HEARING EXAMINER MEETING
WEDNESDAY, OCTOBER 30, 2024 – 6:00 PM
501 DELTA AVE, MARYSVILLE, WA 98270

PA24-002 - Taylor Lane hearing

AGENDA

The public hearing is a *hybrid* meeting which you are welcome to attend in-person or via Zoom. Anyone wishing to provide verbal public comment must pre-register by contacting the Project Manager listed in the item by *4PM the day prior to the meeting*. Those providing verbal public comment will need to provide their name, address, e-mail and phone number.

Join Zoom Meeting:

https://us06web.zoom.us/j/84494899392?pwd=6Rdg7K2ryaOcRQVBPOQETDpaME82wf.1

Meeting ID: 844 9489 9392
Passcode: 555684
Phone: 253.215.8782

Call to Order

Public Hearings *PA24-002 Taylor Lane subdivision*

Special Accommodations: The City of Marysville strives to provide accessible meetings for people with disabilities. Please contact the City Clerk's office at (360) 363-8000 or 1-800-833-6384 (Voice Relay), 1-800-833-6388 (TDD Relay) two business days prior to the meeting date if any special accommodations are needed for this meeting.

Discussion Items

Discussion items for PA24-002
E001 - Land Use Application - PA24-002.pdf
E033 - Affidavit of Publication - PA24-002.pdf
E002 - Project Narrative - PA24-002.pdf
E003 - Title Report-Legal Description - PA24-002.pdf
E004 - Critical Areas Report - PA24-002.pdf

E005 - Traffic Impact Analysis - PA24-002.pdf
E006 - Geotechnical Report - PA24-002.pdf
E007 - Drainage Report - PA24-002.pdf
E008 - Landscape Plan - PA24-002.pdf
E009 - Plat Map - PA24-002.pdf
E010 - Preliminary Civil Plans - PA24-002.pdf
E011 - Variance Request - PA24-002.pdf
E012 - Letter of Completeness - PA24-002.pdf
E013 - Request for Review - PA24-002.pdf
E014 - Notice of Application - PA24-002.pdf
E015 - Affidavit of Publication - PA24-002.pdf
E016 - Technical Review Comments - PA24-002.pdf
E017 - Resubmittal Letter - PA24-002.pdf
E018 - Preliminary Civil Plans - PA24-002.pdf
E019 - Critical Areas Report - PA24-002.pdf
E020 - Buffer Mitigation Planting Plan - PA24-002.pdf
E021 - Drainage Report - PA24-002.pdf
E022 - Traffic Impact Analysis - PA24-002.pdf
E023 - Technical Review Comments 2 - PA24-002.pdf
E024 - Concurrency Recommendation - PA24-002.pdf
E025 - Concurrency Acceptance - PA24-002.pdf
E026 - Resubmittal Letter - PA24-002.pdf
E027 - Preliminary Civil Plans - PA24-002.pdf
E028 - Critical Areas Report - PA24-002.pdf
E029 - Buffer Mitigation Planting Plan - PA24-002.pdf
E030 - Notice of Public Hearing - PA24-002.pdf
E031 - Preliminary Site Plan - PA24-002.pdf
E032 - Staff Recommendation - PA24-002.pdf

Discussion items for PA24-002 (2)
E033 - Affidavit of Publication - PA24-002.pdf
E034 - Staff Recommendation - PA24-002.pdf

Agenda Bill

HEARING EXAMINER AGENDA ITEM REPORT

DATE:	October 30, 2024
SUBMITTED BY:	Marisa Nishmura, Community Development
ITEM TYPE:	Discussion Item
AGENDA SECTION:	Discussion Items
SUBJECT:	Discussion items for PA24-002
SUGGESTED ACTION:	
SUMMARY:	

ATTACHMENTS:

E001 - Land Use Application - PA24-002.pdf
E033 - Affidavit of Publication - PA24-002.pdf
E002 - Project Narrative - PA24-002.pdf
E003 - Title Report-Legal Description - PA24-002.pdf
E004 - Critical Areas Report - PA24-002.pdf
E005 - Traffic Impact Analysis - PA24-002.pdf
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E018 - Preliminary Civil Plans - PA24-002.pdf
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E022 - Traffic Impact Analysis - PA24-002.pdf
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E025 - Concurrency Acceptance - PA24-002.pdf

E026 - Resubmittal Letter - PA24-002.pdf
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E028 - Critical Areas Report - PA24-002.pdf
E029 - Buffer Mitigation Planting Plan - PA24-002.pdf
E030 - Notice of Public Hearing - PA24-002.pdf
E031 - Preliminary Site Plan - PA24-002.pdf
E032 - Staff Recommendation - PA24-002.pdf

EST. 1891
MARYSVILLE COMMUNITY DEVELOPMENT

MASTER LAND USE PERMIT APPLICATION

Community Development Department ◆ 501 Delta Avenue ◆ Marysville, WA 98270
Office Hours: Mon - Fri 8:00 AM - 4:30 PM ◆ Phone: (360) 363-8000

SITE INFORMATION

SITE ADDRESS: 4820 83rd Ave NE, Marysville, WA 98270	**APN(S):** 00590700013600
PROPOSED PROJECT NAME: Taylor Lane	**SECTION, TOWNSHIP, & RANGE:** 35, 30, 5
LAND USE (ZONING) DESIGNATION: R-6.5	**SHORELINE ENVIRONMENT:** N/A
WATER SUPPLY **Current:** Marysville **Proposed:** Marysville	**SEWER SUPPLY** **Current:** Marysville **Proposed:** Marysville

PRESENT USE OF PROPERTY:
Vacant

PRE-APPLICATION CONFERENCE HELD? ☒ **Yes, the City file # is** PreA23-030 ☐ **No**

	PROPERTY OWNER	APPLICANT	PROJECT CONTACT
NAME	TAYLOR JACOB	Joe Long, Keystone Land, LLC	Tom Abbott, Solid Ground Engineering
ADDRESS	4820 83rd Ave NE	13805 Smokey Point Blvd #102	8105 166th Ave NE
CITY, STATE, ZIP	Marysville, WA 98270	Marysville, WA 98271	Redmond, WA 98052
PHONE		425-268-6373	425-281-8324
E-MAIL		joe@cornerstonehomes.com	tabbott@solidgroundpnw.com

PROJECT INFORMATION

TYPE OF APPLICATION (Check all that apply):
***Permit type has supplemental checklist that must be submitted with Master Land Use Permit Application*

☐ Annexation Request	☐ Grading Permit	☐ SEPA Environmental Review**
☐ Binding Site Plan (Preliminary)**	☒ Major Subdivision (Preliminary)**	☐ Rezone
☐ Boundary Line Adjustment**	☐ Modification**	☐ Shoreline**
☐ Comprehensive Plan Amendment**	☐ Minor	☐ SDP Exemption
☐ Conditional Use Permit**	☐ Major	☐ Substantial Dev. Permit
☐ Critical Area Review	☐ Planned Residential Dev. (PRD)**	☐ Conditional Use Permit
☐ Final Plat Review**	☐ Site Plan Review**	☐ Variance
☐ BSP	☐ Commercial	☐ Variance**
☐ Short Plat	☐ Multifamily	☐ Wireless Communication Facility**
☐ Major Subdivision	☐ Short Plat (Preliminary)	☐ Other

LIST ANY OTHER PERMITS NEEDED (State/Federal):
NPDES, Grading Permit, Building Permit (vault), Building Permit (walls)

DETAILED PROJECT DESCRIPTION:
The Taylor Property project is a 21-lot single-family residential development in Marysville, Washington. The 4.66-acre project is located at 4820 83rd Ave NE, Marysville, WA 98270. The site consists of one tax parcel containing an existing single-family home and associated outbuildings. The existing home on the site will be removed as a part of the project.

I certify that I am the owner or owners authorized agent If acting as an authorized agent, I further certify that I am authorized to act as the Owners agent regarding the property at the above-referenced address for the purpose of filing applications for decision, permits, or review under the Unified Development Code and other applicable Marysville Municipal Codes and I have full power and authority to perform on behalf of the Owner all acts required to enable the City to process and review such applications.

I certify that the information on this application is true and correct and that the applicable requirements of the City of Marysville will be met. I grant permission for City employees, agents of the City and/or other agency officials to enter the subject property, if necessary, for the purpose of site inspection.

Digitally signed by Tom Abbott
DN: C=US, E=tabbott@solidgroundpnw.com, O=Solid Ground Engineering, OU=Engineering, CN=Tom Abbott
Location: Redmond, WA
Reason: I am approving this document
Date: 2024.01.25 16:46:06-08'00'

1/25/23

Owner/Owner's Authorized Agent **Date**

Everett Daily Herald

Affidavit of Publication

State of Washington }
County of Snohomish } ss

Michael Gates being first duly sworn, upon oath deposes and says: that he/she is the legal representative of the Everett Daily Herald a daily newspaper. The said newspaper is a legal newspaper by order of the superior court in the county in which it is published and is now and has been for more than six months prior to the date of the first publication of the Notice hereinafter referred to, published in the English language continually as a daily newspaper in Snohomish County, Washington and is and always has been printed in whole or part in the Everett Daily Herald and is of general circulation in said County, and is a legal newspaper, in accordance with the Chapter 99 of the Laws of 1921, as amended by Chapter 213, Laws of 1941, and approved as a legal newspaper by order of the Superior Court of Snohomish County, State of Washington, by order dated June 16, 1941, and that the annexed is a true copy of EDH1003950 NOPH PA 24-002 as it was published in the regular and entire issue of said paper and not as a supplement form thereof for a period of 1 issue(s), such publication commencing on 10/17/2024 and ending on 10/17/2024 and that said newspaper was regularly distributed to its subscribers during all of said period.

The amount of the fee for such publication is $72.24.

Subscribed and sworn before me on this 17th day of October, 2024.

Randie Pospical

Notary Public in and for the State of Washington.

COMM DEVEL - CITY OF MARYSVILLE | 88522148
MARISA NISHIMURA

RANDIE POSPICAL
Commission Expires 10-20-2027
NOTARY PUBLIC
License Number 23034934
STATE OF WASHINGTON

Classified Proof

MARYSVILLE

CITY OF MARYSVILLE
COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue • Marysville, WA 98270 • (360) 363-8000

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that open record public hearing will be held before the Hearing Examiner on Wednesday, October 30th at 6:00 PM at 501 Delta Avenue, 2nd Floor – Council Chambers for the following proposal:

File Number: PA 24-002
Project Title: Taylor Lane Subdivision
Applicant: Keystone Land, LLC
Project Agent: Tom Abbott, Solid Ground Engineering
8105 166th Ave NE, Redmond, WA 98052
Project Location: 4820 83rd Ave NE
APNs: 00590700013600

Project Description: The applicant is proposing a 13-lot single family residential subdivision; the existing residence is to be retained on proposed lot 9. The project site includes a portion of a Category II wetland and its associated buffer along with geological hazard areas for steep slopes. The applicant has the intent of using buffer width averaging to accommodate portions of the proposed development; compensatory mitigation via buffer addition and enhancement is proposed.

Open Record Public Hearing: The public hearing will take place in person at 501 Delta Avenue, 2nd Floor – Council Chambers and via Zoom/teleconference. The Hearing Examiner and the City's project manager will attend in person; however, other staff, the applicant, and the public may attend either in person or via Zoom.

Zoom Meeting Link:
https://us06web.zoom.us/j/84948999392?pwd=6Rdq7K2rvaQcRQVBPOQETDpaME82wf.1
• Passcode: 555684
• To listen to the meeting without providing public comment:
• Dial in: 1.253.215.8782
• Meeting ID: 838 1746 9833

Document Availability:
http://docs.marysvillewa.gov/htcomnet/public/?folder=7f88ad36

For Project Information: Emily Morgan, Senior Planner - 360.363.8216 or emorgan@marysvillewa.gov
Community Development Department, 501 Delta Ave, Marysville, WA 98270

Published: October 17, 2024. EDH1003950

Proofed by Pospical, Randie, 10/17/2024 08:46:25 am

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052
Office: 425.305.5104

January 26, 2024

City of Marysville
ATTN: Emily Morgan
501 Delta Avenue
Marysville, WA 98270
(360) 363-8000

Taylor Lane
Project Narrative

Project Overview
The Taylor Lane project is a 21-lot single-family residential development in Marysville, Washington. The 4.66-acre project is located at 4820 83rd Ave NE, Marysville, WA 98270. The site consists of one tax parcel containing an existing single-family home and associated outbuildings. The existing home on the site will be retained, while some of the outbuildings will be removed as a part of the project. The following narrative includes information about the project and responses to how the proposed project will comply with The City of Marysville's code requirements.

Property Address: 4820 83rd Ave NE, Marysville, WA 98270
Tax Parcel Number: 00590700013600
Property Zoning: R-6.5
Lot Dimension Zoning: R-8
Property Area: 4.66-acres
Proposed Residential Units: 21 total (20 new + 1 retained)
Project Use: Single-family residential
Permits: Preliminary Plat

Site Description
The project site is made up of one tax parcel within the City of Marysville. The existing home on the site will be retained, while some of the outbuildings will be removed as a part of the project. Site topography generally consists of moderate slopes descending to the south, with some steep slope areas within the wetland buffer area. There is a Category II wetland located within the south-central portion of the site.

The development surrounding the site is:

- North: Harvest Heights detached single-family residential development
- East: 83rd Ave NE & Undeveloped parcel
- South: 49th St NE & Undeveloped parcel
- West: Puget Sound Power & Light Co Baker River Transmission Line

Drainage:
The proposed development's stormwater infrastructure will include catch basins and stormwater pipes that will collect and direct stormwater into one stormwater detention vault located in the southwestern portion of the site. Stormwater will then be treated for water quality and discharged outside the existing wetland buffer area.

Water/Sewer:
The City of Marysville Water and Sewer District will provide the site with water and sewer services. To provide the individual units with water and sewer service, main extensions will be constructed from the existing water and sewer mains in the 49th St NE ROW.

Access/Streets/Parking:
To provide the proposed development access to 49th St NE, a local access road ending in a cul-de-sac will be constructed to serve lots not taking direct access from 49th St. The proposed road and access tract will be consistent with the Marysville EDDS. See the road sections that are included in the project's construction plans for the exact dimensions of the proposed roads.

Project Density and Residential Density Incentives
Project density calculations are as follows:
Gross Area: 202,990 sf (4.66 ac)
Flat 20% Deduction: 40,580 sf (0.93 ac)
Net Area: 162,410 sf (3.73 ac):
Base Density: 3.73 x 6.5 = 24.25 = 24 lots (6.5 lots/ac)
Lots proposed: 20 new + 1 retained = 21 Total Lots

We look forward to working with you on this project. Please let us know if you have any questions related to the submittal items proposed.

Regards,



Tom Abbott, P.E.
Principal Civil Engineer
Solid Ground Engineering

Chicago Title
Everett, WA 98201
Main Phone: (425)259-8223

Commitment for Title Insurance

Title Officer: Builder Unit
Email: evebuilder@ctt.com
Title No.: 500144045C

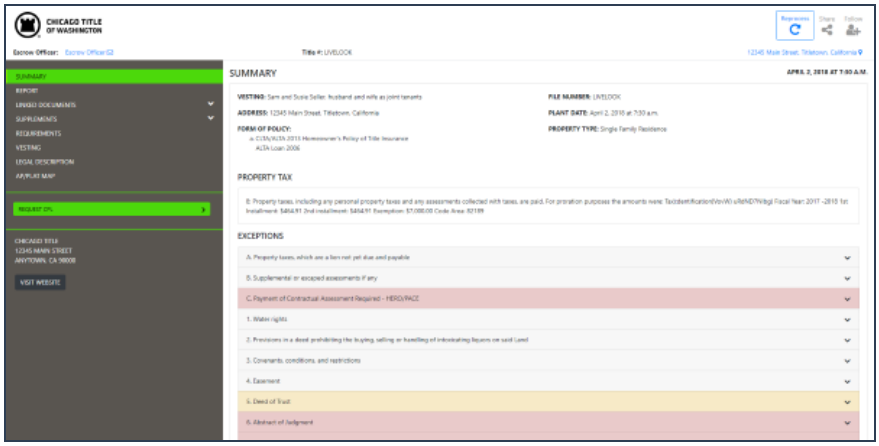
Property Address:

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SUBDIVISION

Issued By:

CHICAGO TITLE INSURANCE COMPANY

Guarantee/Certificate Number:

500144045c

CHICAGO TITLE INSURANCE COMPANY

a corporation, herein called the Company

GUARANTEES

Keystone Land LLC

herein called the Assured, against actual loss not exceeding the liability amount stated in Schedule A which the Assured shall sustain by reason of any incorrectness in the assurances set forth in Schedule A.

LIABILITY EXCLUSIONS AND LIMITATIONS

1. No guarantee is given nor liability assumed with respect to the identity of any party named or referred to in Schedule A or with respect to the validity, legal effect or priority of any matter shown therein.
2. The Company's liability hereunder shall be limited to the amount of actual loss sustained by the Assured because of reliance upon the assurance herein set forth, but in no event shall the Company's liability exceed the liability amount set forth in Schedule A.

Please note carefully the liability exclusions and limitations and the specific assurances afforded by this guarantee. If you wish additional liability, or assurances other than as contained herein, please contact the Company for further information as to the availability and cost.

Chicago Title Insurance Company

By:

Michael J. Nolan, President

Chicago Title Company of Washington
3002 Colby Ave., Suite 200
Everett, WA 98201

Countersigned By:

Brent Aune
Authorized Officer or Agent

Attest:

Marjorie Nemzura, Secretary

ISSUING OFFICE:
Title Officer: Builder Unit Chicago Title Company of Washington 3002 Colby Ave., Suite 200 Everett, WA 98201 Fax: (866)827-8844 Main Phone: (425)259-8223 Email: evebuilder@ctt.com

SCHEDULE A

Liability	Premium	Tax
$0.00	$0.00	$0.00

Effective Date: December 20, 2023 at 08:00 AM

The assurances referred to on the face page are:

That, according to those public records which, under the recording laws, impart constructive notice of matter relative to the following described property:

SEE EXHIBIT "A" ATTACHED HERETO AND MADE A PART HEREOF

Title to said real property is vested in:

Jacob Taylor, an unmarried person

subject to the matters shown below under Exceptions, which Exceptions are not necessarily shown in the order of their priority.

END OF SCHEDULE A

EXHIBIT "A"

Legal Description

For APN/Parcel ID(s): 005907-000-136-00

TRACTS 136, SUNNYSIDE FIVE ACRE TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

SCHEDULE B

GENERAL EXCEPTIONS

A. Rights or claims of parties in possession, or claiming possession, not shown by the Public Records.

B. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land.

C. Easements, prescriptive rights, rights-of-way, liens or encumbrances, or claims thereof, not shown by the Public Records.

D. Any lien, or right to a lien, for contributions to employee benefit funds, or for state workers' compensation, or for services, labor, or material heretofore or hereafter furnished, all as imposed by law, and not shown by the Public Records.

E. Taxes or special assessments which are not yet payable or which are not shown as existing liens by the Public Records.

F. Any lien for service, installation, connection, maintenance, tap, capacity, or construction or similar charges for sewer, water, electricity, natural gas or other utilities, or for garbage collection and disposal not shown by the Public Records.

G. Unpatented mining claims, and all rights relating thereto.

H. Reservations and exceptions in United States Patents or in Acts authorizing the issuance thereof.

I. Indian tribal codes or regulations, Indian treaty or aboriginal rights, including easements or equitable servitudes.

J. Water rights, claims or title to water.

SCHEDULE B
(continued)

SPECIAL EXCEPTIONS

1. Covenants, conditions, restrictions, recitals, reservations, easements, easement provisions, dedications, building setback lines, notes, statements, and other matters, if any, but omitting any covenants or restrictions, if any, including but not limited to those based upon race, color, religion, sex, sexual orientation, familial status, marital status, disability, handicap, national origin, ancestry, or source of income, as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law, as set forth on the Plat of Sunny Side Five Acre Tracts:

   Recording No: 122901

2. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to:	Public Utility District No. 1 of Snohomish County
Purpose:	Tree Trimming along with ingress, and egress.
Recording Date:	February 16, 1967
Recording No.:	1933259
Affects:	Adjacent to the West line of Tract 136.

3. Covenants, conditions, restrictions, recitals, reservations, easements, easement provisions, dedications, building setback lines, notes, statements, and other matters, if any, but omitting any covenants or restrictions, if any, including but not limited to those based upon race, color, religion, sex, sexual orientation, familial status, marital status, disability, handicap, national origin, ancestry, or source of income, as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law, as set forth on Survey:

   Recording No: 9601045005

4. Covenants, conditions, restrictions, recitals, reservations, easements, easement provisions, dedications, building setback lines, notes, statements, and other matters, if any, but omitting any covenants or restrictions, if any, including but not limited to those based upon race, color, religion, sex, sexual orientation, familial status, marital status, disability, handicap, national origin, ancestry, or source of income, as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law, as set forth on Survey:

   Recording No: 9601185006

5. City, county or local improvement district assessments, if any.

6. A deed of trust to secure an indebtedness in the amount shown below,

Amount:	$460,750.00
Dated:	October 26, 2020
Trustor/Grantor:	Jacob Taylor, an unmarried person
Trustee:	Chicago Title Company of Washington
Beneficiary:	Mortgage Electronic Registration Systems, Inc., acting solely as nominee for Wallick and Volk, Inc., as lender
Loan No.:	8982456
Recording Date:	October 29, 2020
Recording No:	202010290072

   Affects: Includes other property

SCHEDULE B
(continued)

7. A deed of trust to secure an indebtedness in the amount shown below,

Amount:	$100,000.00
Trustor/Grantor:	Jacob Taylor, an unmarried person
Trustee:	Chicago Title Company
Beneficiary:	HomeStreet Bank
Recording Date:	June 15, 2022
Recording No.:	202206150081

Affects: Includes other property

The Deed of Trust set forth above is purported to be a “Credit Line” Deed of Trust. It is a requirement that the Trustor/Grantor of said Deed of Trust provide written authorization to close said credit line account to the Lender when the Deed of Trust is being paid off through the Company or other Settlement/Escrow Agent or provide a satisfactory subordination of this Deed of Trust to the proposed Deed of Trust to be recorded at closing.

END OF SCHEDULE B

CRITICAL AREA STUDY
AND
BUFFER MITIGATION PLAN

FOR

TAYLOR LANE
MARYSVILLE, WA

Wetland Resources, Inc. Project #23124

Prepared By
Wetland Resources, Inc.
9505 19th Avenue SE, Suite 106
Everett, WA 98208
(425) 337-3174

Prepared For
Keystone Land, LLC
13805 Smokey Point Boulevard, #102
Marysville, WA 98271

January 26, 2024

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APPENDIX B: DOE RATING FORM AND FIGURES
APPENDIX C: CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

1.0 INTRODUCTION

Wetland Resources, Inc. (WRI) completed a site investigation on September 20, 2023, to identify and evaluate wetlands and fish and wildlife habitat conservation areas on the property located at 4820 83rd Ave NE, in the city limits of Marysville, Washington. The site is composed of one 4.66-acre tax parcel (00590700013600), located within Section 35, Township 30N, Range 05E, W.M. The entire property is within the Snohomish River-Frontal Possession Sound subbasin of the Snohomish Watershed (WRIA 7).

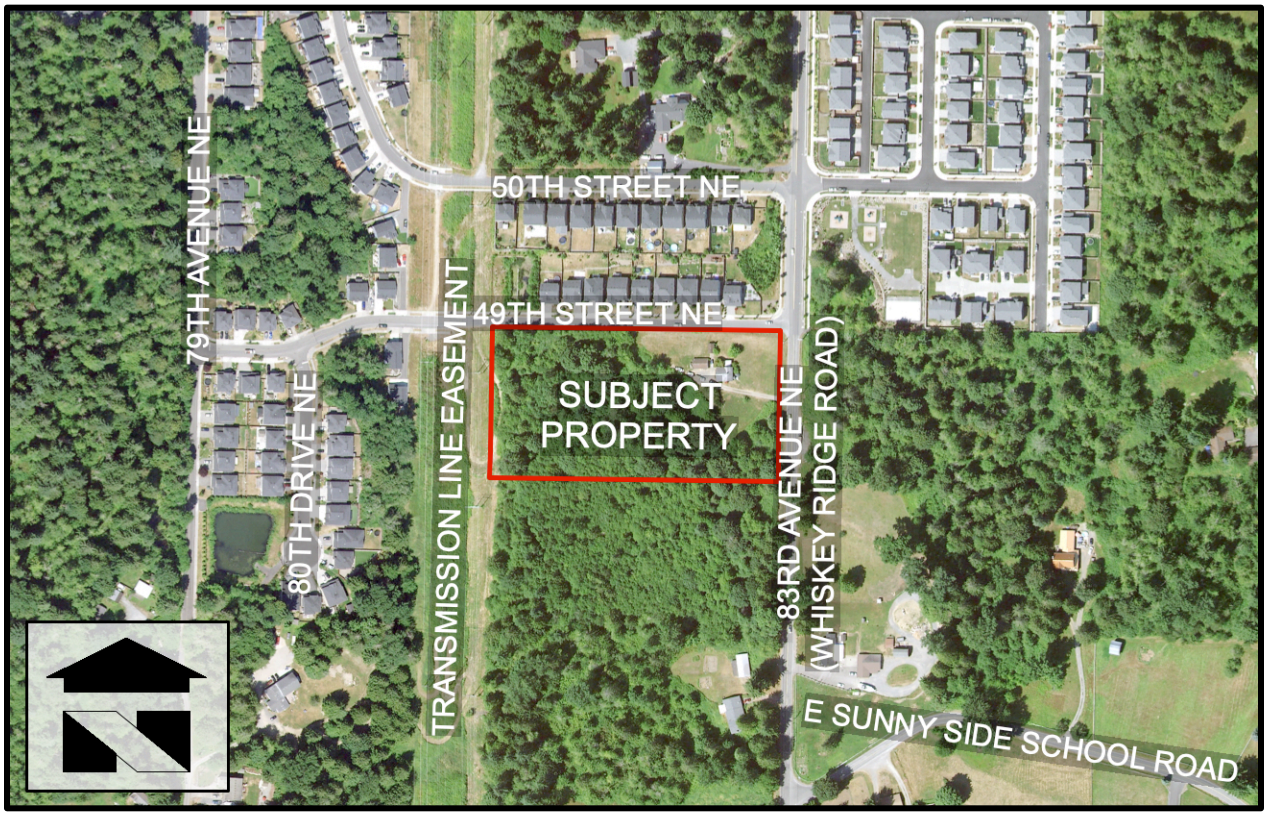


Figure 1 – Aerial view of the subject property

1.1 SITE DESCRIPTION

The subject property is situated in a residential area, surrounded by developments to the west, north, and northeast. The property directly south of the subject parcel is undeveloped, and the properties east and southeast consist of large-lot residential uses. A power transmission corridor parallels the western property boundary. The site has a general southern aspect, sloping towards a depression in the southern portion of the property.

The northeastern portion of the parcel is developed with a single-family residence (SFR) and associated structures. Vegetation within this area is limited to maintained lawn and some sporadic trees and ornamental shrubs. The remainder of the parcel is undeveloped and vegetated by a dense native forest canopy of Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*). The understory consists of salmonberry (*Rubus*

spectabilis), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum*), sword fern (*Polystichum munitum*), and a few sparse patches of Himalayan blackberry (*Rubus armeniacus*).

One wetland (Wetland A) was identified on site during the September 2023 investigation. Wetland A is a Category II wetland with a moderate (7) habitat score, receiving a standard buffer of 100-feet. The location of this feature is depicted on the attached *Critical Area Study and Buffer Mitigation Plan Map* (See appendix C).

1.2 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR and develop the northern portion of the property with a 21-lot residential subdivision and associated stormwater and access infrastructure. The applicant proposes to implement buffer averaging, buffer restoration for temporary impacts, enhancement of degraded buffer, and installation of permanent fencing and critical area signage.

2.0 WETLAND AND STREAM DETERMINATION

2.1 LIMIT OF STUDY

The proposed project occurs within one tax parcel. Lack of legal access prevents WRI staff from performing routine wetland and stream determinations in surrounding areas on adjacent parcels. Wetland and stream boundaries depicted outside of the subject parcel are based on visual observation from the edge of legal access, publicly available resources, fine-scale elevation contours, and best professional judgment.

2.2 INFORMATION REVIEW

Prior to conducting the site investigation, public resource information was reviewed to gather background information on the subject site and the surrounding area in regards to wetlands, streams, and other critical areas. These sources included the following:

- *USDA/NRCS Web Soil Survey:* The Web Soil Survey identifies the soils underlying the site as Tokul gravelly medial loam, 0 to 8 percent slopes. This unit is not a hydric soil.

- *USFWS National Wetlands Inventory (NWI)*: NWI does not map any features on or near the site.

- *Snohomish County PDS:* PDS maps a large wetland associated with King Creek near the southern property boundary, continuing off-site to the southwest. King Creek is mapped approximately 700 feet off-site to the south. This stream flows southwest, ultimately draining into Ebey Slough. The county maps the portion of King Creek nearest the property boundary as a Type F.

- *WDNR Forest Practices Application Mapping Tool FPAMT:* This resource maps King Creek in approximately the same location as Snohomish County PDS. The portion of this stream closest to the property is mapped as a Type F.

- *WDFW SalmonScape*: SalmonScape maps King Creek in approximately the same location as PDS and FPAMT. The portion of King Creek closest to the property is mapped as gradient-accessible to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*).

- *WDFW Priority Habitat and Species (PHS) Interactive Map:* PHS does not map any features on or near the site.

- *Washington State Department of Natural Resources (DNR) Wetland of High Conservation Value:* This resource does not depict any wetlands of high conservation value on or near the site.

- *City of Marysville Critical Areas Map*: The city of Marysville maps two Category III wetlands approximately 150 feet off-site to the west. King Creek is shown in approximately the same location as depicted by other resources; however, the headwaters are mapped approximately 700 feet south of the subject property.

2.3 METHODOLOGY

Wetland boundaries in western Washington are determined using the methodologies described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers 2010). Under the routine methodology, the process for making a wetland determination is based on three steps:

1.) Examination of the site for hydrophytic vegetation (species present and percent cover);
2.) Examination of the site for hydric soils;
3.) Determining the presence of wetland hydrology

2.3.1 Vegetation Criteria

The Corps Manual and 2010 Regional Supplement define hydrophytic vegetation as "*the assemblage of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence.*" Field indicators are used to determine whether the hydrophytic vegetation criteria have been met. Examples of these indicators include, but are not limited to, the rapid test for hydrophytic vegetation, a dominance test result of greater than 50%, and/or a prevalence index score less than or equal to 3.0.

2.3.2 Soils Criteria

The 2010 Regional Supplement (per the National Technical Committee for Hydric Soils) defines hydric soils as soils *"that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."* Field indicators are used to determine whether a given soil meets the definition for hydric soils. Indicators are numerous and include, but are not limited to, presence of a histosol or histic epipedon, a sandy gleyed matrix, depleted matrix, and redoximorphic depressions.

2.3.3 Hydrology Criteria

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface for a sufficient duration during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and chemically reducing conditions, respectively. The strongest indicators include the presence of surface water, a high-water table, and/or soil saturation within at least 12 inches of the soil surface.

2.4 WETLAND AND STREAM DETERMINATION FINDINGS

One wetland (Wetland A) was identified in the southern portion of the site during the September 2023 inspection. Wetland A is documented by publicly available resources as a headwater wetland to King Creek, which starts approximately 700 feet south of the subject property. Wetland A is classified per MMC 22E.010.060 and its buffer is designated by MMC 22E.010.100(4).

2.4.1 Wetland A

Jurisdiction: City of Marysville
HGM Class: Depressional
Cowardin Classification: PFO4E
City of Marysville Classification: Category II
City of Marysville Buffer: 100 feet

Wetland A is an approximately 13.6-acre depressional wetland located in the southern portion of the subject property and it extends off site to the south. Vegetation observed within the on-site portion of the wetland is dominated by a canopy of western red cedar (*Thuja plicata*; FAC) and red alder (*Alnus rubra*; FAC). Understory vegetation consists of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), twinberry (*Lonicera involucrata*; FAC), skunk cabbage (*Lysichiton americanus*; OBL), creeping buttercup (*Ranunculus repens*; FAC), piggyback plant (*Tolmiea menziesii*; FAC), and reed canarygrass (*Phalaris arundinacea*; FACW). Dominant vegetation in the area mapped as Wetland A is FAC or wetter, indicating a hydrophytic plant community is present.

Soils within the on-site portion of the wetland are generally black (10YR 2/1) sandy loam throughout the upper profile to a depth of at least 16 inches. Soils from six to 16 inches contain approximately three percent of dark yellowish-brown (10YR 3/4) redoximorphic concentrations. Wetland A meets the hydric soil indicator for redox dark surface (F6). Soils were dry during the September 2023 investigation, however the geomorphic position (D2) of the depression and dominance of hydrophytic vegetation (D5) are indicative of prolonged saturation during the wet season.



Figure 2 Photograph of Wetland A taken during September 2023 visit.

Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which would typically require expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). However, discussion with City staff indicates that installation of retaining walls along the standard buffer is adequate to satisfy this requirement and maintain the standard buffer width.

2.4.2 Non-wetland Areas

Vegetation in the non-wetland portions of the site consist of two distinct types. The northeastern portion of the site surrounding the existing residence is dominated by maintained lawn with a few sporadic trees and ornamental shrubs. The remainder of the property consists of forest dominated by a canopy of Douglas fir (*Pseudotsuga menziesii*; FACU), western red cedar (*Thuja plicata*; FAC), bigleaf maple (*Acer macrophyllum*; FACU), red alder (*Alnus rubra*; FAC), and bitter cherry (*Prunus emarginata*; FACU), and an understory of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), red elderberry (*Sambucus racemosa*; FACU), sword fern (*Polystichum munitum*; FACU), and pacific trailing blackberry (*Rubus ursinus*; FACU). A dense layer of Himalayan blackberry (*Rubus armeniacus*; FAC) and Japanese knotweed (*Fallopia japonica*) is present at the forested fringe between the two vegetation communities.

A power transmission corridor is located adjacent to the western property boundary. Maintenance activities have meandered onto the subject property, leaving a portion of the southwest corner of the property being dominated by maintained grasses and Himalayan blackberry.



Figure 3 Photograph taken at Wetland A boundary. Wetland area located to the right, non-wetland area located to the left.

Soils in the non-wetland areas are generally dark brown (10YR 3/3) sandy loam in the upper layer to a depth of approximately seven inches. Soils in the lower layer are typically dark yellowish-brown (10YR 4/4) sandy loam from approximately seven inches to at least 18 inches. Soils were dry at the time of the September 2023 site investigation. Non-wetland soils did not meet any hydric soil indicators and were generally dry.

2.4.3 King Creek

Jurisdiction: City of Marysville
HGM Class: Riverine
Cowardin Classification: Riverine, Unknown Perennial, Unconsolidated Bottom (R5UB)
City of Marysville Classification: Type F
City of Marysville Buffer: 150 feet

The headwaters of King Creek originate within Wetland A, approximately 700 feet south of the property boundary, and flows to the southwest, ultimately draining directly into Ebey Slough. SalmonScape maps the portion of King Creek closest to the property as containing gradient accessibility to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*). King Creek is classified as a Type F water and requires a standard buffer of 150 feet.

King Creek is a Type F stream, requiring a standard buffer of 150 feet, measured horizontally from its determined boundary. This feature is estimated to form approximately 700 feet south of the property, therefore its standard buffer does not project onto the property.

3.0 WILDLIFE

Mammalian species expected to use the site include: Eastern cottontail rabbit (*Sylvilagus floridanus*), black-tailed deer (*Odocoileus hemionus columbianus*), shrews (*Sorex spp.*), moles (*Scapanus spp.*), North American porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), skunks (*Mephitis spp*), squirrels (*Sciurus carolinensis*, *Tamiasciurus douglasii*), deer mouse (*Peromyscus maniculatus*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*).

Amphibian species that may utilize the site include: Pacific tree frog (*Hyla regilla*), rough-skinned newt (*Taricha granulosa*), and northwestern salamander (*Ambystoma gracile*).

Avian species likely to utilize the site include Song Sparrow (*Melospiza melodia*), Black-capped Chickadee (*Poecile atricapillus)*, Dark-eyed Junco (*Junco hyemalis*), Brown Creeper (*Certhia americana*), Spotted Towhee (*Pipilo maculatus),* American Robin (*Turdus migratorius*), Red-breasted Nuthatch (*Sitka canadensis*), Downy Woodpecker (*Picoides pubescens*), Stellar's Jay (*Cyanocitta stelleri*), American Crow (*Corvus brachyrhynchos*), Northern Flicker (*Colaptes auratus*), Hairy Woodpecker (*Picoides villosus*), and Downy Woodpecker (*Dendrocopus villosus*).

These lists are not meant to be all-inclusive of the species using the site, but is representative of common wildlife in the Marysville area. No threatened or endangered species are known to be associated with this site.

4.0 PROJECT DESCRIPTION, IMPACTS, AND BUFFER MITIGATION PLAN

4.1 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR, driveway, and associated utility structures and develop the northern portion of the property with a 21-lot residential subdivision, including necessary stormwater and access infrastructure. The applicant proposes altering portions of the wetland buffer area through buffer averaging, exceeding a 1:1 ratio. The proposed buffer will be demarcated by split-rail fencing with Native Growth Protection Area (NGPA) signs affixed every linear 100 feet.

Temporary buffer impacts associated with the installation of retaining walls along portions of the buffer will be restored with native trees and shrubs at a 1:1 ratio. Temporary impacts associated with the installation of a stormwater pipe across the buffer will avoid tree impacts and will be restored with native shrubs and herbs. Areas of degraded buffer will be enhanced with native trees and shrubs. Increasing the total area, species richness, and structural diversity of the on-site wetland buffer is expected to provide a lift in buffer functions over current conditions.

4.2 BUFFER WIDTH AVERAGING

In order to accommodate the proposed development, the applicant is proposing to modify the shape of the buffer through buffer width averaging. A total of 8,163 square feet of buffer is proposed to be reduced, and it will be replaced with 9,179 square feet of buffer addition. Therefore, the total buffer area after averaging will be 1,016 square feet larger than required by standard prescriptive

measures. Buffer averaging is allowed per MMC 22E.010.100(5)(a) and (5)(c). The criteria in this code section are cited below in italics with responses below each in standard text.

(5)(a) Buffer width averaging shall be allowed only where the applicant demonstrates to the community development department that the averaging will not impair or reduce the habitat, water quality purification and enhancement, storm water detention, ground water recharge, shoreline protection and erosion protection and other functions of the wetland and buffer.

Areas that are proposed for buffer reduction are composed of native forest with sparse patches of Himalayan blackberry. Buffer enhancement and restoration will ensure that buffer functions in areas proposed for buffer addition are equal or superior to proposed reduction areas. Buffer restoration and enhancement will increase species and structural diversity, which will provide more complex habitat for wildlife to forage and shelter. Buffer enhancement of sparsely vegetated areas in proposed buffer addition area will increase the ability to filter pollutants, attenuate flood flow, and provide wildlife habitat. The proposed buffer averaging plan will result in an increase in total buffer area of 1,016 square feet. The combination of an increase in buffer area and higher quality habitat will result in an overall increase in on-site buffer functions.

… that lower-intensity land uses would be located adjacent to areas where buffer width is reduced…

A stormwater detention vault will be located adjacent to the buffer within the southwest portion of development. Once constructed, this will be the lowest-intensity land use associated with the proposed development so that impacts to the buffer of Wetland A are minimized.

…and that the total area contained within the buffer after averaging is no less than that contained within the standard buffer prior to averaging;

A total of 8,163 square feet of buffer is proposed to be reduced and 9,179 square feet of buffer is proposed to be added, resulting in a net increase of 1,016 square feet of buffer area.

(5)(c) Notwithstanding the reductions permitted in subsections (5)(a) and (b) of this section, buffer widths shall not be reduced by more than 25 percent of the required buffer.

The maximum buffer width reduction proposed does not exceed 25 percent of the 100 foot buffer of Wetland A.

4.3 TEMPORARY BUFFER IMPACTS TO BE RESTORED

The applicant proposes to temporarily impact a total of 5,454 (810+602+2,209+1,833) square feet of area within the proposed buffer. A majority of temporary buffer impacts (3,621 SF) are from necessary clearing and grading associated with the installation of retaining walls along the edge of the wetland buffer. Buffer Restoration Areas 1 (810 SF), 2 (602 SF), and 3 (2,209 SF) will be restored with an assemblage of native trees and shrubs. A stormwater pipe is proposed to cross the northern portion of buffer, temporarily impacting 1,833 square feet of shrubs and herbaceous cover. Utilities are allowed in buffer areas per MMC 22E.010.100(9) due to site topography and the wetland position prohibiting an alternative location with less adverse impacts. The pipe will be

installed in a hand-dug trench, avoiding cutting of trees. Restoration Area 4 (1,833 SF) will be comprised with an assemblage of native shrubs and herbs, creating a corridor of increased species diversity.

In order to minimize topsoil export from the site and provide a rich planting medium in the buffer enhancement areas, topsoil from the areas outside of the buffer will be stripped and added to the buffer restoration areas prior to planting. Topsoil will not be added to the natively forested portions of the buffer not included in the planting areas.

Buffer Restoration Area 1 (810 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Shore pine	*Pinus contorta*	1 gallon	10'	3
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	2
Nootka rose	*Rosa nutkana*	1 gallon	5'	5
Snowberry	*Symphoricarpos albus*	1 gallon	5'	5
Salmonberry	*Rubus spectabilis*	1 gallon	5'	5
Sword fern	*Polystichum munitum*	1 gallon	5'	5
Total				25

Buffer Restoration Area 2 (602 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	2
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	2
Nootka rose	*Rosa nutkana*	1 gallon	5'	3
Snowberry	*Symphoricarpos albus*	1 gallon	5'	3
Salmonberry	*Rubus spectabilis*	1 gallon	5'	3
Sword fern	*Polystichum munitum*	1 gallon	5'	3
Total				16

Buffer Restoration Area 3 (2,209 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	6
Western hemlock	*Tsuga heterophylla*	1 gallon	10'	4
Western red cedar	*Thuja plicata*	1 gallon	10'	4
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	4
Vine maple	*Acer circinatum*	1 gallon	5'	10
Nootka rose	*Rosa nutkana*	1 gallon	5'	10
Snowberry	*Symphoricarpos albus*	1 gallon	5'	10
Elderberry	*Sambucus racemosa*	1 gallon	5'	10
Salmonberry	*Rubus spectabilis*	1 gallon	5'	10
Tall Oregon grape	*Mahonia aquifolium*	1 gallon	5'	10
Sword fern	*Polystichum munitum*	1 gallon	5'	10
Total				88

Buffer Restoration Area 4 (1,833 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Vine maple	*Acer circinatum*	1 gallon	5’	10
Nootka rose	*Rosa nutkana*	1 gallon	5’	10
Snowberry	*Symphoricarpos albus*	1 gallon	5’	10
Elderberry	*Sambucus racemosa*	1 gallon	5’	10
Salmonberry	*Rubus spectabilis*	1 gallon	5’	10
Tall Oregon grape	*Mahonia aquifolium*	1 gallon	5’	10
Sword fern	*Polystichum munitum*	1 gallon	5’	11
Total				71

4.4 BUFFER ENHANCEMENT PLAN

Pursuant to MMC 22E.010.220(2), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. Buffer Enhancement Area A is located within buffer addition area adjacent to Stormwater Tract 997 and the existing electrical utility corridor. This area is 1,446 square feet in size and consists of bare ground, highly maintained cover from utility encroachment, and/or invasive species including Himalayan blackberry and reed canarygrass.

Non-native and/or invasive species shall be removed from the buffer prior to planting where necessary. Once invasives are removed the following list of plants shall be installed within the designated enhancement area. All plants shall be marked with ribbons and mulched, as specified in the planting notes.

Buffer Enhancement Area (1,446 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10’	4
Shore pine	*Pinus contorta*	1 gallon	10’	3
Bigleaf maple	*Acer macrophyllum*	1 gallon	10’	3
Nootka rose	*Rosa nutkana*	1 gallon	5’	10
Snowberry	*Symphoricarpos albus*	1 gallon	5’	10
Salmonberry	*Rubus spectabilis*	1 gallon	5’	10
Thimbleberry	*Rubus parviflorus*	1 gallon	5’	10
Total				50

5.0 FUNCTIONS AND VALUES ASSESSMENT

Pursuant to requirements set forth in SCC 30.62A.140, critical area studies shall assess impacts to any critical areas or buffers within the project vicinity. The following assessment is intended to compare the current and post-mitigation functions and values provided by the on-site critical areas and buffers.

The methodology for this functions and values assessment is based on professional opinion developed through past field analyses and interpretation. This assessment pertains specifically to the wetland buffer impacted by this project, but is typical for assessments of similar systems common to Western Washington.

5.1 Functional Components of Wetland Buffers

Wetland buffers in Western Washington perform a variety of ecosystem functions. Included among the most important are: flood/stormwater control, base flow/groundwater support, erosion protection, water quality improvement, and overall wildlife habitat function.

Water Quality and Hydrology Functions
Vegetated buffers obstruct water flow, thereby decreasing water velocity, allowing infiltration into the soil, and reducing soil erosion potential. Healthy floodplains and buffers store water during wetter periods and release it during drier periods, thereby maintaining a steady base flow throughout the year. Buffer vegetation impedes the flow of runoff, increases the humus content of soil (greater adsorption capacity), and preserves soil composition as intense rainfall hits the ground. Wetland buffers improve water quality by acting as filters as water passes through them, trapping sediments and pollutants from surface water. Healthy vegetation also provides temperature moderation to adjacent aquatic areas. Shading by the forest canopy maintains cooler water temperatures and influences the availability of dissolved oxygen.

Wildlife Habitat Functions
Healthy vegetation within buffers helps maintain wildlife habitat function within and adjacent to aquatic areas. Buffer vegetation provides many crucial aspects of healthy habitat including shade, soil stabilization, nutrient cycling, and pollutant removal. Vegetated buffers also provide benefits to terrestrial wildlife including, refuge/cover, nesting, foraging, and resting habitat.

5.2 Existing Buffer Conditions

The buffer area surrounding Wetland A is dominated by a native forest with native trees and shrubs, interlaced with sporadic patches of Himalayan blackberry and reed canary grass. The forested buffer is able to sufficiently filter pollutants, control erosion, attenuate flood flow, and provide wildlife habitat. A small portion of proposed buffer has been historically maintained due to its proximity to an existing utility corridor. This area provides very limited ability to filter pollutants, attenuate flood flow, or allow for wildlife for forage and shelter.

5.3 Post Mitigation Buffer Functions and Values

After implementation of buffer averaging, restoration, and enhancement, a significant lift in functions and values is expected. The area proposed for buffer reduction consists of mainly native forest with small amounts of Himalayan blackberry. Areas of buffer addition consist of a similar vegetation community or will be restored/enhanced to have equal or superior functions. The project will result in a net buffer increase of 1,016 square feet, providing more area available to infiltrate runoff, filter pollutants, and provide wildlife habitat. Buffer enhancement of degraded buffer areas will provide high value in terms of slowing the rate of incoming surface flows, decreasing erosion potential, performing water quality improvement, and providing higher quality

wildlife habitat. Restoring the buffer area temporarily impacted from grading activities with an assemblage of native trees and shrubs will adequately restore buffer functions over time. Restoring temporary impacts from the installation of a stormwater pipe will result in a corridor of increased species diversity within the understory. Additionally, a dense patch of Himalayan blackberry and Japanese knotweed located at the forested fringe is proposed to be removed and replaced by the proposed development, eliminating the risk of spreading into native forested buffer.

Overall, the proposed project will result in a substantial net improvement in buffer function as compared to the current conditions on the site.

6.0 PROJECT MONITORING PROGRAM

6.1 INSPECTION AND REPORTING REQUIREMENTS

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage.

During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified.

Photo points
At least one photo point shall be established in each buffer restoration area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the restoration/enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:

1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation / restoration goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

6.2 PROJECT SUCCESS & COMPLIANCE

Criteria for Success
Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement and restoration areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive woody plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation, as described in the *Flagging* section of Section 3.6 "Planting Notes."

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met early, the City may consider the project to be successful and terminate the monitoring period at that time.

6.3 MAINTENANCE

The mitigation areas will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation

system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

6.4 CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

6.5 PROJECT NOTES

Pre-Construction Meeting
Mitigation projects are typically more complex to install than can be described in plans. Careful monitoring by a wetland professional for all portions of this project is strongly recommended. Construction timing and sequencing is important to the success of this type of project. There shall be a pre-construction meeting on this site between the Permittee, consulting wetland professional, and laborers. The objective will be to verify the location of erosion control facilities, verify the location of mitigation areas, and to discuss project sequencing.

Inspections
A wetland professional shall be contracted to periodically inspect the mitigation installation described in this plan. Minor adjustments to the original design may be necessary prior to and during construction due to unusual or hidden site conditions. A City of Marysville representative and/or the consulting professional will make these decisions during construction and any changes will be reflected in the As-built report.

6.6 PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

7.0 FENCING AND SIGNAGE

Pursuant to MMC 22E.010.370, split-rail fencing and signs designating the presence of a critical area will be constructed along the perimeter of the buffer. A split-rail fence will be installed along the perimeter of buffer on the subject property. A total of 8 Native Growth Protection Area (NGPA) signs will be affixed to the fence.

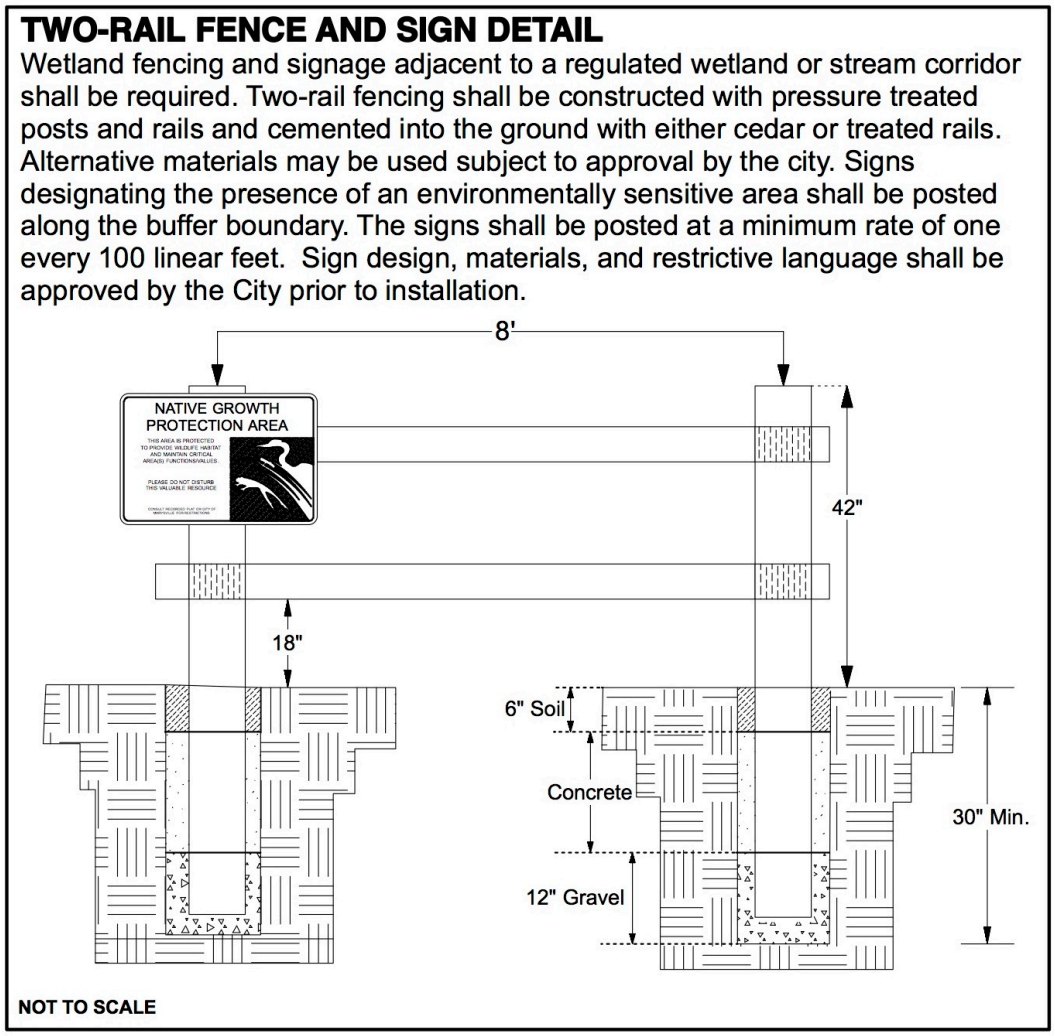


Figure 4 – Two-rail Fence and NGPA Sign Detail

8.0 PERFORMANCE AND MAINTENANCE BONDING

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	250 x $15.00/plant, installed	$3,750.00
Mulch	$50.00/CU x 8 CY	$400.00
Split rail fencing and signage	$8/foot x 818 feet	$6,544.00
Critical area signage	$30/sign x 8 signs	$240.00
Monitoring	$2,500.00/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$33,434.00**

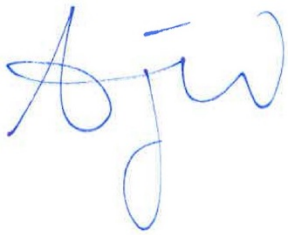
9.0 USE OF THIS REPORT

This report is supplied to Keystone Land, LLC, as a means of determining on-site wetland and stream conditions. It is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the Applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report and any implied representation or warranty is disclaimed.

Wetland Resources, Inc.



Alex Wachter
Associate Ecologist

10.0 REFERENCES

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APPENDIX A

USACE WETLAND DELINEATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S1

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): LRR A Lat: 48.039442 Long: -122.120978 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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:

In pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. *Prunus emarginata	5	N	FACU
3.			
4.			
	65	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	80	Y	FAC
2. Sambucus racemosa	5	N	FACU
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	60	Y	FAC
2. Polystichum munitum	5	N	FACU
3. Rubus ursinus	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

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% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = 0
FACW species ____	x 2 = 0
FAC species ____	x 3 = 0
FACU species ____	x 4 = 0
UPL species ____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

Prunus emarginata rooted out of wetland however provides canopy coverage.

SOIL

Sampling Point: S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					Sandy loam	
6-16	10YR 2/1	97	10YR 3/4	3	C	M	Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S2

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): ~4%

Subregion (LRR): LRR A Lat: 48.039531 Long: -122.120945 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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:

Out pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. Acer macrophyllum	15	N	FACU
3. Prunus emarginata	5	N	FACU
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	75	Y	FAC
2. Rubus armeniacus	35	Y	FAC
3. Acer circinatum	5	N	FAC
4.			
5.			
	115	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	20	Y	FAC
2. Rubus ursinus	10	Y	FACU
3. Polystichum munitum	10	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/3	100					Sandy loam	
7-18	10YR 4/4	100					Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B

DEPARTMENT OF ECOLOGY (2023)
WETLAND RATING FORM AND FIGURES

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 9/20/2023

Rated by AW Trained by Ecology? ✔ Yes ___No Date of training 6/2022

HGM Class used for rating **Depressional** Wetland has multiple HGM classes? ✔ Y ____N

NOTE: **Form is not complete without the required figures** (figures can be combined).
Source of base aerial photo/map ESRI, SnoCo.

OVERALL WETLAND CATEGORY **II** (based on functions ✔ 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

_____**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	**8**			**7**			**7**			**22**

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	[✔]

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	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

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 total 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 total 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 total 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 sheet flow, 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).

Wetland name or number A_____

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.

   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	**2**
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	**3**
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	**2**
Total for D 1 Add the points in the boxes above	**7**

Rating of Site Potential If score is: __**12-16 = H** ✔ **6-11 = M** ___**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	**1**
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? [Yes = 1] No = 0	**1**
D 2.3. Are there septic systems within 250 ft of the wetland? [Yes = 1] No = 0	**1**
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	**3**

Rating of Landscape Potential If score is: ✔ **3 or 4 = H** ___**1 or 2 = M** ___**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	**1**
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 in development or in effect for the basin in which the unit is found.) Yes = 2 No = 0	**2**
Total for D 3 Add the points in the boxes above	**3**

Rating of Value If score is: ✔ **2-4 = H** ___**1 = M** ___**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:

- ☐ Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4
- ☑ Wetland has an intermittently flowing stream/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

2

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.

- ☐ 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

3

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 area of the wetland unit itself.

- ☐ 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

3

Total for D 4 — Add the points in the boxes above — **8**

Rating of Site Potential If score is: ___**12-16 = H** ___✔**6-11 = M** ___**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 — **1**

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 — **1**

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 — **1**

Total for D 5 — Add the points in the boxes above — **3**

Rating of Landscape Potential If score is: ___✔**3 = H** ___**1 or 2 = M** ___**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. Is the unit 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.

The wetland captures surface water that would otherwise flow downgradient 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 downgradient of unit. points = 2
- ☑ • Surface flooding problems are in a sub-basin farther downgradient. 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

1

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 — **1**

Rating of Value If score is: ___**2-4 = H** ___✔**1 = M** ___**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 if the unit is at least 2.5 ac, or more than 10% of the unit if it is smaller than 2.5 ac.

____Aquatic bed	4 structures or more: points = 4	**2**
_✔_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/groundcover) that each cover 20% within the Forested polygon

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 if the unit is < 2.5 ac, or ¼ ac if the unit is at least 2.5 ac to count (see text for descriptions of hydroperiods).

____Permanently flooded or inundated	4 or more types present: points = 3	**1**
_✔_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		
____Intermittently or seasonally flowing stream in, or adjacent to, the wetland		
____**Lake Fringe wetland**	**2 points**	
____**Freshwater tidal wetland**	**2 points**	

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, Canada thistle**

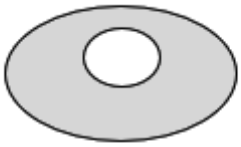
If you counted:	> 19 species	points = 2 **2**
	5 - 19 species	points = 1
	< 5 species	points = 0

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. **2**



None = 0 points

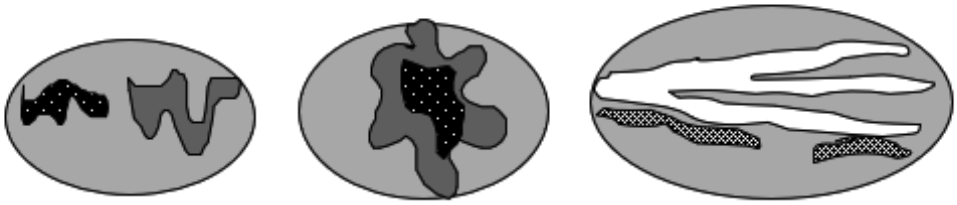


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **High** = 3 points



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 extend at least 3.3 ft (1 m) over open water or 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 above for the list of strata and H 1.5 in the manual for the list of aggressive plant species)	**5**
Total for H 1 Add the points in the boxes above	**12**

Rating of Site Potential If score is: ___**15-18 = H** ✔ **7-14 = M** ___**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 polygons accessible from the wetland. *Calculate:* % relatively undisturbed habitat 13 + [(% moderate and low intensity land uses)/2] 5 = 18 % 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	**1**
H 2.2. Total habitat in 1 km Polygon around the wetland. *Calculate:* % relatively undisturbed habitat 18 + [(% moderate and low intensity land uses)/2] 17 = 35 % ☐ Total habitat > 50% of Polygon points = 3 ☐ Total habitat 10-50% and in 1-3 patches points = 2 ✔ Total habitat 10-50% and > 3 patches points = 1 ☐ Total habitat < 10% of 1 km Polygon points = 0	**1**
H 2.3. Land use intensity in 1 km Polygon: ☐ > 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	**2**

Rating of Landscape Potential If score is: ___**4-6 = H** ✔ **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 data ☐ 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	**2**

Rating of Value If score is: ✔ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number A

WDFW Priority Habitats

See complete descriptions of Priority Habitats listed by WDFW, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008 (current year, as revised). Priority Habitat and Species List.[133] This list was updated for consistency with guidance from WDFW.

This question is independent of the land use between the wetland unit and the Priority Habitat. All vegetated wetlands are by definition a Priority Habitat but are not included in this list because they are addressed by this rating system.

Count how many of the following Priority Habitats are within 330 ft (100 m) of the wetland unit:

☐ **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. This habitat automatically counts if mapped on the PHS online map within 100m of the wetland. If not mapped, a determination can be made in the field.

☐ **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.

☐ **Fresh Deepwater:** Lands permanently flooded with freshwater, including environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. Substrate does not support emergent vegetation. Do not select if Instream habitat is also present, or if the entire Deepwater feature is included in the wetland unit being rated (such as a pond with a vegetated fringe).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☑ **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. Do not select if Fresh Deepwater habitat is also present.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore.

☐ **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) diameter at breast height (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.

[133] http://wdfw.wa.gov/publications/00165/wdfw00165.pdf

Wetland name or number A

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important. For single oaks or oak stands <0.4 ha in urban areas, WDFW's Management Recommendations for Oregon White Oak[134] provides more detail for determining if they are Priority Habitats

☑ **Riparian:** The area adjacent to freshwater aquatic systems with flowing or standing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **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.

☐ **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.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie.

[134] https://wdfw.wa.gov/publications/00030/wdfw00030.pdf

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 chapter 4.8 in the manual. ☐ 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. Does the wetland overlap with any known or historical rare plant or rare & high-quality ecosystem polygons on the WNHP Data Explorer?[135] Yes **= Category I** No – Go to **SC 2.2** SC 2.2. Does the wetland have a rare plant species, rare ecosystem (e.g., plant community), or high-quality common ecosystem that may qualify the site as a WHCV? Contact WNHP for resources to help determine the presence of these elements. Yes – Submit data to WA Natural Heritage Program for determination,[136] Go to **SC 2.3** No **= Not a WHCV** SC 2.3. Did WNHP review the site within 30 days and determine that it has a rare plant or ecosystem that meets their criteria? 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 = **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 = **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 = **Category I bog** No **= Not a bog**	**Cat. I**

[135] https://www.dnr.wa.gov/NHPdata

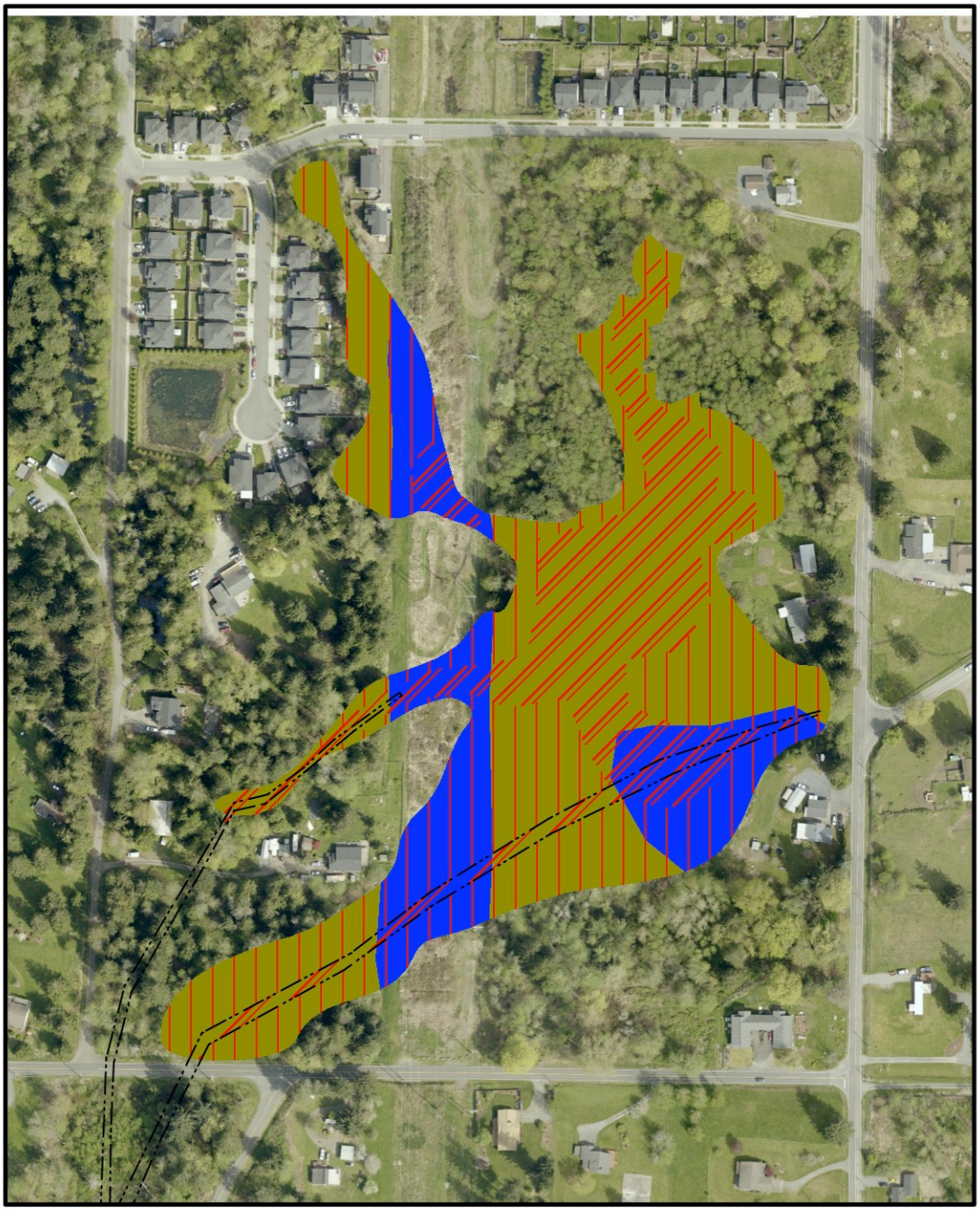
[136] https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf

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)* ☐ The lagoon retains some of its surface water at low tide during spring tides 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 in H 1.5 in the manual). ☐ 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 and Ocean Shores Blvd SW, including lands west of E. Oceans Shores Blvd SW. 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	

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 1- WETLAND A



LEGEND

- EMERGENT VEGETATION
- FORESTED VEGETATION
- SATURATED ONLY
- SEASONALLY FLOODED
- 150' FROM WL BOUNDARY
- INTERMITTENT STREAM

Scale 1" = 300'

0 150 300 450 600

Wetland Resources, Inc.

Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance

9505 19th Avenue S.E. Suite 106 Everett, Washington 98208

Phone: (425) 337-3174

Fax: (425) 337-3045

Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland A

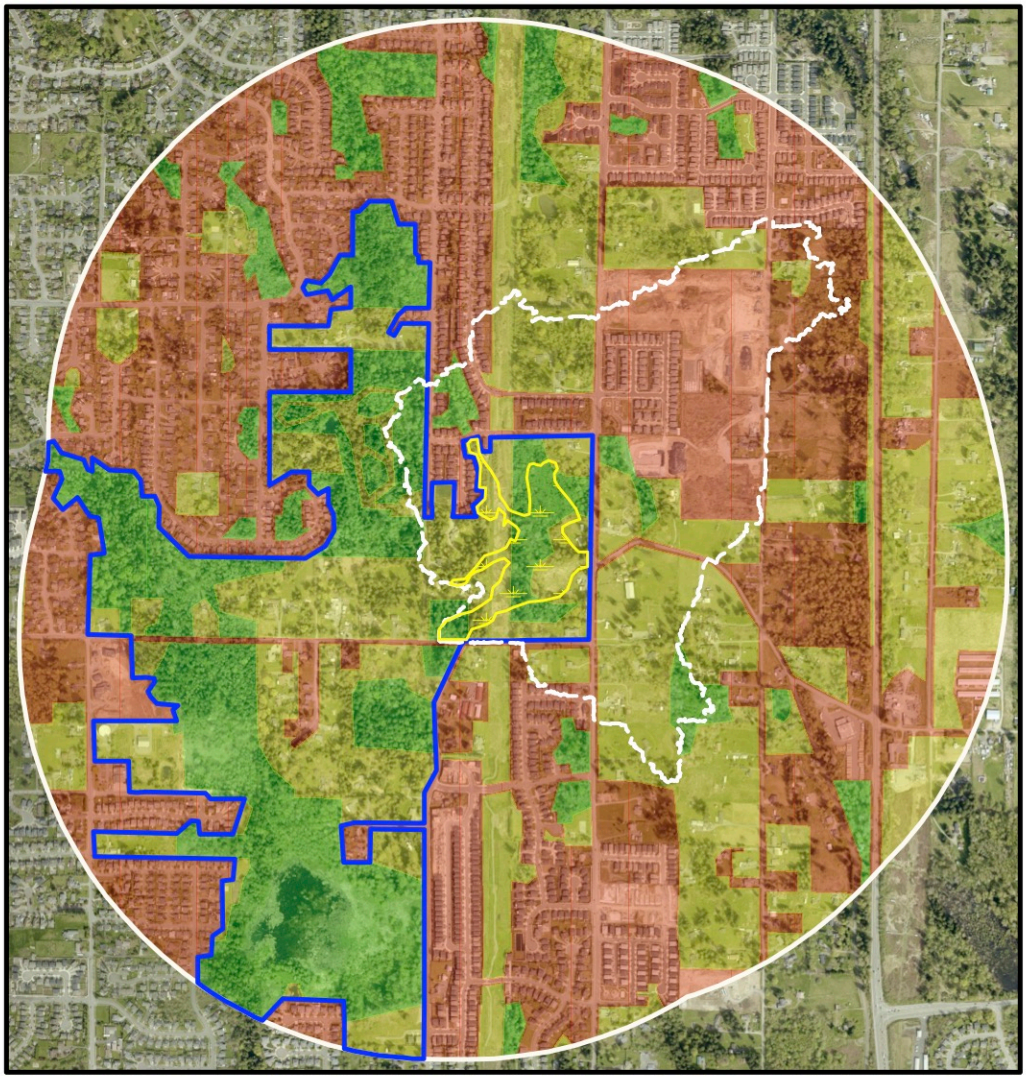
Figure A-1

WRI Job # 231

Rated by:

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 2- WETLAND A



LEGEND

- RELATIVELY UNDISTURBED
- LOW/MOD. INTENSITY
- HIGH INTENSITY
- ACCESSIBLE HABITAT
- WETLAND
- 1 KM FROM WETLAND
- CONTRIBUTING BASIN

CONTRIBUTING BASIN AREA RELATIVE TO WETLAND UNIT IS 14:1

Scale 1" = 1,500'

0 1,500 3,000

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WETLAND RATING

Wetland A

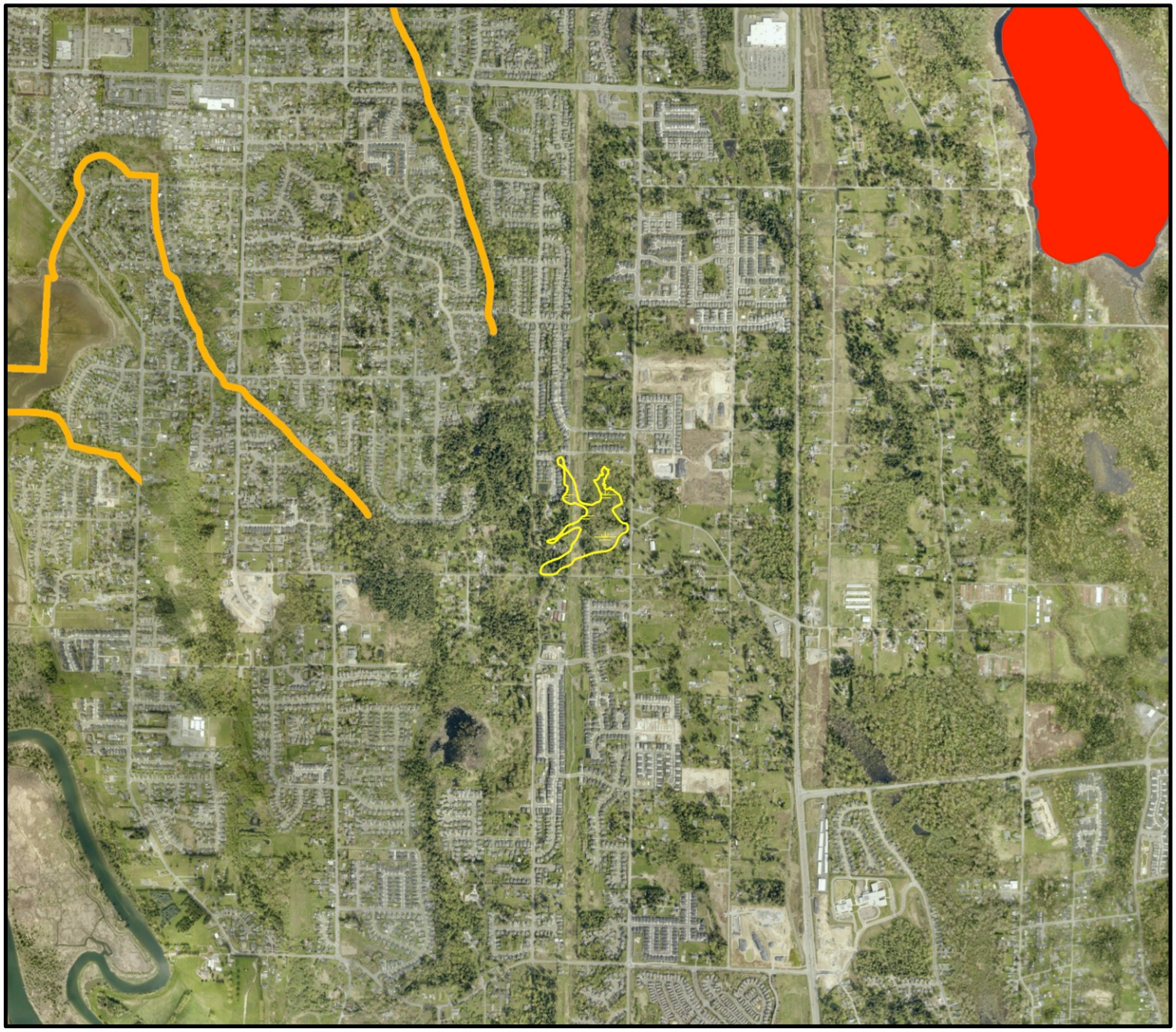
Figure A-2

WRI Job # 231

Rated by:

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 3- WETLAND A



LEGEND

- WETLAND
- AQUATIC RESOURCES ON THE 303(d) LIST
- CONTAINS TMDL

Scale 1" = 2,000'

0 2,000 4,000

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WETLAND RATING

Wetland A

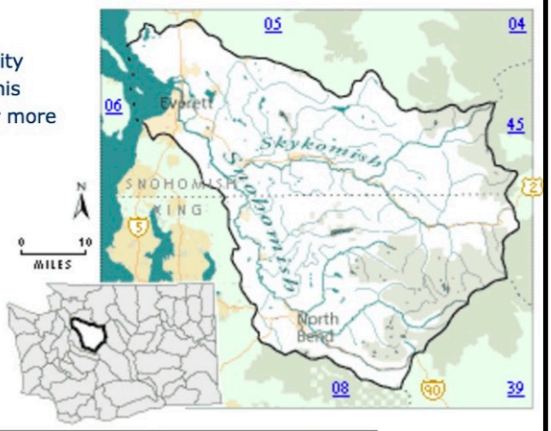
Figure A-3

WRI Job # 231

Rated by:

WRIA 7: Snohomish

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.



