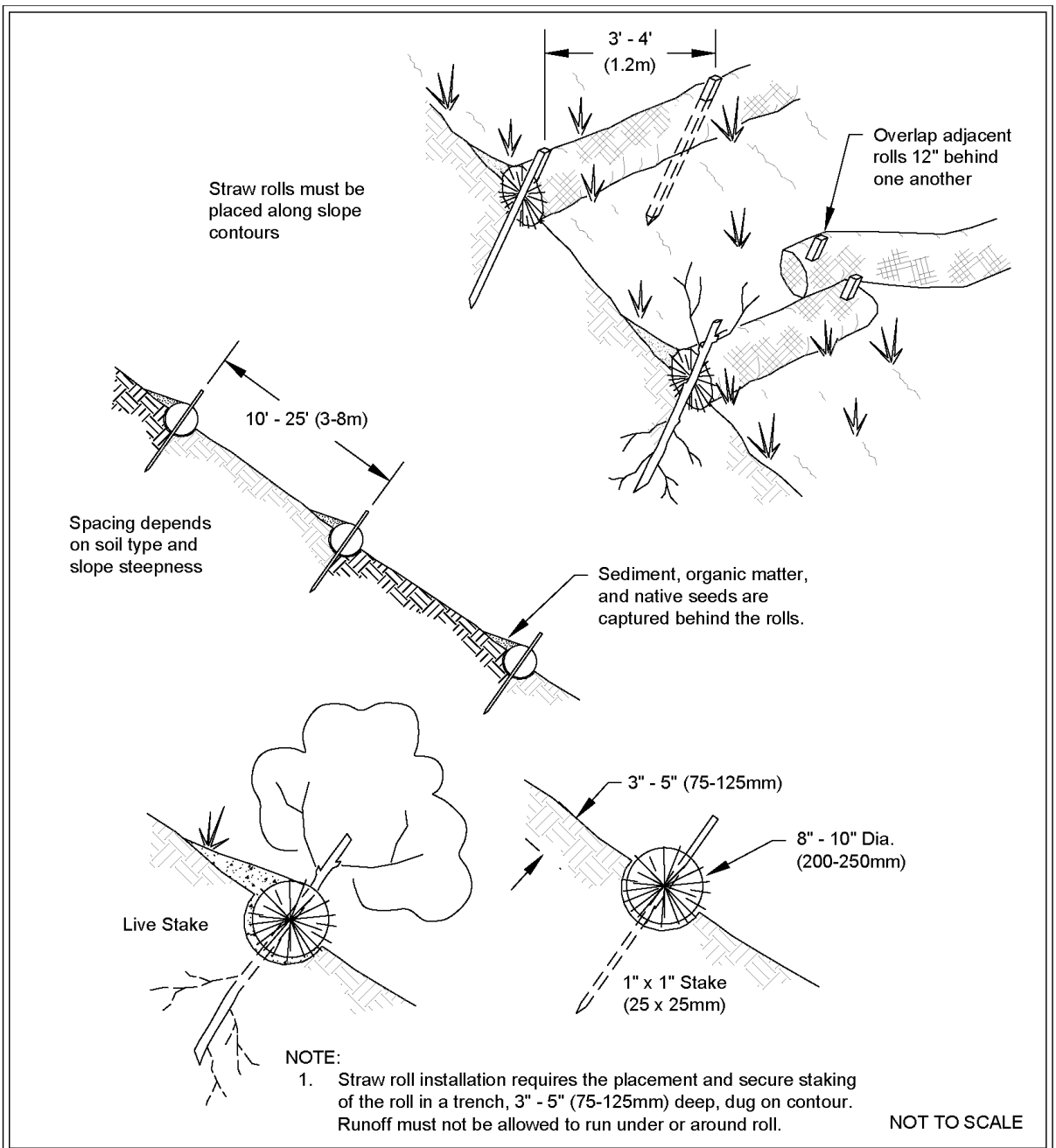
Design Criteria

- See Figure II-3.24: Wattles for typical construction details.
- Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.
- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Place wattles in shallow trenches, staked along the contour of disturbed or newly constructed slopes. Dig narrow trenches across the slope (on contour) to a depth of 3- to 5-inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5- to 7- inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact it using hand tamping or other methods.
- Construct trenches at intervals of 10- to 25-feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and overlap the ends of adjacent wattles 12 inches

behind one another.

- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 0.75 x 0.75 x 24 inches min. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Figure II-3.24: Wattles



NOTE:

1. Straw roll installation requires the placement and secure staking of the roll in a trench, 3" - 5" (75-125mm) deep, dug on contour. Runoff must not be allowed to run under or around roll.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Wattles

Revised December 2016

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.
- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C240: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use

- Sediment traps are intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the tributary area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Projects that are constructing permanent Flow Control BMPs, or Runoff Treatment BMPs that use ponding for treatment, may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment trap. When permanent BMP footprints are used as temporary sediment traps, the surface area requirement of the sediment trap must be met. If the surface area requirement of the sediment trap is larger than the surface area of the permanent BMP, then the sediment trap shall be enlarged beyond the permanent BMP footprint to comply with the surface area requirement.
- A floating pond skimmer may be used for the sediment trap outlet if approved by the Local Permitting Authority.
- Sediment traps may not be feasible on utility projects due to the limited work space or the short-term nature of the work. Portable tanks may be used in place of sediment traps for utility projects.

Design and Installation Specifications

- See Figure II-3.26: Cross Section of Sediment Trap and Figure II-3.27: Sediment Trap Outlet for details.
- To determine the sediment trap geometry, first calculate the design surface area (SA) of the trap, measured at the invert of the weir. Use the following equation:

$$SA = FS(Q_2/V_s)$$

where Q_2 =

  - Option 1 - Single Event Hydrograph Method:

Q_2 = Peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 2-year, 24-hour frequency storm for the developed condition. The 10-year peak volu- metric flow rate shall be used if the project size, expected timing and duration of con- struction, or downstream conditions warrant a higher level of protection.

  - Option 2 - For construction sites that are less than 1 acre, the Rational Method may be used to determine Q_2.

V_s = The settling velocity of the soil particle of interest. The 0.02 mm (medium silt) particle with an assumed density of 2.65 g/cm3 has been selected as the particle of interest and has a set- tling velocity (Vs) of 0.00096 ft/sec.

FS = A safety factor of 2 to account for non-ideal settling.

Therefore, the equation for computing sediment trap surface area becomes:

$$SA = 2 \times Q_2/0.00096$$

or

2080 square feet per cfs of inflow

- Sediment trap depth shall be 3.5 feet minimum from the bottom of the trap to the top of the overflow weir.
- To aid in determining sediment depth, all sediment traps shall have a staff gauge with a prom- inent mark 1-foot above the bottom of the trap.
- Design the discharge from the sediment trap by using the guidance for discharge from tem- porary sediment ponds in BMP C241: Sediment Pond (Temporary).

Maintenance Standards

- Sediment shall be removed from the trap when it reaches 1-foot in depth.
- Any damage to the trap embankments or slopes shall be repaired.

Figure II-3.26: Cross Section of Sediment Trap

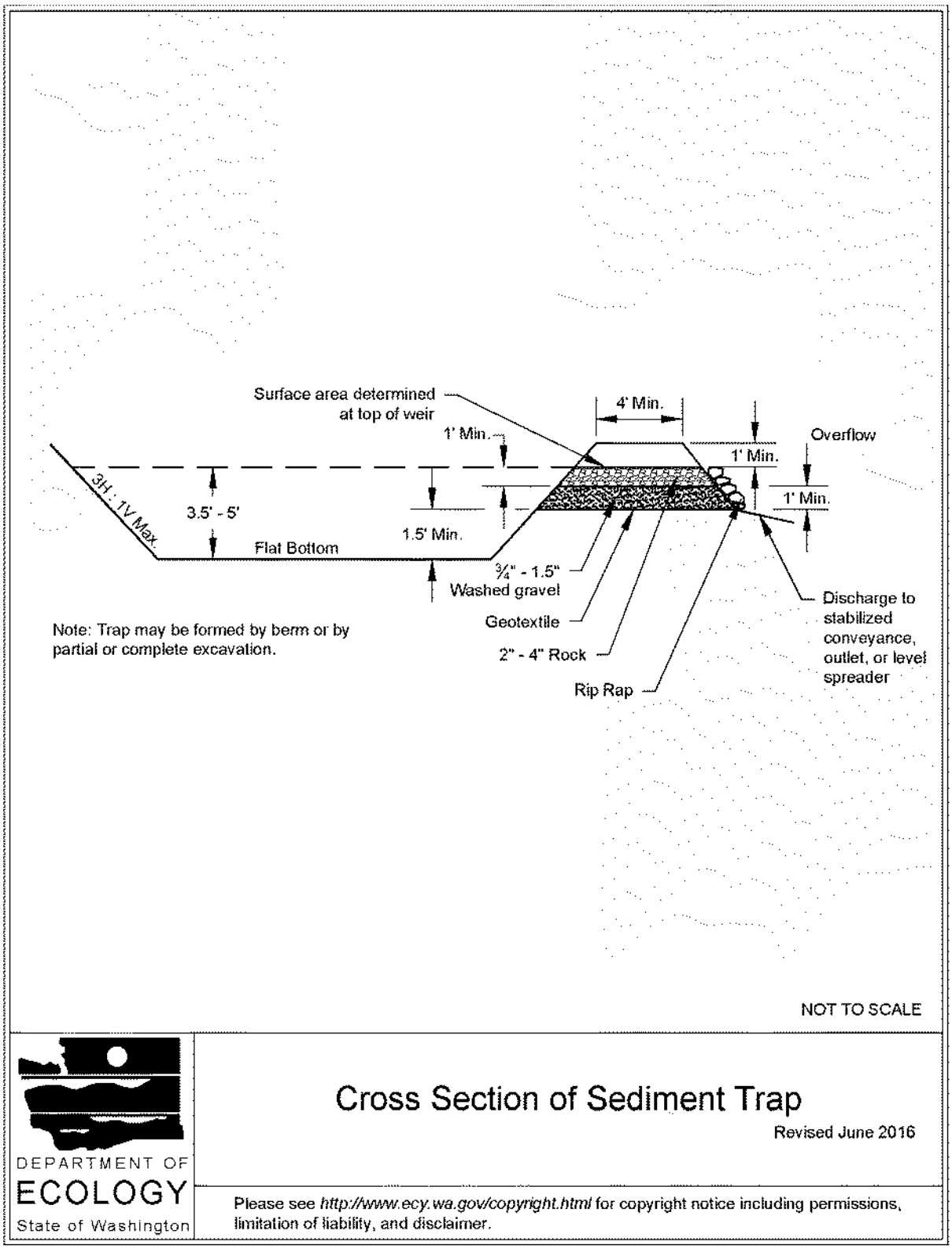
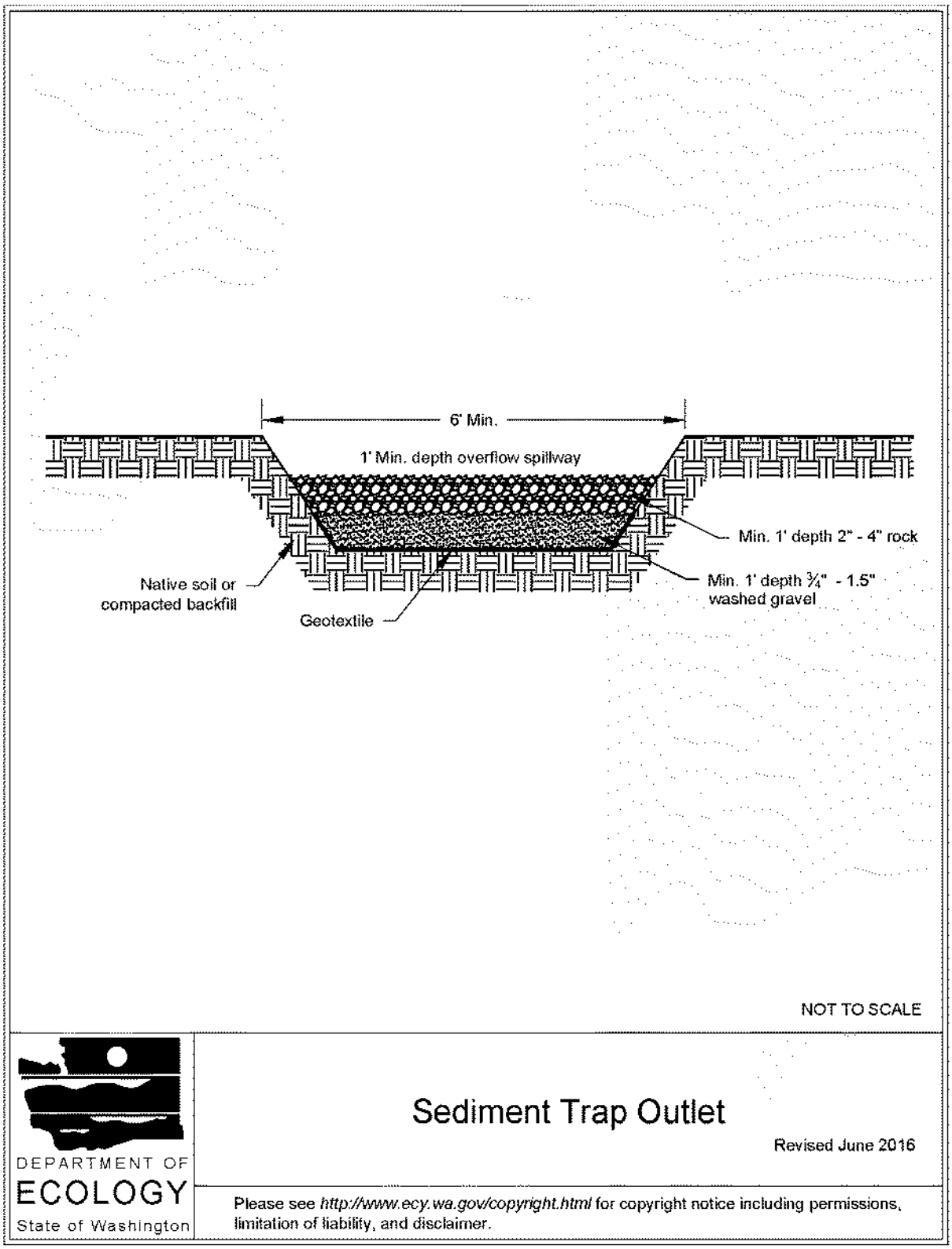


Figure II-3.27: Sediment Trap Outlet



BMP C241: Sediment Pond (Temporary)

Purpose

Sediment ponds are temporary ponds used during construction to remove sediment from runoff originating from disturbed areas of the project 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

- Use a sediment pond where the contributing drainage area to the pond is 3 acres or more. Ponds must be used in conjunction with other Construction Stormwater BMPs to reduce the amount of sediment flowing into the pond.
- Do not install sediment ponds on sites where failure of the BMP would result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment ponds are attractive to children and can be dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, show the type of fence and its location on the drawings in the Construction SWPPP.
- Sediment ponds that can impound 10 acre-ft (435,600 cu-ft, or 3.26 million gallons) or more, or have an embankment of more than 6 feet, are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC). See BMP D.1: Detention Ponds for more information regarding dam safety considerations for detention ponds.
- Projects that are constructing permanent Flow Control BMPs or Runoff Treatment BMPs that use ponding for treatment may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment pond. When permanent BMP footprints are used as temporary sediment ponds, the surface area requirement of the temporary sediment pond must be met. If the surface area requirement of the sediment pond is larger than the surface area of the permanent BMP, then the sediment pond shall be enlarged beyond the permanent BMP footprint to comply with the surface area requirement.

The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the temporary sediment pond from the surface or by pumping. Alternatively, the permanent control structure may used if it is temporarily modified by plug- ging any outlet holes below the riser. The permanent control structure must be installed as part of the permanent BMP after the site is fully stabilized.

Design and Installation Specifications

General

- See Figure II-3.28: Sediment Pond Plan View, Figure II-3.29: Sediment Pond Cross Section, and Figure II-3.30: Sediment Pond Riser Detail for details.
- Use of permanent infiltration BMP footprints for temporary sediment ponds during

construction tends to clog the soils and reduce their capacity to infiltrate. If permanent infilt- ration BMP footprints are used, the sides and bottom of the temporary sediment pond must only be rough excavated to a minimum of 2 feet above final grade of the permanent infiltration BMP. Final grading of the permanent infiltration BMP shall occur only when all contributing drainage areas are fully stabilized. Any proposed permanent pretreatment BMP prior to the infiltration BMP should be fully constructed and used with the temporary sediment pond to help prevent clogging of the soils. See Element 13: Protect Low Impact Development BMPs for more information about protecting permanent infiltration BMPs.

- The pond shall be divided into two roughly equal volume cells by a permeable divider that will reduce turbulence while allowing movement of water between the cells. The divider shall be at least one-half the height of the riser, and at least one foot below the top of the riser. Wire-backed, 2- to 3-foot high, high strength geotextile fabric supported by treated 4"x4"s can be used as a divider. Alternatively, staked straw bales wrapped with geotextile fabric may be used. If the pond is more than 6 feet deep, a different divider design must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent erosion under and around the divider.
- The most common structural failure of sediment ponds is caused by piping. Piping refers to two phenomena: (1) water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and, (2) water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.

The most critical construction practices to prevent piping are:

  - Tight connections between the riser and outlet pipe, and other pipe connections.
  - Adequate anchoring of the riser.
  - Proper soil compaction of the embankment and riser footing.
  - Proper construction of anti-seep devices.

Sediment Pond Geometry

To determine the sediment pond geometry, first calculate the design surface area (SA) of the pond, measured at the top of the riser pipe. Use the following equation:

$$SA = 2 \times Q_2/0.00096$$

or

2080 square feet per cfs of inflow

See BMP C240: Sediment Trap for more information on the above equation.

The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area SA (from the equation above) at the top of the riser.

- Minimum 3.5-foot depth from the top of the riser to the bottom of the 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.

Sediment Pond Discharge

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 storm. If, due to site conditions and basin geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. Base the runoff calculations on the site conditions during construction. The flow through the dewatering orifice cannot be utilized when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

The principal spillway designed by the procedures described below will result in some reduction in the peak rate of runoff. However, the design will not control the discharge flow rates to the extent required to comply with I-3.4.7 MR7: Flow Control. The size of the contributing basin, the expected life of the construction project, the anticipated downstream effects, and the anticipated weather conditions during construction should be considered to determine the need for additional discharge control.

Principal Spillway: Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the peak volumetric flow rate using a 15-minute time step from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Use Figure II- 3.31: Riser Inflow Curves to determine the riser diameter.

To aid in determining sediment depth, one-foot intervals shall be prominently marked on the riser.

Emergency Overflow Spillway: Size the emergency overflow spillway for the peak volumetric flow rate using a 10-minute time step from a Type 1A, 100-year, 24-hour frequency storm for the developed condition. See BMP D.1: Detention Ponds for additional guidance for Emergency Overflow Spillway design

Dewatering Orifice: Size of the dewatering orifice(s) (minimum 1-inch diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

$$A_o = \frac{A_S(2h)^{0.5}}{0.6\times 3600 Tg^{0.5}}$$

where

A_o = orifice area (square feet)

A_S = pond surface area (square feet)

h = head of water above orifice (height of riser in feet) T

= dewatering time (24 hours)

g = acceleration of gravity (32.2 feet/second^2)

Convert the orifice area (in square feet) to the orifice diameter D (in inches):

$$D = 24 \times \sqrt{\frac{A_o}{\pi}} = 13.54 \times \sqrt{A_o}$$

The vertical, perforated tubing connected to the dewatering orifice must be at least 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

Figure II-3.28: Sediment Pond Plan View

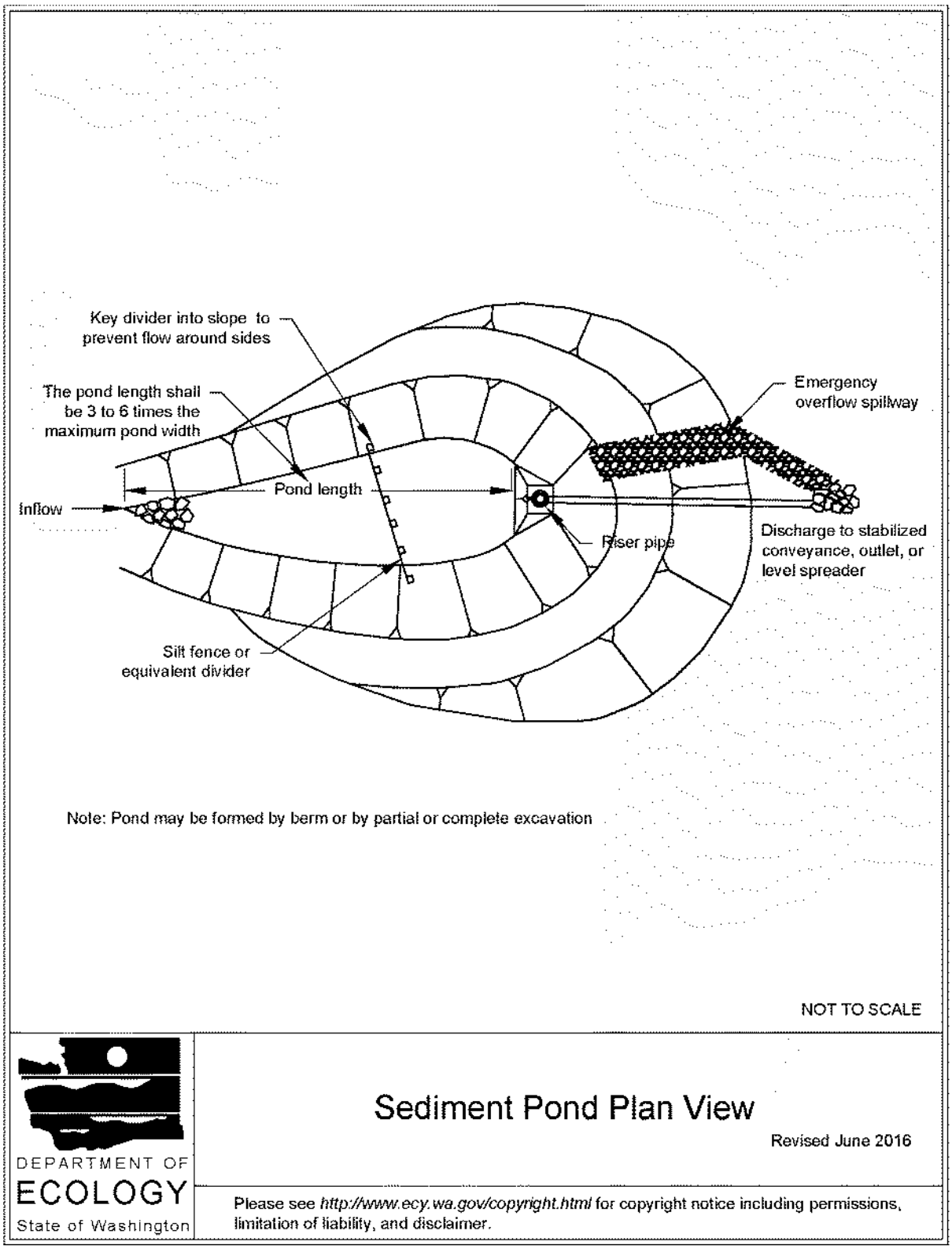


Figure II-3.29: Sediment Pond Cross Section

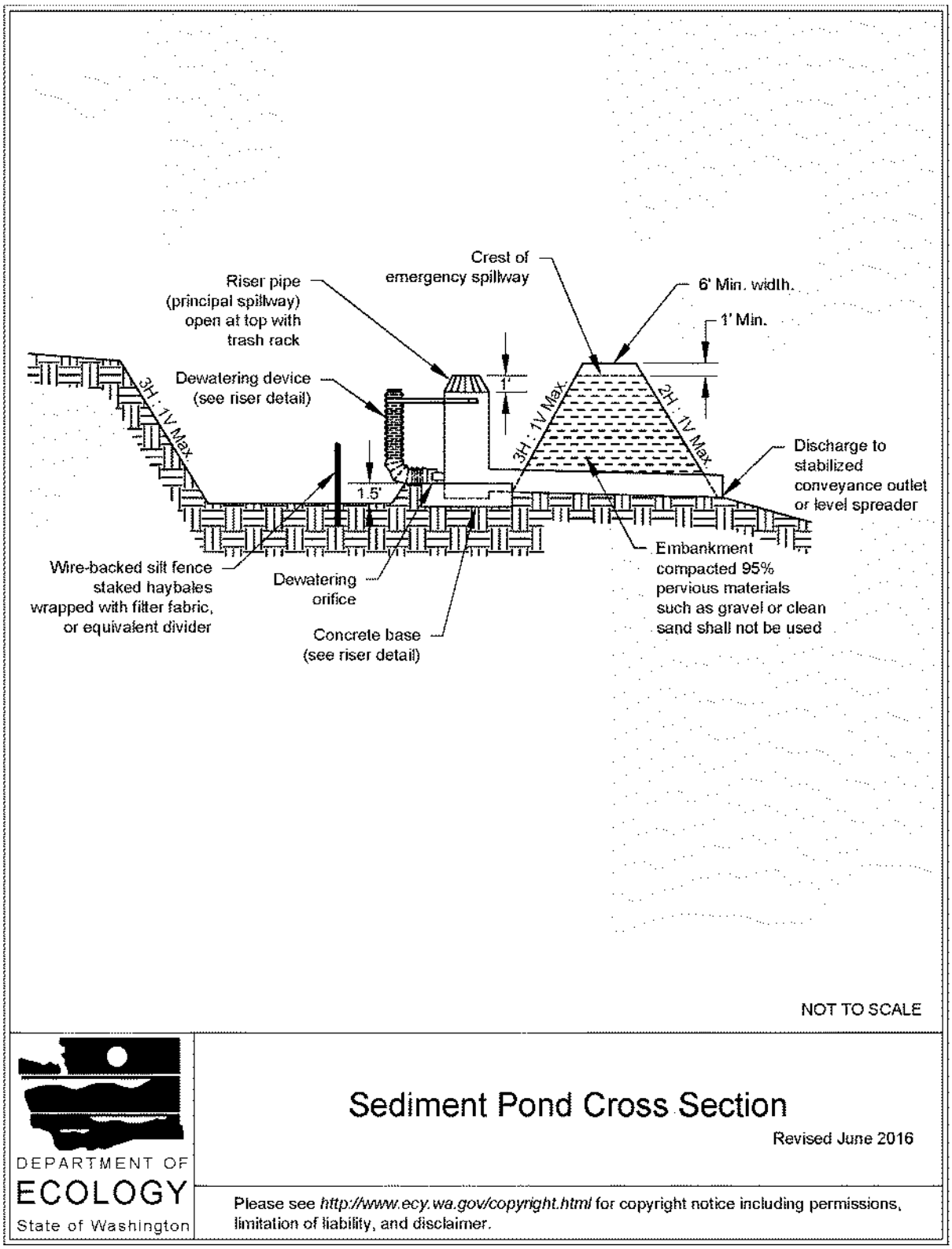


Figure II-3.30: Sediment Pond Riser Detail

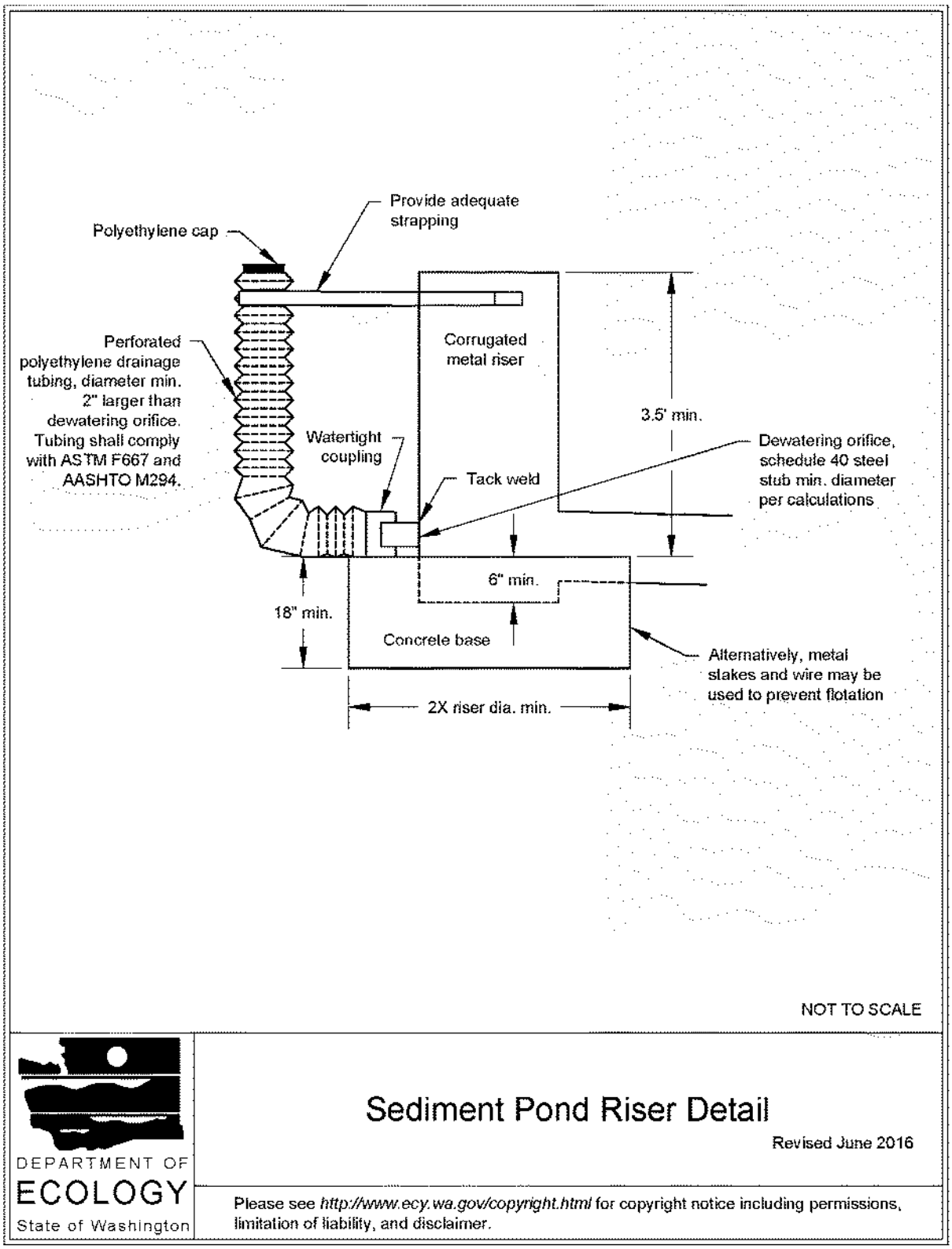
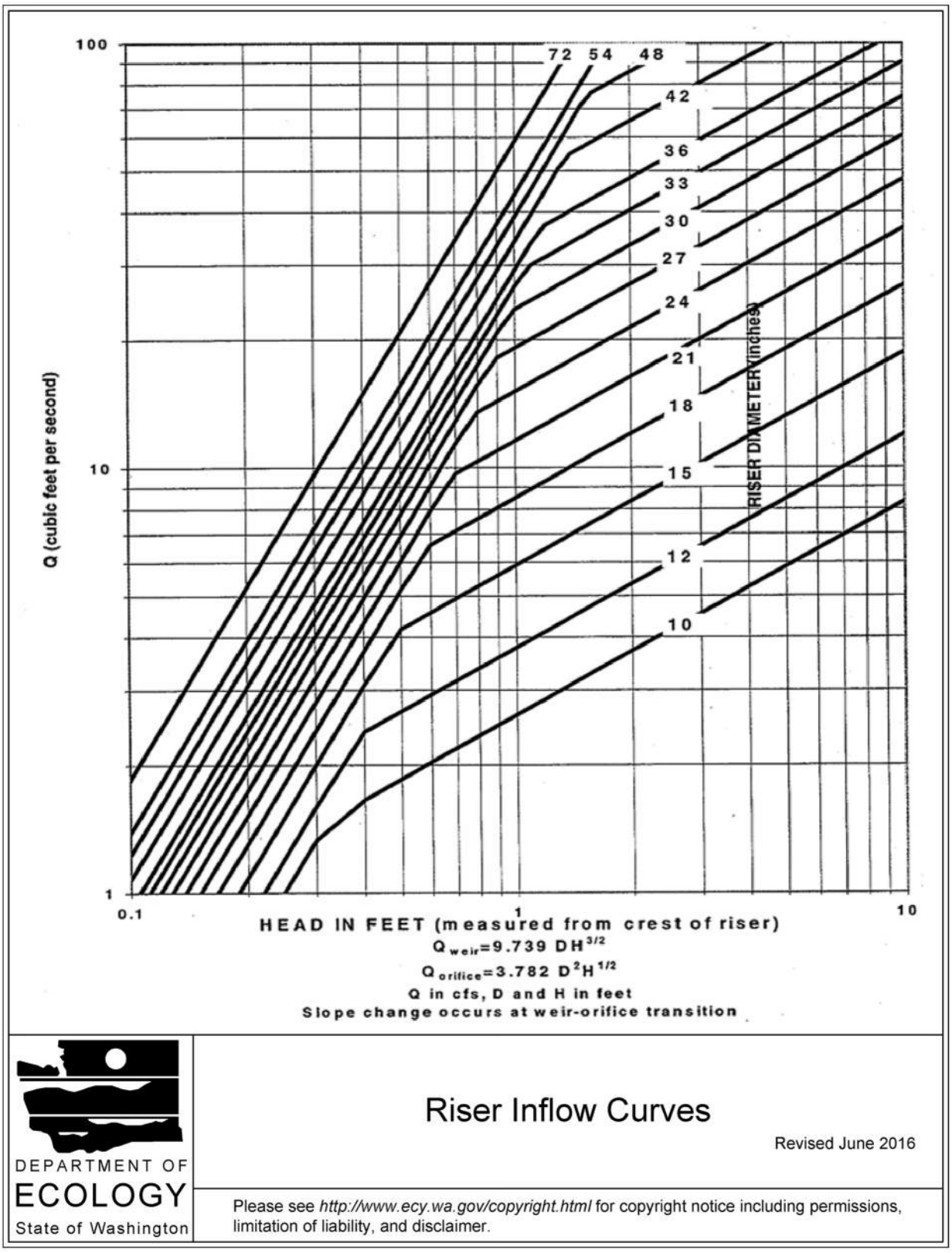


Figure II-3.31: Riser Inflow Curves



DEPARTMENT OF ECOLOGY
State of Washington

Riser Inflow Curves

Revised June 2016

Maintenance Standards

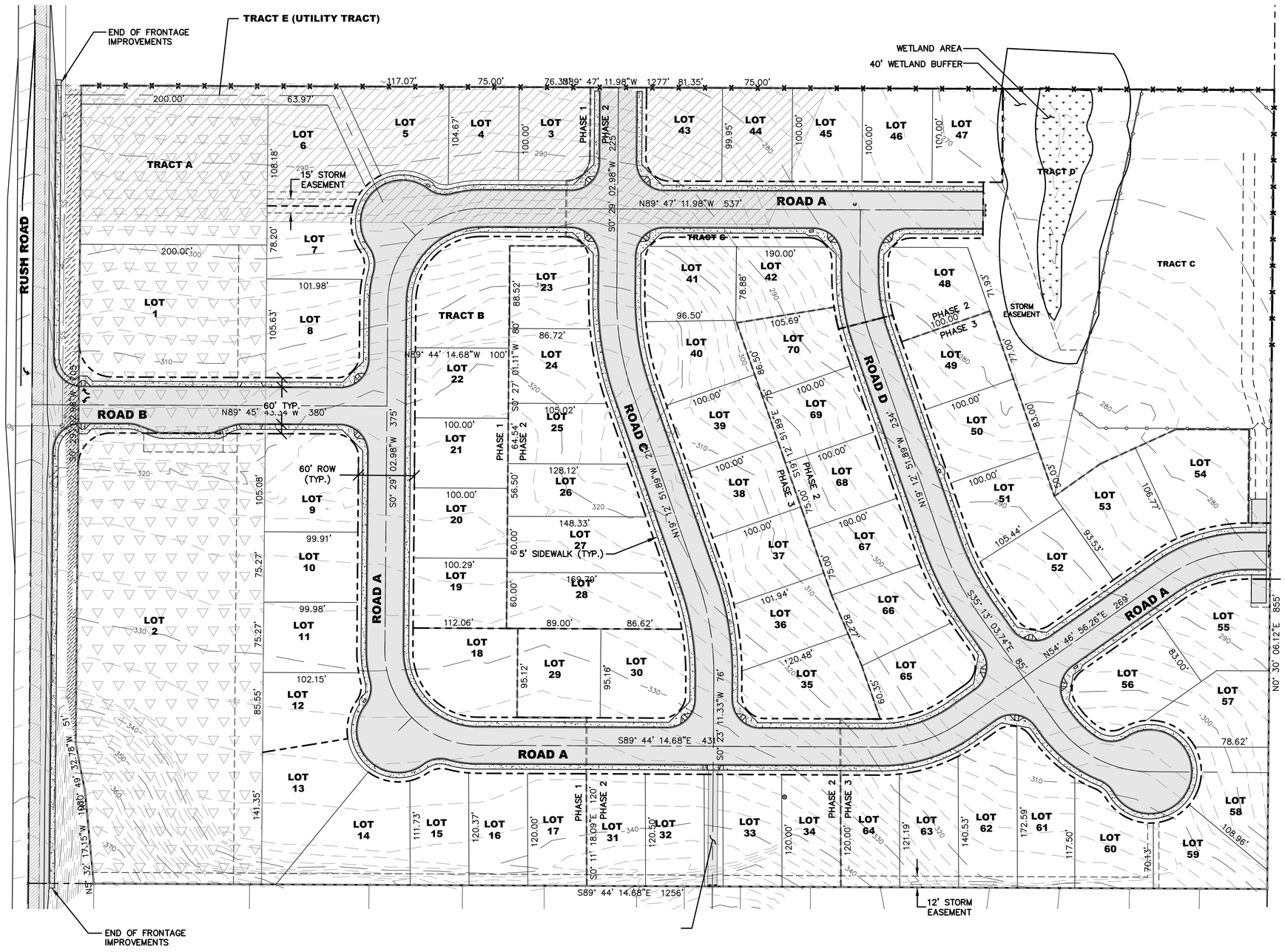
- Remove sediment from the pond when it reaches 1 foot in depth.
- Repair any damage to the pond embankments or slopes.