Counties

- King
- Snohomish

Waterbody Name	Pollutant(s)	Status**	TMDL Lead
Lake Loma	Total Phosphorus	Straight to implementation project under development	Tricia Shoblom 425-649-7288
Snohomish River	French Creek / Pilchuck River • Dissolved Oxygen • Temperature	Under development	Ralph Svrjcek 425-649-7165
	Dioxin	EPA approved	Ralph Svrjcek 425-649-7165
	Estuary • Ammonia • BOD	EPA approved	Ralph Svrjcek 425-649-7165
	Tributaries • Fecal Coliform Tributaries: • Allen Creek • Quilceda Creek • French Creek • Woods Creek • Pilchuck River • Marshlands (Wood Creek) {2}	EPA approved	Ralph Svrjcek 425-649-7165
	Snoqualmie River • Ammonia-N • BOD (5-day) • Fecal Coliform Temperature	EPA approved EPA approved Has an implementation plan	Ralph Svrjcek 425-649-7165

** ***Status*** *will be listed as one of the following: Approved by EPA, Under Development or Implementation*

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WETLAND RATING
Wetland A

Figure A-4
WRI Job # 231
Rated by:

APPENDIX C

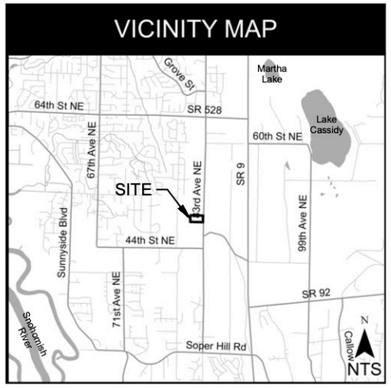
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

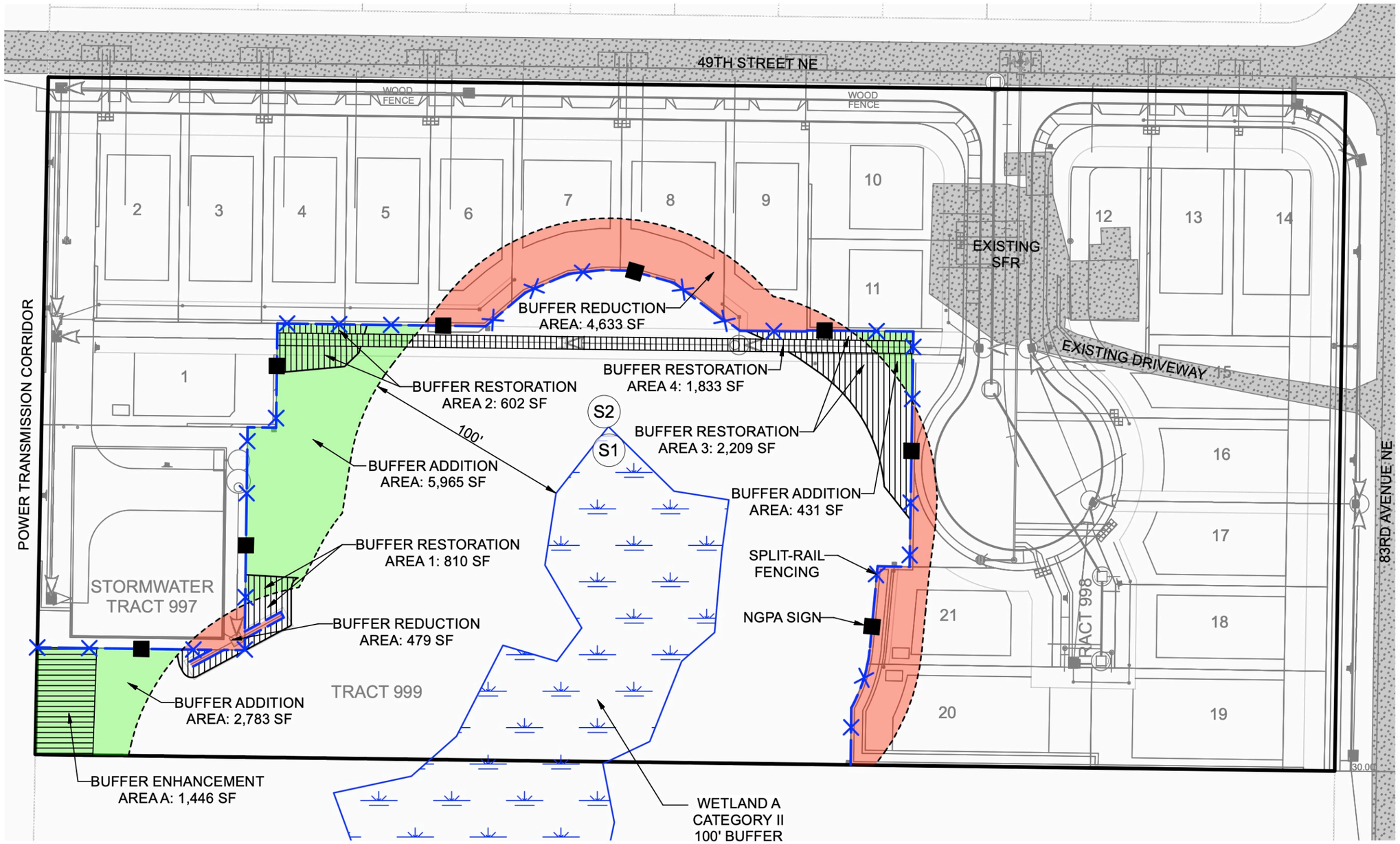
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

KEYSTONE LAND - TAYLOR LANE

PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

VICINITY MAP





Scale 1" = 50'

0 25 50 75 100

LEGEND

- WETLAND
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- TEMPORARY BUFFER IMPACT & RESTORATION
- BUFFER ENHANCEMENT
- FINAL BUFFER
- SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

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CRITICAL AREA STUDY & BUFFER MITIGATION PLAN MAP
TAYLOR LANE
MARYSVILLE, WA

Keystone Land, LLC
13805 Smokey Pt Blvd #102
Marysville, WA 98271

Sheet 1/1
WRI #: 23124
Drawn by: AM
Date: 1/26/202

TRAFFIC IMPACT ANALYSIS

TAYLOR PROPERTY

JURISDICTION: CITY OF MARYSVILLE, WA
LOCATION: 49TH STREET NE, WEST OF 83RD AVENUE NE

Prepared for:
Keystone Land
13805 Smokey Point Boulevard
Suite 102
Marysville, Washington 98258

Prepared by:
Kimley»Horn

January 2024
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Kimley»Horn

TRAFFIC IMPACT ANALYSIS

FOR

TAYLOR PROPERTY

Prepared for:
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13805 Smokey Point Boulevard
Suite 102
Marysville, Washington 98258

Prepared by:
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Kimley»Horn

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TRIP DISTRIBUTION ..... A

1. DEVELOPMENT IDENTIFICATION

Kimley-Horn and Associates, Inc. (Kimley-Horn) has been retained to provide a traffic impact analysis for the Taylor Property Development (Development). This report is intended to provide the City of Marysville (City) and Snohomish County (County) with the necessary traffic generation, trip distribution, and mitigation fee determination to facilitate their reviews of the Development. The Development is located on the south side of 49th Street NE, west of 83rd Avenue NE. A site vicinity map is included in **Figure 1**. The Development is proposed to consist of 21 single-family detached residential units. The site is currently listed as developed with one single-family detached unit per the *Snohomish County Online Property Information (SCOPI)* web map. The site will have access 49th Street NE via direct access and a public road.

Brad Lincoln, responsible for this report and traffic analysis, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of the Institute of Transportation Engineers (ITE).

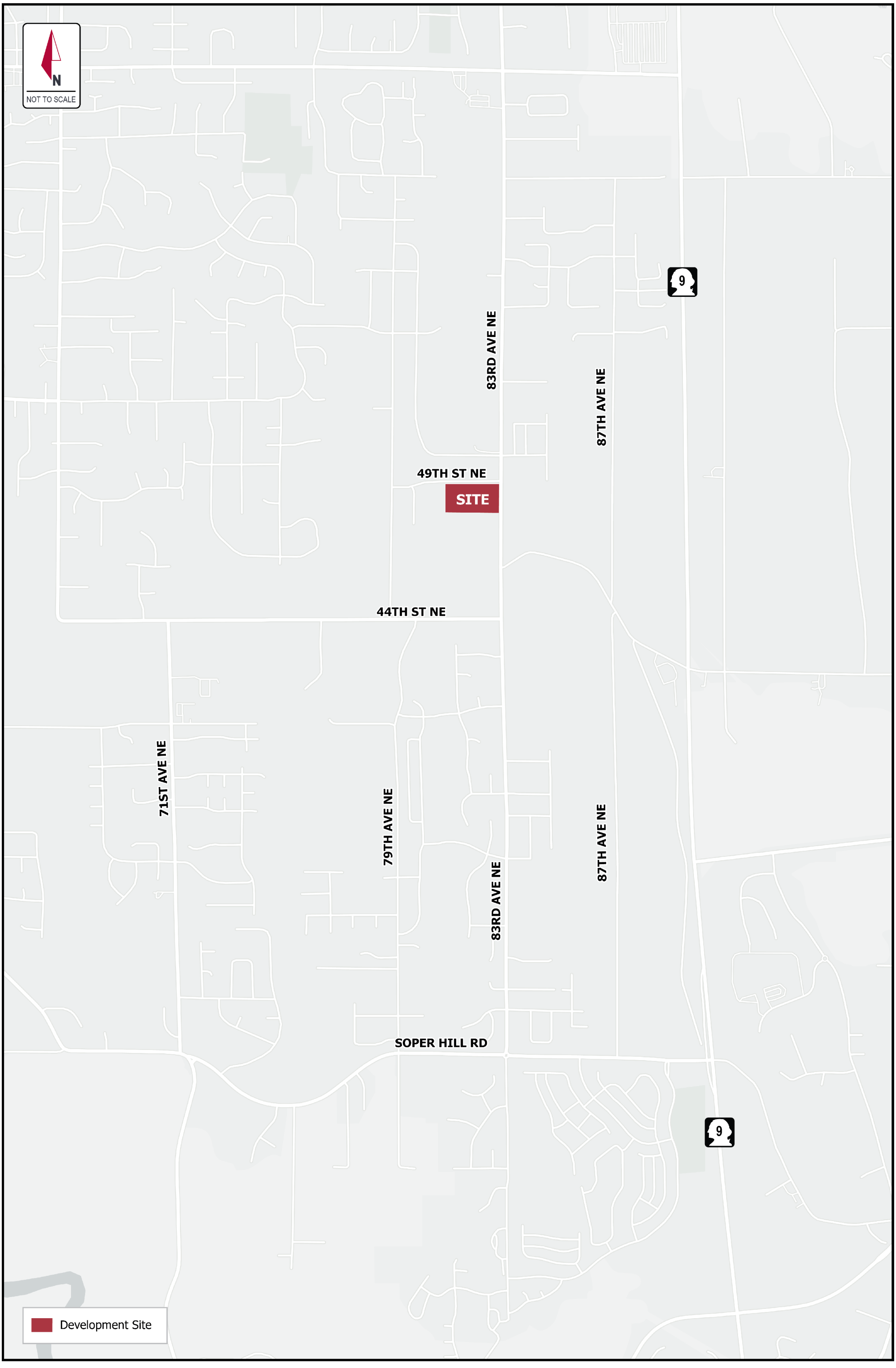


FIGURE 1: SITE VICINITY MAP

TAYLOR PROPERTY - CITY OF MARYSVILLE, WA (090223170

2. TRIP GENERATION

The Development is proposed to consist of 21 total single-family detached units. The site is currently developed with one single-family detached unit that will remain, resulting in 20 new single-family residential units. The trip generation calculations have been performed using data published by the ITE *Trip Generation Manual, 11st Edition* (*2021*) and Marysville Municipal Code (MMC). The average trip generation rates for ITE Land Use Codes (LUC) 210, Single-Family Detached Housing, have been used for the average daily trips (ADTs) and AM peak-hour trip generation calculations. The rate of 1.0 PM peak-hour trip per unit has been used as identified in the MMC Chapter 22A.020. The trip generation calculations for the Development are summarized in **Table 1**.

Table 1: Trip Generation Summary

20 Units Single-Family Detached Housing	Average Daily Trips (ADTs)			AM Peak-Hour Trips			PM Peak-Hour Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Generation Rate	9.43 trips per unit			0.70 trips per unit			1.00 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	95	94	189	4	10	14	13	7	20

The Development is anticipated to generate approximately 189 new ADTs with approximately 14 new AM peak-hour trips and 20 new PM peak-hour trips.

3. TRIP DISTRIBUTION

The trip distribution for the Development is based on the Whiskey Ridge North distributions established by the City which has the same values for both the opening-year and horizon-year conditions. The trip distribution for the Development is:

- 35% to and from the north along 83rd Avenue NE
- 34% to and from the east
  - 19% to and from the south along SR-9
  - 7% to and from the east along SR-92
  - 5% to and from the south along 87th Avenue NE
  - 3% to and from the north along SR-9
- 27% to and from the west along 44th Street NE
- 4% to and from the south along 83rd Avenue NE

Detailed trip distributions for the AM peak-hour and PM peak-hour are shown in **Figure 2** and **Figure 3**, respectively. The established distributions are provided in **Appendix A**.

The trip distribution shows that there are not any intersections that are impacted by 25 PM peak-hour trips generated by the Development. Intersection level of service should therefore not be required by the City.

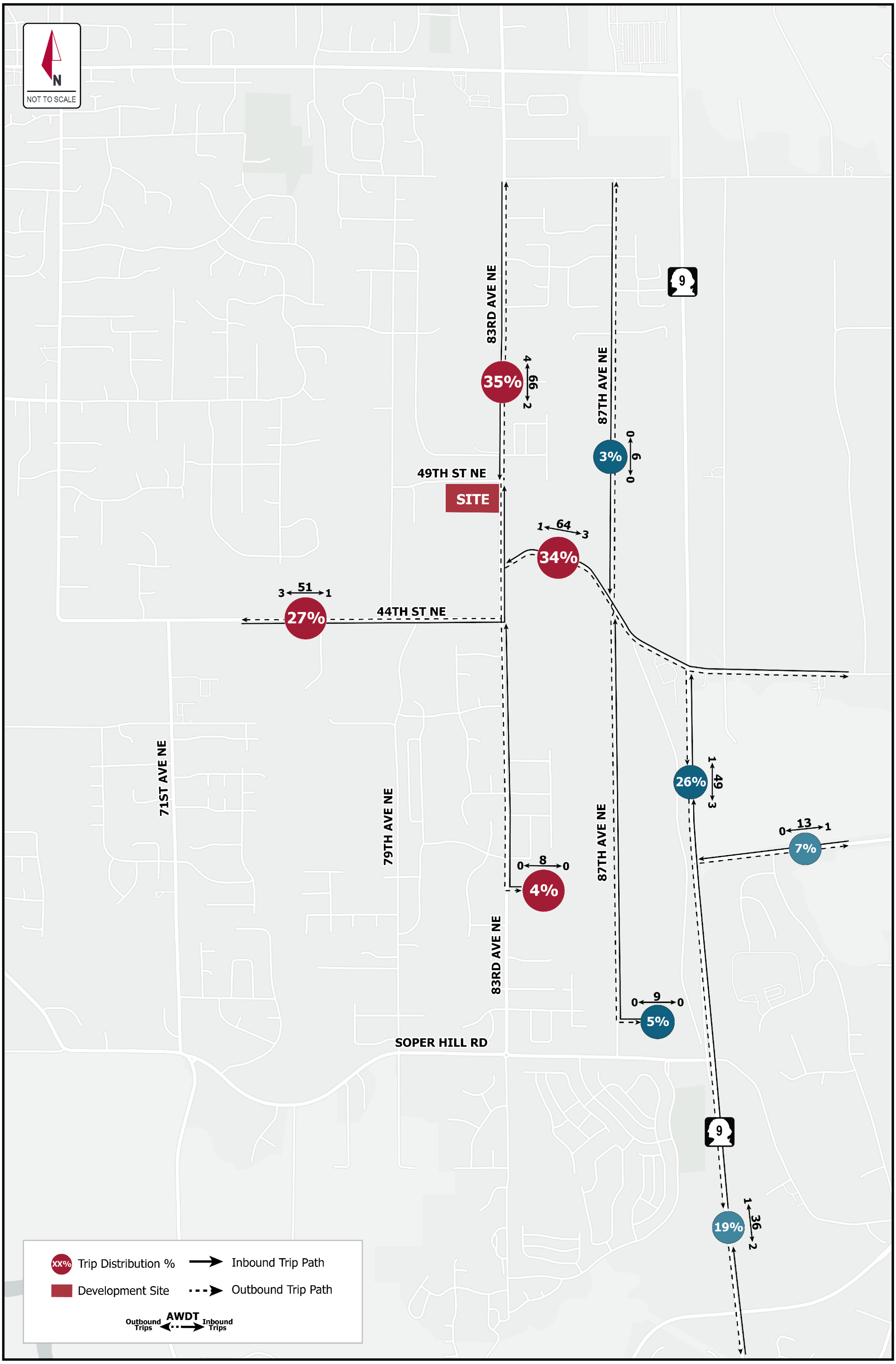


FIGURE 2: TRIP DISTRIBUTION - AM PEAK HOUR

TAYLOR PROPERTY - CITY OF MARYSVILLE, WA (090223172

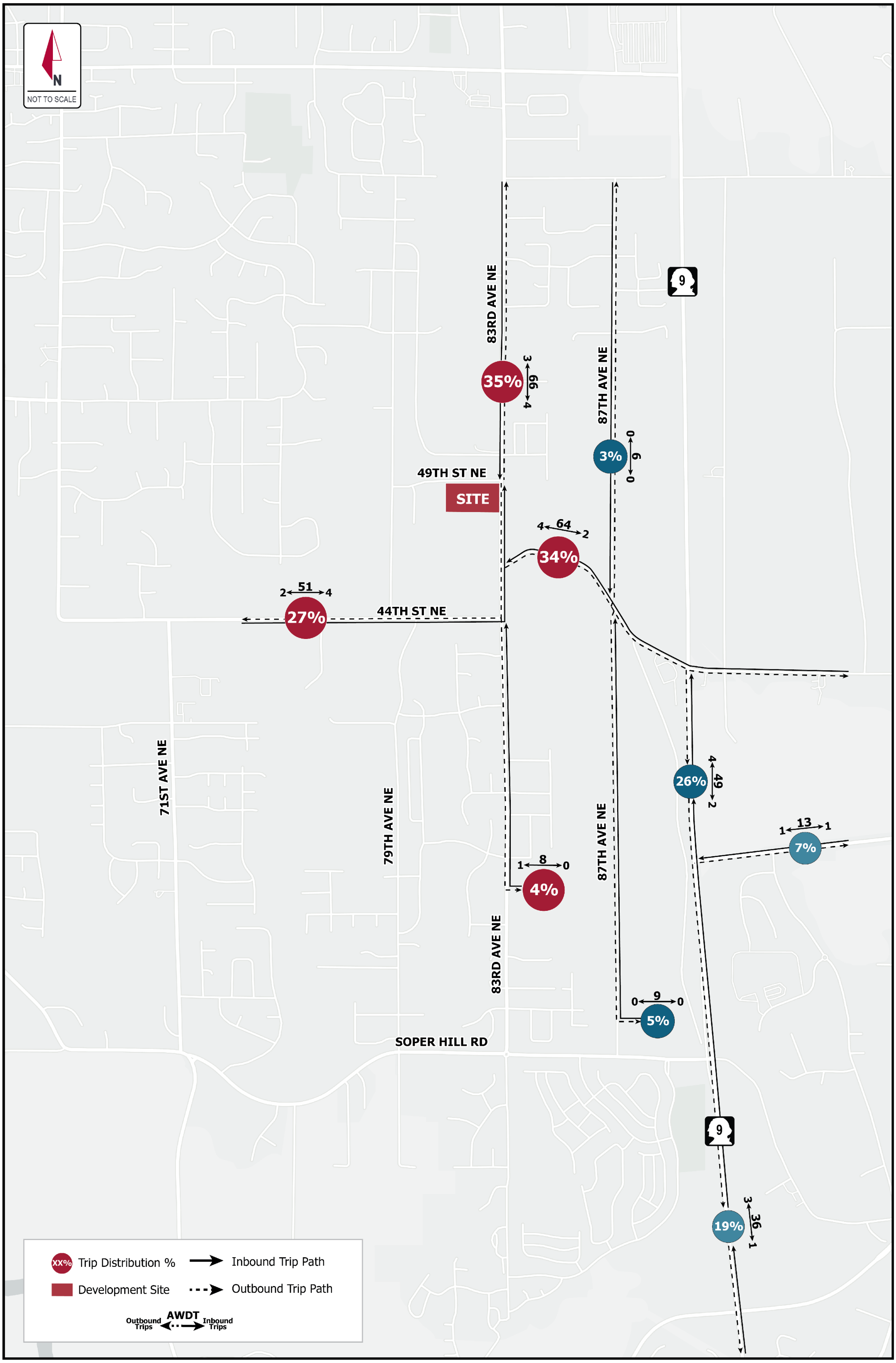


FIGURE 3: TRIP DISTRIBUTION - PM PEAK HOUR

TAYLOR PROPERTY - CITY OF MARYSVILLE, WA (090223173

3.1. Snohomish County Intersections

The interlocal agreement between the City and County requires detailed development trip turning movement data at County key intersections impacted with three or more directional trips on an approach or departure. The trips generated by the Development will not impact any key intersection during the AM or PM Peak-hour. Key intersection impacts should therefore not be required by the City.

4. SITE ACCESS

The Development is proposed to have individual driveways to 49th Street NE and a public road that will provide access to 7 units. It is anticipated that the majority of the trips generated by the Development will travel along 83rd Avenue NE.

5. TRANSPORTATION IMPACT FEES

The City has interlocal agreements with the County and Washington State Department of Transportation (WSDOT) for transportation impact fees. These transportation impact fees are based on the area wide traffic mitigation fee or actual impacts to improvement projects.

5.1. City of Marysville

The City traffic mitigation fees have been calculated using the residential rate of $6,300 per new single-family unit. The Development is anticipated to construct 20 new single-family units after credit for the existing unit on the site that will be removed. The City traffic mitigation fees for the Development should therefore be $126,000.00.

5.2. Snohomish County

The City and County have an interlocal agreement that provides for the payment of traffic mitigation for impacts to County roadways by City developments. Traffic mitigation fees are based on predetermined area impacts or impacts to actual improvement projects. The only County improvement project in the area is along 88th Street NE, between approximately 44th Drive NE to 66th Drive NE. This improvement project is not anticipated to be impacted by three directional PM peak-hour trips generated by the Development. County traffic mitigation fees should therefore not be required for the Development.

5.3. Washington State Department of Transportation

The WSDOT mitigation fees are based on impacts to improvement projects identified in the Exhibit C List included in the interlocal agreement between the County and WSDOT. There are not any WSDOT intersections on the Exhibit C List that will be impacted by three directional PM peak-hour trips generated by the Development. WSDOT transportation impact fees should therefore not be required for the Development.

6. CONCLUSIONS

The Development is proposed to consist of 21 single-family detached residential units. The site is currently listed as occupied with one single-family detached unit, resulting in 20 new single-family residential units. The Development is anticipated to generate approximately 189 new ADTs with approximately 14 new AM peak-hour trips and 20 new PM peak-hour trips. The City traffic mitigation fees for the Development should therefore be $126,000.00. Neither County nor WSDOT traffic mitigation fees should be required for the Development.

APPENDIX A

TRIP DISTRIBUTION

WHISKEY RIDGE NORTH - EXISTING

City of Marysville

November 2017

- Marysville City Limits
- Other City Limits
- Urban Growth Boundary
- Tulalip Reservation
- Parks and open space
- Interstate Highway
- State Highway
- Arterial
- Schools

N

0 2,000 4,000 6,000 Feet

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WHISKEY RIDGE NORTH - EXISTING

N

City of Marysville

City Limits
City of Marysville Urban Growth Area
Tulalip Reservation
Park
City Park

Fire Station
Police Station
School
Street
Burlington Northern RR
Trails

Marysville Street Classification
Interstate
State Highway
Principal Arterial
Minor Arterial
Collector Arterial
Future Arterial

0 1,250 2,500 5,000 7,500 10,000 Feet

Map Plotted: May, 2018

CITY OF Marysville WASHINGTON

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Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services



GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
MARYSVILLE, WASHINGTON

ES-7386.01

15365 NE 90th Street, Suite 100 • Redmond, WA 98052 • (425) 449-4704
3130 Varney Lane, Suite 105 • Pasco, WA 99301 • (509) 905-0275
esnw.com

PREPARED FOR

KEYSTONE LAND, LLC

January 30, 2024

Samuel E. Suruda, L.G.
Senior Staff Geologist



01/30/2024

Henry T. Wright, P.E.
Associate Principal Engineer

GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
MARYSVILLE, WASHINGTON

ES-7386.01

Earth Solutions NW, LLC
15365 NE 90th Street, Suite 100 • Redmond, WA 98052 • (425) 449-4704
3130 Varney Lane, Suite 105 • Pasco, WA 99301 • (509) 905-0275
esnw.com

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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Earth Solutions NW LLC

Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

January 30, 2024
ES-7386.01

Keystone Land, LLC
13805 Smokey Point Boulevard, Suite 102
Marysville, Washington 98271

Attention: Joe Long

Dear Joe:

Earth Solutions NW, LLC (ESNW), is pleased to present this geotechnical engineering study to support the proposed residential development. Based on the results of our investigation, the proposed project is feasible from a geotechnical standpoint. Our study indicates the site is underlain primarily by competent native soil.

The site will be mass graded to create access drives and building pads. New structural fill should be placed on competent soil. The subgrade of the existing sloped areas of the site will need to be keyed and benched prior to placing new structural fill; drainage measures may be necessary prior to placing new fill on the benched subgrade. If earthwork activities occur during wet weather, additional drainage measures, cement treatment of native soil, and/or the use of select fill material will likely be necessary. After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Pertinent geotechnical recommendations are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC



Samuel E. Suruda, L.G.
Senior Staff Geologist

cc: Perkls Properties, LLC
Attention: Nate Perkl

Solid Ground Engineering
Attention: Tom Abbott, P.E.

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Appendix A	**Subsurface Exploration Logs**
Appendix B	**Laboratory Test Results**

GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
MARYSVILLE, WASHINGTON

ES-7386.01

INTRODUCTION

General

This geotechnical engineering study (study) was prepared for the proposed residential development to be constructed at 4820 – 83rd Avenue Northeast, in Marysville, Washington. The purpose of this study was to develop geotechnical recommendations for the project. The following tasks were completed as part of our scope of services for this project:

- Observation of test pits and borings to characterize soil and groundwater conditions.
- Laboratory testing of soil samples collected at the test locations.
- Engineering analyses and recommendations for the proposed development.
- Preparation of this report.

Project Description

The proposed project is currently pursuing redevelopment of the existing parcel for the construction of a new 21-lot residential plat. The existing single-family residence will remain, and the remainder of the associated improvements will be redeveloped into 20 additional single-family residences. A stormwater detention vault is proposed for the southwestern corner of the site.

Based on the referenced civil plans, site grading will include fills of up to about 28 feet and cuts of up to about 6 feet to achieve the proposed finish grade elevations. Block retaining walls and rockeries are proposed to facilitate grade changes where necessary. Cuts of up to about 15 feet will be required to construct the proposed detention vault. Earthwork will also include installation of underground utilities.

Based on our experience with similar projects, the proposed residential structures will likely be two to three stories in height and constructed utilizing relatively lightly loaded wood framing supported on conventional foundations. Perimeter footing loads will likely be 1 to 2 kips per linear foot, isolated footing loads will be less than 20 kips, and we anticipate slab-on-grade loading of 150 pounds per square foot (psf).

If the above design assumptions either change or are incorrect, ESNW should be contacted to review the recommendations provided in this report. ESNW should review final designs to confirm that our geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is directly southwest of the intersection between 83rd Avenue Northeast and 49th Street Northeast in Marysville, Washington. The approximate site location is illustrated on Plate 1 (Vicinity Map). The property is comprised of a single tax parcel (Snohomish County Parcel Number 00590700013600), totaling roughly 4.66 acres. Topography across the subject site generally descends to the south-southwest, with some gently sloped areas and some moderately to steeply sloped areas. There is approximately 60 feet of total elevation change present across the parcel. The subject site is bordered by 83rd Avenue Northeast to the east, 49th Street Northeast to the north, a single-family residence to the south, and a powerline easement to the west. Vegetation within the subject site primarily consists of mature trees, forest undergrowth, landscaping, and some areas overgrown with invasive vegetation. We understand that a delineated Category 3 wetland is present on the south portion of the subject site, this study has been produced under the assumption that the buffers pertaining to the wetland will be maintained.

Subsurface

An ESNW representative observed, logged, and sampled five test pits on October 2, 2023. The test pits were excavated at accessible site locations, using an operator and mini trackhoe retained by ESNW. Additionally, two borings were completed on October 5, 2023 using an operator and machine retained by ESNW. The subsurface exploration was completed to evaluate soil and groundwater conditions within the proposed development area. The maximum exploration depth was approximately 46.5 feet below the existing ground surface (bgs). The primary purposes of the borings were to evaluate slope stability for the proposed regrading of the sloped area. The approximate locations of the explorations are depicted on Plate 2 (Subsurface Exploration Plan). Please refer to the logs provided in Appendix A for a more detailed description of subsurface conditions. Representative soil samples collected at the exploration locations were analyzed in general accordance with Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) methods and procedures.

Topsoil

Topsoil, where present, was observed at depths of 6 to 12 inches bgs. The topsoil was characterized by its dark brown color, the presence of fine organic material, and small root intrusions.

Fill

Fill was not encountered during our subsurface explorations. Based on the existing topography on site throughout the areas of improvements, we anticipate some fill may be encountered during mass grading. If significant amounts of fill are encountered within the subject site, ESNW should be evaluate the materials for potential applications on site.

Native Soil

Underlying the topsoil, native soil encountered at the test pit locations were observed primarily as medium dense to dense silty sand with varying amounts of gravel (USCS: SM). Density was observed to increase at depths of roughly four to six feet bgs across the subject site, and the soil was observed to transition to a weakly cemented and unweathered state. The borings indicate somewhat variable fines content and soil density within the upper 20 to 40 feet which was underlain by very dense silty sand at the bottom of each boring.

Geologic Setting

Geologic mapping identifies Vashon glacial till (Qvt) across the site and the nearby area. Vashon glacial till consists primarily of a nonsorted mixture of silt, sand, and sub-rounded to well-rounded gravels, commonly referred to as “hardpan.” The till was deposited directly from the glacier as it advanced over bedrock and older Quaternary sediment.

The referenced Web Soil Survey (WSS) identifies Tokul gravelly medial loam as the primary unit underlying the subject site. The Tokul series formed in hillslopes and glacial till plains. Based on our field observations, on-site native soils are similar to the typical makeup of glacial till but the variability encountered within the upper 20 to 40 feet may be more representative of transitional bed deposits.

Groundwater

Groundwater seepage was encountered at boring B-2 at a depth of approximately 18 feet, roughly at the transition from the loose silt material to the dense silty sand. Light groundwater seepage was also encountered at test pit location TP-3 at a depth of approximately two feet bgs. Groundwater seepage rates and elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. Groundwater seepage flow rates are typically higher during the winter, spring, and early summer months. Therefore, perched groundwater seepage should be expected in site excavations, particularly if excavations are made in winter, spring, and early summer months.

GEOLOGIC HAZARD AREAS EVALUATION

As part of this geotechnical engineering study, ESNW reviewed available geologic hazard mapping and the geologic hazard areas section of the Marysville Municipal Code. Based on review of the topographic survey, the site contains some areas with slope gradients of 15 to 40 percent.

Landslide Hazard

With respect to landslide hazards, section 22A.020.130 of the Marysville Municipal Code defines landslide hazard areas as follows:

(1) Low Hazard. Areas with slopes of less than 15 percent.

(2) Moderate Hazard. Areas with slopes of between 15 and 40 percent and that are underlain by soils consisting largely sand, gravel, bedrock or glacial till.

(3) High Hazard. Areas with slopes between 15 and 40 percent that are underlain by soils consisting largely of silt and clay, and all areas sloping more steeply than 40 percent.

(4) Very High Hazard. Areas with slopes over 40 percent and areas of known mappable landslide deposits.

Based on the above definition, the areas of the site with slopes between 15 and 40 percent classify as moderate to high landslide hazard areas.

The proposed project will include construction of mechanically stabilized earth (MSE) retaining walls within or near areas sloped between 15 and 40 percent. The subgrade of these sloped areas should be prepared in accordance with the recommendations in the *Slope Fill* section of this report. As part of the engineering of the proposed MSE walls, global stability analysis should be completed, because geogrid strengths and lengths may be dictated by global stability.

Based on the results of our study, it is our opinion that the risk of damage from the proposed project, both on-site and off-site, is minimal subject to the conditions set forth in this report, and the proposed project will not increase the risk of occurrence of a geologic hazard, and measures to reduce risks have been incorporated into the recommendations of this report.

Erosion Hazard

With respect to erosion hazards, section 22.A.020.060 of the Marysville Municipal Code defines erosion hazard areas as follows:

(1) Low Hazard. Areas sloping less than 15 percent.

(2) Moderate Hazard. Areas sloping between 15 and 40 percent and underlain by soils that consist predominantly of silt, clay, bedrock or glacial till.

(3) High Hazard. Areas sloping between 15 and 40 percent that are underlain by soils consisting largely of sand and gravel, and all areas sloping more steeply than 40 percent.

Based on the above definition, the areas of the site with slopes between 15 and 40 percent classify as moderate erosion hazard areas.

During our visual slope reconnaissance, no signs of large-scale erosion features were observed. It is our opinion, with proper implementation of erosion control BMPs, the proposed development presents a low erosion hazard.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our investigation, construction of the proposed residential development is feasible from a geotechnical standpoint. The primary geotechnical considerations associated with the proposed development include site preparation and earthwork, engineered slope cuts and fills, engineered retaining walls, utility installation, foundation support, slab-on-grade subgrade support, drainage, and the suitability of using on-site soils as structural fill.

The site will be mass graded to create access drives and building pads. New structural fill should be placed on competent soil. The subgrade of the existing sloped areas of the site will need to be keyed and benched prior to placing new structural fill; drainage measures may be necessary prior to placing new fill on the benched subgrade. If earthwork activities occur during wet weather, additional drainage measures, cement treatment of native soil, and/or the use of select fill material will likely be necessary. After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, and site clearing and stripping activities. Subsequent earthwork activities will involve mass site grading and installation of infrastructure and stormwater management improvements.

Temporary Erosion Control

The following temporary erosion and sediment control (TESC) best management practices (BMPs) are offered:

- Temporary construction entrances and drive lanes, consisting of at least six inches of quarry spalls, should be considered to both minimize off-site soil tracking and provide a stable access entrance surface. Placing geotextile fabric underneath the quarry spalls will provide greater stability, if needed.

- Silt fencing should be placed around the construction site perimeter.

- When not in use, soil stockpiles should be covered or otherwise protected.

- Temporary measures for controlling surface water runoff, such as interceptor trenches, sumps, or swales, should be installed prior to beginning earthwork activities.

- Dry soils disturbed during construction should be wetted to minimize dust and airborne soil erosion.

- When appropriate, permanent planting or hydroseeding will help to stabilize on-site soil.

Additional TESC BMPs, as specified by the project civil engineer and indicated on the plans, should be incorporated into construction activities. TESC BMPs may be modified during construction as site conditions require and as approved by the site erosion control lead.

Stripping

Topsoil was encountered within the upper 6 to 12 inches, and root intrusions generally extended below the topsoil into the upper weathered soil. Stripping may need to extend deeper where loose existing fill needs to be recompacted or removed and replaced with structural fill. The organic-rich topsoil should be stripped and segregated into a stockpile for later use on site or to haul off site. The material remaining immediately below the topsoil may have some root zones and will likely be variable in composition, density, and/or moisture content. The material exposed after initial topsoil stripping will likely not be suitable for direct structural support as is and will likely need to either be compacted in place or stripped and stockpiled for reuse as fill; depending on the time of year stripping occurs, the soil exposed below the topsoil may be too wet to compact and may need to be aerated or treated. ESNW should observe initial stripping activities to provide recommendations regarding stripping depths and material suitability.

Excavations and Slopes

Excavation activities on site are likely to expose medium dense to dense native soil within the upper four to six feet of existing grades. Based on the soil conditions observed at the test locations, the following maximum allowable temporary slope inclinations may be used. The applicable Federal Occupation Safety and Health Administration and Washington Industrial Safety and Health Act soil classifications are also provided:

- Areas exposing groundwater 1.5H:1V (Type C)
- Loose soil 1.5H:1V (Type C)
- Medium dense soil 1H:1V (Type B)
- Dense to very dense “hardpan” native soil 0.75H:1V (Type A)

Permanent slopes should be planted with vegetation to both enhance stability and minimize erosion and should maintain a gradient of 2H:1V or flatter. The presence of perched groundwater may cause localized sloughing of temporary slopes. An ESNW representative should observe temporary and permanent slopes to confirm the slope inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope recommendations, as necessary. If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations.

Slope Fill

Structural fill within sloping areas (where a “sloping area” is defined as an area inclined at 15 percent or steeper) should be placed on a level bench as depicted on Plate 3 (Slope Fill Detail). Benches must be “keyed” into the slope and subsequently filled and compacted with suitable structural fill before continuing to the next bench; the need for drainage below the new structural fill should be evaluated during construction. Sloping finish grades should be “overbuilt” using a bench-style fill and cut to the design gradient to ensure a compacted slope face is maintained. ESNW should observe structural fill placement to confirm subgrade conditions and provide additional drainage recommendations, as necessary.

In-situ and Imported Soil

The on-site soil is moisture sensitive, and successful use of the on-site soil as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Remedial measures may be necessary as part of site grading and earthwork activities. If the on-site soil cannot be successfully compacted, the use of an imported soil may be necessary. In our opinion, a contingency should be provided in the project budget for the export of soil that cannot be successfully compacted as structural fill, particularly if grading activities take place during periods of rainfall. In general, soils with appreciable fines contents (greater than 5 percent) typically degrade rapidly when exposed to periods of rainfall.

Imported soil intended for use as structural fill should consist of a well-graded, granular soil with a moisture content that is at (or slightly above) the optimum level. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Structural Fill

Structural fill is defined as compacted soil placed in foundation, slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. Structural fill placed and compacted during site grading activities should meet the following specifications and guidelines:

- Structural fill material — Granular soil*
- Moisture content — At or slightly above optimum**
- Relative compaction*** — 95 percent (Modified Proctor)
- Loose lift thickness (maximum) — 12 inches

* *Existing soil may not be suitable for use as structural fill unless at (or slightly above) the optimum moisture content at the time of placement and compaction.*
** *Soil shall not be placed dry of optimum and should be evaluated by ESNW during construction.*
*** *Relative compaction of 90 percent can be considered for mass grading activities and should be evaluated by ESNW during construction.*

With respect to underground utility installations and backfill, local jurisdictions may dictate the soil type(s) and compaction requirements. Areas of otherwise unsuitable material and debris should be removed from structural areas and replaced with structural fill.

Foundations

After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

Provided the structures will be supported as described above, the following parameters may be used for design of the new foundations:

- Allowable soil bearing capacity — 2,500 psf
- Passive earth pressure — 300 pcf
- Coefficient of friction — 0.40

A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. The passive earth pressure and coefficient of friction values include a safety factor of 1.5. With structural loading as expected, total settlement in the range of one inch is anticipated, with differential settlement of about one-half inch. Most of the anticipated settlement should occur during construction as dead loads are applied.

Seismic Design

The 2018 International Building Code (2018 IBC) recognizes the most recent edition of the Minimum Design Loads for Buildings and Other Structures manual (ASCE 7-16) for seismic design, specifically with respect to earthquake loads. Based on the soil conditions encountered at the test pit and boring locations, the parameters and values provided below are recommended for seismic design per the 2018 IBC.

Parameter	Value
Site Class	C*
Mapped short period spectral response acceleration, S_S (*g*)	1.098
Mapped 1-second period spectral response acceleration, S_1 (*g*)	0.39
Short period site coefficient, F_a	1.2
Long period site coefficient, F_v	1.5
Adjusted short period spectral response acceleration, S_{MS} (*g*)	1.317
Adjusted 1-second period spectral response acceleration, S_{M1} (*g*)	0.585
Design short period spectral response acceleration, S_{DS} (*g*)	0.878
Design 1-second period spectral response acceleration, S_{D1} (*g*)	0.39

* *Assumes very dense soil conditions, encountered to a maximum depth of 46.5 feet bgs during the field exploration, remain very dense to at least 100 feet bgs. Based on our experience with the project geologic setting (glacial till) across the Puget Sound region, soil conditions are likely consistent with this assumption.*

Liquefaction

Liquefaction is a phenomenon that can occur within a soil profile as a result of an intense ground shaking or loading condition. Most commonly, liquefaction is caused by ground shaking during an earthquake. Sand or silt soil profiles that are loose, cohesionless, and present below the groundwater table are most susceptible to liquefaction. During the ground shaking, the soil contracts, and porewater pressure increases. The increased porewater pressure occurs quickly and without sufficient time to dissipate, resulting in water flowing upward to the ground surface and a liquefied soil condition. Soil in a liquefied condition possesses very little shear strength in comparison to the drained condition, which can result in a loss of foundation support for structures.

In our opinion, the liquefaction potential for the site should be considered low. The soil composition, relative density, and the absence of an established shallow groundwater table are the primary bases for this opinion.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed structures should be supported on firm and unyielding subgrades. Unstable or yielding subgrade areas should be recompacted or overexcavated and replaced with suitable structural fill prior to slab construction.

A capillary break consisting of a minimum of four inches of free-draining crushed rock or gravel should be placed below each slab. The free-draining material should have a fines content of 5 percent or less (percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of a vapor barrier below the slab should be considered. If a vapor barrier is to be utilized, it should be a material specifically designed for use as a vapor barrier and should be installed per manufacturer specifications.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for design:

- Active earth pressure (unrestrained condition) — 35 pcf (equivalent fluid)
- At-rest earth pressure (restrained condition) — 55 pcf
- Traffic surcharge* (passenger vehicles) — 70 psf (rectangular distribution)
- Passive earth pressure — 300 pcf (equivalent fluid)
- Coefficient of friction — 0.40
- Seismic surcharge — 8H psf**

* *Where applicable.*
** *Where H equals the retained height (in feet).*

The above passive earth pressure and coefficient of friction values include a safety factor of 1.5 and are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along with the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of less permeable soil if desired. A sheet drain may be considered instead of free-draining backfill. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 4. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Based on our field observations, groundwater seepage should be anticipated within site excavations, particularly utility and stormwater detention excavations. Temporary measures to control surface water runoff and groundwater seepage during construction will be critical to minimizing the potential for on-site soils to degrade. ESNW should be consulted during preliminary grading to identify areas of seepage and provide recommendations to reduce the potential for seepage-related instability.

Finish grades must be designed to direct surface drain water away from structures and slopes. Water must not be allowed to pond adjacent to structures or slopes. Grades adjacent to buildings should be sloped away from the buildings at a gradient of either at least 2 percent for a horizontal distance of 10 feet or the maximum allowed by adjacent structures. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 5.

Infiltration Evaluation

As indicated in the *Subsurface* section of this report, the native soil encountered during our fieldwork is generally considered to be low permeability. Additionally, the site is generally moderately sloped, and stability of proposed retaining walls and slopes could be negatively impacted by concentrated stormwater infiltration. From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Stormwater Vault Design

We understand a stormwater vault will be constructed to manage stormwater. Interflow groundwater seepage into the vault excavation should be anticipated, particularly if completed during the wet season. The vault foundations should be supported on dense native soil or crushed rock placed on dense native soil. Final stormwater vault designs must incorporate adequate buffer space from property boundaries such that temporary excavations to construct the vault structure can be successfully completed. Perimeter drains should be installed around the vault and conveyed to an approved discharge point.

The following parameters can be used for stormwater vault design:

- Allowable soil bearing capacity (dense native soil) 5,000 psf
- Active earth pressure (unrestrained) 35 pcf
- Active earth pressure (unrestrained, hydrostatic) 80 pcf
- At-rest earth pressure (restrained) 55 pcf
- At-rest earth pressure (restrained, hydrostatic) 100 pcf
- Coefficient of friction 0.40
- Passive earth pressure 300 pcf
- Seismic Surcharge 8H*

* *Where H equals the retained height.*

The vault walls should be backfilled with free-draining material or suitable sheet drainage that extends along the height of the walls. The upper one foot of the wall backfill can consist of a less permeable soil, if desired. A perforated drain pipe should be placed along the base of the wall and connected to an approved discharge location. If the elevation of the vault bottom is such that gravity flow to an outlet is not possible, the portion of the vault below the drain should be designed to include hydrostatic pressure. Design values accounting for hydrostatic pressure are included above. The above passive earth pressure and coefficient of friction values include a safety factor of 1.5.

ESNW should observe grading operations for the vault and the subgrade conditions prior to concrete forming and pouring to confirm conditions are as anticipated, and to provide supplemental recommendations as necessary. Additionally, ESNW should be contacted to review final vault designs to confirm that appropriate geotechnical parameters have been incorporated.

Vault backfill should be placed and compacted in accordance with the recommendations provided in the *Structural Fill* section of this report.

Preliminary Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and/or placement of thicker crushed rock or structural fill sections, prior to pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of two inches of hot-mix asphalt (HMA) placed over four inches of crushed rock base (CRB).

- A minimum of two inches of HMA placed over three inches of asphalt-treated base (ATB).

Heavier traffic areas generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for occasional truck traffic and access roadways may be considered:

- Three inches of HMA placed over six inches of CRB, or;

- Three inches of HMA placed over four and one-half inches of ATB.

The HMA, ATB, and CRB materials should conform to WSDOT and/or the City of Marysville specifications. All soil base material should be compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by ASTM D1557. Final pavement design recommendations, including recommendations for heavy traffic areas, access roads, and frontage improvement areas, can be provided once final traffic loading has been determined. Road standards utilized by the City may supersede the recommendations provided in this report.

If an inverted crown will be used for roadway surfaces, drainage measures should be included in the design to prevent accumulation of water in the subgrade adjacent to catch basins. Such measures may consist of finger drains extending from the catch basins.

Utility Support and Trench Backfill

In our opinion, the on-site soil will generally be suitable for support of utilities. However, remedial measures may be necessary in some areas to provide support for utilities, such as overexcavation and replacement with structural fill and/or placement of geotextile fabric. Groundwater seepage may be encountered within utility excavations, and caving of trench walls may occur where groundwater or unsuitable fill are encountered. Depending on the time of year and conditions encountered, dewatering and/or temporary trench shoring may be necessary during utility excavation and installation.

The on-site soil may not be suitable for use as structural backfill throughout utility trench excavations unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Moisture conditioning of the soil may be necessary at some locations prior to use as structural fill. Each section of the utility lines must be adequately supported in the bedding material. Utility trench backfill should be placed and compacted to the structural fill specifications previously detailed in this report or to the applicable specifications of the presiding jurisdiction.

LIMITATIONS

This study has been prepared for the exclusive use of Keystone Land, LLC and its representatives. The recommendations and conclusions provided in this study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. No warranty, express or implied, is made. Variations in the subsurface conditions observed at the test locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this study if variations are encountered.

Additional Services

ESNW should have an opportunity to review the final design with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.

REFERENCES

The following documents were reviewed as part of the preparation of this study:

- Preliminary Road and Grading, prepared by Solid Ground Engineering, dated December 5, 2023
- Geologic Map of the Lake Stevens Quadrangle, Snohomish County, Washington, prepared by James P. Minard, dated 1983
- Chapter 22E.10 Article IV – Geologic Hazard Areas, provided the City of Marysville, updated September 26, 2023
- Stormwater Management Manual for Western Washington, adopted by the City of Marysville, dated 2019
- WSS, provided by the USDA, Natural Resources Conservation Service



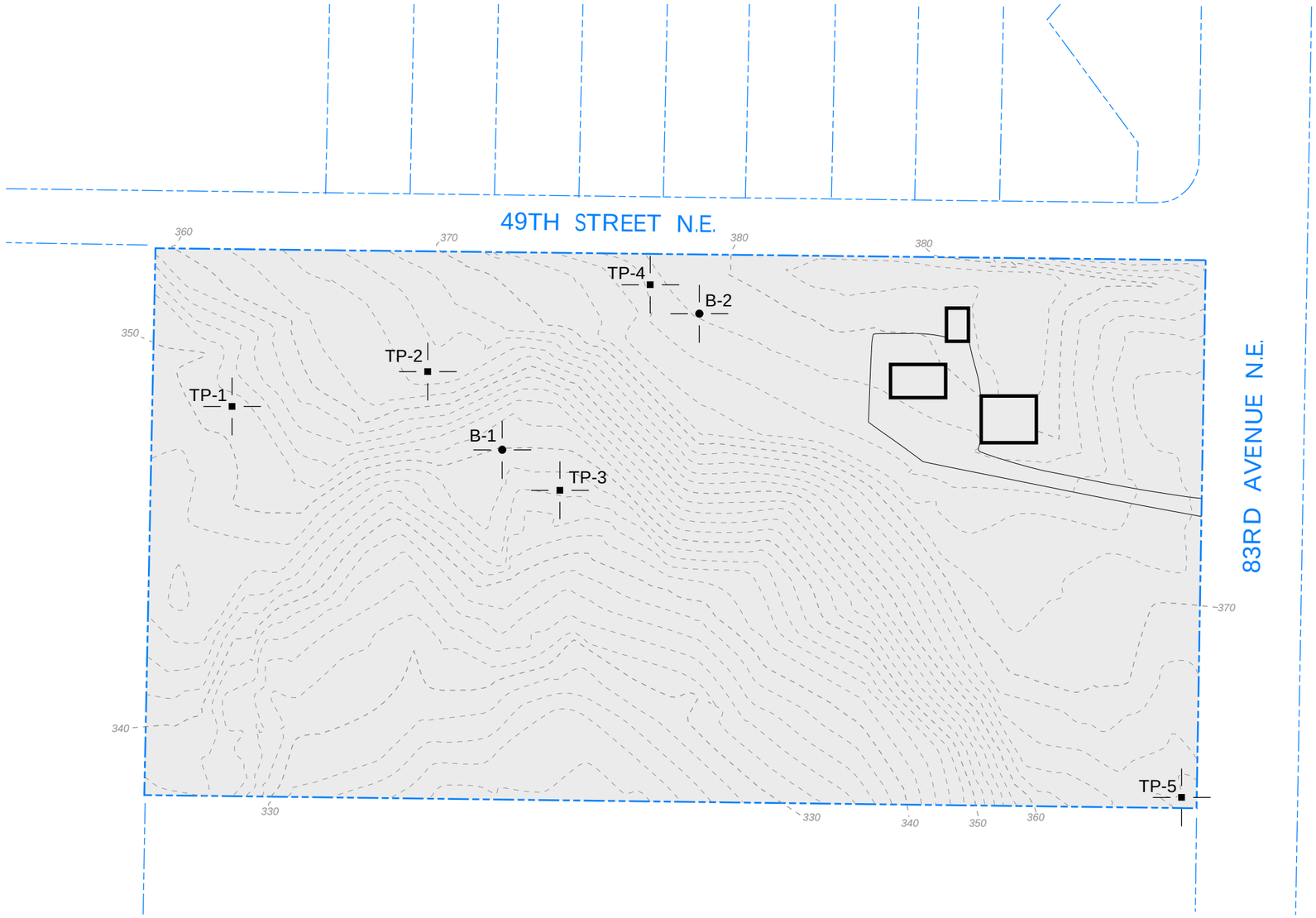
Reference:
Snohomish County, Washington
OpenStreetMap.org

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

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Vicinity Map
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/02/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 1



LEGEND

TP-1 — Approximate Location of ESNW Test Pit, Proj. No. ES-7386.01, Oct. 2023

B-1 — Approximate Location of ' ESNW Boring, Proj. No. ES-7386.01, Oct. 2023

Subject Site

Existing Building

NORTH

0 50 100 200

1"=100' Scale in Feet

NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

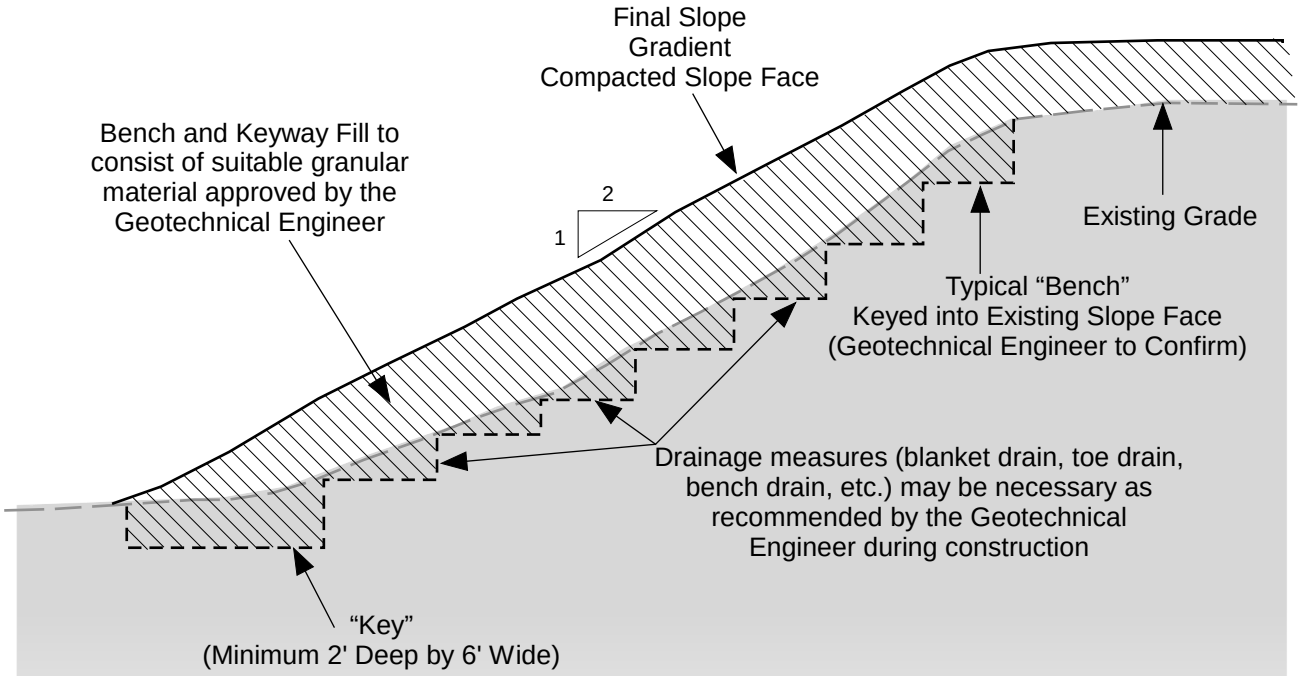
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Subsurface Exploration Plan
Taylor 83rd
Marysville, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Drawn	MRS
Checked	SES
Date	11/02/2023
Proj. No.	7386.01
Plate	2

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING



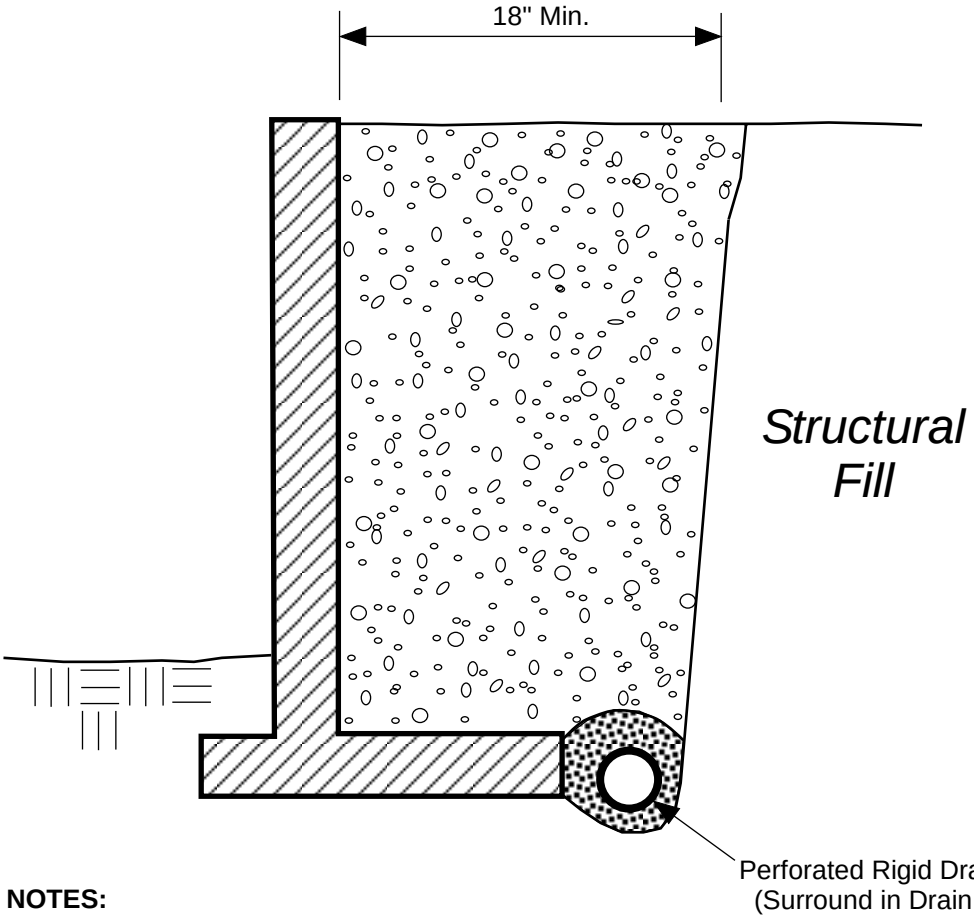
NOTES:

- Slope should be stripped of topsoil and unsuitable materials prior to excavating Keyway or benches.
- Benches will typically be equal to a bulldozer blade width of approximately 8 feet but shall be at least 4 feet.
- Final slope gradient should be 2H : 1V.
- Final slope face should be densified by over-building with compacted fill and trimming back to shape or by compaction with a bulldozer or vibratory drum roller.
- Planting or hydroseeding slope face with a rapid growth deep-rooted vegetative mat will reduce erosion potential of slope area.
- Use of pegged-in-place jute matting or geotechnical fabric will help maintain the seed and mulch in place until the root system has an opportunity to germinate.
- Structural fill should be placed in thin loose lifts not exceeding 12 inches in thickness. Each lift should be compacted to no less than the degree specified in the "Site Preparation and Earthwork" section of this report. No additional lift should be placed until compaction is achieved.

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Slope Fill Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 3



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Free-draining Structural Backfill

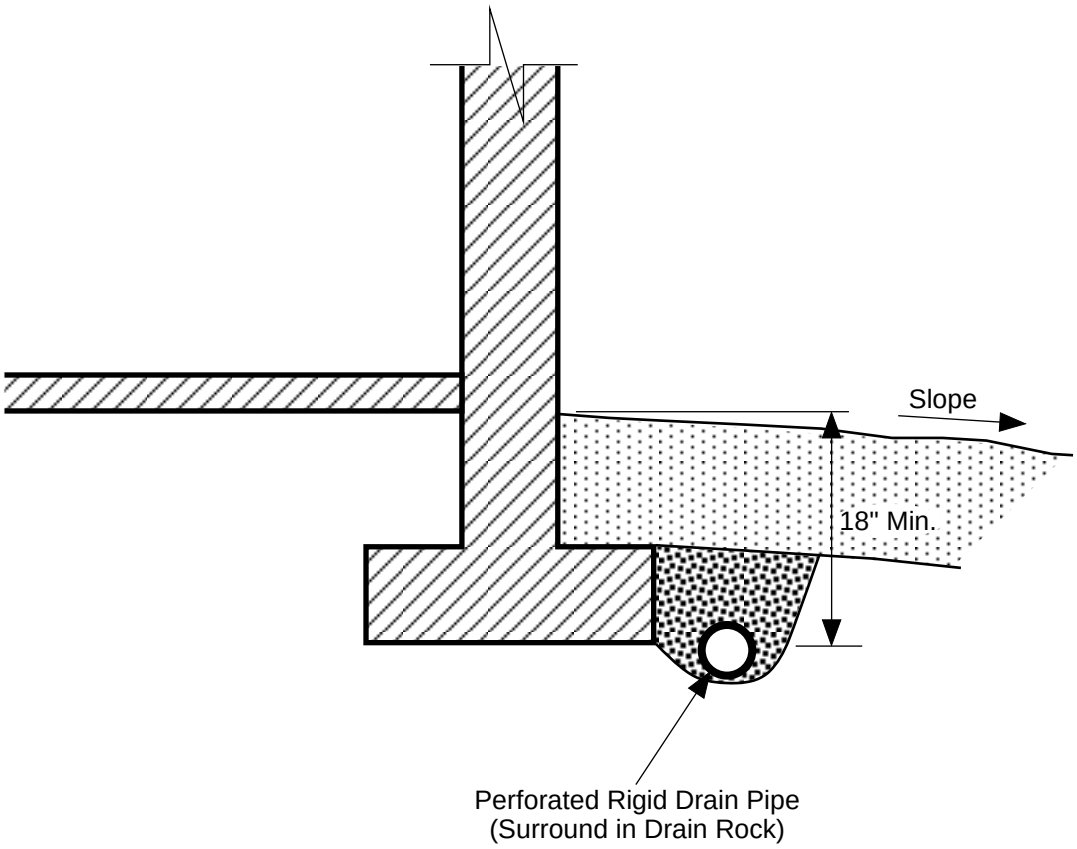
1-inch Drain Rock

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Retaining Wall Drainage Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 4



NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

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NOT A CONSTRUCTION DRAWING

LEGEND:

Surface Seal: native soil or other low-permeability material.

1-inch Drain Rock

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Footing Drain Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 5

Appendix A

Subsurface Exploration Logs

ES-7386.01

Subsurface conditions at the subject site were explored on October 2, 2023 and October 5, 2023. Five test pits were excavated and two borings were advanced using equipment and operators retained by ESNW. The approximate locations of the explorations are illustrated on Plate 2 of this study. The boring and test pit logs are provided in this Appendix. The maximum exploration depth was approximately 46.5 feet bgs.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve	Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve	< 5% Fines	GW	Well-graded gravel with or without sand, little to no fines
			GP	Poorly graded gravel with or without sand, little to no fines
		> 12% Fines	GM	Silty gravel with or without sand
			GC	Clayey gravel with or without sand
	Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve	< 5% Fines	SW	Well-graded sand with or without gravel, little to no fines
			SP	Poorly graded sand with or without gravel, little to no fines
		> 12% Fines	SM	Silty sand with or without gravel
			SC	Clayey sand with or without gravel
Fine-Grained Soils - 50% or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML	Silt with or without sand or gravel; sandy or gravelly silt
			CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt
			CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils
Fill			FILL	Made Ground

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch

Damp - Perceptible moisture, likely below optimum MC

Moist - Damp but no visible water, likely at/near optimum MC

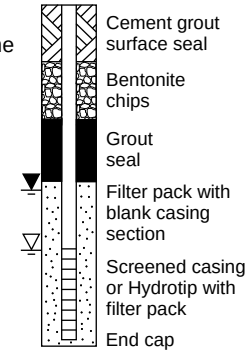
Wet - Water visible but not free draining, likely above optimum MC

Saturated/Water Bearing - Visible free water, typically below groundwater table

Symbols

ATD = At time of drilling

Static water level (date)



Terms Describing Relative Density and Consistency

Coarse-Grained Soils:

Density	SPT blows/foot
Very Loose	< 4
Loose	4 to 9
Medium Dense	10 to 29
Dense	30 to 49
Very Dense	≥ 50

Fine-Grained Soils:

Consistency	SPT blows/foot
Very Soft	< 2
Soft	2 to 3
Medium Stiff	4 to 7
Stiff	8 to 14
Very Stiff	15 to 29
Hard	≥ 30

Test Symbols & Units

Fines = Fines Content (%)

MC = Moisture Content (%)

DD = Dry Density (pcf)

Str = Shear Strength (tsf)

PID = Photoionization Detector (ppm)

OC = Organic Content (%)

CEC = Cation Exchange Capacity (meq/100 g)

LL = Liquid Limit (%)

PL = Plastic Limit (%)

PI = Plasticity Index (%)

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

Modifier Definitions

Percentage by Weight (Approx.)	Modifier
< 5	Trace (sand, silt, clay, gravel)
5 to 14	Slightly (sandy, silty, clayey, gravelly)
15 to 29	Sandy, silty, clayey, gravelly
≥ 30	Very (sandy, silty, clayey, gravelly)

Classifications of soils in this geotechnical report and as shown on the exploration logs are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.

Earth Solutions NW LLC
15365 NE 90th Street, Suite 100
Redmond, WA 98052
Office (425) 449-4704 | esnw.com
Branch Office: Pasco, WA

BORING NUMBER B-1

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.04009 **LONGITUDE** -122.12093
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Brown silty SAND, dense, damp
	SS	67	18-25-31 (56)	MC = 9.1			
5							-becomes gray
	SS	56	5-10-14 (24)	MC = 13.9			-becomes medium dense, moist
	SS	56	7-21-26 (47)	MC = 9.9			-becomes dense to very dense
10					SM		
	SS	89	12-26-27 (53)	MC = 10.2			
15							-becomes dense
	SS	78	13-17-20 (37)	MC = 16.4			
20							20.0

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LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	78	13-7-12 (19)	MC = 13.0	SM		Gray silty SAND, medium dense, damp
							-increasing sand
25	SS	78	7-9-11 (20)	MC = 14.1			-becomes moist
30	SS	78	5-5-5 (10)	MC = 13.2 Fines = 43.0			[USDA Classification: gravelly LOAM]
35	SS	100	4-5-10 (15)	MC = 13.2			
40							40.0

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BORING NUMBER B-1

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.04009 **LONGITUDE** -122.12093
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SS	100	23-50/6"	MC = 12.4	SM		Gray silty SAND, very dense, moist
45	SS	80	28-40-50/3"	MC = 10.5			
							46.5

Boring terminated at 46.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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BORING NUMBER B-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.03983 **LONGITUDE** -122.12118
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Brown silty SAND, dense, damp
	SS	89	6-15-19 (34)	MC = 8.5			
5							-becomes medium dense
	SS	67	2-7-20 (27)	MC = 13.5			
							6.5
					ML		Dark brown sandy SILT, loose, wet
	SS	100	2-4-4 (8)	MC = 16.4			
10							
	SS	100	3-6-6 (12)	MC = 19.6 Fines = 60.6			[USDA Classification: slightly gravelly LOAM]
							-becomes gray
15							
	SS	100	5-5-3 (8)	MC = 14.4			
							18.0
					SM		Gray silty SAND, dense, moist to wet
20							-groundwater seepage

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Branch Office: Pasco, WA

BORING NUMBER B-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.03983 **LONGITUDE** -122.12118
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	67	17-22-22 (44)	MC = 12.7			Gray silty SAND, dense, moist to wet *(continued)*
							-becomes very dense
25	SS	100	50/6"	MC = 16.1	SM		
30	SS	100	50/5"	MC = 12.0			
							30.5

Boring terminated at 30.5 feet below existing grade. Groundwater seepage encountered at 18.0 feet during drilling. Boring backfilled with bentonite.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Office (425) 449-4704 | esnw.com
Branch Office: Pasco, WA

TEST PIT NUMBER TP-1

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03987 **LONGITUDE** -122.12192
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, root intrusions to 2'
				1.0	
					Brown silty SAND, medium dense, moist
		MC = 8.5			
					-becomes dense
5					
			SM		-becomes gray, increasing sand
		MC = 10.7 Fines = 47.1			[USDA Classification: slightly gravelly LOAM]
10		MC = 9.0		10.0	

Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

GENERAL BH / TP / WELL - 7386-1.GPJ - GINT US.GDT - 1/30/24

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Redmond, WA 98052
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Branch Office: Pasco, WA

TEST PIT NUMBER TP-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.04008 **LONGITUDE** -122.12145
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, shallow root intrusions
					1.0
					Brown silty SAND, medium dense, moist
		MC = 8.6			
					-becomes gray, dense
5			SM		
					-becomes very dense
10		MC = 9.9			10.0
					Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Branch Office: Pasco, WA

TEST PIT NUMBER TP-3

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03979 **LONGITUDE** -122.12097
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff on slope **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL (0.5)
					Dark brown silty SAND, loose, wet
		MC = 29.2 Fines = 38.8			-light groundwater seepage at 2' [USDA Classification: gravelly LOAM]
			SM		-becomes medium dense, moist
5		MC = 15.8			
					-becomes dense, weakly cemented
		MC = 13.0			(7.0)

Test pit terminated at 7.0 feet below existing grade. Groundwater seepage encountered at 2.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Branch Office: Pasco, WA

TEST PIT NUMBER TP-4

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.04012 **LONGITUDE** -122.12098
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, minimal root intrusions
0.5					Brown silty SAND, medium dense, damp
		MC = 7.0			
5			SM		-becomes dense, moist, weakly cemented
9.0		MC = 9.6			

Test pit terminated at 9.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Branch Office: Pasco, WA

TEST PIT NUMBER TP-5

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03944 **LONGITUDE** -122.11980
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, root intrusions to 2'
0.5					Brown silty SAND with gravel, medium dense, moist
		MC = 9.5 Fines = 16.2			[USDA Classification: gravelly loamy coarse SAND]
5		MC = 10.5	SM		-becomes gray, dense
					-weakly cemented
10		MC = 10.4			
10.0					Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Appendix B

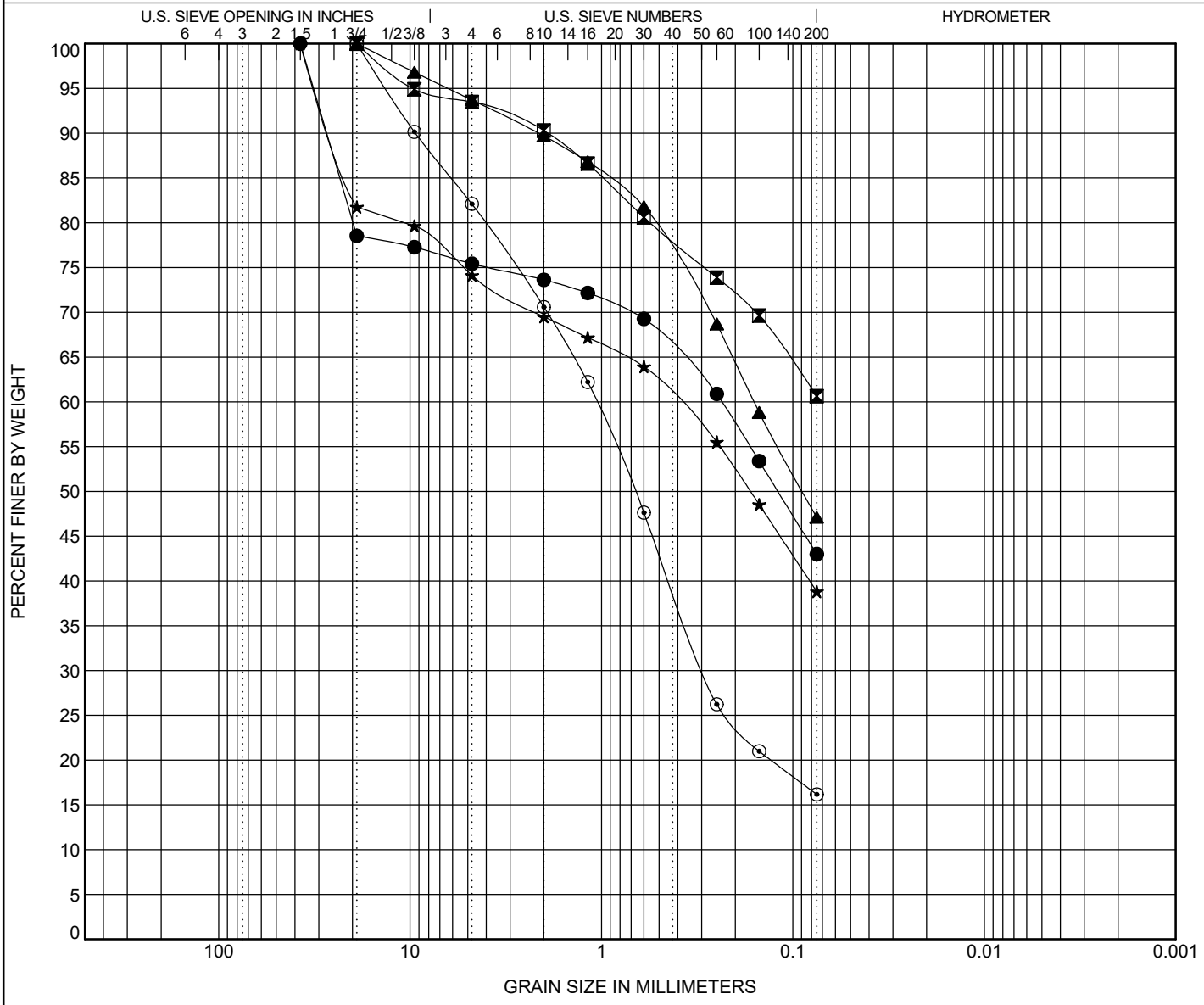
Laboratory Test Results

ES-7386.01

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Branch Office: Pasco, WA

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	B-01	30.00ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		
⊠	B-02	10.00ft.	USDA: Dk Brown Slightly Gravelly Loam. USCS: Sandy ML.		
▲	TP-01	6.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: SM.		
★	TP-03	2.00ft.	USDA: Dk Brown Gravelly Loam. USCS: SM with Gravel.		
⊙	TP-05	2.00ft.	USDA: Brown Gravelly Loamy Coarse Sand. USCS: SM with Gravel.		

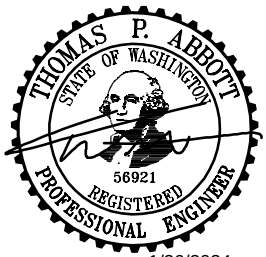
Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	B-01	30.0ft.	37.5	0.235						43.0	
⊠	B-02	10.0ft.	19							60.6	
▲	TP-01	6.0ft.	19	0.159						47.1	
★	TP-03	2.0ft.	37.5	0.399						38.8	
⊙	TP-05	2.0ft.	19	1.065	0.292					16.2	

GRAIN SIZE USDA ES-7386.01 TAYLOR 83RD.GPJ GINT US LAB.GDT 10/25/23

Taylor Lane

Preliminary Drainage Report

Presented to: City of Marysville



1/26/2024

Taylor Lane

Drainage Report

Prepared for
Cornerstone Homes
Contact: Joe Long
13805 Smokey Point Blvd #102
Marysville, WA 98271

Prepared by

Cooper Danby

Approved by
Tom Abbott, PE

January 2024 ***Job No: 23-0009***

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Appendices

#	Title
1	Project Overview
2	Temporary Erosion and Sediment Control Design
3	Downstream Analysis
4	Detention and Water Quality Treatment Design
5	Conveyance Analysis and Design
6	Operations and Maintenance Manual
7	Special Reports and Studies

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#	Title
1	Vicinity Map
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SECTION 1: PROJECT OVERVIEW

The proposed Taylor Lane project is approximately a 4.66-acre site. The project is a single-family residential development on parcel #00590700013600 and addressed at 4820 83rd Ave NE Marysville 98270. The project proposes to construct 20 new single-family lots and retain the existing single-family home for a total of 21 lots. Emergency and standard access drives along with associated private and public utilities are proposed to serve project development from 49th St NE. Frontage improvements along 49th St NE and 83rd Ave NE consisting of sidewalk improvements to City standards are proposed. See the Vicinity Map in Appendix 1 for visual representation of the subject property.

Existing Site

The parcel #00590700013600 is currently occupied by one single family home with associated outbuildings taking access from 83rd Ave NE. The northeast corner of the site containing the existing home consists of lawn coverage and gravel driveways, while the rest of the site contains dense forest and vegetative coverage. Existing topography generally descends to the south, with some areas of steep slopes, towards a wetland located in the lower-middle region. The project parcel is currently zoned R-6.5 in the City of Marysville.

The proposed development will exist within the bounds of a single stormwater threshold discharge basin as all site runoff from developed surfaces meets within ¼ mile from the project site downstream. Wetland Resources Inc has prepared a Critical Areas Report dated January 2024 on the site. The findings indicate that in the southerly portion of the site, there is a Category II wetland with a 100' buffer. Impacts are planned within portions of these buffer areas, requiring averaging and mitigation. Additionally, stormwater is proposed to be discharged to the wetland area on the parcel via a dispersion trench.

A preliminary Geotechnical Engineering Design Study has been prepared by Earth Solutions NW in January 2024 on the site. Please reference the geotechnical report for detailed soils information. There are a number of steep slopes on the site, as the parcel generally slopes from north to south. Per the Geotechnical Engineer's recommendations, the steep slopes are proposed to be graded and walls constructed to support construction and development activities on the project site. Please see the submitted geotechnical report for addition discussion of the onsite soils and project grading proposal.

Proposed Development

The proposed project will construct 20 new single-family lots and retain the existing home onsite. Emergency and standard access drives will serve the site from 49th St NE, along with associated private and public utilities are proposed to serve project development. Frontage improvements along 49th St NE and 83rd Ave NE consisting of sidewalk improvements to City standards are proposed. Retaining walls will be required along the southern side of most lots bordering the wetland buffer area.

Proposed Drainage System

This project is designed to comply with the 2019 Department of Ecology Stormwater Manual for Western Washington (2019 DOE SWMMWW). Stormwater will be mitigated via a detention vault that is proposed in the southwestern portion of the site. Prior to discharge, a perkfilter cartridge filtration unit will be used to treat stormwater runoff to meet basic water quality treatment requirements. The proposed detention vault and water quality treatment system will discharge to the existing onsite wetland area which continues offsite to the south until joining King Creek.

Onsite development will create 2.19 AC of new impervious surfaces which will be collected by the detention vault for mitigation and stormwater quality treatment. This area is considered to be within the Onsite Basin for stormwater modeling. Frontage improvements consisting of new sidewalk and planter along 49th St NE and 83rd Ave NE, referred to as the Frontage Basin, will also be collected and routed to the detention vault to the maximum extent feasible. The runoff from these surfaces unable to be collected due to vertical constraints, approximately 0.02 AC, will be considered to bypass detention and be within the Frontage Bypass Basin.

Erosion/Sedimentation Control

Erosion control measures that will be utilized during construction will include a combination of silt fence, storm drain inlet protection, interceptor swales, and sediment ponds. See Section 2.0 for discussion of how SWPPP Elements are addressed.

Minimum Requirements
Per the 2019 DOE Manual, Minimum Requirements 1-9 apply to the proposed development.

Minimum Requirement #1: Preparation of Stormwater Site Plans
This report along with the preliminary plans satisfies the minimum requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention
See Section 2 of this Report for the SWPPP BMP Elements, and the SWPPP (submitted as a separate document) for a complete discussion of erosion control BMP's and their use specific to the site.

Minimum Requirement #3: Source of Pollution
Permanent source control BMPs are not applicable for the subject site since the associated activities for the new residence do not fall within the types of facilities listed within Volume IV of the DOE Manual (Residential developments are not required to implement source control BMP's). BMPs for erosion and sedimentation control will be specified in the Construction Plans and the SWPPP.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls
Flow from the site will preserve its natural drainage pattern south toward the onsite wetland. Runoff flows towards King Creek, a tributary to Ebey Slough, which then eventually discharges into The Puget Sound.

Minimum Requirement #5: On-Site Stormwater Management
The project proposes BMP T5.13 soils to be underlain within all pervious areas that are disturbed by development. Generally, all other infiltration-related BMPs are infeasible due to the site development area's adjacent location to steep slopes. Per the geotechnical report other dispersion-related BMPs are considered infeasible due to the proximity of the steep slopes to the developed impervious coverage of the site and the lack of available dispersion length. Please see Section 4.5 for additional discussion of Onsite Stormwater Management and Low Impact Development BMP feasibility.

Minimum Requirement #6: Runoff Treatment
Proposed new pollution generating impervious surfaces (PGIS) will exceed the 5,000 SF threshold and thus basic water quality treatment will be provided via a water quality treatment structure that treats stormwater runoff discharging from the stormwater detention vault. A Perkfilter cartridge filtration unit is proposed for this purpose. See Section 4.0 for additional discussion regarding proposed stormwater management and water quality treatment measures.

Minimum Requirement #7: Flow Control
The project will exceed the 10,000 SF new plus replaced impervious threshold and is required to provide flow control. A concrete detention vault will be installed in the southwestern portion of the project site, accessible via access easement serving Lot 1. This vault will discharge via dispersion trench at historic, mitigated rates towards the existing onsite wetland area. Please see Section 4.0 for additional flow control modeling and parameters for detention sizing.

Minimum Requirement #8: Wetlands Protection
Wetland Resources Inc has prepared a Critical Areas Report dated January, 2024 on the site. The findings indicate that in the southerly portion of the site, there is a Category II wetland with a 100' buffer. Development is anticipated to impact these buffer areas which will require mitigation and buffer averaging.

Minimum Requirement #9: Operation and Maintenance
See Operations and Maintenance in Section 6 of this report.

SECTION 2: TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN

SWPPP Design Elements
A Construction Stormwater Pollution Prevention Plan (SWPPP) will be provided prior to construction. The SWPPP report is modeled under the guidelines of I.3.4.2 MR2 of the DOE Manual. Construction SWPPP Elements #1 through #13 are addressed below. These elements will be delineated within future civil plans for the project.

Element #1 – Mark Clearing Limits
All clearing limits will be delineated with high visibility plastic fence and/or silt fence.

Element #2 – Establish Construction Access
Stabilized construction accesses will be installed as shown on the plans.

Element #3 – Control Flow Rates
Detention of construction period runoff will be provided by means of sediment ponds on the site.

Element #4 – Install Sediment Controls
Silt fence, catch basin protection, and the temporary sediment pond will be utilized to contain sediments within the project's clearing limits.

Element #5 – Stabilize Soils
Exposed soils will be stabilized as specified in the Grading and Erosion Control Notes with temporary and permanent seeding, mulching, and plastic covering.

Element #6 – Protect Slopes
Slopes shall be protected as specified under Element #5.

Element #7 – Protect Drain Inlets
Storm drain inlet protection will be utilized to contain sediments within the project's clearing limits.

Element #8 – Stabilize Channels and Outlets
Temporary channels, shall be stabilized with check dams.

Element #9 – Control Pollutants
Pollutants shall be controlled as specified in Volume IV of the 2019 DOE Manual—Source Control BMPs to address potential sources of pollution.

Element #10 – Control De-Watering
There will be no de-watering as a part of this project..

Element #11 – Maintain BMPs
Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes that will be included in the civil plans associated with the project.

Element #12: Manage the Project
The Grading and Erosion Control Notes specify seasonal work limitations. Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes.

Element #13: Protect on-site stormwater management BMPs
On-site stormwater management BMPs used for runoff from roofs and other hard surfaces are not feasible due to soil conditions and proposed project density.

SECTION 3: DOWNSTREAM ANALYSIS

Task 1. Study Area Definition and Maps

Snohomish County Bare Earth LiDAR, survey, and 2021 aerial photography were the best topographical references available for the area containing the site. The limits of the downstream analysis extend roughly 0.25 miles beyond the subject property's natural discharge location.

Task 2. Resource Review

All of the resources below have been reviewed for existing and potential issues near the project site:

Adopted Basin Plans
No Adopted Basin Plans were located that include the project site.

Drainage Basin
This site is in the King Creek subbasin, within the Ebey Slough watershed. Discharge from the proposed development will discharge into a wetland area tributary to King Creek.

Floodplain / Floodway (FEMA) maps
Per FEMA Floodplain map #53061C0736F the subject property is not within a floodplain.

Critical Areas Map
There's a Category II wetland in the southern portion of the site. There are steep slopes located within the wetland buffer area near the central portion of the site. See section 7.0 for a complete list of reports prepared for the project including a Critical Areas Report, Wetland critical areas, and geotechnical and slope analysis reports.

Drainage Complaints
No relevant issues were identified near the proposed site.

Road Drainage Problems
No issues were identified near the proposed site.

Soil Survey
Site soils are classified as Tokul gravelly medial loam (0 to 8 percent slopes) which is classified as Hydrologic Soil Group B. Per geotechnical analysis, infiltration is infeasible onsite, which is consistent with NRCS soil mapping data.

Wetland Inventory Maps
Wetlands are identified to be on and immediately adjacent to the south of the project site. Reference the critical areas report submitted with this report for additional information regarding the wetland areas onsite.

Migrating River Studies
Migrating River Studies are not considered applicable to the proposed development.

Section 303d List of Polluted Waters
Washington State Department of Ecology's Water Quality Assessment for Washington contains a listing for King Creek which the project is tributary to. Please refer to Appendix 3 for copies of applicable 303(d) listings.

Water Quality Problems
King creek has a category 5 listing in the DOE Water Quality Assessment Review tools for temperature which does not fall under water quality problems. The development however will improve water quality tributary to the creek via basic treatment device(s).

Stormwater Compliance Plans
Not applicable to the proposed project.

Task 3. Field Inspection/Downstream Analysis
On November 27th, 2023, a Downstream Analysis was performed at the site. The weather consisted of 46ºF and clear skies. The following observations were verified during the visit.

The subject property contains impervious areas associated with an existing home, driveways, and associated outbuildings surrounded by lawn area in the northeastern portion of the site. Slopes are generally moderate in the developed portion. The rest of the site consists of steep slopes generally descending south with dense forest/vegetation, and an existing wetland and wetland buffer area in the south-central portion. Frontages along 49th St NE (north) and 83rd Ave NE (east) were observed for potential upstream run-on. 49th St does not produce upstream run-on to the site (Images 1 & 2) while 83rd Ave does yield some upstream flow from the existing road centerline (Image 3).

The site is located within a single threshold discharge area (TDA) since all runoff exits the southern property line and converges prior to exiting the quarter mile boundary of analysis. The flow path is formed where runoff enters Wetland A either onsite or offsite to the south. Flow continues south/southwest through several undeveloped properties until ultimately joining King Creek prior to crossing under 44th St NE and continuing beyond the quarter mile boundary of analysis (Images 4 & 5).

Task 4. Drainage System Description and Problem Descriptions
Based on the information available and all the resources available including visual inspection of the downstream flow path to the ¼-mile boundary, there is no evidence of existing or anticipated downstream drainage problems. All flows are adequately carried through natural channels to the quarter mile buffer of analysis.

Task 5. Mitigation of Existing or Potential Drainage Problems
No evidence of existing or potential problems with downstream drainage conveyance infrastructure was found. Mitigation is not required.

SECTION 4: DETENTION AND WATER QUALITY TREATMENT DESIGN

4.1 Predeveloped Site Hydrology

The pre-developed and developed conditions were modeled in WWHM for the purpose of peak flow determination for direct discharge. Based on the site location, the WWHM used the Seatac Gage with a Precipitation Scale factor of 1.20. For visual representation of the listed basins, see the Predeveloped Hydrology Map.

Onsite Basin:

The predeveloped condition applied to the Onsite Basin results in a forested land cover condition. It includes all disturbed areas onsite. The values as modeled in WWHM are as follows:

Table 1: Predeveloped Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Forest, steep	2.84
Total	**2.84**

Frontage Basin:

The predeveloped condition is applied to the Frontage Basin, which includes area within 49th St NE and 83rd Ave NE to be developed. In the developed condition, this basin will be detained and mitigated in the proposed detention vault. The values as modeled in WWHM are as follows:

Table 2: Predeveloped Conditions: Frontage Basin

Frontage Basin	
Ground Cover	Area (acre)
Forest, flat	0.47
Total	**0.47**

Upstream Basin:

In the predeveloped condition, a portion of the pavement within the 83rd Ave NE ROW is tributary to the project site. In the developed condition, this pavement will continue to be tributary to the site. This area has been modeled as upstream flow through in WWH\M in both the predeveloped and developed conditions. The values as modeled in WWHM are as follows:

Table 3: Predeveloped Conditions: Upstream Basin

Upstream Basin	
Ground Cover	Area (acre)
Roads, flat	0.09
Total	**0.09**

4.2 Developed Site Hydrology

In the developed condition, the proposed apartment project will construct 20 new single family lots with proposed ROW access, stormwater detention and utilities. Frontage improvements along 49th St NE and 83rd Ave NE are proposed.

In compliance with the 2019 DOE Manual, all runoff from onsite developed/disturbed surfaces will be collected, treated, and discharged directly to existing/historic flow paths or will bypass detention and be mitigated within the proposed flow control system.

Onsite Basin:
The developed Onsite Basin includes the onsite disturbed area, including all lot areas. The maximum lot impervious value (65%) per zoning code was utilized in determine proposed site impervious coverage. In the developed condition, the Onsite Basin has been modeled using WWHM with the following areas and ground cover designations:

Table 4: Developed Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Roof, flat	1.04
Roads, flat	0.36
Driveway, flat	0.35
Sidewalks, flat	0.07
Pasture, flat	0.75
Pasture, mod	0.27
Total	**2.84**

Frontage Basin:
The developed Frontage Basin is comprised of area within 49th St NE and 83rd Ave NE to be developed for ROW improvements. The Frontage Basin was modeled using WWHM with the following areas and ground cover designations:

Table 5: Developed Conditions: Fontage Basin

Frontage Basin	
Ground Cover	Area (acre)
Roads, flat	0.25
Sidewalk, flat	0.10
Pasture, flat	0.10
Total	**0.45**

Frontage Bypass Basin:
The developed Frontage Bypass Basin is comprised of 83rd Ave NE pavement that cannot be collected due to topographical reasons. The Frontage Bypass Basin was modeled using WWHM with the following areas and ground cover designations:

Table 6: Developed Conditions: Frontage Bypass Basin

Frontage Bypass Basin	
Ground Cover	Area (acre)
Road, flat	0.02
Total	**0.02**

Upstream Basin:
In the predeveloped condition, a portion of the pavement within the 83rd Ave NE ROW is tributary to the project site. In the developed condition, this pavement will continue to be tributary to the site. This area has been modeled as upstream flow through in WWH\M in both the predeveloped and developed conditions. The values as modeled in WWHM are as follows:

Table 7: Predeveloped Conditions: Upstream Basin

Upstream Basin	
Ground Cover	Area (acre)
Roads, flat	0.09
Total	**0.09**

4.3 Detention Facility Design

The proposed detention vault facility used for mitigating developed condition flows was designed in compliance with the 2019 DOE requirements to model hydrologic conditions and detention in a continuous runoff model (WWHM2012) where the following evaluation parameters are employed:

> *"Flow duration is computed by counting the number of flow values that exceed a specified flow level. The specified flow levels used by WWHM in the flow duration*
> *analysis are listed below.*
> 1. *50% of the 2-year predevelopment peak flow.*
> 2. *100% of the 2-year predevelopment peak flow.*
> 3. *100% of the 50-year predevelopment peak flow.*
>
> *There are three criteria by which flow duration values are compared:*
> 1. *If the postdevelopment flow duration values exceed any of the predevelopment flow levels between 50% and 100% of the 2-year predevelopment peak flow values (100 Percent Threshold) then the flow duration requirement has not been met.*
> 2. *If the postdevelopment flow duration values exceed any of the predevelopment flow levels between 100% of the 2-year and 100% of the 50-year predevelopment peak flow values more than 10 percent of the time (110 Percent Threshold) then the flow duration requirement has not been met.*
> 3. *If more than 50 percent of the flow duration levels exceed the 100 percent threshold then the flow duration requirement has not been met."*

Detention Vault Facility
The proposed cast in place concrete detention facility detains, and releases collected storm water runoff from the Onsite Basin, Upstream Basin and Frontage Basin. The facility is located in Tract 997. Flows from the developed basins are collected and conveyed to the detention vault via a proposed network of catch basins and storm water conveyance pipes. Detailed WWHM output is provided in Appendix 4. A summary of the detailed statistics and inputs used for modeling the system in WWHM2012 can be found below.

Table 8: Detention Vault Design Summary

Detention Vault	
Live Storage Bottom Area (modeled)	*6,300 SF*
Live Storage Bottom Area (provided)	*6,300 SF*
Number of Cells	*3*
Cell Dimensions	*(3 x 23.3' x 90)*
Begin Live Storage Elevation	336.0
Riser Height	6.00'
Volume (modeled)	37,800 CF
Volume (provided)	37,800 CF

See table below for the flow rates and water surface elevations by storm event for the detention vault.

Table 9: Flow Rates and Water Surface Elevations by Storm Event

Storm Event	Predeveloped Rate (cfs)	Mitigated Rates (cfs)	Water Surface Elevation (ft)
2-Year	0.1952	0.1053	338.52
10-Year	0.4076	0.1723	340.25
50-Year	0.6837	0.2484	340.67
100-Year	0.8320	0.2869	341.01

4.4 Water Quality Treatment

Perkfilter
Water quality treatment for the mitigated site is accomplished through a Perkfilter structure located downstream of the detention vault. A summary of design criteria is provided below:

Table 10: Perkfilter Design Summary

60" Ø Perkfilter Manhole	
Tributary Area	3.38 AC
Tributary PGIS Area	1.05 AC
Water Quality Flow Rate (2 yr mitigated peak)	0.1053 cfs
WQ Treatment Capacity	0.1130 cfs
Number of Cartridges	3
Cartridge Height	12"+18"
Internal Drop	3.5'
Peak Flow Rate	0.2869 cfs
Peak Flow Storm Event	100-year

4.5 Onsite Stormwater Management

The project does not the LID performance standard and minimum requirements 1-9 are required for the project but choose to implement List #2 to evaluate low impact design. The following BMP's below are assessed for implementation:

Lawn and Landscaped Areas:

1. *Post-Construction Soil Quality and Depth*
    - BMP T5.13 soils will be applied to all permeable and landscaped areas in developed condition.
        i. **Conclusion: Feasible**

Roofs:

1. *Downspout Full Infiltration per BMP T5.10A or Downspout Full Dispersion per BMP T5.30*
    - Infiltration is not feasible on site due to the lack of infiltratable soils which has been confirmed by testing found in the geotechnical report and thus BMP T5.10A is infeasible. Due to site specific constraints including building locations as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path to disperse on site per BMP T5.30.
        i. **Conclusion: Infeasible**

2. *Bioretention*
    - Due to spatial constraints provide by the development footprint and infiltration infeasibility as confirmed by testing in the geotechnical report, a bioretention facility cannot be designed to provide the required horizontally projected surface area.
        i. **Conclusion: Infeasible**

3. *Downspout Dispersion per BMP T5.10B.*
    - Due to site specific constraints including building location as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path length to disperse on site.
        i. **Conclusion: Infeasible**

4. *Perforated Stub-Out Connections per BMP T5.10C.*
    - No stub-out connections will be implemented in the design as soils are not suitable for infiltration as well as the site's proximity to steep slopes.
        i. **Conclusion: Infeasible**

Other Hard Surfaces:

1. *Full Dispersion per BMP T5.30*
    - Due to site specific constraints including building as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path to disperse on site.
        i. **Conclusion: Infeasible**

2. *BMP T5.15 Permeable Pavement*
    - Infiltration is not feasible on site per the Geotechnical Engineer, which has been confirmed by testing found in the geotechnical report.
        i. **Conclusion: Infeasible**

3. *Bioretention*
    - Due to spatial constraints provide by the development footprint and infiltration infeasibility as confirmed by testing in the geotechnical report, a bioretention facility cannot be designed to provide the required horizontally projected surface area.
        i. **Conclusion: Infeasible**

4. *Sheet Flow Dispersion or Concentrated Flow Dispersion in accordance with BMP T5.12 or BMP T5.11*
    - Due to site specific constraints including building location as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path length to disperse on site.
        i. **Conclusion: Infeasible**

SECTION 5: CONVEYANCE DESIGN

The stormwater conveyance system is comprised of a network of open/closed grate catch basins, buried pipe, a concrete detention vault and a Perkfilter water quality unit. Catch basins have been located such that each section of storm drainage pipe may adequately convey associated tributary area flows.

A fully prepared conveyance capacity analysis of the proposed pipes onsite will be prepared at a future submittal.

SECTION 6: OPERATIONS AND MAINTENANCE MANUAL

The proposed storm drainage system consists of buried pipes, catch basins, a detention vault, and a perkfilter water quality treatment structure. These facilities will require periodic maintenance and inspection. Inspection and maintenance procedures are contained on the following pages.

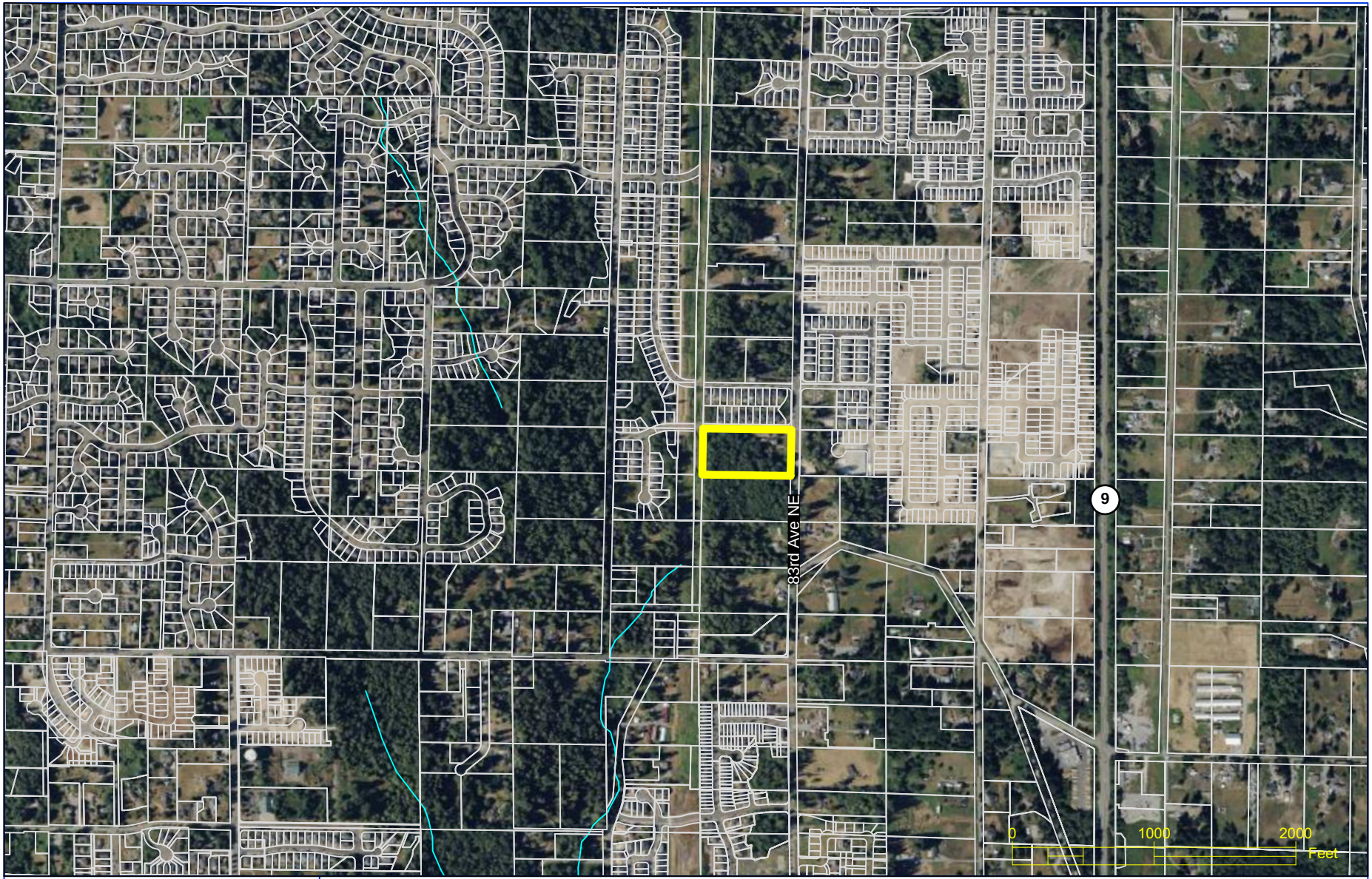
SECTION 7: SPECIAL REPORTS AND STUDIES

The following studies were conducted in preparation of this Report:

- Critical Areas Report, Wetland Resources, January 2024
- Geotechnical Report, Earth Solutions NW, January 2024

Appendix 1: Project Overview

1. Vicinity Map
2. Existing Conditions Map
3. Proposed Development Map



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Redmond, WA 98052

CORNERSTONE HOMES

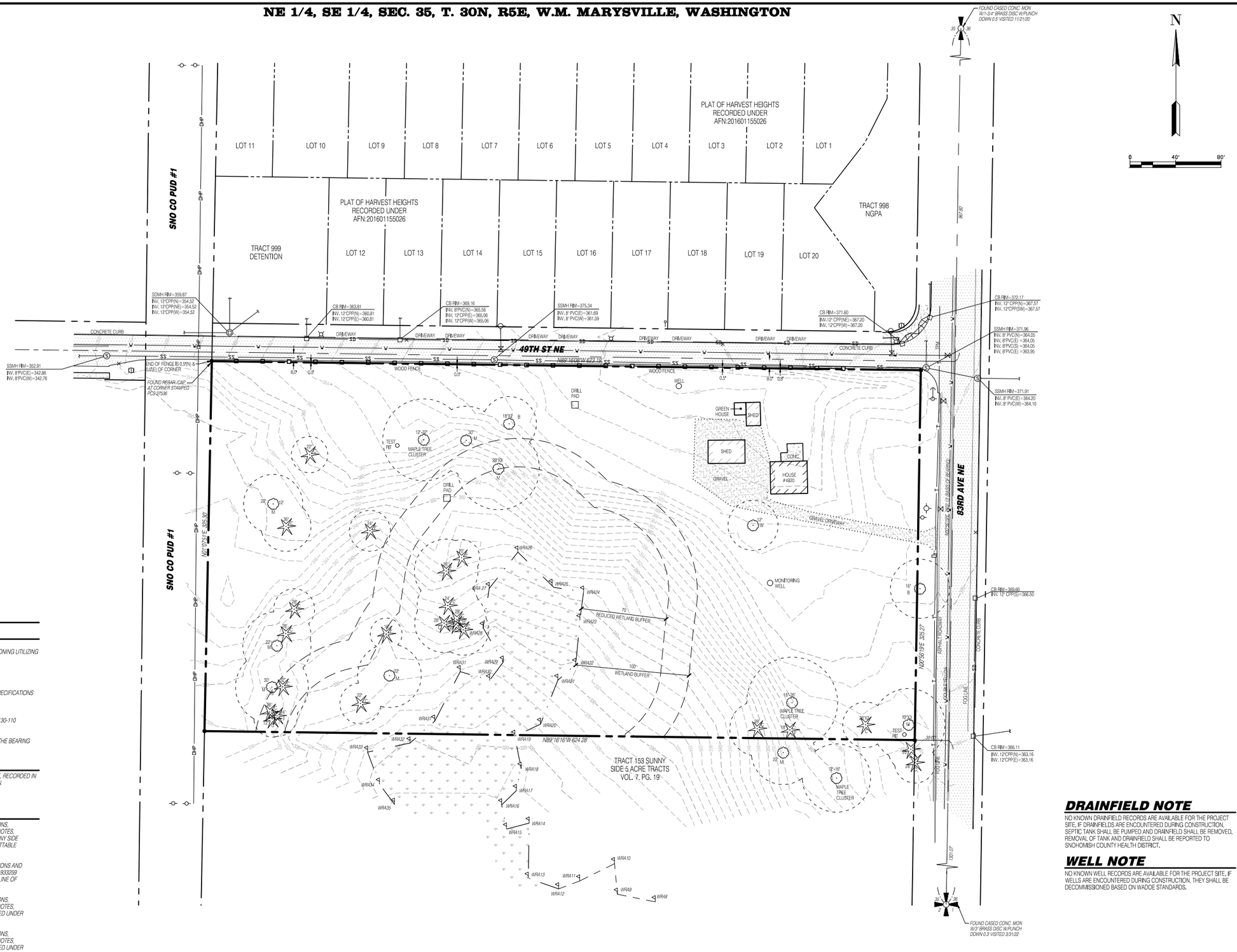
TAYLOR LANE

VICINITY MAP

JOB NUMBER:	23-0009	DATE:	1-15-24
JURISDICTION:	Marysville	DRAWN BY:	CJD

C:\Users\CooperDanby\Documents\CAD-GIS\Maps\Taylor Marysville\Taylor Vicinity Map.dwg

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 005619' EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67'= NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

DRAINFIELD NOTE

NO KNOWN DRAINFIELD RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF DRAINFIELDS ARE ENCOUNTERED DURING CONSTRUCTION, SEPTIC TANK SHALL BE PUMPED AND DRAINFIELD SHALL BE REMOVED. REMOVAL OF TANK AND DRAINFIELD SHALL BE REPORTED TO SNOHOMISH COUNTY HEALTH DISTRICT.

WELL NOTE

NO KNOWN WELL RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF WELLS ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE DECOMMISSIONED BASED ON WADOE STANDARDS.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

811 SAFETY IS IN YOUR HANDS. EVERY DIG. EVERY TIME.

THOMAS P. ABBOTT STATE OF WASHINGTON 56921 REGISTERED PROFESSIONAL ENGINEER

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

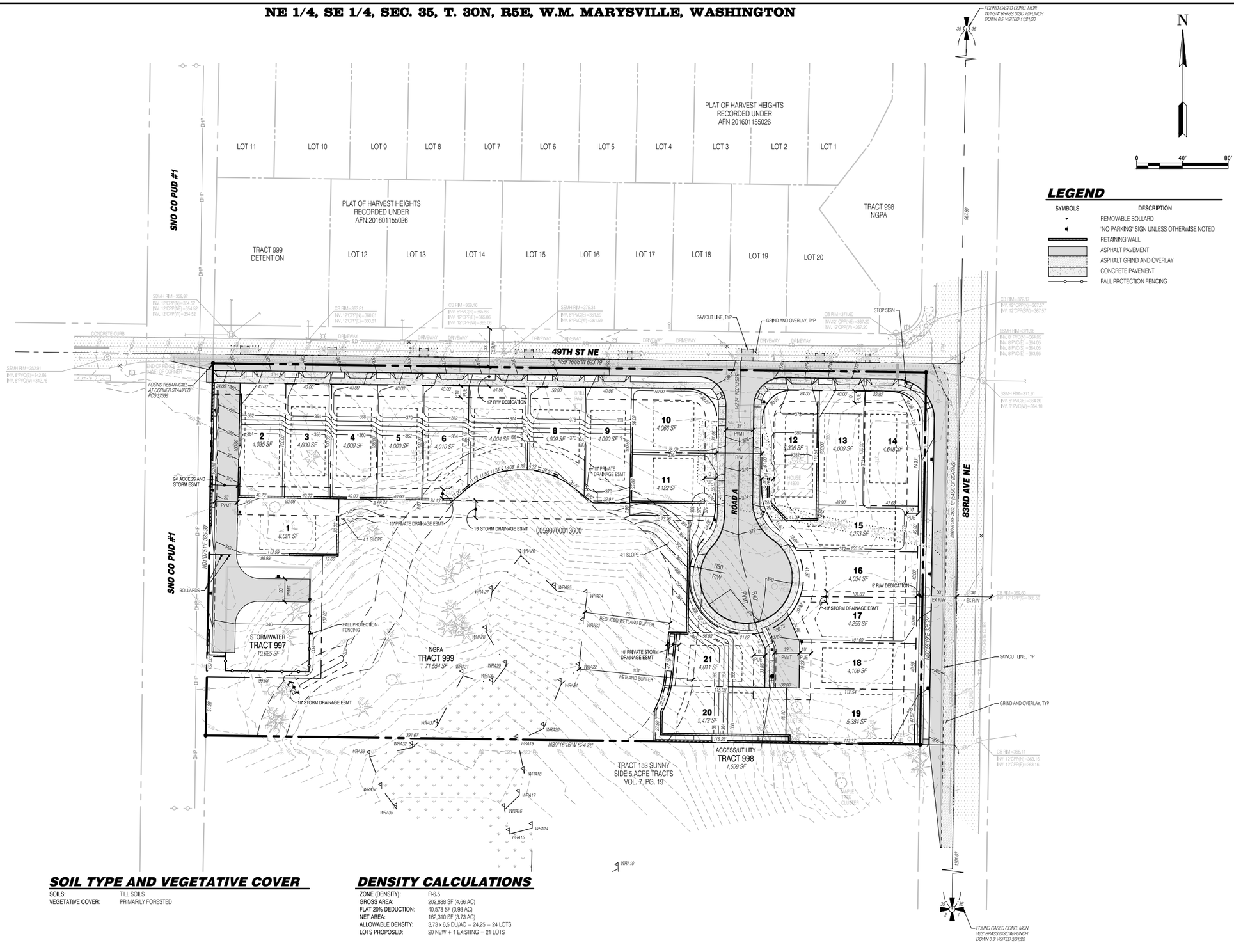
DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	12-05-23
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

EC-01

2 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



PROJECT INFORMATION

TAX PARCELS:	005907000013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE
SITE AREA:	202,889 SF 4.66 AC
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	20 NEW + 1 EXISTING = 21 LOTS

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

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ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 168th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	12-05-23
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PP-01

3 OF 8

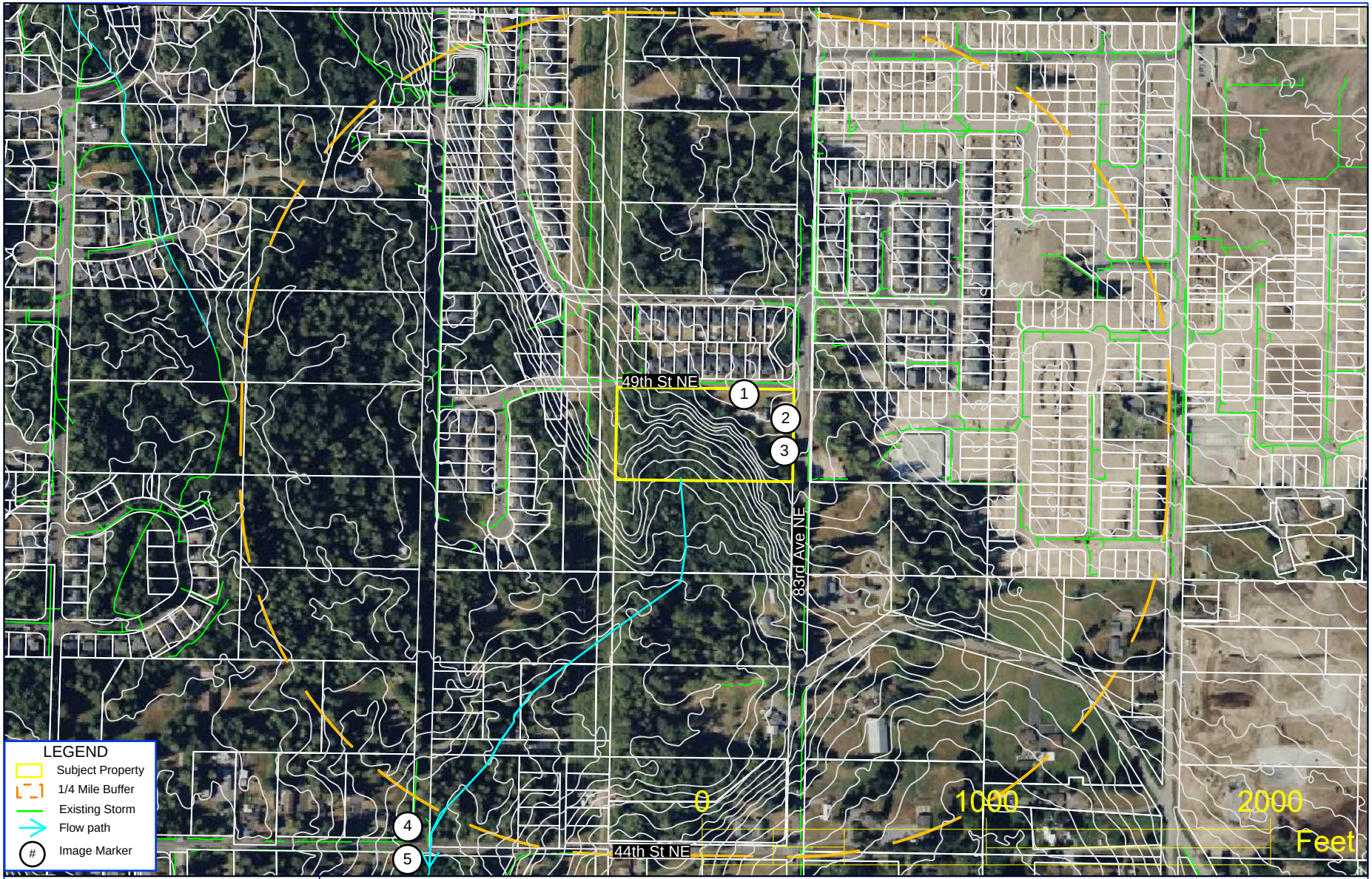
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Appendix 2: Temporary Erosion and Sediment Control Design

1. TESC Plans (to be provided in later submittal)

Appendix 3: Downstream Analysis

1. Downstream Analysis Map
2. Downstream Analysis Site Visit Pictures
3. USDA Soils Map & Description



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CORNERSTONE HOMES

TAYLOR LANE

DOWNSTREAM ANALYSIS MAP

JOB NUMBER:	23-0009	DATE:	1-15-24
JURISDICTION:	Marysville	DRAWN BY:	CJD

C:\Users\CooperDanby\Documents\CAD-GIS\Maps\Taylor Marysville\Taylor Downstream Map.dwg

Downstream Analysis Photographs



Image 1: 49th St NE frontage, does not contribute upstream run-on



Image 2: 49th St NE and 83rd Ave NE intersection property corner



Image 3: 83rd Ave NE frontage, contributes some upstream run-on due to lack of existing swale/ditch



Image 4: North side of 44th St NE, prior to King Creek crossing



Image 5: South side of 44th St NE, King Creek continues beyond quarter mile boundary



Map Scale: 1:1,060 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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: Snohomish County Area, Washington
Survey Area Data: Version 25, Aug 29, 2023

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

Date(s) aerial images were photographed: Aug 14, 2022—Sep 1, 2022

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
72	Tokul gravelly medial loam, 0 to 8 percent slopes	5.0	100.0%
Totals for Area of Interest		**5.0**	**100.0%**

Snohomish County Area, Washington

72—Tokul gravelly medial loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t61k
Elevation: 160 to 1,150 feet
Mean annual precipitation: 45 to 70 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 140 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tokul and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tokul

Setting

Landform: Hillslopes, till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash mixed with loess over glacial till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oa - 1 to 2 inches: highly decomposed plant material
A - 2 to 6 inches: gravelly medial loam
Bs1 - 6 to 9 inches: gravelly medial loam
Bs2 - 9 to 17 inches: gravelly medial loam
Bs3 - 17 to 24 inches: gravelly medial loam
BC - 24 to 33 inches: gravelly medial fine sandy loam
2Bsm - 33 to 62 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material; 20 to 39 inches to cemented horizon
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 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 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XF303WA)
Other vegetative classification: Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XF303WA)
Hydric soil rating: No

Minor Components

Pastik

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Barneston

Percent of map unit: 5 percent
Landform: Moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Norma

Percent of map unit: 3 percent
Landform: Drainageways, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Mckenna

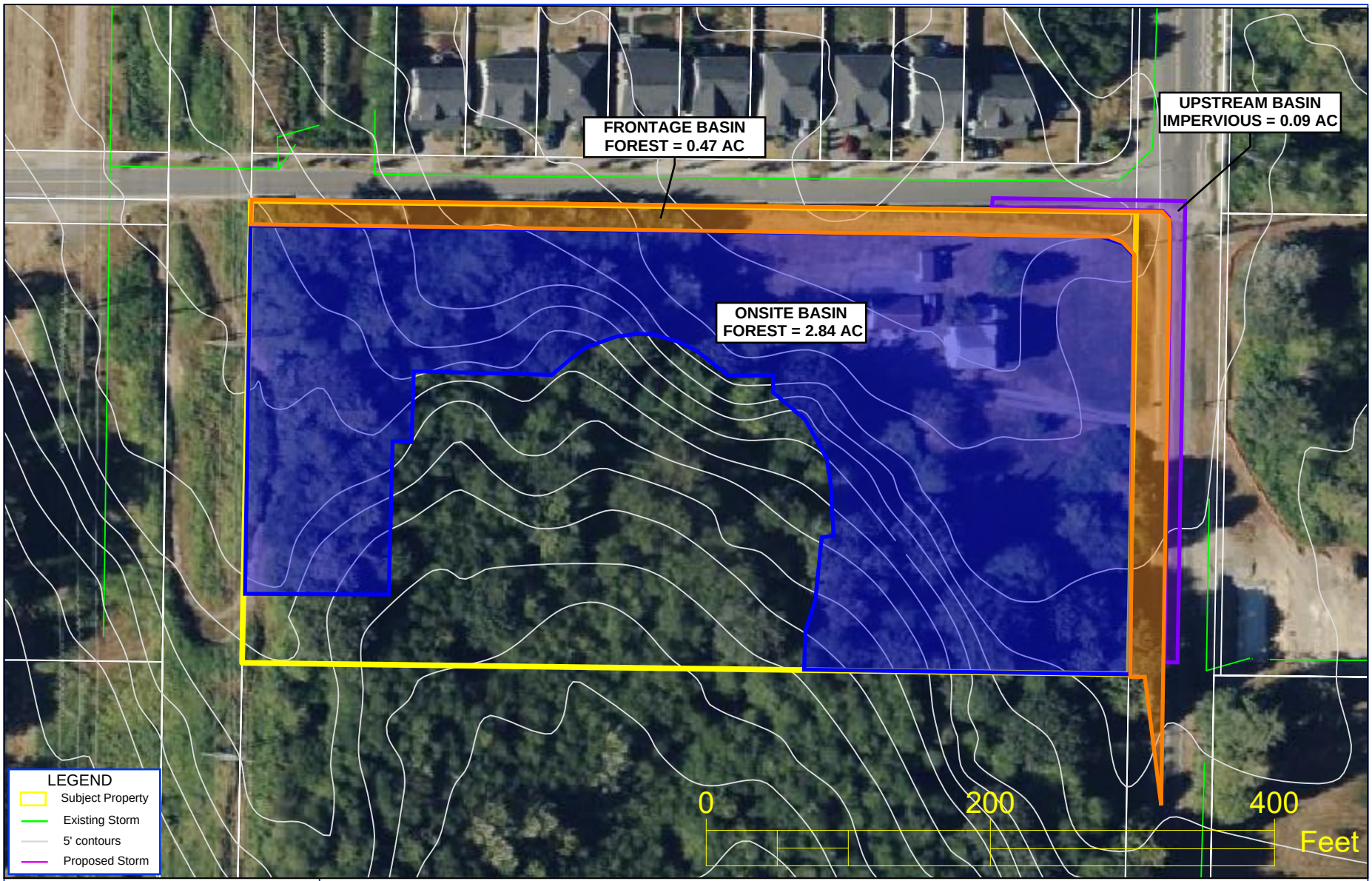
Percent of map unit: 2 percent
Landform: Drainageways, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Snohomish County Area, Washington
Survey Area Data: Version 25, Aug 29, 2023

Appendix 4: Detention and Water Quality Design Analysis

1. Predeveloped Hydrology Map
2. Developed Hydrology Map
3. Perkfilter Detail
4. WWHM2012 Output – Detention Vault



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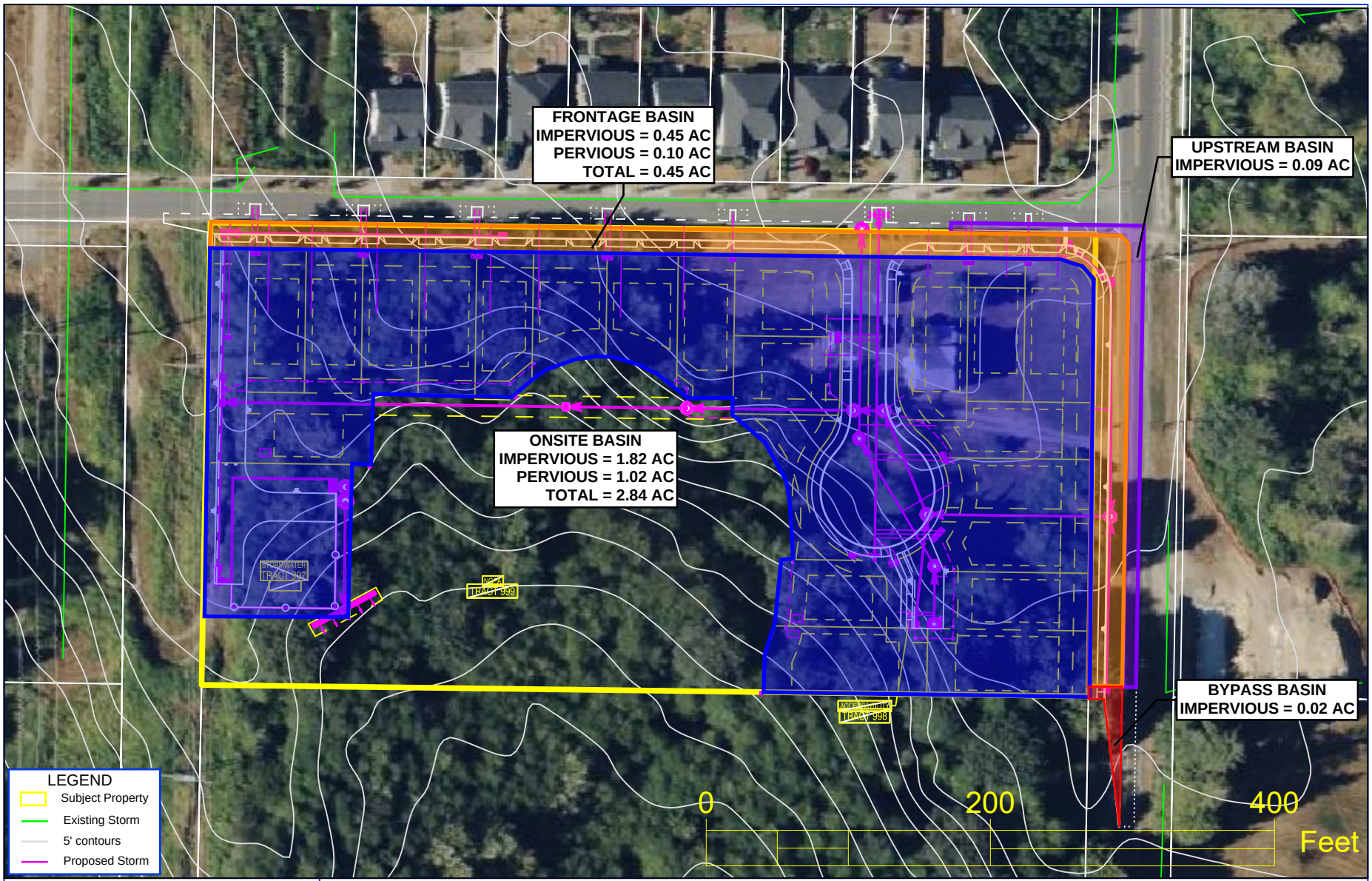
CORNERSTONE HOMES

TAYLOR LANE

PREDEVELOPED HYDROLOGY MAP

JOB NUMBER:	23-0009	DATE:	1-15-24
JURISDICTION:	Marysville	DRAWN BY:	CJD

C:\Users\CooperDanby\Documents\CAD-GIS\Maps\Taylor Marysville\Taylor PreDev Basin Map.dwg



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Redmond, WA 98052

CORNERSTONE HOMES

TAYLOR LANE

DEVELOPED HYDROLOGY MAP

JOB NUMBER:	23-0009	DATE:	1-15-24
JURISDICTION:	Marysville	DRAWN BY:	CJD

C:\Users\CooperDanby\Documents\CAD-GIS\Maps\Taylor Marysville\Taylor Dev Basin Map.dwg

SITE SPECIFIC DATA	
Structure ID	-
Treatment Flow Rate (gpm/cfs)	-
Peak Flow Rate (cfs)	-
Cartridge Quantity	-
Rim Elevation	-

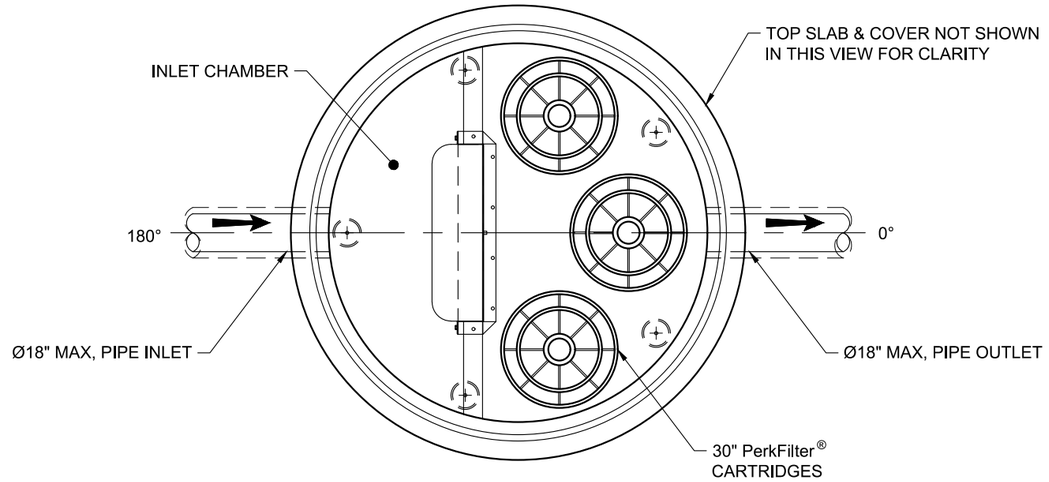
Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Inlet	-	-	-	-
Outlet	-	-	-	-

Notes:
-

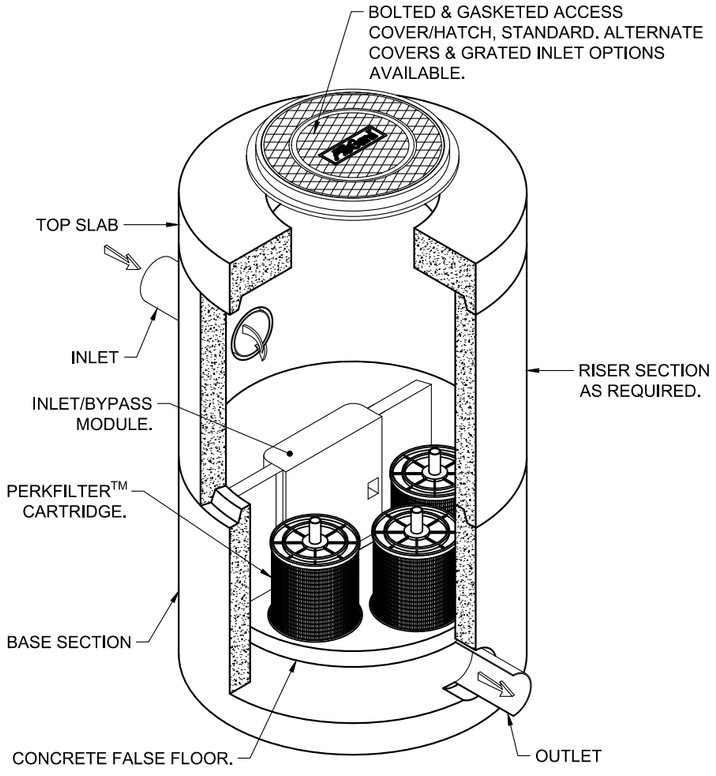
PERFORMANCE SPECIFICATIONS	
Peak Treatment Capacities: [1]	
Max. Cartridge Quantity	3
NJDEP 80% Removal, 75 micron	102 gpm / 0.227 cfs
WA Ecology GULD - Basic & Phosphorus	51 gpm / 0.113 cfs
Max. Bypass Capacity	3.62 cfs

1. Contact Oldcastle for alternative treatment and peak flow capacities.

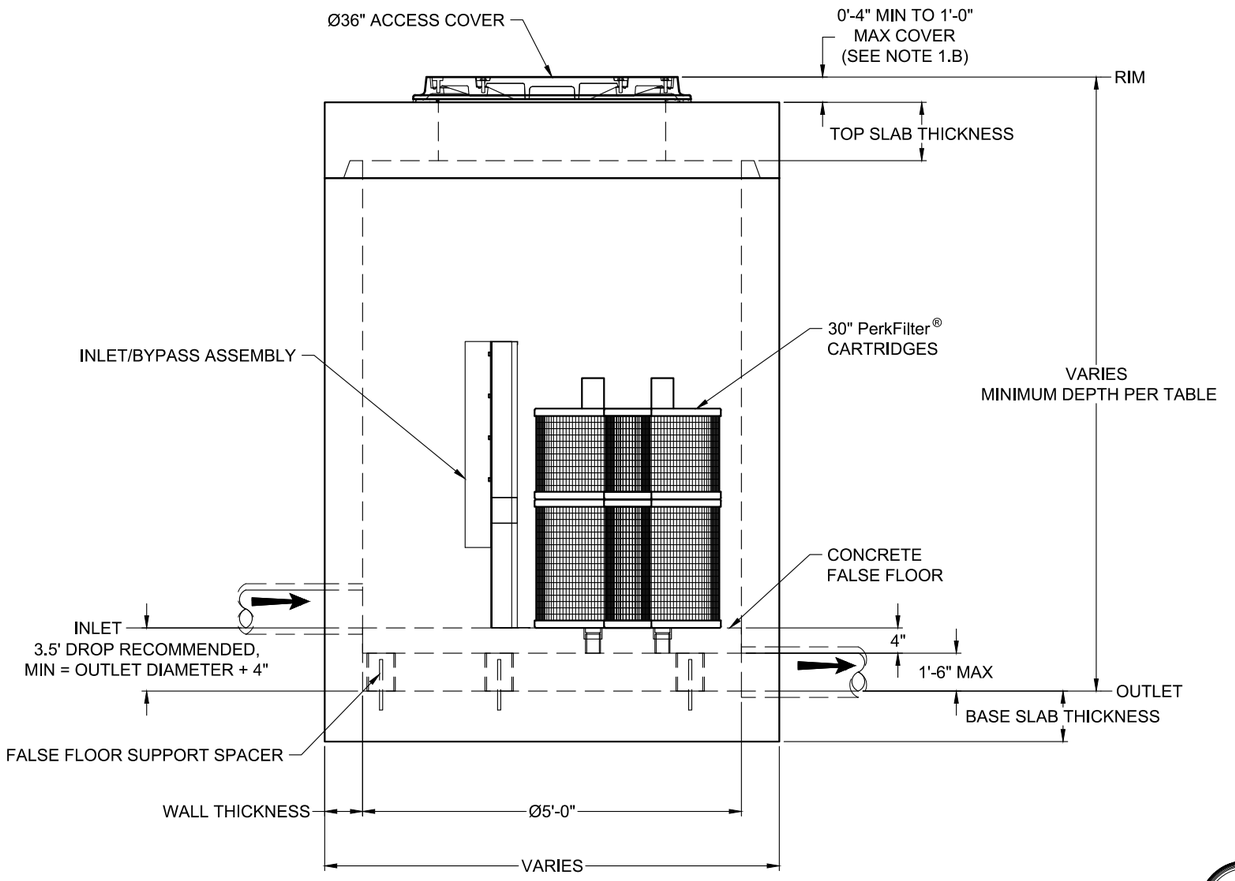
MINIMUM DEPTH	
Outlet Pipe Size	Minimum Rim to Outlet Depth
Ø6"	6.08'
Ø8"	6.33'
Ø10"	6.58'
Ø12"	6.83'
Ø15"	7.08'
Ø18"	7.33'



PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW

NOTES:

1. DESIGN LOADINGS:
   A. AASHTO HS-20-44 (WITH IMPACT)
   B. DESIGN SOIL COVER: 1'-0" MAXIMUM
   C. ASSUMED WATER TABLE: BELOW INVERT.
   D. LATERAL EARTH PRESSURE: 45 PCF (DRAINED)
   E. LATERAL LIVE LOAD SURCHARGE: 80 PSF (APPLIED TO 8'-0" BELOW GRADE)
   F. NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
2. CONCRETE 28-DAY MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI MINIMUM.
3. REINFORCING: REBAR, ASTM A615/A706, GRADE 60
4. CEMENT: ASTM C150
5. REQUIRED ALLOWABLE SOIL BEARING CAPACITY: 2,500 PSF
6. REFERENCE STANDARD:
   A. ASTM C 478
   B. ASTM C 497
7. THIS STRUCTURE IS DESIGNED TO THE PARAMETERS NOTED HEREIN. ENGINEER-OF-RECORD SHALL VERIFY THAT NOTED PARAMETERS MEET OR EXCEED PROJECT REQUIREMENTS. IF DESIGN PARAMETERS ARE INCORRECT, REVIEWING ENGINEER/AUTHORITY SHALL NOTIFY OLDCASTLE INFRASTRUCTURE UPON REVIEW OF THIS SUBMITTAL.
8. OVERSIZED HOLES TO ACCOMMODATE SPECIFIC PIPE TYPE MUST BE CONCENTRIC TO PIPE ID. AFTER PIPES ARE INSTALLED, ALL ANNULAR SPACES SHALL BE FILLED WITH A MINIMUM OF 3,000 PSI CONCRETE FOR FULL THICKNESS OF PRECAST WALLS. PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE.
9. CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
10. CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
11. SECTION HEIGHTS, SLAB/WALL THICKNESSES, AND KEYWAYS ARE SUBJECT TO CHANGE AS REQUIRED FOR SITE REQUIREMENTS AND/OR DUE TO PRODUCT AVAILABILITY AND PRODUCTION FACILITY CONSTRAINTS.
12. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT OLDCASTLE INFRASTRUCTURE.
13. MAXIMUM PICK WEIGHTS:
   A. TOP SLAB: XX,XXX LBS
   B. RISER: XX,XXX LBS
   C. BASE: XX,XXX LBS*
   (* COMBINED WEIGHT OF BASE INCLUDES FALSE FLOOR, AND PRODUCT INTERNALS.)
14. INTERNALS SHALL CONSIST OF CARTRIDGES, INLET/BYPASS ASSEMBLIES, FALSE FLOOR AND FALSE FLOOR SUPPORT SPACERS.