APPENDIX 6 – DRAINAGE AND TESC PLANS

ROGNLIN'S RUSH RD PLAT

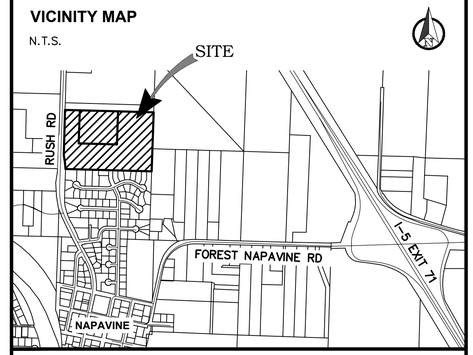
SECTION 26, TOWNSHIP 13 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON

SCALE: 1"=60 FEET
0 30 60 120



VICINITY MAP

N.T.S.



PROJECT INFORMATION

APPLICANT:	ROGNLIN PROPERTIES LLC RANDY ROGNLIN PO BOX 307 ABERDEEN, WA 98520 (360) 532 5220 RANDY@ROGNLINS.COM
PARCEL NOS:	018152003000 018152004000
SITE ADDRESS:	1054 RUSH RD NAPAVINE, WA 98565
ZONING:	R3
TOTAL SITE AREA:	25.21
GRADING:	XX± CY FILL
SOILS:	LACAMAS SILT LOAM PRATHER SILTY CLAY LOAM SCAMMAN SILTY CLAY LOAM
SANITARY SEWER:	CITY OF NAPAVINE
WATER:	CITY OF NAPAVINE
FIRE DISTRICT:	LEWIS COUNTY

SHEET INDEX

HATCH KEY

- NEW ASPHALT PAVING
- WETLAND AREA
  9,190 SF (0.21 AC)
- EXISTING COMMERCIAL ZONE
  2.41 AC
- NEW COMMERCIAL ZONE
  3.5 AC
  2.81 AC (NET)

NO.	DATE	REVISION

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY: RWB
DATE: 5/25/22
SCALE: 1" = 60'

RUSH ROAD NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

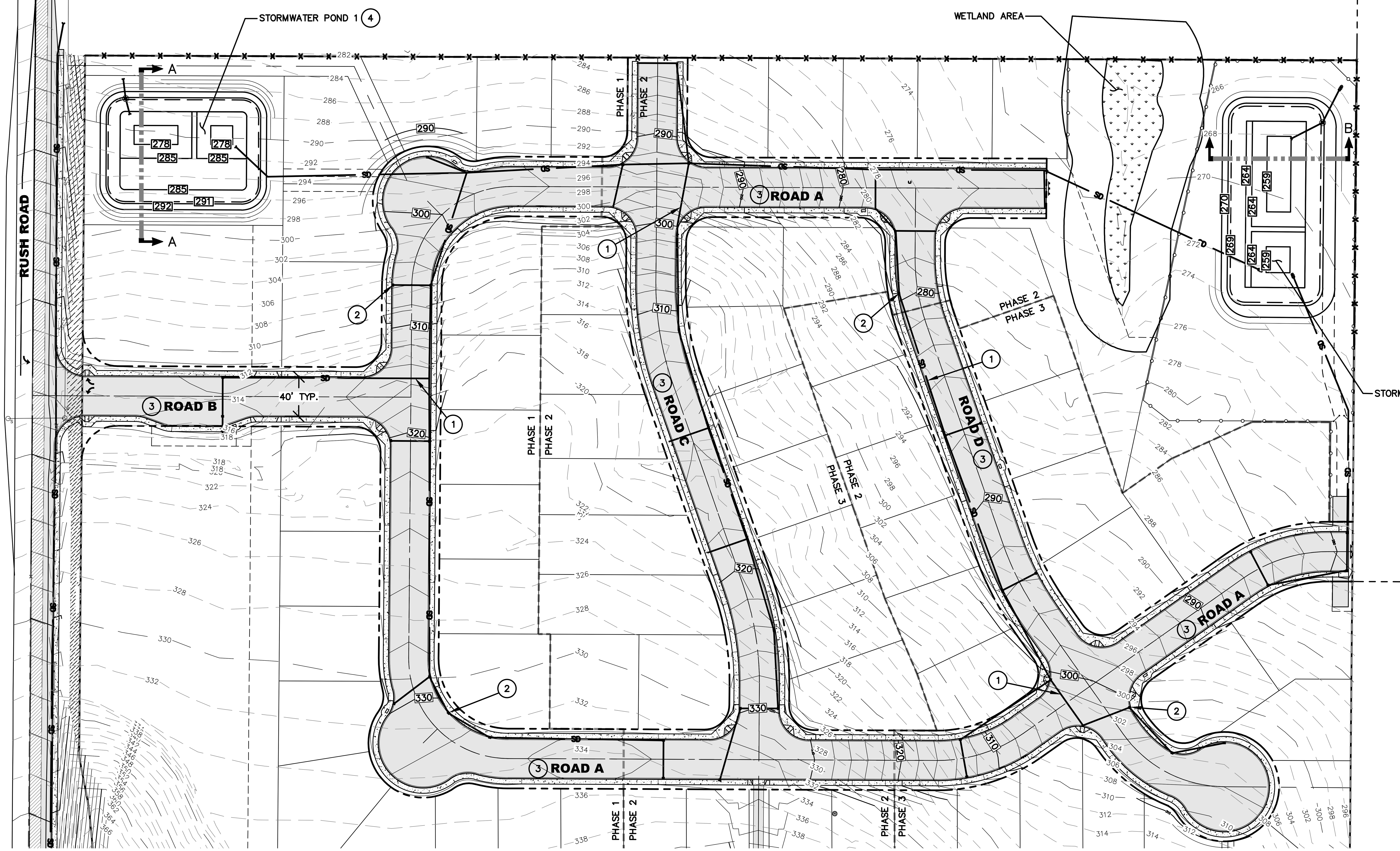
CIVIL COVER AND SITE PLAN

ROBERT W. BALLEW — STATE OF WASHINGTON — 21118 — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
CIVIL ENGINEERING - LAND PLANNING - UTILITIES
P.O. Box 923
OMEGA, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

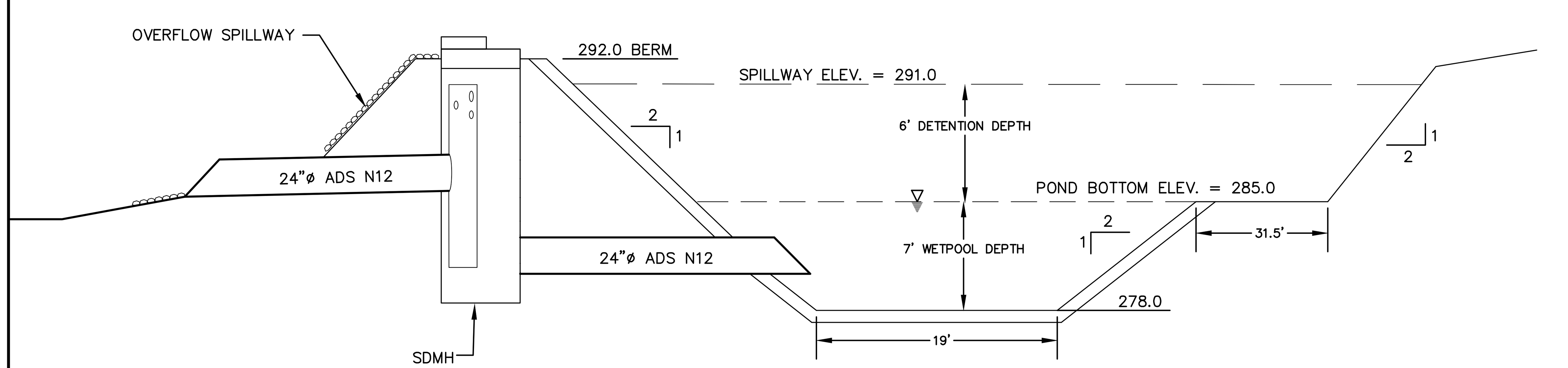
JOB NUMBER 21118
DRAWING NAME 21118_CVR

C0.1
1 OF 3



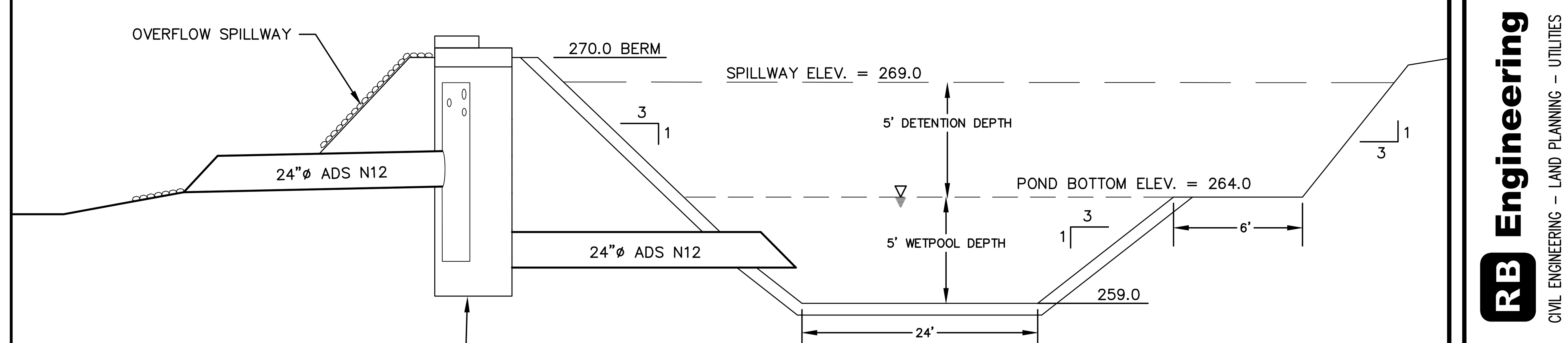
GRADING AND DRAINAGE NOTES:

1. INSTALL 12" ADS N-12 OR EQUAL STORM DRAIN PIPE.
2. INSTALL TYPE 1 CATCH BASINS (TYP.).
3. ALL ROAD SECTIONS TO BE CROWNED.
4. STORMWATER POND 1 SIZED TO ACCOMMODATE FOR PHASE 1 CONSTRUCTION.
5. STORMWATER POND 2 TO ACCOMMODATE FOR PHASE 2 AND 3 CONSTRUCTION.



(A) STORMWATER POND 1 SECTION
N.T.S.

RB ENGINEERING
SEDIMENT POND.dwg



(B) STORMWATER POND 2 SECTION
N.T.S.

NO.	DATE	REVISION

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY: RWB
DATE: 5/25/22
SCALE: 1" = 60'

RUSH ROAD NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

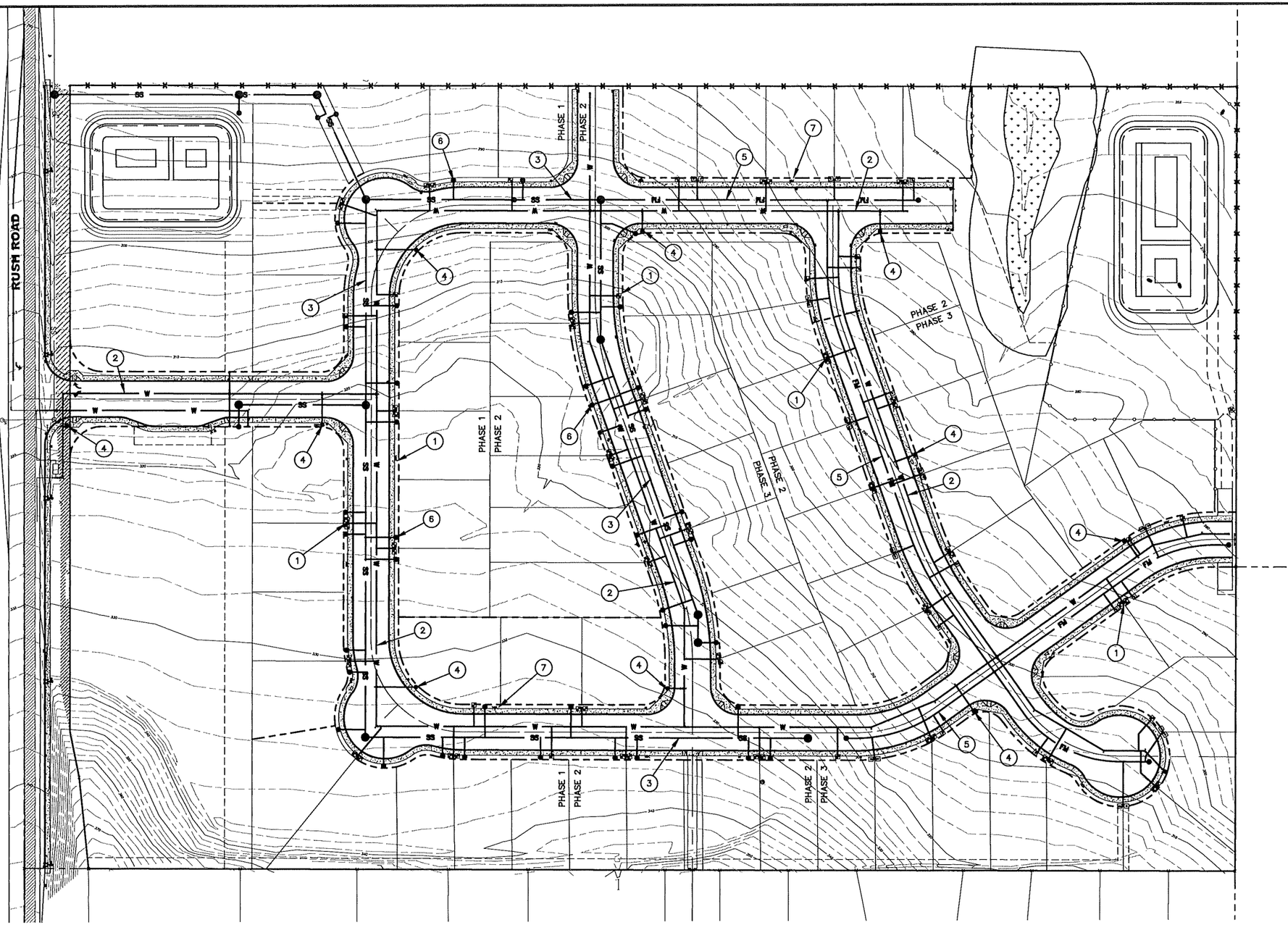
PRELIMINARY GRADING PLAN

RB Engineering
CIVIL ENGINEERING – LAND PLANNING – UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

JOB NUMBER
21118

DRAWING NAME
21118_PGDPL

C1.0
2 OF 3



UTILITY NOTES:

1. PROPOSED NEW WATER SERVICE METER (TYP.).
2. PROPOSED NEW 8" C900 PVC WATER MAIN.
3. PROPOSED NEW 8" SDR 35 SEWER PIPE.
4. PROPOSED NEW FIRE HYDRANT.
5. PROPOSED NEW 2" SEWER FORCE MAIN.
6. PROPOSED NEW SEWER CLEANOUT (TYP.).
7. PROPOSED NEW STREET LIGHT (TYP.)

NO.	DATE	REVISION

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY: RWB
DATE: 5/25/22
SCALE: 1" = 60'

RUSH ROAD
NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

PRELIMINARY UTILITY PLAN

ROBERT W. BAKER
STATE OF WASHINGTON
21118
REGISTERED PROFESSIONAL ENGINEER

RB Engineering
CIVIL ENGINEERING - LAND PLANNING - UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

JOB NUMBER 21118
DRAWING NAME 21118_PUTPL

C2.0
3 OF 3

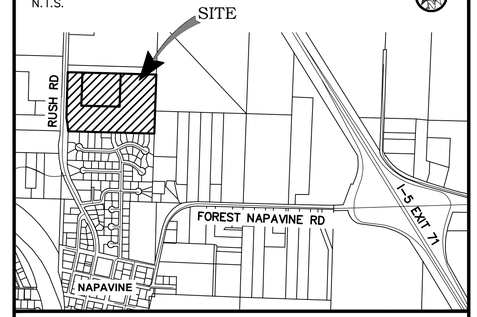
ROGNLIN'S RUSH RD PLAT

SECTION 26, TOWNSHIP 13 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON

SCALE: 1"=60 FEET
0 30 60 120

VICINITY MAP

N.T.S.



PROJECT INFORMATION

APPLICANT:	ROGNLIN PROPERTIES LLC RANDY ROGNLIN PO BOX 307 ABERDEEN, WA 98520 (360) 532 5220 RANDY@ROGNLINS.COM
PARCEL NOS:	018152003000 018152004000
SITE ADDRESS:	1054 RUSH RD NAPAVINE, WA 98565
ZONING:	R3
TOTAL SITE AREA:	25.21
GRADING:	XX± CY FILL
SOILS:	LACAMAS SILT LOAM PRATHER SILTY CLAY LOAM SCAMMAN SILTY CLAY LOAM
SANITARY SEWER:	CITY OF NAPAVINE
WATER:	CITY OF NAPAVINE
FIRE DISTRICT:	LEWIS COUNTY

SHEET INDEX

HATCH KEY

- NEW ASPHALT PAVING
- WETLAND AREA 9,190 SF (0.21 AC)
- EXISTING COMMERCIAL ZONE 2.41 AC
- NEW COMMERCIAL ZONE 3.5 AC 2.81 AC (NET)

NO.	DATE	REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT
CITY OF NAPAVINE WA.

CIVIL COVER AND SITE PLAN

ROBERT W. BALLARD — STATE OF WASHINGTON — 21118 — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
OAKHARS, WA 98532
OFF: (360) 740-8819
EMAIL: CivilProjects@rbengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 21118
DRAWING NAME 21118_CVR

C0.1
1 OF 7

SCALE: 1"=60 FEET

0 30 60 120

SINGH RAI, AMARJIT & GURJIT
TPN: 018152001000

N89° 47' 11.98"W 1292'

EXISTING EASTERLY R/W LINE
(40' EAST OF RUSH ROAD ℄)

PROPOSED EASTERLY R/W DEDICATION
(50' EAST OF RUSH ROAD CENTERLINE)

N0° 29' 02.98"E, 354.60'

ROGNLIN PROPERTIES, LLC
TPN: 018152003000

EXISTING GRAVEL DRIVEWAY

N2° 22' 41.68"W
100.14'

RUSH ROAD
(EXIST. R/W WIDTH VARIES)

N0° 29' 02.98"E 200.00'

EXISTING STRUCTURES
TO BE REMOVED

ROGNLIN PROPERTIES, LLC
TPN: 018152004000

N10°49'27.8"W
51.00'

N53°17'15"W
100.00'

STANDARD 40' BUFFER

CAT. IV WETLAND AS DELINEATED
BY ENVIRONMENTAL DESIGN XX/XX/XXXX

SINGH RAI, AMARJIT & GURJIT
TPN: 018140001000

N0° 30' 06.12"E 855'

KALICH, GARY H & JUDY W
TPN: 018151003000

S89° 44' 14.68"E 1256'

A B C D E F 60' R/W G H I J K L M

WILDWOOD AVENUE NE

ADJACENT PROPERTY OWNERS		
LABEL	OWNER	TPN
A	LHI INVESTMENTS, LLC.	008250001012
B	GARCIA, FERNANDO E & JUANA C	008250001013
C	PEA, JAMES & WENDY	008250001013
D	ROLLO, CHARLES J & RUTH L	008250001015
E	CITY OF NAPAVINE	008250001034
F	CITY OF NAPAVINE	ROAD ROW
G	FOOTE, KENNETH L & SHARON L TETRAULT—	008250001017
H	LHI INVESTMENTS, LLC.	008250001018
I	LHI INVESTMENTS, LLC.	008250001019
J	LHI INVESTMENTS, LLC.	008250001020
K	RICHTER, PATRICK & CRIST, RAVEN	008250001021
L	LANDRUM, JEREMY & NATASHA	008250001022
M	SHEAROUSE, JASON	008250001023

NO. DATE REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT

CITY OF NAPAVINE WA.

EXISTING SITE CONDITIONS

ROBERT W. BALLARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923 CHEHALIS, WA 98532
OFF: (360) 740-6919
EMAIL: CivilProjectMgt@rbengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 21118

DRAWING NAME C0.2_ESP

C0.2

2 OF 7

STORMWATER POND 1 (4)

WETLAND AREA

STORMWATER POND 2 (5)

RUSH ROAD

ROAD A

ROAD B

ROAD C

ROAD D

PHASE 1

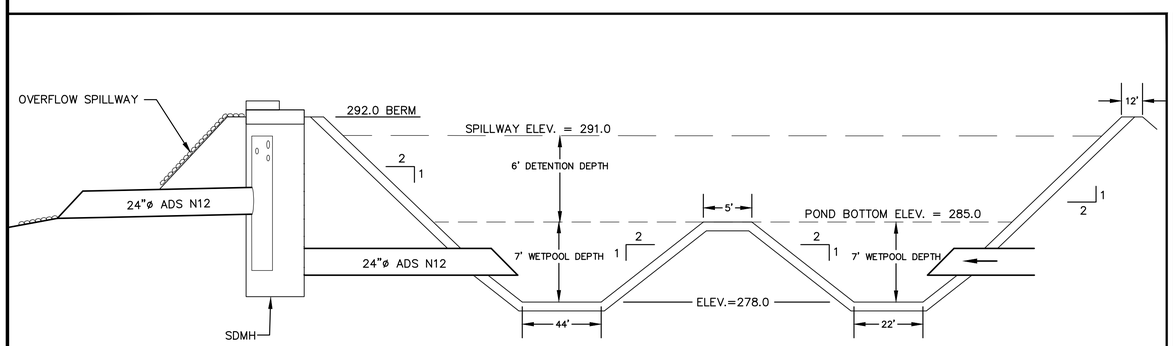
PHASE 2

PHASE 3

SCALE: 1"=60 FEET
0 30 60 120

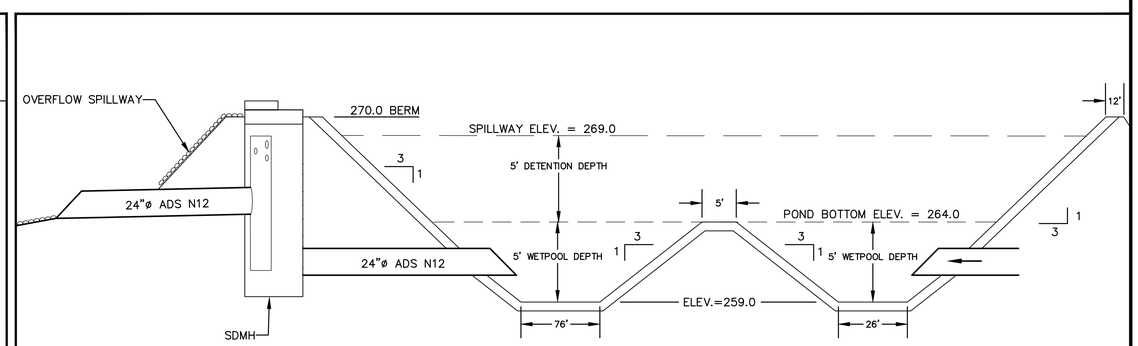
GRADING AND DRAINAGE NOTES:

1. INSTALL 12" ADS N-12 OR EQUAL STORM DRAIN PIPE.
2. INSTALL TYPE 1 CATCH BASINS (TYP.).
3. ALL ROAD SECTIONS TO BE CROWNED.
4. STORMWATER POND 1 SIZED TO ACCOMMODATE FOR PHASE 1 CONSTRUCTION.
5. STORMWATER POND 2 TO ACCOMMODATE FOR PHASE 2 AND 3 CONSTRUCTION.



A **STORMWATER POND 1 SECTION**
N.T.S.

RB ENGINEERING
SEDIMENT POND.dwg



B **STORMWATER POND 2 SECTION**
N.T.S.

RB ENGINEERING
SEDIMENT POND.dwg

NO.	DATE	REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT

CITY OF NAPAVINE WA.

PRELIMINARY GRADING PLAN

ROBERT W. BAKER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF.: (360) 740-8919
EMAIL: CWProtect@rbengineers.com

811 Know what's below. Call 811 before you dig.

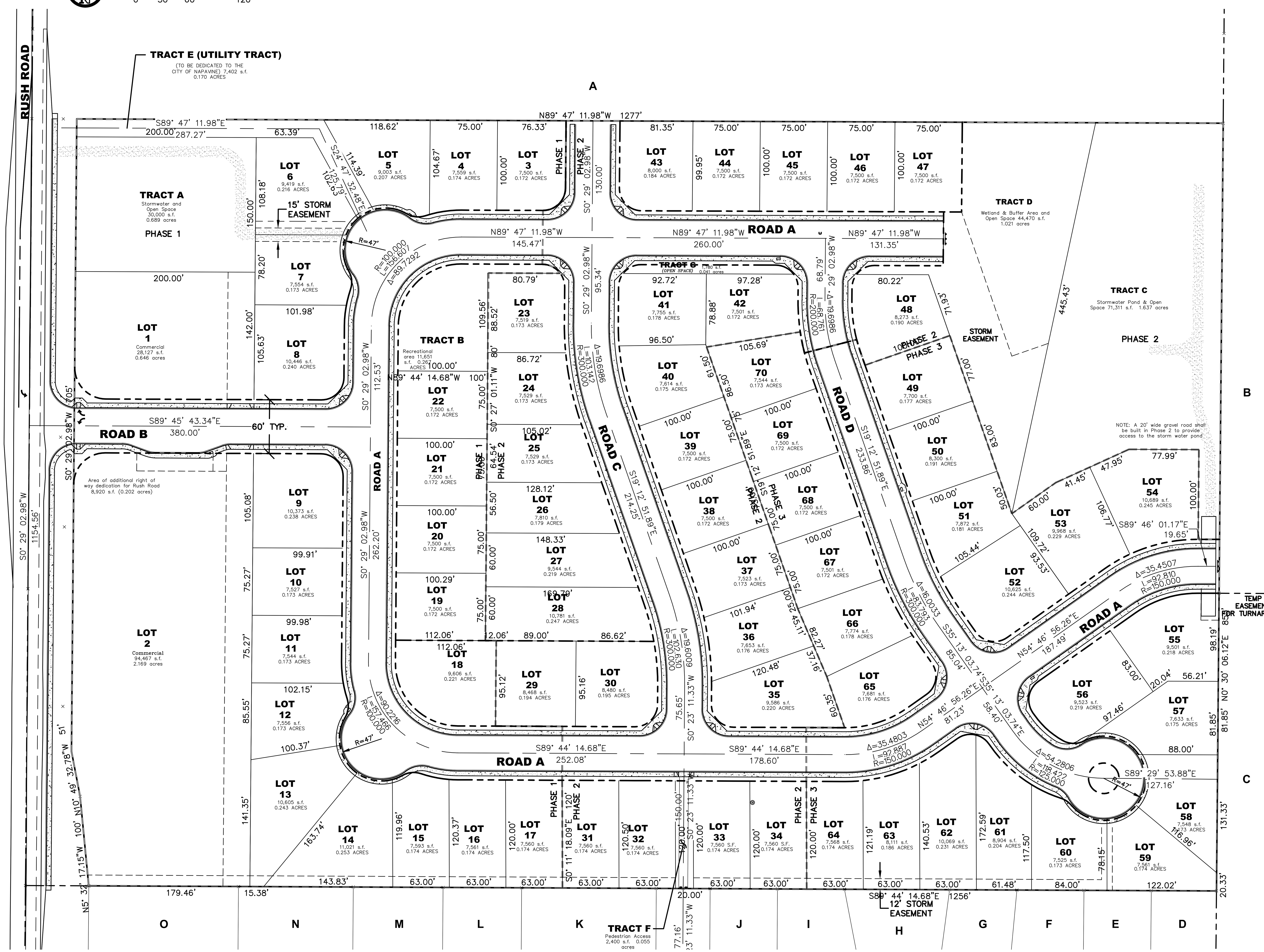
JOB NUMBER 21118

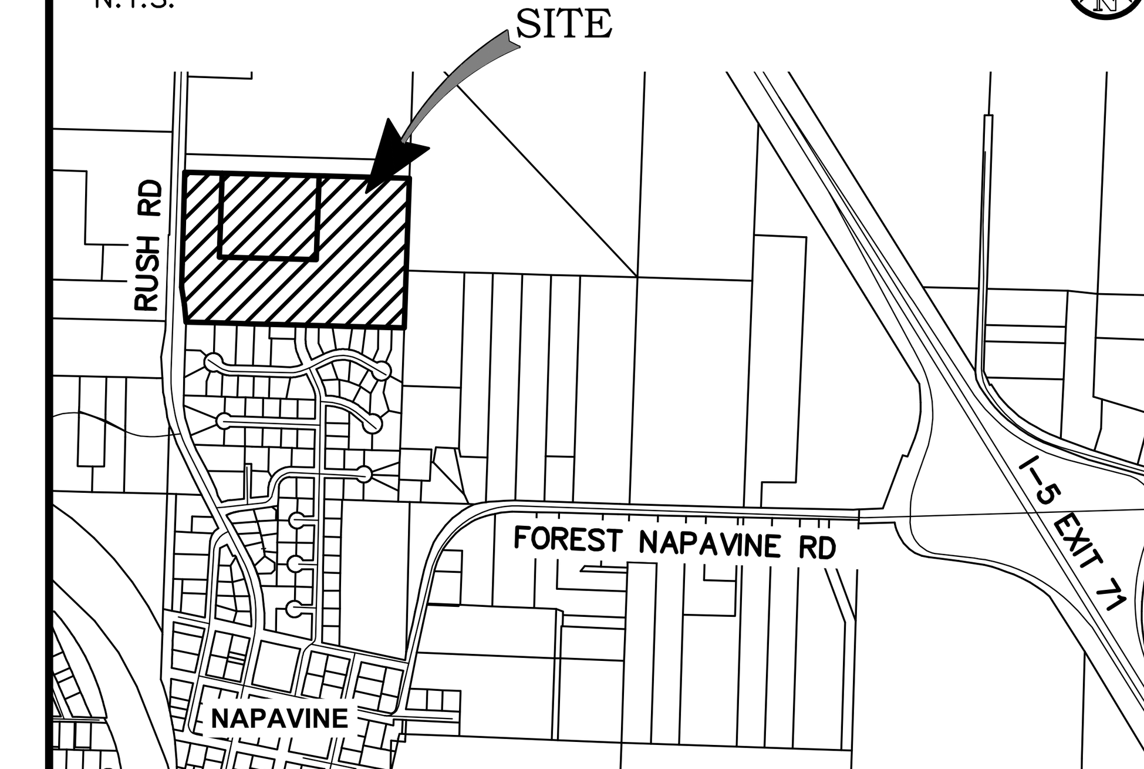
DRAWING NAME 21118_PGDPL

C1.0
3 OF 7

ROGNLIN'S RUSH RD PLAT

SECTION 26, TOWNSHIP 13 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON





PROJECT INFORMATION

APPLICANT:	ROGNLIN PROPERTIES LLC RANDY ROGNLIN PO BOX 307 ABERDEEN, WA 98520 (360) 532 5220 RANDY@ROGNLINS.COM
PARCEL NOS:	018152003000 018152004000
SITE ADDRESS:	1054 RUSH RD NAPAVINE, WA 98565
ZONING:	R3
SITE AREA:	25.21 AC. TOTAL 2.81 AC. COMMERCIAL 22.4 AC. RESIDENTIAL (GROSS)
PROPOSED LOTS:	70 LOTS 3.1 DU/AC (GROSS)
LOT SIZE:	MIN: 0.172 AC MAX: 2.169 AC AVE: 0.232 AC
SOILS:	LACAMAS SILT LOAM PRATHER SILTY CLAY LOAM SCAMMAN SILTY CLAY LOAM
SANITARY SEWER:	CITY OF NAPAVINE
WATER:	CITY OF NAPAVINE
FIRE DISTRICT:	LEWIS COUNTY

ADJACENT PARCEL OWNERS

LOT	PARCEL #	OWNER
A	018152001000	AMARJIT & GURJIT SINGH RAI
B	018140001000	AMARJIT & GURJIT SINGH RAI
C	018151003000	GARY & JUDY KALICH
D	008250001023	JASON SHEAROUSE
E	008250001022	JEREMY & NATASHA LANDRUM
F	008250001021	PATRICK RICHTER & RAVEN CRIST
G	008250001020	LHI INVESTMENTS LLC
H	008250001019	LHI INVESTMENTS LLC
I	008250001018	LHI INVESTMENTS LLC
J	008250001017	KENNETH & SHARON FOOTE
K	008250001034	CITY OF NAPAVINE
L	008250001015	CHARLES & RUTH POLLO
M	008250001014	JAMES & WENDY PEA
N	008250001013	FERNANDO & JUANA GARCIA
O	008250001012	LHI INVESTMENTS LLC

NO.	DATE	REVISION

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

RUSH ROAD NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

PRELIMINARY PLAT MAP

ROBERT W. BALMELLI — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
CIVIL ENGINEERING – LAND PLANNING – UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

JOB NUMBER 21118
DRAWING NAME 21118_PPM

P0.1
1 OF 1

SEPA Environmental Checklist – 2016 Version

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 of compensatory mitigation measure will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants: [help]

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 analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make and adequate threshold determination. Once the threshold determinate is made, the leas agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for non-project proposals: [help]

For non project proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NON PROJECT 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: [help]

   Rognlin's Rush Rd Plat

   RBE Project No. 21118

2. Name of applicant: [help]

   Randy Rognlin - Rognlin Properties LLC

3. Address and phone number of applicant and contact person: [help]

   PO Box 307
   Aberdeen, WA 98520

4. Date checklist prepared:[help]

May 16, 2022

5. Agency requesting checklist: [help]

City of Napavine

6. Proposed timing or schedule (including phasing, if applicable): [help]

The plat would be developed in three divisions. Initial construction depends on timing of permits. Site grading will be done during summer months.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. [help]

No.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [help]

A Wetland Report is being prepared by Environmental Designs, a Geotech Report is being prepared by Riley Group and Transportation Analysis by Jake Traffice..

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. [help]

None known.

10. List any government approvals or permits that will be needed for your proposal, if known. [help]

This project will include the following permits: NPDES Construction Permit, Grading, Site Development Permit, Prelminary & Final Plat and Right-of-Way access permit.

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.) [help]

The project is a 68-lot moderate density plat for single family detached housing in the three divisions. The plat will provide two commercial zoned lots fronting Rush Road, and six open space tracts for critical areas, stormwater and access / recreation.The project will provide new streets, lighting, frontage improvements and utility extensions to all lots.

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. [help]

Property Address(s) is 1054 & 0 Rush Rd, Napvine WA 98565, Parcel No.(s) 018152003000 & 018152004000, Section 26, Township 13N, Range 2W, W.M.

B. ENVIRONMENTAL ELEMENTS [help]

1. **Earth**

a. General description of the site [help] (select one): ☐Flat, ☒rolling, ☐hilly, ☒steep slopes, ☐mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)? [help]

Steepest slope onsite is approximately 30%.

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. [help]

Per NRCS Soils Data Survey the following soils are present onsite: 118 Lacamas silt loam, 169 Prather silty clay loam and 194 Scamman silty clay loam.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [help]

No.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill. [help]

Construction of streets & stormwater ponds will include approximately 40,000 cy of cut and 45,000 cy of fill. Most material will be graded onsite. Structural base will be from a local DNR approved mining operation.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [help]

Yes, However a Stormwater Pollution Prevention Plan (SWPPP) will be prepared that outlines approriate Best Management Practices to control and contain any sediment migration within the project limits

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? [help]

39% percent of the property will be covered with impervious surface

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [help]

Best Management Practices will be used to prevent and contain erosion onsite during construction. The projects SWPPP requires that a Certified Erosion and Sediment Control Lead (CESCL) monitoring the site during construction.

2. Air

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. [help]

Normal emissions assoicated with construction equipment combustion engine exhaust and possible dust emissions will be generated during the construction phase of the project. Once the project is completed, public and commercial vehicle emmissions will be generated.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [help]

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any: [help]

The project SWPPP will include a BMP to control dust that is appropriate for the size and scope of the project.

3. Water

a. Surface Water: [help]

DNR Stream Classification Mapping Website https://fpamt.dnr.wa.gov/default.aspx

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. [help]

Per DNR Stream Classification Mapping there are no surface water bodies onsite. A Category IV Wetland has been delineated on the site. The wetland is roughly 9,200 SF with a standard buffer of 40 FT.

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. [help]

No.