Oldcastle Infrastructure™
A CRH COMPANY

Ph: 800.579.8819 | www.oldcastleinfrastructure.com/stormwater

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PerkFilter® Manhole (STANDARD)
Ø60" with 30" Cartridges

CUSTOMER
-

PROJECT NAME
-

SHEET NAME	REVISION	SHEET
Specifier Drawing PFMH-60-30	-	1 OF 1
	REV DATE -	

Media Filtration

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: Prelim Vault Sizing
Site Name:
Site Address:
City:

Report Date:	11/30/2023
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.200
Version Date:	2023/01/27
Version:	4.2.19

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

onsite

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	2.84
Pervious Total	2.84
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.84

frontage

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.47
Pervious Total	0.47
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.47

upstream

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.09
Impervious Total	0.09
Basin Total	0.09

Mitigated Land Use

onsite

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.75
C, Pasture, Mod	0.27
Pervious Total	1.02

Impervious Land Use	acre
ROADS FLAT	0.36
ROOF TOPS FLAT	1.04
DRIVEWAYS FLAT	0.35
SIDEWALKS FLAT	0.07
Impervious Total	1.82
Basin Total	2.84

frontage

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.1
Pervious Total	0.1

Impervious Land Use	acre
ROADS FLAT	0.25
SIDEWALKS FLAT	0.1
Impervious Total	0.35
Basin Total	0.45

frontage bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.02
Impervious Total	0.02
Basin Total	0.02

upstream

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.09
Impervious Total	0.09
Basin Total	0.09

Mitigated Routing

Vault 1

Width: 90 ft.
Length: 70 ft.
Depth: 7 ft.
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 1.563 in. Elevation:0 ft.
Orifice 2 Diameter: 2.375 in. Elevation:4.2 ft.
Orifice 3 Diameter: 1.531 in. Elevation:5.3 ft.
Element Flows To:
Outlet 1 Outlet 2

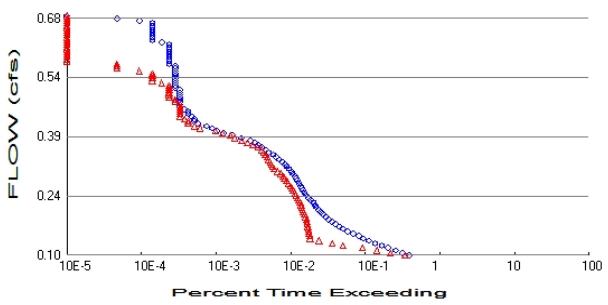
Vault Hydraulic Table

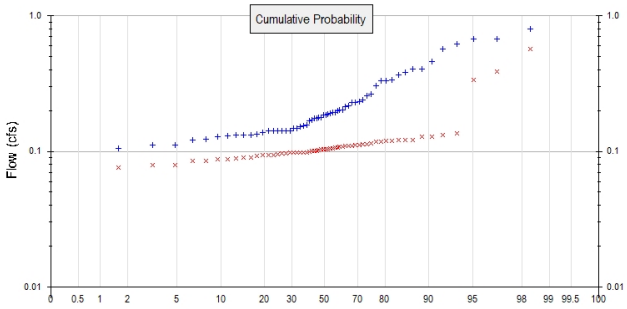
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.144	0.000	0.000	0.000
0.0778	0.144	0.011	0.018	0.000
0.1556	0.144	0.022	0.026	0.000
0.2333	0.144	0.033	0.032	0.000
0.3111	0.144	0.045	0.037	0.000
0.3889	0.144	0.056	0.041	0.000
0.4667	0.144	0.067	0.045	0.000
0.5444	0.144	0.078	0.048	0.000
0.6222	0.144	0.090	0.052	0.000
0.7000	0.144	0.101	0.055	0.000
0.7778	0.144	0.112	0.058	0.000
0.8556	0.144	0.123	0.061	0.000
0.9333	0.144	0.135	0.064	0.000
1.0111	0.144	0.146	0.066	0.000
1.0889	0.144	0.157	0.069	0.000
1.1667	0.144	0.168	0.071	0.000
1.2444	0.144	0.180	0.073	0.000
1.3222	0.144	0.191	0.076	0.000
1.4000	0.144	0.202	0.078	0.000
1.4778	0.144	0.213	0.080	0.000
1.5556	0.144	0.225	0.082	0.000
1.6333	0.144	0.236	0.084	0.000
1.7111	0.144	0.247	0.086	0.000
1.7889	0.144	0.258	0.088	0.000
1.8667	0.144	0.270	0.090	0.000
1.9444	0.144	0.281	0.092	0.000
2.0222	0.144	0.292	0.094	0.000
2.1000	0.144	0.303	0.096	0.000
2.1778	0.144	0.315	0.097	0.000
2.2556	0.144	0.326	0.099	0.000
2.3333	0.144	0.337	0.101	0.000
2.4111	0.144	0.348	0.102	0.000
2.4889	0.144	0.360	0.104	0.000
2.5667	0.144	0.371	0.106	0.000
2.6444	0.144	0.382	0.107	0.000
2.7222	0.144	0.393	0.109	0.000
2.8000	0.144	0.405	0.110	0.000
2.8778	0.144	0.416	0.112	0.000

2.9556	0.144	0.427	0.113	0.000
3.0333	0.144	0.438	0.115	0.000
3.1111	0.144	0.450	0.116	0.000
3.1889	0.144	0.461	0.118	0.000
3.2667	0.144	0.472	0.119	0.000
3.3444	0.144	0.483	0.121	0.000
3.4222	0.144	0.494	0.122	0.000
3.5000	0.144	0.506	0.123	0.000
3.5778	0.144	0.517	0.125	0.000
3.6556	0.144	0.528	0.126	0.000
3.7333	0.144	0.539	0.128	0.000
3.8111	0.144	0.551	0.129	0.000
3.8889	0.144	0.562	0.130	0.000
3.9667	0.144	0.573	0.132	0.000
4.0444	0.144	0.584	0.133	0.000
4.1222	0.144	0.596	0.134	0.000
4.2000	0.144	0.607	0.135	0.000
4.2778	0.144	0.618	0.179	0.000
4.3556	0.144	0.629	0.198	0.000
4.4333	0.144	0.641	0.213	0.000
4.5111	0.144	0.652	0.226	0.000
4.5889	0.144	0.663	0.237	0.000
4.6667	0.144	0.674	0.247	0.000
4.7444	0.144	0.686	0.257	0.000
4.8222	0.144	0.697	0.266	0.000
4.9000	0.144	0.708	0.274	0.000
4.9778	0.144	0.719	0.282	0.000
5.0556	0.144	0.731	0.290	0.000
5.1333	0.144	0.742	0.298	0.000
5.2111	0.144	0.753	0.305	0.000
5.2889	0.144	0.764	0.312	0.000
5.3667	0.144	0.776	0.335	0.000
5.4444	0.144	0.787	0.349	0.000
5.5222	0.144	0.798	0.361	0.000
5.6000	0.144	0.809	0.372	0.000
5.6778	0.144	0.821	0.383	0.000
5.7556	0.144	0.832	0.392	0.000
5.8333	0.144	0.843	0.402	0.000
5.9111	0.144	0.854	0.411	0.000
5.9889	0.144	0.866	0.419	0.000
6.0667	0.144	0.877	0.610	0.000
6.1444	0.144	0.888	1.008	0.000
6.2222	0.144	0.899	1.490	0.000
6.3000	0.144	0.911	1.961	0.000
6.3778	0.144	0.922	2.338	0.000
6.4556	0.144	0.933	2.580	0.000
6.5333	0.144	0.944	2.774	0.000
6.6111	0.144	0.956	2.943	0.000
6.6889	0.144	0.967	3.102	0.000
6.7667	0.144	0.978	3.252	0.000
6.8444	0.144	0.989	3.395	0.000
6.9222	0.144	1.001	3.532	0.000
7.0000	0.144	1.012	3.664	0.000
7.0778	0.144	1.023	3.790	0.000
7.1556	0.000	0.000	3.912	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.31
Total Impervious Area: 0.09

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.12
Total Impervious Area: 2.28

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.195214
5 year	0.311313
10 year	0.407627
25 year	0.554341
50 year	0.68372
100 year	0.832006

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.10527
5 year	0.143273
10 year	0.172345
25 year	0.213816
50 year	0.248357
100 year	0.28621

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.228	0.098
1950	0.256	0.101
1951	0.171	0.094
1952	0.174	0.079
1953	0.176	0.085
1954	0.677	0.104
1955	0.239	0.110
1956	0.192	0.118
1957	0.265	0.121
1958	0.673	0.098

1959	0.169	0.107
1960	0.201	0.113
1961	0.799	0.106
1962	0.201	0.102
1963	0.331	0.093
1964	0.212	0.093
1965	0.131	0.103
1966	0.105	0.088
1967	0.190	0.097
1968	0.232	0.121
1969	0.620	0.094
1970	0.128	0.090
1971	0.231	0.110
1972	0.177	0.108
1973	0.141	0.098
1974	0.367	0.097
1975	0.194	0.089
1976	0.135	0.108
1977	0.123	0.095
1978	0.142	0.079
1979	0.382	0.113
1980	0.185	0.088
1981	0.138	0.096
1982	0.177	0.128
1983	0.305	0.098
1984	0.152	0.118
1985	0.218	0.115
1986	0.459	0.337
1987	0.200	0.135
1988	0.142	0.109
1989	0.185	0.071
1990	0.141	0.111
1991	0.156	0.111
1992	0.155	0.100
1993	0.132	0.090
1994	0.111	0.104
1995	0.149	0.119
1996	0.333	0.119
1997	0.571	0.573
1998	0.148	0.085
1999	0.130	0.104
2000	0.121	0.121
2001	0.059	0.076
2002	0.141	0.106
2003	0.111	0.098
2004	0.189	0.133
2005	0.141	0.104
2006	0.404	0.128
2007	0.335	0.102
2008	0.405	0.386
2009	0.132	0.099

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.7991	0.5725
2	0.6774	0.3858
3	0.6727	0.3371

4	0.6201	0.1352
5	0.5705	0.1327
6	0.4588	0.1284
7	0.4054	0.1278
8	0.4040	0.1213
9	0.3819	0.1210
10	0.3665	0.1205
11	0.3354	0.1194
12	0.3326	0.1192
13	0.3306	0.1181
14	0.3052	0.1175
15	0.2648	0.1146
16	0.2555	0.1129
17	0.2386	0.1126
18	0.2324	0.1112
19	0.2308	0.1110
20	0.2283	0.1100
21	0.2179	0.1096
22	0.2124	0.1094
23	0.2013	0.1079
24	0.2008	0.1076
25	0.2004	0.1072
26	0.1939	0.1065
27	0.1922	0.1055
28	0.1905	0.1045
29	0.1892	0.1044
30	0.1851	0.1042
31	0.1851	0.1040
32	0.1774	0.1031
33	0.1772	0.1017
34	0.1761	0.1015
35	0.1741	0.1012
36	0.1707	0.1004
37	0.1687	0.0991
38	0.1564	0.0984
39	0.1553	0.0978
40	0.1517	0.0978
41	0.1486	0.0976
42	0.1480	0.0976
43	0.1420	0.0974
44	0.1417	0.0968
45	0.1415	0.0959
46	0.1412	0.0950
47	0.1411	0.0942
48	0.1407	0.0942
49	0.1381	0.0934
50	0.1348	0.0931
51	0.1324	0.0899
52	0.1319	0.0896
53	0.1312	0.0888
54	0.1302	0.0877
55	0.1275	0.0877
56	0.1234	0.0853
57	0.1209	0.0846
58	0.1108	0.0791
59	0.1108	0.0787
60	0.1052	0.0758
61	0.0585	0.0707

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0976	8339	7330	87	Pass
0.1035	6688	4648	69	Pass
0.1094	5407	3041	56	Pass
0.1154	4336	1946	44	Pass
0.1213	3531	1075	30	Pass
0.1272	2890	769	26	Pass
0.1331	2398	512	21	Pass
0.1390	2021	388	19	Pass
0.1450	1754	383	21	Pass
0.1509	1472	376	25	Pass
0.1568	1239	372	30	Pass
0.1627	1070	368	34	Pass
0.1687	955	362	37	Pass
0.1746	848	357	42	Pass
0.1805	755	353	46	Pass
0.1864	685	347	50	Pass
0.1923	630	339	53	Pass
0.1983	578	329	56	Pass
0.2042	538	316	58	Pass
0.2101	506	308	60	Pass
0.2160	471	299	63	Pass
0.2219	452	294	65	Pass
0.2279	431	284	65	Pass
0.2338	398	271	68	Pass
0.2397	366	263	71	Pass
0.2456	347	251	72	Pass
0.2515	328	243	74	Pass
0.2575	314	233	74	Pass
0.2634	302	221	73	Pass
0.2693	289	211	73	Pass
0.2752	274	198	72	Pass
0.2811	264	188	71	Pass
0.2871	254	176	69	Pass
0.2930	243	169	69	Pass
0.2989	230	159	69	Pass
0.3048	220	143	65	Pass
0.3107	202	128	63	Pass
0.3167	189	121	64	Pass
0.3226	178	117	65	Pass
0.3285	165	114	69	Pass
0.3344	150	109	72	Pass
0.3403	135	103	76	Pass
0.3463	125	97	77	Pass
0.3522	109	92	84	Pass
0.3581	100	87	87	Pass
0.3640	86	78	90	Pass
0.3699	78	66	84	Pass
0.3759	70	56	80	Pass
0.3818	62	47	75	Pass
0.3877	47	38	80	Pass
0.3936	35	33	94	Pass
0.3995	27	26	96	Pass
0.4055	22	21	95	Pass

0.4114	19	13	68	Pass
0.4173	16	11	68	Pass
0.4232	12	9	75	Pass
0.4291	11	9	81	Pass
0.4351	11	8	72	Pass
0.4410	10	7	70	Pass
0.4469	9	7	77	Pass
0.4528	9	7	77	Pass
0.4587	8	7	87	Pass
0.4647	7	7	100	Pass
0.4706	7	7	100	Pass
0.4765	7	6	85	Pass
0.4824	7	6	85	Pass
0.4883	7	5	71	Pass
0.4943	7	5	71	Pass
0.5002	7	5	71	Pass
0.5061	7	5	71	Pass
0.5120	6	5	83	Pass
0.5180	6	5	83	Pass
0.5239	6	4	66	Pass
0.5298	6	3	50	Pass
0.5357	6	3	50	Pass
0.5416	6	3	50	Pass
0.5476	6	3	50	Pass
0.5535	6	2	33	Pass
0.5594	6	1	16	Pass
0.5653	6	1	16	Pass
0.5712	5	1	20	Pass
0.5772	5	0	0	Pass
0.5831	5	0	0	Pass
0.5890	5	0	0	Pass
0.5949	5	0	0	Pass
0.6008	5	0	0	Pass
0.6068	5	0	0	Pass
0.6127	5	0	0	Pass
0.6186	5	0	0	Pass
0.6245	4	0	0	Pass
0.6304	3	0	0	Pass
0.6364	3	0	0	Pass
0.6423	3	0	0	Pass
0.6482	3	0	0	Pass
0.6541	3	0	0	Pass
0.6600	3	0	0	Pass
0.6660	3	0	0	Pass
0.6719	3	0	0	Pass
0.6778	2	0	0	Pass
0.6837	1	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.1562 acre-feet
On-line facility target flow:	0.0818 cfs.
Adjusted for 15 min:	0.0818 cfs.
Off-line facility target flow:	0.0523 cfs.
Adjusted for 15 min:	0.0523 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
Vault 1 POC	☐	475.34			☐	0.00			
Total Volume Infiltrated		475.34	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 = Passed

Model Default Modifications

Total of 0 changes have been made.

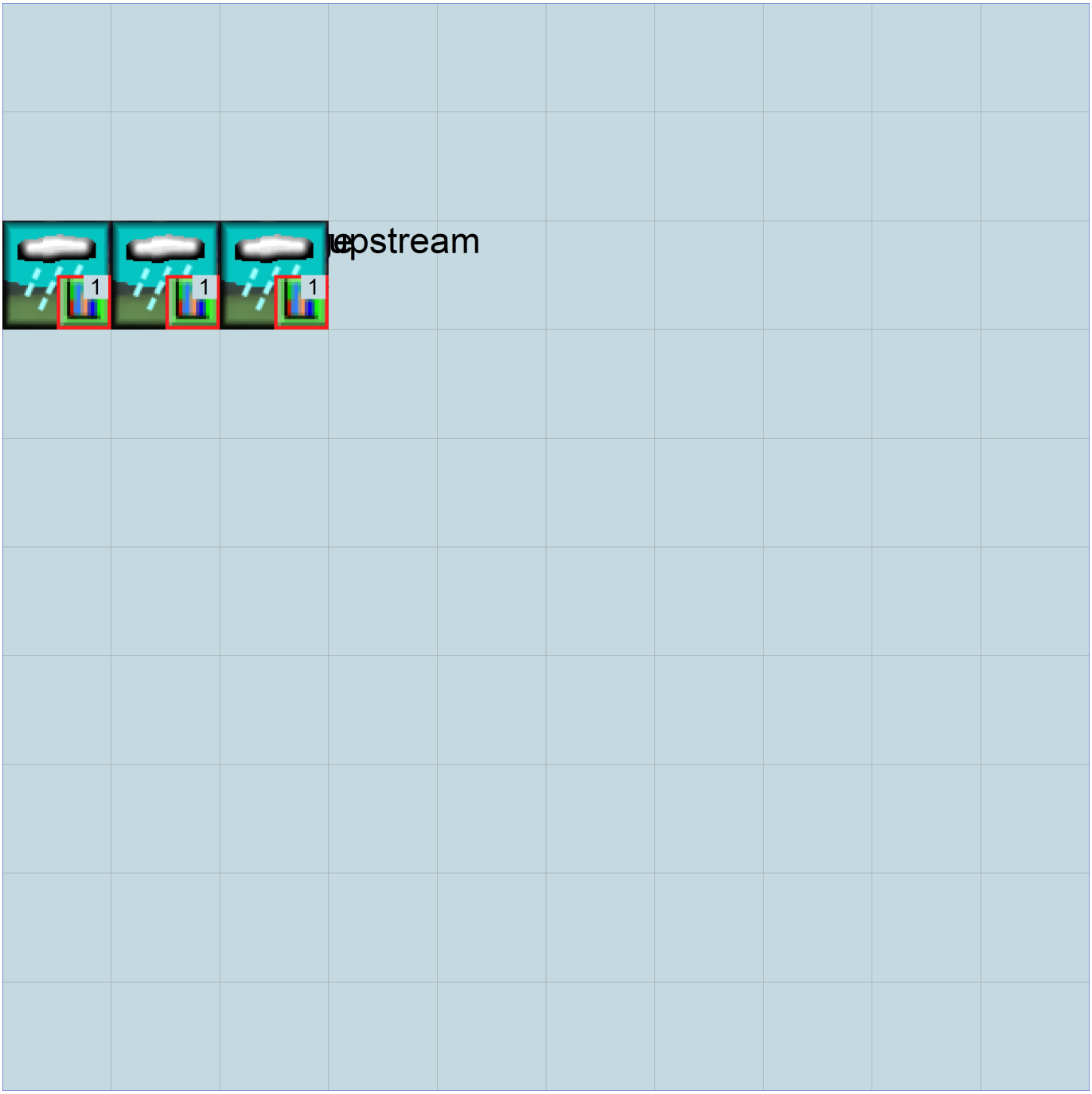
PERLND Changes

No PERLND changes have been made.

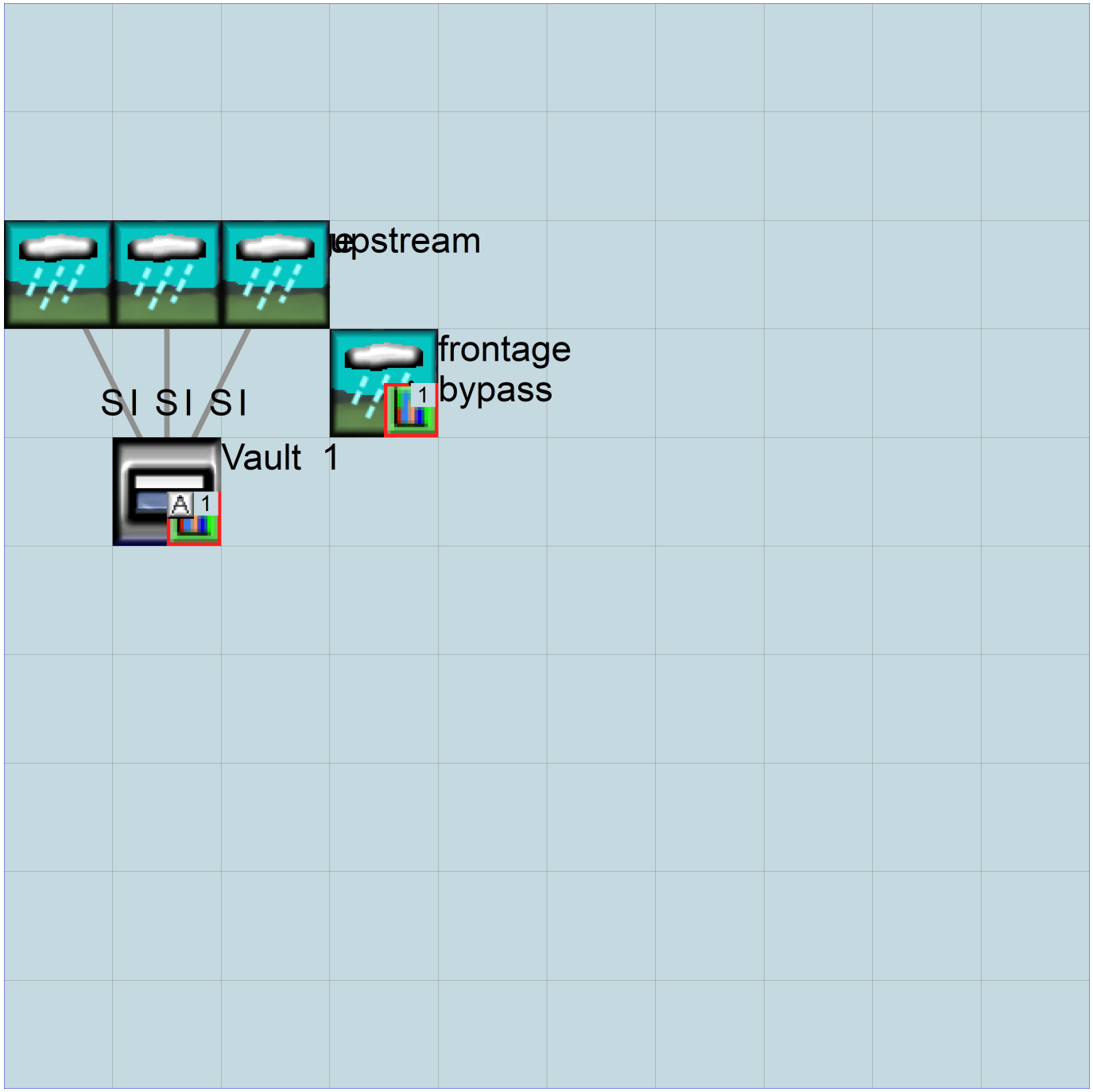
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 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   Prelim Vault Sizing.wdm
MESSU      25   PrePrelim Vault Sizing.MES
           27   PrePrelim Vault Sizing.L61
           28   PrePrelim Vault Sizing.L62
           30   POCPrelim Vault Sizing1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      PERLND      10
      IMPLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        onsite                    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           ***
   12     C, Forest, Steep        1    1    1    1   27    0
   10     C, 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 ***
   12         0    0    1    0    0    0    0    0    0    0    0    0
   10         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  *********
   12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   10         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 ***
   12         0    0    0    0    0    0    0    0    0    0    0
   10         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
   12              0       4.5      0.08       400      0.15       0.5     0.996
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   12              0         0         2         2         0         0         0
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   12            0.2       0.3      0.35         6       0.3       0.7
   10            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   12              0         0         0         0       2.5         1         0
   10              0         0         0         0       2.5         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
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         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    4    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
  END IWAT-PARM1

  IWAT-PARM2
```

```
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
onsite***
PERLND  12                       2.84     COPY   501     12
PERLND  12                       2.84     COPY   501     13
frontage***
PERLND  10                       0.47     COPY   501     12
PERLND  10                       0.47     COPY   501     13
upstream***
IMPLND   1                       0.09     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                     in  out                                ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1
```

```
  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                           ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 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   Prelim Vault Sizing.wdm
MESSU      25   MitPrelim Vault Sizing.MES
           27   MitPrelim Vault Sizing.L61
           28   MitPrelim Vault Sizing.L62
           30   POCPrelim Vault Sizing1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      13
      PERLND      14
      IMPLND       1
      IMPLND       4
      IMPLND       5
      IMPLND       8
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Vault  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         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           ***
   13     C, Pasture, Flat        1    1    1    1   27    0
   14     C, Pasture, Mod         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 ***
   13         0    0    1    0    0    0    0    0    0    0    0    0
   14         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  *********
   13         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   14         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 ***
   13         0    0    0    0    0    0    0    0    0    0    0
   14         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
   13              0       4.5      0.06       400      0.05        0.5      0.996
   14              0       4.5      0.06       400       0.1        0.5      0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   13              0         0         2         2         0         0         0
   14              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13           0.15       0.4       0.3         6       0.5       0.4
   14           0.15       0.4       0.3         6       0.5       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
   13              0         0         0         0       2.5          1         0
   14              0         0         0         0       2.5          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    4    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#   ***
onsite***
PERLND  13                       0.75     RCHRES   1      2
PERLND  13                       0.75     RCHRES   1      3
PERLND  14                       0.27     RCHRES   1      2
PERLND  14                       0.27     RCHRES   1      3
IMPLND   1                       0.36     RCHRES   1      5
IMPLND   4                       1.04     RCHRES   1      5
IMPLND   5                       0.35     RCHRES   1      5
IMPLND   8                       0.07     RCHRES   1      5
frontage***
PERLND  13                        0.1     RCHRES   1      2
PERLND  13                        0.1     RCHRES   1      3
IMPLND   1                       0.25     RCHRES   1      5
IMPLND   8                        0.1     RCHRES   1      5
upstream***
IMPLND   1                       0.09     RCHRES   1      5
frontage bypass***
IMPLND   1                       0.02     COPY   501     15
IMPLND   1                       0.02     COPY   601     15
```

```
******Routing******
PERLND  13                        0.75     COPY     1     12
PERLND  14                        0.27     COPY     1     12
IMPLND   1                        0.36     COPY     1     15
IMPLND   4                        1.04     COPY     1     15
IMPLND   5                        0.35     COPY     1     15
IMPLND   8                        0.07     COPY     1     15
PERLND  13                        0.75     COPY     1     13
PERLND  14                        0.27     COPY     1     13
PERLND  13                         0.1     COPY     1     12
IMPLND   1                        0.25     COPY     1     15
IMPLND   8                         0.1     COPY     1     15
PERLND  13                         0.1     COPY     1     13
IMPLND   1                        0.09     COPY     1     15
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     Vault  1                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      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
           *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  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
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.144628  0.000000  0.000000
  0.077778  0.144628  0.011249  0.018477
  0.155556  0.144628  0.022498  0.026130
  0.233333  0.144628  0.033747  0.032003
  0.311111  0.144628  0.044995  0.036954
  0.388889  0.144628  0.056244  0.041315
  0.466667  0.144628  0.067493  0.045259
  0.544444  0.144628  0.078742  0.048885
  0.622222  0.144628  0.089991  0.052260
  0.700000  0.144628  0.101240  0.055430
  0.777778  0.144628  0.112489  0.058429
  0.855556  0.144628  0.123737  0.061281
  0.933333  0.144628  0.134986  0.064005
  1.011111  0.144628  0.146235  0.066619
  1.088889  0.144628  0.157484  0.069134
  1.166667  0.144628  0.168733  0.071560
  1.244444  0.144628  0.179982  0.073907
  1.322222  0.144628  0.191230  0.076182
  1.400000  0.144628  0.202479  0.078390
  1.477778  0.144628  0.213728  0.080538
  1.555556  0.144628  0.224977  0.082631
  1.633333  0.144628  0.236226  0.084671
  1.711111  0.144628  0.247475  0.086664
  1.788889  0.144628  0.258724  0.088612
  1.866667  0.144628  0.269972  0.090517
  1.944444  0.144628  0.281221  0.092384
  2.022222  0.144628  0.292470  0.094214
  2.100000  0.144628  0.303719  0.096008
  2.177778  0.144628  0.314968  0.097770
  2.255556  0.144628  0.326217  0.099501
  2.333333  0.144628  0.337466  0.101202
  2.411111  0.144628  0.348714  0.102874
  2.488889  0.144628  0.359963  0.104521
  2.566667  0.144628  0.371212  0.106141
  2.644444  0.144628  0.382461  0.107737
  2.722222  0.144628  0.393710  0.109310
  2.800000  0.144628  0.404959  0.110861
  2.877778  0.144628  0.416208  0.112390
  2.955556  0.144628  0.427456  0.113899
  3.033333  0.144628  0.438705  0.115388
  3.111111  0.144628  0.449954  0.116857
  3.188889  0.144628  0.461203  0.118309
  3.266667  0.144628  0.472452  0.119743
  3.344444  0.144628  0.483701  0.121160
  3.422222  0.144628  0.494949  0.122561
  3.500000  0.144628  0.506198  0.123946
  3.577778  0.144628  0.517447  0.125316
  3.655556  0.144628  0.528696  0.126670
  3.733333  0.144628  0.539945  0.128011
  3.811111  0.144628  0.551194  0.129338
  3.888889  0.144628  0.562443  0.130651
  3.966667  0.144628  0.573691  0.131951
  4.044444  0.144628  0.584940  0.133238
  4.122222  0.144628  0.596189  0.134513
  4.200000  0.144628  0.607438  0.135776
  4.277778  0.144628  0.618687  0.179716
  4.355556  0.144628  0.629936  0.198639
  4.433333  0.144628  0.641185  0.213436
  4.511111  0.144628  0.652433  0.226093
  4.588889  0.144628  0.663682  0.237378
  4.666667  0.144628  0.674931  0.247686
  4.744444  0.144628  0.686180  0.257252
```

```
  4.822222  0.144628  0.697429  0.266228
  4.900000  0.144628  0.708678  0.274721
  4.977778  0.144628  0.719927  0.282808
  5.055556  0.144628  0.731175  0.290547
  5.133333  0.144628  0.742424  0.297984
  5.211111  0.144628  0.753673  0.305156
  5.288889  0.144628  0.764922  0.312090
  5.366667  0.144628  0.776171  0.335241
  5.444444  0.144628  0.787420  0.349526
  5.522222  0.144628  0.798669  0.361693
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  5.755556  0.144628  0.832415  0.392799
  5.833333  0.144628  0.843664  0.402106
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  6.066667  0.144628  0.877410  0.610261
  6.144444  0.144628  0.888659  1.008783
  6.222222  0.144628  0.899908  1.490066
  6.300000  0.144628  0.911157  1.961409
  6.377778  0.144628  0.922406  2.338529
  6.455556  0.144628  0.933655  2.580843
  6.533333  0.144628  0.944904  2.773986
  6.611111  0.144628  0.956152  2.943065
  6.688889  0.144628  0.967401  3.101990
  6.766667  0.144628  0.978650  3.252427
  6.844444  0.144628  0.989899  3.395629
  6.922222  0.144628  1.001148  3.532567
  7.000000  0.144628  1.012397  3.664010
  7.077778  0.144628  1.023646  3.790583
  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    1.2           PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2           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
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 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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Appendix 5: Conveyance Analysis

Nothing is necessary for this appendix at this time

Appendix 6: Operations and Maintenance Manual

1. Operations and Maintenance Manual

Table V-A.2: Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		(A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Piping	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway	Rock Missing	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.

Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults) (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.4: Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)
Catch Basin	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Table V-A.13: Maintenance Standards - Sand Filters (Above Ground/Open) (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.	Spreader leveled and cleaned so that flows are spread evenly over sand filter.
	Damaged Pipes	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.	Pipe repaired or replaced.

Table V-A.14: Maintenance Standards - Sand Filters (Below Ground/Enclosed)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault.	Sediment Accumulation on Sand Media Section	Sediment depth exceeds 1/2-inch.	No sediment deposits on sand filter section that which would impede permeability of the filter section.
	Sediment Accumulation in Pre-Settling Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	No sediment deposits in first chamber of vault.
	Trash/Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault and inlet/outlet piping.
	Sediment in Drain Pipes/Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.	Sediment and debris removed.
	Short Circuiting	When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area.	Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.	Cover repaired to proper working specifications or replaced.
	Ventilation	Ventilation area blocked or plugged	Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab.	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound. Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles/Internal walls	Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.

Table V-A.15: Maintenance Standards - Manufactured Media Filters

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground	Sediment Accumulation on Media.	Sediment depth exceeds 0.25-inches.	No sediment deposits which would impede permeability of the

Table V-A.15: Maintenance Standards - Manufactured Media Filters (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Vault			compost media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.	No sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.	Trash and debris removed from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound. Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.	Media cartridges replaced.
	Short Circuiting	Flows do not properly enter filter cartridges.	Filter cartridges replaced.

Appendix 7: Special Reports and Studies

1. Critical Areas Report, Wetland Resources, Inc., dated January 25th, 2024
2. Geotechnical Engineering Design Study, Earth Solutions NW, dated January 25th, 2024

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M.
SNOHOMISH COUNTY, WASHINGTON

GENERAL NOTES

All rough grading shall be positive, draining away from all structures.

All stones larger than 1.5" diameter shall be removed from the growing medium.

Topsoil shall be provided in accordance to BMP T5.13 WSDOE Stormwater Management Manual for Western Washington.

All bed areas to receive 2" of fine ground fir or hemlock bark, composition mulches are not an acceptable alternative.

Trees and shrubs are to be planted at a depth 3/4" higher than the level that they were grown in the nursery.

Bark mulch is not to be placed above the root crown.

All plants shall at least conform to the minimum standard established by the american association of nurserymen.

Lawn areas are to be hydroseeded per manufacturer's specifications, OR EQUIVALENT. Remove all stones larger than 1" from lawn areas.

Equivalent plant material substitutions may be allowed with prior approval by the Landscape Architect.

If the site work is different than shown on the Landscape Plan, or poor soils and debris are discovered, requiring changes to the Landscape Plan, contact the Landscape Architect for instruction.

The Landscape Contractor is responsible for maintaining the landscape during installation, until final acceptance by the owner's representative.

The Landscape Contractor shall warranty all materials and workmanship for a period of one year, from the time of final acceptance.

During the warranty period, the Landscape Contractor will not be responsible for plant death caused by unusual climatic conditions, vandalism, theft, fire, or poor maintenance practices. The Landscape Architect shall have sole authority to determine the cause of death.

Planting plan takes precedent when there is a discrepancy between plant quantities in the plant schedule and the plan.

LANDSCAPE MAINTENANCE PER MMC 22C.120.180

(1) All landscaped areas and plants required by this chapter must be permanently maintained in a healthy growing condition in order to accomplish the purpose for which they were required.

(2) Dead or diseased plants must be replaced within 30 days of notification, or as soon as practical in regard to freezing weather, or complex situations involving the removal and replacement of large trees.

(3) All landscaped areas must be kept free of debris and weeds.

(4) Plant material must not interfere with public utilities, restrict pedestrian or vehicular access, or constitute a traffic hazard.

(5) Planted areas next to pedestrian walkways and sidewalks shall be maintained or plant material chosen to maintain a clear zone between three and eight feet from ground level.

(6) The owners, their agents and assigns are responsible for providing, protecting, and maintaining all landscaping material in a healthy and growing condition, replacing it when necessary, and keeping it free of refuse and debris.

(7) All fencing, walls and other features used for screening purposes shall be kept free of litter, debris, and weeds.

IRRIGATION ASSESSMENT

All proposed plants have naturalized to the Pacific Northwest. Once established, irrigation will not be required. For the first growing season, temporary irrigation by means of hand watering truck shall be provided by the developer. Landscape areas shall be watered 3 times a week during the months of June-September. If there is an unusually dry summer, watering days may need to be increased by 1 or 2 days.

TREE PROTECTION

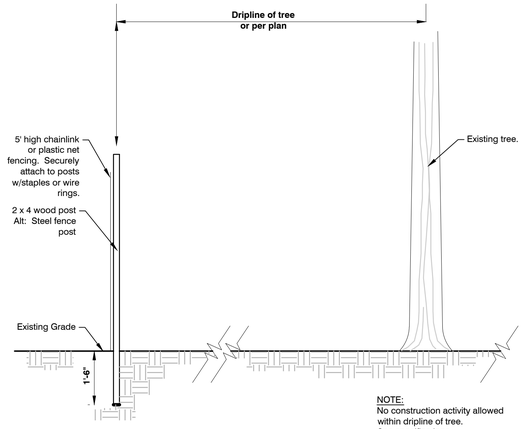
All vehicle traffic shall be routed away from significant trees during construction to avoid excessive soil compaction. Where vehicular traffic is required the soil shall be protected with a 10" layer of woodchips and/or plywood placed over the path of the vehicle. The woodchips may be removed when no longer needed.

All significant trees to be saved and/or retained shall be protected with a 5' high chainlink or plastic net fencing placed 5' beyond tree driplines during construction. The fencing shall not be removed without the authorization of the consulting arborist or site supervisor.

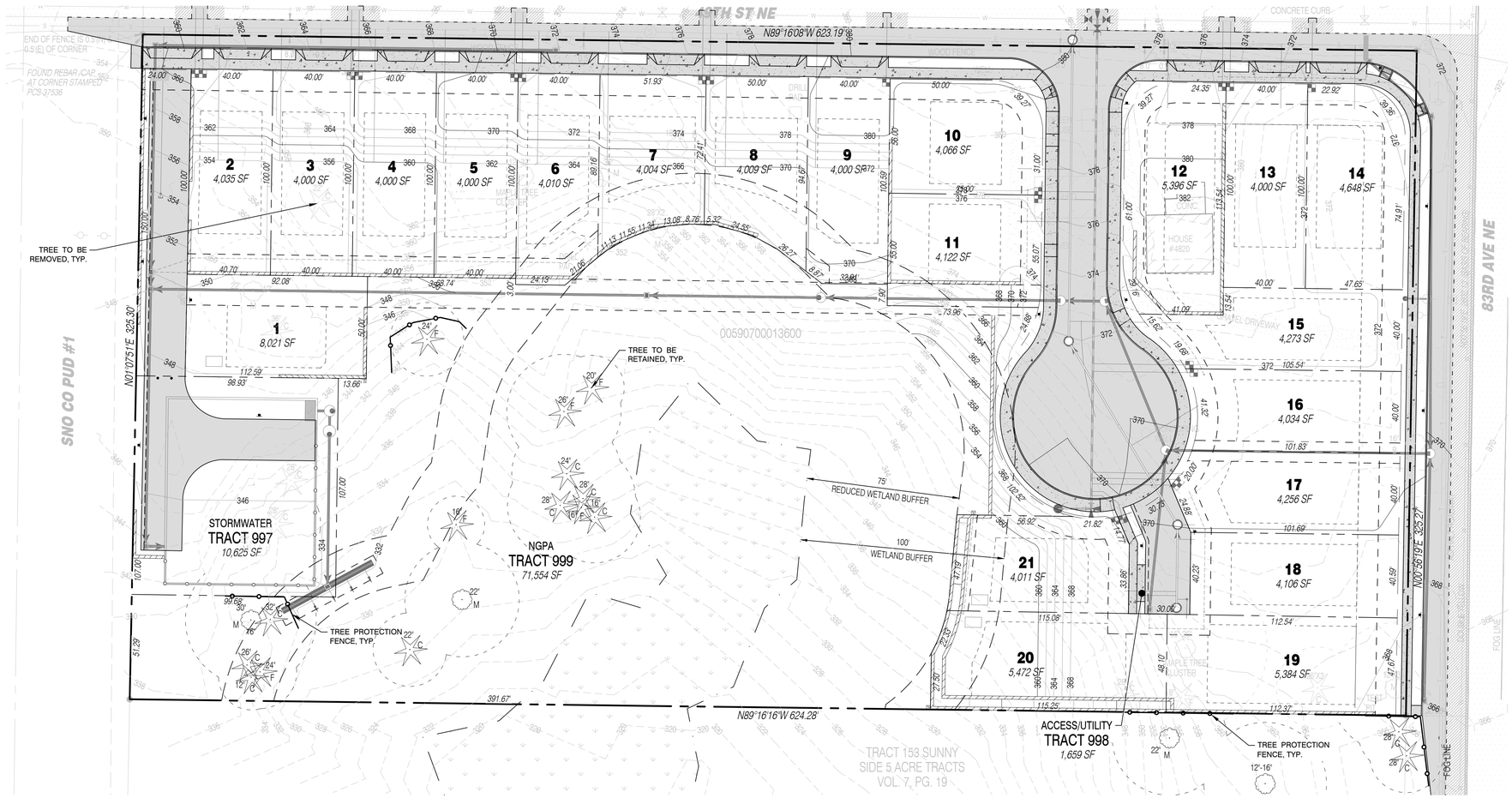
Trenching within tree driplines shall be avoided. Tunneling around primary tree roots is permitted when disturbance within driplines is necessary.

Stump pulling of all trees to be removed in the vicinity of significant trees to be retained shall be avoided. Stump grinding is permitted as necessary.

It may be necessary to provide supplemental irrigation during dry periods within the construction process, and mulching over the roots of any or all preserved trees.



1 TREE PROTECTION FENCING
NTS



NORTH

0 30' 60'

ORIGIN
DESIGN GROUP
1031 185TH AVE NE
SNOHOMISH, WA 98290
TEL: 425.346.1905

STATE OF WASHINGTON
LICENSED
LANDSCAPE ARCHITECT
KRYSTAL LOWE
LICENCE NO. 1206

REVISIONS

#	DESCRIPTION	DATE

TAYLOR LANE
4820 83RD AVE NE
MARYSVILLE, WA
PARCEL: 00590700013600

DRAWING TITLE:
LANDSCAPE PLAN

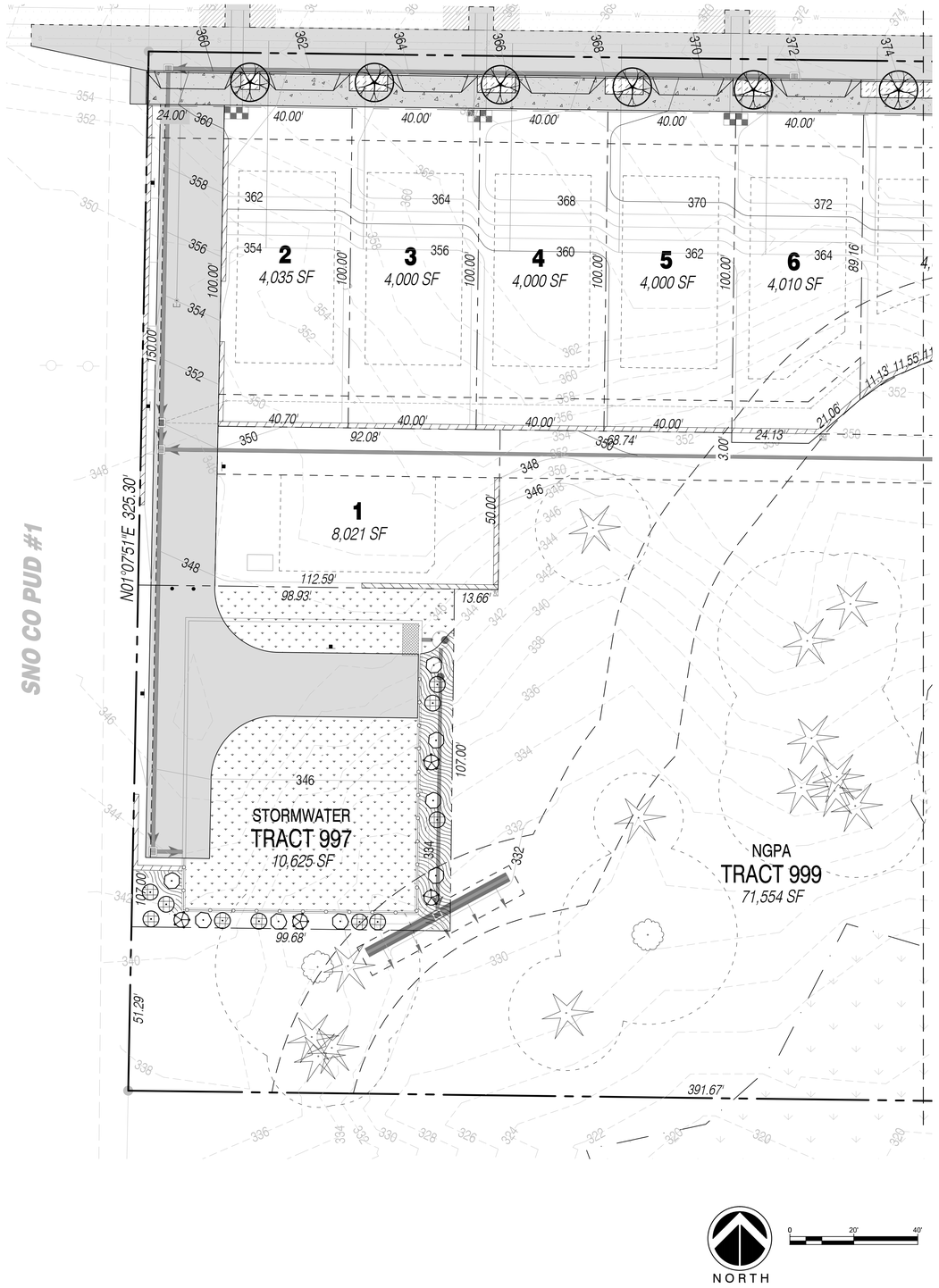
APPLICANT:
KEYSTONE LANE, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373

DRAWING INFORMATION
ODG PROJECT #: 24-499
DRAWN BY: MY
CHECKED BY: KL

DATE:
JANUARY 24, 2024

SHEET NO.
L-1
OF 4

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M.
SNOHOMISH COUNTY, WASHINGTON



PLANT SCHEDULE

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
DECIDUOUS TREES						
	7	Acer platanoides 'Crimson Sentry'	Crimson Sentry Norway Maple	2" CAL. MIN.	B&B	40` O.C.
	11	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Apple Serviceberry	2" CAL. MIN.	B&B	SPACING AS SHOWN
	12	Prunus serrulata 'Amanogawa'	Japanese Flowering Cherry	2" CAL. MIN.	B&B	SPACING AS SHOWN
EVERGREEN TREES						
	1	Chamaecyparis obtusa 'Gracilis'	Slender Hinoki False Cypress	10` Ht.	B&B	SPACING AS SHOWN
SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
DECIDUOUS SHRUBS						
	2	Physocarpus opulifolius 'SMPOTW'	Tiny Wine® Ninebark	2 gal.	Pot	48" o.c.
	8	Ribes sanguineum	Red Flowering Currant	2 gal.	Pot	60" o.c.
	4	Spiraea x bumalda 'Goldflame'	Goldflame Spirea	2 gal.	Pot	48" o.c.
EVERGREEN SHRUBS						
	5	Ilex crenata `Sky Pencil`	Sky Pencil Japanese Holly	2 gal.	Pot	36" o.c.
	10	Myrica californica	Pacific Wax Myrtle	2 gal.	Pot	60" o.c.
	4	Philadelphus lewisii	Wild Mockorange	2 gal.	Pot	60" o.c.
ORNAMENTAL GRASSES						
	3	Calamagrostis x acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	2 gal.	Pot	36" o.c.
GROUND COVERS						
	219	Arctostaphylos uva-ursi	Kinnikinnick	1 gal.	Pot	24" o.c.
	5,281 sf	Turf Hydroseed	Drought Tolerant Sun/Shade Mix	seed		
	2,761 sf	Turf Sod	Sun/Shade Mix	sod		

BMP T5.13 DESIGN GUIDELINES

SOIL RETENTION
THE DUFF LAYER AND NATIVE TOPSOIL SHOULD BE RETAINED IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. IN ANY AREAS REQUIRING GRADING REMOVE AND STOCKPILE THE DUFF LAYER AND TOPSOIL ON SITE IN A DESIGNATED, CONTROLLED AREA, NOT ADJACENT TO PUBLIC RESOURCES AND CRITICAL AREAS, TO BE REAPPLIED TO OTHER PORTIONS OF THE SITE WHERE FEASIBLE.

SOIL QUALITY
ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE THE FOLLOWING:

1. A TOPSOIL LAYER WITH A MINIMUM ORGANIC MATTER CONTENT OF TEN PERCENT DRY WEIGHT IN PLANTING BEDS, AND 5% ORGANIC MATTER CONTENT IN TURF AREAS, AND A PH FROM 6.0 TO 8.0 OR MATCHING THE PH OF THE ORIGINAL UNDISTURBED SOIL. THE TOPSOIL LAYER SHALL HAVE A MINIMUM DEPTH OF EIGHT INCHES EXCEPT WHERE TREE ROOTS LIMIT THE DEPTH OF INCORPORATION OF AMENDMENTS NEEDED TO MEET THE CRITERIA. SUBSOILS BELOW THE TOPSOIL LAYER SHOULD BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
2. PLANTING BEDS MUST BE MULCHED WITH 2 INCHES OF ORGANIC MATERIAL
3. QUALITY OF COMPOST AND OTHER MATERIALS USED TO MEET THE ORGANIC CONTENT REQUIREMENTS:
   a. THE ORGANIC CONTENT FOR "PRE-APPROVED" AMENDMENT RATES CAN BE MET ONLY USING COMPOST THAT MEETS THE DEFINITION OF "COMPOSTED MATERIALS" IN WAC 173-350-220. THIS CODE IS AVAILABLE ONLINE AT: HTTP://WWW.ECY.WA.GOV/PROGRAMS/SWFA/FACILITIES/350.HTML THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 45% TO 65%, AND A CARBON TO NITROGEN RATIO BELOW 25:1. THE CARBON TO NITROGEN RATIO MAY BE AS HIGH AS 35:1 FOR PLANTINGS COMPOSED ENTIRELY OF PLANTS NATIVE TO THE PUGET SOUND LOWLANDS REGION.
   b. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS AS DEFINED ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATIO REQUIREMENTS, AND MEETING THE CONTAMINANT STANDARDS OF GRADE A COMPOST. THE RESULTING SOIL SHOULD BE CONDUCIVE TO THE TYPE OF VEGETATION TO BE ESTABLISHED.

IMPLEMENTATION OPTIONS:
THE SOIL QUALITY DESIGN GUIDELINES LISTED ABOVE CAN BE MET BY USING ONE OF THE METHODS LISTED BELOW:

1. LEAVE UNDISTURBED NATIVE VEGETATION AND SOIL, AND PROTECT FROM COMPACTION DURING CONSTRUCTION.
2. AMEND EXISTING SITE TOPSOIL OR SUBSOIL EITHER AT DEFAULT "PREAPPROVED" RATES, OR AT CUSTOM CALCULATED RATES BASED ON SPECIFICS TESTS OF THE SOIL AND AMENDMENT.
3. STOCKPILE EXISTING TOPSOIL DURING GRADING, AND REPLACE IT PRIOR TO PLANTING. STOCKPILED TOPSOIL MUST ALSO BE AMENDED IF NEEDED TO MEET THE ORGANIC MATTER OR DEPTH REQUIREMENTS, EITHER AT A DEFAULT "PRE-APPROVED" RATE OR AT A CUSTOM CALCULATED RATE.
4. IMPORT TOPSOIL MIX OF SUFFICIENT ORGANIC CONTENT AND DEPTH TO MEET THE REQUIREMENTS. MORE THAN ONE METHOD MAY BE USED ON DIFFERENT PORTIONS OF THE SAME SITE. SOIL THAT ALREADY MEETS THE DEPTH AND ORGANIC MATTER QUALITY STANDARDS, AND IS NOT COMPACTED, DOES NOT NEED TO BE AMENDED.

MAINTENANCE
- SOIL QUALITY AND DEPTH SHOULD BE ESTABLISHED TOWARD THE END OF CONSTRUCTION AND ONCE ESTABLISHED, SHOULD BE PROTECTED FROM COMPACTION, SUCH AS FROM LARGE MACHINERY USE, AND FROM EROSION.
- SOIL SHOULD BE PLANTED AND MULCHED AFTER INSTALLATION.
- PLANT DEBRIS OR ITS EQUIVALENT SHOULD BE LEFT ON THE SOIL SURFACE TO REPLENISH ORGANIC MATTER.

ORIGIN
DESIGN GROUP
1031 185TH AVE NE
SNOHOMISH, WA 98290
TEL: 425.346.1905

STATE OF
WASHINGTON
LICENSED
LANDSCAPE ARCHITECT
KRYSTAL LOWE
LICENCE NO. 1206

REVISIONS:

#	DESCRIPTION	DATE

TAYLOR LANE
4820 83RD AVE NE
MARYSVILLE, WA
PARCEL: 00590700013600

DRAWING TITLE:
LANDSCAPE PLAN

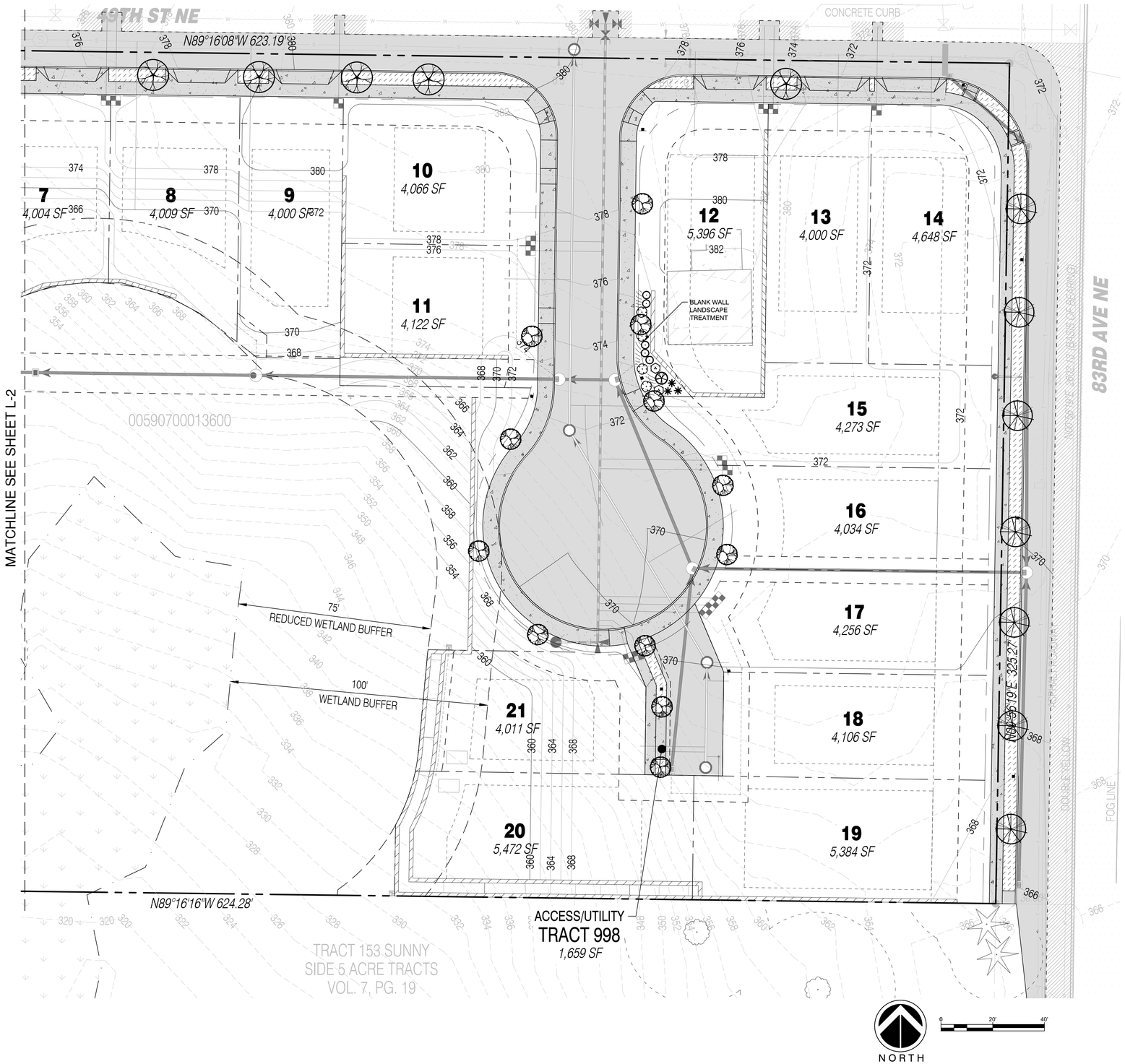
APPLICANT:
KEYSTONE LANE, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373

DRAWING INFORMATION
ODG PROJECT #: 24-499
DRAWN BY: MY
CHECKED BY: KL

DATE:
JANUARY 24, 2024

SHEET NO:
L-2
OF 4

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M.
SNOHOMISH COUNTY, WASHINGTON



ORIGIN
DESIGN GROUP
1031 185TH AVE NE
SNOHOMISH, WA 98290
TEL: 425.346.1905

STATE OF
WASHINGTON
LICENSED
LANDSCAPE ARCHITECT

KRYSTAL LOWE
LICENCE NO. 1206

REVISIONS

#	DESCRIPTION	DATE

TAYLOR LANE
4820 83RD AVE NE
MARYSVILLE, WA
PARCEL: 00590700013600

DRAWING TITLE:
LANDSCAPE PLAN

APPLICANT:

KEYSTONE LANE, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373

DRAWING INFORMATION

ODG PROJECT #: 24-499
DRAWN BY: MY
CHECKED BY: KL

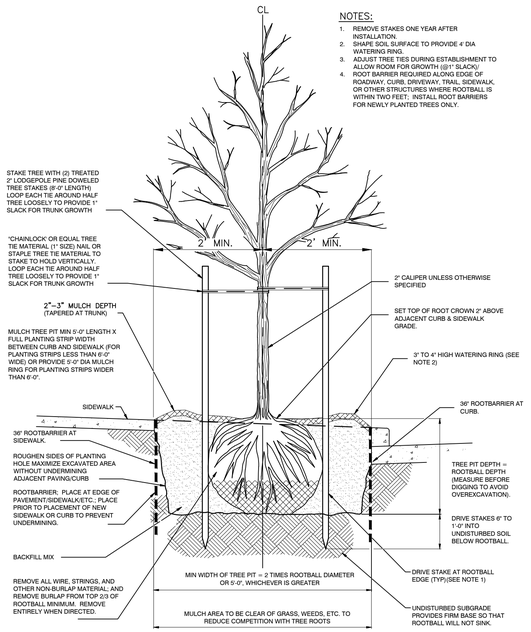
DATE:

JANUARY 24, 2024

SHEET NO:

L-3
OF 4

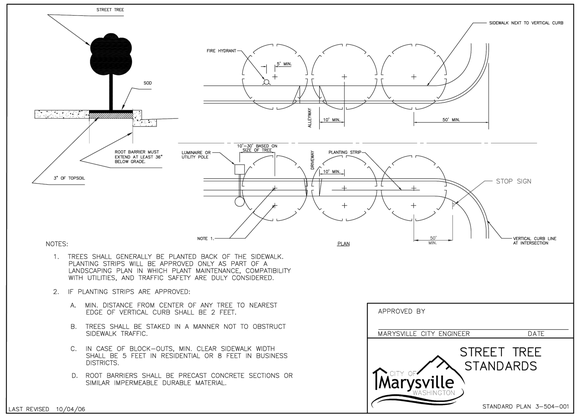
NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M.
SNOHOMISH COUNTY, WASHINGTON



1 ROOT BARRIER TREE PLANTING

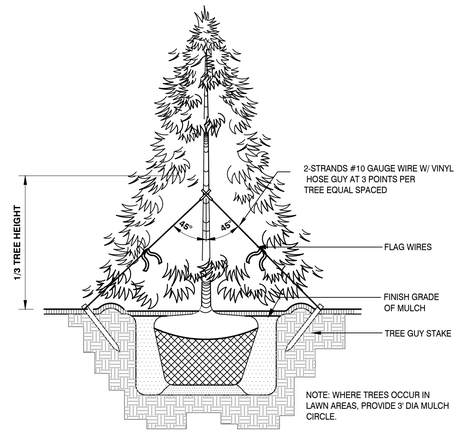
1" = 1'-0"

329301.04-02



2 STREET TREE STANDARDS 3-504

329301.04-01



3 CONIFER TREE PLANTING & GUYING

1/2" = 1'-0"

4 SHRUB PLANTING

1" = 1'-0"

5 GROUNDCOVER

3/4" = 1'-0"

ORIGIN
DESIGN GROUP
1031 185TH AVE NE
SNOHOMISH, WA 98290
TEL: 425.346.1905

STATE OF WASHINGTON
LICENSED
LANDSCAPE ARCHITECT
KRYSTAL LOWE
LICENCE NO. 1206

REVISIONS:

#	DESCRIPTION	DATE

TAYLOR LANE
4820 83RD AVE NE
MARYSVILLE, WA
PARCEL: 00590700013600

DRAWING TITLE:
LANDSCAPE PLAN

APPLICANT:

KEYSTONE LANE, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373

DRAWING INFORMATION

ODG PROJECT #: 24-499
DRAWN BY: MY
CHECKED BY: KL

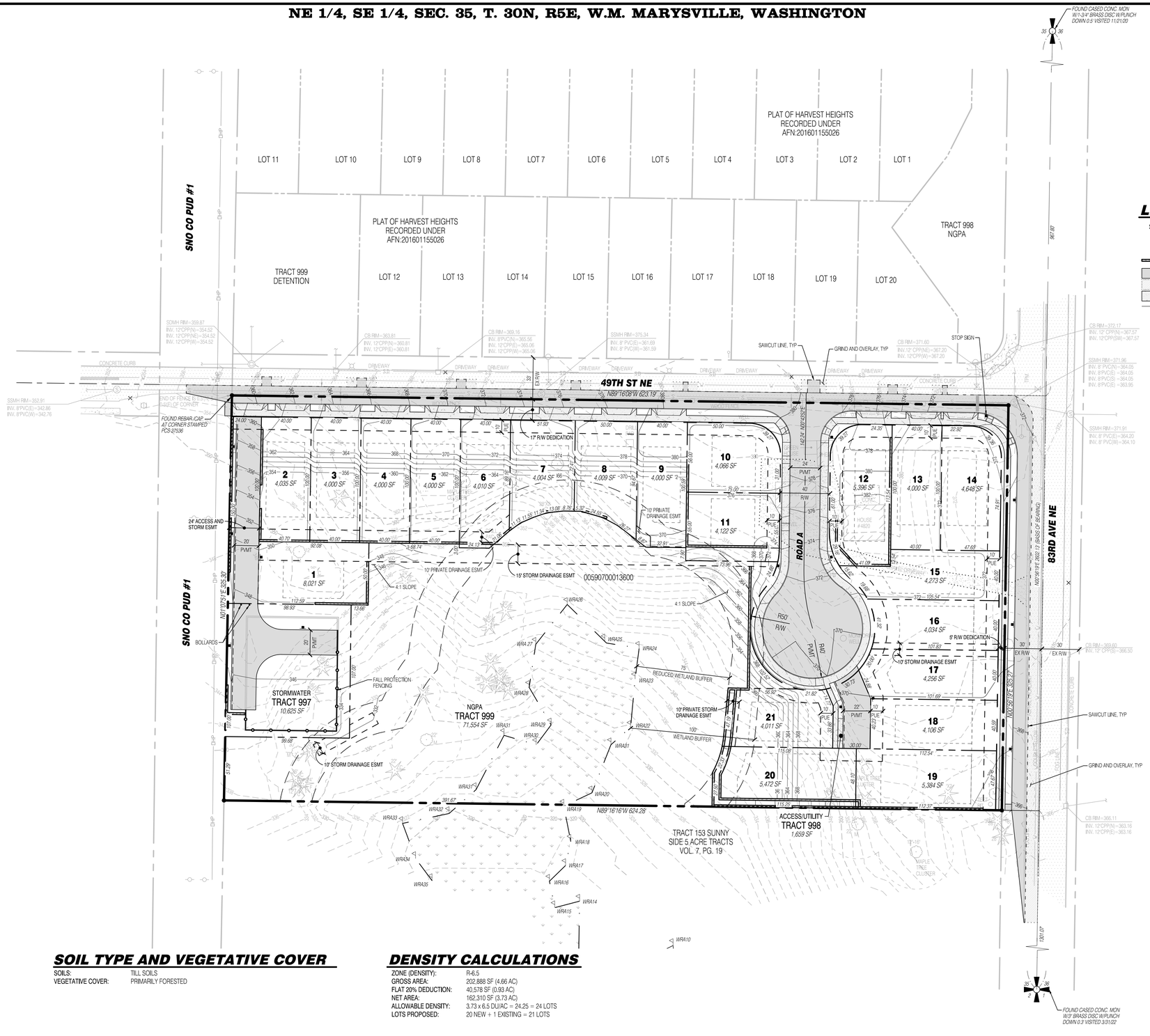
DATE:

JANUARY 24, 2024

SHEET NO:

L-4
OF 4

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

PROJECT INFORMATION

TAX PARCELS:	005907000013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	20 NEW + 1 EXISTING = 21 LOTS

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

811 SAFETY IS IN YOUR HANDS. EVERY DIG. EVERY TIME.

THOMAS P. ARBUTT STATE OF WASHINGTON 54921 REGISTERED PROFESSIONAL ENGINEER 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PP-01

3 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

TAYLOR LANE
PRELIMINARY PLANS
MARYSVILLE, WA

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION
●	SET 1/2" X 24" REBAR W/CAP "PCS 37536"
○	EXISTING CORNER MONUMENT AS NOTED
	QUARTER SECTION TIE
	SECTION TIE
	BLOW-OFF VALVE
	CATCH BASIN
	FIRE HYDRANT
	GAS VALVE
	GUY ANCHOR
	LIGHT STANDARD
	MAILBOX
	SANITARY SEWER MANHOLE
	SIGN POST
	STORM DRAIN MANHOLE
	UTILITY/ POLE
	WATER METER
	WATER VALVE
	WETLAND FLAG
	CONIFEROUS TREE
	DECIDUOUS TREE

ABBREVIATIONS	
CPP	CORRUGATED PLASTIC PIPE
IE	INVERT ELEVATION
INV	INVERT ELEVATION
OHP	OVERHEAD POWER LINE
TPM	TELEPHONE PAINT MARK
B	BIRCH
C	CEDAR
F	FIR
M	MAPLE
S	SPRUCE
W	WILLOW

PROPOSED STORM SYMBOLS

SYMBOL	DESCRIPTION
	SD CAP
	TYPE 1 CATCH BASIN, GRATED LID
	TYPE 1 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN, GRATED LID
	TYPE 2 CATCH BASIN, SOLID LID
	BEEHIVE MANHOLE COVER
	SQUARE YARD DRAIN
	ROUND YARD DRAIN
	STORM CLEAN OUT
	STORM PIPE

PROPOSED SEWER SYMBOLS

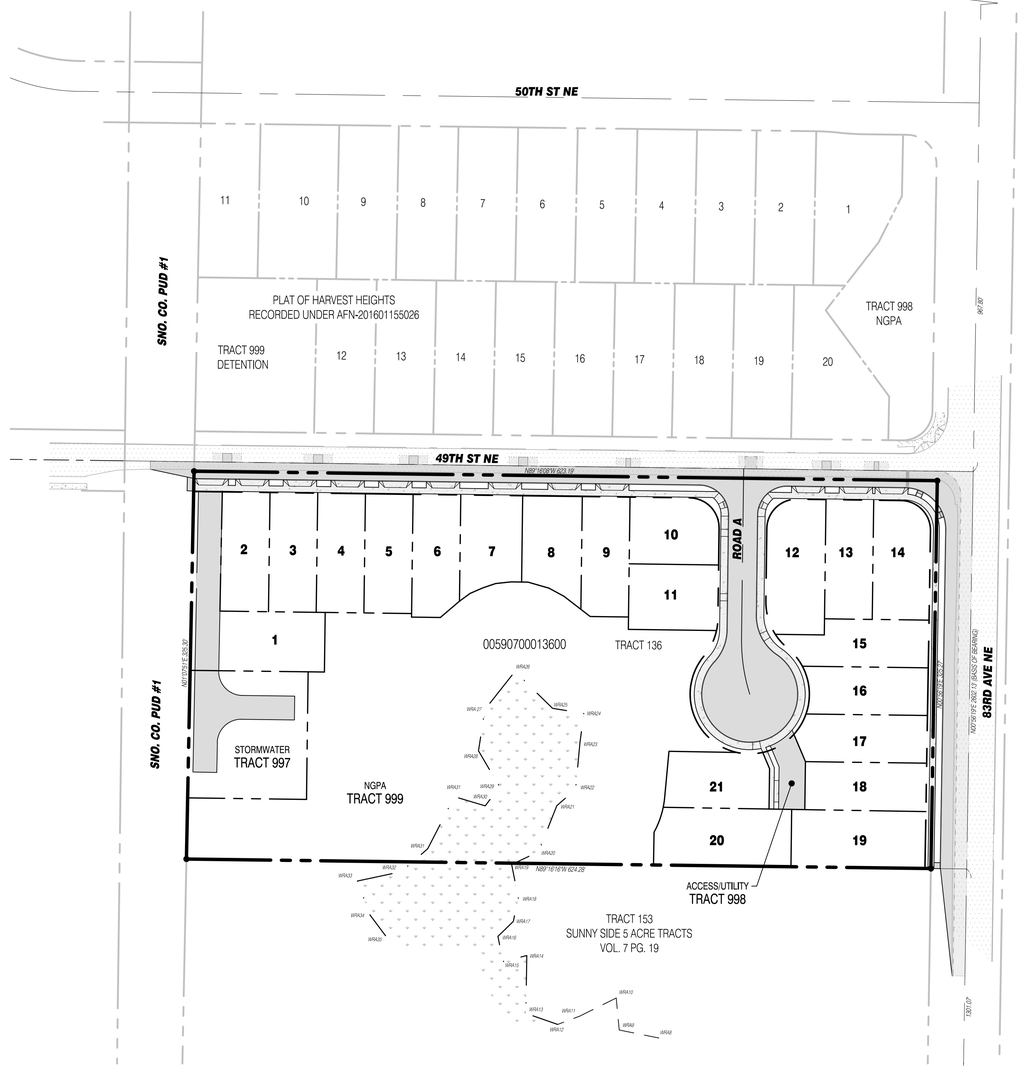
SYMBOL	DESCRIPTION
	SEWER CAP
	SEWER CLEANOUT
	SEWER MANHOLE
	SEWER PIPE

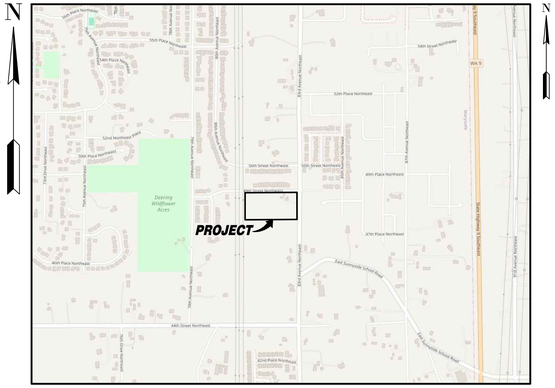
PROPOSED WATER SYMBOLS

SYMBOL	DESCRIPTION
	WATER CAP
	CONCRETE BLOCKING
	11.25° BEND
	22.5° BEND
	45° BEND
	90° BEND
	VALVE
	HYDRANT ASSEMBLY
	BLOW-OFF VALVE
	REDUCER
	AIR-VAC ASSEMBLY
	WATER METER
	WATER PIPE

PROPOSED SURVEY SYMBOLS

SYMBOL	DESCRIPTION
	SURVEY MONUMENT IN PROPOSED ROAD





VICINITY MAP
SCALE: 1"=2000'

CONTACT LIST

DEVELOPER:
KEYSTONE LAND, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373
EMAIL: joe@cornerstonehomes.com

CIVIL ENGINEER:
SOLID GROUND ENGINEERING
8105 166TH AVE NE
REDMOND, WA 98052
CONTACT: TOM ABBOTT, PE
PHONE: (425) 281-8324
EMAIL: tabbott@solidgroundpnw.com

GEOTECHNICAL ENGINEER:
EARTH SOLUTIONS NW
15365 NE 90TH ST #100
REDMOND, WA 98052
CONTACT: HENRY WRIGHT, PE
PHONE: (425) 449-4704
EMAIL: Henryw@esnw.com

LANDSCAPE ARCHITECT:
PAUL JAY LANDSCAPE ARCHITECT
1115 BRIDGE ROAD
EASTHAM, MA 02642
CONTACT: PAUL JAY
PHONE: (425) 210-1986
EMAIL: Pauljayla@gmail.com

SURVEYOR:
PACIFIC COAST SURVEYS, INC.
P.O. BOX 13619
MILL CREEK, WASHINGTON 98082
CONTACT: DARREN RIDDLE, PLS
PHONE: (425) 512-709
FAX: (425) 357-3577
EMAIL: darren@pcsurveys.net

WETLAND BIOLOGIST:
WETLAND RESOURCES
9505 19TH AVE SE, STE 106
EVERETT, WASHINGTON 98208
CONTACT: JOHN LAUFENBURG
PHONE: (425) 337-3174
FAX: (425) 337-3045
EMAIL: john@wetlandresources.com

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	161,009 SF (3.70 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

TABLE OF CONTENTS

1	COVER SHEET
2	EXISTING CONDITIONS MAP
3	PRELIMINARY PLAT MAP
4	PRELIMINARY ROAD AND GRADING
5	PRELIMINARY STORM DRAINAGE
6-7	PRELIMINARY ROAD PROFILES AND SECTIONS
8	PRELIMINARY UTILITY PLAN

SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 0056'19" EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1932859 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67'= NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503139002

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

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811 SAFETY IS IN YOUR HANDS. EVERY DIG. EVERY TIME.

THOMAS P. ABBOTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

COVER SHEET

KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

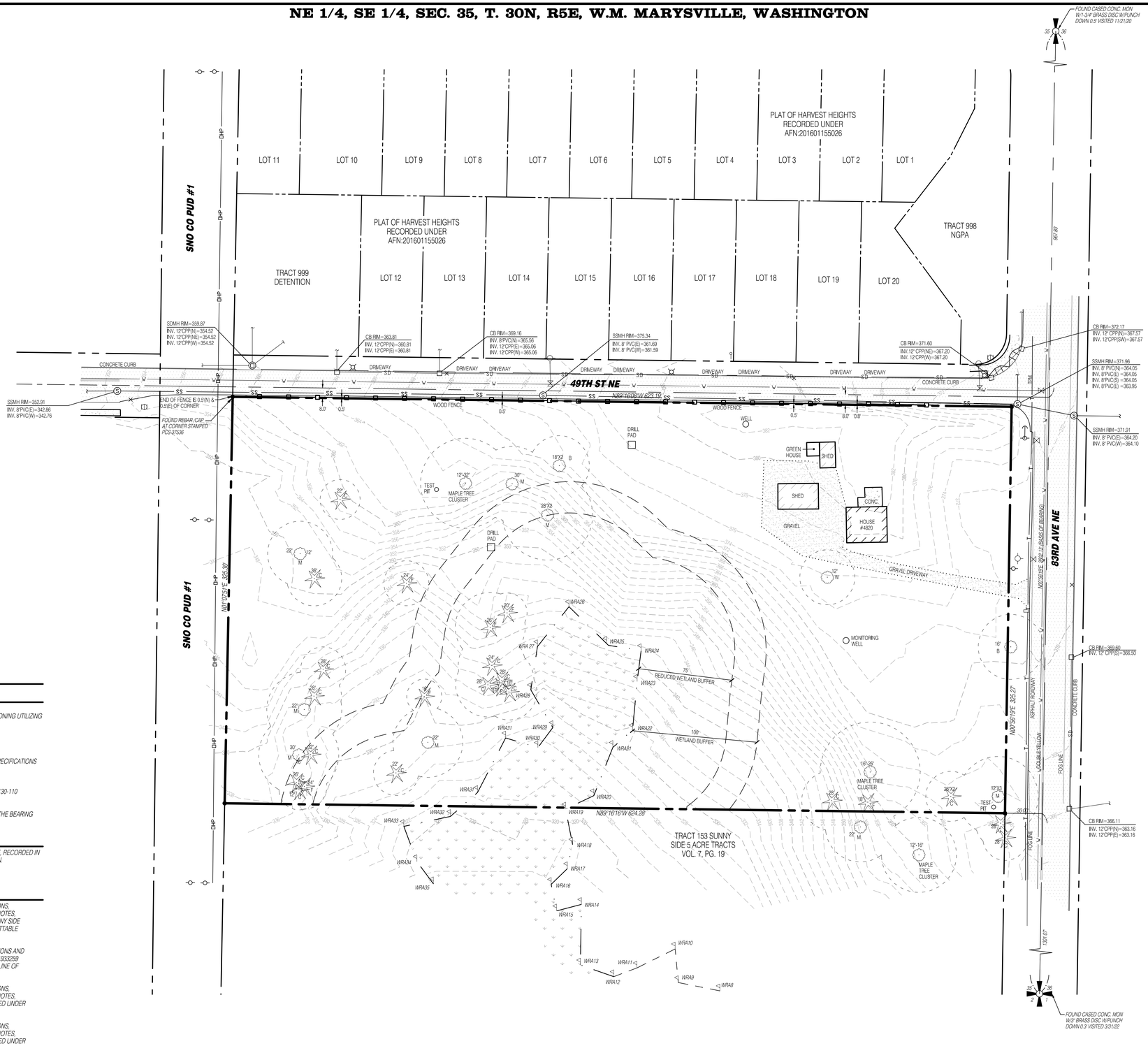
DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

CS-01
1 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

NS



SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 005619' EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

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2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67' = NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

DRAINFIELD NOTE

NO KNOWN DRAINFIELD RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF DRAINFIELDS ARE ENCOUNTERED DURING CONSTRUCTION, SEPTIC TANK SHALL BE PUMPED AND DRAINFIELD SHALL BE REMOVED. REMOVAL OF TANK AND DRAINFIELD SHALL BE REPORTED TO SNOHOMISH COUNTY HEALTH DISTRICT.

WELL NOTE

NO KNOWN WELL RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF WELLS ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE DECOMMISSIONED BASED ON WADOE STANDARDS.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

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THOMAS P. ARBUTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

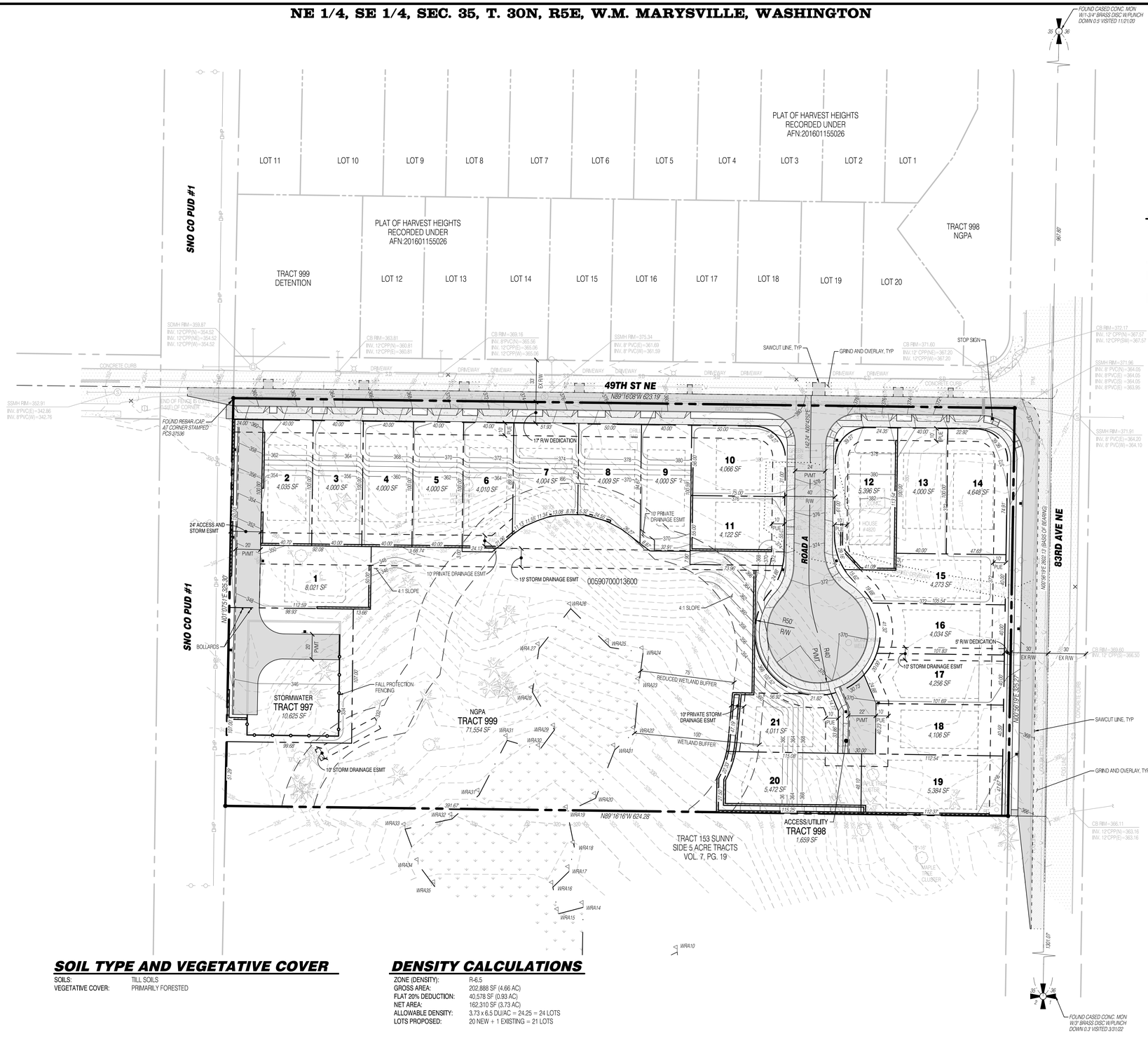
DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

EC-01

2 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

PROJECT INFORMATION

TAX PARCELS:	005907000013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	20 NEW + 1 EXISTING = 21 LOTS

UTILITY NOTE

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THOMAS P. ARBUTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

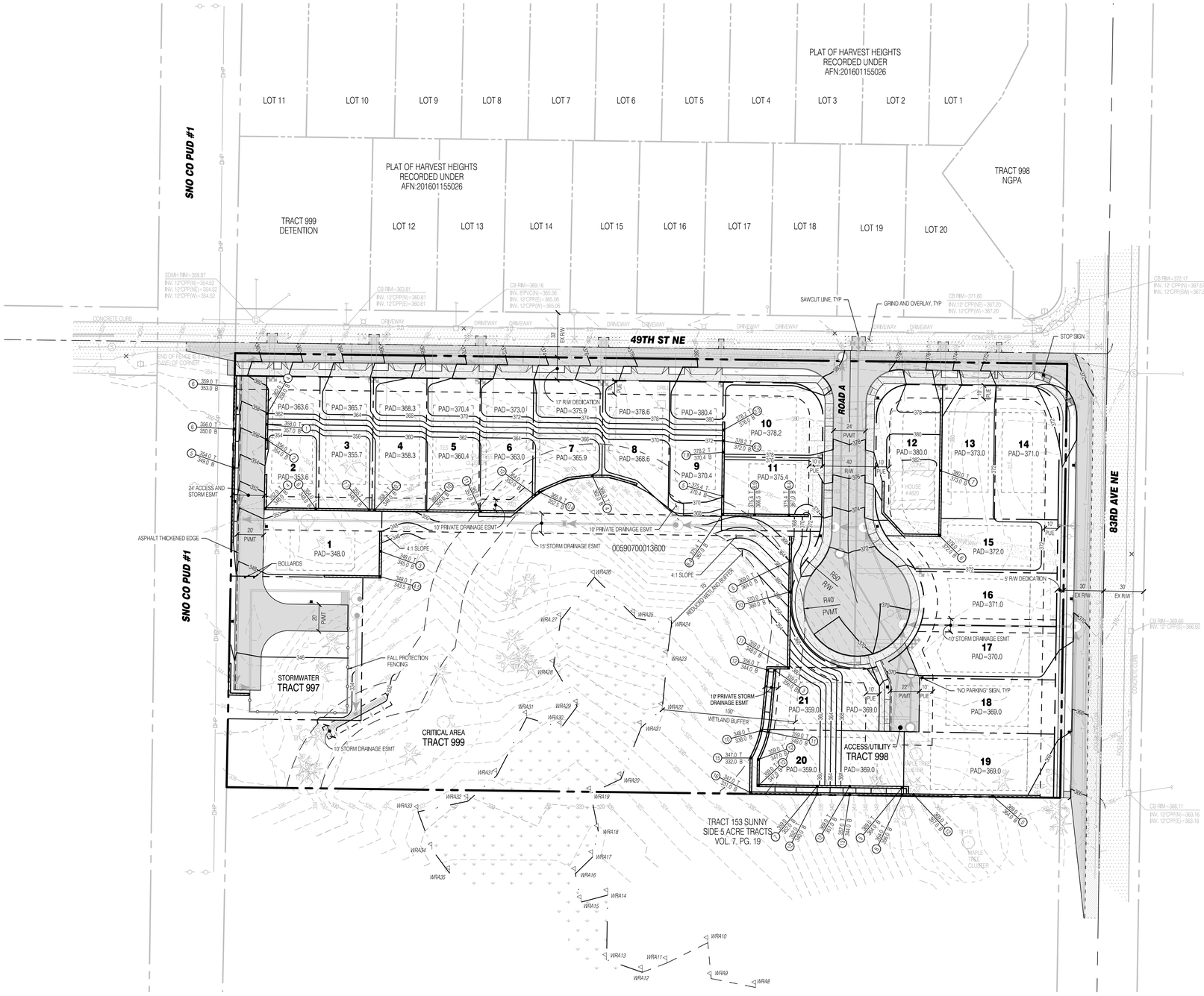
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JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PP-01

3 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



0 40' 80'

LEGEND

SYMBOLS	DESCRIPTION
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	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

ROAD AND GRADING NOTES

1. GRADING AND PLACEMENT OF WALLS MUST BE IN CONFORMANCE WITH 220.50.030 OF THE MMC.
2. ALL DISTURBED PERVIOUS AREAS TO BE UNDERLAIN WITH BMP T5.13 SOILS.
3. TRENCH RESTORATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 3-703 OF THE EDDS.
4. ALL OVERHEAD UTILITIES ARE TO BE PLACED UNDERGROUND.
5. ALL WALLS OVER 48' REQUIRE A SEPARATE BUILDING PERMIT.
6. ALL WALLS OVER 30' REQUIRE FALL PROTECTION FENCING.
7. ALL WALLS TO BE 2' OR LESS AT TERMINATION.

UTILITY NOTE

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY ROAD AND GRADING

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

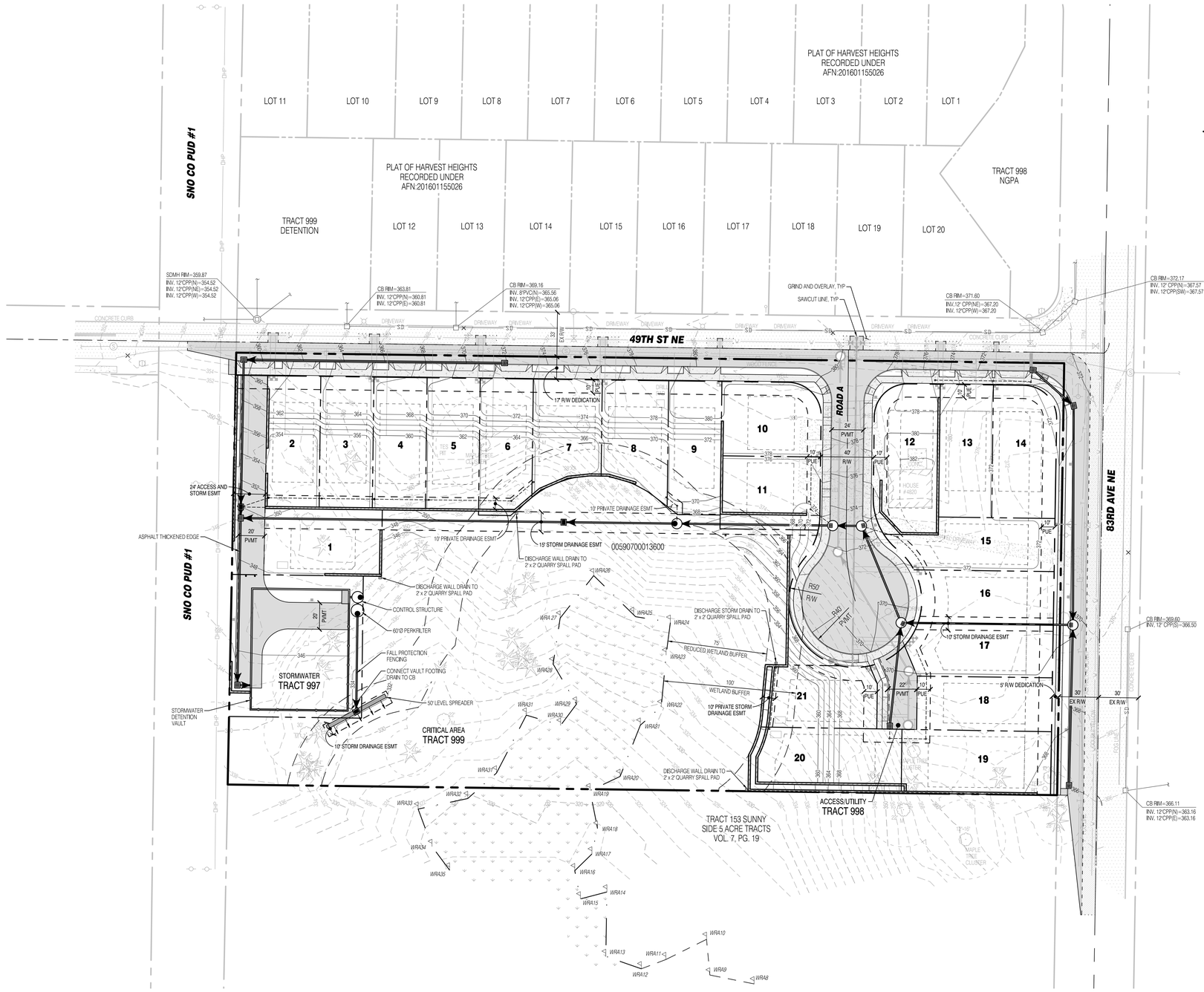
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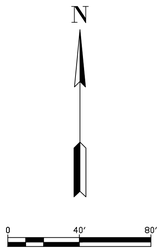
RG-01

4 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON





LEGEND

SYMBOLS	DESCRIPTION
	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING
	STORM MAIN PIPE
	SEWER MAIN PIPE
	WATER MAIN PIPE

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THOMAS P. ARBUTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY DRAINAGE PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

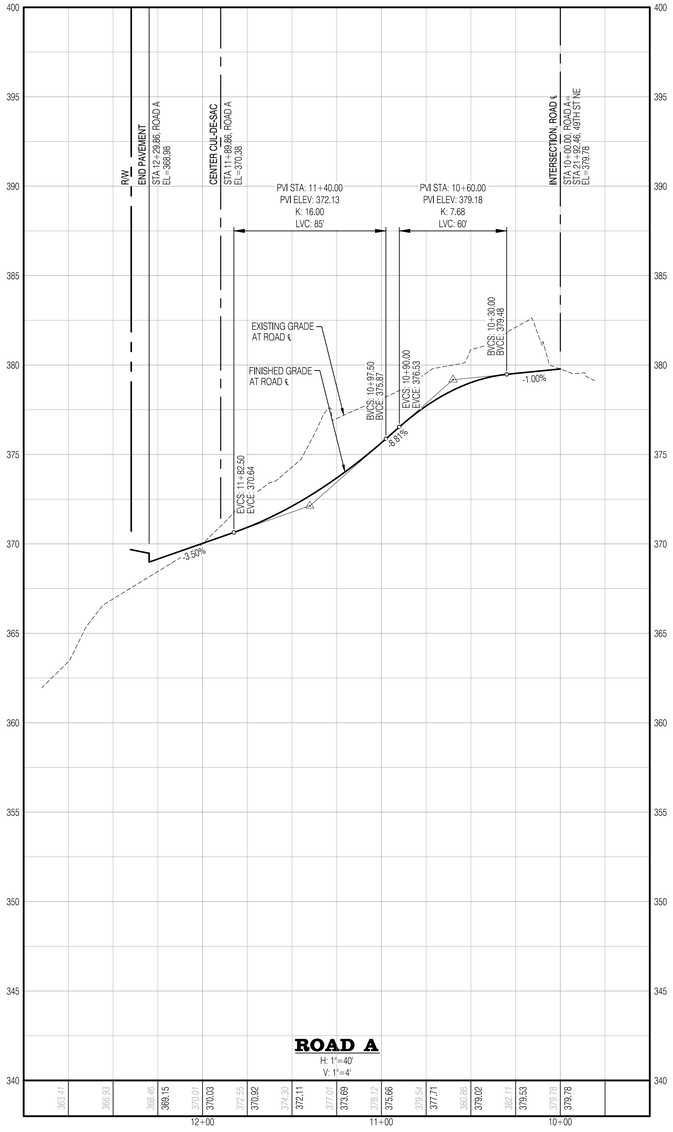
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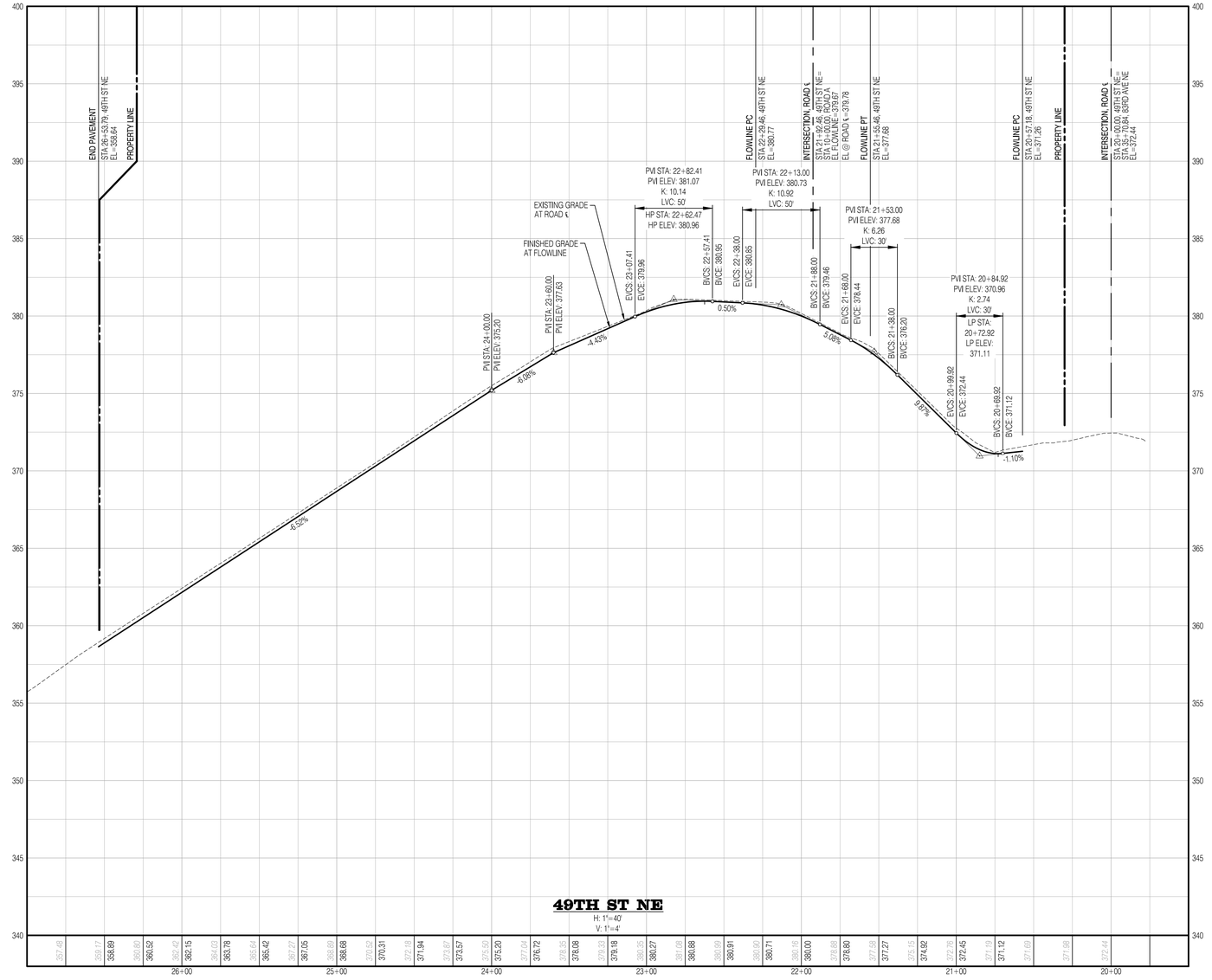
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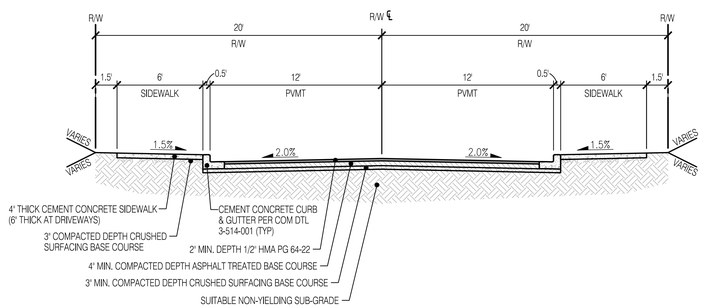
5 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

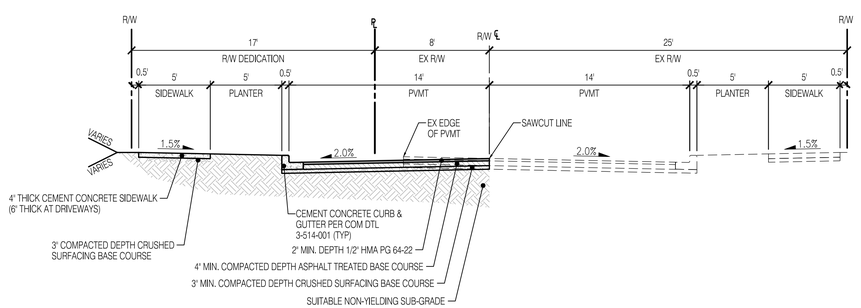






ROAD A ROAD SECTION

SCALE: 1"=5'



49TH ST NE ROAD SECTION

SCALE: 1"=5'

UTILITY NOTE

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 56621 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY ROAD PROFILES AND SECTIONS

KEYSTONE LAND, LLC.

TAYLOR LANE

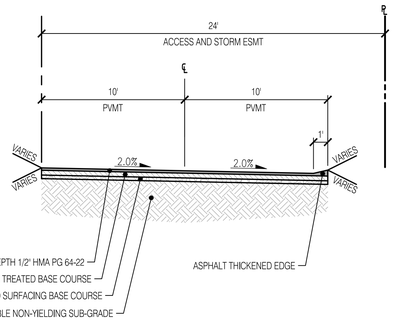
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PR-01
6 OF 8

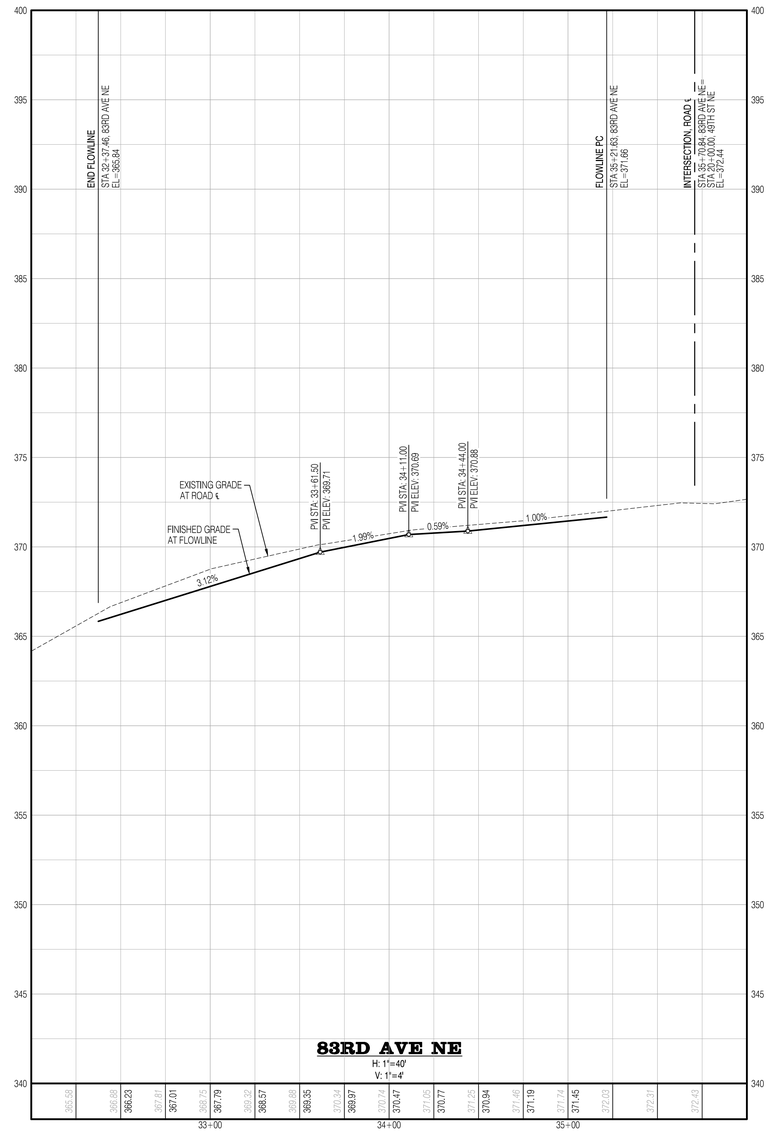
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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



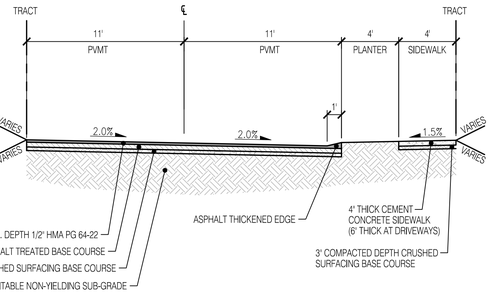
VAULT ACCESS ROAD

SCALE: 1"=5'



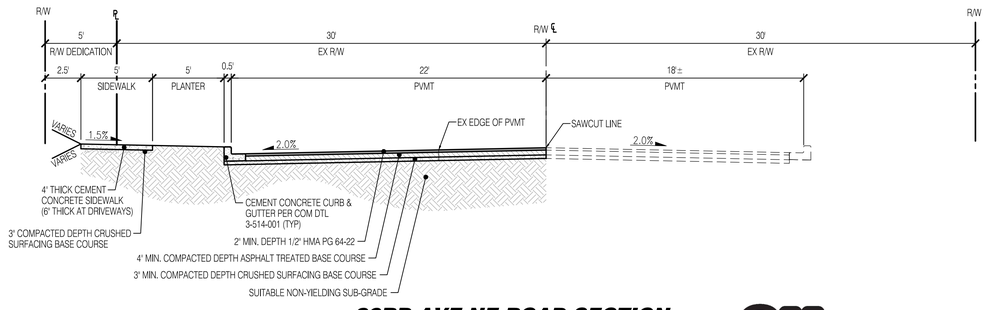
83RD AVE NE

H: 1"=40'
V: 1"=4'



TRACT 998

SCALE: 1"=5'



83RD AVE NE ROAD SECTION

SCALE: 1"=5'

UTILITY NOTE

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THOMAS P. ABBOTT
STATE OF WASHINGTON
56621
REGISTERED PROFESSIONAL ENGINEER
1-26-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY ROAD PROFILES AND SECTIONS

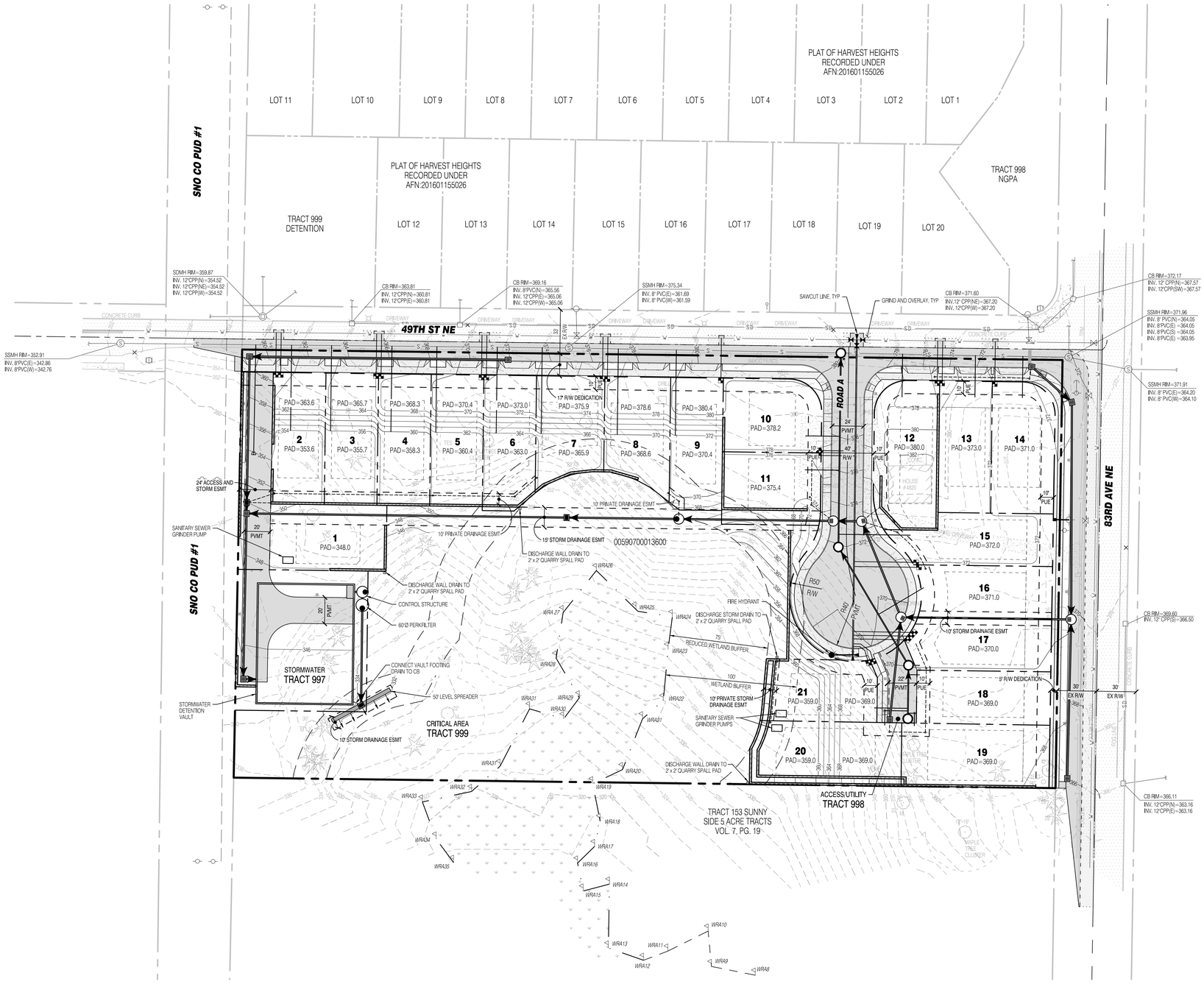
KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

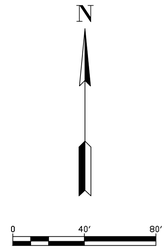
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DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PR-02
7 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON





LEGEND

SYMBOLS	DESCRIPTION
	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING
	STORM MAIN PIPE
	SEWER MAIN PIPE
	WATER MAIN PIPE

UTILITY NOTES

1. RESIDENTIAL SANITARY SEWER GRINDER PUMPS TO BE USED TO SERVE LOT 1 AND LOWER LEVELS OF LOTS 19-20.

UTILITY NOTE

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THOMAS P. ARBUTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER — 1-26-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY UTILITY PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

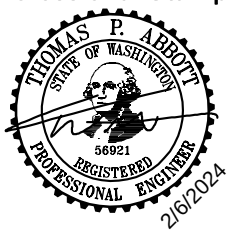
UT-01
8 OF 8

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ENGINEERING VARIANCE REQUEST

One variance request form shall be submitted for each section of the Marysville Municipal Code (MMC) or Engineering Design and Development Standards (EDDS) for which variances are being sought. Each variance shall be considered on a case-by-case basis, and shall not be construed as setting precedent for any subsequent applications.

PROJECT INFORMATION:	
Project Name:	Taylor Lane
Project Number:	PA24-002
Request Submittal Date:	2/6/2024

CONTACT INFORMATION:		
Engineer/Surveyor Name:	Tom Abbott, PE	**Professional Stamp**
Firm Name:	Solid Ground Engineering	
Mailing Address:	8105 166th Ave NE #202	
E-Mail Address:	tabbott@solidgroundpnw.com	
Phone Number:	(425) 281-8324	

VARIANCE REQUEST INFORMATION:	
MMC/EDDS Section:	EDDS Section 3-205.E.3
$250 Application Fee Submitted:	☑ Yes ☐ Deferred

Variance Justification (attach additional pages if needed):

The proposed alignment of the private road to serve lots 18-21 extends from the proposed cul-de-sac. This request intends to propose an access solution that better meets City requirements than an EDDS-compliant design, which would require lots to access directly off of the proposed cul-de-sac. The reasons for a better design should the deviation be approved are as follows:

- The project is located in the Whiskey Ridge subarea. Per the subarea plan, lots along an arterial such as 83rd Ave need to have pedestrian access to the arterial. The proposed layout provides that. Lots 18-19 would be served in an “alley loaded” scenario from the private road where a door would front onto 83rd for access. If the deviation is not approved, individual driveways would be needed to extend to lots 18 and 19. This would create two flag lots next to each other off the cul-de-sac, which is not allowed by City requirements. The only option to provide lots in this location would be to extend the cul-de-sac closer to the property line, eliminating lots 20 and 21 and increasing the wall height along the wetland buffer along the cul-de-sac by 10'.

- If the proposed deviation were to be approved, there would be less access points to the cul-de-sac abutted next to each other.

- If the flag lot driveway scenario for lots 18 and 19 was approved via deviation to serve those lots, then lots 20 and 21 would be forced to orient north/south to access the cul-de-sac. In this revised lot orientation, the proposed rear wall on lots 20 and 21 would be 10’ taller. These two lots (if two could even be kept, which is unlikely) would now be facing towards the cul-de-sac and ruin the potential for the 10’ step that they currently have towards the rear off the lots, thereby reducing the wall height & its associated

[See MMC 22G.010.420 for variance decision criteria]

MARYSVILLE
PUBLIC WORKS

(360) 363-8100

Public Works
80 Columbia Avenue
Marysville, WA 98270

MARYSVILLE
PUBLIC WORKS

(360) 363-8100

Public Works
80 Columbia Avenue
Marysville, WA 98270

FINDINGS/DECISION (City Staff Use Only)	
Reviewing Staff Member:	
$250 Application Fee Submitted:	☐ Yes ☐ Deferred
Decision:	☐ Approve ☐ Approve with Conditions ☐ Disapprove
Findings/Decision/Conditions:	

Signature/Date

COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue ◆ Marysville, WA 98270
360.363.8000

February 6, 2024

Solid Ground Engineering
Attn: Tom Abbott
8105 166th Ave NE
Redmond, WA 98052

Re: **PA24-002 – Taylor Lane Subdivision – *Complete Application***
Major Subdivision

Dear Tom,

The Community Development Department has reviewed the above referenced application and determined the application ***complete*** on February 6, 2024. Any additional information/items that are needed will be requested after all affected departments and local agencies have had an opportunity to review the proposal.

If you have any questions regarding this application, please contact me at emorgan@marysvillewa.gov, or by phone at 360-363-8216.

Sincerely,

Emily Morgan

Emily Morgan
Senior Planner

e-copy: Haylie Miller, CD Director
Chris Holland, Planning Manager
Joe Long, Keystone Development

REQUEST FOR REVIEW

Community Development Department ◆ 501 Delta Avenue ◆ Marysville, WA 98270
Office Hours: Mon - Fri 8:00 AM - 4:30 PM ◆ Phone: (360) 363-8000

PROJECT INFORMATION					
File Number	PA24-002	**Date Sent**	2.7.2024	**Please Return by**	2.21.2024
Project Title	Taylor Lane Subdivision	**Related File Number**(s)	PreA23-030		
Project Description	The applicant is proposing a 21-lot single family residential subdivision; the existing residence is to be retained on proposed lot 12. The project site includes a portion of a Category II wetland and its associated buffer. The applicant has the intent of using buffer width averaging to accommodate the proposed development; compensatory mitigation via buffer enhancement is proposed. The application also includes an EDDS Variance Request to allow for a private access lane off of a public cul-de-sac.				

BACKGROUND SUMMARY									
Applicant	Joe Long, Keystone Land LLC / Tom Abbott, Solid Ground Engineering								
Location	4820 83rd Ave NE			**APNs**	00590700013600				
Acreage (SF)	4.66 acres (202,889 sq. ft.)			**Section**	35	**Township**	30	**Range**	05
Comprehensive Plan	Single Family High	**Zoning**	R-6.5	**Shoreline Environment**	N/A				

REVIEWING AGENCIES				
Marysville	**Local Agencies & Districts**	**State & Federal**	**County**	**Other**
☒ **Building** ☒ **Parks** ☐ **Police** ☒ **PW – Development Services** ☒ **PW – Engineering** ☒ **PW – Operations** ☒ **PW – Solid Waste** ☒ **PW – Streets** ☒ **PW – Traffic Eng.** ☒ **PW – Water Res.** ☒ **PW – WWTP**	☐ **Arlington Airport** ☐ **Arlington** (city) ☒ **Comcast** ☐ **Community Transit** ☒ **Marysville Fire District** ☒ **Lake Stevens SD** ☒ **PUD No. 1** (electric) ☒ **Ziply**	☒ **US Army Corps of Engineers** ☐ **BNSF** ☒ **DAHP** ☐ **DNR** ☒ **DOE** (Bellevue) ☐ **DOE** (Floodplain) ☐ **DOE** (Register) ☐ **DOE** (Shorelands) ☒ **WDFW** ☐ **WSDOT** ☐ **WUTC**	☐ **Health District** ☐ **Planning** ☐ **Public Works - Land Development** ☐ ☐	☐ **Olympic Pipeline** ☐ **Puget Sound Energy** ☒ **Stillaguamish Tribe** ☒ **Tulalip Tribes** ☐ ☐

PROJECT MANAGER			
Name Emily Morgan	**Title** Senior Planner	**Phone** 360.363.8216	**E-mail** emorgan@marysvillewa.gov

The City of Marysville Community Development Department is reviewing this application and encourages other affected agencies, departments, community groups and municipalities to respond. Your comments will assist the City's evaluation of this application. Furthermore, you will become a Party of Record to this case if you submit a response with your name and address. We highly recommend that you send your comments on letterhead. Without a full name and address, you will not be considered a Party of Record. You may e-mail, fax or send via regular mail your comments to this project manager listed above.

If you have no comments, please check the box below, sign and return this form to the project manager.

☐ **NO COMMENTS** **Signature**: _____ **Date**: _____

☐ **ATTACHED** **Title**: _____ **Agency**: _____

COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue ◆ Marysville, WA 98270 ◆ (360) 363-8000

NOTICE OF APPLICATION

File Number: PA24-002

Project Title: Taylor Lane Subdivision

Applicant: Keystone Land, LLC

Project Contact: Tom Abbott, Solid Ground Engineering
8105 166th Ave NE, Redmond, WA 98052

Project Location: 4820 83rd Ave NE

APN: 00590700013600

Date of Completeness: February 6, 2024

Scan to View Project Materials

NOTICE IS HEREBY GIVEN THAT AN APPLICATION WAS MADE FOR THE FOLLOWING PROPOSAL:

The applicant is proposing a 21-lot single family residential subdivision; the existing residence is to be retained on proposed lot 12. The project site includes a portion of a Category II wetland and its associated buffer. The applicant has the intent of using buffer width averaging to accommodate the proposed development; compensatory mitigation via buffer enhancement is proposed.

Existing Environmental Documents: Traffic Impact Analysis; Geotechnical Report; Critical Area Report; Preliminary Drainage Report

Public Hearing: An Open Public Record Decision Hearing is required for this application; a subsequent Notice of Hearing will be published at a later date.

Public Comment Period: Written comments must be submitted to the contact person listed below by **5:00 PM on February 28, 2024**.

Document Availability: http://docs.marysvillewa.gov/htcomnet/public/?folder=7f88ad36

ANY PERSON HAS THE RIGHT TO RECEIVE NOTICE, PARTICIPATE IN ANY HEARINGS, REQUEST A COPY OF THE FINAL DECISION AND APPEAL THE DECISION AS PROVIDED BY LAW.

For project information or to become a party of record, please contact:
Emily Morgan, Senior Planner
(360) 363-8216
emorgan@marysvillewa.gov

THIS NOTICE IS NOT TO BE REMOVED CONCEALED OR DESTROYED

Everett Daily Herald

Affidavit of Publication

State of Washington }
County of Snohomish } ss

Michael Gates being first duly sworn, upon oath deposes and says: that he/she is the legal representative of the Everett Daily Herald a daily newspaper. The said newspaper is a legal newspaper by order of the superior court in the county in which it is published and is now and has been for more than six months prior to the date of the first publication of the Notice hereinafter referred to, published in the English language continually as a daily newspaper in Snohomish County, Washington and is and always has been printed in whole or part in the Everett Daily Herald and is of general circulation in said County, and is a legal newspaper, in accordance with the Chapter 99 of the Laws of 1921, as amended by Chapter 213, Laws of 1941, and approved as a legal newspaper by order of the Superior Court of Snohomish County, State of Washington, by order dated June 16, 1941, and that the annexed is a true copy of EDH991360 NOA PA24-002 as it was published in the regular and entire issue of said paper and not as a supplement form thereof for a period of 1 issue(s), such publication commencing on 02/09/2024 and ending on 02/09/2024 and that said newspaper was regularly distributed to its subscribers during all of said period.

The amount of the fee for such publication is $77.52.

Subscribed and sworn before me on this 13th day of February 2024

Linda Phillips
Notary Public
State of Washington
My Appointment Expires 8/29/2025
Commission Number 4317

Notary Public in and for the State of Washington.

COMM DEVEL - CITY OF MARYSVILLE | 8852148
JANIS LAMOUREUX

MARYSVILLE

CITY OF MARYSVILLE
COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue • Marysville, WA 98270 • (360) 363-8000
NOTICE OF APPLICATION

File Number: PA24-002
Project Title: Taylor Lane Subdivision
Applicant: Keystone Land, LLC
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8105 166th Ave NE,
Redmond, WA 98052
Project Location: 4820 83rd Ave NE
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For project information or to become a party of record, please contact:
Emily Morgan, Senior Planner
(360) 363-8216
emorgan@marysvillewa.gov
Published: February 9, 2024.

EDH991360

From: Emily Morgan
To: Tom Abbott
Cc: Joe Long; Chris Holland
Subject: Review of Taylor Lane - PA24-002
Date: Thursday, February 29, 2024 10:40:44 AM
Attachments: TR1 Comments.pdf
image001.png

Good Morning,

Based on the provided materials for Taylor Lane, we have determined that as proposed, the project is not approvable. One of the main issues that will alter the project is the on-site wetland and the report provided.

In reviewing the provided Critical Area Study, dated January 26, 2024, prepared by Wetland Resources, staff does not concur with findings and analysis found in this report. A few areas that are of particular concern are:

- Page 5 states: *Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which would typically require expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). However, discussion with City staff indicates that installation of retaining walls along the standard buffer is adequate to satisfy this requirement and maintain the standard buffer width.*

  Staff does not agree with the above conclusion and based on the site sloping/existing vegetation within the buffer, it is not anticipated that buffer reduction would be allowable per MMC 22E.010.100(5)(b)(i).

  Further, staff is not going to approve the proposed walls along the buffer. These walls vary from 2 ft. to 16 ft. with Lots 20 and 21 having tiered walls that total over 28 ft.

- The report mentions that the site investigation was conducted in September 2023 and that soils were dry but it was commented that*, "the geomorphic position (D2) of the depression and dominance of hydrophytic vegetation (D5) are indicative of prolonged saturation during the wet season*". The delineation time frame appears to be outside of the growing season and is anticipated to not be an accurate depiction of the site conditions and wetland function.

- Being as the report notes that the wetland scored a 22 categorizing it as a Category II (scoring of 23 would qualify as a Category I), staff request that an updated site visit be conducted, during the wet growing season, with a report updated to adequately and correctly apply the provision of MMC 22E.010. If a revised report is not provided, the City will request a 3rd party peer review of the report.

Attached are the comments that were received from other departments/agencies for the project. Planning is going to wait until the updated critical area report is provided as it is suspected that the findings may alter the proposed site configuration.

Let me know if you have questions.

From: Will Brandt
To: Emily Morgan
Cc: Will Brandt
Subject: [External!] Traffic Safety Concerns: PA24-002
Date: Friday, February 9, 2024 8:43:38 AM

You don't often get email from udubwill@gmail.com. Learn why this is important

[CAUTION:] This email originated from outside the City of Marysville. **Do not click links or open attachments** unless you recognize the sender and know the content is safe. Contact helpdesk if you have any concerns or questions.

Hello Emily,

I saw a proposed land use sign this morning on the southwest corner of 83rd Avenue and 49th Street for a development called Taylor Lane.

Upon review of the documents online, I would like to note my concerns regarding possible traffic safety issues as follows:

1. There is a blind spot for drivers travelling eastbound along 49th Street at the intersection with 83rd Avenue, specifically being able to clearly see traffic travelling northbound along 83rd Avenue. There is a sharp hill that goes southward from this intersection. This makes it quite challenging to see any traffic coming northbound along 83rd Avenue. Over the years I have had to reach out to the city to have them come out and clear brush blocking visibility at this intersection to aid in seeing traffic. Even with this, though, it is hard to often see traffic. Vehicles, including large trucks, often speed along 83rd Avenue. My concern is with the placement of Lot 14. It appears that having a structure on Lot 14 will more or less block any visibility at this intersection, thereby substantially increasing the likelihood of collisions. It is already bad enough where I have witnessed a large number of near misses of vehicles coming off of 83rd Avenue northbound and shorting the turn as they come onto westbound 49th Street, almost hitting the vehicle waiting at this intersection. To err on the side of safety, I would like any structure on Lot 14 to be permanently removed from this proposal, to be replaced by open space; thereby keeping (the already limited) visibility at this already dangerous intersection. Any additional improvements or enhancements that the city might require of this development to improve visibility at this intersection is also welcome.
2. There is a cul-de-sac ("Road A") proposed directly across from the second house in from 83rd Avenue along the northside of 49th Street (Harvest Heights Lot 19). To reiterate my statement from above, cars coming off of 83rd Avenue and onto westbound 49th Street (especially from northbound 83rd Avenue) already fly around the corner. I am concerned about the traffic safety at this intersection as having a street so close to 83rd Avenue may catch drivers off guard. I would like to request that a "hidden driveway" sign or something of a similar nature be placed across from Lot 13 to indicate to drivers heading westbound along 49th Street that there is a hidden driveway ("Road A"). My assumption is that drivers heading eastbound along 49th Street should be able to see this cul-de-sac in time; however with the slope of 49th Street at this point causing some visibility issues, it may be worthwhile to assess visibility as well and address this accordingly.

I would also like to clarify/confirm that this development would widen 49th Street as a result. This street is already very narrow and often creates visibility issues when someone decides to park in the street. In my review of this proposed development, my conclusion is that this

development would widen 49th Street to the full standard road width as a result. Thus, this would bring a positive benefit in having a widened street as well as extending the sidewalk along the south side of 49th Street.

Currently 49th Street narrows just west of the power lines (with the sidewalk on the south side ending as well). The documentation I have reviewed indicates that the road would be widened potentially to full standard street width from the east point of the power lines and include a sidewalk along the south side of 49th Street to and around southbound 83rd Avenue . However, it appears that this may still leave a small section of narrow road just under the power lines that may not be at full width (the section along the south side of 49th Street). I am unclear whether the sidewalk will be extended from just west of the power lines to connect to this development. Can you please confirm whether this would or would not occur; that if this does not fall under this proposal, how could this section be fixed if not part of this development?

I would be interested in your input and how these safety issues will be addressed, as well as your response regarding the street width and sidewalk extension along 49th Street.

Thank you,

Will Brandt
7915 49th St NE
udubwill@gmail.com

COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Ave Marysville, WA 98270

MEMORANDUM

Date: **February 9, 2024** **PA24-002**

To: **Emily Morgan, Senior Planner**

From: **Michael Snook, Building Official**

Re: **Project Name:** Taylor Lane Subdivision
Applicant: Joe Long, Keystone Land LLC/Tom Abbott, Solid Ground Engineering
Proposal: The applicant is proposing a 21-lot single family residential; the existing residence is to be retained on proposed lot 12. The project site includes a portion of a Category II wetland and its associated buffer. The applicant has the intent of using buffer width averaging to accommodate the proposed development; compensatory mitigation via buffer enhancement is proposed.
The application also includes an EDDS Variance Request to allow for a private access lane off of a public cul-de-sac.
Address: 4820 83rd Ave NE

In response to your request for review of the above project. Please see requirements below;

1. Applicant shall comply with any and or all provisions the 2018 Edition of the International Building, Residential, Mechanical, 2018 Uniform Plumbing Codes, and current Washington State Amendments, or 2021 International Codes and Uniform Plumbing code if submitted after March 15, 2024

2. All plans and permit applications will be required to be submitted electronically as part of their submittal process. One (1) complete set of building plans, structural calculations, and 2018 Washington State Energy Code work sheets. 2021 Washington State Energy Codes required if submitted after March 15, 2024.

3. Contact our office if you have questions in regards to permit applications, checklists and/or handouts that you and/or your design team will be preparing plans for on your project.

4. If any demolition of structures is proposed, and you are unsure if permit/s will be required for the removal of any existing structures. Please contact the Building Division at 360-363-8100, to ask any specific questions. An asbestos report will be required for each demo permit.

5. Separate permits will be required for any proposed rockeries or underground storm vaults. One (1) complete set of building plans, structural calculations, site plan, and Geotech Report are to be submitted for review.

6. A grading permit will be required. A Geotechnical report shall be submitted to the City for this project. This is to be an in-depth report to address the following:

    - Soil Classification
    - Required Drainage Systems
    - Soil Compaction Requirements
    - Type of Footings, Foundations, and Slabs Allowed
    - Erosion Control Requirements
    - Retaining Walls
    - Fill and Grade
    - Final Grade

Please provide the below information in regards to this overall project the 2018 International Building requirements;

1. The building structure will be required to be designed under the 2018 IBC, Chapter 16, and Structural Design Requirements. Or 2021 IBC if submitted after March 15, 2024. The seismic zone criteria is to be established under the guidelines of a Washington State Licensed Architect and/or Structural Engineer.

2. Please provide scaled floor plans with square footage.

3. Show on the plans the type of building materials proposed, and if required, what type of fire-resistant construction will be required.

4. Site plan is to show the distance from the proposed structure to the property lines, from all sides of the building.

5. A Fire Sprinkler system may be required. The applicant is to verify this requirement with the Fire Marshal's Office.

6. All Electrical installations are to be permitted, inspected and approved through the City. The current code is NEC 2023 with WCEC Amendments. A separate application, plans, and plan review will be required.

7. Special Inspection may be required. The list of the type of inspections shall be indicated on the plans by the Engineer of Record. The owner is to notify the City of the registered special inspection agency prior to permit issuance.

Building application for plan review will be approximately 4-6 weeks for first-time plan review comments.

We look forward to your project coming to our City!

If I may be of any further assistance, please feel free to contact me.

Michael Snook, Building Official, 360-363-8210 or msnook@marysvillewa.gov during office hours 7:30 am – 4:00 pm, Monday through Friday.

PUBLIC WORKS DEPARTMENT
501 Delta Ave. ◆ Marysville, WA 98270
(360) 363-8100 ◆ (360) 651-5099 FAX

MEMORANDUM

To: Emily Morgan, Senior Planner

From: Shane Whitney, Civil Plan Reviewer

RE: Taylor Subdivision, File# PA24-002
21 Lot Subdivision
4820 83rd Ave & Parcel # 00590700013600

Date: 2/22/2024

The following comments are offered after review of the above referenced application.

1. **Existing utilities**:
   a. Sanitary sewer: The sewer main in 49th is shown on record drawing RD227.
   b. Water: The water main and storm system in 49th is also on record drawing RD227.

2. Per MMC 14.03.250, utilities are to be extended along the street frontages of the proposed project.
   a. Storm drainage will need to be provided for the widened sections of 83rd Ave and 49th Street.

3. **Frontage Improvements:** Frontage improvements are required per MMC 12.02A.090 on all projects. Frontage improvements are described as curbs, gutters, and sidewalks; underground storm drainage facilities; patching the street from its preexisting edge to the new curb line; and overlayment of the existing public street to its centerline.
   a. 49th Street NE is classified as a local access street. Buildout is to match the section to the west of the project. This will include connecting the sidewalk and widening to the west of the site within the PUD powerline easement.
   b. 83rd Ave is an arterial, a 6 foot planter and 6 foot sidewalk is required. Widening shall align with the project to the north.

4. **Dedication Requirements:**
   a. Dedication on 49th street shall give a total right-of-way width of at least 50 feet. Should additional area be necessary, the project will be required to dedicate it.
   b. For 83rd Ave NE, a 35 foot half width will be necessary.

5. **Access**:
    a. No direct lot access is permitted to 83rd Ave NE as it is an arterial (EDDS 3-301). None appears to be proposed.
    b. The minimum width of a residential driveway is 12-feet and the maximum is 26-feet. Curb cuts shall be limited to a 20 foot maximum.
    c. The access to lot 14 must not be within 50 feet of the curbline within 83rd Ave. NE.
    d. The EDDS variance to lots 18 – 20 is under review by the Engineering Services Manager. The planned access will be problematic. Auto-courts are only allowed in a PRD development, and private roads are only allowed in short plats. A final determination will come from the manager.
    e. The driveway to lot 1 may add a requirement from the Fire Marshall that a sprinkler system be required.

6. **Drainage:** All projects in the city of Marysville must comply with requirements stipulated under the MMC 14.15.040 and 14.15.050.
    a. Stormwater drainage: The city has adopted the 2019 Ecology Manual. Projects above the 2,000 square feet threshold must comply with requirements stipulated in Volume I, Chapter 2 of the Stormwater Management Manual for Western Washington. The supplied report will need to be amended to account for the additional widening and sidewalk that will occur to connect to the existing improvements to the west.
    b. A geotechnical report has been supplied.
    c. The maximum allowed impervious surface coverage for the Zoning designation is 50%.

Other Comments:

7. Survey control datum NAVD-88 and NAD-83 are required to be used. Civil construction plans will not be accepted in any other datum.

8. Trench restoration is to be completed in accordance with section 3-703 of the EDDS. A full lane or full street overlay may be required.

9. The onsite grading and placement of any retaining walls must be compliant with section 22D.050.030 of the MMC. Grading will need to match the grades on adjacent parcels to the extent feasible.

10. A right of way use permit for all work proposed within City right of way is required. Cost for the ROW permit is $648.00. ROW permit fees must be paid before right of way permit issuance.

11. The applicant is responsible for identifying any existing well or septic systems on site or on adjacent properties. If there are any existing septic systems on site they need to be decommissioned based on the Snohomish Health District standards. If there are any wells on site they need to be decommissioned based on Department of Ecology standards.

12. Engineering construction plan review fees will be due prior to starting the review of the civil construction plans.

Engineering construction plan review per MMC 22G.030.020:
$976 plus a $2000 deposit are due for submittal of the grading permit.
Review fee of $130 per hour will be charged against the deposit.

13. Engineering construction inspection fees will be due prior to issuance of the grading permit.
    Engineering construction inspection fees per MMC 22G.030.020:
    Inspection is charged at $130 per hour with a $2500 deposit required.

14. **All civil construction plan submittals are to be routed directly to Shane Whitney**, Civil Plan Reviewer. The first *civil construction* plan submittal is to consist of a completed LDA application, a plan set, a copy of the drainage report, and a copy of the geotechnical report. **Once the documents are ready to be submitted, we will provide you a link to where the materials can be uploaded to.**
    a. Review timing:
        i. First review = 5 weeks
        ii. Second review = 3 weeks
        iii. Third review = 3 weeks
        iv. Subsequent reviews will be 3 weeks.

15. Please be advised these comments are in reference to specific items and do not imply a full review of the proposed application. Additional comments which may change the design requirements will be provided during the civil construction plan review process.

If you have additional questions regarding the above comments, please contact me at swhitney@marysvillewa.gov or at (360) 363-8227.

cc: Joshua King, PE, Engineering Services Manager

From: Gresham, Doug (ECY)
To: Emily Morgan
Subject: [External!] Taylor Lane Subdivision (PA 24-002)-review comments
Date: Wednesday, February 21, 2024 9:29:10 AM
Attachments: image001.png

You don't often get email from dgre461@ecy.wa.gov. Learn why this is important

[CAUTION:] This email originated from outside the City of Marysville. **Do not click links or open attachments** unless you recognize the sender and know the content is safe. Contact helpdesk if you have any concerns or questions.

Emily,
I have reviewed the Taylor Lane subdivision drawings and have the following comments.

Although there are no direct wetland impacts from filling there will be indirect impacts from buffer degradation. They are using buffer averaging to reduce the buffer 25% in some locations while enlarging the buffer elsewhere, which meets your CAO.

- There will be temporary impacts from grading in the buffer, installing retaining walls, and installing a stormwater pipe through the buffer. They need to replant these areas, and conduct maintenance to ensure invasive plants do not colonize this buffer area. They need to conduct five years of buffer monitoring to prove that their buffer enhancement was successful.
- I am concerned that the source of water to Wetland A and buffer will be disrupted by constructing houses in its drainage basin. All of the water that would have recharged groundwater or reached Wetland A and its buffer as sheet flow, will now be conveyed to the stormwater pond for detention. I am worried that the buffer and portions of Wetland A will dry out from reducing its source of hydrology. One solution could be to route rainwater falling on the house roofs to a French drain at the downstream edge of each property.

Doug Gresham, Wetland Specialist (he/him)
Washington State Department of Ecology
PO Box 330316
Shoreline, WA 98133-9716
Cell: (425) 429-1846
Email: Doug.Gresham@ecy.wa.gov

DEPARTMENT OF ECOLOGY State of Washington

When Recorded, Return to:

City of Marysville
Community Development
80 Columbia Ave
Marysville, WA 98270

Stormwater Covenant and Easement
(MMC 14.15.155)

DOCUMENT TITLE: *Project Name* Stormwater Covenant and Easement
Grantor: *Property Owner Name*
Grantee: CITY OF MARYSVILLE, a Municipal Corporation
Legal Description (abbreviated):
Assessor's Parcel(s):
Address:
Reference Number(s):
City of Marysville Project No: City of Marysville Building Permit No:
Note The Auditor/Recorder will rely on the information provided on this form. City staff not read the document to verify the accuracy or completeness of the indexing information provided herein.

Stormwater Covenant and Easement
(MMC 14.15.155)

This Stormwater Covenant and Easement (the "Agreement") is executed in favor of the City of Marysville (the "City") by the undersigned owner(s) (the "Grantor") of the following described real property situated in the City of Marysville, Snohomish County, State of Washington (the "Property") (insert complete legal description):

(attach Exhibit A if necessary to fit full legal description)

WHEREAS, pursuant to Marysville Municipal Code Chapter 14.15, as may be hereafter amended, a condition of developing the Property requires that it have adequate stormwater drainage; and

WHEREAS, the Grantor has installed a private storm drainage system for the Property; and

WHEREAS, such a private storm drainage system will require ongoing maintenance as detailed in the approved Facility Maintenance Plan to ensure it operates as designed;

WHEREAS, the private storm drainage system includes the following specified drainage control facilities, which are documented in the drainage control plan drawing(s), as amended by record drawing(s) on file with the City of Marysville. The following runoff treatment or flow control facilities are onsite:

	Detention or Infiltration Pond		BMP T8.20 Sand Filter vault
	Detention or Infiltration Vault		BMP T8.30 Linear Sand Filter
	BMPT5.15 Permeable Pavements		BMP T8.40 Media Filter Drain
	Detention Tank/Pipes		BMP T9.10 Basic Biofiltration Swale
	BMP T5.16 Tree Retention and Tree Planti		BMP T9.20 Wet Biofiltration Swale
	BMP T5.17 Vegetated Roofs		BMP T9.30 Continuous Inflow Biofiltration Swale
	BMP T5.20 Rainwater Harvesting		BMP T9.40 Basic Filter Strip
	BMP T5.30 Full Dispersion area		BMP T10.10 Wetponds Basic and Large
	BMP T6.10 Presettling Basin		BMP T10.20 Wetvaults
	BMP T7.10 Infiltration Basins		BMP T10.30 Stormwater Treatment Wetlands
	BMP T7.20 Infiltration trenches		BMP T10.40 Combined Detention and Wetpool Facilities
	BMP T7.30 Bioretention Cells, Swales and Planter Boxes		BMP T11.10 API (Baffle type) Separator ba
	BMP T7.40: Compost Amended Vegetated Filter Strips (CAVFS)		BMP T11.11 Coalescing Plate (CP) Separa Bay

	BMP T8.10 Basic Sand Filter basin		Ecology approved Emerging Technology Manufacturer: Device Name:
	BMP T8.11 Large Sand Filter basin		

Now, therefore, the Grantor, on behalf of Grantor and Grantor's heirs, successors, and assigns, agrees to the following and hereby creates a covenant running with the land that shall be binding upon all parties and their heirs, successors, and assigns forever:

(1) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, agrees to and shall:

(a) inspect and maintain the above described drainage control facilities in accordance with the provisions of Marysville Municipal Code (MMC) Title 14, the approved Facility Maintenance Plan (attached hereto as Exhibit B and incorporated by this reference), and any other provisions applicable to the facilities, as now and hereafter in effect;

(b) implement the terms of the drainage control plan required for development; and

(c) inform all future purchasers, heirs, successors, and assigns of the existence of the drainage control facilities and other elements of the drainage control plan and the limitations of the drainage control facilities.

(2) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, hereby grants permission for authorized representatives of the City of Marysville to enter onto the Property for inspection, monitoring, correction, or abatement of conditions related to the Property's drainage control plan, drainage control facilities, MMC Title 14, or any other MMC provision applicable to drainage control, as now and hereafter in effect.

(3) If the private storm drainage system is not maintained in accordance with the approved or record drawing design, the Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns grants the City the right to inspect and repair the system and assess reasonable costs for the work that may be charged against the Property, the Property owner, or any beneficiary.

(4) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns:

(a) Agrees and acknowledges that the City is not responsible for the adequacy or performance of the drainage control plan or the drainage control facilities;

(b) Agrees to accept any and all risks of harm, loss, injury, or damage related to the drainage control plan or the drainage control facilities; and

(c) Hereby waives any right to assert any and all present and future claims against the City, whether known or unknown, for any harm, loss, injury, or damage occurring either on or off the Property, related to the drainage control plan, the drainage control facilities, or drainage

or erosion on the Property, except only for such harm, loss, injury, or damage that directly results from the sole negligence of the City.

(5) This Agreement shall be recorded in the real estate records of the Auditor's Office of Snohomish County, Washington. If any provision of this Agreement is held invalid, the remainder of the Agreement is not affected.

(6) The obligations of the Grantor and each of the Grantor's heirs, successors, and assigns under this Agreement shall terminate when that person sells, devises, or transfers the Property, or his or her interest therein, unless the obligation arises out of a claim of negligence or intentional act of that person.

Now, therefore, to this end, the Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, hereby grants a perpetual easement to the City of Marysville and its authorized representatives to enter the Property, inspect the private storm drainage system, and make necessary repairs, with any expenses incurred being chargeable against the Property, the Property owner, and any beneficiary.

By: _____ Date: _____

Type signer's name here, Type signer's title or affiliation

Type company name here

Type address here

Type City, State, Zip here

By: _____ Date: _____

Type signer's name here, Type signer's title or affiliation

Type company name here

Type address here

Type City, State, Zip here

ACKNOWLEDGEMENT

(Individual)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument and acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at_____

My commission expires_____

(Entity)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of Washington, residing at _____

My commission expires _____

ACKNOWLEDGEMENT

(Individual)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument and acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at_____

My commission expires_____

(Entity)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of Washington, residing at _____

My commission expires _____

EXHIBIT A

LEGAL DESCRIPTION

(Insert complete legal description):

Situated in the City of Marysville, County of Snohomish, State of Washington.

EXHIBIT B

FACILITIES MAINTENANCE PLAN

MEMORANDUM

TO: Emily Morgan – Senior Planner

FROM: Jesse Hannahs, P.E. – Traffic Engineering Manager

DATE: February 27, 2024

SUBJECT: PA 24-002 – Taylor Property

I have reviewed the Pre-application Site Plan for the proposed Taylor Property at 4820 83rd Ave NE and have the following comments:

1) Traffic impact fees will be required from the City and depending on trip generation/distribution, may be required from the County and State.
2) A Traffic Impact Analysis (TIA) will be required.
    a. TIA is acceptable.
3) Undergrounding of overhead utilities along frontage of 83rd Ave NE shall be required.
4) Frontage improvements shall be required upon 83rd Ave NE frontage.
    a. 83rd Ave NE is designated as a Minor Arterial.
    b. Roadway cross-section shall be 70' ROW three lane roadway with bike lanes per EDDS Standard Plan 3-201-004.
5) Per EDDS 3-506, street lighting will be required.
    a. Roadways:
        i. Street Lighting upon public residential street of 49th ST NE shall be PUD installed fiberglass pole installation type street lighting utilizing 100 watt equivalent LED fixtures.
        ii. Street Lighting upon Arterial Street of 83rd Ave NE shall be PUD installed fiberglass pole installation type street lighting utilizing 250 watt equivalent LED fixtures.
    b. Spacing of fixtures should be approximately 180'-220'.
    c. As part of civil construction approval proposed PUD street lighting locations will be provided by the City to the developer for submission to PUD and incorporation into the PUD site electrical plans.
    d. Snohomish County PUD Process:
        i. For specific questions regarding street lighting, contact Eddie Haugen of Snohomish County PUD at (425) 783-8276 or wehaugen@snopud.com for more information.
6) A signing and channelization plan shall be required as part of civil construction plans.
    a. 49th ST NE:
        i. Existing parking restrictions up 49th ST NE shall be eliminated for length of frontage improvements as part of development.

ii. Driveways shall be placed staggered from existing driveways upon north side of 49th ST NE to enable staggered parking upon either side of residential street.
    1. Existing driveways shall be shown on site plan.
    2. Opposing driveways result in poor parking practices affecting sanitation pickup and emergency vehicle access often requiring undesirable parking restrictions that negatively affect neighborhoods.

b. 83rd Ave NE:
    i. Channelization Plan shall be provided with 83rd Ave NE to include ultimate planned channelization to extent feasible including bike lanes and two-way left turn lane.

August 21, 2024

City of Marysville Public Works Department
ATTN: Emily Morgan
501 Delta Ave
Marysville, WA 98270
(360) 363-8100

RE: Taylor Subdivision (PA 24-002) 1st Preliminary Review Comment/Response Letter

Project: Taylor Lane (SGE #23-0009)

Emily,

Please find below responses to all comments as received from the City of Marysville. All comments have now been addressed and responses to each comment are outlined below.

Existing Utilities – Shane Whitney

1. Sanitary Sewer: The sewer main in 49th is shown on record drawing RD227.

   Response: Noted.

2. Water: The water main and storm system in 49th is also on record drawing RD227.

   Response: Noted.

3. Peer MMC 14.03.250, utilities are to be extended along the street frontages of the proposed project.

   a. Storm drainage will need to be provided for the widened sections of 83rd Ave and 49th Street.

   Response: Noted – collection structures are located along curblines of pavement extensions as requested.

Frontage Improvements – Shane Whitney

1. Frontage improvements are required per MMC 12.02A.090 on all projects. Frontage improvements are described as curbs, gutters, and sidewalks; underground storm drainage facilities; patching the gate from its preexisting edge to the new curb line; and overlayment of the existing public street to its centerline.

   Response: These are the improvements shown.

2. 49th Street NE is classified as a local access street. Buildout is to match the section to the west of the project. This will include connecting the sidewalk and widening to the west of the site within the PUD powerline easement.

   Response: 49th has been extended as requested.

3. 83rd Ave is an arterial, a 6-foot planter and 6 foot sidewalk is required. Widening shall align with the project to the north.

   Response: Road section for 83rd has been updated as requested. ROW dedication remains the same as previously shown.