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. [help]

No impact to the Category IV Wetland is proposed.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. [help]

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. [help]

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. [help]

No.

b. Ground Water:

1) Will ground water 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 ground water? Give general description, purpose, and approximate quantities if known. [help]

No.

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. [help]

None.

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. [help]

The project will create new impervious surface that will generate stormwater runoff. The runoff will be conveyed to the stormwater facility. The stormwater facility will discharge runoff by metered release to the downstream drainage system) Discharged stormwater will eventually reach Allan Creek atributary to the Newaukum River roughly 1.5 miles downstream.

2) Could waste materials enter ground or surface waters? If so, generally describe. [help]

No.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No.Drainage patterns will be retained. Stormwater discharge will be routed to the existing ditch below the site.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

The project will incorporate a SWPPP and stormwater design that provides water quality and flow control facilities to mitigate the impacts to surface and ground waters.

4. **Plants** [help]

a. Check or circle 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? [help]

Approximately 21 acres of vegetation will be removed to construct this project. Vegetation include: Primarily grasses.

c. List threatened or endangered species known to be on or near the site. [help]

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [help]

Vegetation on steeper slopes will be retained. All exposd soils will be permanently stabilized with landscaping or seeding. Buffer plantings maybe proposed to enhance the buffer functions.

e. List all noxious weeds and invasive species known to be on or near the site:

None known.

5. **Animals**

Washington Endangered Species Website https://wdfw.wa.gov/conservation/endangered/

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: [help]

birds: ☐hawk, ☐heron, ☐eagle, ☒songbirds, ☐other:
mammals: ☒deer, ☐bear, ☐elk, ☐beaver, ☐other:
fish: ☐bass, ☐salmon, ☐trout, ☐herring, ☐shellfish, ☐other:

b. List any threatened or endangered species known to be on or near the site. [help]

None known

c. Is the site part of a migration route? If so, explain. [help]

Yes, Pacific Flyway Migration Route.

d. Proposed measures to preserve or enhance wildlife, if any: [help]

None

e. List any invasive animal species known to be on or near the site:

None known.

6. **Energy and natural resources**

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. [help]

Electricity will be used to provide energy for heating and typical housing power needs.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. [help]

No

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: [help]

The project building design will utilize the latest IBC and Energy Codes to provide an energy efficient facility.

7. **Environmental health**

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. [help]

No

1) Describe any known or possible contamination at the site from present or past uses:

None

2) Describe existing hazardous chemical/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:

None.

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:

Household cleaning supplies and chemicals typical of a residential subdivision

4) Describe special emergency services that might be required.

None.

5) Proposed measures to reduce or control environmental health hazards, if any:

None.

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [help]

None.

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. [help]

Short Term: Construction noise from equipment and building construction.
Long Term: Private vehicles accessing the completed project.

3) Proposed measures to reduce or control noise impacts, if any: [help]

Construction will be limited to Monday through Friday, 7:30AM to 4:30 PM

8. **Land and shoreline use**

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. [help]

The site is currently vacant land, adjacent properties consist of vacant land and single family residences.

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 non-farm or non-forest use? [help]

Yes, site was used for domestic production of hay and pasture.

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 impacts to local agriculture.

c. Describe any structures on the site. [help]

None.

d. Will any structures be demolished? If so, what? [help]

No.

e. What is the current zoning classification of the site? [help]

R3 and Commercial. A zoning change is requested to re-orient the commercial portion parallel with Rush Road. Gross acreage of commercial would increase slightly from 2.76 to 4.14 acres.

f. What is the current comprehensive plan designation of the site? [help]

High Density Residential.

g. If applicable, what is the current shoreline master program designation of the site? [help]

None.

h. Has any part of the site been classified as critical area by the city or county? If so, specify. [help]

Yes, A Category IV Wetland has been delineated on the site. The wetland is roughly 9200 SF with a standard buffer of 40 FT.

i. Approximately how many people would reside or work in the completed project? [help]

The completed subdivision would house roughly 204 people (3 per dwelling unit), and create 2.8 acres of commercial use.

j. Approximately how many people would the completed project displace? [help]

None.

k. Proposed measures to avoid or reduce displacement impacts, if any: [help]

None.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: [help]

Re-orienting the commercial zone does not appreciably increase commercial zoning in the area. The proposed housing density of 3.1 du/ac is allowed in R3 zone. Lots sizes comply with development standards in NMC 17.24.050.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

None

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [help]

68 market rate single-family detached lots.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [help]

None.

c. Proposed measures to reduce or control housing impacts, if any: [help]

None

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? [help]

The future homes will be designed to current building practices and use modern materials. The tallest building height would be 25-feet for a two-story home.

b. What views in the immediate vicinity would be altered or obstructed? [help]

The project will not block any views.

c. Proposed measures to reduce or control aesthetic impacts, if any: [help]

Current design standards and materials will be used for the future homes.

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [help]

None

b. Could light or glare from the finished project be a safety hazard or interfere with views? [help]

No

c. What existing off-site sources of light or glare may affect your proposal? [help]

None

d. Proposed measures to reduce or control light and glare impacts, if any:

None

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity? [help]

Mayme Shaddock Park and Napavine Schools are .7 miles from project site. Newaukum Valley Golf Course is approximately 3.8 miles from site.

b. Would the proposed project displace any existing recreational uses? If so, describe. [help]

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [help]

The project proposes a small community park with tot-lot and seating.

13. **Historic and cultural preservation**

State Historical Preservation Office (SHPO) WISAARD: https://fortress.wa.gov/dahp/wisaardp3/

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 located on or near the site? If so, specifically describe. [help]

Research of available public resources did not produce any structures over 45 years old.

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. [help]

Research of available public resources did not produce any known registers.

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, archeological surveys, historic maps, GIS data, etc. [help]

Review of the online search engine WISAARD on the Washington State Department of Historic Preservation website.

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.

None

14. **Transportation**

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. [help]

Rush Rd will be used to access the future development.

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? [help]

No, nearest transit stop is 2.9 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? [help]

Project will create a minimum of 2 parking stalls per residential lot. Commercial projects will comply with parking ordinance dpending on final use.

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). [help]

Frontage improvements will be required on Rush Road (curb/gutter, sidewalk, street lighting) including a turn pocket for southbound entering traffic. New streets within the plat will meet development standards.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [help]

No

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 non- passenger vehicles). What data or transportation models were used to make these estimates? [help]

The residential project will generate 48 AM peak hour trips and 64 PM peak hour trips based on the traffic report.

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

h. Proposed measures to reduce or control transportation impacts, if any: [help]

Participation in any applicable pro-rata transportation improvement projects that the project impacts.

15. **Public services**

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. [help]

Yes, fire and police protection, health care and schools maybe needed by future residences.

b. Proposed measures to reduce or control direct impacts on public services, if any. [help]

None.

16. **Utilities**

a. Select utilities currently available at the site: [help]

☒electricity, ☐natural gas, ☐water, ☒refuse service, ☒telephone,
☒sanitary sewer, ☐septic system, ☐other:

b. 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. [help]

Sewer Service - City of Napavine
Water Service - City of Napavine
Phone Service - Centurylink
Cable Service - Comcast
Power - Lewis County PUD

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: Chris Aldrich, RLA

Position and Agency/Organization: Planning Manager / RB Engineering

Date Submitted: 5/23/22

Notice of Public Hearing

Hearing Date: 6:00 PM on August 29, 2022
Location: City of Napavine Council Chambers,
407 Birch Ave, Napavine, WA 98565

Applicant:	Randy Rognlin - Rognlin Properties LLC PO Box 307 Aberdeen, WA 98520 360-532-5220
Project Name:	Rognlin's Rush Road Subdivision
File Number(s):	
Proposal:	The City Planning Commission will hold a Public Hearing on the application of Rognlin's Rush Road subdivision for a project will consist of 68 single family residential lots and two commercial lots, along with six tracts for open space, utilities/access, and stormwater. The proposal will take place on two existing parcels for a total site area of 25.21 acres. The site is split-zoned, with a 2.41-acre portion in the northwest corner zoned General Commercial and the remainder zoned R3-High Density Residential.
Project Location:	1054 Rush Road, Napavine, WA 98565 Parcel # 018152003000 and 018152004000
Public Hearing:	The Public Hearing has been scheduled for 6:00 p.m. Monday, August 29, 2022.
Required Permits:	
Environmental Review:	The proposal is subject to review under the State Environmental Policy Act (RCW 43.21C) and the City of Napavine SEPA Guidelines. Existing environmental documents that evaluate the proposed project include; SEPA Checklist by Applicant dated May 26th, 2022; Revised Critical Area Review by Environmental Design and prepared for Rognlin Properties dated June 27th, 2022. Said document(s) are available for review.
Required Studies:	No Additional studies have been requested at this time.
Public Comments:	Anyone wishing to testify during the public hearing may reach out to Rachelle Denham, Clerk, at (360)262-3547. Written comments received by the City on or before August 29, 2022, will be considered by the City Planning Commission.
Staff Contact:	Rachelle Denham, Clerk, at (360) 262-3547
Final Decision:	A Final Decision on the proposal is made by the Napavine City Council. A Notice of Final Decision will be sent to the Parties of Record (those who have commented on the project).
Appeal Procedure:	The Final Decision is appealable pursuant to Napavine Municipal Code 17.88.100

JACKSONCIVIL

STATE ENVIRONMENTAL POLICY ACT (SEPA) DETERMINATION OF NON-SIGNIFICANCE

CASE NO: **Rognlin's Rush Rd Subdivision**

APPLICANT: **Randy Rognlin - Rognlin Properties LLC**

Proposal: The proposed plat consists of 68 single family residential lots and two commercial lots, along with six tracts for open space, utilities/access, and stormwater. The proposal will take place on two existing parcels for a total site area of 25.21 acres. The site is split-zoned, with a 2.41-acre portion in the northwest corner zoned General Commercial and the remainder zoned R3-High Density Residential.

Location: 1054 Rush Road, Napavine, WA 98565

Parcels: 018152003000 and 018152004000

Legal Description: Section 26 Township 13N Range 02W PT S 19 AC N24 NW4, EX N 100' & RD

6.00 Acres (018152003000)

Section 26 Township 13N Range 02W N2 N2 SW4 NW4 & PT S 19 AC NW4 NW4 EX N 100' & RD

19.21 Acres (018152004000)

SEPA Determination: Determination of Non-significance (DNS)

Comment Deadline: **August 29th, 2022** (comments should be delivered to the city hall office at 407 SW Birch Ave, Napavine, WA 98532)

As lead agency under the State Environmental Policy Act (SEPA) Rules [Chapter 197-11, Washington Administrative Code (WAC)], the City of Napavine must determine if there are possible significant adverse environmental impacts associated with this proposal. The options include the following:

- **DS = Determination of Significance** (The impacts cannot be mitigated through conditions of approval and, therefore, requiring the preparation of an Environmental Impact Statement (EIS);
- **MDNS = Mitigated Determination of Non-Significance** (The impacts can be addressed through conditions of approval), or;
- **DNS = Determination of Non-Significance** (The impacts can be addressed by

applying the City Code).

Determination:

Determination of Non-Significance (DNS). The City of Napavine, as lead agency for review of this proposal, has determined that this proposal 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)(e). This decision was made after review of a completed environmental checklist and land use application documents as they apply to the City's Municipal Code and adopted standards.

Date of Publication and Comment Period:

Publication date of this DNS is **August 15th, 2022,** and is issued under WAC 197-11- 960. The lead agency will not act on this proposal until the close of the 14-day comment period, which ends on **August 29th, 2022.**

SEPA Appeal Process:

A final decision on this proposal will not be made until after the comment period described above. An **appeal** of any aspect of this decision, including the SEPA determination and any required mitigation, must be filed with the City of Napavine within fourteen (14) calendar days from the date of the final decision as provided in the NMC 17.88.100.

Mail or deliver appeals to the following address:

City of Napavine
407 SW Birch Ave.
Napavine, WA 98532

Staff Contact Person:
Rachelle Denham
Clerk
(360) 262-3547

Responsible Official:
Bryan Morris
City of Napavine
407 SW Birch Ave
Napavine, WA 98532

Name of PLAT/PUD: Rognlin's Rush Road Plat

CITY OF NAPAVINE
COMMUNITY DEVELOPMENT DEPARTMENT

407 Birch Ave. SW, PO BOX 810, NAPAVINE, WA 98565 (360) 262-9344 FAX (360) 262-9199

Preliminary Plat / PUD Application

Base Fee:	**2-5 Lots**	**$650**
	6-10 Lots	**$750**
	11-15 Lots	**$850**
	16-20 Lots	**$950**
	21-25 Lots	**$1050**
	26-35 Lots	**$1150**
	36-50 Lots	**$1250**
	51-75 Lots	**$1350**
	76-100 Lots	**$1450**

Date Received: _____ By: _____ Plat _____ PUD _____

APPLICATION SHALL CONSIST OF:

- 6 Application forms
- 10 folded copies of the Preliminary Plans
- 10 copies of the Environmental Checklist
- 2 copies of the complete 25 year Storm Drainage Analysis

The application must be submitted to the Napavine Community Development Department, prior to the application deadline submittal dates. (Incomplete applications will not be accepted.)

Name of PLAT/PUD: Rognlin's Rush Road Plat

Number of Units/Lots: 68 Lots

General Location of the Property:
0 & 1054 Rush Rd, Napavine Washington

Location: Section(s) 26 Township: 13N Range: 02W

Developer (Applicant): Randy Rognlin - Rognlin Properties LLC

Developer's Address/Phone: PO Box 307, Aberdeen WA 98520

Engineer or other representatives, if any: Robert Balmelli - RB Engineering

Total Area: 25.21 acres Minimum lot size: .172 acres

Density – Units per Acre: 3.12 Total Units: 68 Average lot size: 7500 SF

Comprehensive Plan Designation: High Density Residential Present zoning: R3 & Commercial

Assessor's Parcel Number: 018152003000 & 018152004000

Name of PLAT/PUD: Rognlin's Rush Road Plat

Water Service from: City of Napavine Sewerage: City of Napavine
(Form attached)

Has the property been logged in the past six (6) years? ☐ Yes ■ No

Forest Practice Application Number (if any) _____

Legal Description of Property:
Section 26 Township 13N Range 02W N2 N2 SW4 NW4 & PT S 19 AC NW 4 NW 4 EX N 100' & RD

Vicinity Map
(Draw below or provide a map suitable for publication)

See attached plan

Name of PLAT/PUD: Rognlin's Rush Road Plat

Planned Unit Development

Complete the following additional information if your proposal is a Planned Unit Development.

☐	Multi-family proposal	☒	Single family proposal
☐	Number multifamily units	68	Number of single family units
☒	Commercial 2.4 acres	☒	Critical Areas

Note: Application must be Owner of Record or contract purchaser. If contract purchaser is the Applicant, he must furnish the name and address of the owners of Record who must be notified by the City of the application. If said owner does not acknowledge receipt of the notification, final action on the application could be delayed.

Owner of Record: Rognlin Properties LLC
(Person that holds title to property)

Owner's of record address: PO Box 307, Aberdeen WA 98520

Description of Development (list uses by type and note number of acres and dwelling units for each use, i.e., apartments, mobile homes, single-family dwelling, etc.)

See attached project narrative.

If the project site will be logged, a Forest Practice Application MUST BE OBTAINED from the Department of Natural Resources prior to final project approval.

Signature of Applicant

Name of Agent or Representative:

Name: Chris Aldrich - RB Engineering Telephone: 360.740.8919

Address: PO Box 923
Chehalis, WA 98532

Napavine City Approval _____ Date _____

Critical Area Report

Prepared For: Rognlin Properties, LLC

Site Address: Rush Road, Napavine

Tax Parcel Number: 018152003000 & 018152004000

Date: May 25, 2022
Revised: June 27, 2022

Prepared By:
Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street, Centralia, WA 98531
(360) 219-3343

Table of Contents

Introduction:

Environmental Design, LLC conducted a Wetland Study in June 2021 and on December 1, 2021 to determine if wetland habitat is present on the site located at Rush Road in Napavine. The client is proposing a residential development on the parcels.

In order to conduct a thorough review of the site to determine if wetlands are present on the site several resources were reviewed. The project started by pulling research and reviewing the research from several sources. After review of the research it was noted that wetlands were mapped on the site. A site visit was then conducted in order to test in areas for wetland habitat. Since the site has been primarily used and maintained as residential use, test sites were completed in areas where vegetation, elevation or other characteristics changed that indicated a possible presence of wetland habitat.

Site Description:

The site is located at Rush Road in Napavine, Washington. The site is in Section 26 of Township 13 North, Range 02 West and is identified by Lewis County with the parcel numbers of 018152003000 and 018152004000. The total acreage of the parcels is about 25.2 acres. The site is currently vacant land and has previously been a farm that has since been demolished.

The area around the site is primarily residential and vacant land with wetland and stream habitat mapped throughout the sites.

Methodology:

A site visit was conducted on June 2021 and on December 1, 2021 where Environmental Design walked the property and tested in various areas where vegetation seemed to have changed or where wetland habitat could be present. The site is consistent with the hydrology, vegetation, and soils at each test plot location.

Environmental Design, LLC completed the wetland study of this site by using the Routine Determination Method according to the 1987 U.S. Army Corp of Engineers Wetland Delineation Manual and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region.

In order to complete this method first research was conducted by pulling information and maps from the National Wetland Inventory website, the Lewis County Website, the NRCS website to find out what the soils were and also further information was pulled from the Department of Natural Resources website. After reviewing the research a site visit was conducted and areas were tested where vegetation, elevation, or the soil may have changed.

When using the Routine Approach, a wetland area must meet three specific parameters. These three parameters are hydrology, vegetation and hydric soils. Hydrology can be difficult to assess because it may or may not be present, depending on the time of year. Vegetation and soils are important to assess if there has been hydrology present in the past. If the site meets the hydrology, vegetative and hydric soil parameters then the site is considered a wetland. If one parameter is not met then the area is not considered a wetland. There must be hydrology present as this is the most critical parameter that makes a wetland. Hydrology was able to be identified during the growing season at previous site inspections of the site.

Observations:

Vegetation:

Wetland Vegetation has been classified into indicator statuses of how likely the plant is to be found in a wetland habitat. The indicator status of each plant species can be found on the data forms. The different indicator statuses are listed below:

- Obligate Wetland (OBL) – highly likely to be in a natural wetland environment
- Facultative Wetland (FACW) –most likely to be present in a natural wetland environment
- Facultative (FAC) – can be present in both a natural wetland and non-wetland environment
- Facultative Upland (FACU) –may be present in a natural wetland, but most likely to be seen in non-wetland conditions
- Obligate Upland (UPL) – most likely to occur in non-wetland conditions
- No Indicator – the plant does not have enough data to determine the indicator status yet

The primary vegetation for the upland areas is identified as listed:

Common Name	Scientific Name	Indicator
Sweet Vernal Grass	*Anthoxanthum odoratum*	FACU
Orchardgrass	*Dactylis glomerata*	FACU
Queen Anne's Lace	*Daucus carota*	FACU
Trailing Blackberry	*Rubus ursinus*	FACU

The primary vegetation for the wetland area is identified as listed:

Common Name	Scientific Name	Indicator
Creeping Buttercup	*Ranunculus repens*	FAC
Reed Canary Grass	*Phalaris arundinacea*	FACW
Soft Rush	*Juncus effusus*	FACW

Most of the site is vegetated with upland field grass species. The vegetation did meet the criteria for wetland habitat in the northeastern portion of the site. The vegetation turns more to Reed Canary Grass with patches of Soft Rush.

Soils:

The site is mapped as Lacamas Silt Loam, Prather Silty Clay Loam and Scamman Silty Clay Loam Series according to the U.S.D.A Natural Resources Conservation Service *Soil Survey of Lewis County, Washington (1980)*. All series are listed on the hydric soils list produced by the U.S.D.A Natural Resources Conservation. The areas where test plots were conducted, the soil appeared to be consistent with the mapped series.

The NRCS describes the Lacamas Silt Loam series as a very deep, poorly drained soil located on broad plains, terraces and bottom lands. In a typical profile, the upper portion of the surface layer extends to a depth of about 7 inches and is very dark grayish brown silt loam. The lower portion of the surface layer is mottled, dark grayish brown and grayish brown silt loam extending to a depth of about 10 inches. The subsoil is mottled, olive gray silty clay for the upper 19 inches and the lower portion is mottled, olive gray clay extending to a dept of 60 inches or more.

The NRCS describes the Prather Silty Clay Loam series is described as a very deep moderately drained soil that can be found on broad till plains and terraces. In a representative profile, the surface is generally covered with a mat of partially decomposed organic litter about 2 inches thick. The upper part of the surface layer is very dark brown silty clay loam that extends about 7 inches. The lower portion of the surface layer about 7 inches thick and is a dark brown silty clay loam. The following 12 inches of the subsoil is dark brown silty clay and the next 25 inches is

mottled, dark brown silty clay and yellowish brown clay. The substratum of the profile extends to a depth of 60 inches or more and is mottled, dark reddish brown, gray and brown clay.

The Scamman Silty Clay Loam series is described as a very deep and somewhat poorly drained soil. In a representative profile, the upper portion of the surface layer is a dark brown silty clay loam extending about 6 inches in depth. The lower portion of the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is about 60 percent mottled, dark brown silty clay loam and 40 percent gray silt loam that extends about 10 inches in depth. The lower portion extends to a depth of 60 inches or more and is mottled, grayish brown and dark grayish brown silty clay.

The soil appeared to be moderately drained throughout most of the site. The soil was evaluated to a depth of about 20 inches at each test plot location as required. Indicators of hydric soil were observed in the soil profile in the depressional area and throughout the site. The soils were observed as expected as they are all considered to be hydric. See Appendix C for the profile details at the test plot locations.

Hydrology:

The site appears to be moderately well drained throughout the site. The site does have seasonal drainage areas that have been man-made located on the site. These areas were evaluated for wetland habitat and were not found to meet jurisdictional wetland habitat. The depressional area located in the northeastern portion of the site did have evidence of standing water, drainage patterns and oxidized rhizospheres in the soil profile.

Wildlife:

The area is shown to have big brown bat present as a priority species listed on the Priority Habitat Species Map produced by Fish and Wildlife. The site has a brushy forested area around it and field habitat, which provides great habitat for the wildlife.

Topography:

The topography of the site is terraced with a sloped area measuring between 10-20%.

Surrounding Wetlands and Impacts:

The National Wetlands Inventory (NWI) map and other maps do not depict mapped wetlands within the area. It needs to be noted that the NWI maps and GeoData Center needs to be used cautiously as they compile general wetland data.

Environmental Design concludes that jurisdictional wetland habitat is present on the site. The wetland has been rated in accordance with the current Department of Ecology's Rating forms and it has been calculated to be a Category IV wetland. The wetland has a protective buffer of 40 feet as stated in City of Napavine's Critical Area Ordinance 14.010.120.E in Table 14.010.120.120.E.7.a.1.

A stormwater drain is proposed through the wetland buffer as required to extend to the east treatment and pond facility. The pipe is located in the outer portion of the buffer as allowed per the City of Napavine's Critical Area Ordinance 14.010.050.C.-2 and D. Due to the contours and the site layout the pipe is required to extend in order to dispose of stormwater from the development properly.

The following mitigation measures will be followed in order to restore the buffer. As characterized in the main report the wetland buffer is comprised entirely of grass and forbe species. Adding a shrub/scrub vegetative component within the buffer will significantly increase it's functional values. The following is a list of mitigative measures that may be conditioned to allow use of the buffer for storm pipe as proposed:

- Final pipe placement and construction activities shall be limited to the outer half of the standard buffer.
- BMP's shall be proposed for temporary construction within the buffer, e.g. temporary sediment protection, etc.
- Vegetation at the trenching location shall be restored.
- A shrub/scrub vegetative component shall be shown on the landscape plan for the plat and be implemented prior to Final approvals.
- A 5-year maintenance and monitoring program for plantings within the buffer shall be conditioned for the Final plat.

Conclusions:

Environmental Design, LLC concludes that wetland habitat is present on the site within 300 feet of the proposed project. The wetland has a 40-foot buffer. The proposed project is located outside of the wetland buffer and the client is aware of the setbacks.

References:

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Lewis County. Critical Areas Map. Online map. https://fortress.wa.gov/lewisco/home/.

Soil Conservation Service. 1995. Hydric Soils for Washington. Online document: http://www.statlab.iastate.edy:80/soils/hydric/wa/html.

Soil Conservation Service. 1980. Soil Survey of Lewis County, Washington. U.S. Department of Agriculture, Washington DC.

Soil Conservation Service. 1990. Soil Survey of Thurston County, Washington. U.S. Department of Agriculture, Washington DC.

U.S Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), ed. J. S. Wakeley, R.W. Lichvar, and C. V. Noble. ERDC / EL TR-103. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Washington State Department of Ecology. 1997. Washington State Wetlands Identification and Delineation Manual. Publication # 96-94. Olympia, Washington.

Washington State Department of Ecology. 2004. Washington State Wetlands Rating System: Western Washington Revised. Publ. # 04-06-025. Olympia, Washington.

Washington Department of Fish and Wildlife. Priority Habitat Species (PHS) Database. (August 2014)

The determination of this wetland was completed by Environmental Design, LLC. The determination of this wetland is based on scientific method and our best professional judgment. Environmental Design, LLC agrees that the conclusion should agree with the local, state, and federal regulatory agencies.

Completed By:

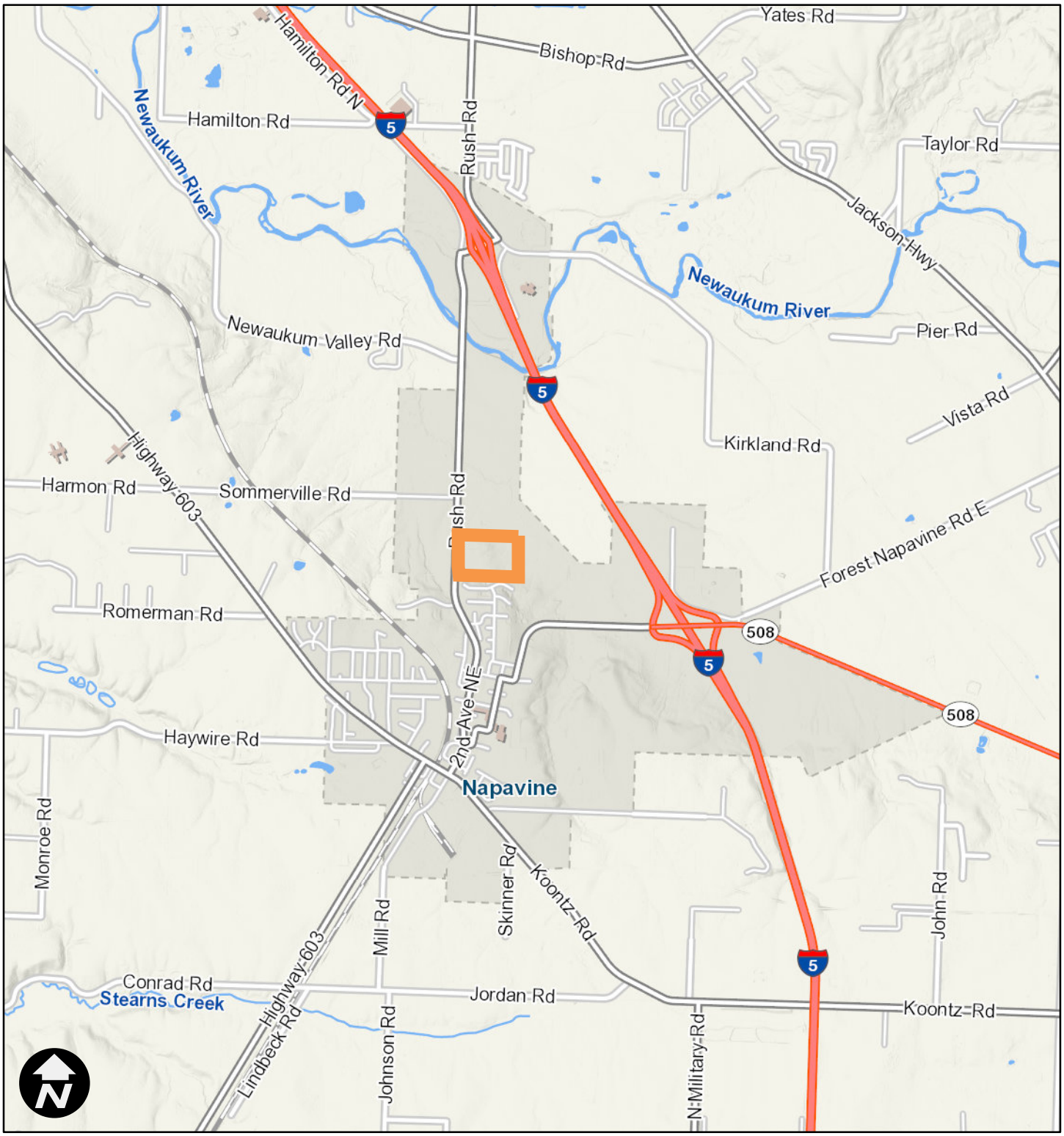
Becky Rieger

Becky Rieger, *Wetland Specialist*

Appendix A:

Wetland Maps

Figure 1: Site Location Map



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0 1,600 3,200 6,400 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

THE PROPERTY LINES IN THIS MAP ARE APPROXIMATE AND ARE NOT INTENDED TO BE USED AS A SURVEY.

SITE MAP

Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street
Centralia, Wa. 98531
(360) 219-3343

CLIENT NAME:	ROGNLIN PROPERTIES	SITE ADDRESS:	RUSH ROAD
MAILING ADDRESS:	PO BOX 307		NAPAVINE
	ABERDEEN, WA 98520	PARCEL NUMBER:	018152004000
PHONE NUMBER:	360.538.7596	SEC-TWN-RNG:	26-13N-02W

JOB NUMBER:	2021-220
DATE:	08/11/2021
DRAFTED BY:	BJR
REVIEWED BY:	BJR

Soil Map—Lewis County Area, Washington
(Figure 3: NRCS Soil Map)

Map Scale: 1:2,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 21, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2019—May 10, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
118	Lacamas silt loam, 0 to 3 percent slopes	7.7	29.3%
169	Prather silty clay loam, 15 to 30 percent slopes	0.8	3.1%
194	Scamman silty clay loam, 5 to 15 percent slopes	17.7	67.6%
Totals for Area of Interest		**26.1**	**100.0%**

U.S. Fish and Wildlife Service
National Wetlands Inventory

Figure 4: NWI Map

January 5, 2022

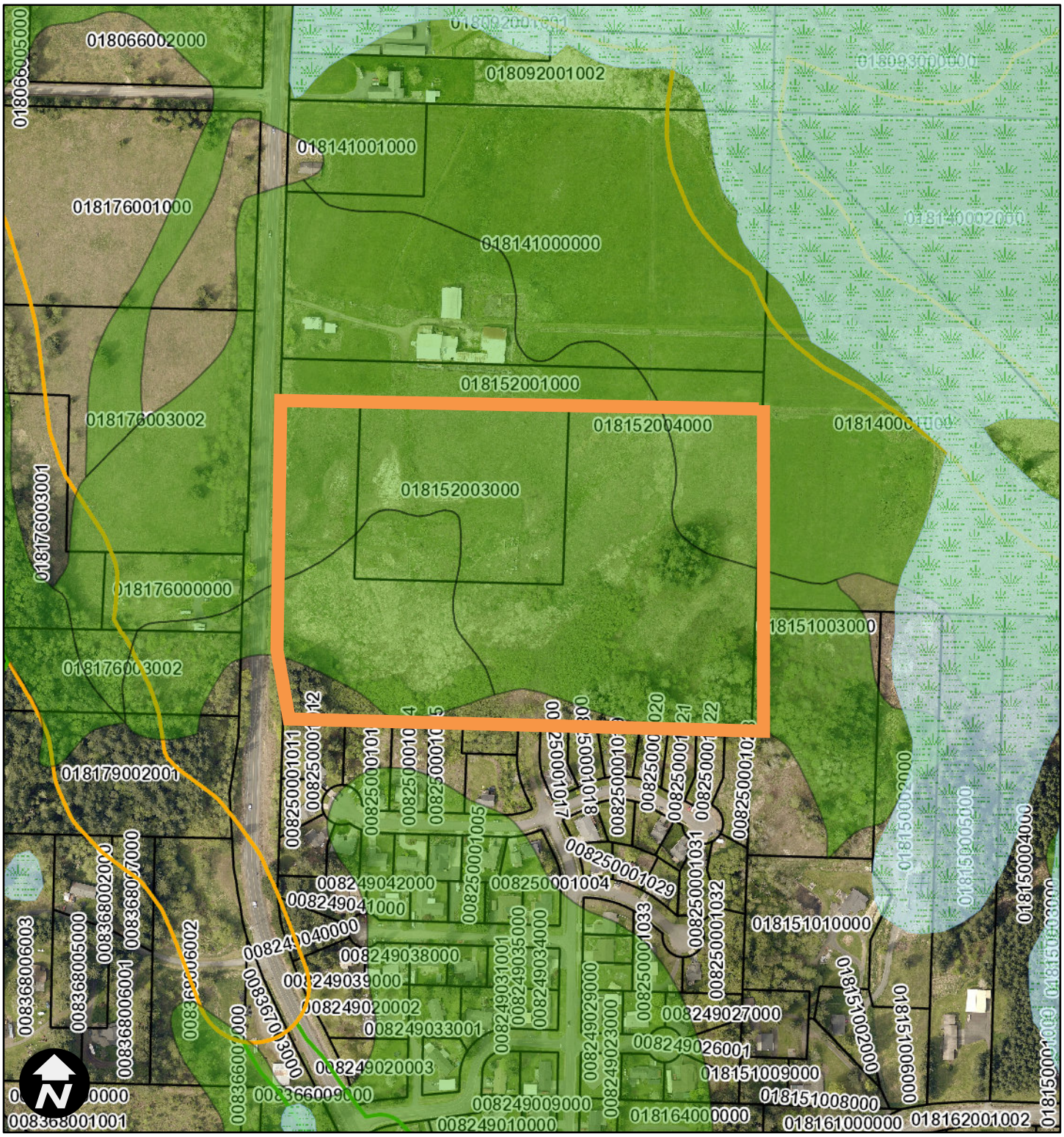
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Figure 5: Lewis County Critical Area Map



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- Wetlands
- Hydric Soils
- Shoreline Residential
- High Intensity
- Parcel Numbers
- Parcels

0 205 410 820 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

Shoreline Environments

- Aquatic
- Natural
- Rural or Urban Conservancy

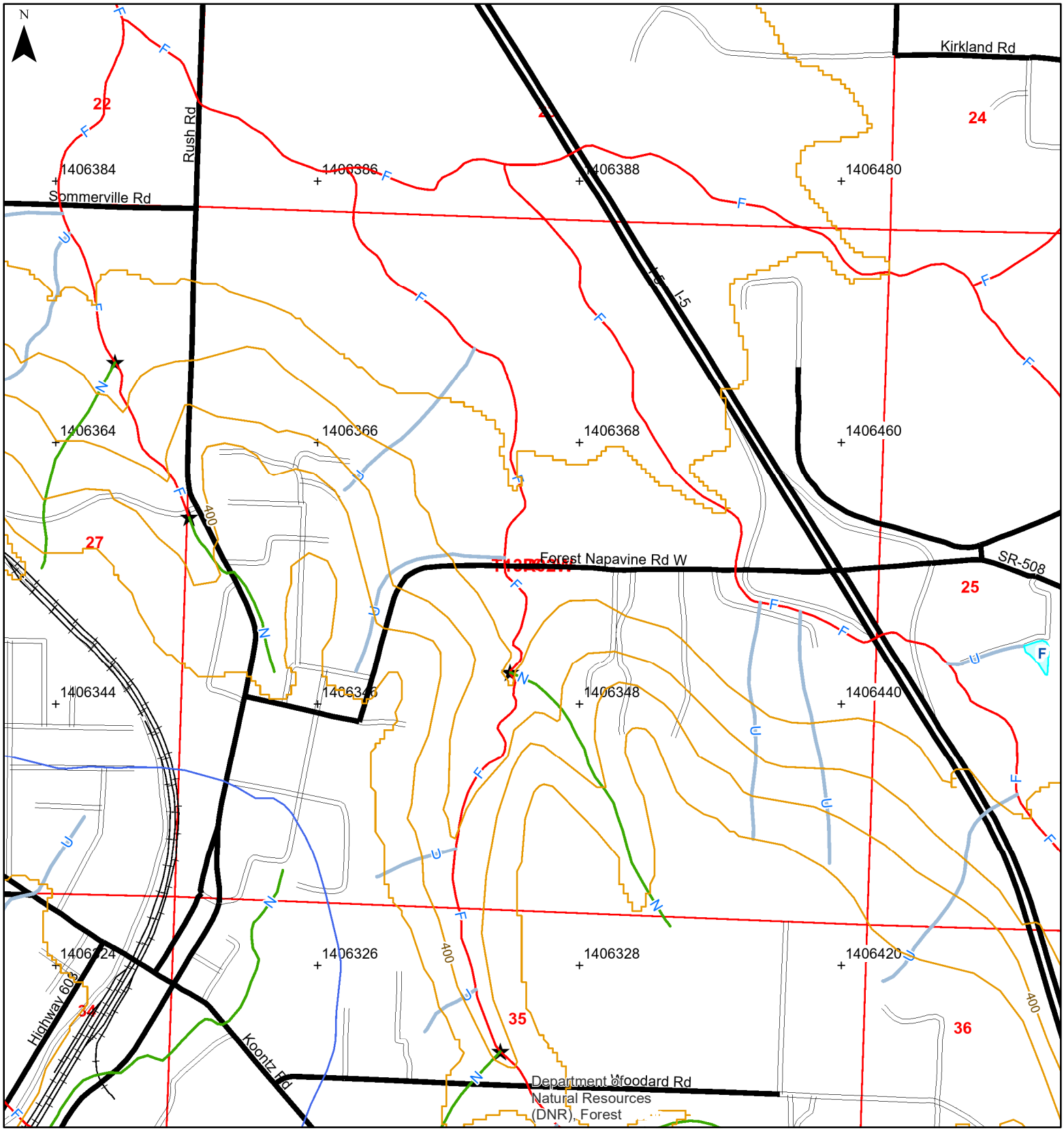
Stream Buffers

- Shoreline 150'
- Fish 150'
- Non-Fish 75'

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

Forest Practices Activity Map - Application #_____



Map Symbols

- Harvest Boundary
- Road Construction
- Stream
- RMZ / WMZ Buffers
- Rock Pit
- Landing
- Waste Area
- Clumped WRTS/GRTS
- Existing Structure

Additional Information

Legal Description

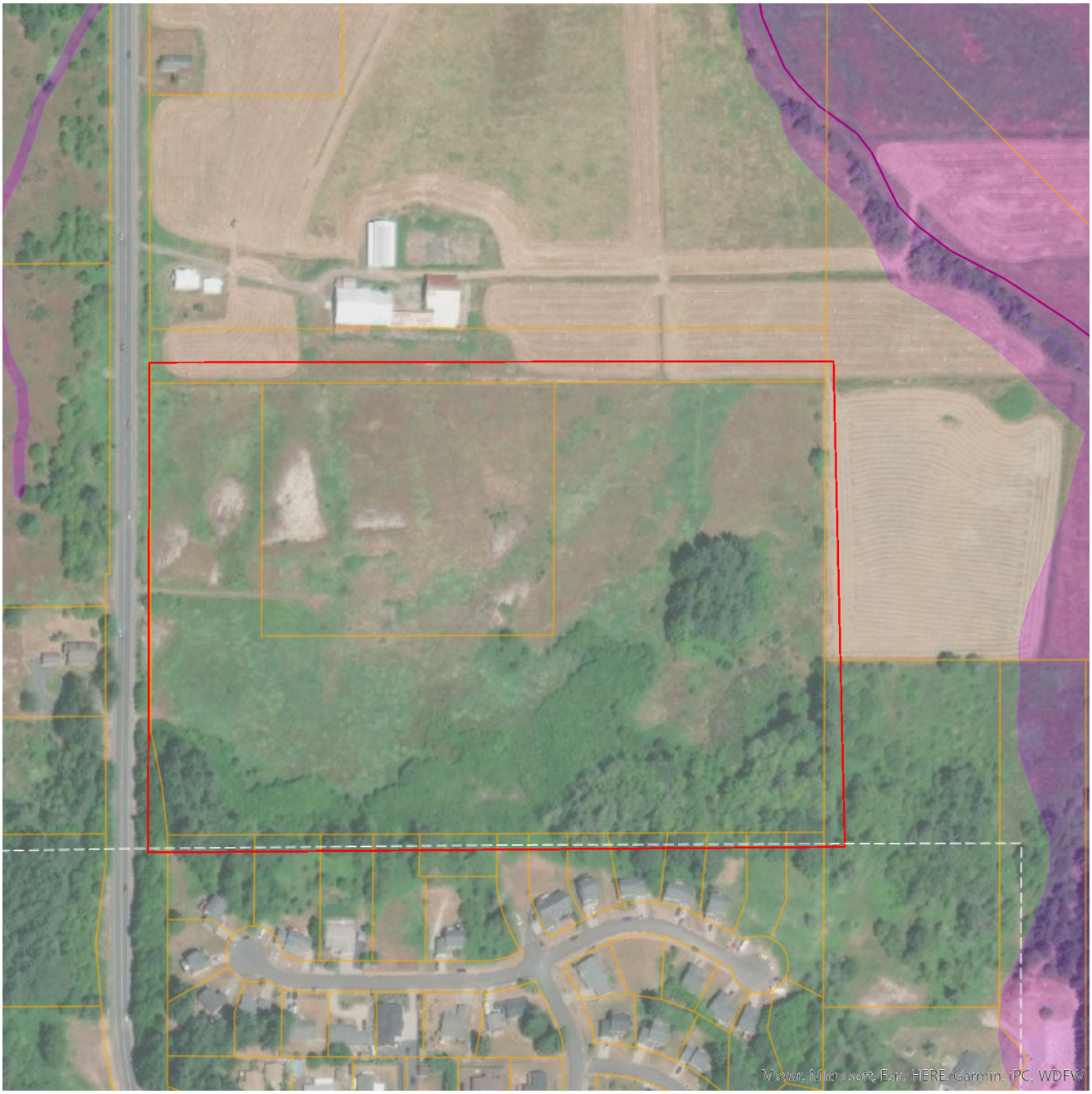
S24 T13.0N R02.0W, S23 T13.0N R02.0W
S26 T13.0N R02.0W, S35 T13.0N R02.0W
S34 T13.0N R02.0W, S27 T13.0N R02.0W
S22 T13.0N R02.0W, S25 T13.0N R02.0W
S36 T13.0N R02.0W

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

0 0.25 Miles

Date: 1/5/2022 Time: 1:27:50 PM

Priority Habitats and Species on the Web



Report Date: 01/05/2022

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Big brown bat	N/A	N/A	Yes

PHS Species/Habitats Details:

Big brown bat	
Scientific Name	*Eptesicus fuscus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

Appendix B:

Site Pictures

View of Site

View of Site

View of Site

Appendix C:

Test Plot Data Forms

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 1

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 46.2%	FACU
2. Juncus effusus	30	☑ 23.1%	FACW
3. Daucus carota	40	☑ 30.8%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	130	= Total Cover	
Herb Stratum (Plot size:)			
1. Poa annua		☐ 0.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 30	x 2 =	60
FAC species	x 3 =	
FACU species 140	x 4 =	560
UPL species 0	x 5 =	0
Column Totals:	(A)	(B)

Prevalence Index = B/A = 3.125

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-21	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 2

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 46.2%	FACU
2. Juncus effusus	30	☑ 23.1%	FACW
3. Daucus carota	40	☑ 30.8%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	130	= Total Cover	
Herb Stratum (Plot size:)			
1. Poa annua		☐ 0.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 30	x 2 =	60
FAC species	x 3 =	
FACU species 140	x 4 =	560
UPL species 0	x 5 =	0
Column Totals:	(A)	(B)

Prevalence Index = B/A = 3.125

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-22	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 3

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	**= Total Cover**	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 46.2%	FACU
2. Juncus effusus	30	☑ 23.1%	FACW
3. Daucus carota	40	☑ 30.8%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	130	**= Total Cover**	
Herb Stratum (Plot size:)			
1. Poa annua		☐ 0.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	**= Total Cover**	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	**= Total Cover**	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	30	**x 2 =**	60
FAC species		**x 3 =**	
FACU species	140	**x 4 =**	560
UPL species	0	**x 5 =**	0
Column Totals:		**(A)**	**(B)**

Prevalence Index = B/A = 3.125

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-22	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 4

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 42.9%	FACU
2. Dactylis glomerata	40	☑ 28.6%	FACU
3. Daucus carota	40	☑ 28.6%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	140	= Total Cover	
Herb Stratum (Plot size:)			
1.		☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	180	x 4 =	720
UPL species	0	x 5 =	0
Column Totals:	180 (A)		720 (B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-23	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 5

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present? Yes ◉ No ○	
Wetland Hydrology Present? Yes ◉ No ○	

Remarks:
Site does meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Juncus effusus	60	☑ 60.0%	FACW
2. Phalaris arundinacea	40	☑ 40.0%	FACW
3.		☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	100	= Total Cover	
Herb Stratum (Plot size:)			
1. Ranunculus repens	40	☑ 100.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	40	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.		☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	100	**x 2 =**	200
FAC species	40	**x 3 =**	120
FACU species	0	**x 4 =**	0
UPL species	0	**x 5 =**	0
Column Totals:	140	**(A)**	320 **(B)**

Prevalence Index = B/A = 2.286

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Vegetation does meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR	4/3	100						Silty Clay Loam	
13-21	10YR	4/1	60	10YR	6/6	40	C	M	Silty Clay	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Soil is hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☑ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 6

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	**= Total Cover**	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 42.9%	FACU
2. Dactylis glomerata	40	☑ 28.6%	FACU
3. Daucus carota	40	☑ 28.6%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	140	**= Total Cover**	
Herb Stratum (Plot size:)			
1.		☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	**= Total Cover**	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	**= Total Cover**	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	0	**x 2 =**	0
FAC species	0	**x 3 =**	0
FACU species	180	**x 4 =**	720
UPL species	0	**x 5 =**	0
Column Totals:	180	**(A)**	720 **(B)**

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-23	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 7

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present? Yes ◉ No ○	
Wetland Hydrology Present? Yes ◉ No ○	

Remarks:
Site does meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Juncus effusus	60	☑ 60.0%	FACW
2. Phalaris arundinacea	40	☑ 40.0%	FACW
3.		☐ 0.0%	
4.		☐ 0.0%	
5.	0	☐ 0.0%	
	100	= Total Cover	
Herb Stratum (Plot size:)			
1. Ranunculus repens	40	☑ 100.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	40	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.		☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	100	**x 2 =**	200
FAC species	40	**x 3 =**	120
FACU species	0	**x 4 =**	0
UPL species	0	**x 5 =**	0
Column Totals:	140	**(A)**	320 **(B)**

Prevalence Index = B/A = 2.286

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Vegetation does meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR	4/3	100						Silty Clay Loam	
13-21	10YR	4/1	60	10YR	6/6	40	C	M	Silty Clay	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Soil is hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☑ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is present and site was evalauted after heavy rain storms and also during the 2022 growing season.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Rush Road **City/County:** Napavine / Lewis **Sampling Date:** 01-Dec-21

Applicant/Owner: Rognlin Properties **State:** Washington **Sampling Point:** WTP 8

Investigator(s): Becky Rieger **Section, Township, Range:** S 26 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Sloped **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas / Prather / Scamman **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Site does not meet critieria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Anthoxanthum odoratum	60	☑ 42.9%	FACU
2. Dactylis glomerata	40	☑ 28.6%	FACU
3. Daucus carota	40	☑ 28.6%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	140	= Total Cover	
Herb Stratum (Plot size:)			
1.		☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	40	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	40	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	180	x 4 =	720
UPL species	0	x 5 =	0
Column Totals:	180 (A)		720 (B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetation does not meet critieria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-23	10YR	4/3	100						Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil is not hydric

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Aerial Photos / Previous Insepctions

Remarks:

Hydrology is not present and site was evalauted after heavy rain storms and also during the 2022 growing season.

Appendix D:

Wetland Rating Forms

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: December 2021

Rated by Becky Rieger Trained by Ecology? X Yes ___No Date of training 6/2014

HGM Class used for rating Depressional Wetland has multiple HGM classes?___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.

Source of base aerial photo/map Lewis County GIS

OVERALL WETLAND CATEGORY IV (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

_____**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

X **Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H M **L**	H M **L**	H M **L**	
Landscape Potential	H M **L**	H M **L**	H **M** L	
Value	H M **L**	H M **L**	H M **L**	**TOTAL**
Score Based on Ratings	3	3	4	10

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I II**
Interdunal	**I II III IV**
None of the above	N/A

Wetland name or number A

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	RF1
Hydroperiods	D 1.4, H 1.2	RF2
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	RF2
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	RF3
Map of the contributing basin	D 4.3, D 5.3	RF3
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	RF4
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	303D Map
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	303D Map

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number A

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number A

NO – go to 6 **YES** – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	1
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions).* Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	1
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	0
Total for D 1 Add the points in the boxes above	2

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 or 4 = H** ___ **1 or 2 = M** X **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** X **0 = L** *Record the rating on the first page*

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?

D 4.1. Characteristics of surface water outflows from the wetland: **0**

- Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4
- Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2
- Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1
- Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0

D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* **0**

- Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7
- Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5
- Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3
- The wetland is a "headwater" wetland points = 3
- Wetland is flat but has small depressions on the surface that trap water points = 1
- Marks of ponding less than 0.5 ft (6 in) points = 0

D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* **0**

- The area of the basin is less than 10 times the area of the unit points = 5
- The area of the basin is 10 to 100 times the area of the unit points = 3
- The area of the basin is more than 100 times the area of the unit points = 0
- Entire wetland is in the Flats class points = 5

Total for D 4	Add the points in the boxes above	0

Rating of Site Potential If score is: ___ **12-16 = H** ___ **6-11 = M** X **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?

D 5.1. Does the wetland receive stormwater discharges?	Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff?	Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)?	Yes = 1 No = 0	0
Total for D 5	Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 = H** ___ **1 or 2 = M** X **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?

D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* **0**

The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds):

- Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2
- Surface flooding problems are in a sub-basin farther down-gradient. points = 1

Flooding from groundwater is an issue in the sub-basin. points = 1

The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0

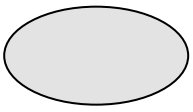
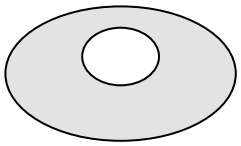
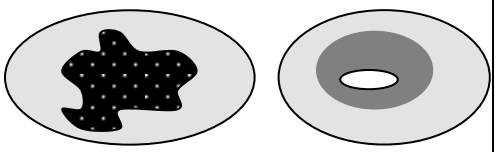
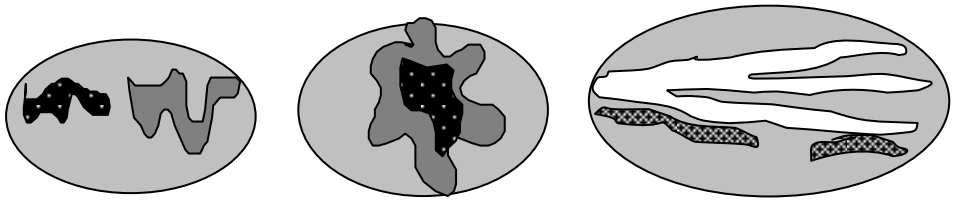
There are no problems with flooding downstream of the wetland. points = 0

D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0 **0**

Total for D 6	Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** X **0 = L** *Record the rating on the first page*

Wetland name or number A

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* ____Aquatic bed — 4 structures or more: points = 4 __X__Emergent — 3 structures: points = 2 ____Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 ____Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	0
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____Permanently flooded or inundated — 4 or more types present: points = 3 __X__Seasonally flooded or inundated — 3 types present: points = 2 ____Occasionally flooded or inundated — 2 types present: points = 1 ____Saturated only — 1 type present: points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland ____**Lake Fringe wetland** — **2 points** ____**Freshwater tidal wetland** — **2 points**	0
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	1

Wetland name or number __A__

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	0
Total for H 1 Add the points in the boxes above	3

Rating of Site Potential If score is:___**15-18 = H** ___**7-14 = M** X **0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 0 **+** [(% moderate and low intensity land uses)/2] 30 **=** 30 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	2
H 2.2. ~~Undisturbed~~ habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 0 **+** [(% moderate and low intensity land uses)/2] 50 **=** 50 % ~~Undisturbed~~ habitat > 50% of Polygon points = 3 ~~Undisturbed~~ habitat 10-50% and in 1-3 patches poins = 2 ~~Undisturbed~~ habitat 10-50% and > 3 patches points = 1 ~~Undisturbed~~ habitat < 10% of 1 km Polygon points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	3

Rating of Landscape Potential If score is:___**4-6 = H** X **1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	0

Rating of Value If score is:___**2 = H** ___**1 = M** X **0 = L** *Record the rating on the first page*

Wetland name or number A

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

x **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** (No) = **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** (No) – Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 2.4** (No) **= Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = **Category I** No = **Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** (No) – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** (No) = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No **= Is not a bog**	**Cat. I**

Wetland name or number A

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** — **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. — **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** (No) = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** (No) = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: — Long Beach Peninsula: Lands west of SR 103 — Grayland-Westport: Lands west of SR 105 — Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** (No) = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	N/A

RF 1: Cowardin Plant Classes

1/5/2022, 3:24:57 PM

1:2,257

Legend:
Yellow - Wetland Boundary
All of wetland is scrub / shrub

0 100 200 400 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

RF 2: Hydroperiods

1/5/2022, 3:27:23 PM

1:2,257

Legend:
Yellow - Wetland Boundary
All of wetland is Seasonally Flooded

0 100 200 400 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

RF 3: Contributing Basin

1/5/2022, 3:29:20 PM

1:4,514

Legend:
Yellow - Wetland Boundary
Blue - Contributing Basin

0 205 410 820 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

RF4: 1km

1/5/2022, 3:23:32 PM

1:4,514

Legend:

Yellow - Wetland Boundary

All is moderate intensity due to farming

0 205 410 820 ft

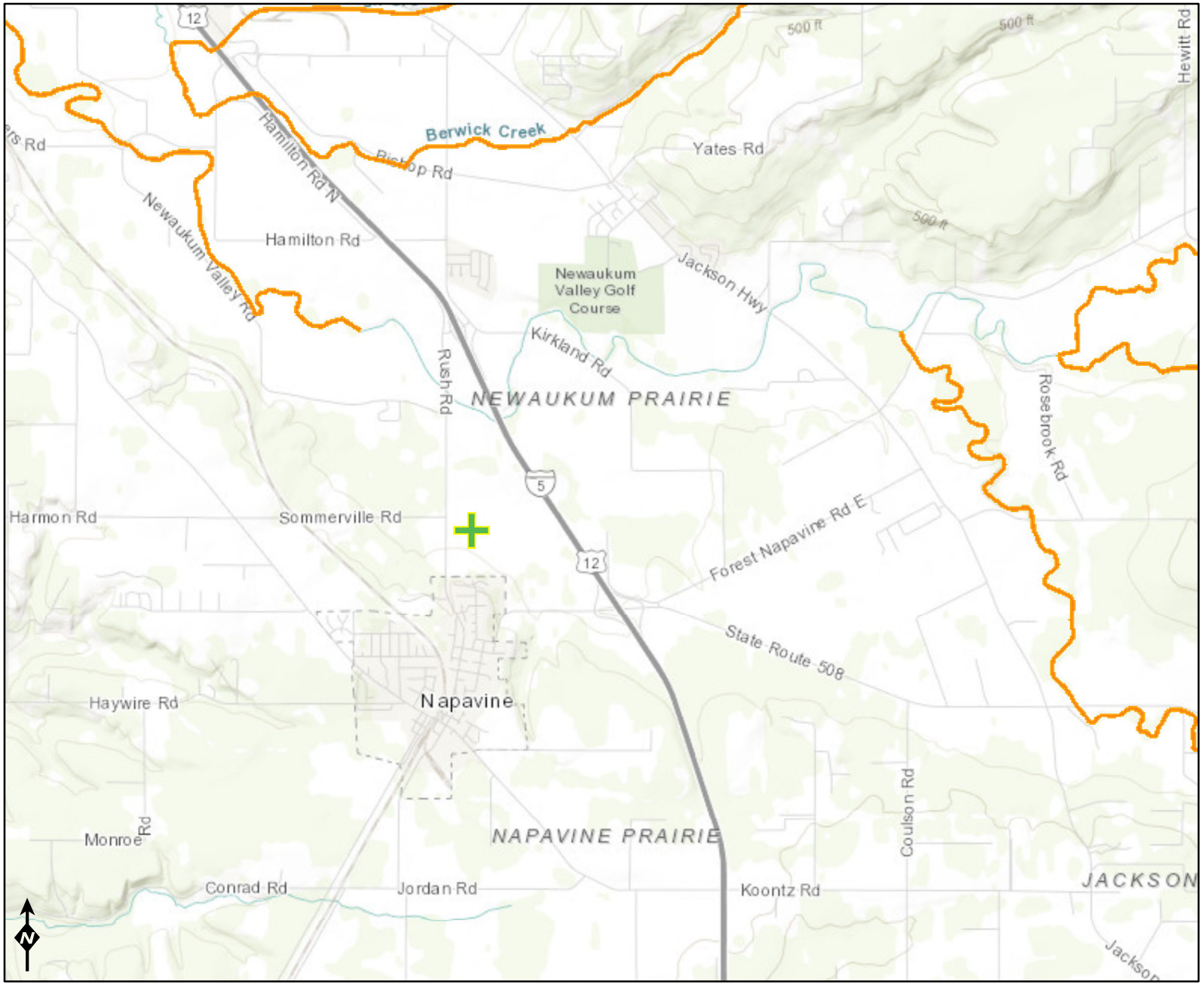
NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

January 5, 2022

303d Map



Assessed Water/Sediment

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Miles
0 0.5 1 2

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and

DEPARTMENT OF ECOLOGY
State of Washington

Credentials

Becky Rieger

Home Address:
901 L Street
Centralia, WA 98531
Phone: (360) 219-3343

Education

Associates Degree in Arts
Centralia Community College — Centralia, Washington
Date of Graduation: June 2007

Associates Degree in Applied Science
Major in Geographic Information Systems
Grays Harbor Community College — Aberdeen, Washington
Date of Graduation: June 2002

Continuing Education / Awards / Organizations

Coastal Training Program
- Certificate in Using the Revised Wetland Rating System (2014)
- Certificate in Identifying Hydric Soils (2012)
- Certificate in Using the Revised Wetland Rating System (2007)

Oregon State University (2006)
- Certificate in Soil Identification

Portland State University Wetland Program (2006)
- Certificate in Wetland Delineation Course
- Certificate in Advanced Hydric Soils and Hydrology Course
- Certificate in Hydrophytic Vegetation Identification Coarse

Licensed On-Site Wastewater Designer (2009-Current) License # 5100369

Olympia Master Builders
- Lewis County Chapter Vice President
- Olympia Master Builders Associate Vice President

Washington On-Site Sewage Association
- SW Washington Designer Rep. (2018 – Current)

Professional Experience

Licensed Designer / Wetland Specialist / Owner May 5, 2010 - Current
Environmental Design, LLC
- Complete Site and Soil Evaluations, Site Consultations, Topography Field Work
- Complete Septic Designs and mapping projects using MicroSurvey
- Complete Wetland and other Critical Area Reports per regulations in multiple jurisdictions
- Perform presentations to educate people about wetlands and septic systems

Assistant Designer / Certified Wetland Specialist Feb. 24, 2005 – Oct. 30, 2007
Goode & Associates Supervisor: Jeannie Yackley
- Complete designs of on-site wastewater designs for county submittal
- Communicate with county regulators, installers, and clients
- Conduct wetland determinations, delineations, mitigations and consultations
- Research projects, apply for permits, and conduct final inspections on installed septic systems
- Perform presentations to educate people about wetlands and septic systems

Community Development
407 Birch Ave SW, P. O. Box 810 Napavine, WA 98565
Phone: (360) 262-9344 Fax: (360) 262-9199
www.napavine.wa.gov

R-3 Subdivision and Environmental Review Staff Report

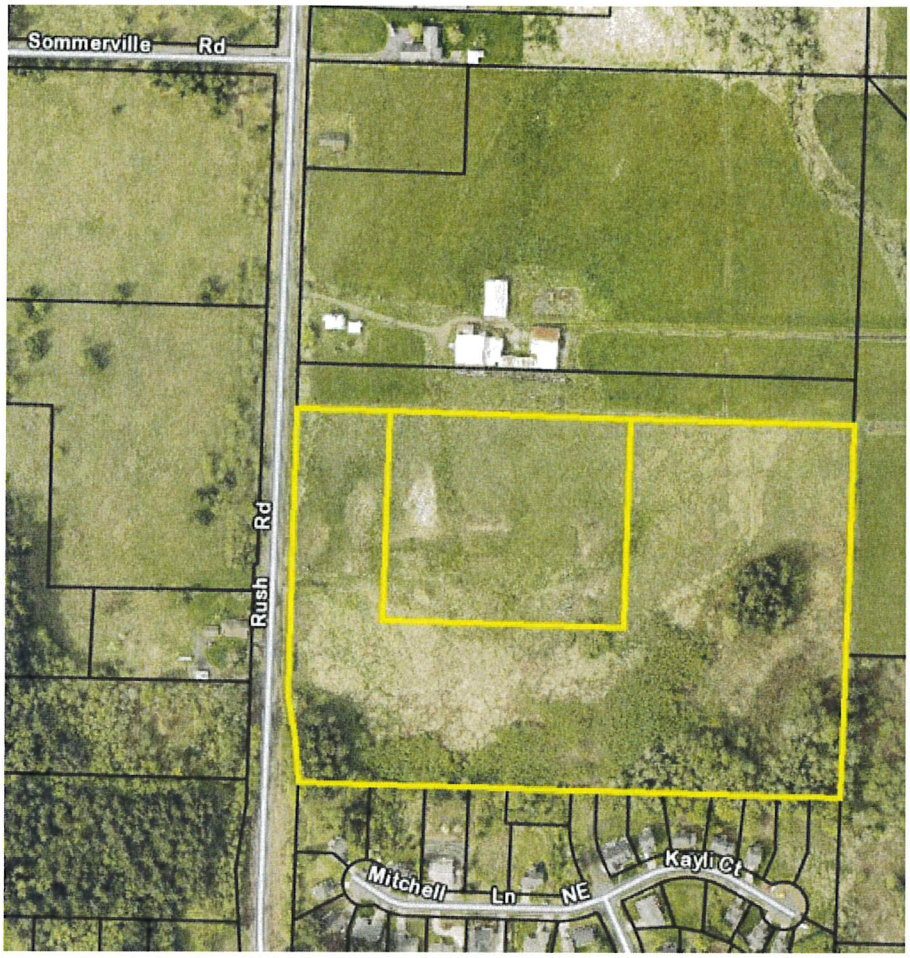
Project Name:	Rognlin's Rush Rd
Meeting Date	August 29th, 2022
Proposal:	The proposed plat consists of 68 single family residential lots and two commercial lots, along with six tracts for open space, utilities/access, and stormwater. The proposal will take place on two existing parcels for a total site area of 25.21 acres. The site is split-zoned, with a 2.41-acre portion in the northwest corner zoned General Commercial and the remainder zoned R3-High Density Residential.
Location:	East of Rush Road, and north of Mitchell Ln, Napavine WA 98565 Parcel: 018152003000 and 018152004000.
Owner:	Randy Rognlin
Applicant:	Rognlin Properties LLC
Applicant's Rep:	R&B Engineering Attn: Chris Aldrich PO Box 923 Chehalis, WA 98532
Staff:	Bryan Morris, City of Napavine Public Works Director Katie Williams, City of Napavine Administrative Assistant Devin Jackson, City Engineer *(Consultant, Jackson Civil)* *Jim Buzzard, City Attorney (Consultant, Buzzard O'Rourke)* *Marissa Y. Jay, City Attorney (Consultant, Buzzard O'Rourke)*

Recommendation: **Approved subject to Conditions**

City of Napavine Public Works Director's initials: BM
Date issued: 8-12-2022

JACKSONCIVIL

Figure 1. Location



Parcel Number: 018152004000
Situs Address: 0 RUSH RD
Owner: ROGNLIN PROPERTIES LLC
Assessor's Use Description: 91 Residential Land - Undivided
Property Type: COM
Land Use: undeveloped/vacant
Land Value: 836,800
Improvement Value: 0
Total Value: 836,800
Total Acres: 19.21
Mail Address: PO BOX 307
City: ABERDEEN
State: WA
Zip: 98520

Parcel Number: 018152003000
Situs Address: 1054 RUSH RD
Owner: ROGNLIN PROPERTIES LLC
Assessor's Use Description: 11 Single Unit
Property Type: COM
Land Use: single-residential
Land Value: 261,400
Improvement Value: 17,600
Total Value: 279,000
Total Acres: 6.00
Mail Address: PO BOX 307
City: ABERDEEN
State: WA
Zip: 98520

C. *Development of parcels shall be required to resemble and match improvements on continuous parcels; i.e., sidewalks, culverts and driveways, curbs and gutters.*
D. *Development of parcels parallel to Rush Road shall be allowed placement of a culvert and driveway.*
E. *A new sub-division resembling developments such as Stadium Estates, Parkside Loop and Camden Yards shall be required to develop curbs and gutter and sidewalks when it creates a new neighborhood.*
F. *Large sub-divisions consisting of ten tract or lots for single family dwelling or multi-family dwelling shall have a minimum thirty-foot right of way, twenty-foot paved surface, no parking allowed, or parking allowed on one side of the street, one sidewalk five feet in width, and one and one-half foot curb and gutter on both sides.*
G. *Napavine City Council shall have the final authority to determine whether a development be required to install curbs and gutters, sidewalks and street lights and the city council may waive any other standard set forth herein as allowed by law. Provided however, a person must first exhaust administrative remedies prior to applying directly to the city council.*

FINDING: The proposal shows one access street on Rush Road, and new residential subdivision streets with cul-de-sac and eyebrows. NMC 12.04 applies.

CONDITION OF APPROVAL: Prior to engineering approval, final plans depicting public improvements satisfying applicable City standards and the most current version of the WSDOT Standard Specifications shall be submitted for review and approval by the City.

12.08 CONSTRUCTION IN PUBLIC PLACES

12.08.010 - Work obstructing public places

A. *All persons, corporations and/or utilities desiring to perform work upon, obstructing or making installations that cause disturbance, disruption, or damage to city streets, alleys, rights-of-way, bridges, parking lots, parks or other public places within the city are required to obtain a permit from the city mayor or his designated representative before proceeding therewith.*
B. *The city mayor or his designated representative is authorized and directed to require applications for the performance of work, obstructing or making installations on city streets, alleys, rights-of-way, bridges, parking lots, parks or other public places upon such forms and regulations as are or hereafter shall be approved by resolution of the city mayor.*

FINDING: The proposal includes half-width improvement to Rush Road and utilities connection in the City right-of-way. NMC 12.08 applies.

CONDITION OF APPROVAL: Prior to construction, the applicant shall have received engineering approval and be in possession of all necessary permits.

12.14 STREET TREES

12.14.050 - Planting size

Street trees shall be two-to-three-inch caliper, measured six inches above the base.

12.14.060 - Planting location

A. *Street trees shall be located at least four feet behind the backside of the curb.*
B. *Street trees shall be spaced thirty-five feet on center starting fifteen feet from property line.*

A. *Within the corporation limits of the city, meters shall be placed within two feet of the edge of the sidewalk or proposed sidewalk on the curb side in existing plats and within two feet of the sidewalk on the property side in new plats.*
B. *Within the county, meters shall be placed within the county right-of-way and within two feet of the property line nearest the customer's premises.*
C. *In instances other than contained herein, or where the public works director determines that unusual or conflicting conditions exist, the location of meters shall be determined by the public works director.*

13.02.100 - Service connection—Location of service pipe
Water service pipe shall not be laid or maintained parallel with and within ten feet horizontally of any sanitary sewer, electrical conduit, gas pipe, or communications cable, septic tank, or drain field. When additional water pipe extensions or replacements are to be made beneath the surface of the ground within the premises and connected with existing water service pipes between the meter and the premises, an application therefor shall be made to the city for inspection and approval prior to backfilling the trenches.

13.02.370 - Construction standards
All persons, firms, corporations, and governmental agencies, and/or their contractors, repairing, replacing, installing, extending, or performing other work on water system lines, facilities, service lines, connections, and/or appurtenances thereto, or performing other work that may interfere, conflict, affect, or endanger the water system of the city shall follow and comply with the provisions of the engineering development code of the city as adopted by the city. Where the engineering development code of the city are silent on any construction standards issue, the current version of the Washington State Department of Transportation/Washington State Chapter of the American Public Works Association Standard Specifications for Road, Bridge, and Municipal Construction shall apply.

13.02.410 - Water main extension request
When a person desires to extend a city water main, that person must make a written request to the city and state on that request the location where the extension is desired, the purpose for extension, and give details and extent of any development they are considering, as well as any other factors as may be pertinent. The public works director shall evaluate all requests for main extensions, taking into consideration the availability of water in the existing mains, reservoir capacity, pressures in the area, and other local conditions. If the proposal is acceptable, specific conditions and requirements will be determined by the public works director.

13.02.420 - Water main extension design
The proposed main extension shall be designed by a licensed engineer and be approved by the public works director and appropriate governmental authorities. The design shall be in conformance with city standards as contained in the engineering development code of the city, and shall be designed by the use of a hydraulic analysis, considering pipe size, restrictions, peak demand, length of run, elevation differences, and other factors that may be pertinent.

FINDING: The proposal indicated that water will be accessible via connection to the existing water system on Rush Road. The proposed water system shall include new fire hydrants on proposed streets. Additionally, one water meter shall serve one lot and the proposed plan shall show all water meters located within public right-of-way. **See Chapter 4 NPW of this report for water design conditions of approval.**

The owner of any house, building or property used for human occupancy, employment, recreation or other purpose, situated inside the district and abutting any street, alley or right-of-way in which there is now located or may in the future be located a public sanitary sewer of the city, is required, at the owner's expense, to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of this article, provided that such public sewer is within two hundred feet of the property line of the lot or parcel upon which such house, building or property is situated.

FINDING: The proposal indicates that the proposed sewer connection will be established to the existing sewer system under Rush Road. Sewer services shall extend to all lots. **See Chapter 5 NPW of this report for water design conditions of approval.**

13.30 - STORM WATER SYSTEM

13.30.010 - Storm water standards

The city council adopts the Washington State Department of Ecology "Basic Storm Water Protection Standards" for use in the storm water management within the city of Napavine.

13.30.020 - Use in development review

The city council requires the use of the basic storm water protection standards for all building and development review of storm water drainage and authorizes the public works superintendent to attach storm water quantity and quality conditions to meet the basic storm water program standards.

13.30.040 - Standards of practice

The city council sets the city standard of performance for storm drainage as in all utilities as that of "best engineering practices" for all construction within city.

13.30.060 – Permits

A. *No building permit shall be issued nor excavation begun upon private land on which a driveway will be installed or constructed, unless or until a culvert permit is issued under this chapter. No driveway may be installed without an approved culvert and no culvert may be installed unless or until a culvert permit is issued under this chapter.*
B. *A culvert permit may be issued only upon approval of an application for such a permit. Installation of the culvert under the permit must be done pursuant to the specifications in the permit. Permits may be issued per culvert.*

13.30.090 - Existing driveways and culverts

A. *Prior existing culverts which were in existence before the passage of this chapter are exempt from the requirement to procure a permit prior to installation. Prior existing driveways that do not have an existing or operable culvert must be upgraded and must include a culvert upon notification by the city. When the city becomes aware of a prior existing driveway without a culvert or without an operable culvert, it may provide written notice to the owner thereof by mailing, postage prepaid, a notice to the owner's last known address or by posting the notice at or near the driveway in a conspicuous location. Upon mailing or posting, the owner shall have ninety days to apply for a permit and properly install a working culvert. This provision does not limit the city's ability to repair or remove the danger driveway or culvert as provided in this chapter.*
B. *Any modifications or upgrades to a prior existing driveway or culvert must conform to this chapter and are not exempt from the permitting requirement.*

FINDING: The National Wetlands Inventory (NWI) map and other maps do not depict mapped wetlands within the area. However, the critical area report concludes that jurisdictional wetland habitat is present on site. The wetland has been calculated to be a Category IV wetland with a 40-foot buffer. A stormwater conveyance system is proposed through the wetland buffer for discharge to a proposed treatment and pond facility. The critical area report provides a list of mitigative measures that may be conditioned to allow use of the buffer for storm pipe as proposed. The standard applies.

CONDITION OF APPROVAL: Prior to engineering approval, the applicant shall submit all necessary drawings compliant with the list of mitigative measures to use of the buffer for storm pipe for City review and approval.

Title 15 - BUILDINGS AND CONSTRUCTION

15.04 - CONSTRUCTION CODES

15.04.020 - Codes adopted

Pursuant to the state Building Code Act, RCW 19.27A.010 et seq., the city adopts by reference the following:

A. *The International Building Code, 2009 edition, as published by the International Code Council, be and is hereby adopted as the building code of the city of Napavine;*
B. *Uniform Mechanical Code, 1982 Edition, including Chapter 22, Fuel Gas Piping, Appendix B, published by the International Conference of Building Officials;*
C. *The Uniform Fire Code and Uniform Fire Code Standards, 1982 Edition, published by the International Conference of Building Officials and the Western Fire Chiefs Association; provided that, notwithstanding any wording in this code, participants in religious ceremonies shall not be precluded from carrying hand-held candles;*
D. *The Uniform Plumbing Code and Uniform Plumbing Code Standards, 1982 Edition, published by the International Association of Plumbing and Mechanical Officials; provided, that Chapters 11 and 12 of such code are not adopted;*
E. *The rules and regulations adopted by the council establishing standards for making buildings accessible to and usable by the physically handicapped or elderly persons as provided for in RCW 70.92.100 through 70.92.160; and*
F. *The Washington State Energy Code, June 30, 1980 Edition, adopted by the state Building Code Advisory Council and amendments to the code adopted prior to January 1, 1985, the revisions to the state energy code adopted pursuant to RCW 19.27.075, and subsequent amendments adopted by the council under RCW Chapter 34.05.*
G. *The International Residential Code, 2009 edition, as published by the International Code Council, be and is hereby adopted as the residential code of the city of Napavine.*

In case of conflict among the codes enumerated in subsections A through G of this section, the first named code shall govern over those following.

15.08 - ENERGY CODE

15.08.010 – Adopted

WAC Chapter 51-12 as the same now appears or hereafter may be amended, shall be, and is adopted by this reference as the energy code of the city.

FINDING: The proposed project will construct 68 single-family residential units. Architecture plans were not submitted for review. This standard is not met.