Dedication Requirements - Shane Whitney

1. Dedication on 49th street shall give a total right-of-way width of at least 50 feet. Should additional area be necessary, the project will be required to dedicate it.

Response: Road section for 83rd has been updated as requested. ROW dedication remains the same as previously shown.

2. For 83rd Ave NE, a 35-foot half width will be necessary.

   Response: Noted. 5' dedication is shown.

Access – Shane Whitney

1. No direct lot access is permitted to 83rd Ave NE as it is an arterial (EDDS 3-301). None appear to be proposed.

   Response: Correct.

2. The minimum width of a residential driveway is 12-feet, and the maximum is 26-feet. Curb cuts shall be limited to a 20-foot maximum.

   Response: Driveways shown are depicted as such.

3. The access to lot 14 must not be within 50 feet of the curbline within 83rd Ave NE.

   Response: Lot 10, after new lot configuration, has located the driveway cut 50' from the curbline in 83rd.

4. The EDDS variance to lots 18-20 is under review by the Engineering Services Manager. The planned access will be problematic. Auto-courts are only allowed in a PRD development, and private roads are only allowed in short plats. A final determination will come from the manager.

   Response: This variance is no longer needed due to the new project layout.

5. The driveway to lot 1 may add a requirement from the Fire Marshall that a sprinkler system be required.

   Response: Due to the revised layout and shared driveway easements that have been added to the design, lots

Drainage – Shane Whitney

1. All projects in the City of Marysville must comply with requirements stipulated under the MMC 14.15.040 and 14.15.050.

   Response: Noted.

2. Stormwater drainage: The city had adopted the 2019 Ecology Manual. Projects above the 2,000 square feet threshold must comply with requirements stipulated in Volume I, Chapter 2 of the Stormwater Management Manual for Western Washington. The supplied report will need to be amended to account for the additional widening and sidewalk that will occur to connect to the existing improvements to the west.

   Response: Noted.

3. A geotechnical report has been supplied.

   Response: Noted.

4. The maximum allowed impervious surface coverage for the Zoning designation is 50%.

   Response: Noted.

Doug Gresham – Wetland Specialist Comments

1. Although there are no direct Wetland impacts from filing there will be indirect impacts from buffer degradation. They are using buffer averaging to reduce the buffer 25% in some locations while enlarging the buffer elsewhere, which meets your CAO.

Response: Noted. Please see the revised critical areas report for additional information regarding the updated layout and approach to buffer averaging.

2. There will be temporary impacts from grading in the buffer, installing retaining walls, and installing a stormwater pipe through the buffer. They need to replant these areas and conduct maintenance to ensure invasive plants do not colonize this buffer area. They need to conduct five years of buffer monitoring to prove that their buffer enhancement was successful.

   Response: With the revised approach, there are no longer temporary impacts to the level that was previously proposed.

3. I am concerned that the source of water to Wetland A and buffer will be disrupted by constructing houses in its drainage basin. All of the water that would have recharged groundwater or reached Wetland A and its buffer as sheet flow, will now be conveyed to the stormwater pond for detention. I am worried that the buffer and portions of Wetland A will dry out from reducing its source of hydrology. One solution could be to route rainwater falling on the house roofs to a French drain at the downstream edge of each property.

   Response: Per flow control requirements in the DOE Manual, the detention pond will collect and release stormwater runoff from the developed site at mitigated, historic rates for the area of develop that will occur within the wetland tributary basin. This stormwater will be treated to DOE water quality thresholds prior to release. The discharge will drain to the wetland and hydrate it.

Ryan Carney – Surface Water Inspector Comments

1. For residential projects triggering minimum requirements #6 Runoff Treatment and #7 Flow Control, the stormwater facility lot will be dedicated to the HOA when there are park amenities on the lot. The HOA will be responsible to maintain the landscaping and park amenities. The City will receive an easement to maintain the vault. This policy may be modified depending on facility design.

   Response: Noted. Please note that an open pond with concrete cast in place walls is now proposed.

2. Please include all access points (manholes, access grates) in the landscape plan.

   Response: There are no long any access points as was previously prosed by the detention vault, as the structure is now an open-air pond.

Jesse Hannahs, P.E. – Traffic Engineering Manager Comments

1. Traffic impact fees will be required from the City and depending on trip generation/distribution , may be required from the County and State.

   Response: Noted.

2. A Traffic Impact Analysis (TIA) will be required.

   a. TIA is acceptable.

   Response: Noted.

3. Undergrounding of overhead utilities along frontage of 83rd Ave NE shall be required.

   Response: Noted.

4. Frontage improvements shall be required upon 83rd Ave NE frontage.

   a. 83rd Ave NE is designated as a Minor Arterial.

   b. Roadway cross-section shall be 70’ ROW three lane roadway with bike lanes per EDDS Standard Plan 3-201-004.

Response: Noted. This is the section currently proposed.

5. Per EDDS 3-506, street lighting will be required.
    a. Roadways:
        i. Street Lighting upon public residential street of 49th ST NE shall be PUD installed fiberglass pole installation type street lighting utilizing 100-watt equivalent LED fixtures.
        ii. Street Lighting upon Arterial Street of 83rd Ave NE shall be PUD installed fiberglass pole installation type street lighting utilizing 250 watt equivalent LED fixtures.
    b. Spacing of fixtures should be approximately 180'-220'.
    c. As part of civil construction approval proposed PUD street lighting locations will be provided by the City to the developer for submission to PUD and incorporation into the PUD site electrical plans.
    d. Snohomish County PUD Process:
        i. For specific questions regarding street lighting, contact Eddie Haugen of Snohomish County PUD at (425) 783-8276 or wehaugen@snopud.com for more information.

    Response: Street lights are already located along the north side of 49th St, including at the intersection of 49th and 83rd so none are required along the project frontage. Lighting has recently been constructed along the east side of 83rd Ave has already been installed and therefore none are required along the project frontage of 83rd Ave.

6. A signing and channelization plan shall be required as part of civil construction plans.
    a. 49th ST NE:
        i. Existing parking restrictions up 49th ST NE shall be eliminated for length of frontage improvements as part of development.
        ii. Driveways shall be placed staggered from existing driveways upon north side of 49th ST NE to enable staggered parking upon either side of residential street.
            1. Existing driveways shall be shown on site plan.
            2. Opposing driveways result in poor parking practices affecting sanitation pickup and emergency vehicle access often requiring undesirable parking restrictions that negatively affect neighborhoods.
    b. 83rd Ave NE:
        i. Channelization Plan shall be provided with 83rd Ave NE to include ultimate planned channelization to extent feasible including bike lanes and two-way left turn lane.

    Response: Driveway locations have been visually added on the north side of 49th St NE. A channelization plan will be prepared for a future civil permit submittal.

Comments from Emily Morgan – City Planner

In reviewing the provided Critical Area Study, dated January 26, 2024, prepared by Wetland Resources, staff does not concur with the findings and analysis found in this report. A few areas that are of particular concern are:

1. Page 5 states: *Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which would typically require expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). However, discussion with*

City staff indicates that installation of retaining walls along the standard buffer is adequate to satisfy this requirement and maintain the standard buffer width.

Staff does not agree with the above conclusion and based on the site sloping/existing vegetation within the buffer, it is not anticipated that buffer reduction would be allowable per MMC 22E.010.100(5)(b)(i).
Further, the staff is not going to approve the proposed walls along the buffer. These walls vary from 2 ft. to 16 ft. with Lots 20 and 21 having tiered walls that total over 28 ft.

Response: Per previous discussions with City staff, the site layout has been adjusted and verified. The buffer of Wetland A has been revised to meet the requirements of MMC 25E.010.100(6)(d)(ii).

2. The report mentions that the site investigation was conducted in September 2023 and that soils were dry but it was commented that, "the geomorphic position (D2) of the depression and dominance of hydrophytic vegetation (D5) are indicative of prolonged saturation during the wet season". The delineation time frame appears to be outside of the growing season and is anticipated to not be an accurate depiction of the site conditions and wetland function.

   Response: Please see the revised critical areas report that addresses these comments.

3. Being as the report notes that the wetland scored a 22 categorizing it as a Category II (scoring of 23 would qualify as a Category I), staff request that an updated site visit be conducted, during the wet growing season, with a report updated to adequately and correctly apply the provision of MMC 22E.010. If a revised report is not provided, the City will request a 3rd party peer review of the report.

   Response: The delineation of Wetland A occurred in September 2023, within the growing season which occurs between February and November in Western Washington. It is common during summer and fall site investigations for wetland areas to lack direct hydrologic indicators, particularly near the transition between wetland and non-wetland areas. In these cases, the determination of the wetland boundary leans more heavily on vegetative and hydric soil wetland indicators. These indicators can be used to accurately define wetland boundaries in the absence of a dry-season water table or saturation. These methods are in line with the 1987 delineation manual and the 2010 regional supplement.

   It is not practical for wetland delineations to only occur in early parts of the growing season. Furthermore, although hydrologic indicators are more likely to be available during these months, it is not guaranteed that they will accurately represent the extent of wetland areas. For instance, heavy rainfall could result in hydrologic indicators being present outside of wetland areas just as drought may cause hydrologic indicators to be absent.

   Changes in soil color and composition as well as the plant community defined a readily observable break along the edge of Wetland A. This break informed the delineation during the September site investigation.

   A WETS Table analysis of the months preceding the September site investigation has been included in the Methodology section (page 4) of the revised report. Hydrologic conditions preceding the September site investigation were normal.

   Being as the report notes that the wetland scored a 22 categorizing it as a Category II (scoring of 23 would qualify as a Category I), staff request that an updated site visit be conducted, during the wet growing season, with a report updated to adequately and correctly apply the provision of MMC 22E.010. If a revised report is not provided, the City will request a 3rd party peer review of the report.

   There are three places within the wetland rating form where changes in the hydroperiod could increase the wetland rating score: questions D1.3, D 4.2, and H1.2.

   The portion of the wetland located on site is 11,524 square feet, approximately 2 percent, of an estimated 590,040 square-foot wetland. Changing the answer of D1.4 to "Area seasonally ponded is greater than ½ of the total area of wetland" is not practical with access to such a small portion of the wetland and would not change the overall wetland score.

Question D4.2 has to do with the depth of ponding within the wetland. In order to increase the rating score for Wetland A, ponding greater than 3 feet in depth would need to be present at the outlet of the wetland. Very little evidence of ponding was observed during the site investigation. No evidence of ponding deeper than 6 inches was observed on site.

Question H1.2 also requires observing a larger portion of the wetland than is feasible with the available access. In order for a hydroperiod to be included within the wetland rating, more than 10% of the wetland or 10,890 square feet (whichever is less) of wetland area must meet the criteria for the given hydroperiod. The relatively small portion of Wetland A that is available required these hydroperiods to be estimated during the rating process. A follow up site investigation during the wet season would be unlikely to change the mapped hydroperiods within the wetland to a degree that would alter the answer to question H1.2. Additionally, even if the wetland scored the maximum number of points for question H1.2, the total rating score would remain unchanged.

The rating system was designed so that it could be used throughout the year. Although hydroperiods within the wetland may be clearer during a wet-season site visit, evidence of seasonally and occasional ponding are visible throughout the year. This evidence was taken into our consideration during the rating of Wetland A.

Thank you for your review. Let us know if you have any questions or if you need any additional information. We are happy to discuss this project further with you as necessary.

Regards,



Tom Abbott, P.E.
Principal Civil Engineer
Solid Ground Engineering

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

TAYLOR LANE
PRELIMINARY PLANS
MARYSVILLE, WA

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION
●	SET 1/2" X 24" REBAR W/CAP "PCS 37536"
○	EXISTING CORNER MONUMENT AS NOTED
	QUARTER SECTION TIE
	SECTION TIE
	BLOW-OFF VALVE
	CATCH BASIN
	FIRE HYDRANT
	GAS VALVE
	GUY ANCHOR
	LIGHT STANDARD
	MAILBOX
	SANITARY SEWER MANHOLE
	SIGN POST
	STORM DRAIN MANHOLE
	UTILITY/ POLE
	WATER METER
	WATER VALVE
	WETLAND FLAG
	CONIFEROUS TREE
	DECIDUOUS TREE

ABBREVIATIONS	
CPP	CORRUGATED PLASTIC PIPE
IE	INVERT ELEVATION
INV	INVERT ELEVATION
OHP	OVERHEAD POWER LINE
TPM	TELEPHONE PAINT MARK
B	BIRCH
C	CEDAR
F	FIR
M	MAPLE
S	SPRUCE
W	WILLOW

PROPOSED STORM SYMBOLS

SYMBOL	DESCRIPTION
	SD CAP
	TYPE 1 CATCH BASIN, GRATED LID
	TYPE 1 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN, GRATED LID
	TYPE 2 CATCH BASIN, SOLID LID
	BEEHIVE MANHOLE COVER
	SQUARE YARD DRAIN
	ROUND YARD DRAIN
	STORM CLEAN OUT
	STORM PIPE

PROPOSED WATER SYMBOLS

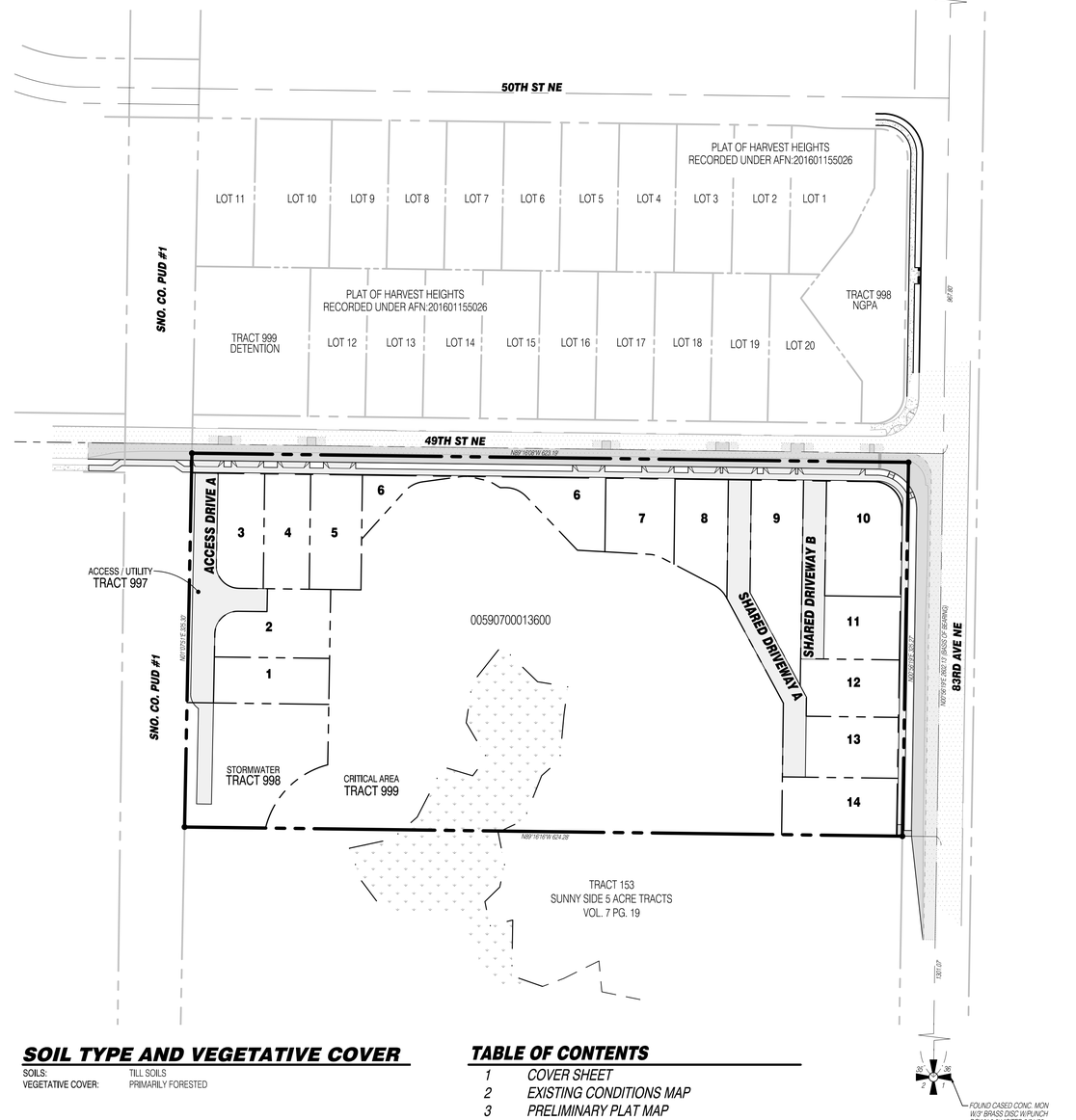
SYMBOL	DESCRIPTION
	WATER CAP
	CONCRETE BLOCKING
	11.25° BEND
	22.5° BEND
	45° BEND
	90° BEND
	VALVE
	HYDRANT ASSEMBLY
	BLOW-OFF VALVE
	REDUCER
	AIR-VAC ASSEMBLY
	WATER METER
	WATER PIPE

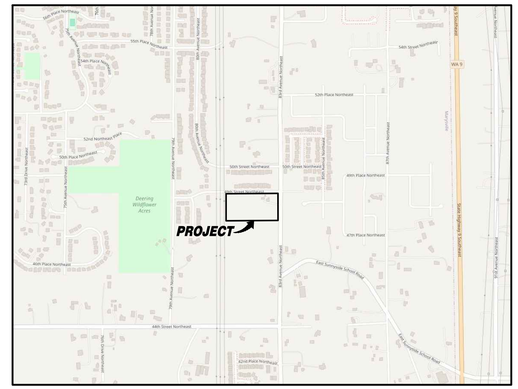
PROPOSED SEWER SYMBOLS

SYMBOL	DESCRIPTION
	SEWER CAP
	SEWER CLEANOUT
	SEWER MANHOLE
	SEWER PIPE

PROPOSED SURVEY SYMBOLS

SYMBOL	DESCRIPTION
	SURVEY MONUMENT IN PROPOSED ROAD





VICINITY MAP
SCALE: 1"=2000'

CONTACT LIST

DEVELOPER:
KEYSTONE LAND, LLC
13905 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373
EMAIL: joe@cornerstonehomes.com

CIVIL ENGINEER:
SOLID GROUND ENGINEERING
8105 166TH AVE NE
REDMOND, WA 98052
CONTACT: TOM ABBOTT, PE
PHONE: (425) 281-8324
EMAIL: tabbott@solidgroundpnw.com

GEOTECHNICAL ENGINEER:
EARTH SOLUTIONS NW
15365 NE 90TH ST #100
REDMOND, WA 98052
CONTACT: HENRY WRIGHT, PE
PHONE: (425) 449-4704
EMAIL: Henryw@esnw.com

LANDSCAPE ARCHITECT:
PAUL JAY LANDSCAPE ARCHITECT
1115 BRIDGE ROAD
EASTHAM, MA 02642
CONTACT: PAUL JAY
PHONE: (425) 210-1986
EMAIL: Pauljayla@gmail.com

SURVEYOR:
PACIFIC COAST SURVEYS, INC.
P.O. BOX 13619
MILL CREEK, WASHINGTON 98082
CONTACT: DARREN RIDDLE, PLS
PHONE: (425) 512-7099
FAX: (425) 357-3577
EMAIL: darren@pcsurveys.net

WETLAND BIOLOGIST:
WETLAND RESOURCES
9505 19TH AVE SE, STE 106
EVERETT, WASHINGTON 98208
CONTACT: JOHN LAUFENBURG
PHONE: (425) 337-3174
FAX: (425) 337-3045
EMAIL: john@wetlandresources.com

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	127,075 SF (2.92 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	14 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

TABLE OF CONTENTS

1	COVER SHEET
2	EXISTING CONDITIONS MAP
3	PRELIMINARY PLAT MAP
4	PRELIMINARY ROAD AND GRADING
5	PRELIMINARY STORM DRAINAGE
6-7	PRELIMINARY ROAD PROFILES AND SECTIONS
8	PRELIMINARY UTILITY PLAN

SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 0°56'19" EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

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VERTICAL DATUM

NAVD 88 (NAVD88 -3.67' = NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

UTILITY NOTE

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SURVEY DISCLAIMER

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 36921 — REGISTERED PROFESSIONAL ENGINEER — 8-20-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION
1	8-20-24	REVISED PER CITY COMMENTS

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

COVER SHEET

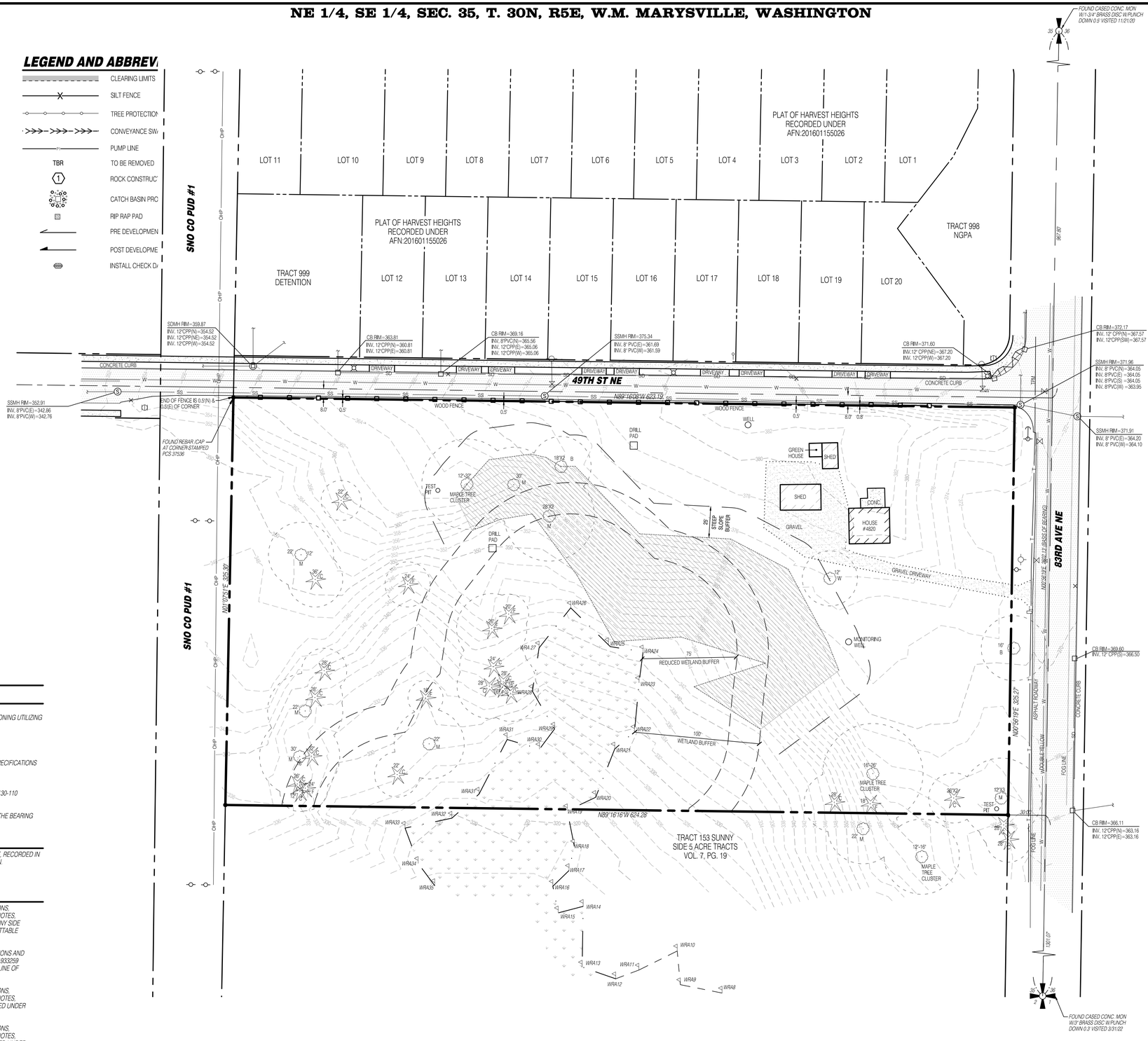
KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

CS-01
1 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 005619' EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

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(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

DRAINFIELD NOTE

NO KNOWN DRAINFIELD RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF DRAINFIELDS ARE ENCOUNTERED DURING CONSTRUCTION, SEPTIC TANK SHALL BE PUMPED AND DRAINFIELD SHALL BE REMOVED. REMOVAL OF TANK AND DRAINFIELD SHALL BE REPORTED TO SNOHOMISH COUNTY HEALTH DISTRICT.

WELL NOTE

NO KNOWN WELL RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF WELLS ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE DECOMMISSIONED BASED ON WADOE STANDARDS.

UTILITY NOTE

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SURVEY DISCLAIMER

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER — 8-20-24

ENGINEER'S STAMP

REVISIONS

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Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

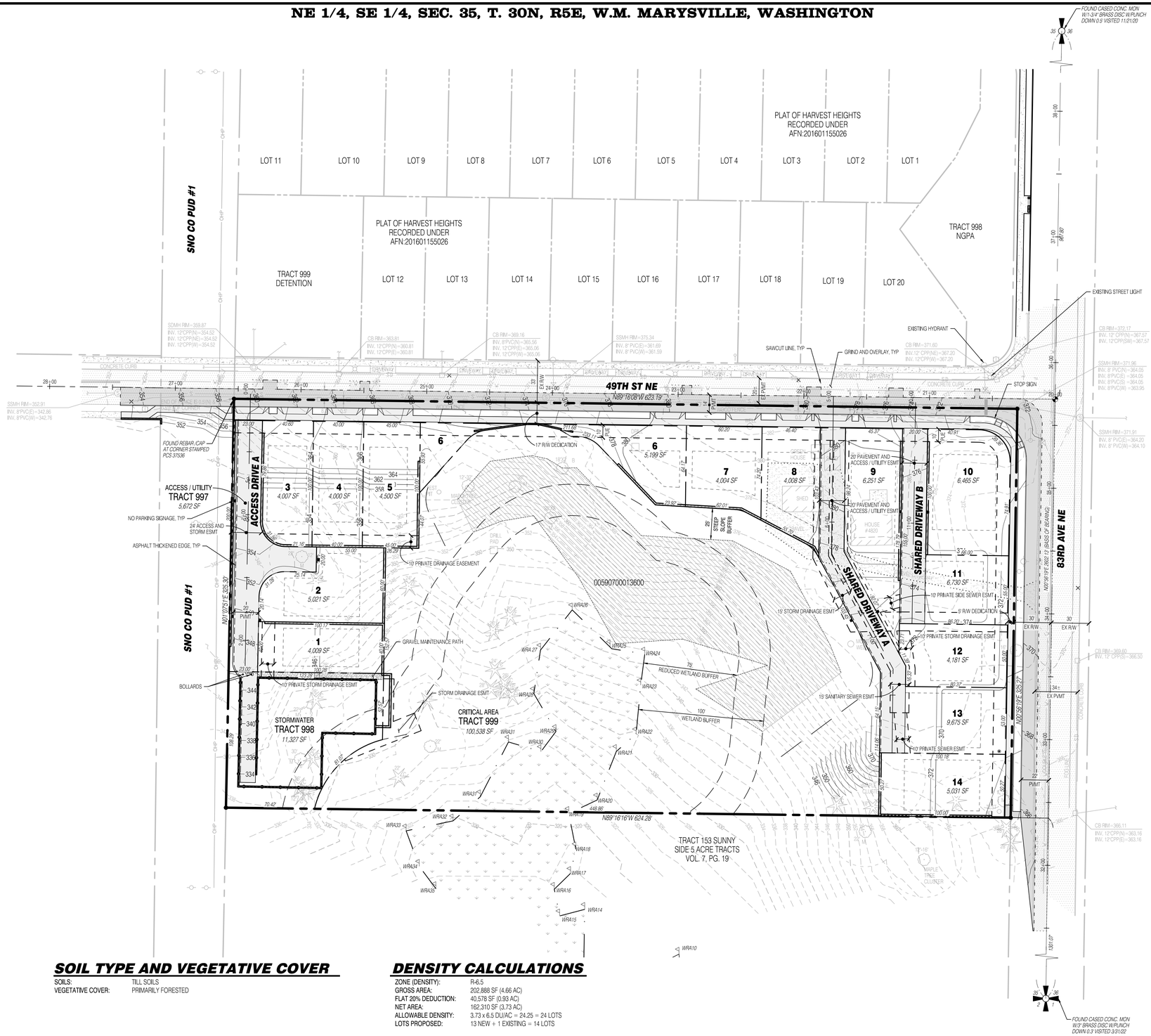
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JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

EC-01
2 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

NOTES

1.) LOTS 1, 2, 11, 12, 13 AND 14 WILL REQUIRE FIRE SPRINKERS.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	14 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	13 NEW + 1 EXISTING = 14 LOTS

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8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

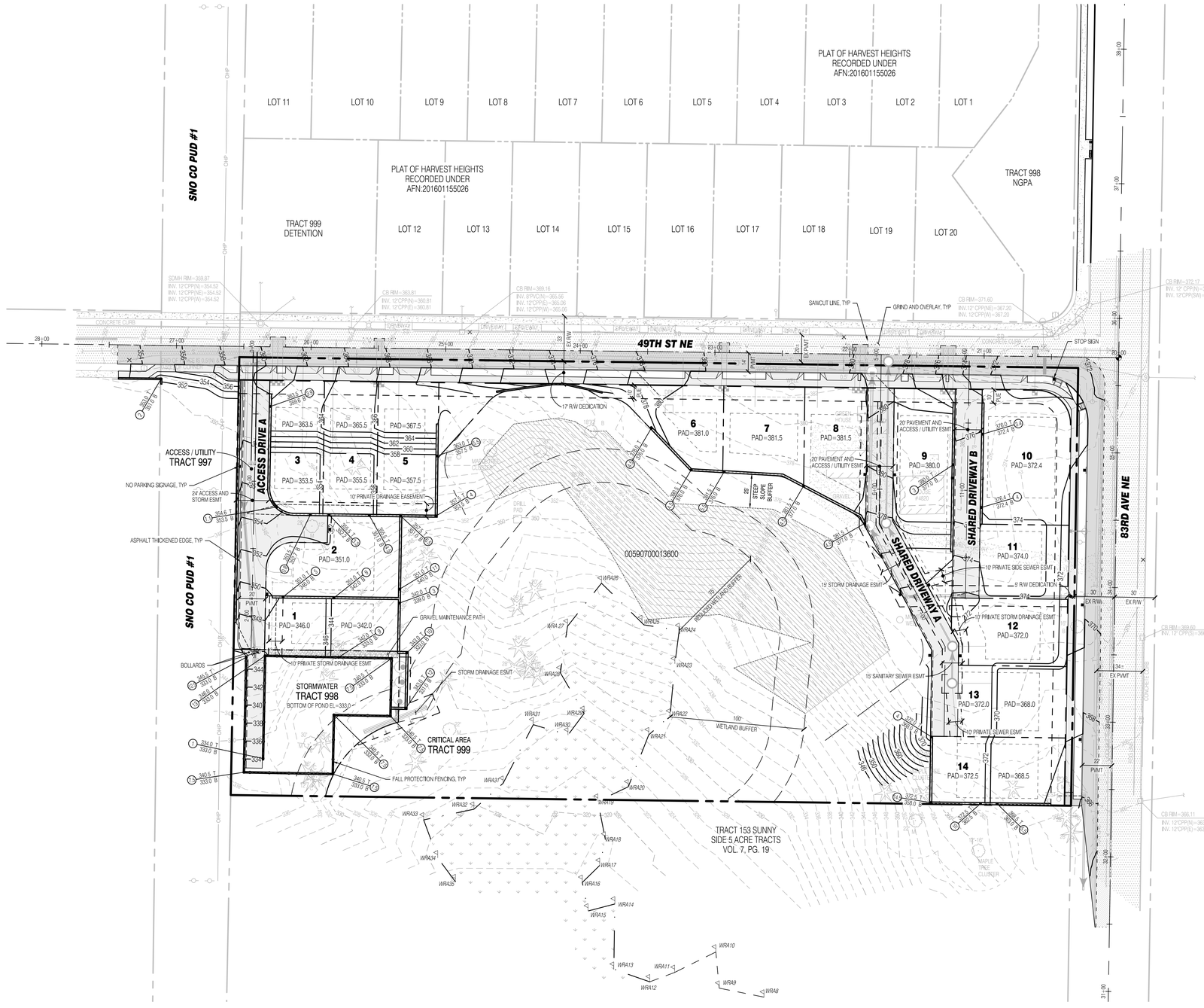
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PP-01

3 OF 8

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	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	127,075 SF (2.92 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

ROAD AND GRADING NOTES

1. GRADING AND PLACEMENT OF WALLS MUST BE IN CONFORMANCE WITH 220.50.030 OF THE MMC.
2. ALL DISTURBED PERVIOUS AREAS TO BE UNDERLAIN WITH BMP T5.13 SOILS.
3. TRENCH RESTORATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 3-703 OF THE EDDS.
4. ALL OVERHEAD UTILITIES ARE TO BE PLACED UNDERGROUND.
5. ALL WALLS OVER 48" REQUIRE A SEPARATE BUILDING PERMIT.
6. ALL WALLS OVER 30" REQUIRE FALL PROTECTION FENCING.
7. ALL WALLS TO BE 2' OR LESS AT TERMINATION.
8. ALL PAVEMENT CUTS SHALL BE RESTORED PER APPENDIX B OF EDDS CHAPTER 3. TACK AND SEAL SHALL BE EMULSIFIED ASPHALT GRADE CSS-1 AS SPECIFIED IN SECTION 9-02.1(6) OF THE STANDARD SPECIFICATIONS AND SHALL BE APPLIED TO THE EXISTING PAVEMENT AND EDGES OF SAWCUTS AS SPECIFIED IN SECTION 5-04 OF THE STANDARD SPECIFICATIONS.

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8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY ROAD AND GRADING

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

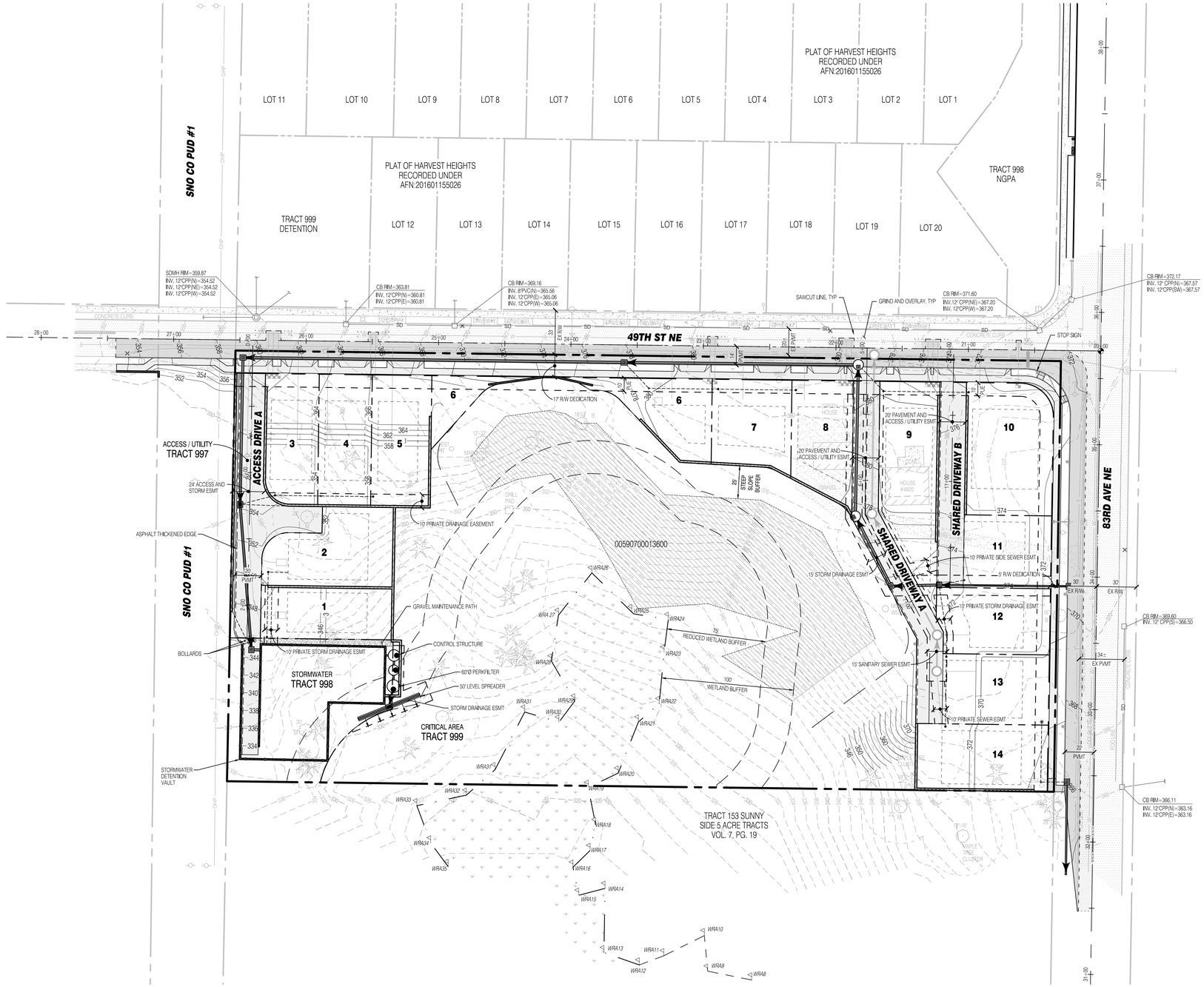
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JOB NUMBER:	23-0009

RG-01

4 OF 8

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LEGEND

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	FALL PROTECTION FENCING
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	SEWER MAIN PIPE
	WATER MAIN PIPE
	DRAIN PIPE
	FRENCH DRAIN
	FIRE HYDRANT
	SEWER MANHOLE
	SEWER CLEANOUT
	TYPE 1 CATCH BASIN W/ SOLID LID
	TYPE 1 CATCH BASIN W/ OPEN GRATE
	TYPE 2 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN W/ OPEN GRATE
•	STORM CLEAN OUT

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8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY DRAINAGE PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

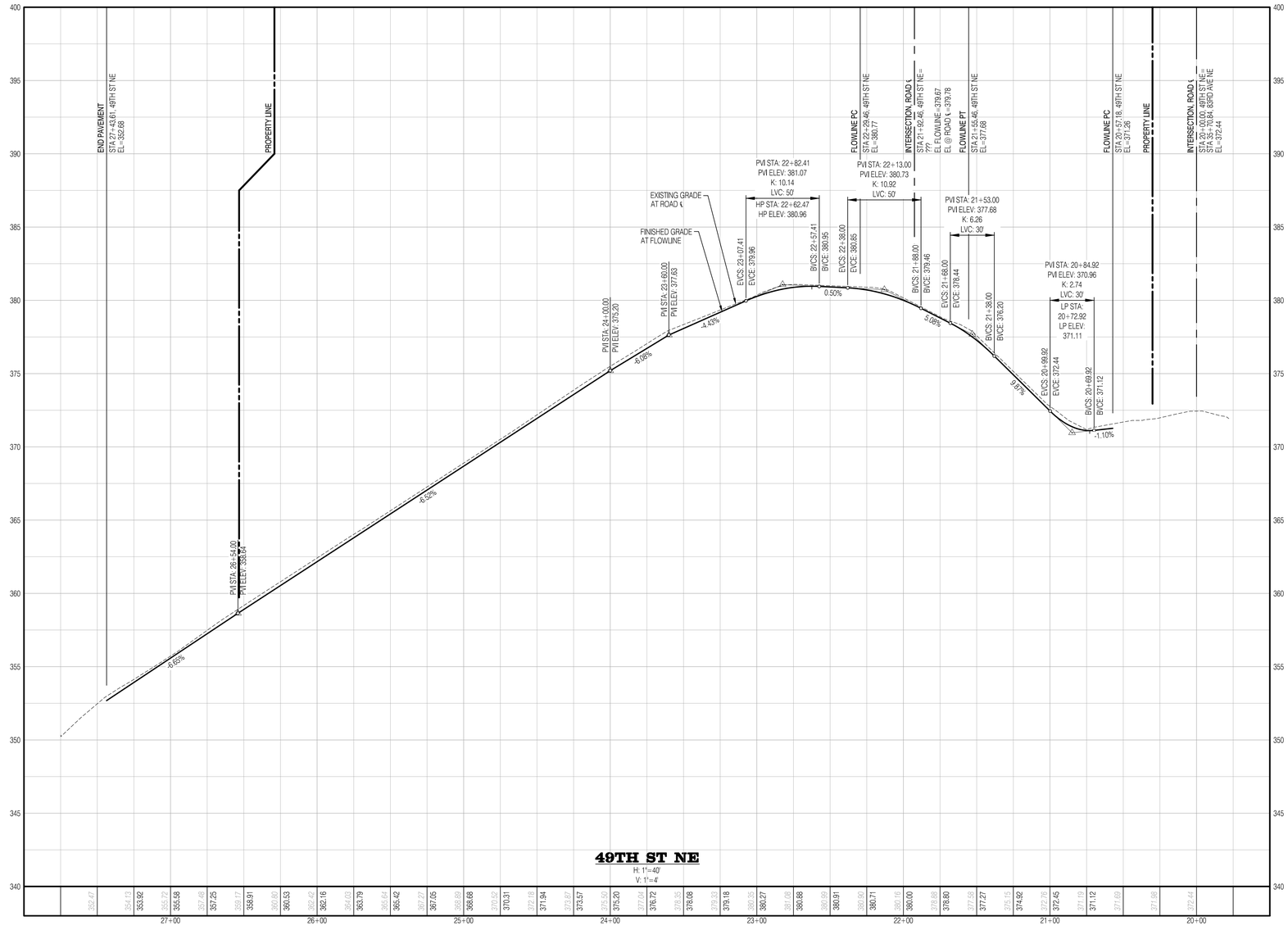
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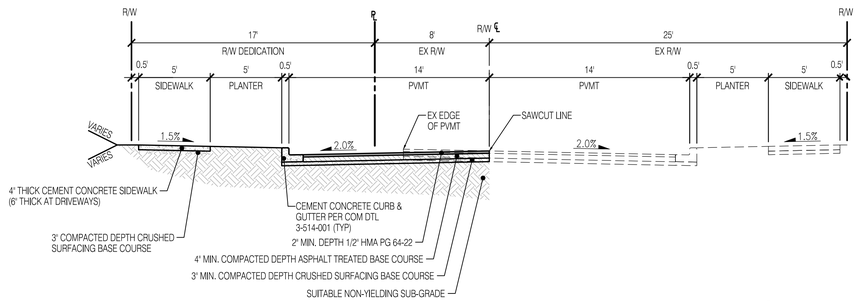
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5 OF 8

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49TH ST NE ROAD SECTION

SCALE: 1"=5'

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PRELIMINARY ROAD PROFILES AND SECTIONS

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

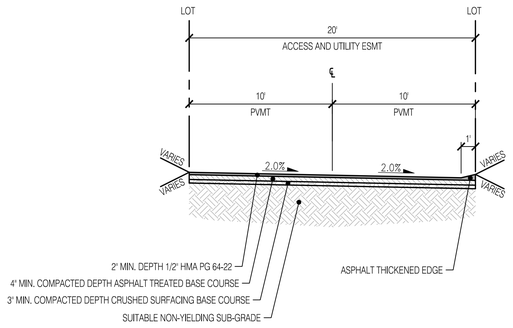
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PR-01

6 OF 8

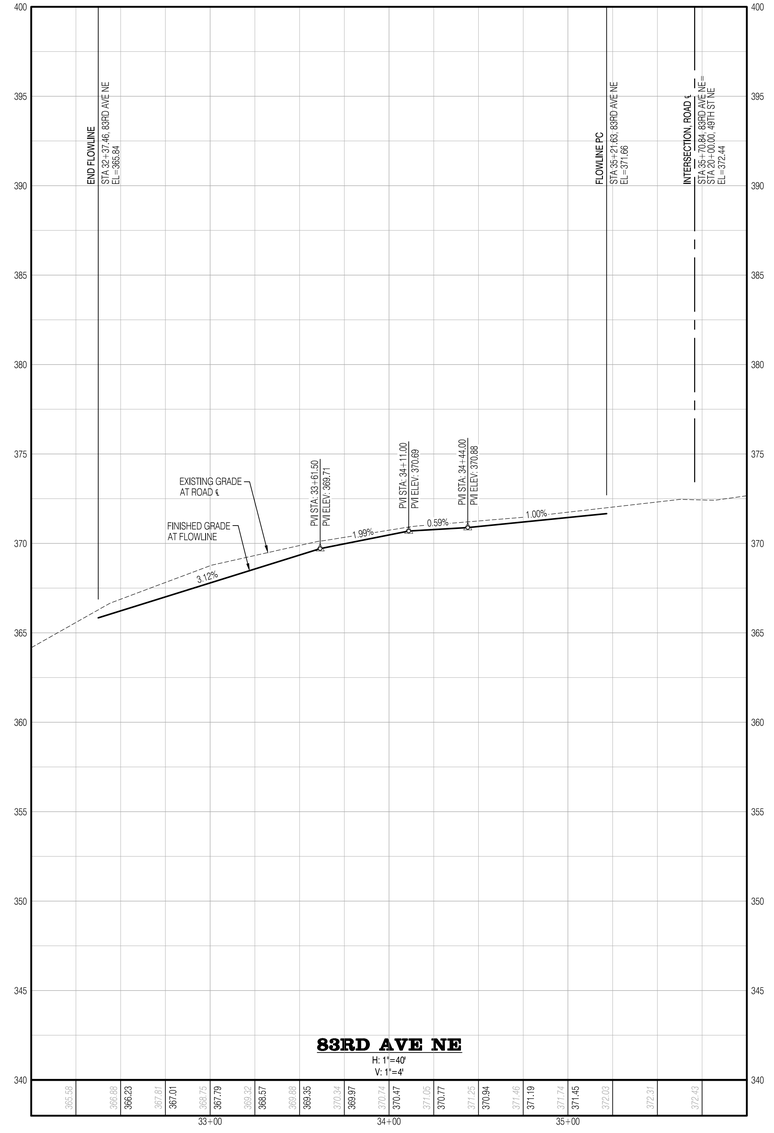
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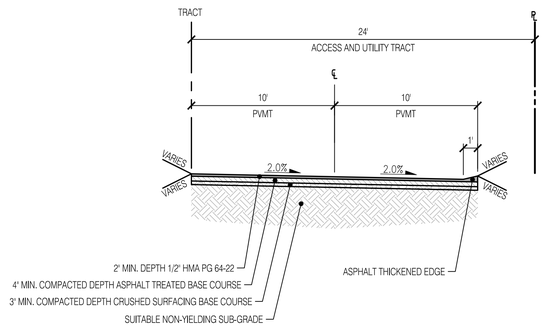
SHARED DRIVEWAY A AND B

SCALE: 1"=5'



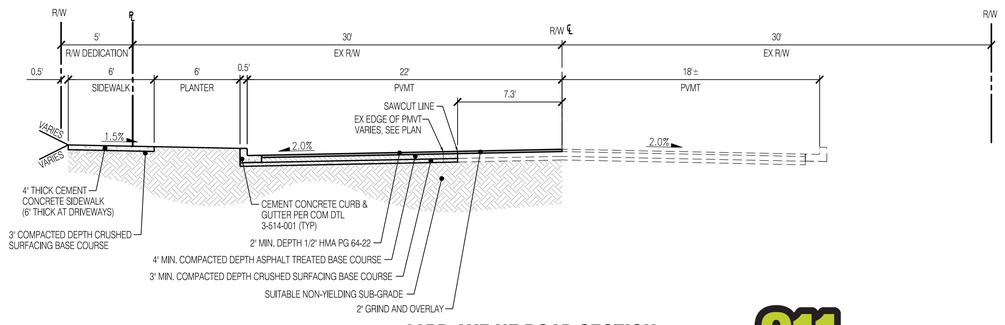
83RD AVE NE

H: 1"=40'
V: 1"=4'



ACCESS DRIVE A

SCALE: 1"=5'



83RD AVE NE ROAD SECTION

SCALE: 1"=5'

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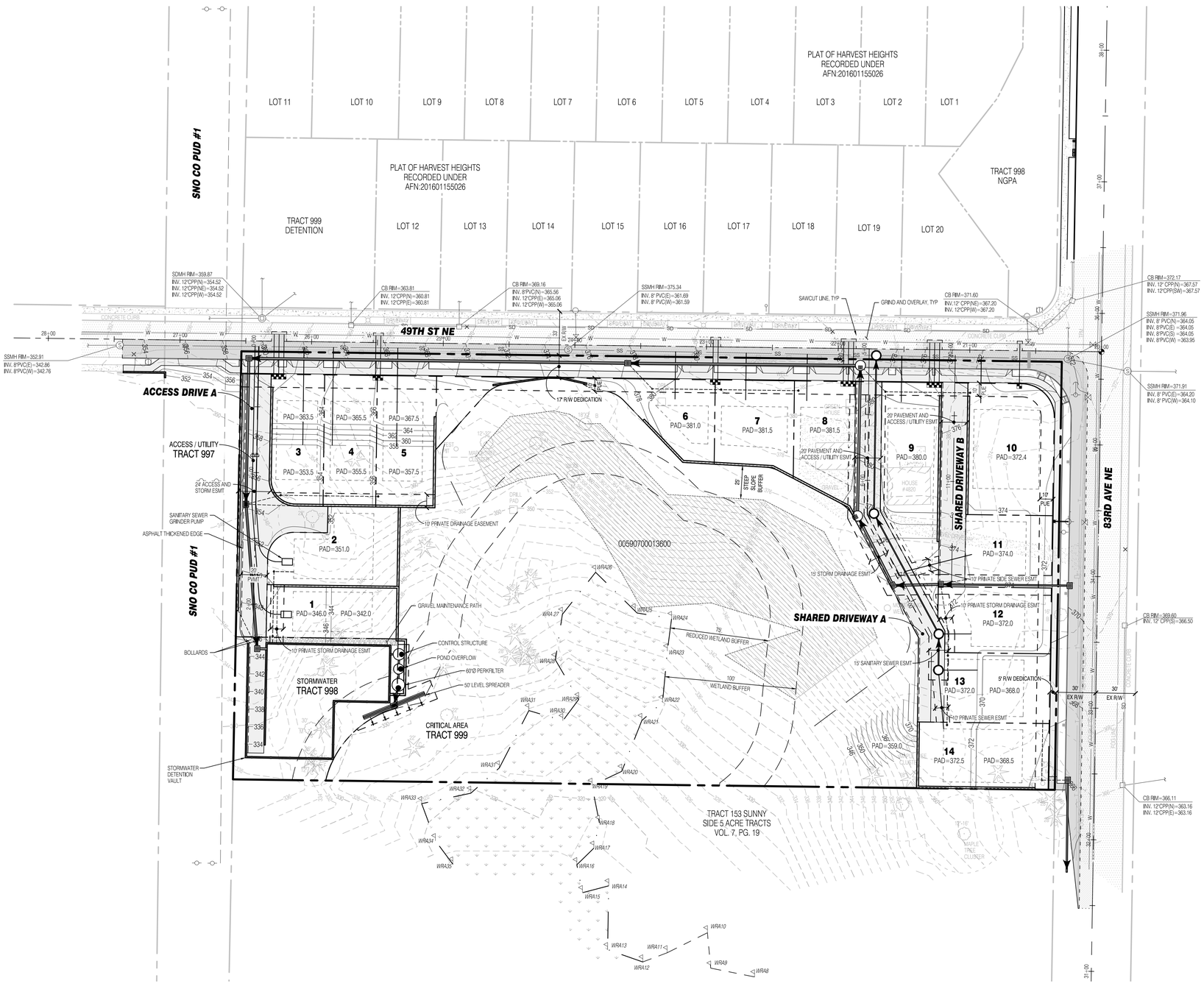
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LEGEND

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	TYPE 2 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN W/ OPEN GRATE
	STORM CLEAN OUT

UTILITY NOTES

1. RESIDENTIAL SANITARY SEWER GRINDER PUMPS TO BE USED TO SERVE LOT 1 AND 2.
2. LOTS 1, 2, 11, 12, 13 AND 14 WILL REQUIRE FIRE SPRINKERS.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

811 SAFETY IS IN YOUR HANDS. EVERY DIG. EVERY TIME.

THOMAS P. ABBOTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER — 8-20-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION
1	8-20-24	REVISED PER CITY COMMENTS

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY UTILITY PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

UT-01
8 OF 8

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CRITICAL AREA STUDY
AND
BUFFER MITIGATION PLAN

FOR

TAYLOR LANE
MARYSVILLE, WA

Wetland Resources, Inc. Project #23124

Prepared By
Wetland Resources, Inc.
9505 19th Avenue SE, Suite 106
Everett, WA 98208
(425) 337-3174

Prepared For
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13805 Smokey Point Boulevard, #102
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Revision 1: August 16, 2024
Original submittal: January 26, 2024

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1.0 INTRODUCTION

Wetland Resources, Inc. (WRI) completed a site investigation on September 20, 2023, to identify and evaluate wetlands and fish and wildlife habitat conservation areas on the property located at 4820 83rd Ave NE, in the city limits of Marysville, Washington. The site is composed of one 4.66-acre tax parcel (00590700013600), located within Section 35, Township 30N, Range 05E, W.M. The entire property is within the Snohomish River-Frontal Possession Sound subbasin of the Snohomish Watershed (WRIA 7).

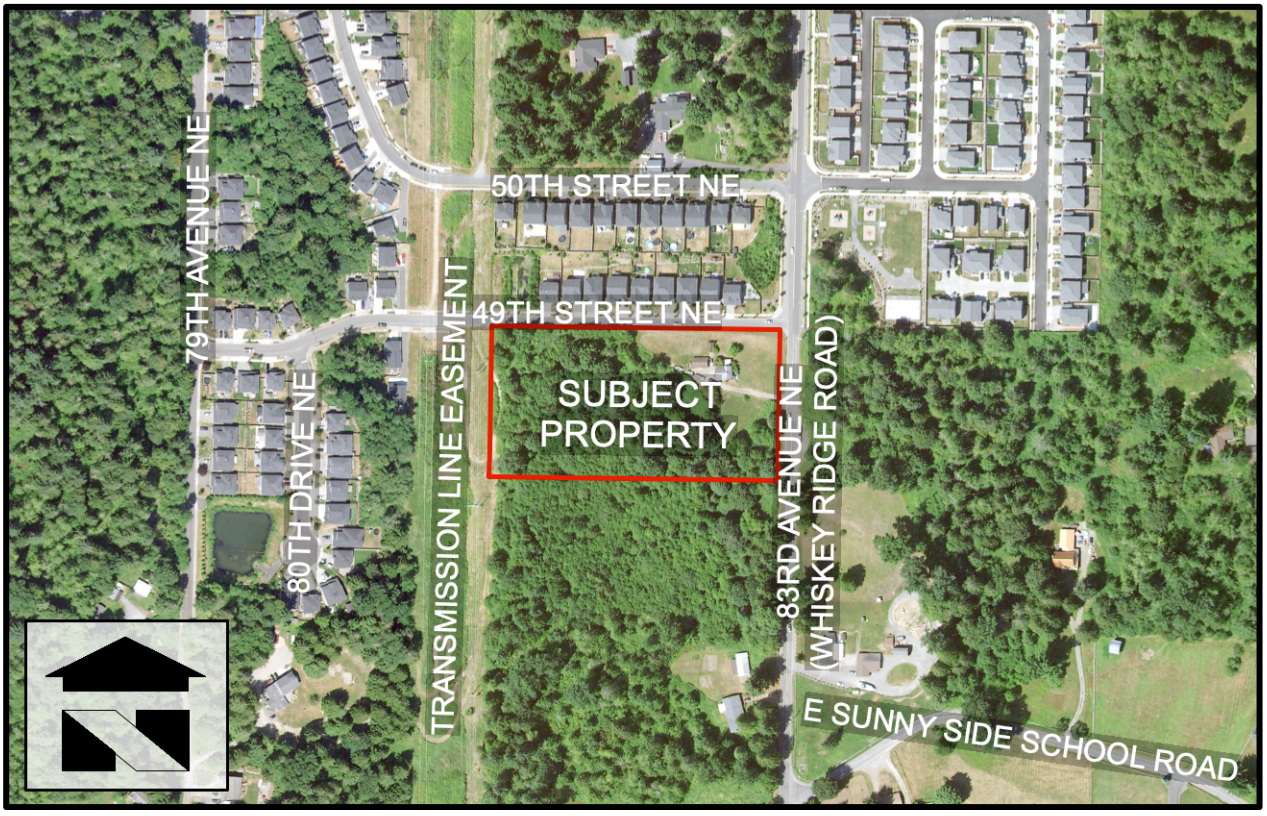


Figure 1 – Aerial view of the subject property

1.1 SITE DESCRIPTION

The subject property is situated in a residential area, surrounded by developments to the west, north, and northeast. The property directly south of the subject parcel is undeveloped, and the properties east and southeast consist of large-lot residential uses. A power transmission corridor parallels the western property boundary. The site has a general southern aspect, sloping towards a depression in the southern portion of the property.

The northeastern portion of the parcel is developed with a single-family residence (SFR) and associated structures. Vegetation within this area is limited to maintained lawn and some sporadic trees and ornamental shrubs. The remainder of the parcel is undeveloped and vegetated by a dense native forest canopy of Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*). The understory consists of salmonberry (*Rubus*

spectabilis), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum*), sword fern (*Polystichum munitum*), and a few sparse patches of Himalayan blackberry (*Rubus armeniacus*).

1.2 CRITICAL AREA SUMMARY

One wetland (Wetland A) was identified on site during the September 2023 investigation. Wetland A is a Category II wetland with a moderate (7) habitat score, receiving a standard buffer of 100-feet. The location of this feature is depicted on the attached *Critical Area Study and Buffer Mitigation Plan Map* (See appendix C).

1.3 PROJECT DESCRIPTION SUMMARY

The applicant is proposing to demolish the existing SFR and develop the eastern and western portions of the property with a 14-lot residential subdivision with associated stormwater, access infrastructure, and frontage improvements along 49th Street NE. The applicant proposes to implement buffer averaging, enhancement of degraded buffer, and installation of permanent fencing and critical area signage.

2.0 WETLAND AND STREAM DETERMINATION

2.1 LIMIT OF STUDY

The proposed project occurs within one tax parcel. Lack of legal access prevents WRI staff from performing routine wetland and stream determinations in surrounding areas on adjacent parcels. Wetland and stream boundaries depicted outside of the subject parcel are based on visual observation from the edge of legal access, publicly available resources, fine-scale elevation contours, and best professional judgment.

2.2 INFORMATION REVIEW

Prior to conducting the site investigation, public resource information was reviewed to gather background information on the subject site and the surrounding area in regards to wetlands, streams, and other critical areas. These sources included the following:

- *USDA/NRCS Web Soil Survey:* The Web Soil Survey identifies the soils underlying the site as Tokul gravelly medial loam, 0 to 8 percent slopes. This unit is not a hydric soil.

- *USFWS National Wetlands Inventory (NWI)*: NWI does not map any features on or near the site.

- *Snohomish County PDS:* PDS maps a large wetland associated with King Creek near the southern property boundary, continuing off-site to the southwest. King Creek is mapped approximately 700 feet off-site to the south. This stream flows southwest, ultimately draining into Ebey Slough. The county maps the portion of King Creek nearest the property boundary as a Type F.

- *WDNR Forest Practices Application Mapping Tool FPAMT:* This resource maps King Creek in approximately the same location as Snohomish County PDS. The portion of this stream closest to the property is mapped as a Type F.

- *WDFW SalmonScape*: SalmonScape maps King Creek in approximately the same location as PDS and FPAMT. The portion of King Creek closest to the property is mapped as gradient-accessible to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*).

- *WDFW Priority Habitat and Species (PHS) Interactive Map:* PHS does not map any features on or near the site.

- *Washington State Department of Natural Resources (DNR) Wetland of High Conservation Value:* This resource does not depict any wetlands of high conservation value on or near the site.

- *City of Marysville Critical Areas Map*: The city of Marysville maps two Category III wetlands approximately 150 feet off-site to the west. King Creek is shown in approximately the same location as depicted by other resources; however, the headwaters are mapped approximately 700 feet south of the subject property.

2.3 METHODOLOGY

Wetland boundaries in western Washington are determined using the methodologies described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers 2010). Under the routine methodology, the process for making a wetland determination is based on three steps:

1.) Examination of the site for hydrophytic vegetation (species present and percent cover);
2.) Examination of the site for hydric soils;
3.) Determining the presence of wetland hydrology

2.3.1 Vegetation Criteria

The Corps Manual and 2010 Regional Supplement define hydrophytic vegetation as "*the assemblage of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence.*" Field indicators are used to determine whether the hydrophytic vegetation criteria have been met. Examples of these indicators include, but are not limited to, the rapid test for hydrophytic vegetation, a dominance test result of greater than 50%, and/or a prevalence index score less than or equal to 3.0.

2.3.2 Soils Criteria

The 2010 Regional Supplement (per the National Technical Committee for Hydric Soils) defines hydric soils as soils *"that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."* Field indicators are used to determine whether a given soil meets the definition for hydric soils. Indicators are numerous and include, but are not limited to, presence of a histosol or histic epipedon, a sandy gleyed matrix, depleted matrix, and redoximorphic depressions.

2.3.3 Hydrology Criteria

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface for a sufficient duration during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and chemically reducing conditions, respectively. The strongest indicators include the presence of surface water, a high-water table, and/or soil saturation within at least 12 inches of the soil surface.

An AgACIS WETS table analysis indicates that the climatic conditions three months leading up to the September 2023 inspection were normal when compared to the 30-year average (1992-2022).

	Long-Term Rainfall Records							
Month	Normal/ Average	30% Chance Will Have Less Than	30% Chance Will Have More Than	Observed Precipitation	Condition (Dry, Normal, Wet)	Condition Value*	Month Weight Value	Product (Condition Value, Month Value)
June	2.29	1.44	2.77	1.1	Dry	1	1	1
July	0.9	0.32	1.06	0.34	Normal	2	2	4
August	0.96	0.34	1.15	0.59	Normal	2	3	6
WETS Station: EVERETT, WA, Period of Record: 1992-2022							**Total**	11
Observed Precipitation Station: Everett, WA								
Form Adapted From NRCS Engineering Field Handbook, Chapter 19, Hydrology Tools for Wetland Determination								

If Sum is:	Then:	*Condition Value:
6-9	Prior Period Has Been Drier Than Normal	Dry = 1
10-14	Prior Period Has Been Normal	Normal = 2
15-18	Prior Period Has Been Wetter Than Normal	Wet = 3

Figure 2 AgACIS WETS table analysis indicates September 2023 climatic conditions normal.

2.4 WETLAND AND STREAM DETERMINATION FINDINGS

One wetland (Wetland A) was identified in the southern portion of the site during the September 2023 inspection. Wetland A is documented by publicly available resources as a headwater wetland to King Creek, which starts approximately 700 feet south of the subject property. Wetland A is classified per MMC 22E.010.060 and its buffer is designated by MMC 22E.010.100(4). Wetland delineation was completed during the growing season, which typically occurs between February and November in Western Washington.

2.4.1 Wetland A

Jurisdiction: City of Marysville
HGM Class: Depressional
Cowardin Classification: PFO4E
City of Marysville Classification: Category II
City of Marysville Buffer: 100 feet

Wetland A is an approximately 13.6-acre depressional wetland located in the southern portion of the subject property and it extends off site to the south. Vegetation observed within the on-site portion of the wetland is dominated by a canopy of western red cedar (*Thuja plicata*; FAC) and red alder (*Alnus rubra*; FAC). Understory vegetation consists of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), twinberry (*Lonicera involucrata*; FAC), skunk cabbage (*Lysichiton americanus*; OBL), creeping buttercup (*Ranunculus repens*; FAC), piggyback plant (*Tolmiea menziesii*; FAC), and reed canarygrass (*Phalaris arundinacea*; FACW). Dominant vegetation in the area mapped as Wetland A is FAC or wetter, indicating a hydrophytic plant community is present.

Soils within the on-site portion of the wetland are generally black (10YR 2/1) sandy loam throughout the surface layer to a depth of at least 16 inches. Soils from six to 16 inches contain approximately three percent of dark yellowish-brown (10YR 3/4) redoximorphic concentrations. Wetland A meets the hydric soil indicator for redox dark surface (F6).

Soils at near the boundary of Wetland A were dry during the September 2023 investigation, however meet geomorphic positioning (D2) and hydrophytic vegetation (D5) indicators. Soil saturation was observed interior of the wetland.



Figure 3 Photograph of Wetland A taken during September 2023 visit.

Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which requires expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). The boundary of steep slopes has been surveyed and is depicted on the *Critical Area Study and Buffer Mitigation Map* (See appendix C) as "top-of-slope".

2.4.2 Non-wetland Areas

Vegetation in the non-wetland portions of the site consist of two distinct types. The northeastern portion of the site surrounding the existing residence is dominated by maintained lawn with a few sporadic trees and ornamental shrubs. The remainder of the property consists of forest dominated by a canopy of Douglas fir (*Pseudotsuga menziesii*; FACU), western red cedar (*Thuja plicata*; FAC), bigleaf maple (*Acer macrophyllum*; FACU), red alder (*Alnus rubra*; FAC), and bitter cherry (*Prunus emarginata*; FACU), and an understory of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), red elderberry (*Sambucus racemosa*; FACU), sword fern (*Polystichum munitum*; FACU), and pacific trailing blackberry (*Rubus ursinus*; FACU). A dense layer of Himalayan blackberry (*Rubus armeniacus*; FAC) and Japanese knotweed (*Fallopia japonica*) is present at the forested fringe between the two vegetation communities.

A power transmission corridor is located adjacent to the western property boundary. Maintenance activities have meandered onto the subject property, leaving a portion of the southwest corner of the property being dominated by maintained grasses and Himalayan blackberry.



Figure 4 Photograph taken at Wetland A boundary. Wetland area located to the right, non-wetland area located to the left.

Soils in the non-wetland areas are generally dark brown (10YR 3/3) sandy loam in the upper layer to a depth of approximately seven inches. Soils in the lower layer are typically dark yellowish-brown (10YR 4/4) sandy loam from approximately seven inches to at least 18 inches. Soils were dry at the time of the September 2023 site investigation. Non-wetland soils did not meet any primary or secondary hydric soil indicators and were generally dry.

2.4.3 King Creek

Jurisdiction: City of Marysville
HGM Class: Riverine
Cowardin Classification: Riverine, Unknown Perennial, Unconsolidated Bottom (R5UB)
City of Marysville Classification: Type F
City of Marysville Buffer: 150 feet

The headwaters of King Creek originate within Wetland A, approximately 700 feet south of the property boundary, and flows to the southwest, ultimately draining directly into Ebey Slough. SalmonScape maps the portion of King Creek closest to the property as containing gradient accessibility to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*). King Creek is classified as a Type F water and requires a standard buffer of 150 feet.

King Creek is a Type F stream, requiring a standard buffer of 150 feet, measured horizontally from its determined boundary. This feature is estimated to form approximately 700 feet south of the property, therefore its standard buffer does not project onto the property.

3.0 WILDLIFE

Wetlands and their buffers often contain resources such as food, water, thermal cover and hiding cover in close proximity, which wildlife species need to thrive. Birds, small mammals, and amphibians likely utilize and reside within the project vicinity.

Mammalian species expected to use the site include: Eastern cottontail rabbit (*Sylvilagus floridanus*), black-tailed deer (*Odocoileus hemionus columbianus*), shrews (*Sorex spp.*), moles (*Scapanus spp.*), North American porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), skunks (*Mephitis spp*), squirrels (*Sciurus carolinensis*, *Tamiasciurus douglasii*), deer mouse (*Peromyscus maniculatus*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*).

Amphibian species that may utilize the site include: Pacific tree frog (*Hyla regilla*), rough-skinned newt (*Taricha granulosa*), and northwestern salamander (*Ambystoma gracile*).

Avian species likely to utilize the site include Song Sparrow (*Melospiza melodia*), Black-capped Chickadee (*Poecile atricapillus)*, Dark-eyed Junco (*Junco hyemalis*), Brown Creeper (*Certhia americana*), Spotted Towhee (*Pipilo maculatus),* American Robin (*Turdus migratorius*), Red-breasted Nuthatch (*Sitka canadensis*), Downy Woodpecker (*Picoides pubescens*), Stellar's Jay (*Cyanocitta stelleri*), American Crow (*Corvus brachyrhynchos*), Northern Flicker (*Colaptes auratus*), Hairy Woodpecker (*Picoides villosus*), and Downy Woodpecker (*Dendrocopus villosus*).

These lists are not meant to be all-inclusive of the species using the site, but is representative of common wildlife in the Marysville area. No threatened or endangered species are known to be associated with this site.

4.0 PROJECT DESCRIPTION, IMPACTS, AND BUFFER MITIGATION PLAN

4.1 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR, driveway, and associated utility structures and develop the western and eastern portions of the property with a 14-lot residential subdivision, including necessary stormwater, access infrastructure, and frontage improvements along 49th Street NE. The applicant proposes altering portions of the wetland buffer area through buffer averaging, exceeding a 1:1 ratio. The proposed buffer will be demarcated by split-rail fencing with Native Growth Protection Area (NGPA) signs affixed every linear 100 feet.

A total of 13,300 square feet of degraded buffer will be enhanced with an assemblage of native trees and shrubs. Increasing the total area, species richness, and structural diversity of the on-site wetland buffer is expected to provide a significant lift in buffer functions over current conditions.

4.2 BUFFER WIDTH AVERAGING

In order to accommodate the proposed development, the applicant is proposing to modify the shape of the buffer through buffer width averaging. A total of 2,922 square feet of buffer is proposed to be reduced, and it will be replaced with 3,834 square feet of buffer addition. Therefore, the total buffer area after averaging will be 912 square feet larger than required by standard prescriptive measures. Buffer averaging is allowed per MMC 22E.010.100(5)(a) and (5)(c). The criteria in this code section are cited below in italics with responses below each in standard text.

(5)(a) Buffer width averaging shall be allowed only where the applicant demonstrates to the community development department that the averaging will not impair or reduce the habitat, water quality purification and enhancement, storm water detention, ground water recharge, shoreline protection and erosion protection and other functions of the wetland and buffer.

Areas of buffer reduction and buffer addition are both composed of native forest with sparse patches of Himalayan blackberry. The applicant is proposing to provide an excess of 912 square feet beyond the required 1:1 averaging ratio, providing greater ability filter pollutants, attenuate flood flow, and provide wildlife habitat.

… that lower-intensity land uses would be located adjacent to areas where buffer width is reduced…

A stormwater detention vault, allowed in MMC 22E.010.100(10), will be located within the reduced buffer area at the southwest portion of development. Once constructed, this will be the lowest-intensity land use associated with the overall proposed development.

…and that the total area contained within the buffer after averaging is no less than that contained within the standard buffer prior to averaging;

A total of 2,922 feet of buffer is proposed to be reduced and 3,834 square feet of buffer is proposed to be added, resulting in a net increase of 912 square feet of buffer area.

(5)(c) Notwithstanding the reductions permitted in subsections (5)(a) and (b) of this section, buffer widths shall not be reduced by more than 25 percent of the required buffer.