For the purpose of expediting the final approval of any plat, the subdivider shall apply to the city planning commission, at the office of the administrator on such forms as may be provided by the commission, for the approval of the preliminary plat. Together with the application, the subdivider shall submit sixteen copies of the preliminary plat at least sixty days prior to the commission meeting at which action is desired. He shall, at that same time, pay a plat fee which is not refundable, by cash or certified check, payable to the general fund of the city.

The administrator, on behalf of the planning commission, shall assign the plat a permanent file number and shall submit copies of the plat to:

A. *County and city engineers, health officer and other county, city and state officials concerned within the scope of their official functions;*
B. *Director of Highways when such plats are located adjacent to the rights-of-way of existing and known proposed state highways;*
C. *The proper city officials, when such land to be platted is adjacent to or within a distance of one mile~ from the corporate limits of the city, or which contemplates the use of any city utilities.*

16.12.030 - Preliminary plat

A. *Preparation. The subdivider shall prepare a preliminary plat, together with improvement plans and other supplementary material~ as may be required to indicate the general program and objectives of the project. To assure knowledge of existing conditions and city requirements to obtain compliance with existing city development plans, the subdivider may confer with the city engineer prior to preparation of the preliminary plat.*
B. *Scope. The preliminary plat need not be a finished drawing, but it should show all pertinent information to scale, in order that the planning commission may properly review the proposed development.*
C. *Partial Development. Where the plat to be subdivided contains only a part of the tract owned or controlled by the subdivider, the planning commission may require a sketch of a tentative layout for streets in the unsubdivided portion.*
D. *Information Required. The preliminary plat shall include the following information:*
    1. *Detailed Map. The preliminary plat shall be drawn at a maximum scale of one inch equals fifty feet, minimum scale of one inch equals two hundred feet, and for areas over one hundred sixty acres, one inch equals two hundred feet.*
    2. *General Information. The following general information shall be shown on the preliminary plat:*
        a. *Proposed Name of the Subdivision. The name must not duplicate nor resemble the name of another subdivision in the county and shall be approved by the planning commission.*
        b. *Date, north point and scale of drawing.*
        c. *Appropriate identification clearly stating the map is preliminary.*
        d. *Location of the subdivision by section, township and range and a legal description sufficient to define the location and boundaries of the proposed tract or the tract designation or other description according to the real estate record of the county assessor.*
        e. *Names and addresses of the owner or owners, subdivider, engineer or surveyor, and land planner or landscape architect.*
    3. *Existing Conditions. The following existing conditions shall be shown on the preliminary plat:*

vi. *Drafts of all covenants to be imposed as well as any other agreements or arrangements.*

FINDING: The application is being processed as a subdivision review.

16.20 - DESIGN STANDARDS

16.20.020 – Streets

A. *General. The location, width and grade of streets shall be considered in their relation to existing and planned streets, to topographical conditions, to public convenience and safety and in their appropriate relation to the proposed use of the land to be served by such streets.*

B. *Minimum Right-of-Way and Roadway Widths. Unless otherwise indicated in the comprehensive plan, the width of streets and roadways shall not be less than the minimums shown in the following table:*

	Minimum Width in Feet	
	Right-of-Way	Roadway
Primary arterials	100	66
Secondary arterials	80	56
Collector streets	70	40
Other lesser streets	60	36
Cul-de-sacs; radius of turnaround	45	40
Alleys	20	As required by City Engineer

C. *Reserve Strips. Reserve strips or street plugs controlling the access to streets will not be approved unless such strips are necessary for the protection of the public welfare or of substantial property rights or both, and in no event, unless the control and disposal of the land composing such strips is placed definitely within the jurisdiction of the city under conditions approved by the planning commission.*

D. *Alignment. Streets other than minor streets or cul-de-sacs shall, as far as practical, be in alignment with existing streets by continuations of the center lines thereof.*

E. *Future Extension of Streets. Where a subdivision adjoins unplatted acreage, streets which in the opinion of the planning commission should be continued in the event of the subdivision of such unplatted acreage will be required to be provided through to the boundary lines of the tract. Reserve strips and street plugs may be required to preserve the objectives of street extensions.*

F. *Intersection Angles. Streets shall intersect one another at an angle as near to a right angle as practical, and no intersection of streets at an angle of less than seventy-five degrees shall be approved. When intersections of other than ninety degrees are unavoidable, the right-of-way lines along the acute angle shall have a minimum corner radius of twenty-five feet. All right-of-way lines at intersections with arterial streets shall have corner radius of not less than fifteen feet.*

G. *Existing Streets. Whenever existing streets adjacent to or within a tract are of inadequate width, additional right-of-way shall be provided at the time of subdivision, and conversely, oversized rights of way may be decreased.*

H. *Cul-de-Sacs. A cul-de-sac shall be as short as possible and shall in no event be more than five hundred feet in length.*

I. *Grades and Curves. Grades shall not exceed five percent on primary or secondary arterials, ten percent on collector streets, or fifteen percent on any other street. In flat areas allowance shall*

A. *Requirements. The following improvements shall be installed at the expense of the subdivider in accordance with city standards:*
    1. *Streets;*
    2. *Storm sewers, unless the area is not accessible to a trunk line within 500 feet;*
    3. *Sanitary sewers, unless the area is not accessible to a trunk line within 500 feet;*
    4. *Water distribution lines;*
    5. *Sidewalks in any special pedestrian ways;*
    6. *Street name signs and street lights;*
    7. *Curbs and gutters wherever storm sewers are installed.*

B. *Streets*
    1. *All streets, including alleys, within the subdivision and streets adjacent but partially within the subdivision shall be improved;*
    2. *All streets shall be constructed to city standards for permanent street and alley construction. Catch basins shall be installed and connected to drainage tile leading to storm sewers or drainage ways as approved by the city engineer. Upon completion of the street improvement, monuments shall be re-established and protected in monument boxes at every street intersection and all points of curvature and points of tangency of street centerlines.*
    3. *In a residential area, if the city requires a subdivider to install a street with pavement width greater than thirty-six feet to provide an arterial traffic route, the city shall pay that portion of the cost in excess of the cost of a thirty-six-foot roadway.*

C. *Surface Drainage and Storm Sewer System*
    1. *Drainage facilities shall be provided within the subdivision and to connect the subdivision drainage ways or storm sewers outside the subdivision as required by the city engineer.*
    2. *Capacity, grade and materials shall be as provided by the city engineer's design. Design of drainage within the subdivision shall take into account the capacity and grade necessary to maintain unrestricted flow from areas draining through the subdivision and to allow extension of the systems to serve such areas.*

D. *Sanitary Sewers*
    1. *Sanitary sewers shall be installed to serve the subdivision and to connect the subdivision to existing mains. In the event it is impractical to connect the subdivision to the city trunk sewer system, the planning commission, in conjunction with the county sanitarian, may authorize the use of septic tanks if lot areas are adequate considering the physical characteristics of the size and the subsurface ground conditions. The septic tanks shall be of a design and capacity designated by the county sanitarian.*
    2. *Size, slope and type of sewer pipe material shall be in accordance with plans and specifications of the city. The subdivider shall pay for the necessary inspection by the city. Design shall take into account the size of pipe and grade elevation to allow for desirable extension beyond the subdivision. The city will not require the subdivider to pay for the extra cost of sewer mains over eight inches in diameter or for excessive depth necessary to provide for extension beyond the subdivision.*
    3. *If required sewer facilities will, without further sewer construction, directly serve property outside the subdivision, the following arrangements will be made to equitably distribute the cost:*
        a. *If the area outside the subdivision to be directly served by the sewer line has reached a state of development to justify sewer installation at the time, the*

comply with requirements set forth in Chapter 17.84 of this title. Mobile home parks are permitted in this zone as planned unit developments subject to approval by the board of adjustment.

17.24.030 - Permitted accessory uses and structures.
Permitted accessory uses in the R-3 zone are as follows: garages or parking spaces for each dwelling unit; home occupations, noncommercial swimming pools, greenhouses, garden, tool or garbage sheds.

17.24.040 - Conditional uses
The following uses are permitted after hearing and attachment of conditions: traditional home occupations, boarding houses, professional offices, and other conditional uses deemed by the board of adjustment to be conditional.

17.24.050 - Permitted dimensions
Permitted dimensions in the R-3 zone are as follows:

- *A. Minimum lot size, one unit, seven thousand five hundred square feet or for transfer of development purposes; two units, ten thousand square feet; three units or more, twelve thousand five hundred square feet plus one thousand five hundred square feet per added unit;*
- *B. Minimum lot front, forty feet;*
- *C. Maximum lot cover, fifty percent;*
- *D. Minimum front yard depth, fifteen feet;*
- *E. Minimum side yard depth, seven and one-half feet for principal or accessory structure; fifteen feet if structure abuts a street;*
- *F. Minimum rear yard depth, fifteen feet for principal structure; five feet for accessory structure;*
- *G. Maximum building height fifty feet, or thirty-five feet when lot is adjacent to any residential district.*

Finding: The proposal indicates the current zoning of development site is R3; therefore, this standard applies. The development minimum lots size is 7500 square feet (min. 7500 square feet), minimum front lot line length is approximately 56.5 feet (min. 40 feet). Based on the SEPA report, about 33% of the property will be covered with impervious surface (max. 50%), and the tallest building height is 25 feet (max. 50 feet). The proposal does not include yard depth (front, side, and rear); therefore, this standard is not met.

CONDITION OF APPROVAL: Prior to engineering approval, architectural and site design plans shall satisfy all parts of NMC Section 17.24.

CONDITION OF APPROVAL: Prior to building construction, plot plan compliant with NMC Section 17.24 shall be submitted and approved by the City.

17.60 - MISCELLANEOUS REGULATIONS

17.60.010 - Visibility at intersections in residential zones

- *A. Fences, walls or hedges up to a maximum height of six feet may be installed except:*
  1. *Within the existing or zone stipulated, whichever is less, front and street side yard setback;*
  2. *Within the area between two main structures with less than five feet of continuous horizontal clearance on each side of the fence, wall or hedge;*

CONDITION OF APPROVAL: Prior to engineering approval, the landscaping plan shall satisfy all parts of NMC 17.60.070. Landscaping plan shall be submitted and approved by the City.

17.62 – SIGNS

FINDING: The proposal does not indicate any signs currently. This standard does not apply.

17.64 - OFF-STREET PARKING AND LOADING

17.64.010 - Requirements for off-street parking

Off-street parking spaces under standards set forth in this chapter shall be provided for new uses in the quantities specified in this section.

A. *Residential Uses*
   1. *One-family dwelling, two spaces;*
   2. *Duplex dwelling, four spaces;*
   3. *Multiple-family dwelling with sixteen or fewer dwelling units, two spaces for each dwelling unit; except in cases of housing dedicated to senior citizen housing one space for each dwelling unit;*
   4. *Multiple-family dwelling with more than sixteen dwelling units, thirty-two spaces, plus one and one-half spaces for each dwelling unit in excess of sixteen; except in cases of housing dedicated to senior citizen housing one space for each dwelling unit;*
   5. *Convalescent homes, homes for the children or aged, and similar residential institutions, one space for each three beds.*

B. *Commercial Uses. Commercial uses within the area designated "Parking Exempt" on the map and addenda to the map shall not be subject to the following requirements:*
   1. *Food or drug stores with more than five thousand square feet of gross floor area: one space for each one hundred square feet of gross floor area;*
   2. *Other retail stores with more than five thousand square feet of gross floor area: one space for each one hundred fifty square feet of gross floor area;*
   3. *Retail stores with five thousand or less square feet of gross floor area: one space for each three hundred square feet of gross floor area; provided that at least two spaces shall be provided for any such use;*
   4. *Medical and dental offices: one space for each one hundred square feet of gross floor area;*
   5. *Offices other than medical or dental: one space for each four hundred square feet of gross floor area; provided that at least two spaces shall be provided for any such use;*
   6. *Restaurants: one space for every three seats or stools or for every three persons of legal occupancy, whichever is greater;*
   7. *Bowling alley: four spaces for each alley;*
   8. *Self-service laundry: one space for every three washing or drying machines;*
   9. *Banks: one space for each four hundred square feet of gross floor area;*
   10. *Funeral parlors: one space for each one hundred square feet of chapel or auditorium area;*
   11. *Barber or beauty shops: two spaces for each operator station;*
   12. *Personal service establishments not otherwise listed: one space for each four hundred square feet of gross floor area; provided that at least two spaces shall be provided for any such use;*
   13. *Motel: one space for each sleeping unit;*

2. *Required screening shall be at least eighty percent opaque when viewed horizontally from between two feet above average grade and the top of the screening;*
3. *Screen plantings shall be of such size as to provide the required degree of screening within twelve months after installation;*
4. *Required screening shall be continuously maintained;*
5. *All areas used for parking, loading and maneuvering of vehicles shall be physically separated from public streets or adjoining property by required setbacks or by bumper rails, or other effective and suitable barriers against the access or egress of unchanneled motor vehicles.*

F. *Joint Use of Parking. The building inspector may authorize the joint use of parking facilities under the following conditions:*
   1. *Up to one hundred percent of the parking space required for a church may be supplied by off-street parking provided for other uses, provided that such parking lies within two hundred feet of the site of the church;*
   2. *Up to fifty percent of the parking space required for a theater, auditorium, bowling alley, or community center may be supplied by off-street parking provided for other uses, provided that such parking lies within two hundred feet of the site of subject use;*
   3. *Two or more uses may join to develop a cooperative parking facility: the total amount of parking required under such circumstances shall be ten percent less than the total amount required for the uses separately. In case of uses which operate at totally different times, the total minimum amount is that required for the most intensive use;*
   4. *Under subdivisions 1, 2 or 3 of this subsection, there shall be filed with the building inspector a written agreement between parties involved assuring to the building inspector's satisfaction, the validity and perpetuity of the joint use.*

G. *Location of Parking. All required off-street parking other than joint use parking as provided in subsection F shall be located on the same site as the principal use, provided that such parking may be located on another site within two hundred feet of the principal use if a covenant or written agreement is filed with the building inspector assuring to the building inspector's satisfaction the perpetuity of such parking.*

Finding: The proposal indicates a minimum of 2 parking spaces per residential. The standard is met.

17.76 - AMENDMENTS AND REZONES

17.76.010 - General procedure

The council may, from time to time, on its own motion, on petition of any person in interest, or on initial recommendation of the commission, amend, supplement or repeal the regulations and provisions of this title, including the chart and map, provided that where territory is sought to be rezoned by application from a person other than the council or commission, the person petitioning for rezoning of territory must have a property interest in the subject property.

17.76.020 - Planning commission advisory report

Any such proposed amendment or change, when initiated by the council or by individual petition, shall be referred to the commission for an advisory report thereon. When a proposed amendment or change is initiated by the commission, said advisory report shall accompany the initial recommendation of the commission.

17.76.040 - Procedure before council

approval process involved and provide the applicant with written instructions describing the approval procedure.

B. *Following such an informal meeting, the potential applicant shall meet with the commission in a pre-application conference which shall be held at a regular meeting of the commission. The applicant shall have for this meeting a map on which the proposal is presented, and information on the availability of utility service, the topography of the site, and such other information as requested by the inspector. At the time of this conference, the commission may extend to the potential applicant its preliminary observations and suggestions on the proposal.*

C. *Following the pre-application conference, an application for rezoning for a planned unit development may be filed. Such application will be processed in accordance with provisions of this section with final action to be taken by council.*

D. *Prior to final recommendation by the commission on an application for a planned unit development, the applicant shall file with the commission covenants, deed restrictions, home association by-laws, and other documents required to guarantee maintenance and construction of common recreation space, private roads and drives, and all other commonly owned property. The documents shall be approved by the city attorney, with revisions as appropriate, prior to formal action by the commission. Copies shall then be transmitted to council for its information during consideration of the rezoning ordinance, and finally shall be filed with the county auditor if the application is approved.*

Finding: The proposal includes an application for rezone. Reorienting commercial zoned portions to align with Rush Road. In addition, commercially zoned lot acreage changes from 2.41 ac. to 2.81 ac. As a results, the reorienting does not affect the total area of commercial and residential zoning. The standard is met.

Title 18 – ENVIRONMENT

18.04 - ENVIRONMENTAL PROTECTION ACT PROCEDURES AND POLICIES

18.04.040 - Categorical exemptions and threshold determinations.

A. *(WAC 173-806-065). Purpose of this Part and Adoption by Reference. This part contains the rules for deciding whether a proposal has a "probable significant, adverse environmental impact" requiring an environmental impact statement to be prepared. This part also contains rules for evaluating the impacts of proposals not requiring an EIS. The city adopts the following sections by reference, as supplemented in this part:*
    1. *197-11-300 Purpose of this part.*
    2. *197-11-305 Categorical exemptions.*
    3. *197-11-310 Threshold determination required.*
    4. *197-11-315 Environmental checklist.*
    5. *197-11-330 Threshold determination process.*
    6. *197-11-335 Additional information.*
    7. *197-11-340 Determination of nonsignificance (DNS).*
    8. *197-11-350 Mitigated DNS.*
    9. *197-11-360 Determination of significance (DS)/Initiation of scoping.*
    10. *197-11-390 Effect of threshold determination.*

B. *(WAC 173-806-070). Flexible Thresholds for Categorical Exemptions.*
    1. *The city establishes the following exempt levels for minor new construction under WAC 197-11-800(1)(b) based on local conditions:*

3. *The city may deny a permit or approval for a proposal on the basis of SEPA so long as:*
    a. *A finding is made that approving the proposal would result in probable significant adverse environmental impacts that are identified in a FEIS or final SEIS prepared pursuant to this chapter; and*
    b. *A finding is made that there are no reasonable mitigation measures capable of being accomplished that are sufficient to mitigate the identified impact; and*
    c. *The denial is based on one or more policies identified in subdivision (4) of this subsection and identified in writing in the decision document.*
4. *The city designates and adopts by reference the following policies as the basis for the city's exercise of authority pursuant to this section:*
    a. *The city shall use all practical means, consistent with other essential considerations of state policy, to improve and coordinate plans, functions, programs, and resources to the end that the state and its citizens may:*
        i. *Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;*
        ii. *Assure for all people of the state safe, healthful, productive and aesthetically and culturally pleasing surroundings;*
        iii. *Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;*
        iv. *Preserve important historic, cultural and natural aspects of our national heritage;*
        v. *Maintain, wherever possible, an environment which supports diversity and variety of individual choice;*
        vi. *Achieve a high balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and*
        vii. *Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*
    b. *The city recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.*
5. *When any proposal or action not requiring a decision of the city council is conditioned or denied on the basis of SEPA by a nonelected official, the decision shall be appealable to the city council. Such appeal may be perfected by the proponent or any aggrieved party by giving notice to the responsible official within ten days of the decision being appealed. Review by the city council shall be on a de novo basis.*

C. *(WAC 173-806-173). Notice<197>Statute of Limitations.*
1. *The city, applicant for, or proponent of an action may publish a notice of action pursuant to RCW 43.21C.080 for any action.*
2. *The form of the notice shall be substantially in the form provided in WAC 197-11-990. The notice shall be published by the city clerk-treasurer or county auditor, applicant or proponent pursuant to RCW 43.21C.080.*

FINDING: A SEPA environmental checklist was included with this proposal; thus, this standard is met.

DESIGN SPEED (MPH)	40	40	30	30	25	N/A
MINIMUM CENTERLINE RADIUS	w/ superelevation * per AASHTO w/o superelevation 600'	w/ superelevation * per AASHTO w/o superelevation 600'	150'	150'	100'	N/A

* Maximum superelevation – 6%

A. Alignment of major arterials, minor arterials and collectors will conform as nearly as possible with that shown in the Comprehensive Plan.
B. Grade. Street grade should conform closely to the natural contour of the land. In some cases the Director of Public Works may require a different grade. The minimum allowable grade will be 0.5 percent. The maximum allowable grade will be 8-15 percent depending on the street classification.
C. Width. The pavement and right-of-way width will depend on the street classification. Table I, Minimum Street Standards, show the minimum widths allowed.

2B.04 Signing and Striping

Street signs are defined as any regulatory, warning, or guide signs. The developer is responsible for the cost of all street signs. Street sign will comply with the latest edition of the U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD).

Pavement markings and street signs, including poles and hardware, will be paid for by the developer, but will be designed. furnished and install d by the city or by the developer under the city's direction, to establish and maintain uniformity. The Public Works Department will determine whether pavement markings and street signs will be provided by the city or by the developer. If the work is to be performed by the city, the developer must submit a written request to Public Works and, the developer will then be billed upon completion of the work.

2B.05 Right-of-Way

Right-of-way is determined by the functional classification of a street, refer to Table 1 Minimum Street Standards.

Right-of-way requirements may be increased if additional lanes, pockets, transit lanes, bus loading zones, operational speed, bike lanes, utilities, or other factors are required as determined by the Director of Public Work.

Right--of-way will be conveyed to the city on a recorded plat or by a right-of- way dedication deed.

2B.06 Private Streets

A. Private streets may be allowed under the following conditions:
    1. Permanently established by tract or lot providing legal access to serve not more than 8 dwelling units or businesses on separate parcels, or unlimited dwelling units or businesses situated on a single parcel and sufficient to accommodate required improvements, to include provisions for future use by adjacent property owners when applicable; and
    2. Have ·a minimum 20-foot paved surface, and a sidewalk five (5) feet in width of such a design that prevents parking on the sidewalk; and
    3. Accessible at all times for emergency and public service vehicle use·; and

2. *"Y" type intersections where streets meet at acute angles*
3. *Intersections adjacent to bridges and other sight obstructions*
4. *Offset intersections that are not conducive to side traffic flow*

In no case will the angle of the intersection be less than 60 degrees nor greater that 120 degrees. The preferred angle is 90 degrees.

C. *Spacing between adjacent intersecting streets, whether crossing or "T," should be as follows:*

When highest classification involved is:	*Minimum centerline offset should be:*
Major Arterial	*350 feet*
Minor Arterial	*300 feet*
Commercial Collector	*200 feet*
Neighborhood Collector	*200 feet*
Local Access	*150 feet*

When different classes of streets intersect, the higher standard will apply on curb radii. Deviations may be allowed at the discretion of the Director of Public Works.

D. *On sloping approaches at an intersection, landings will be provided with a grade not to exceed a one-foot difference in elevation, 1 a distance of 30 feet approaching any arterial, or 20 feet approaching a collector or local access street, measured from the nearest right-of-way line (extended) of intersecting street.*

FINDING: The spacing between adjacent intersecting streets onto Rush Road is in excess of 350 feet. This standard is met.

2B.12 Driveways

A. *All abandoned driveway areas on the same frontage will be removed and the curbing and sidewalk or shoulder and ditch section will be properly restored.*
B. *All driveways will be constructed of Portland Cement Concrete (PCC) or asphalt from the right-of-way line to the edge of the street. The Director of Public Works will make the acceptable driveway material determination. PCC driveways will be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction. Residential PCC driveways will have a nominal concrete thickness of six (6) inches. All other PCC approaches will be eight (8) inches thick.*
C. *Joint-use driveways serving two adjacent parcels may be built on their common boundary with a formal written agreement between both property owners and with the approval of the city. The agreement will be a recorded easement for both parcels of and specifying joint usage.*
D. *Grade breaks, including the tie to the roadway, will be constructed as smooth vertical curves. The maximum change in driveway grade will be eight (8) percent within any ten (10) feet of distance on a crest and twelve (12) percent within any ten (10) feet of distance in a sag vertical curve.*
E. *No commercial driveway will be approved where backing onto the sidewalk or street would occur.*
F. *Driveways will be separated by twenty (20) feet of straight curb between each driveway providing access to a parcel or parcel of land under common ownership or occupancy unless otherwise allowed by the Director of Public Works.*
G. *No driveway will be built within fifteen (15) feet of the end of any curb return or within five (5) feet of any property line unless otherwise allowed by the Director of Public Works.*
H. *Driveway Widths*
    1. *The maximum driveway width for a single driveway onto an arterial or collector will be:*

designed, per the most recent edition, "Transportation and Land Development by V.G. Stover and F. Koepke.

FINDING: The engineering plans do not include driveway locations, design size, and information for each lot. This standard is not met.

CONDITION OF APPROVAL: Prior to engineering approval, a plan providing driveway location, and dimensions for corner lots satisfying NPW 2B.12 shall be submitted for review and approval by the City.

2B.13 Sight Obstruction
The following sight clearance requirements take into account the proportional relationship between speed and stopping distance.
The sight distance area is a clear-view triangle formed on all intersections by extending two lines of specified length (A) and (B) as shown in this section, Uncontrolled Intersection, from the center of the intersecting streets along the centerlines of both streets and connecting those endpoints to form the hypotenuse of the triangle. Refer to Standard Drawing 2-1 at the end of this Chapter. The area within the triangle will be subject to said restrictions to maintain a clear view on the intersection approaches.

Sight Distance Triangle:

A. *Stop or Yield Controlled Intersection. Providing adequate sight distance from a street or driveway is one of the most important considerations to ensure safe-street and driveway operation the Intersection Sight Distance criteria given in the following table is based on line 8-1 shown in Figure IX-40 of "A Policy on Geometric Design of Highways and Streets" published by AASHTO. This table applies to all intersections as well as driveways with an ADT greater than 20. For driveways with an ADT of 20 or less, the Stopping Sight Distance in Table 1/1-1 of the MSHTO publication can be used.*

SIGHT DISTANCE			
Operating Speed (MPH)	*Intersection Sight Distance*		*Stopping Sight Distance*
	2 Lanes	*4+ Lanes*	
20	*210*	*230*	*125*
25	*255*	*280*	*150*
30	*310*	*340*	*200*
35	*355*	*390*	*250*
40	*410*	*450*	*325*

Other factors such as vertical and horizontal curves and roadway grades also need to be taken into account. Such factors can require necessary modification to the intersection sight distance given in the above table.

Sight distance is measured from a point on the minor road or driveway fifteen (15) feet from the edge (extended) of the major road pavement (or nearest traffic lane if parking is permitted) and from a height of 3.50 feet on the minor road to a height of object of 4.25 feet on the major road.

B. Uncontrolled Intersection

Operating Speed (MPH)	*Sight Distance*

2. *statement of existing pavement condition and discussion of how 1 it will "match up" to the new pavement section*

B. *Sidewalks*
Surfacing: four (4) inches Commercial Concrete.
Base: two (2) inches Crushed Surfacing Top Course or well graded sand.
Asphalt sidewalks will not be permitted unless otherwise approved by the Director of Public Works.

C. *Concrete Driveway*
Surfacing: six (6) inches Commercial Concrete for residential, (8) inches Commercial Concrete for all others Base: two (2) inches Crushed Surfacing Top Course or well graded sand.

D. *Asphalt Driveway*
Surfacing: three (3) inches Cass B asphalt concrete for residential, six (6) inches Class B asphalt concrete for all others Base: four (4) inches ballast.

2B.15 Temporary Street Patching

Temporary restoration of trenches will be accomplished by using two (2) inches Class 8 Asphalt Concrete Pavement (when available) or two (2) inches medium-curing (MC-250) Liquid Asphalt (cold mix). two (2) in es Asphalt Treated Base {ATB)1 or steel plates.

ATB used for temporary restoration may be placed directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with asp alt concrete pavement to provide a smooth riding surface. Prior to beginning street trenching work, the contractor will ensure that all necessary material for temporary patching is stockpiled at the project site, both for comple1ing and maintaining the patch.

The contractor will maintain all temporary patches until such time as e permanent pavement patch is in place. Patches not properly maintained by the contractor will be repaired by the city at the developer's, contractor's and/or private utility's expense.

2B.16 Pavement Restoration

Trench cuts in roadways greatly degrade the condition of the pavement as well as reduce its design life. The most significant damage can be seen in newer pavements. Pavement restoration should result in the pavement being as good as, or better than, the pre-trench cut condition. This can be achieved by the prevention of trench cuts, thorough utility coordination, and high-quality. pavement restoration.

A. *Trench Cuts in New Pavements. Trench cuts are not permitted in pavements that have been constructed or rehabilitated within five (5) years. "Rehabilitation" includes all surface treatments such .as chip seal slurry seal, and asphalt overlay.*
If there is no other option but to cut into new pavement, prior approval will be obtained from the Director of Public Works. Pavement must then be restored in accordance with the following standards.

B. *Transverse Utility Crossings must be bored or completed by another trenchless method. Bore puts must be restored in accordance with the following standards.*

C. *Pavement Restoration Requirements. Trench cuts, bore holes, and miscellaneous pavement repairs will be made in accordance with Standard Drawings 2-5 and 2-6, at the end of this chapter. Pavement will be restored across the entire lane. In addition, the patch will be made perpendicular to the closest affected road edge with a single, straight, continuous cut along the entire width of the required restoration. Minimum restoration width is five (5) feet.*

D. *Lane Width Restoration Requirements. For longitudinal utility trench cuts in pavements over five years old, a minimum two-inch overlay or full-depth pavement reconstruction is required for the following widths:*

test results and documentation will be submitted to the Public Works Department prior to final approval of the project.

FINDING: The engineering plans show that proposed water lines shall require cutting of the existing road and restoration is required. The application proposed concrete sidewalk and new asphalt paving; therefore, NPW 2B.14, 2B.15, and 2B.16 apply.

CONDITION OF APPROVAL: Prior to engineering approval, engineering plans demonstrating trenching and restoration compliant with Napavine Public Works standards shall be submitted for review and approval by the City.

2C SIDEWALKS, CURBS AND GUTTERS

2C.02 Design Standards

Plans for construction of sidewalks, curbs and gutters are to be submitted as part of the street plans when applicable. The City has set forth minimum standards that must be met in the design and construction of sidewalks, curbs and gutters. Because these are minimum standards, the Director of Public Works may modify them should it be deemed necessary.

A. *Sidewalks will be constructed of Commercial Concrete four (4) inches thick except in a driveway section at which point the concrete thickness must meet driveway standards. The minimum of sidewalk will be five (5) feet. When the sidewalk, curb and gutter are contiguous the width of the sidewalk will be measured from the back of the curb and gutter to the back of the sidewalk. In commercial areas, sidewalks may be required to extend from the curb to the property line.*
B. *Arterial Streets. Sidewalks, curbs and gutters will be required on both sides of arterial streets interior to the development. Sidewalks, curbs and gutters will also be required on the development side of arterial streets abutting the exterior of said development.*
C. *Local Access Streets. Sidewalks, curbs and gutters will be required on both sides of local access streets interior to the development. Sidewalks, curbs and gutters will also be required on the development side of local access streets abutting the exterior of said development including cul-de-sacs.*
D. *Design and Construction. The design and construction of sidewalks, curbs, gutters and walkways will meet the following minimum standards:*
    1. *The width of sidewalks will be as shown in the street design drawings. Design of all sidewalks will provide for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.*
    2. *Form and subgrade inspection by the Public Works Department is required before the sidewalk is poured.*
    3. *Monolithic pour of curb, gutter and sidewalk will not be allowed without specific approval from the Director of Public Works.*
E. *Driveways - see Section 2B.12*
F. *Curbs and Gutters. Cement concrete curbs and gutters will be used for all street edges unless otherwise approved by the Public Works Director. All curbs and gutters will be constructed in accordance with Standard Drawing 2-7.*
G. *The face or top of all new curbs will be embossed ¼-inch into the cement to denote the location of water and sewer service eras 1ngs. Water services will be marked with a "W" and side-sewers will be marked with an "S". The markings will be at least three (3) inches in height and clearly legible.*

Commercial office/mixed use

Residential
Single family, low density.
Single family, medium density
Multi-family, medium density

As new zones are created, the Director of Public Works will classify them. The following criteria will be used to determine streetlight spacing:

AVERAGE MAINTAINED HORIZONTAL ILLUMINATION (FOOT CANDLES)				
ROAD CLASS	AREA CLASS			
	Residential	Intermediate	Industrial	Commercial
Local	0.2	0.6	N/A	N/A
Collector	0.5	0.7	0.8	0.9
Arterial	0.7	1.0	1.2	1.4
Boulevard	0.7	1.0	1.2	1.4

Uniformity ratio: *6:1 average: minimum for local*
4:1 average: minimum for collector
3:1 average: minimum for arterial and boulevard
Dirt Factor: 0.85
Lamp Lumen Depreciation Factor: 0.73
Weak Point Light: 0.2 fc (except local residential street)

Line loss calculations will show no more than a 5 percent voltage drop in any circuit from the source to the most distant luminaire. Branch circuits will serve a minimum of four (4) luminaires.

Pole foundations will be per Standard Drawing 2-16. Luminaire poles will conform to Section 9-29 of the WSDOT Standard Specifications, except as modified herein. Light standards will be tapered aluminum with satin ground finish. The diameter at the base of the pole will not exceed nine (9) inches and the minimum thickness of the pole will be ¼-inch. Mounting height will be 30 feet. Mast arms will be single bracket, taper, minimum ten (10) feet in length. The shaft will heat treated after welding on the based flange to produce T6 temper. The pole and davit arm will be designated to supp l rt streetlight luminaries with a minimum weight of 60 pounds and a minim m effective protected area (EPA) of 1.5 square feet. Poles will be designed to withstand a 100mph (AASHTO) wind loading with a 1.3 gust factor with luminaire and mast arm attached, without permanent deformation or failure. Minimum wall thickness will be 0.188 inches. Poles will be equipped with a removable metal ornamental pole cap secured to the shaft with stainless steel screws. Poles will have a minimum 3 ½ by 6-inch hand hole with cover, near the base and will be equipped with a grounding lug. The pole will also be equipped with a 120V, 20 AMP recessed weatherproof power receptacle, that meet II applicable guidelines and standards. The receptacle will be located thirteen (13) feet above the base of the pole.
All luminaries will be a medium cut off. JES Type II distribution and will comply with art standards as established by the Public Utility District No. 1 of Lewis County. Unless otherwise required by PUD #1, luminaries will be: 20-watt, catalog #GEMDCLZOS3A11GMC31.
All streetlight electrical installations including wiring conduits and power connections will be located underground.

Parking lot circulation and signing needs to be met on site. The public right-of-way will not be utilized as part of a one-way parking lot flow.
All requirements for construction of parking lots will be determined through the Development Plan Review process, including capacity and configuration. Parking lot ingress and egress will be evaluated to determine traffic controls necessary to ensure vehicle safety to and from
the public right-of-way.
Parking lot surfacing materials must meet the requirements for a permanent all-weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved surface material type. Gravel surfaces are not acceptable or an approved surface material type. Combination grass/paving systems are approved surface material types; however, their use requires submittal of an overall
parking lot paving plan showing the limits of the grass/paving systems and a description of how the systems will be irrigated and maintained. If the Director of Public Works determines the grass/paving system is not appropriate for the specific application, alternate approved surfacing materials will be utilized.

FINDING: The applicant has submitted a landscaping plan to the city for review and comment. Specific comments may be addressed during final civil engineering review.

2G TRAFFIC IMPACT ANALYSIS

2G.02 When Required

The need for a TIA will be based on; the size of the proposed development, existing street and intersection conditions, traffic volumes, accident history, community concerns, and other pertinent factors associated with the proposed project.

A TIA will be required if a proposed development meets one or more if the following conditions:

A. *The proposed project generates more than ten (10) vehicles in the peak direction of the peak hour on the adjacent streets and intersections. This includes the summation of all turning movements that affect the peak direction of traffic.*
B. *The proposed project generates· more than 25 percent of the site- generated peak hour traffic through a signalized intersection or "critical" movement at a non-signalized intersection.*
C. *The proposed project is within an existing or proposed transportation benefit area. This may include Transportation Benefit Districts (TSO), Local Improvement Districts (LID), or local state transportation improvement areas programmed for development reimbursement.*
D. *The proposed project may potentially affect the implementation of the street system outlined. in the transportation element of the Comprehensive Plan, the Six-Year Transportation Improvement Program, or any other documented transportation project.*
E. *If the original TIA was prepared more than two (2) years before the proposed project completion date.*
F. *The increase in traffic volume as measured by ADT, peak hour, or peak hour of the "critical" movement is more than 10 percent.*

Even if it is determined that a TIA is not required, the Director of Pu lie Works may require the developer to have a Trip Generation Study (TGS) conducted. TGS's will be used to forecast project generated traffic for an established future horizon.

2G.03 Qualifications For Preparing TIA Documents

The TIA will be prepared by an engineer licensed in the State of Washington and with special training and demonstrated experience in traffic engineering. The applicant will provide the Public Works

Detention	*Prevent peak flow increase:* *100-year storm event* *Evaluation of erosion control:* *2-year storm event and* *10-year storm event*
Design Storm Duration/Distribution	
Hydrograph Method	*6 and 24-hour duration*
SCS Unit Hydrograph Method	*6 and 24-hour durations* *SCS Type 1A distribution*
Rational Method	*Time of concentration* *Constant rainfall intensity*

3A.03 Conveyance

Pipe: Storm drainpipe within a public right-of-way or. easement will be sized to carry the maximum anticipated runoff from the contributing area. The calculations of anticipated runoff and pipe sizing will be developed by a professional engineer licensed in the State of Washington. The developer will provide the calculations and all associated information to the Public Works Department.

The minimum main size will be twelve (12) inch diameter, smaller pipe sizes will be considered on a case-by-case basis as approved by the Director of Public Works. Lateral lines may be six (6) inch diameter. The city may require the installation of a larger main if it is determined that a larger size is needed to serve adjacent areas or for future service. The installation of a larger main may allow the develop.er to seek partial reimbursement through a Latecomers Agreement. (see Chapter 1 for details)

All pipe used for storm mains will comply with one of the following types:

A. *Plain concrete pipe conforming to the requirements of AASHTO M 86. Class 2.*
B. *Reinforced concrete pipe conforming to the requirements of AASHTO M 170.*
C. *PVC pipe conforming to ASTM D 3034 SOR 35 or ASTM F 794 or ASTM F679 Type 1 with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.*
D. *Ductile iron pipe conforming to the requirements of AWWA C 151, thickness class as shown on the plans.*
E. *High-density polyethylene smooth interior pipe conforming to AASHTO M252 types or AASHTO M294 type S, with a gasketed bell and spigot joints.*
F. *Aluminized steel helical or spiral rib pipe in diameters of thirty (30) inches or greater. with a Mannings" value of 0.020 or less.*

Channels: Open vegetated channels may be utilized for stormwater conveyance when deemed appropriate by the Public Works Department. Open channels located in a public right-of-way will be sized to carry the maximum anticipated runoff from the contributing area without exceeding the confines of the channel. In addition, when the end of the "new" conveyance system is within twenty (20) feet of another piped drainage system, the "new" system will be extended through the open portion to complete the closed system. Extensions to complete closed drainage systems will only be required along the property where the "new" system originates, unless deemed necessary by the Director of Public Works.

When the flow of an open channel is interrupted by the construction of a driveway, the entire channel across the property will be enclosed with piped system, unless deemed impractical by the Director of Public Works. However, the culvert under the driveway must be installed to accommodate closure of

Minimum pond dimensions are as follows:

1. *2-foot depth for settling*
2. *3-foot depth for sediment storage*
3. *3:1 side slope*

The Contractor will inspect sedimentation ponds immediately after each rain event to ensure the integrity of the facility. The contractor will also remove the majority of the sediment collected in the ponds whenever the storage volume is exceeded or the settling volume is infringed upon. In addition, prior to the final completion of the project, ponds will be cleaned out in their entirety.

The length/width ratio of the pond will be as large as possible. A 5:1 ratio is the preferred minimum, but exceptions will be granted when deemed appropriate by the Director of Public Works. The pond will be divided into a series of at least two (2) separate chambers. Perforated pipe risers will be used to convey water between the chambers and at the outlet.

B. *Interceptor Channels*

Interceptor channels are used to capture runoff generated on a construction site before it can leave the project limits. The channel is often used in combination with a sedimentation pond. The channel is typically grass lined and runs along the perimeter of the site. The grass must be established prior to the start of construction. Therefore, sod is often used to establish the vegetated surface of the channel. Upon completion of the project, the sod can be removed and re-used if the ditch is filled in and restored with a suitable and stable cover material.

C. *Sediment Barriers*

Sediment barriers are filtering devices that are run along the perimeter of a site to capture sediment while allowing runoff water to continue along its natural path. Silt fencing and hay bales are common examples of sediment barriers.

Regular removal of sediment is required to ensure that the barriers function properly. In addition, the structural integrity of the barriers must be maintained at all times. Barriers will be installed, inspected and repaired, in accordance with the details and requirements included in these Standards.

D. *Stabilized Construction Entrance*

A stabilized construction entrance is a rocked access point to a construction site. The entrance reduces material carried from the site onto the public right-of-way.

Construction entrances must be cleared of mud and debris regularly to ensure that materials are not being tracked from the construction site, onto the right-of-way and beyond. The contractor is responsible for all required maintenance of entrances.

E. *Detention/Retention Facilities*

No retention/detention facility will be located in an area that is used to satisfy an open space requirement unless it enhances a recreational amenity. Use of designated open space areas for stormwater detention/retention and infiltration must satisfy all conditions of the City of Napavine for usability, landscape conformity and ease of access. The city will make the final determination whether or not the proposed stormwater facilities are compatible with and satisfy the intent of an open space.

The primary purpose of a consolidated open space is to provide usable area for recreation activities, buffer zones, and green belt areas, and must be designed for this intent. Any use of this area for stormwater detention/retention must clearly be subordinate to and not detract from open

4.02 Design Standards
The design of any water extension/connection will conform to these Standards and all other applicable standards. The layout of extensions will provide for continuation and/or looping of the existing system.

FINDING: The proposal includes a new water system connecting to existing city water system located at Rush Road. Water meters for each lot and backflow preventers for recreational area will be installed. Based on submitted preliminary site plan, there are ten hydrants to be installed on site. This standard applies.

CONDITION OF APPROVAL: Prior to engineering approval, water utility plan sheets and details meeting WDG Chapter 4 shall be submitted for review and approval by the City.

CONDITION OF APPROVAL: Prior to construction, all water system and fire hydrant materials and methods shall be reviewed by the City for compliance with applicable standards.

CHAPTER 5 SANITARY SEWER

5A GENERAL CONSIDERATIONS

5A.01 General
Sanitary sewerage refers to wastewater derived from domestic, commercial and industrial pretreated waste to which storm, surface, and ground water are not intentionally admitted. Pretreatment will follow all the requirements as set forth by city ordinances and Public Works Departmental policies.

Any extension of the City of Napavine Sanitary Sewer System must be approved by the Public Works Department and must be consistent with the City of Napavine Comprehensive Plan: City of Napavine General Sewer Plan, Department of Ecology, and Department of Health requirements.
Within the corporate city limits where public sewer is available it must be used. Connection is not required provided that the sewage from the structure originates more than 200 feet from the public sewer, except in the case of private residential or commercial developments where the developed property abuts a right-of-way in which a public sewer is located or where a service connection is otherwise provided. In this case, connection of all structures generating sewage will be required to connect to the public sewer regardless of distance.

Anyone who wishes to extend or connect to the city sewer system will contact the Public Works Department for a Water/Sewer/Storm Application. If a sewer line extension is being requested, a written request that specifically lists and details the line extension must be submitted to the Public Works Department. After the Water/Sewer/Storm Application is returned to the Public Works Department along with a written request and/or any other information as may be required or requested, city staff will determine costs or estimated costs and/or address council and other approvals as may be required.

See Chapter 1, Section 1.02 for definitions of specific sewers. Maintenance of the building sewer will be the responsibility of the property owner while the remaining sewer lateral will be the city's responsibility.

5A.09 Design Standards

V. COMMENTS
N/A

VI. CONDITIONS OF APPROVAL

A. Prior to Engineering Approval

1) Final plans depicting public improvements satisfying applicable City standards and the most current version of the WSDOT Standard Specifications shall be submitted for review and approval by the City.
2) The applicant shall submit all necessary drawings compliant with the list of mitigative measures to use of the buffer for storm pipe for City review and approval.
3) The applicant shall submit grading plans compliant with NMC 15.16 for review and approval by the City.
4) Architectural and site design plans shall satisfy all parts of NMC Section 17.24.
5) The landscaping plan shall satisfy all parts of NMC 17.60.070. Landscaping plan shall be submitted and approved by the City.
6) All road intersection curb returns shall be shown and designed to meet NPW 2b, applicable city standards, and the current version of the WSDOT Standard Specifications. Engineering plans shall be submitted for review and approval by the City.
7) A plan providing driveway location, and dimensions for corner lots satisfying NPW 2B.12 shall be submitted for review and approval by the City.
8) The site plan shall show the sight distance clear-view triangles and any proposed signage at all intersections.
9) Engineering plans demonstrating trenching and restoration compliant with Napavine Public Works standards shall be submitted for review and approval by the City.
10) The engineering plan shall include concrete sidewalks design criteria. All sidewalk construction must follow the standard and be reviewed and approved by the City of Napavine.
11) A street lighting plans showing compliance with NPW 2D for streetlighting plan and design shall be submitted for review and approval by the City.
12) The applicant shall submit a final stormwater plan and TIR complying with NPW 3A and the 2019 SWMMWW for review and approval by the City.
13) Erosion control plans compliant with NPW 3B shall be submitted for review and approval by the City.
14) Water utility plan sheets and details meeting WDG Chapter 4 shall be submitted for review and approval by the City.
15) Engineered sewer plans compliant with Chapter 5 of the NPW shall be submitted to the City for review and approval.

B. Prior to Construction

1) The applicant shall have received engineering approval and be in possession of all necessary permits.
2) The installer of the backflow preventer shall obtain a building or plumbing permit prior to installation.

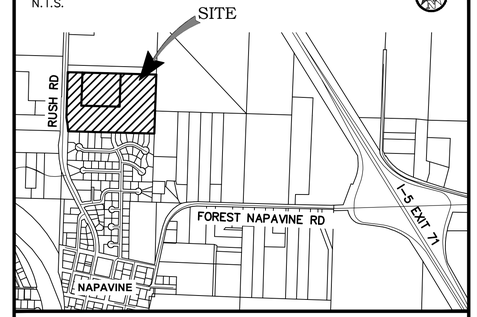
ROGNLIN'S RUSH RD PLAT

SECTION 26, TOWNSHIP 13 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON

SCALE: 1"=60 FEET
0 30 60 120

VICINITY MAP

N.T.S.



PROJECT INFORMATION

APPLICANT:	ROGNLIN PROPERTIES LLC RANDY ROGNLIN PO BOX 307 ABERDEEN, WA 98520 (360) 532 5220 RANDY@ROGNLINS.COM
PARCEL NOS:	018152003000 018152004000
SITE ADDRESS:	1054 RUSH RD NAPAVINE, WA 98565
ZONING:	R3
TOTAL SITE AREA:	25.21
GRADING:	XX± CY FILL
SOILS:	LACAMAS SILT LOAM PRATHER SILTY CLAY LOAM SCAMMAN SILTY CLAY LOAM
SANITARY SEWER:	CITY OF NAPAVINE
WATER:	CITY OF NAPAVINE
FIRE DISTRICT:	LEWIS COUNTY

SHEET INDEX

HATCH KEY

- NEW ASPHALT PAVING
- WETLAND AREA 9,190 SF (0.21 AC)
- EXISTING COMMERCIAL ZONE 2.41 AC
- NEW COMMERCIAL ZONE 3.5 AC 2.81 AC (NET)

NO.	DATE	REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT
CITY OF NAPAVINE WA.

CIVIL COVER AND SITE PLAN

ROBERT W. BALLARD — STATE OF WASHINGTON — 21118 — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
OAKHARS, WA 98532
OFF: (360) 740-8819
EMAIL: CivilProjects@rbengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 21118
DRAWING NAME 21118_CVR

C0.1
1 OF 7

SCALE: 1"=60 FEET

0 30 60 120

SINGH RAI, AMARJIT & GURJIT
TPN: 018152001000

N89° 47' 11.98"W 1292'

EXISTING EASTERLY R/W LINE
(40' EAST OF RUSH ROAD ℄)

PROPOSED EASTERLY R/W DEDICATION
(50' EAST OF RUSH ROAD CENTERLINE)

N0° 29' 02.98"E, 354.60'

ROGNLIN PROPERTIES, LLC
TPN: 018152003000

EXISTING GRAVEL DRIVEWAY

N2° 22' 41.68"W
100.14'

RUSH ROAD
(EXIST. R/W WIDTH VARIES)

N0° 29' 02.98"E 200.00'

EXISTING STRUCTURES
TO BE REMOVED

ROGNLIN PROPERTIES, LLC
TPN: 018152004000

N10°49'27.8"W
51.00'

N53°17'15"W
100.00'

STANDARD 40' BUFFER

CAT. IV WETLAND AS DELINEATED
BY ENVIRONMENTAL DESIGN XX/XX/XXXX

SINGH RAI, AMARJIT & GURJIT
TPN: 018140001000

N0° 30' 06.12"E 855'

KALICH, GARY H & JUDY W
TPN: 018151003000

S89° 44' 14.68"E 1256'

A B C D E F 60' R/W G H I J K L M

WILDWOOD AVENUE NE

ADJACENT PROPERTY OWNERS		
LABEL	OWNER	TPN
A	LHI INVESTMENTS, LLC.	008250001012
B	GARCIA, FERNANDO E & JUANA C	008250001013
C	PEA, JAMES & WENDY	008250001013
D	ROLLO, CHARLES J & RUTH L	008250001015
E	CITY OF NAPAVINE	008250001034
F	CITY OF NAPAVINE	ROAD ROW
G	FOOTE, KENNETH L & SHARON L TETRAULT—	008250001017
H	LHI INVESTMENTS, LLC.	008250001018
I	LHI INVESTMENTS, LLC.	008250001019
J	LHI INVESTMENTS, LLC.	008250001020
K	RICHTER, PATRICK & CRIST, RAVEN	008250001021
L	LANDRUM, JEREMY & NATASHA	008250001022
M	SHEAROUSE, JASON	008250001023

NO. DATE REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT

CITY OF NAPAVINE WA.

EXISTING SITE CONDITIONS

ROBERT W. BALLARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923 CHEHALIS, WA 98532
OFF: (360) 740-6919
EMAIL: CivilProjectMgt@rbengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 21118

DRAWING NAME C0.2_ESP

C0.2

2 OF 7

STORMWATER POND 1 (4)

WETLAND AREA

STORMWATER POND 2 (5)

RUSH ROAD

ROAD A

ROAD B

ROAD C

ROAD D

PHASE 1

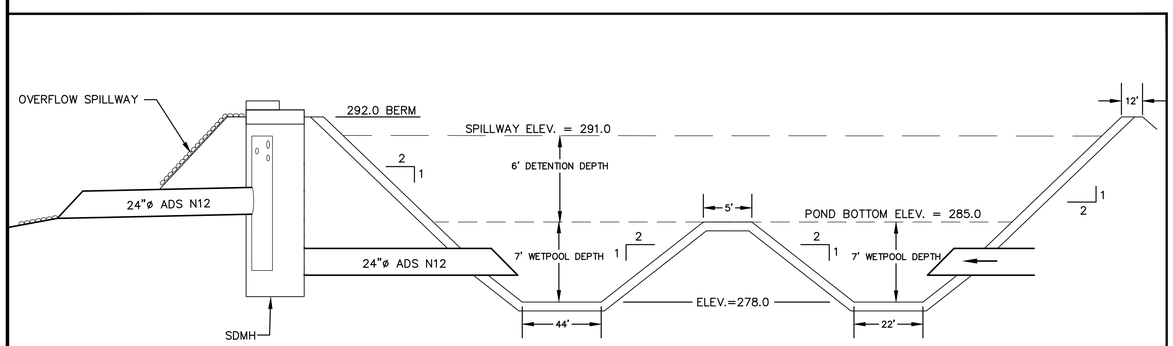
PHASE 2

PHASE 3

SCALE: 1"=60 FEET
0 30 60 120

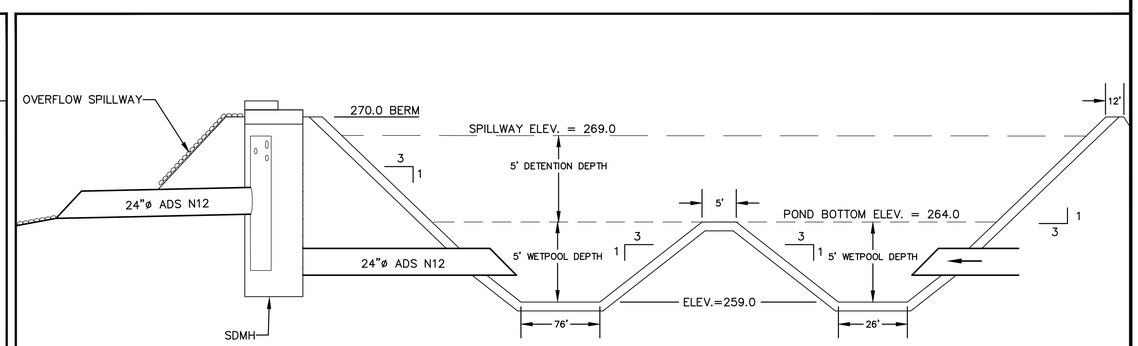
GRADING AND DRAINAGE NOTES:

1. INSTALL 12" ADS N-12 OR EQUAL STORM DRAIN PIPE.
2. INSTALL TYPE 1 CATCH BASINS (TYP.).
3. ALL ROAD SECTIONS TO BE CROWNED.
4. STORMWATER POND 1 SIZED TO ACCOMMODATE FOR PHASE 1 CONSTRUCTION.
5. STORMWATER POND 2 TO ACCOMMODATE FOR PHASE 2 AND 3 CONSTRUCTION.



A **STORMWATER POND 1 SECTION**
N.T.S.

RB ENGINEERING
SEDIMENT POND.dwg



B **STORMWATER POND 2 SECTION**
N.T.S.

RB ENGINEERING
SEDIMENT POND.dwg

NO.	DATE	REVISION

DESIGNED BY: CLA
DRAWN BY: CLA
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

ROGNLIN'S RUSH ROAD PLAT

CITY OF NAPAVINE WA.

PRELIMINARY GRADING PLAN

ROBERT W. BAKER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF.: (360) 740-8919
EMAIL: CWProtect@rbengineers.com

811 Know what's below. Call 811 before you dig.

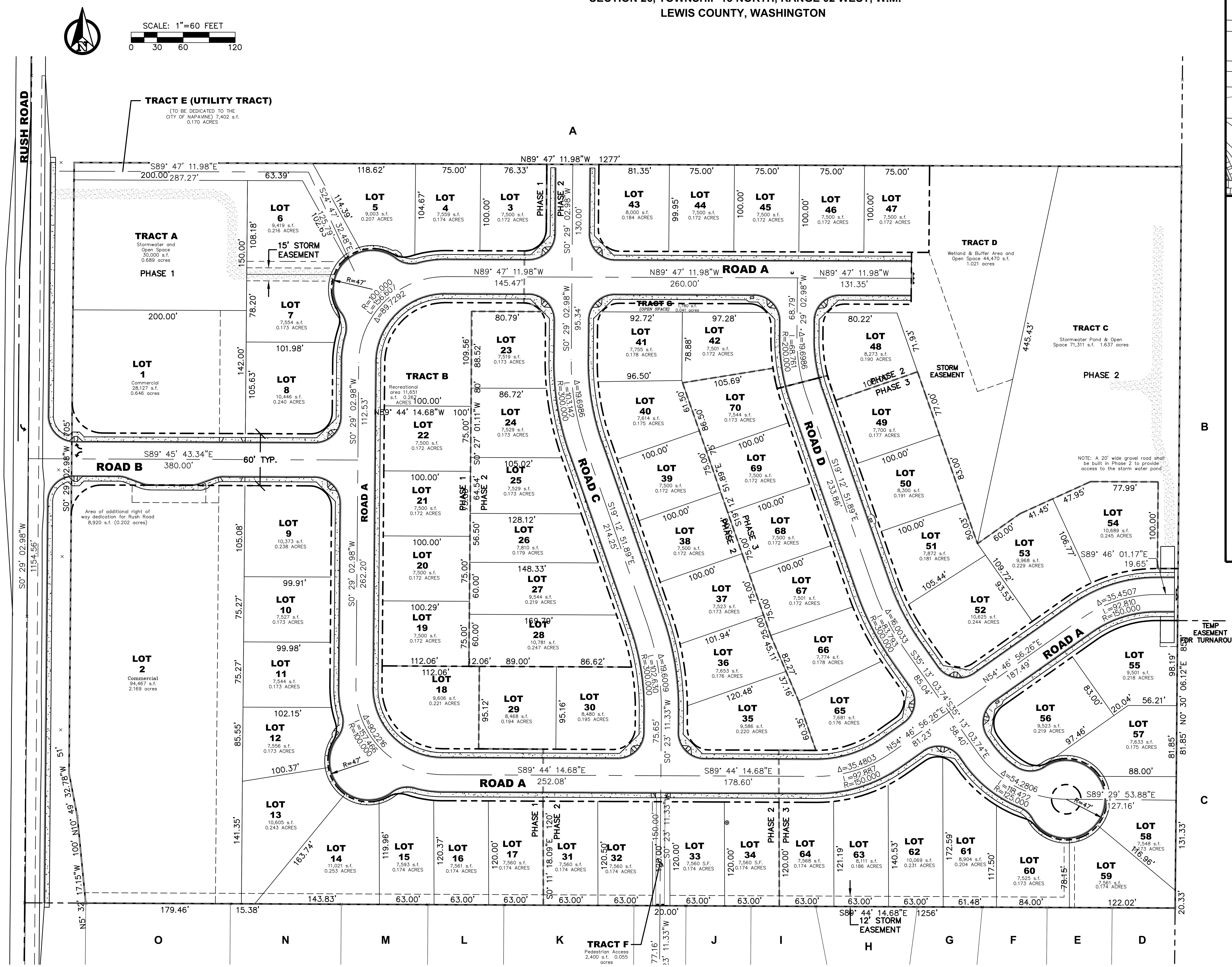
JOB NUMBER 21118

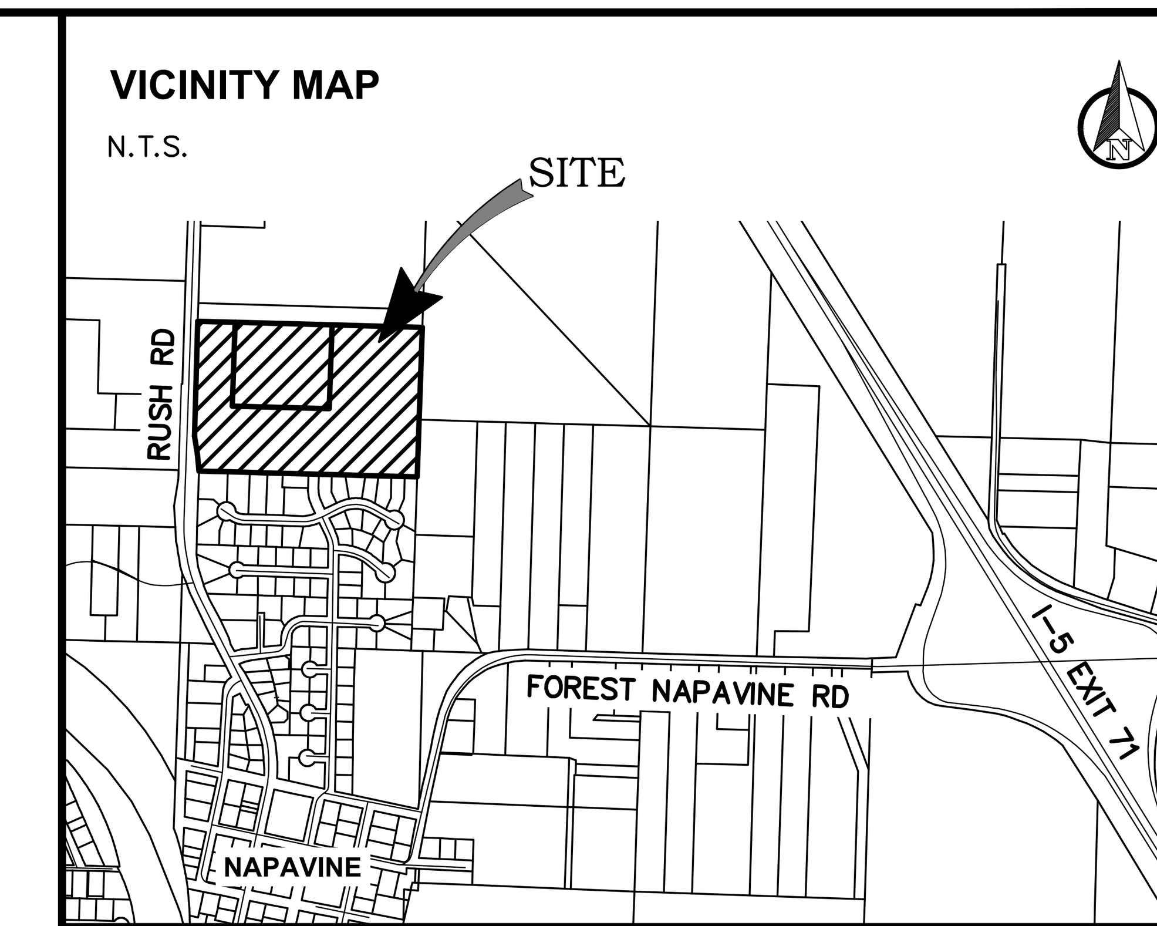
DRAWING NAME 21118_PGDPL

C1.0
3 OF 7

ROGNLIN'S RUSH RD PLAT

SECTION 26, TOWNSHIP 13 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON





PROJECT INFORMATION

APPLICANT:	ROGNLIN PROPERTIES LLC RANDY ROGNLIN PO BOX 307 ABERDEEN, WA 98520 (360) 532 5220 RANDY@ROGNLINS.COM
PARCEL NOS:	018152003000 018152004000
SITE ADDRESS:	1054 RUSH RD NAPAVINE, WA 98565
ZONING:	R3
SITE AREA:	25.21 AC. TOTAL 2.81 AC. COMMERCIAL 22.4 AC. RESIDENTIAL (GROSS)
PROPOSED LOTS:	70 LOTS 3.1 DU/AC (GROSS)
LOT SIZE:	MIN: 0.172 AC MAX: 2.169 AC AVE: 0.232 AC
SOILS:	LACAMAS SILT LOAM PRATHER SILTY CLAY LOAM SCAMMAN SILTY CLAY LOAM
SANITARY SEWER:	CITY OF NAPAVINE
WATER:	CITY OF NAPAVINE
FIRE DISTRICT:	LEWIS COUNTY

ADJACENT PARCEL OWNERS

LOT	PARCEL #	OWNER
A	018152001000	AMARJIT & GURJIT SINGH RAI
B	018140001000	AMARJIT & GURJIT SINGH RAI
C	018151003000	GARY & JUDY KALICH
D	008250001023	JASON SHEAROUSE
E	008250001022	JEREMY & NATASHA LANDRUM
F	008250001021	PATRICK RICHTER & RAVEN CRIST
G	008250001020	LHI INVESTMENTS LLC
H	008250001019	LHI INVESTMENTS LLC
I	008250001018	LHI INVESTMENTS LLC
J	008250001017	KENNETH & SHARON FOOTE
K	008250001034	CITY OF NAPAVINE
L	008250001015	CHARLES & RUTH POLLO
M	008250001014	JAMES & WENDY PEA
N	008250001013	FERNANDO & JUANA GARCIA
O	008250001012	LHI INVESTMENTS LLC

NO.	DATE	REVISION

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY: RWB
DATE: 07/14/22
SCALE: 1" = 60'

RUSH ROAD NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

PRELIMINARY PLAT MAP

ROBERT W. BALMELLI — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
CIVIL ENGINEERING – LAND PLANNING – UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

JOB NUMBER 21118
DRAWING NAME 21118_PPM

P0.1

Notice of Public Hearing

Hearing Date: 6:00 PM on August 29, 2022
Location: City of Napavine Council Chambers,
407 Birch Ave, Napavine, WA 98565

Applicant:	Randy Rognlin - Rognlin Properties LLC PO Box 307 Aberdeen, WA 98520 360-532-5220
Project Name:	Rognlin's Rush Road Subdivision
File Number(s):	
Proposal:	The City Planning Commission will hold a Public Hearing on the application of Rognlin's Rush Road subdivision for a project will consist of 68 single family residential lots and two commercial lots, along with six tracts for open space, utilities/access, and stormwater. The proposal will take place on two existing parcels for a total site area of 25.21 acres. The site is split-zoned, with a 2.41-acre portion in the northwest corner zoned General Commercial and the remainder zoned R3-High Density Residential.
Project Location:	1054 Rush Road, Napavine, WA 98565 Parcel # 018152003000 and 018152004000
Public Hearing:	The Public Hearing has been scheduled for 6:00 p.m. Monday, August 29, 2022.
Required Permits:	
Environmental Review:	The proposal is subject to review under the State Environmental Policy Act (RCW 43.21C) and the City of Napavine SEPA Guidelines. Existing environmental documents that evaluate the proposed project include; SEPA Checklist by Applicant dated May 26th, 2022; Revised Critical Area Review by Environmental Design and prepared for Rognlin Properties dated June 27th, 2022. Said document(s) are available for review.
Required Studies:	No Additional studies have been requested at this time.
Public Comments:	Anyone wishing to testify during the public hearing may reach out to Rachelle Denham, Clerk, at (360)262-3547. Written comments received by the City on or before August 29, 2022, will be considered by the City Planning Commission.
Staff Contact:	Rachelle Denham, Clerk, at (360) 262-3547
Final Decision:	A Final Decision on the proposal is made by the Napavine City Council. A Notice of Final Decision will be sent to the Parties of Record (those who have commented on the project).
Appeal Procedure:	The Final Decision is appealable pursuant to Napavine Municipal Code 17.88.100

JACKSONCIVIL

STATE ENVIRONMENTAL POLICY ACT (SEPA) DETERMINATION OF NON-SIGNIFICANCE

CASE NO: **Rognlin's Rush Rd Subdivision**

APPLICANT: **Randy Rognlin - Rognlin Properties LLC**

Proposal: The proposed plat consists of 68 single family residential lots and two commercial lots, along with six tracts for open space, utilities/access, and stormwater. The proposal will take place on two existing parcels for a total site area of 25.21 acres. The site is split-zoned, with a 2.41-acre portion in the northwest corner zoned General Commercial and the remainder zoned R3-High Density Residential.

Location: 1054 Rush Road, Napavine, WA 98565

Parcels: 018152003000 and 018152004000

Legal Description: Section 26 Township 13N Range 02W PT S 19 AC N24 NW4, EX N 100' & RD

6.00 Acres (018152003000)

Section 26 Township 13N Range 02W N2 N2 SW4 NW4 & PT S 19 AC NW4 NW4 EX N 100' & RD

19.21 Acres (018152004000)

SEPA Determination: Determination of Non-significance (DNS)

Comment Deadline: **August 29th, 2022** (comments should be delivered to the city hall office at 407 SW Birch Ave, Napavine, WA 98532)

As lead agency under the State Environmental Policy Act (SEPA) Rules [Chapter 197-11, Washington Administrative Code (WAC)], the City of Napavine must determine if there are possible significant adverse environmental impacts associated with this proposal. The options include the following:

- **DS = Determination of Significance** (The impacts cannot be mitigated through conditions of approval and, therefore, requiring the preparation of an Environmental Impact Statement (EIS);
- **MDNS = Mitigated Determination of Non-Significance** (The impacts can be addressed through conditions of approval), or;
- **DNS = Determination of Non-Significance** (The impacts can be addressed by

applying the City Code).

Determination:

Determination of Non-Significance (DNS). The City of Napavine, as lead agency for review of this proposal, has determined that this proposal 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)(e). This decision was made after review of a completed environmental checklist and land use application documents as they apply to the City's Municipal Code and adopted standards.

Date of Publication and Comment Period:

Publication date of this DNS is **August 15th, 2022,** and is issued under WAC 197-11- 960. The lead agency will not act on this proposal until the close of the 14-day comment period, which ends on **August 29th, 2022.**

SEPA Appeal Process:

A final decision on this proposal will not be made until after the comment period described above. An **appeal** of any aspect of this decision, including the SEPA determination and any required mitigation, must be filed with the City of Napavine within fourteen (14) calendar days from the date of the final decision as provided in the NMC 17.88.100.

Mail or deliver appeals to the following address:

City of Napavine
407 SW Birch Ave.
Napavine, WA 98532

Staff Contact Person:
Rachelle Denham
Clerk
(360) 262-3547

Responsible Official:
Bryan Morris
City of Napavine
407 SW Birch Ave
Napavine, WA 98532

407 Birch Ave SW, P. O. Box 810
Napavine, WA 98565
Phone: (360) 262-3547
Fax: (360) 262-9199
www.cityofnapavine.com

Public Hearing Notification

Affidavit of Posting.

Project No. Rognlin's Rush Road Subdivision – 1054 Rush Road, Chehalis, WA 98532, Parcel # 018152003000 and 018152004000 – SEPA/Land Use
Date of Planning Commission Meeting: August 29, 2022

I, Katie Williams, hereby certify that I have posted the Public Hearing Notification at City Hall on August 18, 2022. I also emailed the newspaper of record, Lewis County News, to publish the notice in the next available print of Lewis County news (Thursday, August 18, 2022), and also on the Lewis County News website/Facebook immediately.

The Public Hearing Notice was also mailed to the property owners within 300 ft. of the project on Thursday, August 18, 2022.

I further certify that this affidavit was filed with the City of Napavine, Clerks Office within the ten (10) days prior to subject hearing, in accordance with the City of Napavine Municipal Code section 17.88.070(A).

Executed this the August 18, 2022

Katie Williams
Signature:

8/25/2022
Date:

Katie Williams
Print Name:

STATE OF WASHINGTON, COUNTY OF LEWIS, BEFORE ME, a Notary Public, on this 25th day of August, 2022, personally appeared Katie William (print name) the above signed, who, under oath, state the following: "I hereby certify that I am the poster, for the purposes of this application; that all information submitted herein is true and correct."
SUBSCRIBED AND SWORN TO before me, this the 25th day of August, 2022.

Morgan A. Easley
Notary Signature

MORGAN A. EASLEY
COMM. # 21031852
NOTARY PUBLIC
STATE OF WASHINGTON
My Comm. Exp. Seal 2025

407 Birch Ave SW, P. O. Box 810
Napavine, WA 98565
Phone: (360) 262-3547
Fax: (360) 262-9199
www.cityofnapavine.com

Public Hearing Notification

Affidavit of Posting.

Project No. Rognlin's Rush Road Subdivision – 1054 Rush Road, Chehalis, WA 98532, Parcel # 018152003000 and 018152004000 – SEPA/Land Use
Date of Planning Commission Meeting: August 29, 2022

I, Bryan Morris, hereby certify that I have posted or caused to be posted Public Hearing Notification sign(s) on the property subjected to Project Name/Number: Rognlin's Rush Road Subdivision of 1054 Rush Road, Chehalis, WA 98532, Parcel # 018152003000 and 018152004000 WA 98532.

Posting of said sign(s) was accomplished on August 18, 2022. Said sign(s) have been posted in a manner which provides an unobstructed view at Rognlin's Rush Road Subdivision – 1054 Rush Road, Chehalis, WA 98532, Parcel # 018152003000 and 018152004000, Frank's Mini Mart and Plaza Jalisco within the City of Napavine.

I further certify that this affidavit was filed with the City of Napavine, Clerks Office within the ten (10) days prior to subject hearing, in accordance with the City of Napavine Municipal Code section 17.88.070(A).

Executed this the August 18, 2022

_____ _____
Signature: Date:

_____
Print Name:

STATE OF WASHINGTON, COUNTY OF LEWIS, BEFORE ME, a Notary Public, on this _____ day of _____, 2022, personally appeared _____ (print name) the above signed, who, under oath, state the following: "I hereby certify that I am the poster, for the purposes of this application; that all information submitted herein is true and correct."
SUBSCRIBED AND SWORN TO before me, this the _____ day of _____, 2022.

_____
Notary Signature (Seal)

Surrounding Parcels

PARCEL NO.	ADDRESS	PROPERTY OWNER
018176001000	0 Rush Road	F & I Cook Family LLC
018176003002	0 Rush Road	F & I Cook Family LLC
018176000000	1049 Rush Road	William David Phipps
018179002001	0 Rush Road	CKIJ Western LLC
018141000000	1076 Rush Road	Amarjit & Gurjit Singh Rai
018140001000	0 Rush Road	Amarjit & Gurjit Singh Rai
018151003000	0 Forest Napavine Road W	Gary & Judy Kalich
018173005000	662 W Forest Napavine	Jon & Krystal Vasilauskas
018173004000	656 W Forest Napavine	Reece Prehm & Kiersten Milton
018152001000	0 Rush Road off	Amarjit & Gurjit Singh Rai
008250001035	0 Kayli CT	City of Napavine
008250001031	321 Kayli CT	LHI Investments LLC
008250001024	317 Kayli CT	Brian & Natalie Fain
008250001025	313 Kayli CT	Michael & Nicole Postlewait
008250001026	0 Kayli CT	Brenda & Lowell Carlson
008250001027	1410 Wildwood Ave NE	Brenda & Lowell Carlson
008250001004	205 Mitchell LN NE	Robert Lundholm
008250001005	211 Mitchell LN NE	James & Linda Curtis
008250001006	217 Mitchell LN NE	Joshua & Amber Higgins
008250001007	221 Mitchell LN NE	Samantha & Christopher Preston
008250001008	223 Mitchell LN	Tyson Jacobsen & Coty Dutton
008250001009	231 Mitchell LN NE	Christian Olsen & Janice Zielonka
008250001010	235 Mitchell LN	Nathan & Megan Shepherd
008250001011	238 Mitchell LN NE	Cottage Court Federal Way LLC
008250001012	0 Mitchell LN NE	LHI Investments LLC
008250001013	226 Mitchell LN NE	Fernando & Juana Garcia
008250001014	222 Mitchell LN NE	James & Wendy Pea
008250001015	218 Mitchell LN NE	Charles & Ruth Rollo
008250001034	0 Wildwood Ave NE	City of Napavine
008250001016	210 Mitchell LN NE	Douglas & Elizabeth Fletcher
008250001017	306 Kayli CT	Kenneth & Sharon Foote

Surrounding Parcels

008250001018	308 Kayli CT	LHI Investments LLC
008250001019	310 Kayli CT	LHI Investments LLC
008250001020	312 Kayli CT	LHI Investments LLC
008250001021	314 Kayli CT	Patrick Richter & Raven Crist
008250001022	316 Kayli CT	Jeremy & Natasha Landrum
008250001023	324 Kayli CT	Jason Shearouse

F & I Cook Family LLC
5509 Park Place Loop SE
Lacey, WA 98503

William David Phipps
1049 Rush Road
Chehalis, WA 98532

Amarjit & Gurjit Singh Rai
233 Alderwood Dr.
Chehalis, WA 98532

CKIJ Western LLC
5509 Park Place Loop SE
Lacey, WA 98503

Gary & Judy Kalich
614 Newaukum Valley Road
Chehalis, WA 98532

LHI Investments LLC
PO Box 26116
Federal Way, WA 98093

Brian & Natalie Fain
317 Kayli CT
Napavine, WA 98532

Michael & Nicole Postlewait
PO Box 277
Napavine, WA 98565

Brenda & Lowell Carlson
22258 134th St.
Maquoketa, IA 52060

Robert Lundholm
205 Mitchell LN
Napavine, WA 98532

Willis Grant
PO Box 541
Napavine, WA 98565

James & Linda Curtis
211 Mitchell LN
Chehalis, WA 98532

Joshua & Amber Higgins
217 Mitchell LN NE
Napavine, WA 98532

Samantha & Christopher Preston
221 Mitchell LN NE
Napavine, WA 98565

Tyson Jacobsen & Coty Dutton
223 Mitchell LN
Chehalis, WA 98532

Christian Olsen & Janice Zielonka
231 Mitchell LN NE
Chehalis, WA 98532

Nathan & Megan Shepherd
235 Mitchell LN
Napavine, WA 98532

Cottage Court Federal Way LLC
PO Box 26116
Federal Way, WA 98093

Fernando & Juana Garcia
211 Carroll Way
Chehalis, WA 98532

James & Wendy Pea
222 Mitchell LN NE
Napavine, WA 98565

Charles & Ruth Rollo
218 Mitchell LN NE
Napavine, WA 98532

Douglas & Elizabeth Fletcher
210 Mitchell LN NE
Napavine, WA 98565

Kenneth Foote & Sharon Tetrault
306 Kayli CT
Chehalis, WA 98532

Patrick Richter & Raven Crist
314 Kayli CT
Chehalis, WA 98532

Jeremy & Natasha Landrum
316 Kayli CT
Chehalis, WA 98532

Jason Shearouse
PO Box 66961
Burien, WA 98166

City of Napavine
PO Box 810
Napavine, WA 98565

Lewis County GIS Web Map

8/17/2022, 2:44:21 PM

1:4,514

Parcels

Parcels

0 210 420 840 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY

Lewis County G.I.S.