The maximum buffer width reduction proposed does not exceed 25 percent of the 100 foot buffer of Wetland A.

4.3 BUFFER ENHANCEMENT PLAN

Pursuant to MMC 22E.010.100(3), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. The applicant proposes to enhance a total of 13,300 square feet of degraded buffer, divided into two sections based on observed conditions.

4.3.1 Buffer Enhancement Area 1

Buffer Enhancement Area 1 is located within the eastern portion of wetland buffer, adjacent to lots 8 through 12. This area is approximately 7,500 square feet in size and is dominated by Japanese knotweed (*Fallopia japonica*) and Himalayan blackberry (*Rubus armeniacus*). This area is to be cleared of all invasives and planted with a dense assemblage of native trees and shrubs. All plants shall be marked with ribbons and mulched, as specified in the planting notes.

Buffer Enhancement Area 1 (7,500 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10’	23
Shore pine	*Pinus contorta*	1 gallon	10’	23
Bigleaf maple	*Acer macrophyllum*	1 gallon	10’	22
Nootka rose	*Rosa nutkana*	1 gallon	5’	58
Snowberry	*Symphoricarpos albus*	1 gallon	5’	58
Salmonberry	*Rubus spectabilis*	1 gallon	5’	58
Thimbleberry	*Rubus parviflorus*	1 gallon	5’	58
Total				**300**

4.3.2 Buffer Enhancement Area 2

Buffer Enhancement Area 2 is located along the northern buffer, adjacent to 49th Street NE, where a native canopy of red alder (*Alnus rubra*) is underlain by a dense thicket of Himalayan blackberry (*Rubus armeniacus)*. After invasive species are removed, an estimated 70-percent of the area will be interspersed around any existing native vegetation.

Buffer Enhancement Area 2 (5,800 square feet; plant 70% area)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10’	12
Shore pine	*Pinus contorta*	1 gallon	10’	12
Bigleaf maple	*Acer macrophyllum*	1 gallon	10’	12
Nootka rose	*Rosa nutkana*	1 gallon	5’	36
Snowberry	*Symphoricarpos albus*	1 gallon	5’	36
Salmonberry	*Rubus spectabilis*	1 gallon	5’	36
Thimbleberry	*Rubus parviflorus*	1 gallon	5’	36
Total				**180**

5.0 FUNCTIONS AND VALUES ASSESSMENT

Pursuant to requirements set forth in SCC 30.62A.140, critical area studies shall assess impacts to any critical areas or buffers within the project vicinity. The following assessment is intended to compare the current and post-mitigation functions and values provided by the on-site critical areas and buffers.

The methodology for this functions and values assessment is based on professional opinion developed through past field analyses and interpretation. This assessment pertains specifically to the wetland buffer impacted by this project, but is typical for assessments of similar systems common to Western Washington.

5.1 FUNCTIONAL COMPONENTS OF WETLAND BUFFERS

Wetland buffers in Western Washington perform a variety of ecosystem functions. Included among the most important are: flood/stormwater control, base flow/groundwater support, erosion protection, water quality improvement, and overall wildlife habitat function.

Water Quality and Hydrology Functions
Vegetated buffers obstruct water flow, thereby decreasing water velocity, allowing infiltration into the soil, and reducing soil erosion potential. Healthy floodplains and buffers store water during wetter periods and release it during drier periods, thereby maintaining a steady base flow throughout the year. Buffer vegetation impedes the flow of runoff, increases the humus content of soil (greater adsorption capacity), and preserves soil composition as intense rainfall hits the ground. Wetland buffers improve water quality by acting as filters as water passes through them, trapping sediments and pollutants from surface water. Healthy vegetation also provides temperature moderation to adjacent aquatic areas. Shading by the forest canopy maintains cooler water temperatures and influences the availability of dissolved oxygen.

Wildlife Habitat Functions
Healthy vegetation within buffers helps maintain wildlife habitat function within and adjacent to aquatic areas. Buffer vegetation provides many crucial aspects of healthy habitat including shade, soil stabilization, nutrient cycling, and pollutant removal. Vegetated buffers also provide benefits to terrestrial wildlife including, refuge/cover, nesting, foraging, and resting habitat.

5.2 EXISTING BUFFER CONDITIONS

The buffer area surrounding Wetland A is dominated by a native forest with native trees and shrubs, interlaced with sporadic patches of Himalayan blackberry and reed canary grass. The forested buffer is able to sufficiently filter pollutants, control erosion, attenuate flood flow, and provide wildlife habitat. A portion of buffer has been historically maintained due to its proximity to the existing SFR development and 49th Street NE. This area provides limited ability to filter pollutants, attenuate flood flow, or allow for wildlife for forage and shelter.

5.3 Post Mitigation Buffer Functions and Values

After implementation of buffer averaging and enhancement, a significant lift in functions and values is expected. The area proposed for buffer reduction consists of mainly native forest with small amounts of Himalayan blackberry. Areas of buffer addition consist of a similar vegetation community. The project will result in a net buffer increase of 912 square feet, providing more area available to infiltrate runoff, filter pollutants, and provide wildlife habitat.

Enhancing the degraded buffer by removing invasive species and planting an assemblage of native trees and shrubs will provide high value in terms of slowing the rate of incoming surface flows, decreasing erosion potential, performing water quality improvement, and providing higher quality wildlife habitat. Overall, the proposed project will result in a substantial net improvement in buffer function as compared to the current conditions on the site.

6.0 Project Monitoring Program

6.1 Inspection and Reporting Requirements

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage. During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified.

Photo points
At least one photo point shall be established in each buffer enhancement area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:
1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

6.2 PROJECT SUCCESS & COMPLIANCE

Criteria for Success
Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive woody plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation.

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met early, the City may consider the project to be successful and terminate the monitoring period at that time.

6.3 MAINTENANCE

The mitigation areas will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation

system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

6.4 CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

6.5 PROJECT NOTES

Pre-Construction Meeting
Mitigation projects are typically more complex to install than can be described in plans. Careful monitoring by a wetland professional for all portions of this project is strongly recommended. Construction timing and sequencing is important to the success of this type of project. There shall be a pre-construction meeting on this site between the Permittee, consulting wetland professional, and laborers. The objective will be to verify the location of erosion control facilities, verify the location of mitigation areas, and to discuss project sequencing.

Inspections
A wetland professional shall be contracted to periodically inspect the mitigation installation described in this plan. Minor adjustments to the original design may be necessary prior to and during construction due to unusual or hidden site conditions. A City of Marysville representative and/or the consulting professional will make these decisions during construction and any changes will be reflected in the As-built report.

6.6 PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

7.0 FENCING AND SIGNAGE

Pursuant to MMC 22E.010.370, split-rail fencing and signs designating the presence of a critical area will be constructed along the perimeter of the buffer. A split-rail fence will be installed along the perimeter of buffer on the subject property. A total of 10 Native Growth Protection Area (NGPA) signs will be affixed to the fence.

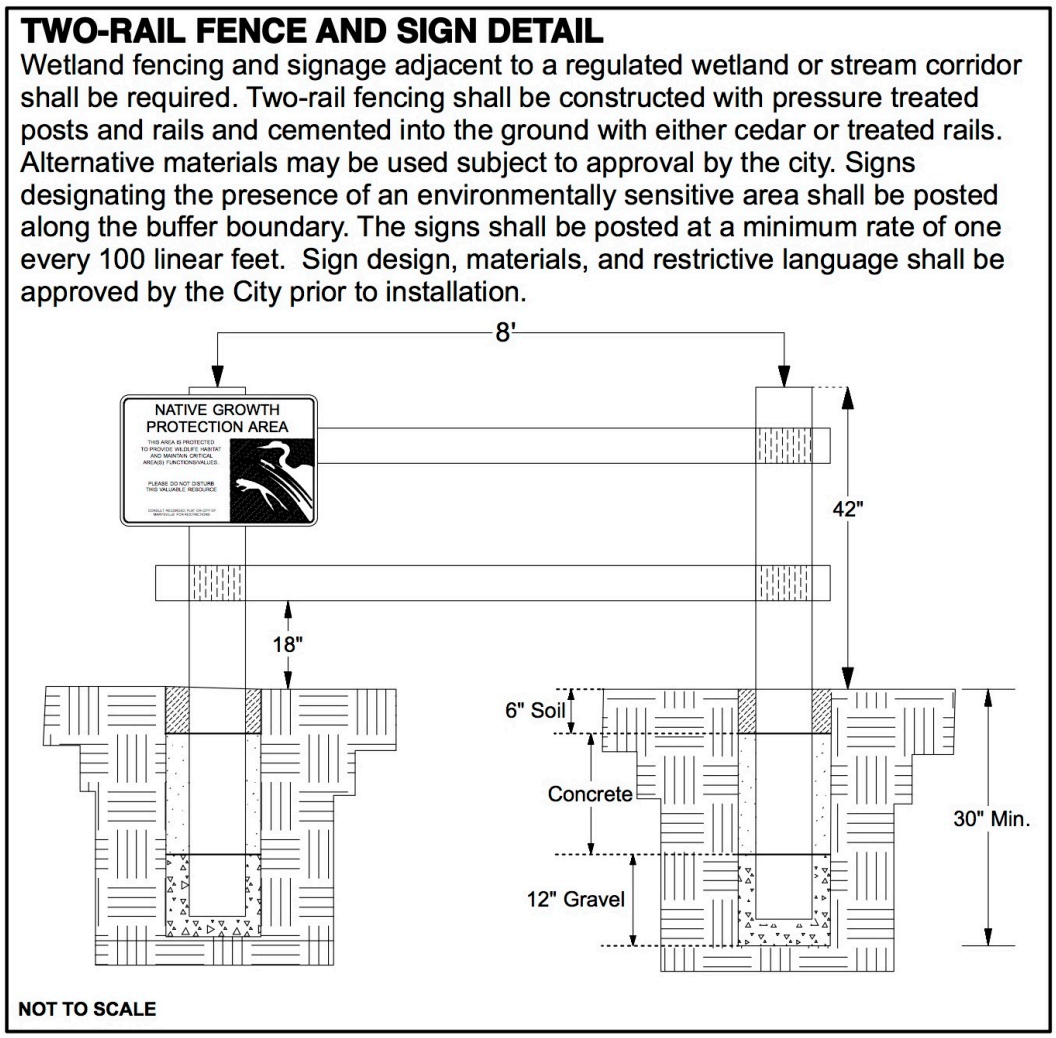


Figure 5 – Two-rail Fence and NGPA Sign Detail

8.0 PERFORMANCE AND MAINTENANCE BONDING

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	480 x $15.00/plant, installed	$7,200.00
Mulch	$50.00/CU x 16 CY	$800.00
Split rail fencing and signage	$8/foot x 983 feet	$7,864.00
Critical area signage	$30/sign x 10 signs	$300.00
Monitoring	$2,500.00/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$38,464.00**

9.0 USE OF THIS REPORT

This Critical Area Study and Buffer Mitigation Plan is supplied to Keystone Land, LLC, as a means of determining on-site wetland and stream conditions, and to provide adequate mitigation for proposed buffer impacts. Determinations are based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the Applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report and any implied representation or warranty is disclaimed.

Wetland Resources, Inc.



Alex Wachter
Associate Ecologist

10.0 REFERENCES

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APPENDIX A

USACE WETLAND DELINEATION DATA FORMS (S1-S2)

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S1

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): LRR A Lat: 48.039442 Long: -122.120978 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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 ☐ Hydric Soil Present? Yes ☑ No ☐ Wetland Hydrology Present? Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐

Remarks:

In pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. *Prunus emarginata	5	N	FACU
3.			
4.			
	65	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	80	Y	FAC
2. Sambucus racemosa	5	N	FACU
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	60	Y	FAC
2. Polystichum munitum	5	N	FACU
3. Rubus ursinus	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

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% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = 0
FACW species ____	x 2 = 0
FAC species ____	x 3 = 0
FACU species ____	x 4 = 0
UPL species ____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

Prunus emarginata rooted out of wetland however provides canopy coverage.

SOIL

Sampling Point: S1

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
0-6	10YR 2/1	100					Sandy loam	
6-16	10YR 2/1	97	10YR 3/4	3	C	M	Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S2

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): ~4%

Subregion (LRR): LRR A Lat: 48.039531 Long: -122.120945 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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:

Out pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. Acer macrophyllum	15	N	FACU
3. Prunus emarginata	5	N	FACU
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	75	Y	FAC
2. Rubus armeniacus	35	Y	FAC
3. Acer circinatum	5	N	FAC
4.			
5.			
	115	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	20	Y	FAC
2. Rubus ursinus	10	Y	FACU
3. Polystichum munitum	10	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

SOIL

Sampling Point: S2

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
0-7	10YR 3/3	100					Sandy loam	
7-18	10YR 4/4	100					Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B

DEPARTMENT OF ECOLOGY
WETLAND RATING FORM AND FIGURES

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 9/20/2023

Rated by AW Trained by Ecology? ✔ Yes ___No Date of training 6/2022

HGM Class used for rating **Depressional** Wetland has multiple HGM classes? ✔ Y ____N

NOTE: **Form is not complete without the required figures** (figures can be combined).
Source of base aerial photo/map ESRI, SnoCo.

OVERALL WETLAND CATEGORY **II** (based on functions ✔ 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

_____**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	**8**			**7**			**7**			**22**

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	[✔]

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	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

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 total 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 total 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 total 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 sheet flow, 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).

Wetland name or number A_____

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.

   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	**2**
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	**3**
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	**2**
Total for D 1 Add the points in the boxes above	**7**

Rating of Site Potential If score is: __**12-16 = H** ✔ **6-11 = M** ___**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	**1**
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? [Yes = 1] No = 0	**1**
D 2.3. Are there septic systems within 250 ft of the wetland? [Yes = 1] No = 0	**1**
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	**3**

Rating of Landscape Potential If score is: ✔ **3 or 4 = H** ___**1 or 2 = M** ___**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	**1**
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 in development or in effect for the basin in which the unit is found.) Yes = 2 No = 0	**2**
Total for D 3 Add the points in the boxes above	**3**

Rating of Value If score is: ✔ **2-4 = H** ___**1 = M** ___**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:

- ☐ Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4
- ☑ Wetland has an intermittently flowing stream/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

2

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.

- ☐ 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

3

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 area of the wetland unit itself.

- ☐ 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

3

Total for D 4 — Add the points in the boxes above — **8**

Rating of Site Potential If score is: __**12-16 = H** ✔ **6-11 = M** ___**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 — **1**

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 — **1**

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 — **1**

Total for D 5 — Add the points in the boxes above — **3**

Rating of Landscape Potential If score is: ✔ **3 = H** ___**1 or 2 = M** ___**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. Is the unit 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.

The wetland captures surface water that would otherwise flow downgradient 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 downgradient of unit. points = 2
- ☑ • Surface flooding problems are in a sub-basin farther downgradient. 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

1

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 — **1**

Rating of Value If score is: __**2-4 = H** ✔ **1 = M** ___**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 if the unit is at least 2.5 ac, or more than 10% of the unit if it is smaller than 2.5 ac.

____Aquatic bed	4 structures or more: points = 4	**2**
_✔_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/groundcover) that each cover 20% within the Forested polygon

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 if the unit is < 2.5 ac, or ¼ ac if the unit is at least 2.5 ac to count (see text for descriptions of hydroperiods).

____Permanently flooded or inundated	4 or more types present: points = 3	**1**
_✔_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		
____Intermittently or seasonally flowing stream in, or adjacent to, the wetland		
____**Lake Fringe wetland**	**2 points**	
____**Freshwater tidal wetland**	**2 points**	

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, Canada thistle**

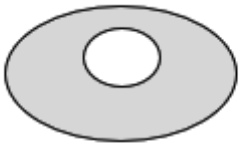
If you counted: > 19 species	points = 2	**2**
5 - 19 species	points = 1	
< 5 species	points = 0	

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

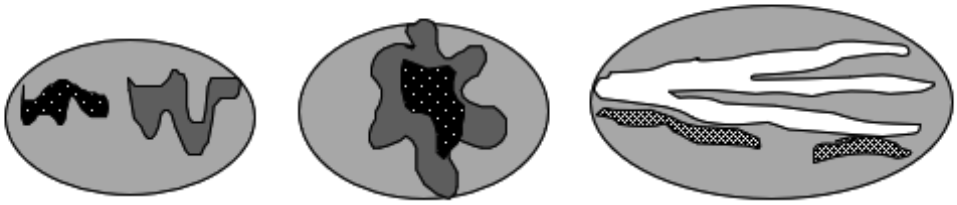


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **High** = 3 points



2

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 extend at least 3.3 ft (1 m) over open water or 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 above for the list of strata and H 1.5 in the manual for the list of aggressive plant species)	**5**
Total for H 1 — Add the points in the boxes above	**12**

Rating of Site Potential If score is: ___**15-18 = H** ✔ **7-14 = M** ___**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 polygons accessible from the wetland. *Calculate:* % relatively undisturbed habitat 13 + [(% moderate and low intensity land uses)/2] 5 = 18 % 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	**1**
H 2.2. Total habitat in 1 km Polygon around the wetland. *Calculate:* % relatively undisturbed habitat 18 + [(% moderate and low intensity land uses)/2] 17 = 35 % ☐ Total habitat > 50% of Polygon — points = 3 ☐ Total habitat 10-50% and in 1-3 patches — points = 2 ✔ Total habitat 10-50% and > 3 patches — points = 1 ☐ Total habitat < 10% of 1 km Polygon — points = 0	**1**
H 2.3. Land use intensity in 1 km Polygon: ☐ > 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	**2**

Rating of Landscape Potential If score is: ___**4-6 = H** ✔ **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 data ☐ 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	**2**

Rating of Value If score is: ✔ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number A_____

WDFW Priority Habitats

See complete descriptions of Priority Habitats listed by WDFW, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008 (current year, as revised). Priority Habitat and Species List.[133] This list was updated for consistency with guidance from WDFW.

This question is independent of the land use between the wetland unit and the Priority Habitat. All vegetated wetlands are by definition a Priority Habitat but are not included in this list because they are addressed by this rating system.

Count how many of the following Priority Habitats are within 330 ft (100 m) of the wetland unit:

☐ **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. This habitat automatically counts if mapped on the PHS online map within 100m of the wetland. If not mapped, a determination can be made in the field.

☐ **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.

☐ **Fresh Deepwater:** Lands permanently flooded with freshwater, including environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. Substrate does not support emergent vegetation. Do not select if Instream habitat is also present, or if the entire Deepwater feature is included in the wetland unit being rated (such as a pond with a vegetated fringe).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☑ **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. Do not select if Fresh Deepwater habitat is also present.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore.

☐ **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) diameter at breast height (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.

[133] http://wdfw.wa.gov/publications/00165/wdfw00165.pdf

Wetland name or number A_____

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important. For single oaks or oak stands <0.4 ha in urban areas, WDFW's Management Recommendations for Oregon White Oak[134] provides more detail for determining if they are Priority Habitats

☑ **Riparian:** The area adjacent to freshwater aquatic systems with flowing or standing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **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.

☐ **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.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie.

[134] https://wdfw.wa.gov/publications/00030/wdfw00030.pdf

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 chapter 4.8 in the manual. ☐ 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. Does the wetland overlap with any known or historical rare plant or rare & high-quality ecosystem polygons on the WNHP Data Explorer?[135] Yes **= Category I** No – Go to **SC 2.2** SC 2.2. Does the wetland have a rare plant species, rare ecosystem (e.g., plant community), or high-quality common ecosystem that may qualify the site as a WHCV? Contact WNHP for resources to help determine the presence of these elements. Yes – Submit data to WA Natural Heritage Program for determination,[136] Go to **SC 2.3** No **= Not a WHCV** SC 2.3. Did WNHP review the site within 30 days and determine that it has a rare plant or ecosystem that meets their criteria? 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 = **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 = **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 = **Category I bog** No **= Not a bog**	**Cat. I**

[135] https://www.dnr.wa.gov/NHPdata

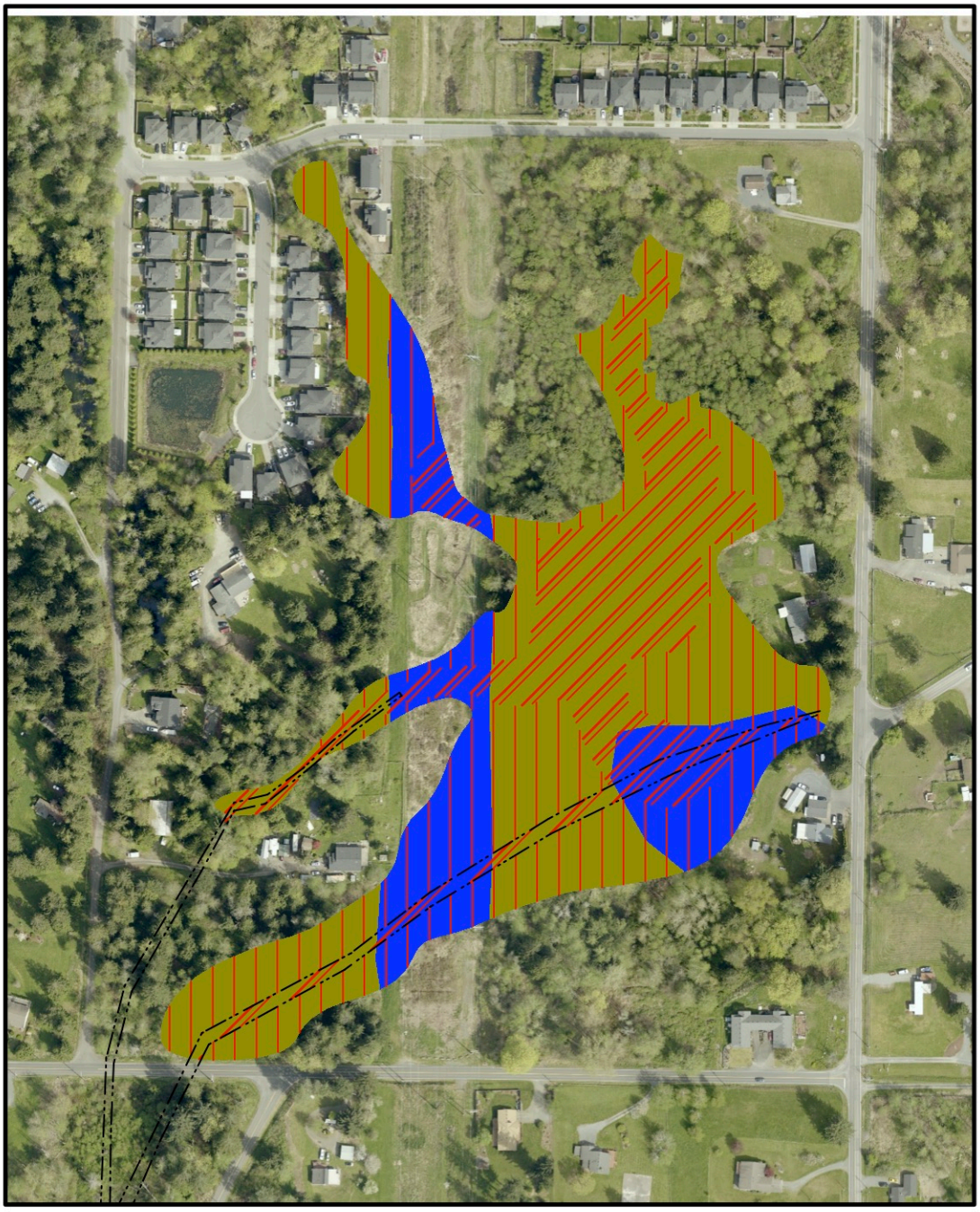
[136] https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf

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)* ☐ The lagoon retains some of its surface water at low tide during spring tides 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 in H 1.5 in the manual). ☐ 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 and Ocean Shores Blvd SW, including lands west of E. Oceans Shores Blvd SW. 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	

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 1- WETLAND A



LEGEND

- EMERGENT VEGETATION
- FORESTED VEGETATION
- SATURATED ONLY
- SEASONALLY FLOODED
- 150' FROM WL BOUNDARY
- INTERMITTENT STREAM

Scale 1" = 300'

0 150 300 450 600

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Fax: (425) 337-3045

Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland A

Figure A-1

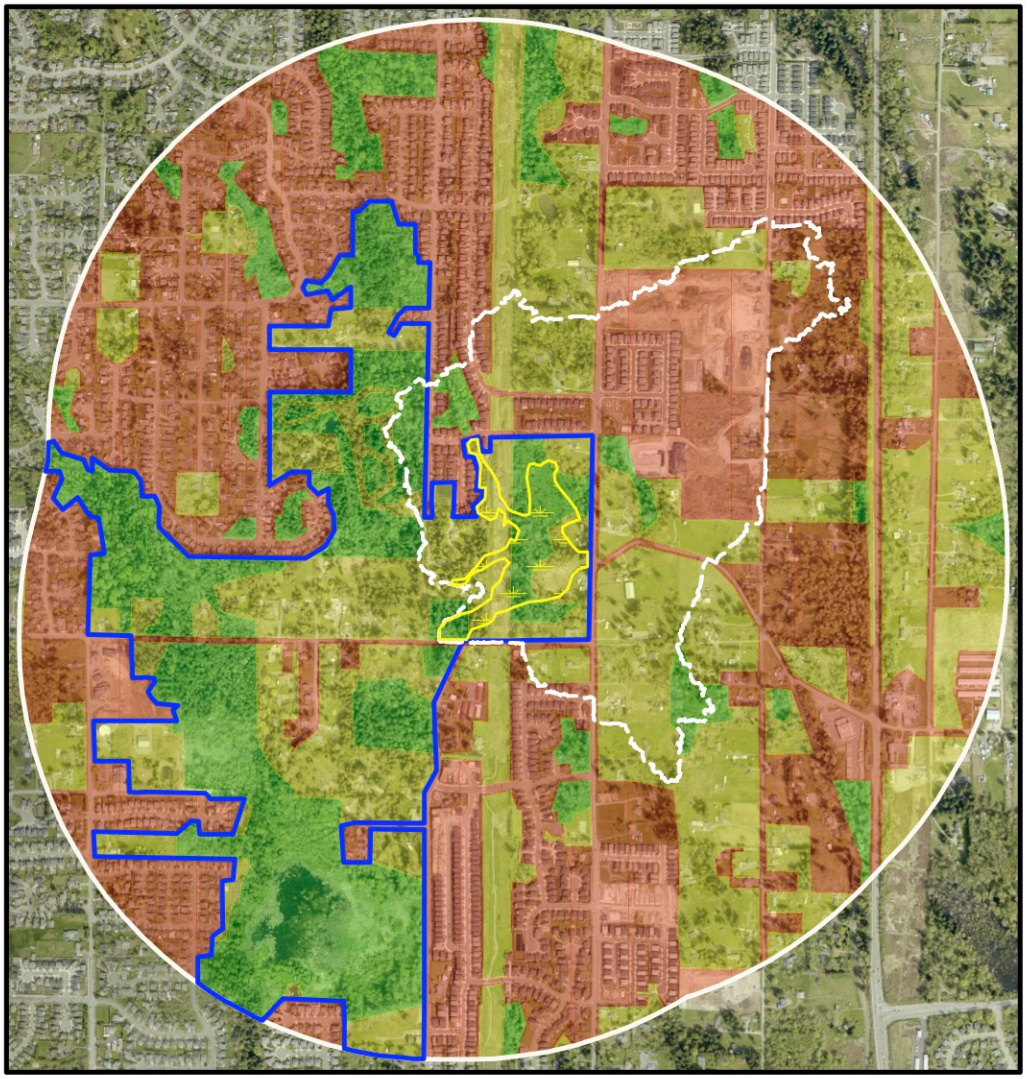
WRI Job # 2

Rated by

300

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 2- WETLAND A



LEGEND

- RELATIVELY UNDISTURBED
- LOW/MOD. INTENSITY
- HIGH INTENSITY
- ACCESSIBLE HABITAT
- WETLAND
- 1 KM FROM WETLAND
- CONTRIBUTING BASIN

CONTRIBUTING BASIN AREA RELATIVE TO WETLAND UNIT IS 14:1

Scale 1" = 1,500'

0 1,500 3,000

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WETLAND RATING

Wetland A

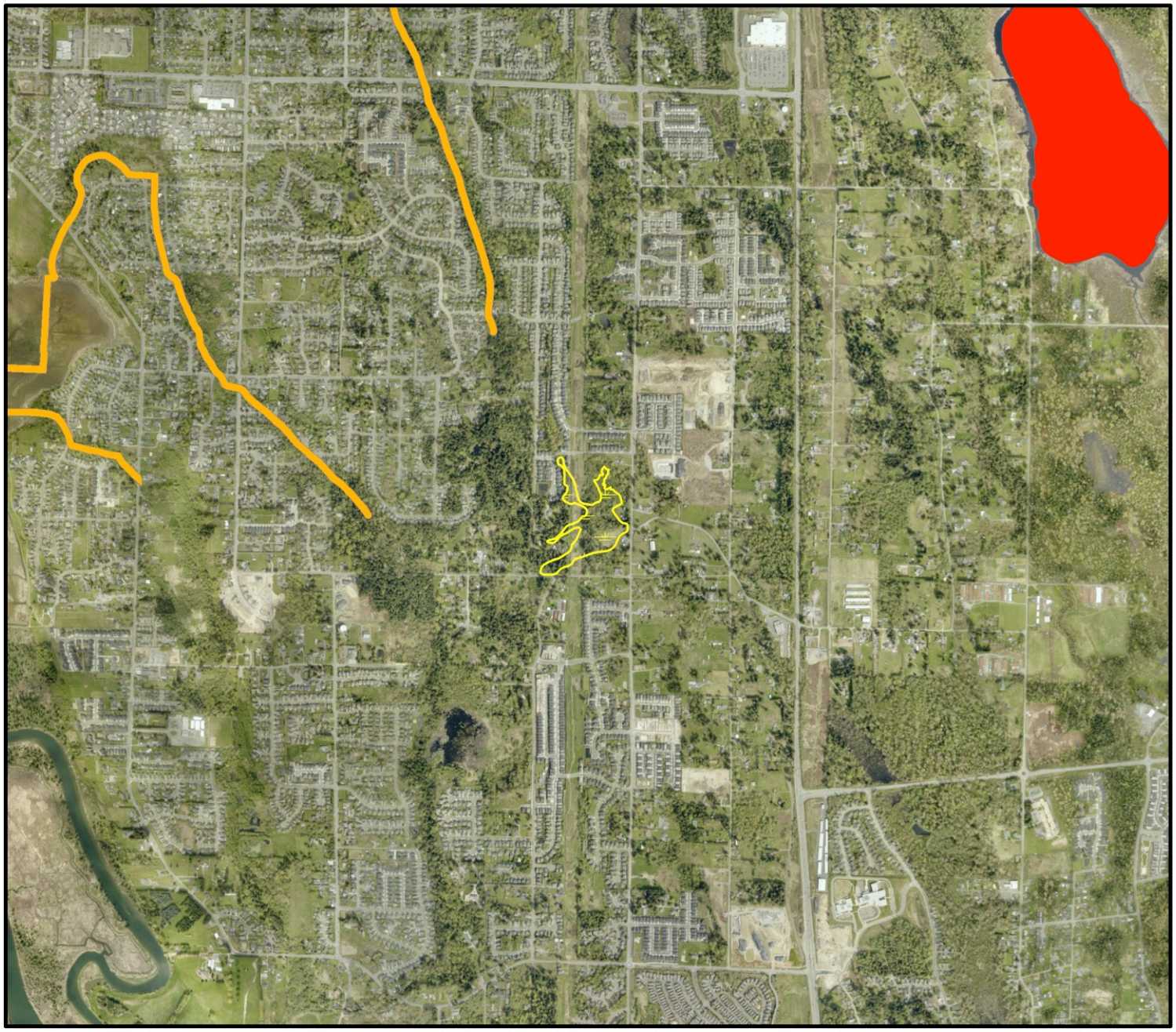
Figure A-2

WRI Job # 2

Rated b

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 3- WETLAND A



LEGEND

- WETLAND
- AQUATIC RESOURCES ON THE 303(d) LIST
- CONTAINS TMDL

Scale 1" = 2,000'

0 2,000 4,000

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WETLAND RATING

Wetland A

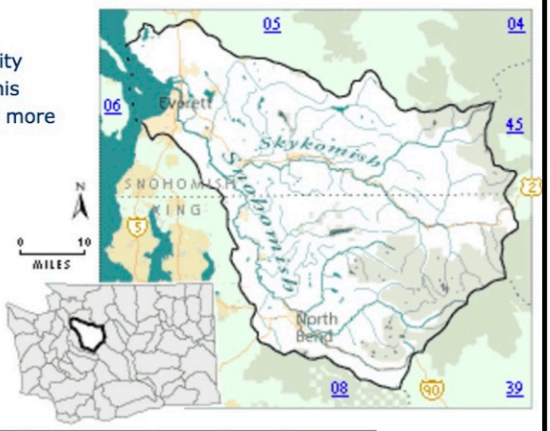
Figure A-3

WRI Job # 2

Rated b

WRIA 7: Snohomish

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.



Counties

- King
- Snohomish

Waterbody Name	Pollutant(s)	Status**	TMDL Lead
Lake Loma	Total Phosphorus	Straight to implementation project under development	Tricia Shoblom 425-649-7288
Snohomish River	French Creek / Pilchuck River • Dissolved Oxygen • Temperature	Under development	Ralph Svrjcek 425-649-7165
	Dioxin	EPA approved	Ralph Svrjcek 425-649-7165
	Estuary • Ammonia • BOD	EPA approved	Ralph Svrjcek 425-649-7165
	Tributaries • Fecal Coliform Tributaries: • Allen Creek • Quilceda Creek • French Creek • Woods Creek • Pilchuck River • Marshlands (Wood Creek) {2}	EPA approved	Ralph Svrjcek 425-649-7165
	Snoqualmie River • Ammonia-N • BOD (5-day) • Fecal Coliform Temperature	EPA approved EPA approved Has an implementation plan	Ralph Svrjcek 425-649-7165

** ***Status*** *will be listed as one of the following: Approved by EPA, Under Development or Implementation*

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WETLAND RATING
Wetland A

Figure A-4
WRI Job # 7
Rated by

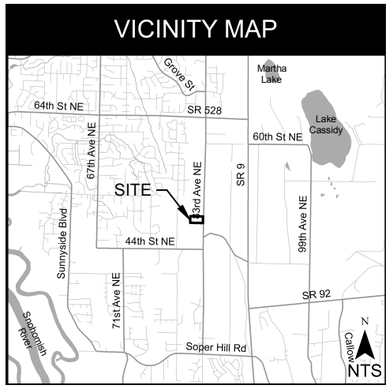
APPENDIX C

CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

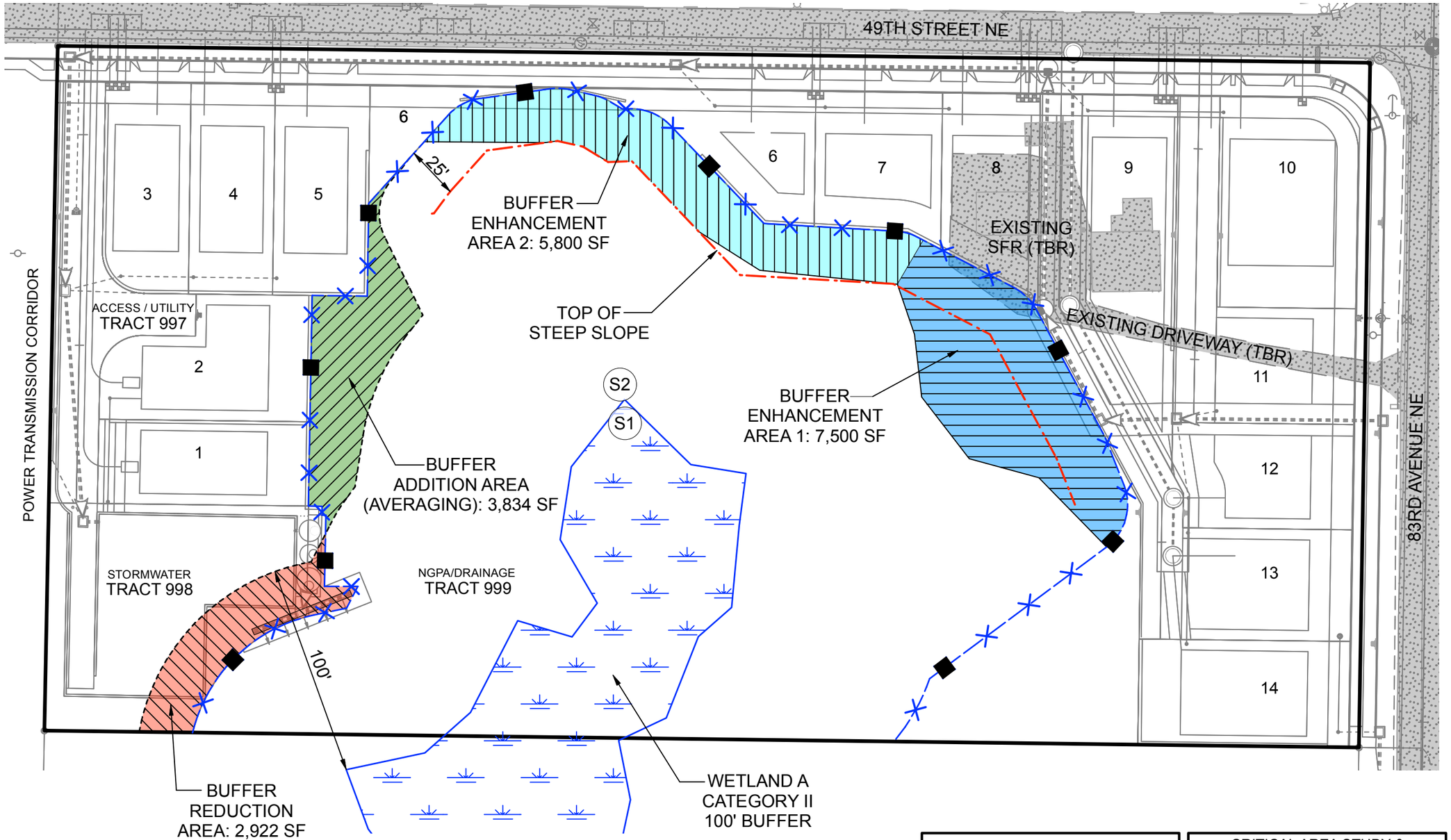
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

KEYSTONE LAND - TAYLOR LANE

PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.





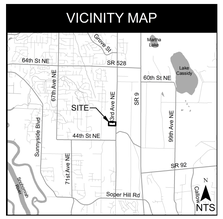


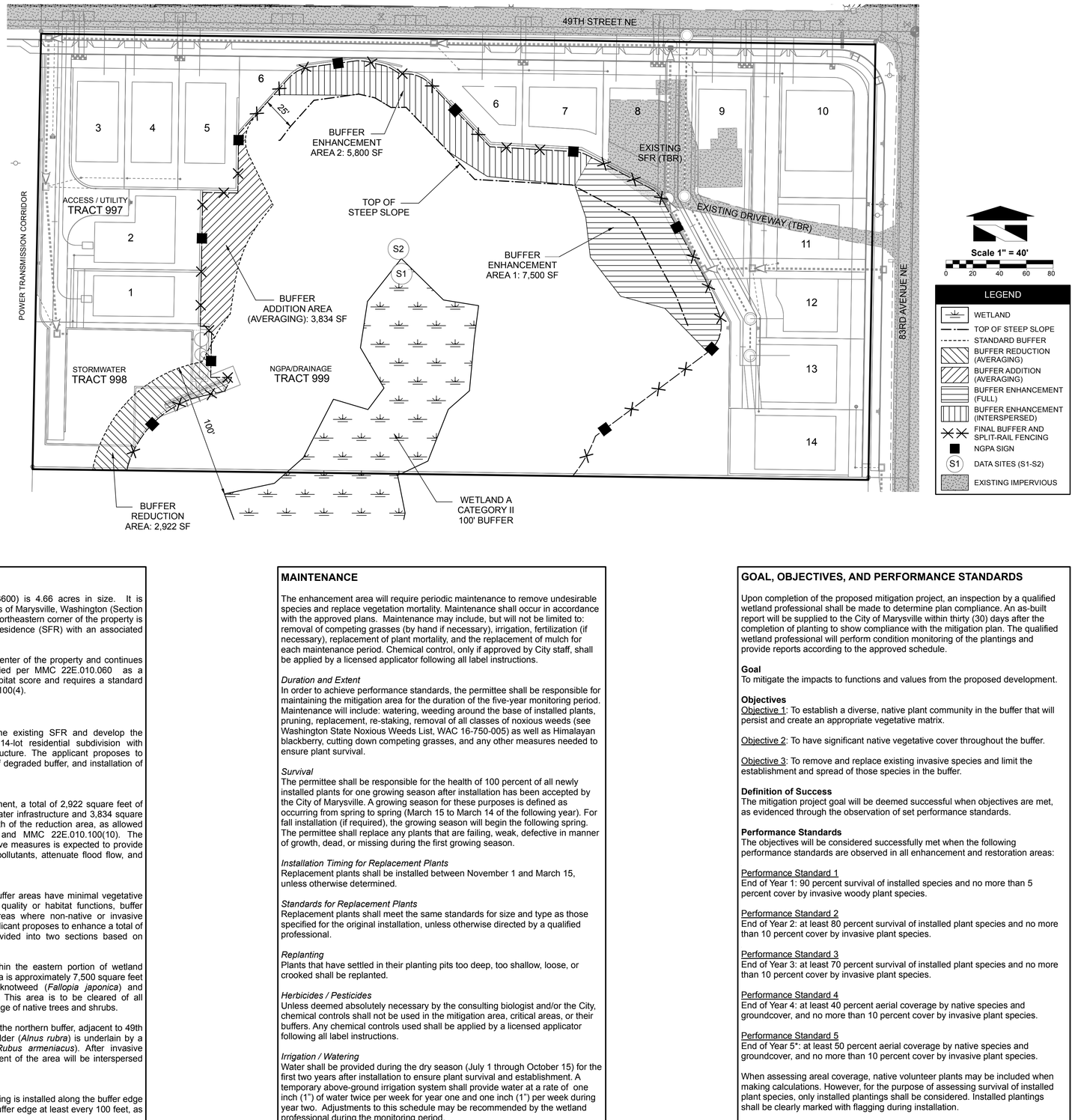
LEGEND

- WETLAND
- TOP OF STEEP SLOPE
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- BUFFER ENHANCEMENT (FULL)
- BUFFER ENHANCEMENT (INTERSPERSED)
- FINAL BUFFER AND SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

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CRITICAL AREA STUDY &
BUFFER MITIGATION PLAN MAP
TAYLOR LANE
MARYSVILLE, WA Sheet 1/1
WRI #: 23124
Keystone Land, LLC Drawn by: AW
13805 Smokey Pt Blvd #102 Rev1Date: 8/16/2024
Marysville, WA 98271 *Orig. Date: 1/26/2*





Scale 1" = 40'
0 20 40 60 80

LEGEND
- WETLAND
- TOP OF STEEP SLOPE
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- BUFFER ENHANCEMENT (FULL)
- BUFFER ENHANCEMENT (INTERSPERSED)
- FINAL BUFFER AND SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

SITE DESCRIPTION

The subject property (Parcel#00590700013600) is 4.66 acres in size. It is located at 4820 83rd Ave NE, in the city limits of Marysville, Washington (Section 35, Township 30N, Range 05E, W.M.). The northeastern corner of the property is developed with an existing Single Family Residence (SFR) with an associated shed, driveway, and utilities.

One wetland (Wetland A) is located at the center of the property and continues off-site to the south. Wetland A is classified per MMC 22E.010.060 as a Category II wetland with a moderate (7) habitat score and requires a standard 100-foot protective buffer per MMC 22E.010.100(4).

PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR and develop the northern portion of the property with a 14-lot residential subdivision with associated stormwater and access infrastructure. The applicant proposes to implement buffer averaging, enhancement of degraded buffer, and installation of permanent fencing and critical area signage.

AVERAGING
To accommodate for the proposed development, a total of 2,922 square feet of buffer is proposed to be reduced for stormwater infrastructure and 3,834 square feet of buffer will be added immediately north of the reduction area, as allowed per MMC 22E.010.100(5)(a) and (5)(c), and MMC 22E.010.100(10). The additional 912 square feet beyond prescriptive measures is expected to provide the wetland with more opportunity to filter pollutants, attenuate flood flow, and provide wildlife habitat.

ENHANCEMENT
Pursuant to MMC 22E.010.100(3), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. The applicant proposes to enhance a total of 13,300 square feet of degraded buffer, divided into two sections based on observed conditions.

Buffer Enhancement Area 1 is located within the eastern portion of wetland buffer, adjacent to lots 8 through 12. This area is approximately 7,500 square feet in size and is dominated by Japanese knotweed (*Fallopia japonica*) and Himalayan blackberry (*Rubus armeniacus*). This area is to be cleared of all invasives and planted with a dense assemblage of native trees and shrubs.

Buffer Enhancement Area 2 is located along the northern buffer, adjacent to 49th Street NE, where a native canopy of red alder (*Alnus rubra*) is underlain by a dense thicket of Himalayan blackberry (*Rubus armeniacus*). After invasive species are removed, an estimated 70-percent of the area will be interspersed around any existing native vegetation.

CRITICAL AREA DEMARCATION
MMC 22E.010.370 requires that two-rail fencing is installed along the buffer edge and NGPA signs shall be posted along the buffer edge at least every 100 feet, as shown on this plan.

MAINTENANCE

The enhancement area will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

GOAL, OBJECTIVES, AND PERFORMANCE STANDARDS

Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement and restoration areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation.

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met by the end of Year 3 or Year 4, the City may consider the project to be successful and terminate the monitoring period at that time.

PROJECT MONITORING PROGRAM

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage. During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified. The native grass seeding area is not part of the buffer enhancement measures and will not be monitored.

Photo points
At least one photo point shall be established in each buffer restoration area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the restoration/enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:
1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation / restoration goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

PERFORMANCE AND/OR MAINTENANCE BOND

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	$15.00/plant x 480 installed	$ 7,200.00
Split rail fencing and signage	$8/foot x 983 feet	$ 7,864.00
Critical area signage	$30/sign x 10 signs	$ 300.00
Mulch	$50.00/CY x 16CY	$ 800.00
Monitoring	$2,500/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$38,464.00**

USE OF THIS PLAN

This Final Mitigation Plan is supplied to Keystone Land, LLC as a means of mitigating for buffer impacts. This report is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report, and any implied representation or warranty is disclaimed.

WRI Project # 23214

SCALE 1" = 40'

Drawn By: A. Wachter

Date: 08.19.2024

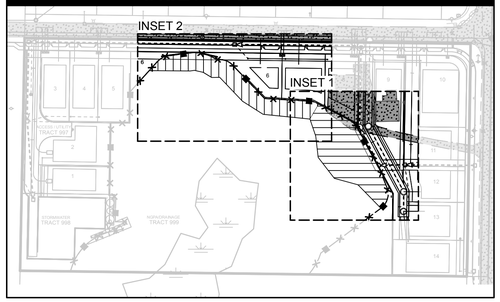
Wetland Resources, Inc.
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PREPARED FOR:
Keystone Land, LLC
13805 Smokey Blvd #102
Marysville, WA 98271

FINAL MITIGATION PLAN
TAYLOR LANE
MARYSVILLE, WASHINGTON
PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

FMP-1

INSET LOCATION MAP



INSET 1



LEGEND

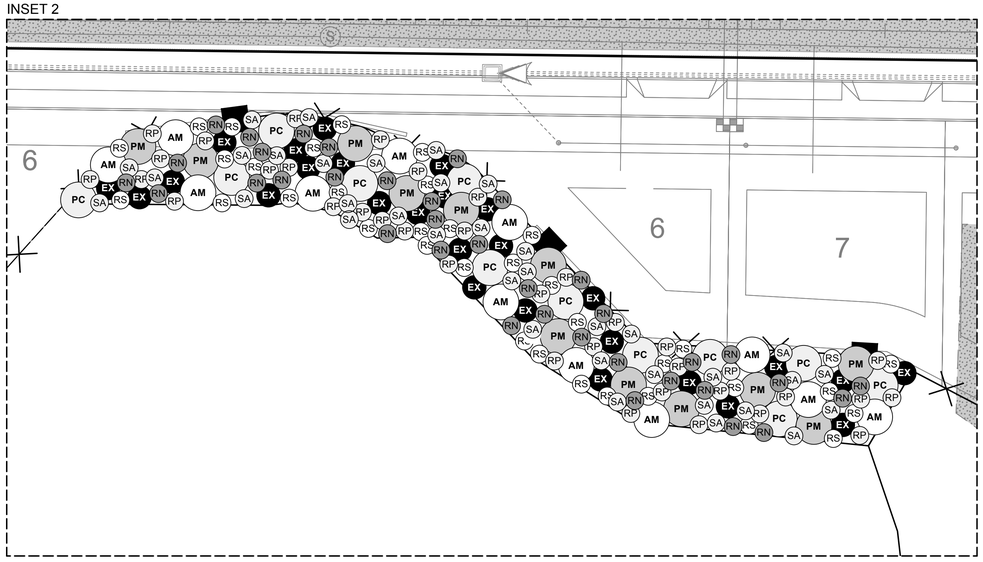
PC	Shore pine
PM	Douglas fir
AM	Big-leaf maple
RS	Salmonberry
SA	Snowberry
RP	Thimbleberry
RN	Nootka rose

Inset Scale 1" = 20'
0 10 20 30 40

Buffer Enhancement Area 1 (7,500 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	23
Shore pine	*Pinus contorta*	1 gallon	10'	23
Bigleaf maple	*Acer macrophyllum*	1 gallon	10'	22
Nootka rose	*Rosa nutkana*	1 gallon	5'	58
Snowberry	*Symphoricarpos albus*	1 gallon	5'	58
Salmonberry	*Rubus spectabilis*	1 gallon	5'	58
Thimbleberry	*Rubus parviflorus*	1 gallon	5'	58
Total				**300**

INSET 2



LEGEND

PC	Shore pine
PM	Douglas fir
AM	Big-leaf maple
RS	Salmonberry
SA	Snowberry
RP	Thimbleberry
RN	Nootka rose
EX	Existing Native Vegetation

Inset Scale 1" = 20'
0 10 20 30 40

Buffer Enhancement Area 2 (5,800 square feet; plant 70% area)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	12
Shore pine	*Pinus contorta*	1 gallon	10'	12
Bigleaf maple	*Acer macrophyllum*	1 gallon	10'	12
Nootka rose	*Rosa nutkana*	1 gallon	5'	36
Snowberry	*Symphoricarpos albus*	1 gallon	5'	36
Salmonberry	*Rubus spectabilis*	1 gallon	5'	36
Thimbleberry	*Rubus parviflorus*	1 gallon	5'	36
Total				**180**

PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

PLANTING NOTES (CON'T)

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

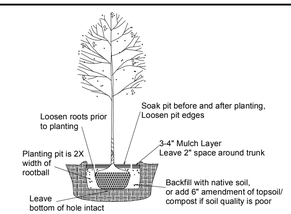
Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

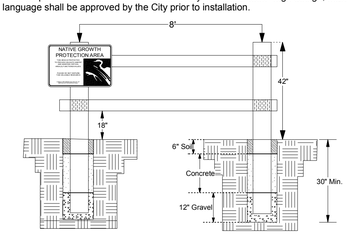
Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.



TREE & SHRUB PLANTING DETAIL
No Scale

TWO-RAIL FENCE AND SIGN DETAIL

Wetland fencing and signage adjacent to a regulated wetland or stream corridor shall be required. Two-rail fencing shall be constructed with pressure treated posts and rails and cemented into the ground with either cedar or treated rails. Alternative materials may be used subject to approval by the city. Signs designating the presence of an environmentally sensitive area shall be posted along the buffer boundary. The signs shall be posted at a minimum rate of one every 100 linear feet. Sign design, materials, and restrictive language shall be approved by the City prior to installation.



NOT TO SCALE

WRI Project # 23214
INSET SCALE 1" = 20'
Drawn By: A. Wachter
Date: 08.19.2024

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
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Email: mailbox@wetlandresources.com

PREPARED FOR:
Keystone Land, LLC
13805 Smokey Blvd #102
Marysville, WA 98271

FINAL MITIGATION PLAN
TAYLOR LANE
MARYSVILLE, WASHINGTON
PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

FMP-2

Taylor Lane

Drainage Report

Prepared for

Cornerstone Homes

Contact: Joe Long

13805 Smokey Point Blvd #102

Marysville, WA 98271

Prepared by

Cooper Danby & Cooper Powers

Approved by

Tom Abbott, PE



August 2024 ***Job No: 23-0009***

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Appendices

#	Title
1	Project Overview
2	Temporary Erosion and Sediment Control Design
3	Downstream Analysis
4	Detention and Water Quality Treatment Design
5	Conveyance Analysis and Design
6	Operations and Maintenance Manual
7	Special Reports and Studies

Figures

#	Title
1	Vicinity Map
2	Existing Conditions Map
3	Downstream Analysis Map
4	Predeveloped Hydrology Map
5	Developed Hydrology Map

SECTION 1: PROJECT OVERVIEW

The proposed Taylor Lane project is approximately a 4.38-acre site. The project is a single-family residential development on parcel #00590700013600 and addressed at 4820 83rd Ave NE Marysville 98270. The project proposes to construct 13 new single-family lots and retain the existing single-family home for a total of 14 lots. Emergency and standard access drives along with associated private and public utilities are proposed to serve project development from 49th St NE. Frontage improvements along 49th St NE and 83rd Ave NE consisting of sidewalk improvements to City standards are proposed. See the Vicinity Map in Appendix 1 for visual representation of the subject property.

Existing Site

The parcel #00590700013600 is currently occupied by one single family home with associated outbuildings taking access from 83rd Ave NE. The northeast corner of the site containing the existing home consists of lawn coverage and gravel driveways, while the rest of the site contains dense forest and vegetative coverage. Existing topography generally descends to the south, with some areas of steep slopes, towards a wetland located in the lower-middle region. The project parcel is currently zoned R-6.5 in the City of Marysville.

The proposed development will exist within the bounds of a single stormwater threshold discharge basin as all site runoff from developed surfaces meets within ¼ mile from the project site downstream. Wetland Resources Inc has prepared a Critical Areas Report dated January 2024 on the site. The findings indicate that in the southerly portion of the site, there is a Category II wetland with a 100' buffer. Impacts are planned within portions of these buffer areas, requiring averaging and mitigation. Additionally, stormwater is proposed to be discharged to the wetland area on the parcel via a dispersion trench.

A preliminary Geotechnical Engineering Design Study has been prepared by Earth Solutions NW in January 2024 on the site. Please reference the geotechnical report for detailed soils information. There are a number of steep slopes on the site, as the parcel generally slopes from north to south.

Proposed Development

The proposed project will construct 13 new single-family lots and retain the existing home onsite. Emergency and standard access drives will serve the site from 49th St NE, along with associated private and public utilities are proposed to serve project development. Frontage improvements along 49th St NE and 83rd Ave NE consisting of sidewalk improvements to City standards are proposed. Retaining walls will be required along the southern side of most lots bordering the wetland buffer area.

Proposed Drainage System

This project is designed to comply with the 2019 Department of Ecology Stormwater Manual for Western Washington (2019 DOE SWMMWW). Stormwater will be mitigated via a detention pond that is proposed in the southwestern portion of the site. Prior to discharge, a perkfilter cartridge filtration unit will be used to treat stormwater runoff to meet basic water quality treatment requirements. The proposed detention pond and water quality treatment system will discharge to the existing onsite wetland area which continues offsite to the south until joining King Creek.

Onsite development will create 1.52 AC of new impervious surfaces which will be collected by the detention pond for mitigation and stormwater quality treatment. This area is considered to be within the Onsite Basin for stormwater modeling. Frontage improvements consisting of new sidewalk and planter along 49th St NE and 83rd Ave NE, referred to as the Frontage Basin, will also be collected and routed to the detention pond to the maximum extent feasible. The runoff from these surfaces unable to be collected due to vertical constraints, approximately 0.12 AC, will be considered to bypass detention and be within the Frontage Bypass Basin.

Erosion/Sedimentation Control

Erosion control measures that will be utilized during construction will include a combination of silt fence, storm drain inlet protection, interceptor swales, and sediment ponds. See Section 2.0 for discussion of how SWPPP Elements are addressed.

Minimum Requirements
Per the 2019 DOE Manual, Minimum Requirements 1-9 apply to the proposed development.

Minimum Requirement #1: Preparation of Stormwater Site Plans
This report along with the preliminary plans satisfies the minimum requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention
See Section 2 of this Report for the SWPPP BMP Elements, and the SWPPP (submitted as a separate document) for a complete discussion of erosion control BMP's and their use specific to the site.

Minimum Requirement #3: Source of Pollution
Permanent source control BMPs are not applicable for the subject site since the associated activities for the new residence do not fall within the types of facilities listed within Volume IV of the DOE Manual (Residential developments are not required to implement source control BMP's). BMPs for erosion and sedimentation control will be specified in the Construction Plans and the SWPPP.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls
Flow from the site will preserve its natural drainage pattern south toward the onsite wetland. Runoff flows towards King Creek, a tributary to Ebey Slough, which then eventually discharges into The Puget Sound.

Minimum Requirement #5: On-Site Stormwater Management
The project proposes BMP T5.13 soils to be underlain within all pervious areas that are disturbed by development. Generally, all other infiltration-related BMPs are infeasible due to the site development area's adjacent location to steep slopes. Per the geotechnical report other dispersion-related BMPs are considered infeasible due to the proximity of the steep slopes to the developed impervious coverage of the site and the lack of available dispersion length. Please see Section 4.5 for additional discussion of Onsite Stormwater Management and Low Impact Development BMP feasibility.

Minimum Requirement #6: Runoff Treatment
Proposed new pollution generating impervious surfaces (PGIS) will exceed the 5,000 SF threshold and thus basic water quality treatment will be provided via a water quality treatment structure that treats stormwater runoff discharging from the stormwater detention pond. A Perkfilter cartridge filtration unit is proposed for this purpose. See Section 4.0 for additional discussion regarding proposed stormwater management and water quality treatment measures.

Minimum Requirement #7: Flow Control
The project will exceed the 10,000 SF new plus replaced impervious threshold and is required to provide flow control. A concrete detention pond will be installed in the southwestern portion of the project site, accessible via access easement serving Lot 1 & 2. This pond will discharge via dispersion trench at historic, mitigated rates towards the existing onsite wetland area. Please see Section 4.0 for additional flow control modeling and parameters for detention sizing.

Minimum Requirement #8: Wetlands Protection
Wetland Resources Inc has prepared a Critical Areas Report dated January, 2024 on the site. The findings indicate that in the southerly portion of the site, there is a Category II wetland with a 100' buffer. Development is anticipated to impact these buffer areas which will require mitigation and buffer averaging.

Minimum Requirement #9: Operation and Maintenance
See Operations and Maintenance in Section 6 of this report.

SECTION 2: TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN

SWPPP Design Elements

A Construction Stormwater Pollution Prevention Plan (SWPPP) will be provided prior to construction. The SWPPP report is modeled under the guidelines of I.3.4.2 MR2 of the DOE Manual. Construction SWPPP Elements #1 through #13 are addressed below. These elements will be delineated within future civil plans for the project.

Element #1 – Mark Clearing Limits

All clearing limits will be delineated with high visibility plastic fence and/or silt fence.

Element #2 – Establish Construction Access

Stabilized construction accesses will be installed as shown on the plans.

Element #3 – Control Flow Rates

Detention of construction period runoff will be provided by means of sediment ponds on the site.

Element #4 – Install Sediment Controls

Silt fence, catch basin protection, and the temporary sediment pond will be utilized to contain sediments within the project's clearing limits.

Element #5 – Stabilize Soils

Exposed soils will be stabilized as specified in the Grading and Erosion Control Notes with temporary and permanent seeding, mulching, and plastic covering.

Element #6 – Protect Slopes

Slopes shall be protected as specified under Element #5.

Element #7 – Protect Drain Inlets

Storm drain inlet protection will be utilized to contain sediments within the project's clearing limits.

Element #8 – Stabilize Channels and Outlets

Temporary channels, shall be stabilized with check dams.

Element #9 – Control Pollutants

Pollutants shall be controlled as specified in Volume IV of the 2019 DOE Manual—Source Control BMPs to address potential sources of pollution.

Element #10 – Control De-Watering

There will be no de-watering as a part of this project..

Element #11 – Maintain BMPs

Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes that will be included in the civil plans associated with the project.

Element #12: Manage the Project

The Grading and Erosion Control Notes specify seasonal work limitations. Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes.

Element #13: Protect on-site stormwater management BMPs

On-site stormwater management BMPs used for runoff from roofs and other hard surfaces are not feasible due to soil conditions and proposed project density.

SECTION 3: DOWNSTREAM ANALYSIS

Task 1. Study Area Definition and Maps

Snohomish County Bare Earth LiDAR, survey, and 2021 aerial photography were the best topographical references available for the area containing the site. The limits of the downstream analysis extend roughly 0.25 miles beyond the subject property's natural discharge location.

Task 2. Resource Review

All of the resources below have been reviewed for existing and potential issues near the project site:

Adopted Basin Plans

No Adopted Basin Plans were located that include the project site.

Drainage Basin

This site is in the King Creek subbasin, within the Ebey Slough watershed. Discharge from the proposed development will discharge into a wetland area tributary to King Creek.

Floodplain / Floodway (FEMA) maps

Per FEMA Floodplain map #53061C0736F the subject property is not within a floodplain.

Critical Areas Map

There's a Category II wetland in the southern portion of the site. There are steep slopes located within the wetland buffer area near the central portion of the site. See section 7.0 for a complete list of reports prepared for the project including a Critical Areas Report, Wetland critical areas, and geotechnical and slope analysis reports.

Drainage Complaints

No relevant issues were identified near the proposed site.

Road Drainage Problems

No issues were identified near the proposed site.

Soil Survey

Site soils are classified as Tokul gravelly medial loam (0 to 8 percent slopes) which is classified as Hydrologic Soil Group B. Per geotechnical analysis, infiltration is infeasible onsite, which is consistent with NRCS soil mapping data.

Wetland Inventory Maps

Wetlands are identified to be on and immediately adjacent to the south of the project site. Reference the critical areas report submitted with this report for additional information regarding the wetland areas onsite.

Migrating River Studies

Migrating River Studies are not considered applicable to the proposed development.

Section 303d List of Polluted Waters

Washington State Department of Ecology's Water Quality Assessment for Washington contains a listing for King Creek which the project is tributary to. Please refer to Appendix 3 for copies of applicable 303(d) listings.

Water Quality Problems

King creek has a category 5 listing in the DOE Water Quality Assessment Review tools for temperature which does not fall under water quality problems. The development however will improve water quality tributary to the creek via basic treatment device(s).

Stormwater Compliance Plans

Not applicable to the proposed project.

Task 3. Field Inspection/Downstream Analysis
On November 27th, 2023, a Downstream Analysis was performed at the site. The weather consisted of 46ºF and clear skies. The following observations were verified during the visit.

The subject property contains impervious areas associated with an existing home, driveways, and associated outbuildings surrounded by lawn area in the northeastern portion of the site. Slopes are generally moderate in the developed portion. The rest of the site consists of steep slopes generally descending south with dense forest/vegetation, and an existing wetland and wetland buffer area in the south-central portion. Frontages along 49th St NE (north) and 83rd Ave NE (east) were observed for potential upstream run-on. 49th St does not produce upstream run-on to the site (Images 1 & 2) while 83rd Ave does yield some upstream flow from the existing road centerline (Image 3).

The site is located within a single threshold discharge area (TDA) since all runoff exits the southern property line and converges prior to exiting the quarter mile boundary of analysis. The flow path is formed where runoff enters Wetland A either onsite or offsite to the south. Flow continues south/southwest through several undeveloped properties until ultimately joining King Creek prior to crossing under 44th St NE and continuing beyond the quarter mile boundary of analysis (Images 4 & 5).

Task 4. Drainage System Description and Problem Descriptions
Based on the information available and all the resources available including visual inspection of the downstream flow path to the ¼-mile boundary, there is no evidence of existing or anticipated downstream drainage problems. All flows are adequately carried through natural channels to the quarter mile buffer of analysis.

Task 5. Mitigation of Existing or Potential Drainage Problems
No evidence of existing or potential problems with downstream drainage conveyance infrastructure was found. Mitigation is not required.

SECTION 4: DETENTION AND WATER QUALITY TREATMENT DESIGN

4.1 Predeveloped Site Hydrology

The pre-developed and developed conditions were modeled in WWHM for the purpose of peak flow determination for direct discharge. Based on the site location, the WWHM used the Seatac Gage with a Precipitation Scale factor of 1.20. For visual representation of the listed basins, see the Predeveloped Hydrology Map.

Onsite Basin:

The predeveloped condition applied to the Onsite Basin results in a forested land cover condition. It includes all disturbed areas onsite. The values as modeled in WWHM are as follows:

Table 1: Predeveloped Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Forest, flat	2.02
Total	**2.02**

Frontage Basin:

The predeveloped condition is applied to the Frontage Basin, which includes area within 49th St NE and 83rd Ave NE to be developed. In the developed condition, this basin will be detained and mitigated in the proposed detention pond. The values as modeled in WWHM are as follows:

Table 2: Predeveloped Conditions: Frontage Basin

Frontage Basin	
Ground Cover	Area (acre)
Forest, flat	0.49
Total	**0.49**

Upstream Basin:

In the predeveloped condition, a portion of the pavement within the 83rd Ave NE ROW is tributary to the project site. In the developed condition, this pavement will continue to be tributary to the site. This area has been modeled as upstream flow through in WWHM in both the predeveloped and developed conditions. The values as modeled in WWHM are as follows:

Table 3: Predeveloped Conditions: Upstream Basin

Upstream Basin	
Ground Cover	Area (acre)
Roads, flat	0.04
Total	**0.04**

4.2 Developed Site Hydrology

In the developed condition, the proposed apartment project will construct 13 new single family lots with proposed ROW access, stormwater detention and utilities. Frontage improvements along 49th St NE and 83rd Ave NE are proposed.

In compliance with the 2019 DOE Manual, all runoff from onsite developed/disturbed surfaces will be collected, treated, and discharged directly to existing/historic flow paths or will bypass detention and be mitigated within the proposed flow control system.

Onsite Basin:
The developed Onsite Basin includes the onsite disturbed area, including all lot areas. The maximum lot impervious value (65%) per zoning code was utilized in determine proposed site impervious coverage. In the developed condition, the Onsite Basin has been modeled using WWHM with the following areas and ground cover designations:

Table 4: Developed Conditions: Onsite Basin

Onsite Basin	
Ground Cover	Area (acre)
Roof, flat	0.81
Roads, flat	0.16
Driveway, flat	0.28
Pasture, flat	0.63
Pond	0.14
Total	**2.02**

Frontage Basin:
The developed Frontage Basin is comprised of area within 49th St NE and 83rd Ave NE to be developed for ROW improvements. The Frontage Basin was modeled using WWHM with the following areas and ground cover designations:

Table 5: Developed Conditions: Fontage Basin

Frontage Basin	
Ground Cover	Area (acre)
Roads, flat	0.16
Sidewalk, flat	0.25
Total	**0.41**

Frontage Bypass Basin:
The developed Frontage Bypass Basin is comprised of 83rd Ave NE and 49th St NE pavement and sidewalk that cannot be collected due to topographical reasons. The areas from the frontage bypass basin come from the Upstream Basin and the Frontage basin. The Frontage Bypass Basin was modeled using WWHM with the following areas and ground cover designations:

Table 6: Developed Conditions: Frontage Bypass Basin

Frontage Bypass Basin	
Ground Cover	Area (acre)
Road, flat	0.06
Sidewalk, flat	0.02
Total	**0.08**

Upstream Basin:
In the predeveloped condition, a portion of the pavement within the 83rd Ave NE ROW is tributary to the project site. In the developed condition, this pavement will continue to be tributary to the site. This area has been modeled as upstream flow through in WWH\M in both the predeveloped and developed conditions. The values as modeled in WWHM are as follows:

Table 7: Predeveloped Conditions: Upstream Basin

Upstream Basin	
Ground Cover	Area (acre)
Roads, flat	0.04
Total	**0.04**

4.3 Detention Facility Design

The proposed detention pond facility used for mitigating developed condition flows was designed in compliance with the 2019 DOE requirements to model hydrologic conditions and detention in a continuous runoff model (WWHM2012) where the following evaluation parameters are employed:

> *"Flow duration is computed by counting the number of flow values that exceed a specified flow level. The specified flow levels used by WWHM in the flow duration*
> *analysis are listed below.*
> 1. *50% of the 2-year predevelopment peak flow.*
> 2. *100% of the 2-year predevelopment peak flow.*
> 3. *100% of the 50-year predevelopment peak flow.*
>
> *There are three criteria by which flow duration values are compared:*
> 1. *If the postdevelopment flow duration values exceed any of the predevelopment flow levels between 50% and 100% of the 2-year predevelopment peak flow values (100 Percent Threshold) then the flow duration requirement has not been met.*
> 2. *If the postdevelopment flow duration values exceed any of the predevelopment flow levels between 100% of the 2-year and 100% of the 50-year predevelopment peak flow values more than 10 percent of the time (110 Percent Threshold) then the flow duration requirement has not been met.*
> 3. *If more than 50 percent of the flow duration levels exceed the 100 percent threshold then the flow duration requirement has not been met."*

Detention Pond Facility
The proposed cast in place concrete detention facility detains, and releases collected storm water runoff from the Onsite Basin, Upstream Basin and Frontage Basin. The facility is located in Tract 997. Flows from the developed basins are collected and conveyed to the detention pond via a proposed network of catch basins and storm water conveyance pipes. Detailed WWHM output is provided in Appendix 4. A summary of the detailed statistics and inputs used for modeling the system in WWHM2012 can be found below.

Table 8: Detention Pond Design Summary

Detention Pond	
Live Storage Bottom Area (modeled)	*6,311 SF*
Live Storage Bottom Area (provided)	*6,311 SF*
Number of Cells	*3*
Cell Dimensions	*(3 x 23.3' x 90)*
Begin Live Storage Elevation	333.0
Riser Height	7.00'
Volume (modeled)	44,177 CF
Volume (provided)	44,177 CF

See table below for the flow rates and water surface elevations by storm event for the detention pond.