LEWIS COUNTY
Washington's First County
est. 1845

Community Development

2025 NE Kresky Avenue
Chehalis WA 98532

August 29, 2022

To: SEPA Administrator

RE: Rognlin's Rush Rd Subdivision / MSC22-0064
Date Received: August 17, 2022
Comments Due: August 29, 2022

Thank you for the opportunity to review and comment on the above project. Lewis County Community Development circulated your documents to the Environmental Health and Public Works departments for their comments. Following are the County comments:

Community Development:

- Building within city limits – no additional comments.

Environmental Health:

- Water - Within approved service area and unspecified number of approved connections

Public Works:

- All traffic impacts are in the City – no additional comments
- Road & Stormwater – no comments

Respectfully,

Megan Sathre

Megan Sathre
Lewis County Community Development
Megan.Sathre@lewiscountywa.gov

Katie Williams

Subject: FW: NAPAVINE - Notice of Application/DNS & SEPA Checklist for Rognlin's Rush Road Subdivision

From: Shaun Dinubilo <sdinubilo@squaxin.us>
Sent: Tuesday, August 23, 2022 9:08 AM
To: Bryan Morris <bmorris@cityofnapavine.com>
Subject: RE: NAPAVINE - Notice of Application/DNS & SEPA Checklist for Rognlin's Rush Road Subdivision

CAUTION: External Email

Hello Bryan,

Thank you for contacting the Squaxin Island Tribe Cultural Resources Department regarding the above listed project for our review and comment. The project area has a high potential for the location of cultural resources. We recommend a cultural resources survey and report be completed for this project. We would prefer to receive an electronic copy by email once completed.

Shaun Dinubilo
Archaeologist
Cultural Resource Department
Squaxin Island Tribe
200 S.E. Billy Frank Jr. Way
Shelton, WA 98584
Office Phone: 360-432-3998
Cell Phone: 360-870-6324
Email: sdinubilo@squaxin.us

Email is my perferred method of communication.

As per 43 CFR 7.18[a][1]) of the Archaeological Resource Protection Act, Section 304 of the National Historic Preservation Act, and RCW 42.56.300 of the Washington State Public Records Act-Archaeological Sites, all information concerning the location, character, and ownership of any cultural resource must be withheld from public disclosure.

From: Katie Williams <kwilliams@cityofnapavine.com>
Sent: Wednesday, August 17, 2022 10:19 AM
To: R5planning@dfw.wa.gov; sepacenter@dnr.wa.gov; SW-SEPA-REVIEW@WSDOT.WA.GOV; dave@swcleanair.org; evan.g.carnes@usace.army.mil; Shane Schutz <sschutz@napavineschools.org>; Judy Godbey <jgodbey@cityofnapavine.com>; chief5100@lcfpd5.com
Cc: hpickernell@chehalistribe.org; Casey_Barney@yakama.com; RAsgeirsson@cowlitz.org; Naomi.Brandenfels@quinault.org; Shaun Dinubilo <sdinubilo@squaxin.us>; Karen Witherspoon

Project Name: Rognlin's Rush Road Subdivision

Subject: Written comments to SEPA checklist due by August 29, 2022

Napavine Staff Contact: Rachelle Denham, Clerk

Comments Date: August 29, 2022

My name is Gary Kalich. My wife and I own Lot C (Ref RB drawing PO.1 and Attachment 1) adjacent to proposed Rognlin's Rush Road Subdivision. Road A of the proposed project extends to the east line of the subdivision, ending at the east lines of Lots 54 and 55. As proposed, it appears that the south side of Road A adjoins the northwest corner of Lot C, but such alignment allows no future access to landlocked Lot C. I believe that City of Napavine has easements or ownerships at the east end of Napavine's Kayli Ct that might allow access to Lot C but, even so, access from Kayli Ct to Lot C is problematic.

Access to Lot C from Road A of Rognlin's Rush Road Project is preferred for a couple other reasons:

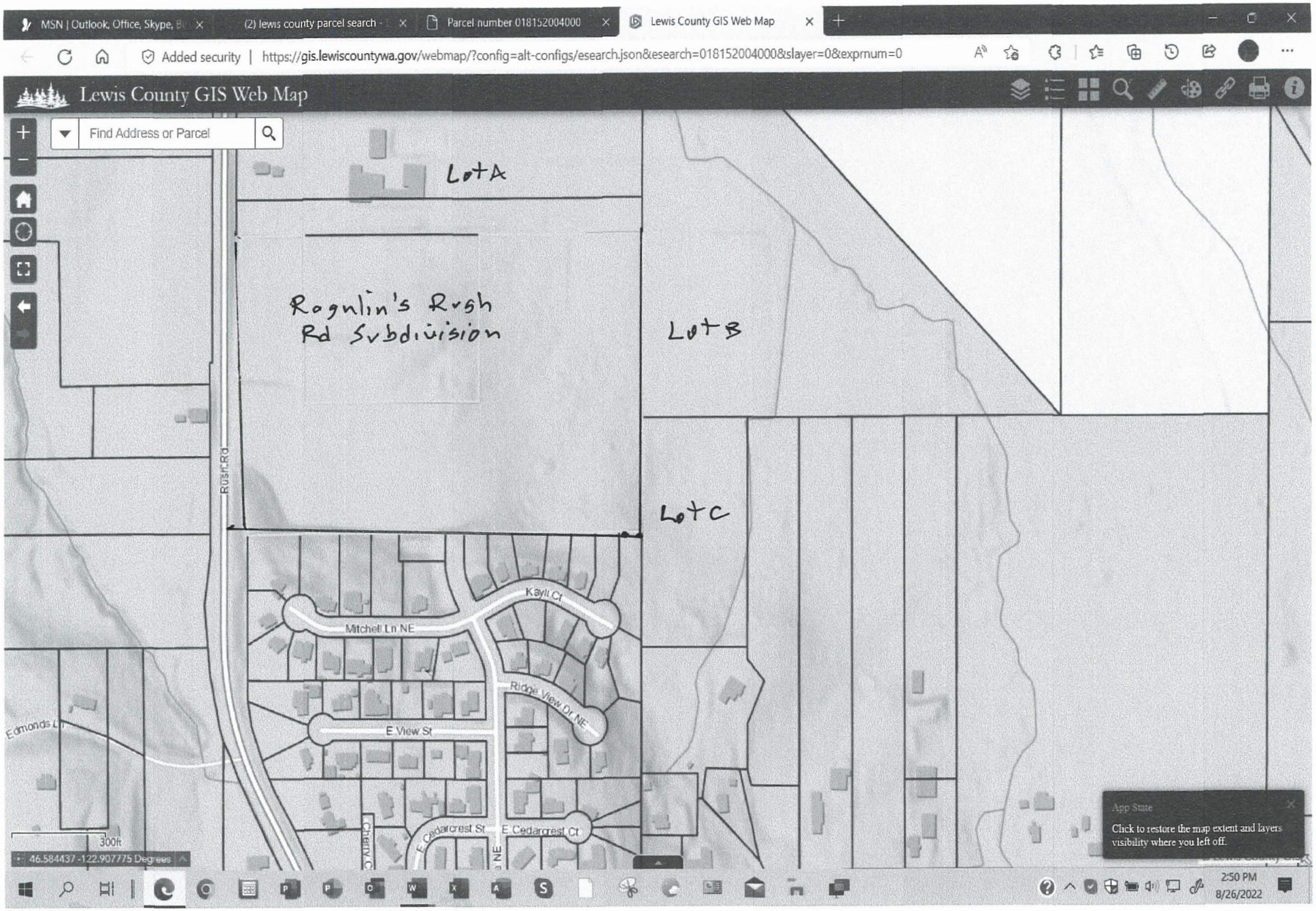
1) Reduced traffic through Napavine subdivisions to the south of the proposed Rognlin project. Note that the proposed project provides pedestrian access between Lots 32 and 33 so that pedestrians can reach schools and downtown avoiding Rush Road.
2) Gravity sewage flow versus pumped sewage from Lot C to Kayli Ct., saving some electrical energy and reducing maintenance.

Considering the above, I respectfully request that City of Napavine Planning Commission and City Council request modifications to the preliminary Rognlin's Rush Road Plat to allow future access to Lot C. Suggested alternatives:

1) Move the east end of Road A between Lots 54 and 55, 80 feet south. The current owner of Lot B also owns Lot A so has access to their Lot B from Rush Road.
2) If Lot B owners desire future access from Road A, move the east end of Road A between Lots 54 and 55, 40 feet south. This alternative would require agreement between Lot B and C owners that both have access to the north 40 feet of Lot C and the south 40 feet of Lot B.
3) Request from Rognlin that Lot 55 be dedicated to City of Napavine so that future access to Lot C is possible. Precedence for such a dedication is Lewis County parcel 008250001035 which City of Napavine owns at the end of Kayli Ct..

City of Napavine or any other party interested in Rognlin's Rush Road Subdivision and my comments may contact me at 360-541-8200.

Gary Kalich



Attachment 1

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

August 29, 2022

Rachelle Denham, Clerk
City of Napavine
407 Birch Ave
Napavine, WA 98520

Dear Rachelle Denham:

Thank you for the opportunity to comment on the determination of nonsignificance for the Rognlin's Rush Road Subdivision Project located at 1054 Rush Road as proposed by Randy Rognlin. 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 your 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.

WATER QUALITY/WATERSHED RESOURCES UNIT:
Evan Wood (360) 706-4599

Erosion control measures must be in place prior to any clearing, grading, or construction. These control measures must be effective to prevent stormwater runoff from carrying soil and other pollutants into surface water or stormdrains that lead to waters of the state. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered to be pollutants.

Any discharge of sediment-laden runoff or other pollutants to waters of the state is in violation of Chapter 90.48 RCW, Water Pollution Control, and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and is subject to enforcement action.

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, 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. 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.

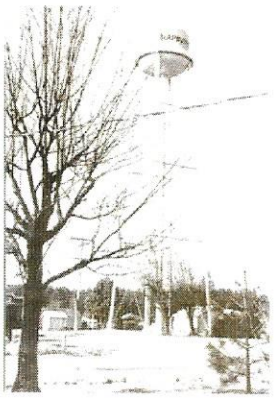
Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

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:202203830)

cc: Derek Rockett, SWM
Evan Wood, WQ



CITY of NAPAVINE
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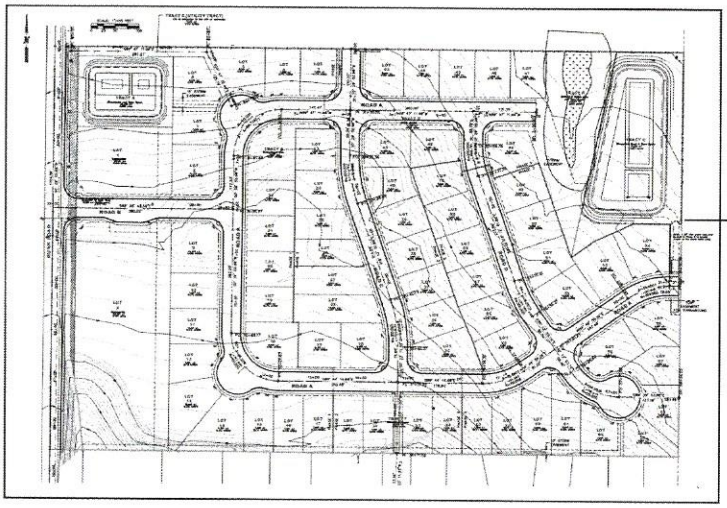
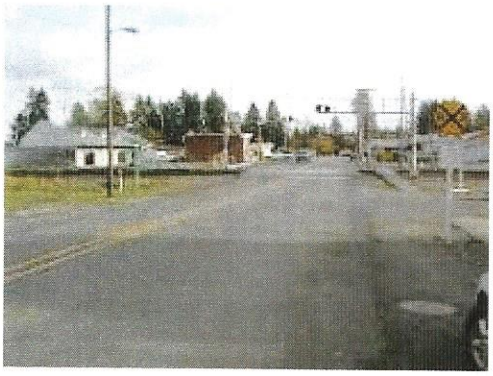
Napavine

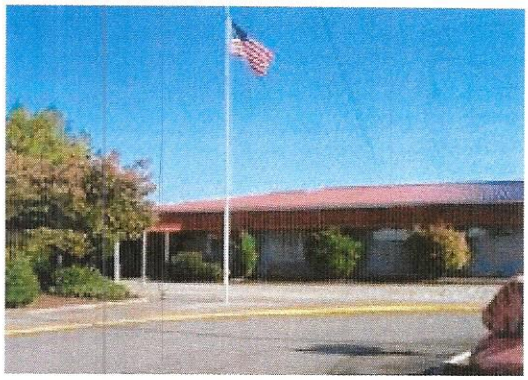
ROGNLIN'S RUSH ROAD PLAT TRAFFIC REPORT

May 26, 2022



JTE . Jake Traffic Engineering, Inc.
Mark J. Jacobs, PE (OR and WA), PTOE, President
2614 39th Ave. SW – Seattle, WA 98116 – 2503
Tel. 206.762.1978 - Cell 206.799.5692
E-mail jaketraffic@comcast.net





JTE . Jake Traffic Engineering, Inc. .

Mark J. Jacobs, PE, PTOE
President
2614 39th Ave. SW – Seattle, WA 98116 – 2503
Tel. 206.762.1978 - Cell 206.799.5692
E-mail jaketraffic@comcast.net

May 26, 2022

RB ENGINEERING
Attn: Robert Balmelli, PE
91 SW 13th Street
Chehalis, WA 98532

Re: Rognlin's Rush Road Plat – Napavine
Traffic Report

Dear Mr. Balmelli,

I have prepared this Traffic Report for the Rognlin's Rush Road Plat. The proposal is to develop 68 lots for SFDU's and is located at 1054 Rush Road. Access to the site would via a new intersection on Rush Road.

Correspondence, copy attached, with Bryan Morris, Public Works Director on 04.05.2022 identified that the SR – 5 at Rush Road interchange has been studied to the nth degree and further study at this time would be moot. Interchange improvements are being discussed and that the project applicant would likely be required to participate on a proportionate share basis.

The following elements are included in this Traffic Report:

- Project description
- Trip Generation and Distribution
- Safety Inspection
- Access analysis using traffic data I have on file
- Discussion of street connectivity
- Ascertain the Rush Road Interchange improvement status and fair share mitigation

I have inspected the site and surrounding street system. The general format of this report is to describe the proposed project, identify future traffic volumes, from prior traffic work in the area, and identify Agency street/road improvements, calculate the traffic that would be generated by the project and then add it to the future baseline traffic volumes at the site access. Operational analyses are used to determine the specific project traffic impact and appropriate traffic mitigation measures to mitigate the project traffic impact.

The **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS** are on page 12 of this report.

PROJECT INFORMATION

Figure 1 is a vicinity map which shows the location of the site and its surrounding street system. An aerial view of the project site obtained from Lewis County GIS, augmented, is shown below:

Figure 2 shows a preliminary site plan prepared by RB Engineering dated 03.24.2022. The plan depicts the 68 lots for SFDU, stormwater/open space Tracts, A & C, wetland buffer Tract D, a pedestrian access connection to Woodland Ave. NE to the south, Tract F. The site plan also includes an internal street system with a street stub to the north and one to the east with access onto Rush Road.

The two commercial lots abutting Rush Road, Lots #1 and 2 are not proposed for development at this time. These two lots are not included in this report.

Development and occupancy of the proposed Rognlin's Rush Road Plat project is anticipated to occur by 2023/2024, presuming the permits are issued in a timely manner.

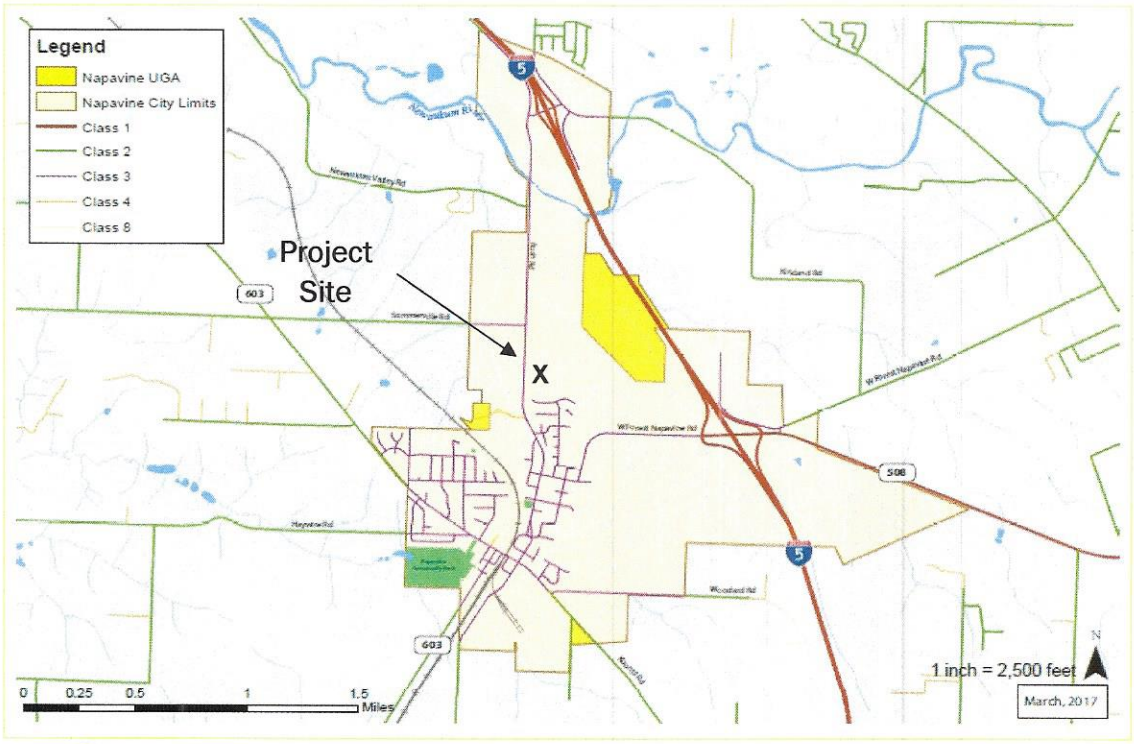
EXISTING ENVIRONMENT

Project Site

The site is located on two undeveloped tax parcels, #'s 018152003000 and 018152004000.

Street System

Figure 3 shows the existing traffic control, number of street lanes, number of approach lanes at the intersections and other pertinent information. Figure 7 from the City of Napavine Comprehensive Plan 2017 – 2037 is below:



SCJ ALLIANCE

Figure 7
Napavine, WA - Road Classifications

The City's street classification map notes essentially all City streets as Class 3 other that SR – 5 and SR - 508. The primary City streets near the project site are Rush Road and Newaukum Valley Rd in the County a Class 2 road.

Pedestrian Facilities (general)

Rush Road has paved shoulders on both sides at the site location. Woodland Avenue Northeast south of Mitchell Ln. NE generally has a continuous sidewalk, there is a ~120' of paved/gravel shoulder north of E. Cedarcrest Court, on the east side of the street to E. Stella St. that has sidewalks.

Transit Service

Twin Transit provides transit service in Lewis County. No service is provided in Napavine.

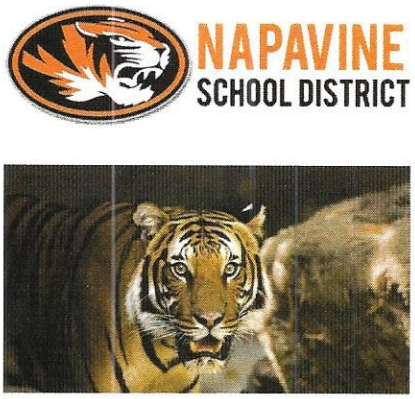
Schools

The City of Napavine School District website (www.napa.k12.wa.us) was reviewed for schools which serve the children of the families of the proposed development. The website identifies one high school, one middle school and one elementary school. The schools are as follows:

- Napavine Elementary School
- Napavine Middle School
- Napavine High School

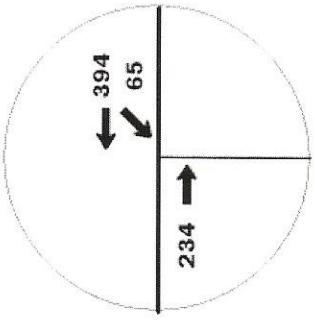
Napavine Middle and High School are combined facilities.

The schools are within walking distance, less than a mile, of the site. Connecting to the existing pedestrian facility on Woodland Ave. NE would be provided as a part of the proposed development.



Traffic Volumes

Jake Traffic Engineering, Inc. recently conducted a detailed Traffic Impact Study for a project off of Rush Road to the north of the site. Traffic volume data from my Arco AM/PM with Truck Fueling Traffic Impact Analysis dated December 7, 2020 includes projected 2025 data at the Rush Road at the Love's Truck Ingress intersection. In addition to the aforementioned traffic data, I have projected 2023 traffic data at the 2nd Ave. NE at E. Stella Road intersection. This data is from my East Stella Street Apartments Traffic Impact Analysis dated 12.10.2018. The traffic data from the respective reports is depicted below.



Rush Road at Love's Truck Ingress

2nd Ave. NE at E. Stella Road (Projected 2023 PMPHT w/ project)

The higher volume Loves Truck Ingress data shows ~395 (394) vehicles southbound and ~235 (234) northbound on Rush Road south of the Love's Truck Ingress. This traffic disperses to abutting streets as you head south.

Incident History

Incident data was reviewed using the WSDOT accident data portal available online at https://remoteapps.wsdot.wa.gov/highwaysafety/collision/data/portal/public/. This portal was used to review incidents in the site vicinity for the years 2017 to 2021. The WSDOT data is attached.

Inspection of the data indicated two incidents on Rush Road between Sommerville Rd. and E. Stella Street; one was property damage and the other a suspected minor injury incident. In 2016 there was a fatality that occurred on SR – 5 just south of Rush Road. There are a number of fender bender incidents; congestion related, on Rush Rd. at SR – 5. No apparent incident issue is noted on the streets and intersections that would serve the proposed project.

STREET IMPROVEMENT PROJECTS

Napavine

I have reviewed the City's website for street improvement projects and am not aware of any projects near the subject development site.

WSDOT

WSDOT in conjunction with Napavine conducted the following traffic revision a few years ago:

- *Converting the Hamilton and Rush roads intersection from a three-way to a two-way stop allows travelers heading westbound on Rush Road to travel through the intersection and turn onto Rush Road/ Hamilton Road without stopping, removing a bottleneck in the overall system.*
- *Travelers on southbound Hamilton Road and northbound Rush Road will continue to stop at the intersection.*

The above improvements allows the highest traffic volume movements at the intersection to operate without stopping

Review of the WSDOT online data shows no other capacity improvement projects in the immediate site vicinity at this time; however I understand that WSDOT is reviewing the SR – 5 at Rush Road interchange for opportunity improvement to better accommodate anticipated increases in traffic in the area.

I understand that a proposal for a roundabout at the Rush Road at Hamilton Road has been made by a private party. The estimated cost of the single lane roundabout with two westbound approach lanes is $2,500,000 to $3,000,000. The pertinent information is included in the appendix of this report.

TRIP GENERATION AND DISTRIBUTION

Definitions

A vehicle trip is defined as a single or one direction vehicle movement with either the origin or destination (exiting or entering) inside the proposed development.
Traffic generated by development projects consists of the following types:

Pass-By Trips:	Trips made as intermediate stops on the way from an origin to a primary trip destination.
Diverted Link Trips:	Trips attracted from the traffic volume on a roadway within the vicinity of the generator but which require a diversion from that roadway to another roadway in order to gain access to the site.
Captured Trips:	Site trips shared by more than one land use in a multi-use development.
Primary (New) Trips:	Trips made for the specific purpose of using the services of the project.

The proposed East Stella Street Apartments project is expected to generate the vehicular trips during the average weekday, street traffic AM and PM peak hours as shown in Table 1. The trip generation is calculated using average trip rates in the Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition, for Multifamily Residential Units (ITE LUC 220). All site trips made by all vehicles for all purposes, including commuter, visitor, and service and delivery vehicle trips are included in the trip generation values.

TABLE 1 - VEHICULAR TRIP GENERATION
ROGNLIN'S RUSH ROAD PLAT - NAPAVINE
TRAFFIC REPORT

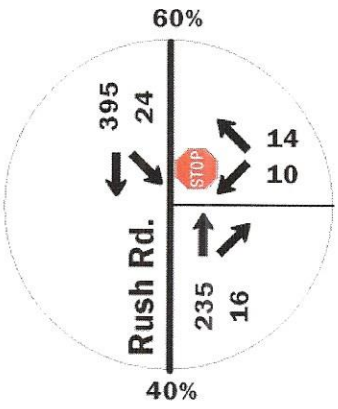
Time Period	Size (X)	TG Rate	Enter %	Enter Trips	Exit %	Exit Trips	Total (T)	Pass-by*	Pass-by Trips	Net Total
Proposed: Single Family Detached - General Urban/Suburban (ITE LUC 210; 68 - units)										
Weekday	68	9.43	50%	320.6	50%	320.6	641.2	0%	0.0	641.2
AM peak hour	68	0.7	26%	12.4	74%	35.2	47.6	0%	0.0	47.6
PM peak hour	68	0.94	63%	40.3	37%	23.7	63.9	0%	0.0	63.9

T = trips, X = number of units
* - pass-by trips percent per ITE and JTE Traffic Engineering exerience, residential trips are considered new
Trip rates per the Institute of Transportation Engineers Trip Generation Manual 11th Edition
Note: Due to rounding some values may not add up.

Based on my analysis, I project the site new trips generated by the Rognlin's Rush Road Plat project during the critical PM peak hour at 64.

Trip Distribution

The project generated trips assigned to the adjacent street system per the characteristics of the street network, existing traffic volume patterns, the location of likely trip origins and destinations (residential, schools, employment, shopping, social and recreational opportunities). The graphic to the right shows the site distribution, using ITE data, and future 2025 PM peak hour traffic volumes at the site access.



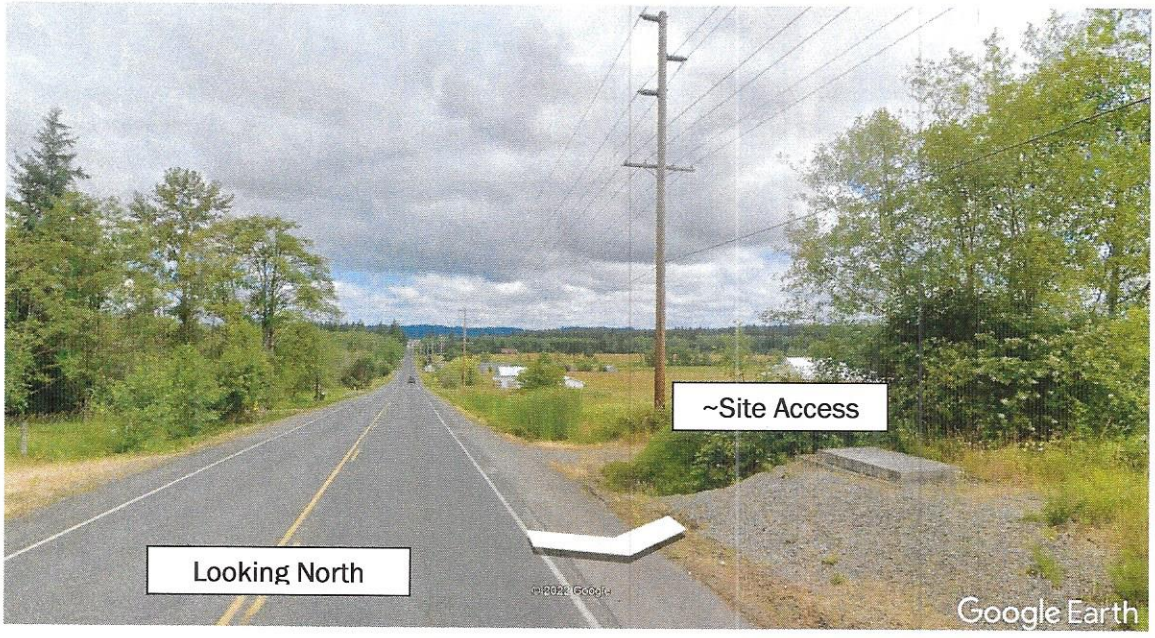
Rush Road at
Rognlin's Rush Road Plat

SIGHT ACCESS REVIEW

Sight Lines

Access to the site will be via new intersection on Rush Road. Rush Road has a slight downgrade south to north and is strait at the accesses. Good sight lines are available presuming that vegetation is properly maintained within the sight triangle and signage is located appropriately.

Below are photographs at the site accesses obtained from Google Street view looking to the north in the vicinity of the north access and south near the south access, respectively:



Intersection Operations

Traffic engineers have developed criteria for intersection operations called level of service (LOS). The LOS's are A to F with A and B being very good and E and F being more congested. LOS C and D correlate to busy traffic conditions with some restrictions to the ability to choose travel speed, change lanes and the general convenience comfort and safety.

The procedures in the Transportation Research Board Highway Capacity Manual, HC6 were used to calculate the level of service at the study intersections. The following table depicts the LOS and corresponding average delay in seconds at signalized and stop control intersections:

Intersection Type	Level of Service					
	A	B	C	D	E	F
Signalized	<10	>10 and <20	>20 and <35	>35 and <55	>55 and <80	>80
Stop Control	<10	>10 and <15	>15 and <25	>25 and <35	>35 and <50	>50

LOS Analysis Criteria

The City of Napavine LOS Standard is 'E'. See excerpt from the Comprehensive Plan 2017 – 2037 below:

Level of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream, generally described in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. It is measured on a scale of LOS-A. (free-flowing traffic) to LOS-F (long delays). Agencies are required to adopt regulations prohibiting any development which would cause a facility to drop below identified standards. The current established LOS for all roads within Napavine is LOS 'E'.

Traffic Affect Threshold

Section 2G.02 in the City's Traffic Impact Analysis Guidelines indicates the traffic thresholds to require the preparation of a TIA report. Subsection A identifies projects that add 10 or more peak hour traffic in the peak direction of traffic on the adjacent street. The peak direction of traffic on Rush Road during the PM peak hour is southbound; the site is projected to add 24 trips southbound, in particular the SR – 5 southbound ramp at Rush Road and the Rush Road at Hamilton Road intersections, per ITE data that are greater than the City's threshold for study.

The SR – 5 southbound ramp at Rush Road and the Rush Road at Hamilton Road intersections have been studied extensively and a roundabout has been proposed by a private party at the Hamilton Road at Rush Road intersection. Site traffic would be added to the low delay southbound to westbound right turn at the SR-5 ramp and the free flow westbound to southbound movement at Hamilton Road. Further study of these intersections at this time would be moot.

Traffic operations at the E. Stella St. at 2nd Ave. NE is projected to operate overall at LOS 'A' in 2023 per my analysis in East Stella Street Apartments Traffic Impact Analysis with the westbound 'Stop' control movements at LOS 'C' just above the LOS 'B' threshold. No classified intersections would be affected by 10 or more peak direction of traffic site trips.

Access Operational Inspection

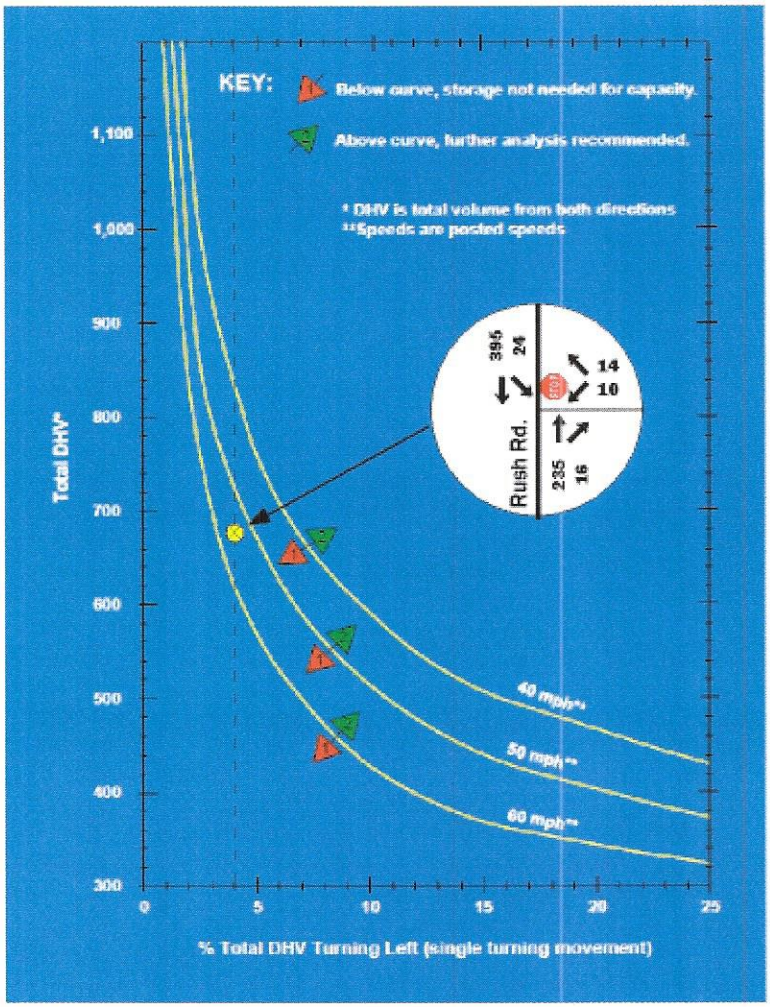
I conducted operational analysis using the Synchro software program for the site access on Rush Road, see graphic to the right:

Overall the site access intersection projects to operate at a Level of Service 'A' with an average delay of about seven seconds. For the westbound 'Stop' controlled site access motorists the LOS is 'B' with an average delay of about 12 seconds. The LOS calculation is attached to this report

Access Channelization

I have reviewed the proposed Scot Access onto Rush Road for channelization using the WSDOT Design Manual Exhibit 1310-7a "Left Turn Storage Guidelines: 2-Lane Unsignalized" to ascertain the need for left turn channelization. A copy of the WSDOT figure is below:

Exhibit 1310-7a Left-Turn Storage Guidelines: Two-Lane, Unsignalized



The traffic volumes are projected to be below the threshold for storage and the intersection is projected to operate at a very good LOS "with" the project. However with the prospect for development of the commercial Lot's #1 & 2 and connectivity to other potential

developments it is likely a southbound left turn pocket would be desirable in the future and having a second approach lane on Road B at its approach to Rush Road. These elements are not needed for the 68 SFDU lots but the intersection needs to be designed in a manner that a southbound to eastbound and second westbound approach lane can be added in conjunction with future development.

AGENCY TRAFFIC IMPACT MITIGATION REQUIREMENTS

The project site, site accesses and street frontages are to be constructed in conformance with City requirements.

Recent traffic studies have identified that the Traffic Operations at the Rush Road at Hamilton Road intersection are projected to fall below City/WSDOT operational requirements. Mitigating the development traffic, projected at about 35 PM peak hour trips (55% of site traffic generation during the PM peak hour), at the intersection on a proportionate share basis would likely be required.

I understand that the current planned traffic mitigation is a roundabout with an estimated cost of $2,500,000 to $3,000,000. The prior planned improvement was a traffic signal that would cost significantly less, $500,000 to $750,000. The City's proportionate share methodology is to take site traffic and then divide this by future traffic with the project traffic volume. This method fails to account for the capacity being added by the improvement. A more equitable, especially in light of the costing of a roundabout versus a signal, is to ascertain the development traffic proportional share of the future capacity of the improvement.

The general capacity per approach lane for a Signal/Roundabout per HCM for an Urban Location (WSDOT LOS Standard is 'D') is 900 vehicles per approach lane (Table 3 per Thurston County Rate Study)

Table 3: Intersection Service Threshold Capacities

	Service Threshold Capacities (PM Peak 2-Hour per Approach Lane[1])	
	Signalized	Unsignalized
Urban (LOS D)	900	500
Rural (LOS C)	720	400

[1] Highway Capacity Manual, 6th Edition

The estimated pro-rata share Urban WSDOT LOS: 35/3,600 * $2.5 to $3,000,000 = $24,310 to **$29,200**

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This Traffic Report provides the Trip Generation and Reviews the site access per the requirement of the Director of Public Works. The site is located at 1054 Rush Road with access to the site via new street intersection.

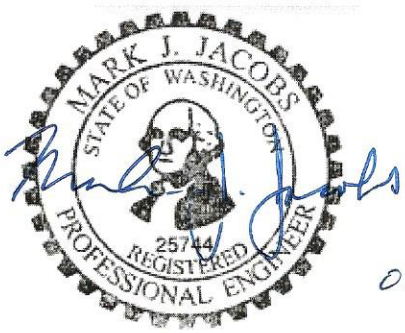
It is noted that the SR – 5 at Rush Road interchange has been studied to the n^{th} degree and further study at this time would be moot. Interchange improvements are being discussed and that the project applicant would be required to participate on a proportionate share basis.

I reviewed the site access using the highest traffic data obtained from my Arco AM/PM with Truck Fueling Traffic Impact Analysis and East Stella Street Apartments Traffic Impact Analysis. The site access is projected to operate at a good level of service. My safety inspection of the streets and intersections in the area did not reveal any apparent issues.

Based on my analysis, I recommend that the Rognlin's Rush Road Plat project be allowed with the following traffic impact mitigation measures.

1. Develop the site in accordance with applicable City requirements.
2. Design and construct the proposed site access to allow for the installation of a southbound to eastbound left turn pocket on Rush Road and facilitate the addition of another westbound approach lane.
3. Install a 'Stop' sign on the plat street, Road B, approach to Rush Road per applicable requirements.
4. Develop a pedestrian connection to the existing Woodland Ave. NE sidewalk located in the southeast corner of Woodland Ave. NE at Mitchell Ln. NE intersection.
5. A proportionate share payment to the future improvement, by others, at the Rush Road at Hamilton Road intersection.

No other traffic mitigation should be necessary. Please contact me at 206.762.1978 or email us at jaketraffic@comcast.net if you have any questions.



Very truly yours,

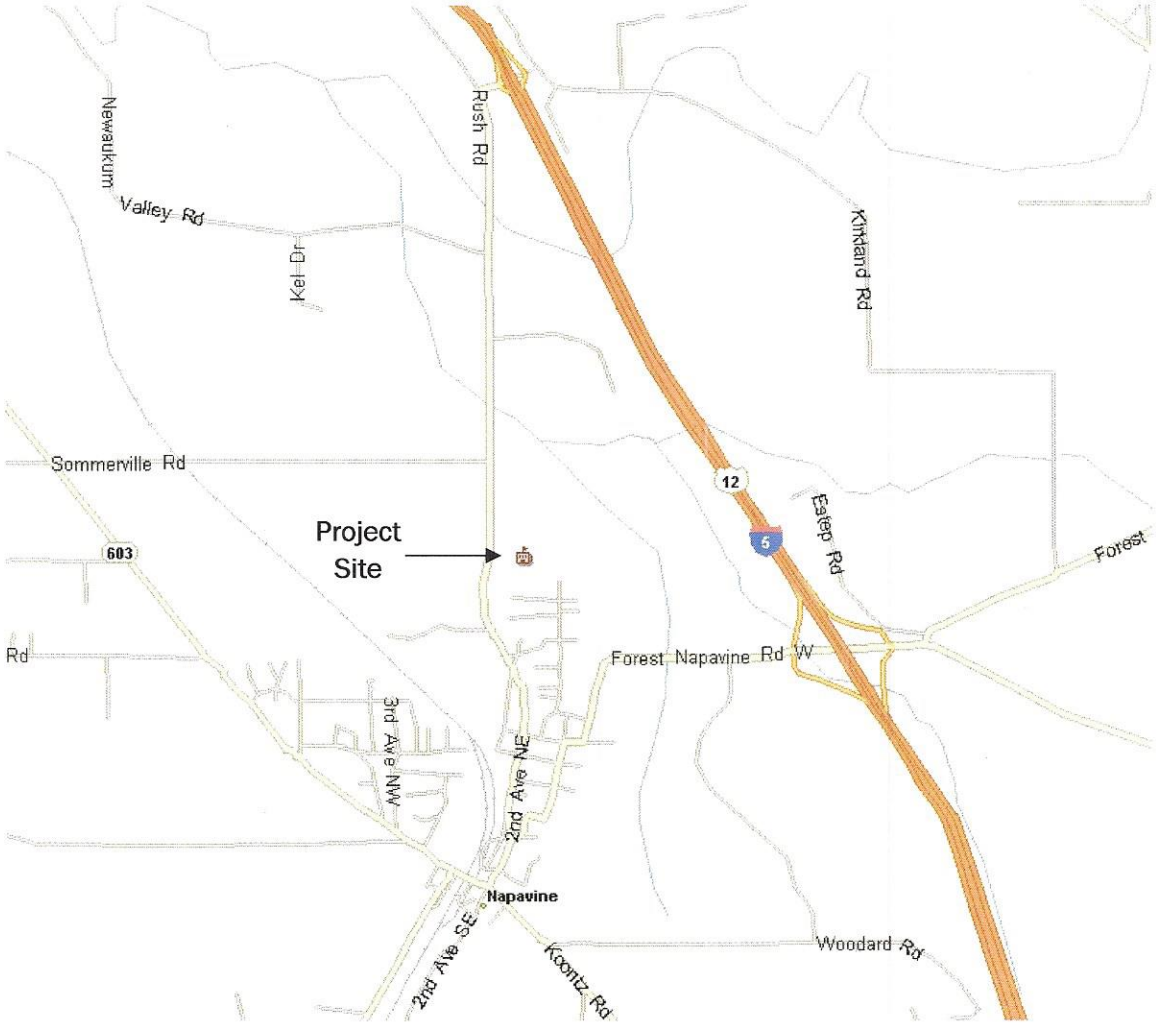
Mark J. Jacobs, PE, PTOE, President
JAKE TRAFFIC ENGINEERING, INC.

05.26.2022

MJJ: mjj

Project: Rognlin's Rush Road Plat – Napavine
Location: 1054 Rush Road

NORTH



JTE, Inc.
FIGURE 1

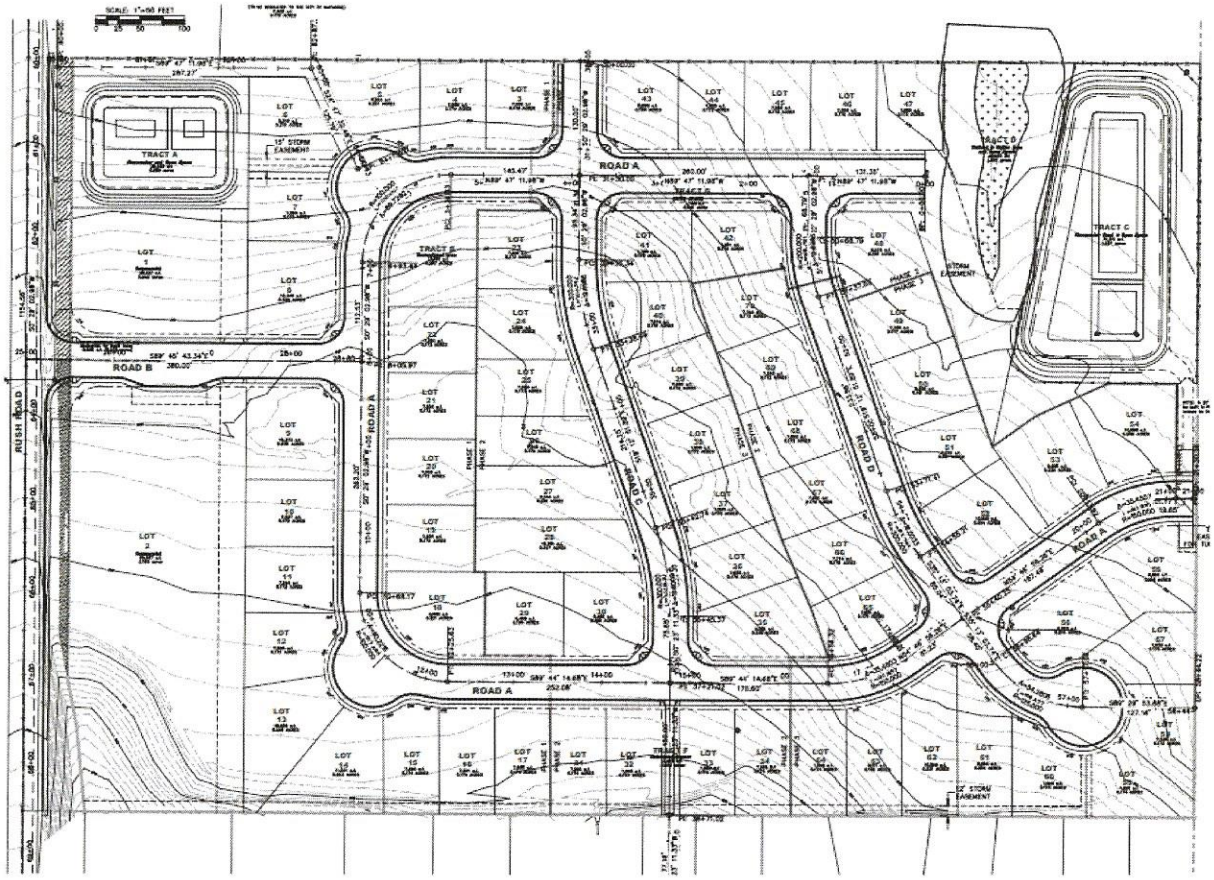
Reprint In Color Only

ROGNLIN'S RUSH ROAD PLAT - NAPAVINE
TRAFFIC REPORT

VICINITY MAP

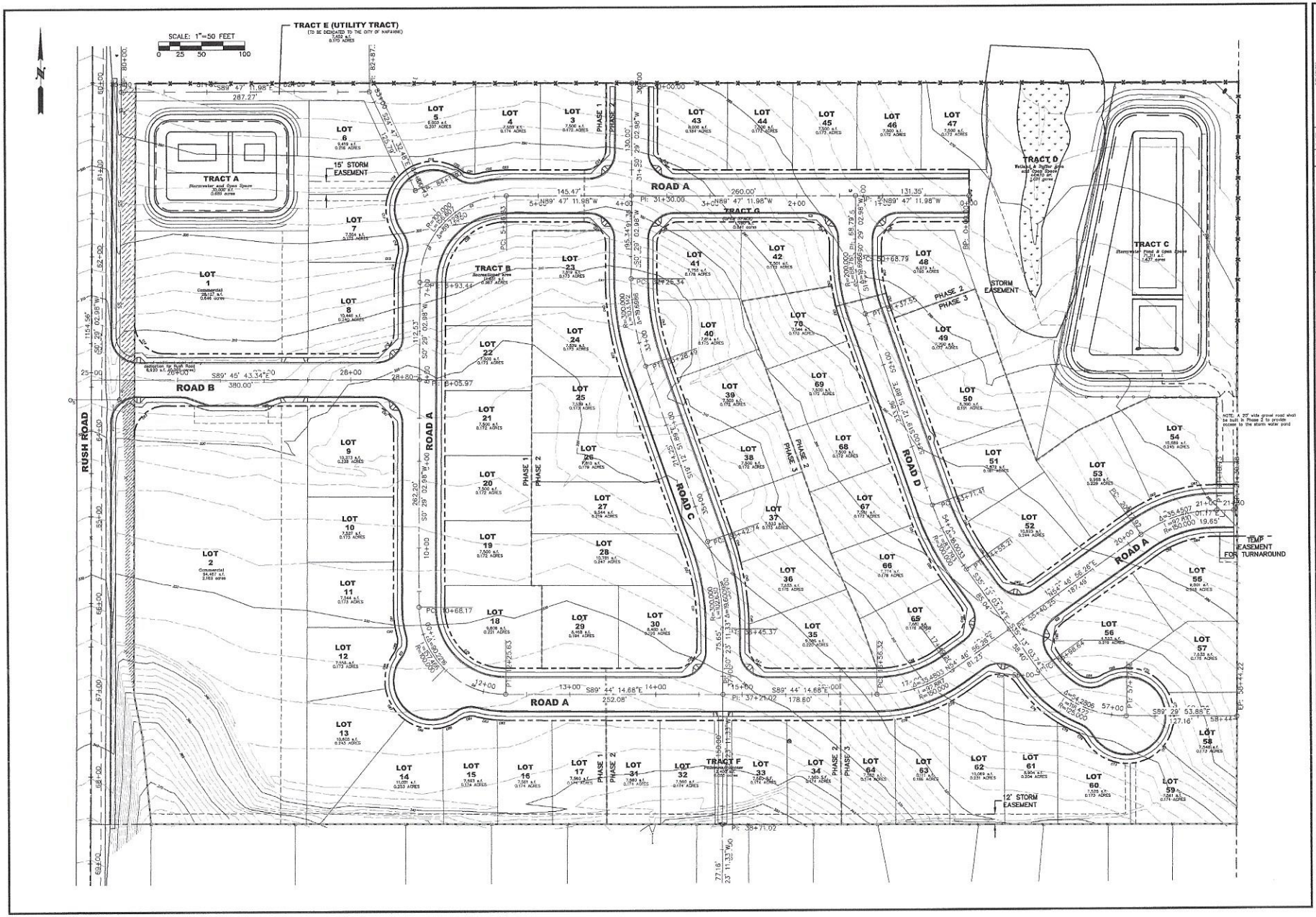
Project: Rognlin's Rush Road Plat – Napavine
Location: 1054 Rush Road

NORTH



Note: An 8.5 x 11" copy of the Preliminary Site Plan is included with this report

JTE, Inc. FIGURE 2 **Reprint In Color Only**	ROGNLIN'S RUSH ROAD PLAT - NAPAVINE TRAFFIC REPORT
	PRELIMINARY SITE PLAN



NO.	DATE	REVISION
1	7/10	REVISED PER CITY COMMENTS
2	8/10	REVISED PER CITY COMMENTS

DESIGNED BY: RWB
DRAWN BY: NJG
CHECKED BY:
DATE: 3/24/22
SCALE: 1" = 50'

RUSH ROAD
NAPAVINE PLAT
ROGNLIN PROPERTIES LLC
PO BOX 307
ABERDEEN, WA 98520
CITY OF NAPAVINE WA.

OVERALL SITE PLAN AND PLAT MAP

ROBERT W. BALMELLI
STATE OF WASHINGTON
22107
REGISTERED PROFESSIONAL ENGINEER

RB Engineering
CIVIL ENGINEERING - LAND PLANNING - UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8819
FAX: (360) 740-8812

JOB NUMBER 21118
DRAWING NAME 10012_SITE
C0.2
2 OF __

APPENDIX

From: Mark J Jacobs, PE, PTO [mailto:JakeTraffic@comcast.net]
Sent: Thursday, April 14, 2022 8:48 AM
To: 'Bryan Morris'; 'Robert Balmelli'
Cc: 'Chris Aldrich'
Subject: RE: 2022.030 - Rognlin's Rush Road Plat - TIA Scoping

Thank you

From: Bryan Morris [mailto:bmorris@cityofnapavine.com]
Sent: Thursday, April 14, 2022 8:07 AM
To: Robert Balmelli; Mark J Jacobs, PE, PTO
Cc: Chris Aldrich
Subject: RE: 2022.030 - Rognlin's Rush Road Plat - TIA Scoping

After the pre-app meeting that we didn't do

Bryan Morris
Public Works Director
City Of Napavine
P.O. Box 810
Napavine, WA 98565
Office (360) 262-3547
Cell (360) 880-6137

From: Robert Balmelli <Robertb@rbengineers.com>
Sent: Wednesday, April 13, 2022 5:26 PM
To: Bryan Morris <bmorris@cityofnapavine.com>; Mark J Jacobs, PE, PTO <JakeTraffic@comcast.net>
Cc: Chris Aldrich <Chrisa@rbengineers.com>
Subject: RE: 2022.030 - Rognlin's Rush Road Plat - TIA Scoping

Bryan,

These pass through contract are sent after we submit correct?

Thanks,

Robert Balmelli, PE **Principal Engineer**

RB Engineering PO Box 923 - 91 SW 13th St - Chehalis, WA 98532 - (360) 740-8919
Check out our website www.RBEngineers.com

From: Bryan Morris <bmorris@cityofnapavine.com>
Sent: Wednesday, April 13, 2022 3:23 PM
To: Mark J Jacobs, PE, PTO <JakeTraffic@comcast.net>
Cc: Chris Aldrich <Chrisa@rbengineers.com>; Robert Balmelli <Robertb@rbengineers.com>
Subject: RE: 2022.030 - Rognlin's Rush Road Plat - TIA Scoping

The city of Napavine will require a pass thru contract to proceed with this proposal.

Bryan Morris
Public Works Director
City Of Napavine
P.O. Box 810
Napavine, WA 98565
Office (360) 262-3547
Cell (360) 880-6137

From: Mark J Jacobs, PE, PTO <JakeTraffic@comcast.net>
Sent: Monday, April 11, 2022 12:04 PM
To: Bryan Morris <bmorris@cityofnapavine.com>
Cc: chrisa@rbengineers.com; robertb@rbengineers.com
Subject: RE: 2022.030 - Rognlin's Rush Road Plat - TIA Scoping

Bryan

Have you had a chance to review this yet?

Thank you

Mark

From: Mark J Jacobs, PE, PTO [mailto:JakeTraffic@comcast.net]
Sent: Tuesday, April 05, 2022 2:20 PM
To: 'bmorris@cityofnapavine.com'
Cc: 'chrisa@rbengineers.com'; 'robertb@rbengineers.com'
Subject: 2022.03X - Rognlin's Rush Road Plat - TIA Scoping

Bryan

Thank you for taking the time to discuss the Rognlin's Rush Road Plat project with me today.

We discussed the following:

- The SR – 5 at Rush Road interchange has been studied to the nth degree and further study at this time would be moot.
- Interchange improvements are being discussed and that the project applicant would likely be required to participate on a proportionate share basis
- Connectivity to Wildwood Ave. NE – EVA and pedestrian
- Prepare a Traffic Impact Analysis to include:

- Project description
- Trip Generation and Distribution
- Safety Inspection
- Access analysis using traffic data I have on file
- Discussion of street connectivity
- Ascertain the Rush Road Interchange improvement status and fair share mitigation

I understand that once the above Traffic Report gets submitted it would be reviewed by the third party.

Please let me know if I missed anything?

Mark

From: Mark J Jacobs, PE, PTO [mailto:JakeTraffic@comcast.net]
Sent: Monday, April 04, 2022 1:39 PM
To: 'bmorris@cityofnapavine.com'
Subject: 2022.03X - Rognlin's Rush Road Plat - TIA Scoping

Bryan

I have been requested to provide a budget to conduct a TIA for a ~70 lot SFDU project off of Rush Road, see attached.

Please review and we can then set up a time to discuss?

Thank you

Mark

Mark J Jacobs, PE, PTOE
JAKE TRAFFIC ENGINEERING, INC
2614 39th Ave. SW
Seattle, WA 98116 – 2503
206.762.1978 o
206.799.5692 c

From: Chris Aldrich [mailto:Chrisa@rbengineers.com]
Sent: Wednesday, March 30, 2022 12:21 PM
To: Mark Jacobs PE, PTOE (jaketraffic@comcast.net)
Cc: Robert Balmelli
Subject: Rognlin's Rush Road Plat

Mark-
Could you please get us your proposal for a Level 1 TIA for this proposed plat in Napavine?
Call me if any questions. Roughly 30-40 days out for submittal... does that work?

Chris Aldrich, RLA **Landscape Architecture / Planning Manager**

RB Engineering PO Box 923 - 91 SW 13th St - Chehalis, WA 98532 - (360) 740-8919
Check out our new website www.RBEngineers.com

WSDOT

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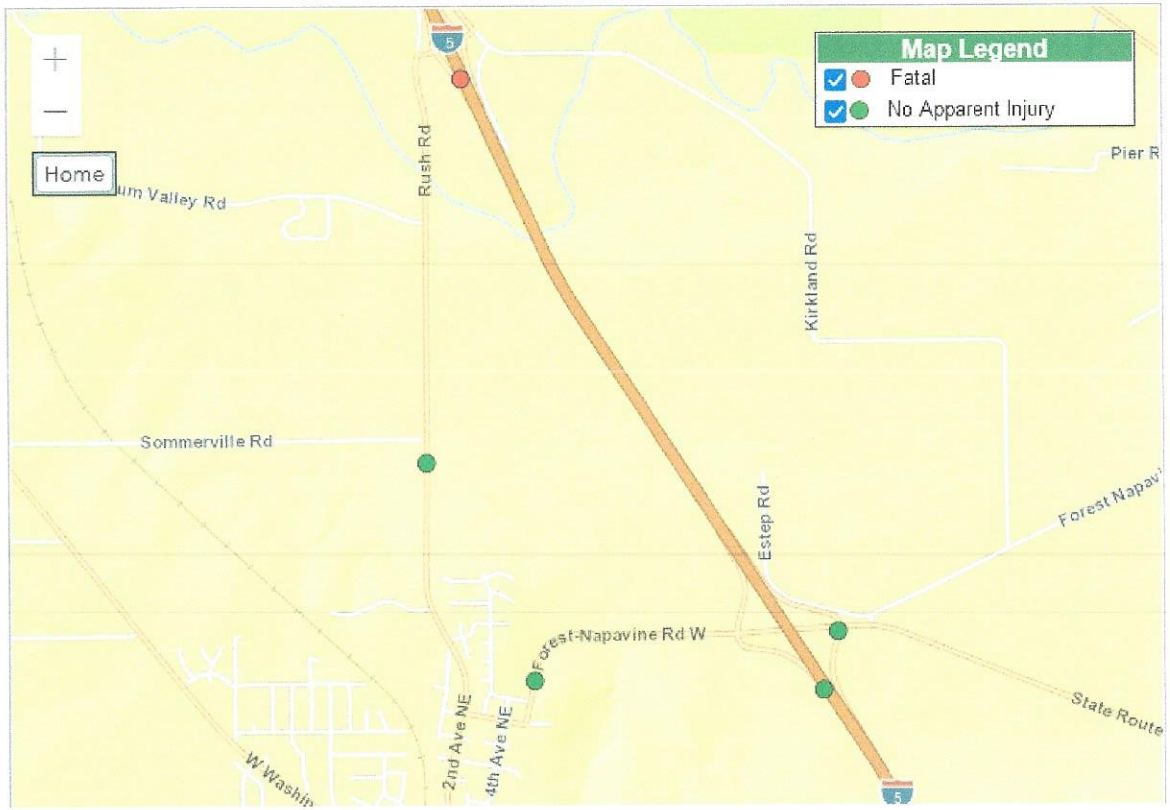
Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisiction
2021	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report



Summary Reports - Total Crashes

Report Year: 2022
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Fatal	1
No Apparent Injury	4
Total Crashes	**5**

WSDOT

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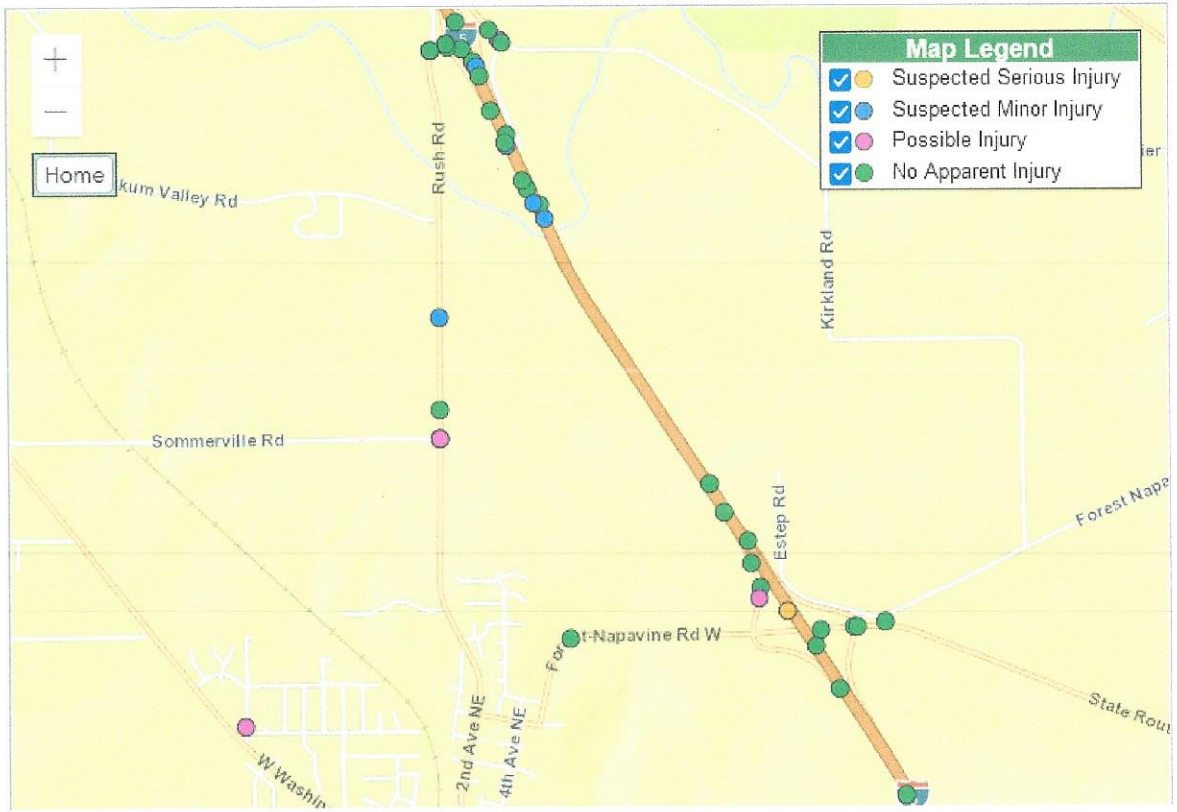
Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisdiction
2021	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report



Summary Reports - Total Crashes

Report Year: 2021
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Suspected Serious Injury	1
Suspected Minor Injury	5
Possible Injury	6
No Apparent Injury	36
Total Crashes	48

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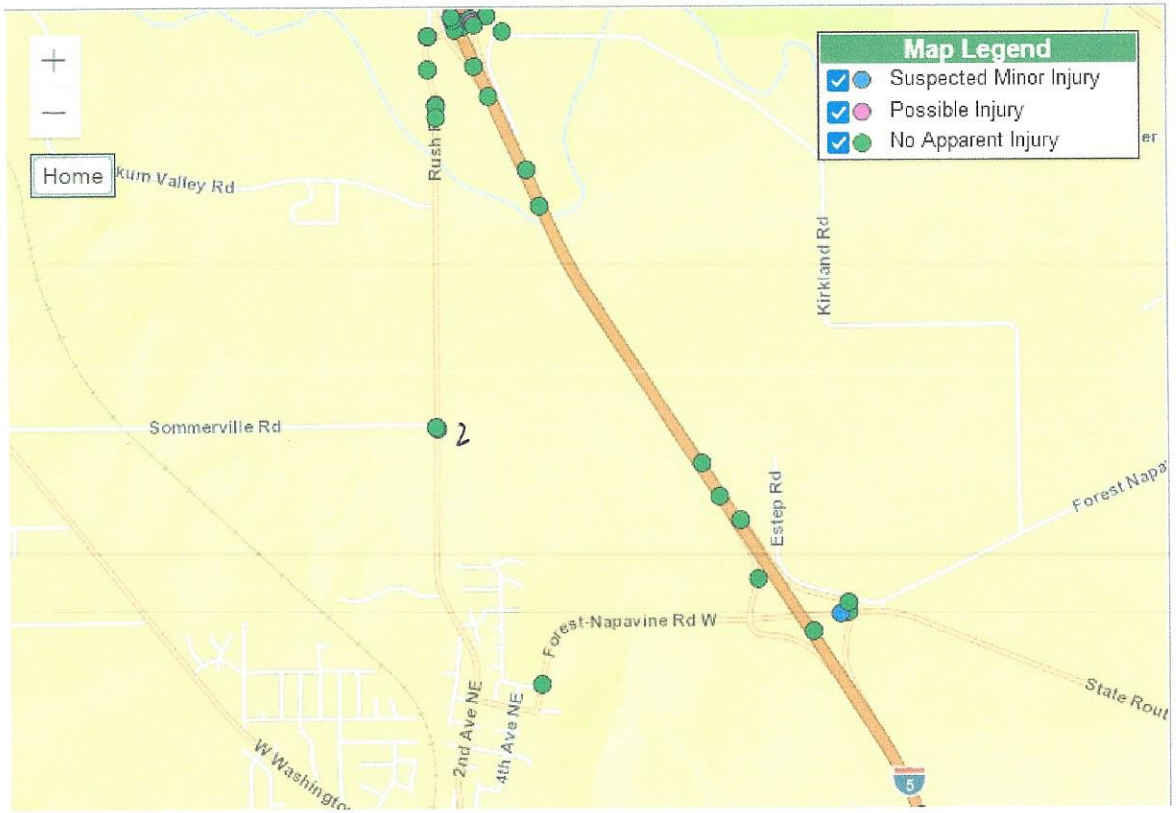
Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisiction
2020	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report



Summary Reports - Total Crashes

Report Year: 2020
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Suspected Minor Injury	1
Possible Injury	1
No Apparent Injury	38
Total Crashes	**40**

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Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisiction
2019	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report

Summary Reports - Total Crashes

Report Year: 2019
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Suspected Minor Injury	2
Possible Injury	4
No Apparent Injury	20
Total Crashes	**26**

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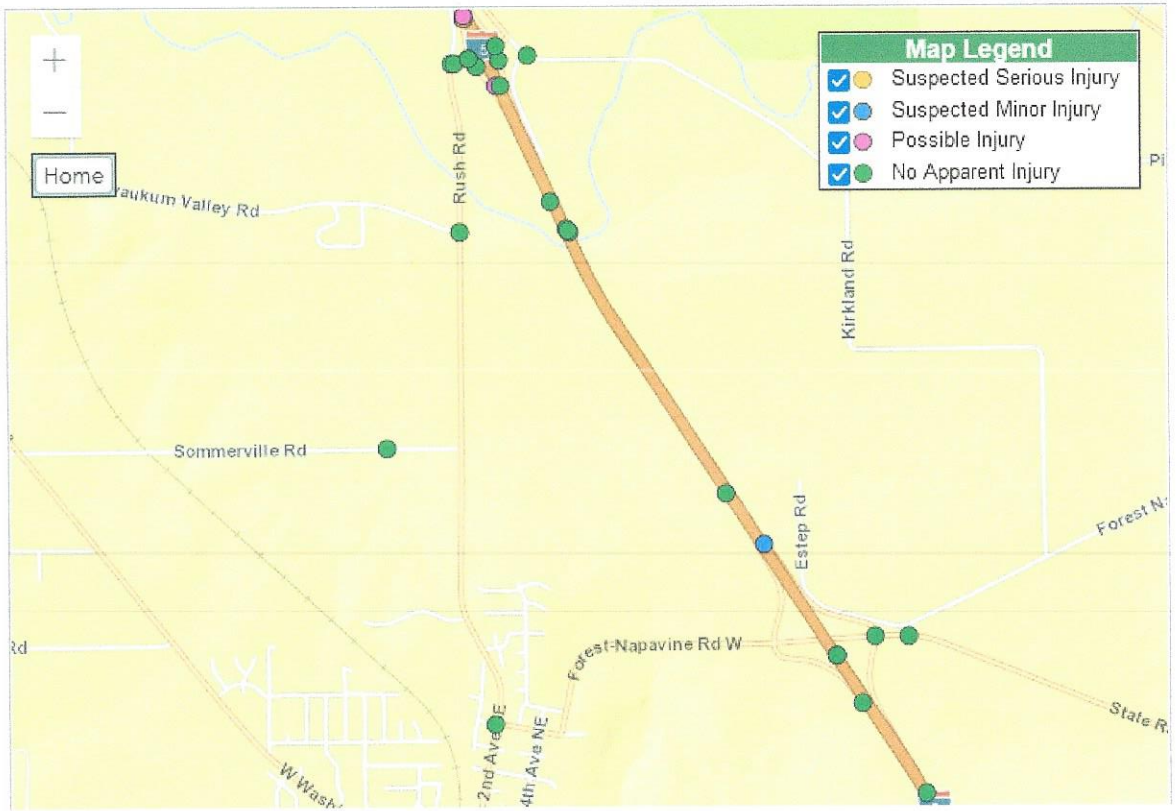
Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisiction
2018	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report



Summary Reports - Total Crashes

Report Year: 2018
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Suspected Serious Injury	1
Suspected Minor Injury	1
Possible Injury	4
No Apparent Injury	29
Total Crashes	35

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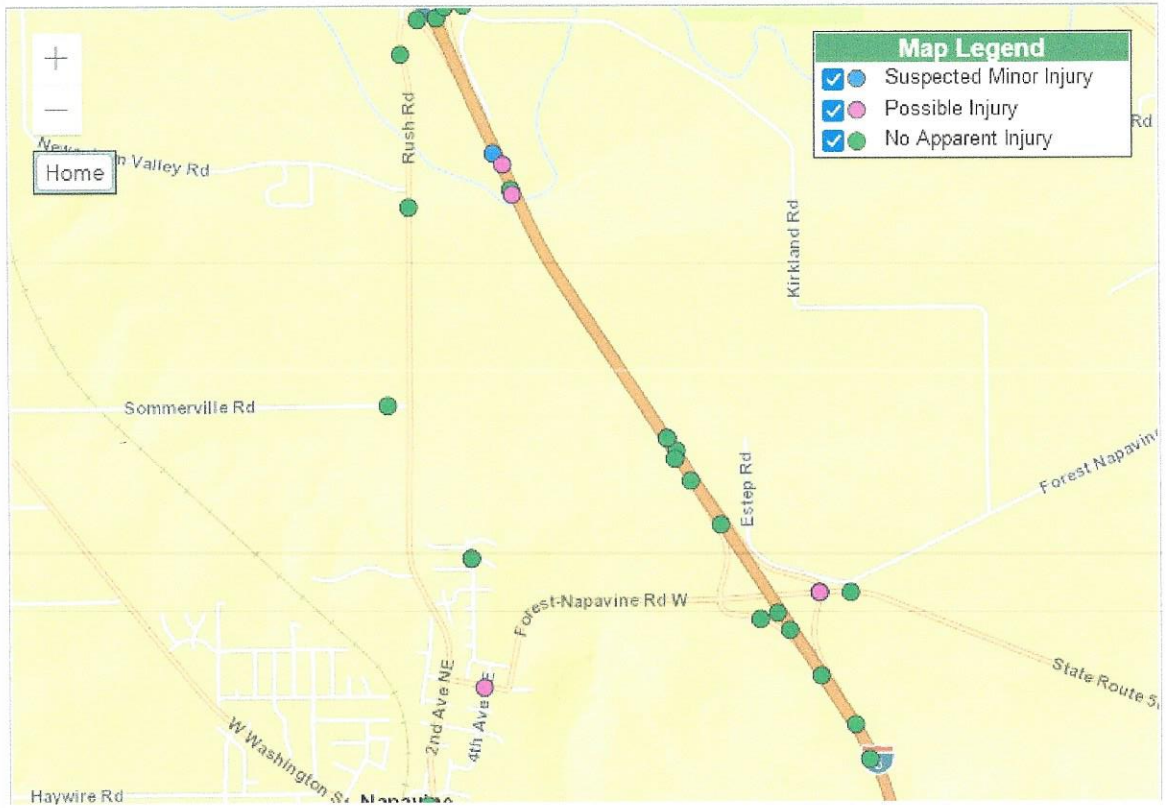
Report Category	Report Name
Summary Reports	Total Crashes

Select Report Parameters

Report Year	Location		Jurisiction
2017	Region:	(All)	(All)
	County:	(All)	
	City:	Napavine	

Run Report



Summary Reports - Total Crashes

Report Year: 2017
Location: City of Napavine
Jurisdiction: (All)

Under 23 U.S. Code 148 and 23 U.S. Code 407, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report, surveys, schedules, lists, or data.

Data | Charts | Notes

Most Severe Injury per Crash	Crashes
Suspected Minor Injury	1
Possible Injury	6
No Apparent Injury	29
Total Crashes	**36**

From: Ryan Shea [mailto:ryan.shea@scjalliance.com]
Sent: Friday, April 22, 2022 9:54 AM
To: Mark J Jacobs, PE, PTO
Subject: Rush Hamilton

Initial Cost estimate for Rush/Hamilton RAB: $2,500,000 – $3,000,000

Ryan

Ryan Shea, PTP
SCJ Alliance
Senior Transportation Planner
o. 360.352.1465, ext. 124
m. 360.701.9269
www.scjalliance.com
he/him/his

SCJ Alliance is 100% Employee-Owned!

SITE LAYOUT

Site: 1 [Hamilton Road at Rush Road - SB Ramps RIRO Mit - Copy (Site Folder: General)]

Projected 2023 With Project
PM Peak Hour
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.