Table 9: Flow Rates and Water Surface Elevations by Storm Event

Storm Event	Predeveloped Rate (cfs)	Mitigated Rates (cfs)	Water Surface Elevation (ft)
2-Year	0.1334	0.0794	335.39
10-Year	0.2798	0.1264	336.37
50-Year	0.4777	0.1784	337.26
100-Year	0.5866	0.2039	337.88

4.4 Water Quality Treatment

The proposed development is residential, therefore basic level water quality treatment is required. Basic level treatment will be provided for collected pollution generating impervious surfaces (PGIS) by a Perkfilter Catchbasin units, manufactured treatment systems currently approved by Ecology with General Use Level Designation (GULD) for basic treatment

4.5 Onsite Stormwater Management

The project does not the LID performance standard and minimum requirements 1-9 are required for the project but choose to implement List #2 to evaluate low impact design. The following BMP's below are assessed for implementation:

Lawn and Landscaped Areas:

1. *Post-Construction Soil Quality and Depth*
    - BMP T5.13 soils will be applied to all permeable and landscaped areas in developed condition.
        i. **Conclusion: Feasible**

Roofs:

1. *Downspout Full Infiltration per BMP T5.10A or Downspout Full Dispersion per BMP T5.30*
    - Infiltration is not feasible on site due to the lack of infiltratable soils which has been confirmed by testing found in the geotechnical report and thus BMP T5.10A is infeasible. Due to site specific constraints including building locations as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path to disperse on site per BMP T5.30.
        i. **Conclusion: Infeasible**

2. *Bioretention*
    - Due to spatial constraints provide by the development footprint and infiltration infeasibility as confirmed by testing in the geotechnical report, a bioretention facility cannot be designed to provide the required horizontally projected surface area.
        i. **Conclusion: Infeasible**

3. *Downspout Dispersion per BMP T5.10B.*
    - Due to site specific constraints including building location as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path length to disperse on site.
        i. **Conclusion: Infeasible**

4. *Perforated Stub-Out Connections per BMP T5.10C.*
    - No stub-out connections will be implemented in the design as soils are not suitable for infiltration as well as the site's proximity to steep slopes.
        i. **Conclusion: Infeasible**

Other Hard Surfaces:

1. *Full Dispersion per BMP T5.30*
    - Due to site specific constraints including building as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path to disperse on site.
        i. **Conclusion: Infeasible**

2. *BMP T5.15 Permeable Pavement*
    - Infiltration is not feasible on site per the Geotechnical Engineer, which has been confirmed by testing found in the geotechnical report.
        i. **Conclusion: Infeasible**

3. *Bioretention*

- Due to spatial constraints provide by the development footprint and infiltration infeasibility as confirmed by testing in the geotechnical report, a bioretention facility cannot be designed to provide the required horizontally projected surface area.
    - **i. Conclusion: Infeasible**

4. Sheet Flow Dispersion or Concentrated Flow Dispersion in accordance with BMP T5.12 or BMP T5.11

- Due to site specific constraints including building location as well as the proximity of slopes and walls to the developed site improvements, there is inadequate flow path length to disperse on site.
    - **i. Conclusion: Infeasible**

SECTION 5: CONVEYANCE DESIGN

The stormwater conveyance system is comprised of a network of open/closed grate catch basins, buried pipe, a concrete detention pond and a Perkfilter water quality unit. Catch basins have been located such that each section of storm drainage pipe may adequately convey associated tributary area flows.

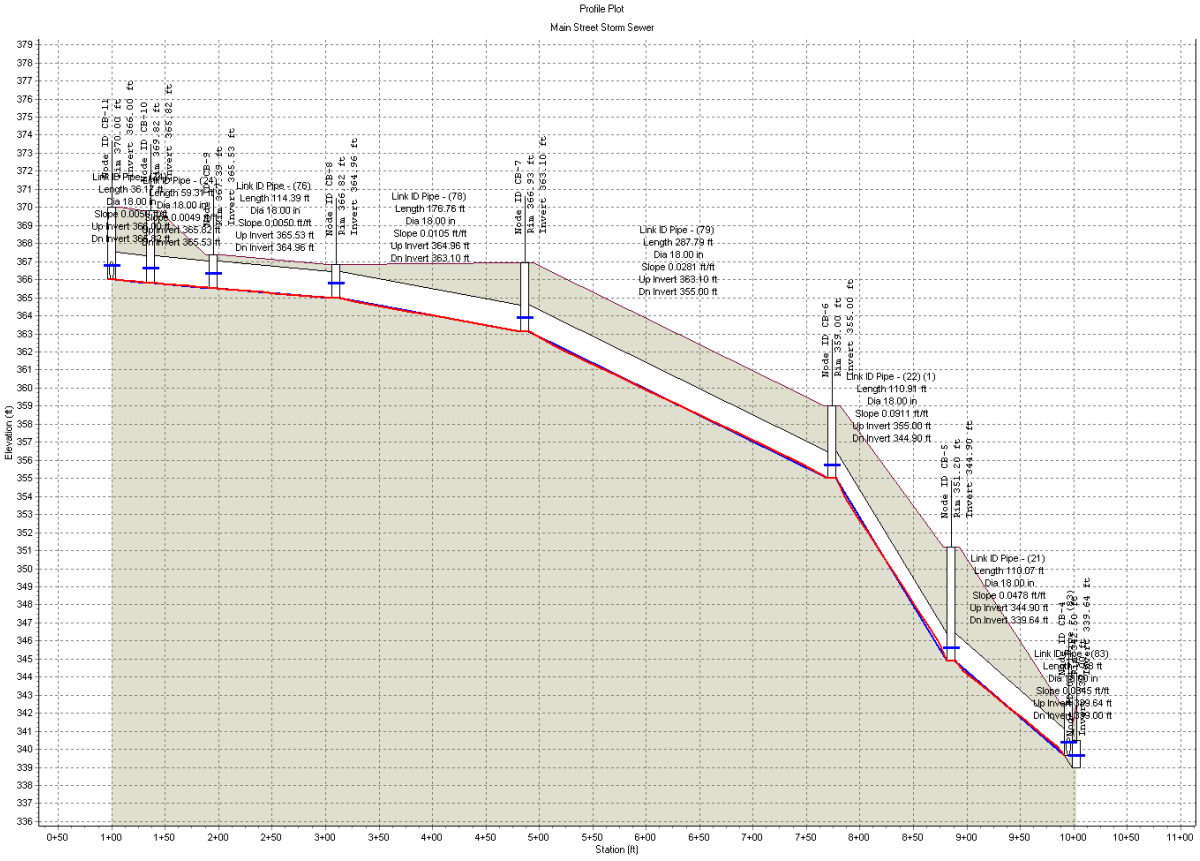
5.1 Onsite Collection and Conveyance

The onsite collection and conveyance systems were designed for the 50-year, 24-hour storm event with the Rational Method by utilizing Autodesk's Storm and Sanitary Analysis 2024. This analysis was performed to ensure that during the 50-year, 24-hour storm event, there would be no significant catch basin overtopping. The table below shows a summary of the conveyance basin areas used in the analysis. See Appendix 5 for the Conveyance Basins Map for a visual representation of measured areas.

BASIN	IMPERVIOUS	PERVIOUS	TOTAL
1	0.23	0.12	0.35
2	0.16	0.09	0.24
3	0.09	0.05	0.14
4	0.10	0.05	0.15
5	0.38	0.21	0.59
6	0.13	0.00	0.13
7	0.17	0.00	0.17
8	0.10	0.00	0.10
9	0.09	0.00	0.09
10	0.07	0.00	0.07
11	0.07	0.00	0.07
12	0.05	0.00	0.05
13	0.10	0.00	0.10

CB11-Detention Pond

According to initial modeling the pipe between CB-11 and the detention pond was undersized for the 50-year flow. Increasing the pipe size to 18" produced a working model. See appendix 5 for the SSA model layout with 18" upsized pipes highlighted in yellow and SSA model results CB-11 to the detention pond.



Node ID:	CB-11	CB-10	CB-9	CB-8	CB-7	CB-6	CB-5	Outfall
Rim (ft):	370.00	369.82	367.39	366.82	366.93	359.00	351.20	342.50
Invert (ft):	366.00	365.82	365.53	364.96	363.10	355.00	344.90	339.00
Min Pipe Cover (ft):			0.36					
Max HGL (ft):	366.73	366.60	366.31	365.75	363.89	355.70	345.60	342.64

Link ID:	Pipe - (74)	Pipe - (24)	Pipe - (76)	Pipe - (78)	Pipe - (79)	Pipe - (22) (1)	Pipe - (21)	Pipe - (83)
Length (ft):	36.17	59.31	114.39	176.76	287.79	110.91	110.07	7.58
Dia (in):	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Slope (ft/ft):	0.0050	0.0049	0.0050	0.0105	0.0281	0.0911	0.0478	0.0845
Up Invert (ft):	366.00	365.82	365.53	364.96	363.10	355.00	344.90	339.64
Dn Invert (ft):	365.82	365.53	364.96	363.10	355.00	344.90	339.64	339.00
Max Q (cfs):	3.84	4.26	4.20	6.37	8.43	9.29	10.99	12.35
Max Vel (ft/s):	4.50	4.60	4.67	6.87	10.65	16.53	13.65	17.34
Max Depth (ft):	0.73	0.78	0.77	0.79	0.70	0.53	0.70	0.64

SECTION 6: OPERATIONS AND MAINTENANCE MANUAL

The proposed storm drainage system consists of buried pipes, catch basins, a detention pond, and a perkfilter water quality treatment structure. These facilities will require periodic maintenance and inspection. Inspection and maintenance procedures are contained on the following pages.

SECTION 7: SPECIAL REPORTS AND STUDIES

The following studies were conducted in preparation of this Report:

- Critical Areas Report, Wetland Resources, January 2024
- Geotechnical Report, Earth Solutions NW, January 2024

Appendix 1: Project Overview

1. Vicinity Map
2. Existing Conditions Map
3. Proposed Development Map

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

TAYLOR LANE
CONSTRUCTION PLANS
MARYSVILLE, WA

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION
●	SET 1/2" X 24" REBAR W/CAP "PCS 37536"
○	EXISTING CORNER MONUMENT AS NOTED
	QUARTER SECTION TIE
	SECTION TIE
	BLOW-OFF VALVE
	CATCH BASIN
	FIRE HYDRANT
	GAS VALVE
	GUY ANCHOR
	LIGHT STANDARD
	MAILBOX
	SANITARY SEWER MANHOLE
	SIGN POST
	STORM DRAIN MANHOLE
	UTILITY/ POLE
	WATER METER
	WATER VALVE
	WETLAND FLAG
	CONIFEROUS TREE
	DECIDUOUS TREE

ABBREVIATIONS	
CPP	CORRUGATED PLASTIC PIPE
IE	INVERT ELEVATION
INV	INVERT ELEVATION
OHP	OVERHEAD POWER LINE
TPM	TELEPHONE PAINT MARK
B	BIRCH
C	CEDAR
F	FIR
M	MAPLE
S	SPRUCE
W	WILLOW

PROPOSED STORM SYMBOLS

SYMBOL	DESCRIPTION
	SD CAP
	TYPE 1 CATCH BASIN, GRATED LID
	TYPE 1 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN, GRATED LID
	TYPE 2 CATCH BASIN, SOLID LID
	BEEHIVE MANHOLE COVER
	SQUARE YARD DRAIN
	ROUND YARD DRAIN
	STORM CLEAN OUT
	STORM PIPE

PROPOSED SEWER SYMBOLS

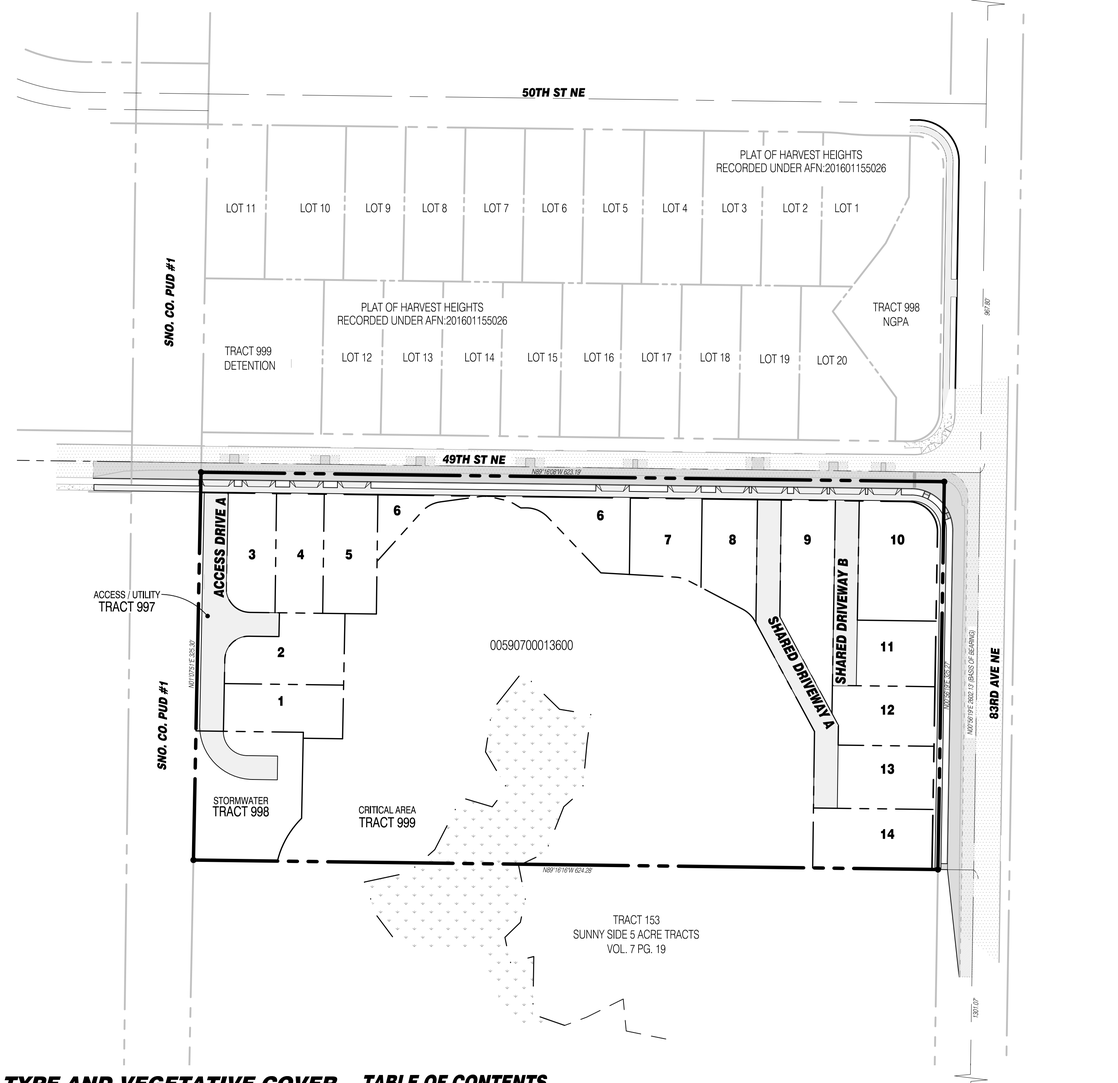
SYMBOL	DESCRIPTION
	SEWER CAP
	SEWER CLEANOUT
	SEWER MANHOLE
	SEWER PIPE

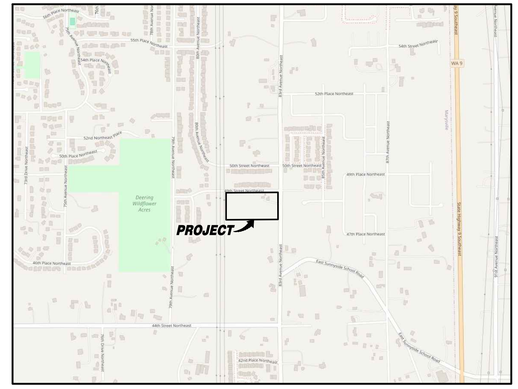
PROPOSED WATER SYMBOLS

SYMBOL	DESCRIPTION
	WATER CAP
	CONCRETE BLOCKING
	11.25° BEND
	22.5° BEND
	45° BEND
	90° BEND
	VALVE
	HYDRANT ASSEMBLY
	BLOW-OFF VALVE
	REDUCER
	AIR-VAC ASSEMBLY
	WATER METER
	WATER PIPE

PROPOSED SURVEY SYMBOLS

SYMBOL	DESCRIPTION
	SURVEY MONUMENT IN PROPOSED ROAD





VICINITY MAP
SCALE: 1"=2000'

CONTACT LIST

DEVELOPER:
KEYSTONE LAND, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373
EMAIL: joe@cornerstonehomes.com

CIVIL ENGINEER:
SOLID GROUND ENGINEERING
8105 166TH AVE NE
REDMOND, WA 98052
CONTACT: TOM ABBOTT, PE
PHONE: (425) 281-8324
EMAIL: tabbott@solidgroundpnw.com

GEOTECHNICAL ENGINEER:
EARTH SOLUTIONS NW
15365 NE 90TH ST #100
REDMOND, WA 98052
CONTACT: HENRY WRIGHT, PE
PHONE: (425) 449-4704
EMAIL: Henryw@esnw.com

LANDSCAPE ARCHITECT:
PAUL JAY LANDSCAPE ARCHITECT
1115 BRIDGE ROAD
EASTHAM, MA 02642
CONTACT: PAUL JAY
PHONE: (425) 210-1986
EMAIL: Pauljayla@gmail.com

SURVEYOR:
PACIFIC COAST SURVEYS, INC.
P.O. BOX 13619
MILL CREEK, WASHINGTON 98082
CONTACT: DARREN RIDDLE, PLS
PHONE: (425) 512-7099
FAX: (425) 357-3577
EMAIL: darren@pcsurveys.net

WETLAND BIOLOGIST:
WETLAND RESOURCES
9505 19TH AVE SE, STE 106
EVERETT, WASHINGTON 98208
CONTACT: JOHN LAUFENBURG
PHONE: (425) 337-3174
FAX: (425) 337-3045
EMAIL: john@wetlandresources.com

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	161,009 SF (3.70 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

TABLE OF CONTENTS

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6	HORIZONTAL CONTROL PLAN	22	WATER NOTES AND DETAILS
7	GRADING PLAN	MB-01	MAILBOX PLAN
8-9	INTERSECTION DETAILS		
10	ROAD AND STORM DRAINAGE PLAN		
11-12	ROAD AND STORM PROFILES		
13	STORM DETENTION VAULT PLAN		
14	STORM DETENTION VAULT DETAILS		
15	CHANNELIZATION PLAN		
16	SIGHT DISTANCE AND PROFILE		
17	NOTES AND DETAILS		

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA, ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

811 SAFETY IS IN YOUR HANDS.
EVERY DIG. EVERY TIME.

SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 0°05'19" EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67' = NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

THOMAS P. ABBOTT — STATE OF WASHINGTON — 56921 — REGISTERED PROFESSIONAL ENGINEER

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

COVER SHEET

KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

CS-01
1 OF 23

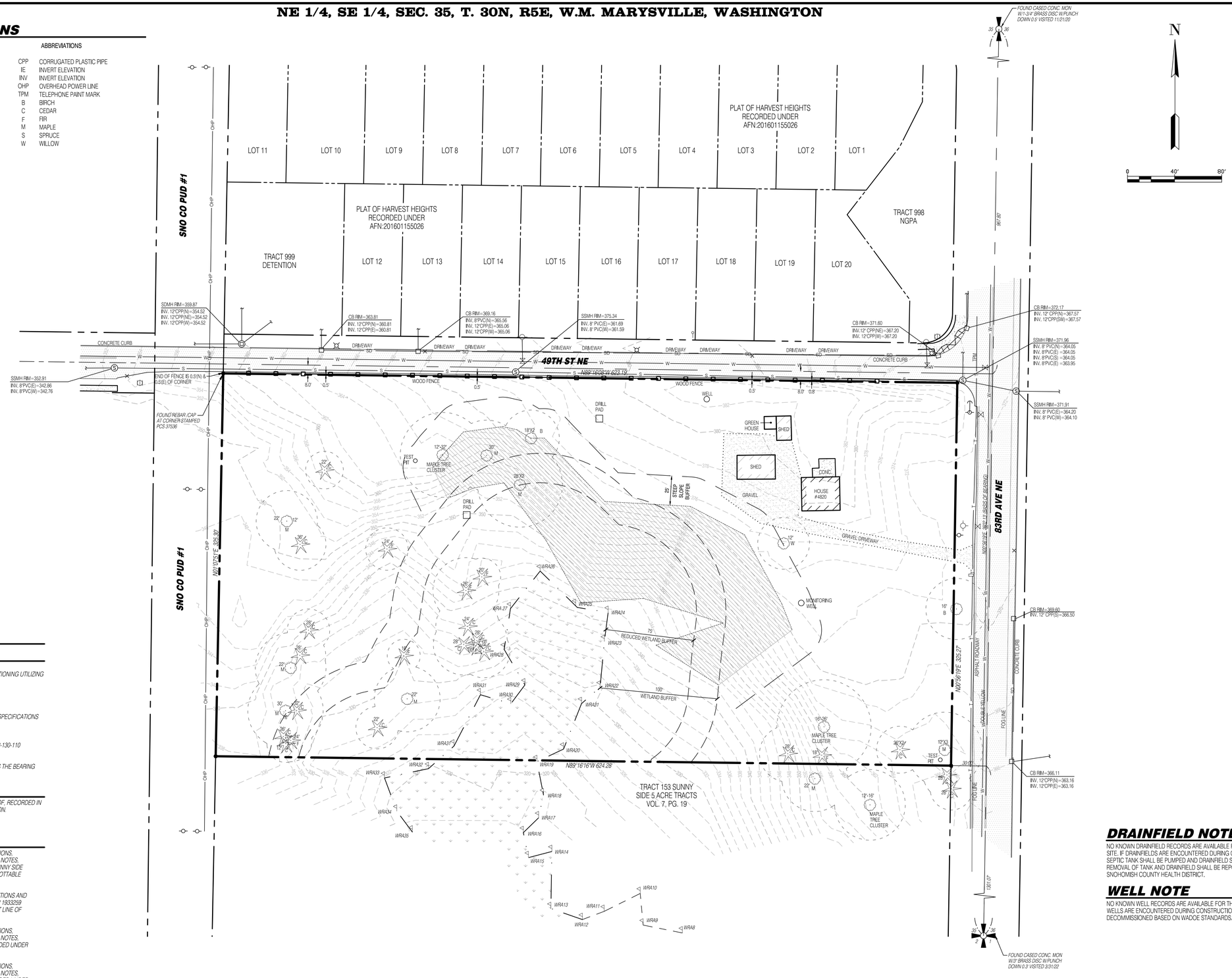
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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION
●	SET 1/2" X 24" REBAR W/CAP "PCS 37536"
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	QUARTER SECTION TIE
	SECTION TIE
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	CATCH BASIN
	FIRE HYDRANT
	GAS VALVE
	GUY ANCHOR
	LIGHT STANDARD
	MAILBOX
	SANITARY SEWER MANHOLE
	SIGN POST
	STORM DRAIN MANHOLE
	UTILITY/ POLE
	WATER METER
	WATER VALVE
	WETLAND FLAG
	CONIFEROUS TREE
	DECIDUOUS TREE

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W	WILLOW



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LEICA VIVA GNSS GS08 RECEIVER
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MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 005619' EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

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1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67'= NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

DRAINFIELD NOTE

NO KNOWN DRAINFIELD RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF DRAINFIELDS ARE ENCOUNTERED DURING CONSTRUCTION, SEPTIC TANK SHALL BE PUMPED AND DRAINFIELD SHALL BE REMOVED. REMOVAL OF TANK AND DRAINFIELD SHALL BE REPORTED TO SNOHOMISH COUNTY HEALTH DISTRICT.

WELL NOTE

NO KNOWN WELL RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF WELLS ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE DECOMMISSIONED BASED ON WADOE STANDARDS.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER

ENGINEER'S STAMP

REVISIONS

#	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

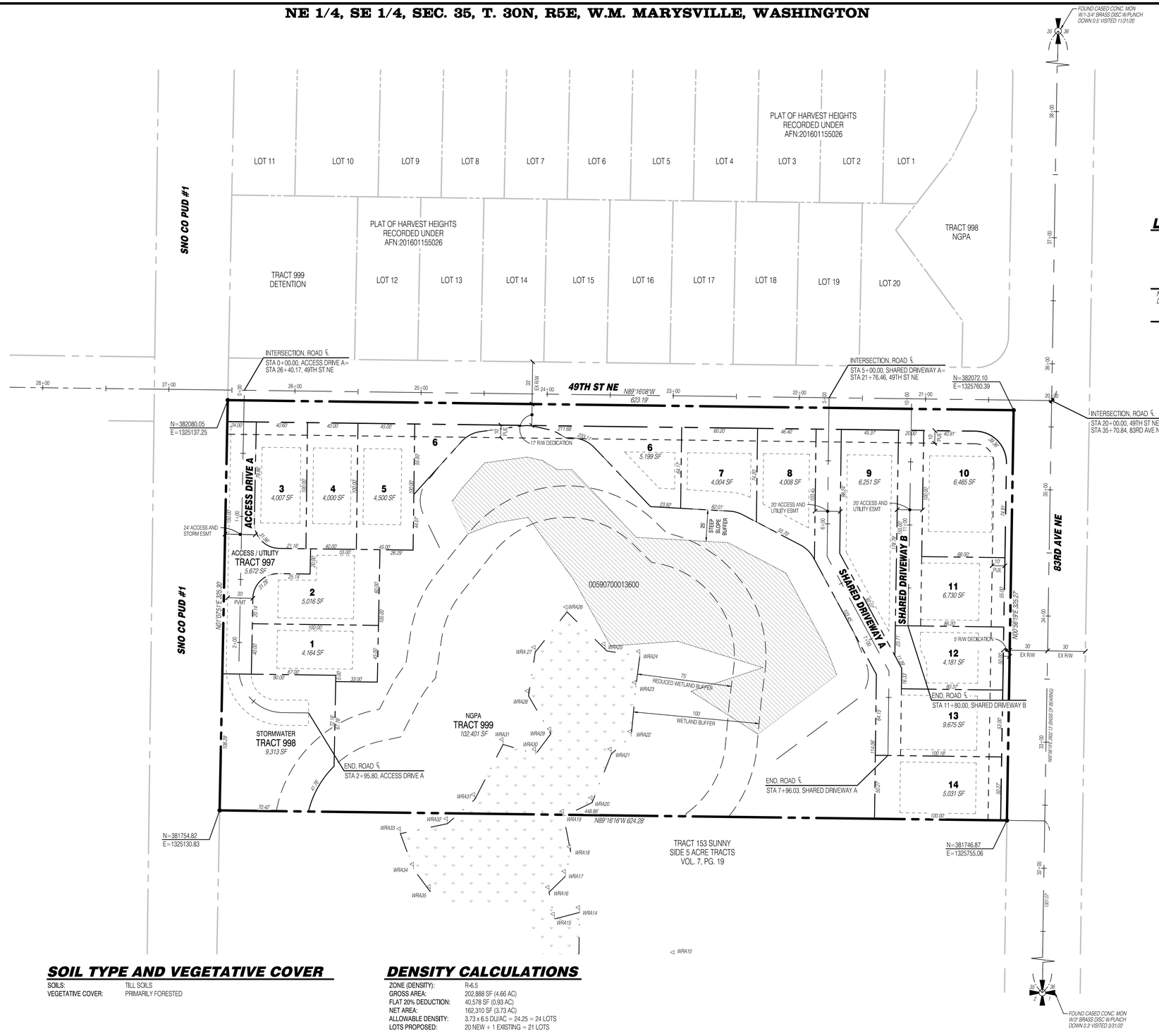
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

TO-01
2 OF 23

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

- MONUMENT IN CASE
- BSBL

SURVEY MONUMENT TABLE

NOTE: INSTALL SURVEY MONUMENTS PER EDDS 3-507-001 ON SHEET DT-02

STATIONING	ROAD/INTERSECTION

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	21 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	20 NEW + 1 EXISTING = 21 LOTS

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

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8105 166th Ave NE
Redmond, WA 98052

HORIZONTAL CONTROL PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

HC-01

6 OF 23

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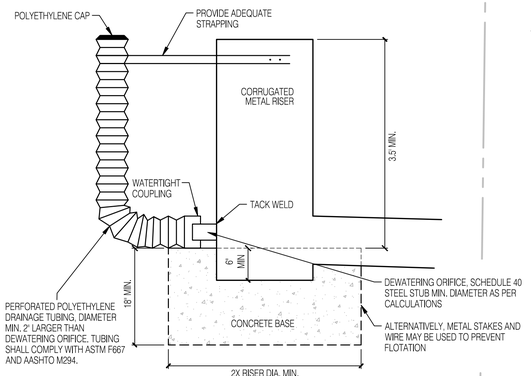
Appendix 2: Temporary Erosion and Sediment Control Design

1. TESC Plans

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

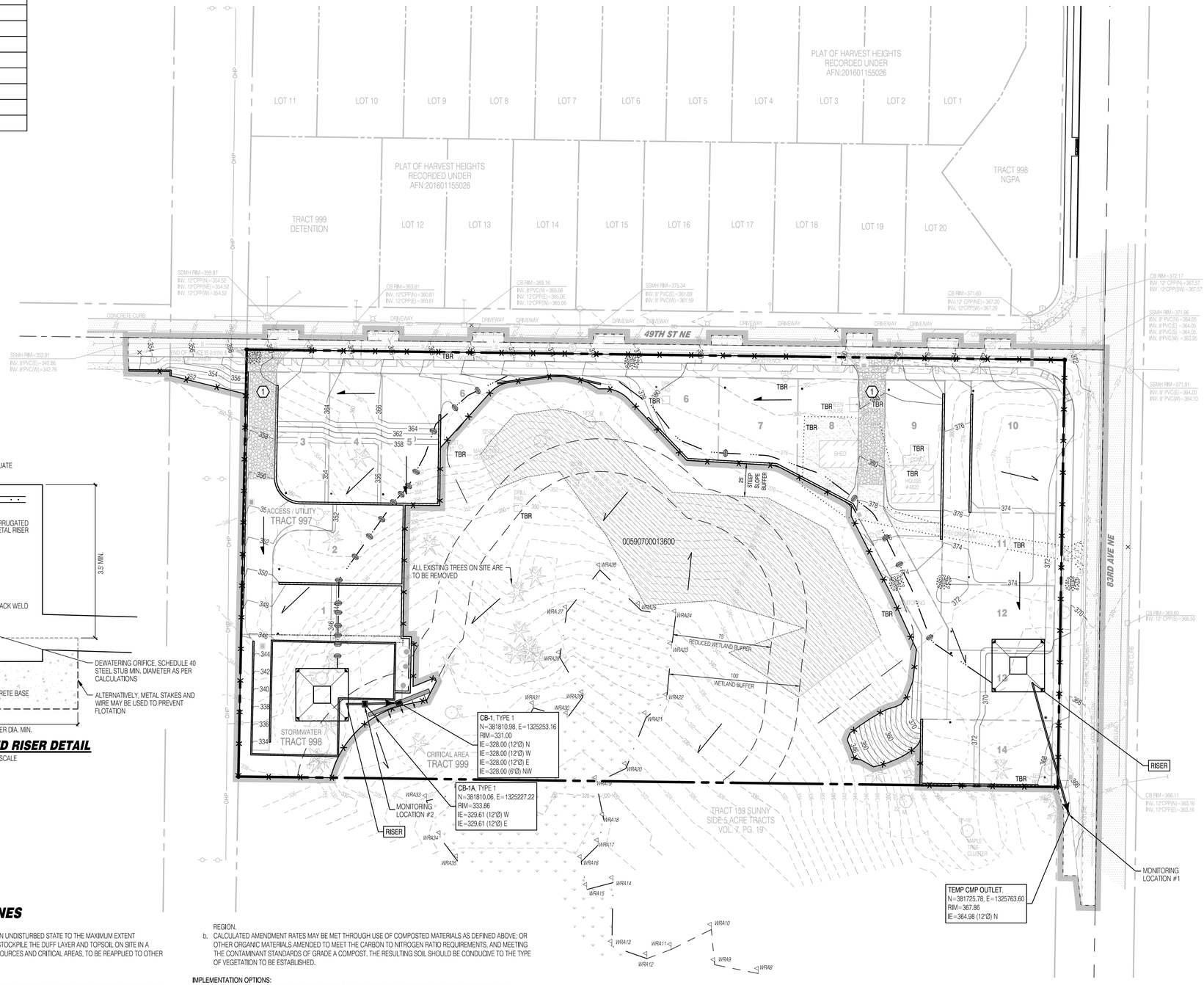
TEMP SEDIMENT POND WEST	
BOTTOM ELEVATION	330.5
BOTTOM AREA (SF)	169
TOP OF RISER ELEVATION	334.5
TOP AREA (SF)	1600
SIDE SLOPES	3H:1V
SPILLWAY ELEVATION	335.00
OUTLET INVERT ELEVATION	331.00
ORIFICE INVERT ELEV.	331.00
ORIFICE SIZE	2"

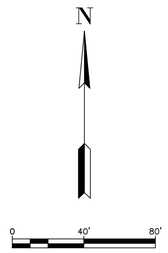
2 YEAR DEVELOPED STORM PRIOR TO DETENTION= 1.0061 CFS



SEDIMENT POND RISER DETAIL

NOT TO SCALE





LEGEND AND ABBREVIATIONS

- CLEARING LIMITS
- SILT FENCE
- TREE PROTECTION FENCE
- CONVEYANCE SWALE
- PUMP LINE
- TBR — TO BE REMOVED
- ① — ROCK CONSTRUCTION ENTRANCE
- CATCH BASIN PROTECTION
- RIP RAP PAD
- PRE DEVELOPMENT DRAINAGE PATTERN
- POST DEVELOPMENT DRAINAGE PATTERN
- INSTALL CHECK DAM EVERY 100' OR 2' OF ELEVATION CHANGE

CONSTRUCTION SEQUENCE

1. PRIOR TO ANY CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRE-CONSTRUCTION CONFERENCE WITH THE CITY STAFF. CESCL SHALL ATTEND CONFERENCE.
2. INSTALL ROCK CONSTRUCTION ENTRANCE(S).
3. STOCKPILE ALL EROSION MATERIALS ON SITE.
4. FLAG CLEARING LIMITS.
5. ARRANGE FOR CITY INSPECTOR TO INSPECT AND APPROVE CLEARING LIMITS FLAGGING PRIOR TO CLEARING.
6. INSTALL FILTER FABRIC FENCE AND CONSTRUCTION FENCE AS SHOWN.
7. CONSTRUCT TEMPORARY SEDIMENT PONDS AND OUTFALLS.
8. BEGIN CLEARING AND GRADING. CONSTRUCT INTERCEPTOR DITCHES AND TEMPORARY CULVERTS AND RELOCATE AS NECESSARY DURING CONSTRUCTION.
9. INSTALL FINAL PAVING, CURBING AND SIDEWALK.
10. CLEAN OUT STORM DRAINAGE SYSTEM. DO NO INSTALL WATER QUALITY MEDIA FILTRATION CARTRIDGES UNTIL AFTER SITE IS STABILIZED AND CONSTRUCTION HAS CEASED.

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	127,075 SF (2.92 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

TEMP SEDIMENT POND EAST	
BOTTOM ELEVATION	365.00
BOTTOM AREA (SF)	169
TOP OF RISER ELEVATION	369.00
TOP AREA (SF)	1600.00
SIDE SLOPES	3H:1V
SPILLWAY ELEVATION	369.50
OUTLET INVERT ELEVATION	369.50
ORIFICE INVERT ELEV.	365.50
ORIFICE SIZE	2"

2 YEAR DEVELOPED STORM PRIOR TO DETENTION= 1.0061 CFS

MINIMUM SURFACE AREA AT PONDING= 1048 SF

BMP T5.13 DESIGN GUIDELINES

SOIL RETENTION:
THE DUFF LAYER AND NATIVE TOPSOIL SHOULD BE RETAINED IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. IN ANY AREAS REQUIRING GRADING REMOVE AND STOCKPILE THE DUFF LAYER AND TOPSOIL ON SITE IN A DESIGNATED, CONTROLLED AREA, NOT ADJACENT TO PUBLIC RESOURCES AND CRITICAL AREAS, TO BE REAPPLIED TO OTHER PORTIONS OF THE SITE WHERE FEASIBLE.

SOIL QUALITY:
ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE THE FOLLOWING:

1. A TOPSOIL LAYER WITH A MINIMUM ORGANIC MATTER CONTENT OF TEN PERCENT DRY WEIGHT IN PLANTING BEDS, AND 5% ORGANIC MATTER CONTENT IN TURF AREAS, AND A PH FROM 6.0 TO 8.0 OR MATCHING THE PH OF THE ORIGINAL UNDISTURBED SOIL. THE TOPSOIL LAYER SHALL HAVE A MINIMUM DEPTH OF EIGHT INCHES EXCEPT WHERE TREE ROOTS LIMIT THE DEPTH OF INCORPORATION OF AMENDMENTS NEEDED TO MEET THE CRITERIA. SUBSOILS BELOW THE TOPSOIL LAYER SHOULD BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
2. PLANTING BEDS MUST BE MULCHED WITH 2 INCHES OF ORGANIC MATERIAL
3. QUALITY OF COMPOST AND OTHER MATERIALS USED TO MEET THE ORGANIC CONTENT REQUIREMENTS:
   a. THE ORGANIC CONTENT FOR 'PRE-APPROVED' AMENDMENT RATES CAN BE MET ONLY USING COMPOST THAT MEETS THE DEFINITION OF 'COMPOSTED MATERIALS' IN WAC 173-350-220. THIS CODE IS AVAILABLE ONLINE AT: HTTP://WWW.ECY.WA.GOV/PROGRAMS/SWFA/FACILITIES/350.HTML THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 35% TO 65%, AND A CARBON TO NITROGEN RATIO BELOW 25:1. THE CARBON TO NITROGEN RATIO MAY BE AS HIGH AS 35:1 FOR PLANTINGS COMPOSED ENTIRELY OF PLANTS NATIVE TO THE PUGET SOUND LOWLANDS REGION.
   b. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS AS DEFINED ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATIO REQUIREMENTS, AND MEETING THE CONTAMINANT STANDARDS OF GRADE A COMPOST. THE RESULTING SOIL SHOULD BE CONDUCIVE TO THE TYPE OF VEGETATION TO BE ESTABLISHED.

IMPLEMENTATION OPTIONS:
THE SOIL QUALITY DESIGN GUIDELINES LISTED ABOVE CAN BE MET BY USING ONE OF THE METHODS LISTED BELOW:

1. LEAVE UNDISTURBED NATIVE VEGETATION AND SOIL, AND PROTECT FROM COMPACTION DURING CONSTRUCTION.
2. AMEND EXISTING SITE TOPSOIL OR SUBSOIL EITHER AT DEFAULT 'PREAPPROVED' RATES, OR AT CUSTOM CALCULATED RATES BASED ON SPECIFICS TESTS OF THE SOIL AND AMENDMENT.
3. STOCKPILE EXISTING TOPSOIL DURING GRADING, AND REPLACE IT PRIOR TO PLANTING. STOCKPILED TOPSOIL MUST ALSO BE AMENDED IF NEEDED TO MEET THE ORGANIC MATTER OR DEPTH REQUIREMENTS, EITHER AT A DEFAULT 'PRE-APPROVED' RATE OR AT A CUSTOM CALCULATED RATE.
4. IMPORT TOPSOIL MIX OF SUFFICIENT ORGANIC CONTENT AND DEPTH TO MEET THE REQUIREMENTS. MORE THAN ONE METHOD MAY BE USED ON DIFFERENT PORTIONS OF THE SAME SITE. SOIL THAT ALREADY MEETS THE DEPTH AND ORGANIC MATTER QUALITY STANDARDS, AND IS NOT COMPACTED, DOES NOT NEED TO BE AMENDED.

MAINTENANCE:

- SOIL QUALITY AND DEPTH SHOULD BE ESTABLISHED TOWARD THE END OF CONSTRUCTION AND ONCE ESTABLISHED, SHOULD BE PROTECTED FROM COMPACTION, SUCH AS FROM LARGE MACHINERY USE, AND FROM EROSION.
- SOIL SHOULD BE PLANTED AND MULCHED AFTER INSTALLATION.
- PLANT DEBRIS OR ITS EQUIVALENT SHOULD BE LEFT ON THE SOIL SURFACE TO REPLENISH ORGANIC MATTER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

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ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

TESC PLAN

KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

ER-01
3 OF 23

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Appendix 3: Downstream Analysis

1. Downstream Analysis Map
2. Downstream Analysis Site Visit Pictures
3. USDA Soils Map & Description

Downstream Analysis Photographs



Image 1: 49th St NE frontage, does not contribute upstream run-on



Image 2: 49th St NE and 83rd Ave NE intersection property corner



Image 3: 83rd Ave NE frontage, contributes some upstream run-on due to lack of existing swale/ditch



Image 4: North side of 44th St NE, prior to King Creek crossing



Image 5: South side of 44th St NE, King Creek continues beyond quarter mile boundary



Map Scale: 1:1,060 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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: Snohomish County Area, Washington
Survey Area Data: Version 25, Aug 29, 2023

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

Date(s) aerial images were photographed: Aug 14, 2022—Sep 1, 2022

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
72	Tokul gravelly medial loam, 0 to 8 percent slopes	5.0	100.0%
Totals for Area of Interest		**5.0**	**100.0%**

Appendix 4: Detention and Water Quality Design Analysis

1. Predeveloped Hydrology Map
2. Developed Hydrology Map
3. Perkfilter Detail
4. WWHM2012 Output – Detention Pond



Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

CORNERSTONE HOMES

TAYLOR LANE

PREDEVELOPED HYDROLOGY MAP

JOB NUMBER:	23-0009	DATE:	7-24-24
JURISDICTION:	Marysville	DRAWN BY:	CMP

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Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

CORNERSTONE HOMES

TAYLOR LANE

DEVELOPED HYDROLOGY MAP

JOB NUMBER:	23-0009	DATE:	7-24-24
JURISDICTION:	Marysville	DRAWN BY:	CMP

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WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 23-0009 Taylor Lane
Site Name:
Site Address:
City:

Report Date:	8/19/2024
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.200
Version Date:	2024/06/28
Version:	4.3.1

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

Onsite Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	2.02
Pervious Total	2.02
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.02

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Upstream Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.04
Impervious Total	0.04
Basin Total	0.04

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Frontage Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.49
Pervious Total	0.49
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.49

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:

Mitigated Land Use

Onsite Basin

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.63
Pervious Total	0.63

Impervious Land Use	acre
ROADS FLAT	0.16
ROOF TOPS FLAT	0.81
DRIVEWAYS FLAT	0.28
POND	0.14
Impervious Total	1.39
Basin Total	2.02

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Vault 1	Vault 1

Frontage Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.16
SIDEWALKS STEEP	0.25
Impervious Total	0.41
Basin Total	0.41

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Vault 1	Vault 1

Upstream Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.04
Impervious Total	0.04
Basin Total	0.04

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Vault 1	Vault 1

Frontage Bypass

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.06
SIDEWALKS FLAT	0.02
Impervious Total	0.08
Basin Total	0.08

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Routing

Vault 1

Width: 79.4418 ft.
Length: 79.4418 ft.
Depth: 10 ft.
Discharge Structure
Riser Height: 7.5 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 0.938 in. Elevation:0 ft.
Orifice 2 Diameter: 1.219 in. Elevation:3.5 ft.
Orifice 3 Diameter: 1.438 in. Elevation:4.7 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

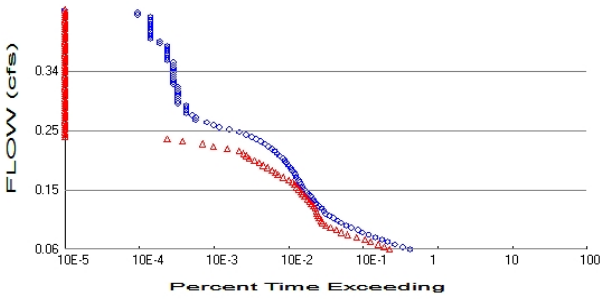
Vault Hydraulic Table

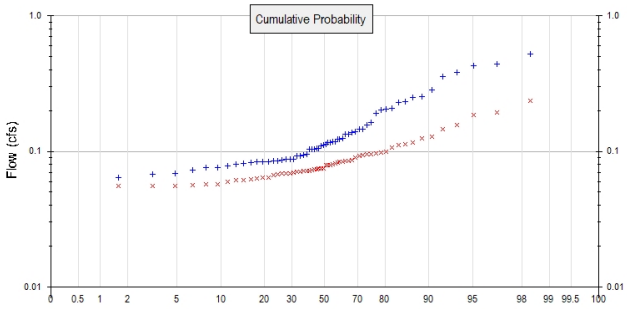
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.144	0.000	0.000	0.000
0.1111	0.144	0.016	0.008	0.000
0.2222	0.144	0.032	0.011	0.000
0.3333	0.144	0.048	0.013	0.000
0.4444	0.144	0.064	0.015	0.000
0.5556	0.144	0.080	0.017	0.000
0.6667	0.144	0.096	0.019	0.000
0.7778	0.144	0.112	0.021	0.000
0.8889	0.144	0.128	0.022	0.000
1.0000	0.144	0.144	0.023	0.000
1.1111	0.144	0.161	0.025	0.000
1.2222	0.144	0.177	0.026	0.000
1.3333	0.144	0.193	0.027	0.000
1.4444	0.144	0.209	0.028	0.000
1.5556	0.144	0.225	0.029	0.000
1.6667	0.144	0.241	0.030	0.000
1.7778	0.144	0.257	0.031	0.000
1.8889	0.144	0.273	0.032	0.000
2.0000	0.144	0.289	0.033	0.000
2.1111	0.144	0.305	0.034	0.000
2.2222	0.144	0.322	0.035	0.000
2.3333	0.144	0.338	0.036	0.000
2.4444	0.144	0.354	0.037	0.000
2.5556	0.144	0.370	0.038	0.000
2.6667	0.144	0.386	0.038	0.000
2.7778	0.144	0.402	0.039	0.000
2.8889	0.144	0.418	0.040	0.000
3.0000	0.144	0.434	0.041	0.000
3.1111	0.144	0.450	0.042	0.000
3.2222	0.144	0.466	0.042	0.000
3.3333	0.144	0.482	0.043	0.000
3.4444	0.144	0.499	0.044	0.000
3.5556	0.144	0.515	0.054	0.000
3.6667	0.144	0.531	0.062	0.000
3.7778	0.144	0.547	0.067	0.000
3.8889	0.144	0.563	0.072	0.000
4.0000	0.144	0.579	0.076	0.000

4.1111	0.144	0.595	0.079	0.000
4.2222	0.144	0.611	0.083	0.000
4.3333	0.144	0.627	0.086	0.000
4.4444	0.144	0.643	0.089	0.000
4.5556	0.144	0.660	0.092	0.000
4.6667	0.144	0.676	0.095	0.000
4.7778	0.144	0.692	0.113	0.000
4.8889	0.144	0.708	0.124	0.000
5.0000	0.144	0.724	0.133	0.000
5.1111	0.144	0.740	0.141	0.000
5.2222	0.144	0.756	0.147	0.000
5.3333	0.144	0.772	0.154	0.000
5.4444	0.144	0.788	0.160	0.000
5.5556	0.144	0.804	0.165	0.000
5.6667	0.144	0.821	0.171	0.000
5.7778	0.144	0.837	0.176	0.000
5.8889	0.144	0.853	0.181	0.000
6.0000	0.144	0.869	0.186	0.000
6.1111	0.144	0.885	0.190	0.000
6.2222	0.144	0.901	0.195	0.000
6.3333	0.144	0.917	0.199	0.000
6.4444	0.144	0.933	0.203	0.000
6.5556	0.144	0.949	0.207	0.000
6.6667	0.144	0.965	0.211	0.000
6.7778	0.144	0.982	0.215	0.000
6.8889	0.144	0.998	0.219	0.000
7.0000	0.144	1.014	0.223	0.000
7.1111	0.144	1.030	0.227	0.000
7.2222	0.144	1.046	0.230	0.000
7.3333	0.144	1.062	0.234	0.000
7.4444	0.144	1.078	0.238	0.000
7.5556	0.144	1.094	0.380	0.000
7.6667	0.144	1.110	0.948	0.000
7.7778	0.144	1.126	1.631	0.000
7.8889	0.144	1.142	2.172	0.000
8.0000	0.144	1.159	2.458	0.000
8.1111	0.144	1.175	2.720	0.000
8.2222	0.144	1.191	2.937	0.000
8.3333	0.144	1.207	3.139	0.000
8.4444	0.144	1.223	3.328	0.000
8.5556	0.144	1.239	3.506	0.000
8.6667	0.144	1.255	3.675	0.000
8.7778	0.144	1.271	3.836	0.000
8.8889	0.144	1.287	3.991	0.000
9.0000	0.144	1.303	4.139	0.000
9.1111	0.144	1.320	4.283	0.000
9.2222	0.144	1.336	4.421	0.000
9.3333	0.144	1.352	4.555	0.000
9.4444	0.144	1.368	4.685	0.000
9.5556	0.144	1.384	4.812	0.000
9.6667	0.144	1.400	4.935	0.000
9.7778	0.144	1.416	5.055	0.000
9.8889	0.144	1.432	5.172	0.000
10.000	0.144	1.448	5.287	0.000
10.111	0.144	1.464	5.399	0.000
10.222	0.000	0.000	5.509	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.02
Total Impervious Area: 0.04

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.63
Total Impervious Area: 1.92

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.119528
5 year	0.192693
10 year	0.253894
25 year	0.347752
50 year	0.431011
100 year	0.526887

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.079405
5 year	0.106181
10 year	0.126383
25 year	0.154873
50 year	0.178358
100 year	0.203881

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.137	0.073
1950	0.156	0.081
1951	0.104	0.070
1952	0.105	0.070
1953	0.104	0.074
1954	0.426	0.094
1955	0.147	0.098
1956	0.118	0.096
1957	0.163	0.081
1958	0.438	0.128

1959	0.105	0.069
1960	0.123	0.071
1961	0.519	0.157
1962	0.124	0.071
1963	0.203	0.083
1964	0.133	0.054
1965	0.081	0.056
1966	0.064	0.056
1967	0.118	0.117
1968	0.145	0.080
1969	0.381	0.125
1970	0.076	0.064
1971	0.141	0.096
1972	0.104	0.099
1973	0.084	0.074
1974	0.228	0.091
1975	0.117	0.072
1976	0.084	0.069
1977	0.076	0.064
1978	0.086	0.062
1979	0.234	0.093
1980	0.113	0.063
1981	0.083	0.057
1982	0.109	0.084
1983	0.191	0.074
1984	0.094	0.107
1985	0.134	0.085
1986	0.286	0.194
1987	0.124	0.146
1988	0.085	0.083
1989	0.112	0.068
1990	0.085	0.075
1991	0.096	0.062
1992	0.093	0.067
1993	0.082	0.056
1994	0.068	0.069
1995	0.092	0.087
1996	0.207	0.080
1997	0.355	0.235
1998	0.088	0.080
1999	0.079	0.056
2000	0.073	0.114
2001	0.035	0.057
2002	0.088	0.071
2003	0.069	0.061
2004	0.116	0.111
2005	0.087	0.059
2006	0.250	0.096
2007	0.206	0.084
2008	0.255	0.185
2009	0.082	0.074

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.5190	0.2348
2	0.4383	0.1943
3	0.4258	0.1854

4	0.3813	0.1573
5	0.3547	0.1464
6	0.2855	0.1281
7	0.2549	0.1251
8	0.2498	0.1169
9	0.2338	0.1137
10	0.2284	0.1112
11	0.2072	0.1070
12	0.2063	0.0993
13	0.2031	0.0977
14	0.1908	0.0965
15	0.1625	0.0958
16	0.1556	0.0956
17	0.1468	0.0935
18	0.1454	0.0932
19	0.1406	0.0906
20	0.1375	0.0866
21	0.1342	0.0849
22	0.1331	0.0844
23	0.1241	0.0836
24	0.1236	0.0833
25	0.1227	0.0827
26	0.1183	0.0813
27	0.1175	0.0807
28	0.1165	0.0797
29	0.1161	0.0796
30	0.1126	0.0796
31	0.1117	0.0748
32	0.1094	0.0744
33	0.1050	0.0743
34	0.1046	0.0742
35	0.1042	0.0741
36	0.1038	0.0725
37	0.1037	0.0718
38	0.0956	0.0714
39	0.0938	0.0714
40	0.0925	0.0709
41	0.0923	0.0703
42	0.0880	0.0698
43	0.0876	0.0689
44	0.0869	0.0687
45	0.0856	0.0686
46	0.0847	0.0681
47	0.0846	0.0665
48	0.0843	0.0644
49	0.0835	0.0639
50	0.0832	0.0627
51	0.0821	0.0625
52	0.0818	0.0617
53	0.0807	0.0611
54	0.0785	0.0592
55	0.0762	0.0573
56	0.0758	0.0571
57	0.0726	0.0562
58	0.0685	0.0558
59	0.0679	0.0556
60	0.0641	0.0556
61	0.0347	0.0536

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0598	9067	4763	52	Pass
0.0635	7202	4066	56	Pass
0.0673	5694	3403	59	Pass
0.0710	4528	2676	59	Pass
0.0748	3824	2244	58	Pass
0.0785	3076	1734	56	Pass
0.0823	2517	1317	52	Pass
0.0860	2076	1083	52	Pass
0.0898	1802	935	51	Pass
0.0935	1488	776	52	Pass
0.0973	1262	665	52	Pass
0.1010	1083	612	56	Pass
0.1048	963	583	60	Pass
0.1085	851	551	64	Pass
0.1123	753	533	70	Pass
0.1160	672	515	76	Pass
0.1198	633	503	79	Pass
0.1235	588	484	82	Pass
0.1273	537	459	85	Pass
0.1310	498	431	86	Pass
0.1348	474	409	86	Pass
0.1385	452	381	84	Pass
0.1423	426	349	81	Pass
0.1460	396	327	82	Pass
0.1498	374	313	83	Pass
0.1535	345	291	84	Pass
0.1573	326	276	84	Pass
0.1610	310	256	82	Pass
0.1648	297	239	80	Pass
0.1685	287	214	74	Pass
0.1723	272	181	66	Pass
0.1760	260	154	59	Pass
0.1798	255	141	55	Pass
0.1835	238	128	53	Pass
0.1873	226	111	49	Pass
0.1910	214	98	45	Pass
0.1948	200	86	43	Pass
0.1985	189	74	39	Pass
0.2023	178	63	35	Pass
0.2060	161	58	36	Pass
0.2098	149	53	35	Pass
0.2135	138	46	33	Pass
0.2173	127	32	25	Pass
0.2210	114	21	18	Pass
0.2248	102	15	14	Pass
0.2285	89	8	8	Pass
0.2323	79	5	6	Pass
0.2360	68	0	0	Pass
0.2398	57	0	0	Pass
0.2435	47	0	0	Pass
0.2473	34	0	0	Pass
0.2510	25	0	0	Pass
0.2548	21	0	0	Pass

0.2585	17	0	0	Pass
0.2623	12	0	0	Pass
0.2660	12	0	0	Pass
0.2698	11	0	0	Pass
0.2735	9	0	0	Pass
0.2773	9	0	0	Pass
0.2810	9	0	0	Pass
0.2848	9	0	0	Pass
0.2885	7	0	0	Pass
0.2923	7	0	0	Pass
0.2960	7	0	0	Pass
0.2998	7	0	0	Pass
0.3035	7	0	0	Pass
0.3073	7	0	0	Pass
0.3110	7	0	0	Pass
0.3148	7	0	0	Pass
0.3185	6	0	0	Pass
0.3223	6	0	0	Pass
0.3260	6	0	0	Pass
0.3298	6	0	0	Pass
0.3335	6	0	0	Pass
0.3373	6	0	0	Pass
0.3410	6	0	0	Pass
0.3448	6	0	0	Pass
0.3485	6	0	0	Pass
0.3523	6	0	0	Pass
0.3560	5	0	0	Pass
0.3598	5	0	0	Pass
0.3635	5	0	0	Pass
0.3673	5	0	0	Pass
0.3710	5	0	0	Pass
0.3748	5	0	0	Pass
0.3785	5	0	0	Pass
0.3823	4	0	0	Pass
0.3860	4	0	0	Pass
0.3898	3	0	0	Pass
0.3935	3	0	0	Pass
0.3973	3	0	0	Pass
0.4010	3	0	0	Pass
0.4048	3	0	0	Pass
0.4085	3	0	0	Pass
0.4123	3	0	0	Pass
0.4160	3	0	0	Pass
0.4198	3	0	0	Pass
0.4235	3	0	0	Pass
0.4273	2	0	0	Pass
0.4310	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

Model Default Modifications

Total of 0 changes have been made.

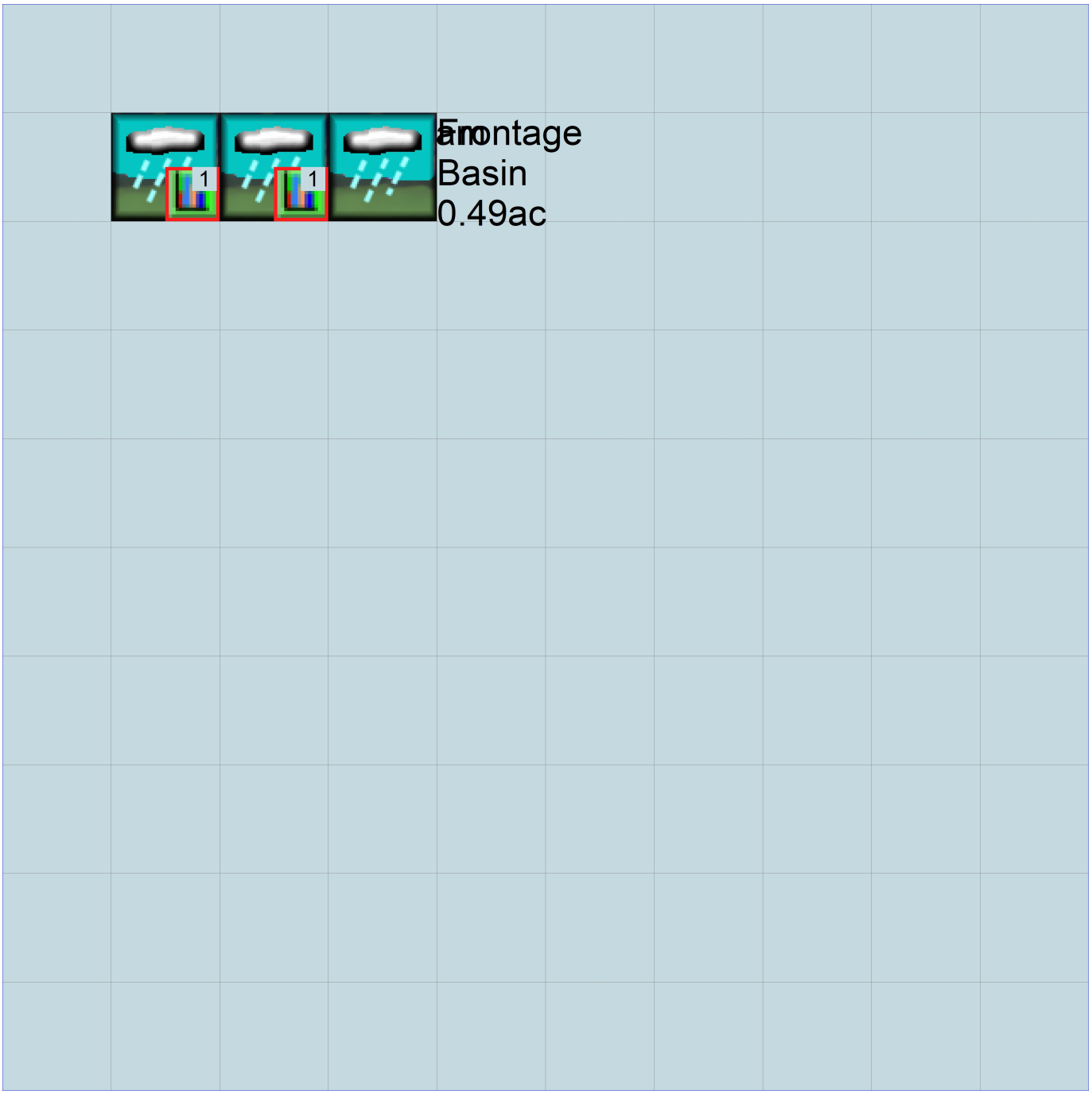
PERLND Changes

No PERLND changes have been made.

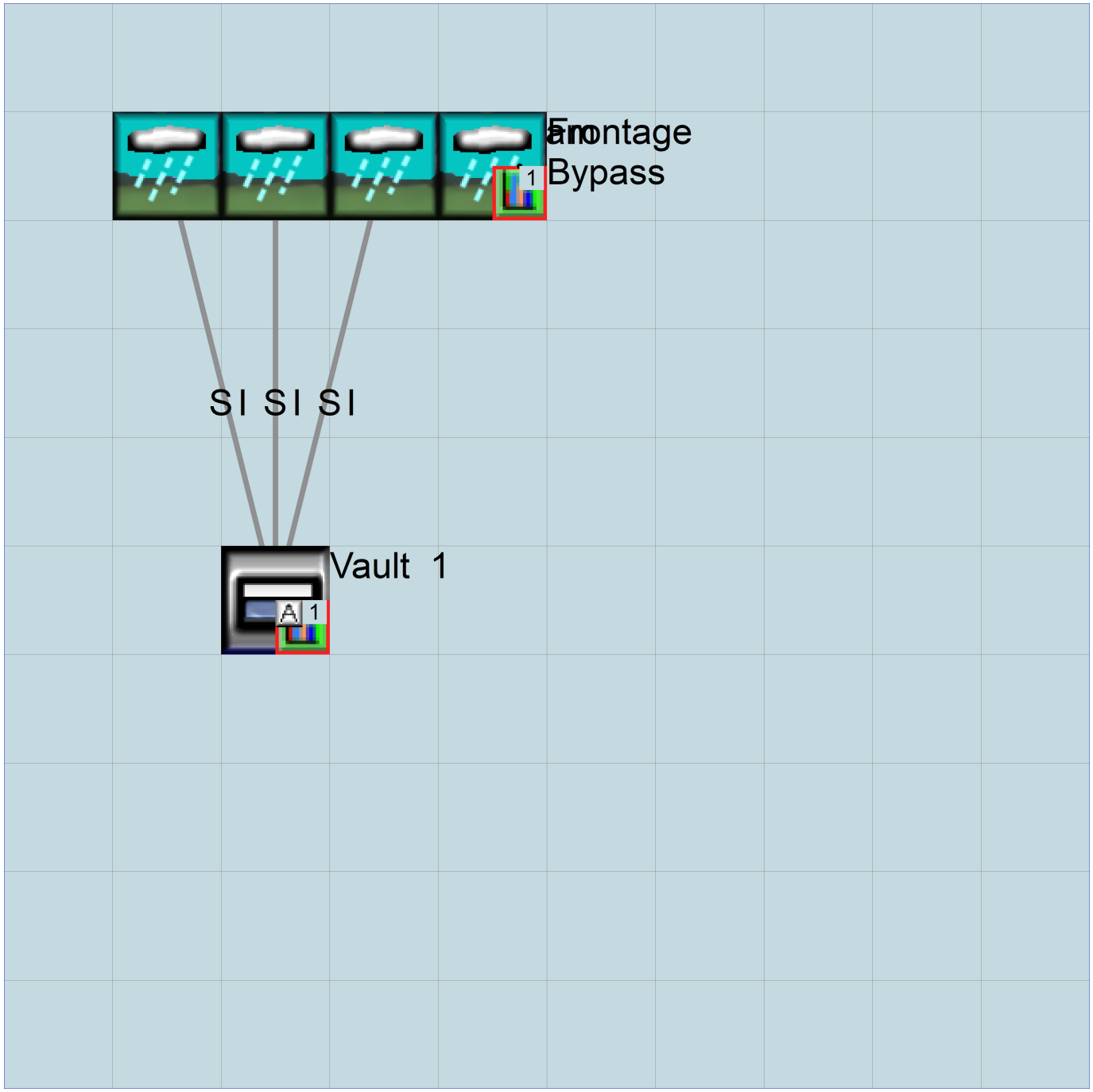
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 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   23-0009 Taylor Lane.wdm
MESSU       25   Pre23-0009 Taylor Lane.MES
            27   Pre23-0009 Taylor Lane.L61
            28   Pre23-0009 Taylor Lane.L62
            30   POC23-0009 Taylor Lane1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      IMPLND       1
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Onsite Basin               MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # 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           ***
   12     C, Forest, Steep        1    1    1    1   27    0
   10     C, 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 ***
   12         0    0    1    0    0    0    0    0    0    0    0    0
   10         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  *********
   12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   10         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 ***
   12         0    0    0    0    0    0    0    0    0    0    0
   10         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
   12              0       4.5      0.08       400      0.15       0.5     0.996
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   12              0         0         2         2         0         0         0
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   12            0.2       0.3      0.35         6       0.3       0.7
   10            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   12              0         0         0         0       2.5         1         0
   10              0         0         0         0       2.5         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
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         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    4    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
  END IWAT-PARM1

  IWAT-PARM2
```

```
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Onsite Basin***
PERLND  12                       2.02     COPY   501     12
PERLND  12                       2.02     COPY   501     13
Upstream Basin***
IMPLND   1                       0.04     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 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   23-0009 Taylor Lane.wdm
MESSU       25   Mit23-0009 Taylor Lane.MES
            27   Mit23-0009 Taylor Lane.L61
            28   Mit23-0009 Taylor Lane.L62
            30   POC23-0009 Taylor Lane1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      13
      IMPLND       1
      IMPLND       4
      IMPLND       5
      IMPLND      14
      IMPLND      10
      IMPLND       8
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Vault  1                    MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         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           ***
   13     C, Pasture, 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 ***
   13         0    0    1    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   13         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 ***
   13         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
   13              0       4.5      0.06       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13           0.15       0.4       0.3         6       0.5       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
   13              0         0         0         0       2.5         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
   14      POND                   1    1    1   27    0
   10      SIDEWALKS/STEEP        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
   14         0    0    1    0    0    0
   10         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    4    1    9
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
   10         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
   14         0    0    0    0    0
   10         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
   14            400      0.01       0.1       0.1
   10            400       0.1       0.1      0.05
    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
   14              0         0
   10              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
   14              0         0
   10              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                <--Area-->     <-Target->   MBLK   ***
<Name>   #                <-factor->     <Name>   #   Tbl#   ***
Onsite Basin***
PERLND  13                     0.63     RCHRES   1      2
PERLND  13                     0.63     RCHRES   1      3
IMPLND   1                     0.16     RCHRES   1      5
IMPLND   4                     0.81     RCHRES   1      5
IMPLND   5                     0.28     RCHRES   1      5
IMPLND  14                     0.14     RCHRES   1      5
Frontage Basin***
IMPLND   1                     0.16     RCHRES   1      5
IMPLND  10                     0.25     RCHRES   1      5
Upstream Basin***
IMPLND   1                     0.08     RCHRES   1      5
Frontage Bypass***
```

```
IMPLND   1                        0.07     COPY   501     15
IMPLND   1                        0.07     COPY   601     15
IMPLND   8                        0.02     COPY   501     15
IMPLND   8                        0.02     COPY   601     15

******Routing******
PERLND  13                        0.63     COPY     1     12
IMPLND   1                        0.16     COPY     1     15
IMPLND   4                        0.81     COPY     1     15
IMPLND   5                        0.28     COPY     1     15
IMPLND  14                        0.14     COPY     1     15
PERLND  13                        0.63     COPY     1     13
IMPLND   1                        0.16     COPY     1     15
IMPLND  10                        0.25     COPY     1     15
IMPLND   1                        0.08     COPY     1     15
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     Vault  1                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      0.02       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
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.144881  0.000000  0.000000
  0.111111  0.144881  0.016098  0.007950
  0.222222  0.144881  0.032196  0.011243
  0.333333  0.144881  0.048294  0.013770
  0.444444  0.144881  0.064391  0.015900
  0.555556  0.144881  0.080489  0.017777
  0.666667  0.144881  0.096587  0.019474
  0.777778  0.144881  0.112685  0.021034
  0.888889  0.144881  0.128783  0.022487
  1.000000  0.144881  0.144881  0.023851
  1.111111  0.144881  0.160978  0.025141
  1.222222  0.144881  0.177076  0.026368
  1.333333  0.144881  0.193174  0.027540
  1.444444  0.144881  0.209272  0.028665
  1.555556  0.144881  0.225370  0.029747
  1.666667  0.144881  0.241468  0.030791
  1.777778  0.144881  0.257566  0.031801
  1.888889  0.144881  0.273663  0.032780
  2.000000  0.144881  0.289761  0.033730
  2.111111  0.144881  0.305859  0.034654
  2.222222  0.144881  0.321957  0.035555
  2.333333  0.144881  0.338055  0.036433
  2.444444  0.144881  0.354153  0.037290
  2.555556  0.144881  0.370250  0.038128
  2.666667  0.144881  0.386348  0.038948
  2.777778  0.144881  0.402446  0.039751
  2.888889  0.144881  0.418544  0.040538
  3.000000  0.144881  0.434642  0.041311
  3.111111  0.144881  0.450740  0.042069
  3.222222  0.144881  0.466838  0.042813
  3.333333  0.144881  0.482935  0.043545
  3.444444  0.144881  0.499033  0.044265
  3.555556  0.144881  0.515131  0.054474
  3.666667  0.144881  0.531229  0.062126
  3.777778  0.144881  0.547327  0.067601
  3.888889  0.144881  0.563425  0.072170
  4.000000  0.144881  0.579522  0.076203
  4.111111  0.144881  0.595620  0.079869
  4.222222  0.144881  0.611718  0.083264
  4.333333  0.144881  0.627816  0.086445
  4.444444  0.144881  0.643914  0.089454
  4.555556  0.144881  0.660012  0.092319
  4.666667  0.144881  0.676110  0.095061
  4.777778  0.144881  0.692207  0.113335
  4.888889  0.144881  0.708305  0.124610
  5.000000  0.144881  0.724403  0.133412
  5.111111  0.144881  0.740501  0.141038
  5.222222  0.144881  0.756599  0.147924
  5.333333  0.144881  0.772697  0.154284
  5.444444  0.144881  0.788794  0.160241
  5.555556  0.144881  0.804892  0.165875
  5.666667  0.144881  0.820990  0.171241
  5.777778  0.144881  0.837088  0.176379
  5.888889  0.144881  0.853186  0.181321
  6.000000  0.144881  0.869284  0.186090
  6.111111  0.144881  0.885382  0.190706
  6.222222  0.144881  0.901479  0.195184
  6.333333  0.144881  0.917577  0.199537
  6.444444  0.144881  0.933675  0.203776
  6.555556  0.144881  0.949773  0.207911
  6.666667  0.144881  0.965871  0.211950
```

```
  6.777778  0.144881  0.981969  0.215899
  6.888889  0.144881  0.998066  0.219766
  7.000000  0.144881  1.014164  0.223555
  7.111111  0.144881  1.030262  0.227271
  7.222222  0.144881  1.046360  0.230919
  7.333333  0.144881  1.062458  0.234503
  7.444444  0.144881  1.078556  0.238026
  7.555556  0.144881  1.094654  0.380220
  7.666667  0.144881  1.110751  0.948334
  7.777778  0.144881  1.126849  1.631812
  7.888889  0.144881  1.142947  2.172675
  8.000000  0.144881  1.159045  2.458167
  8.111111  0.144881  1.175143  2.720228
  8.222222  0.144881  1.191241  2.937893
  8.333333  0.144881  1.207338  3.139560
  8.444444  0.144881  1.223436  3.328337
  8.555556  0.144881  1.239534  3.506438
  8.666667  0.144881  1.255632  3.675508
  8.777778  0.144881  1.271730  3.836805
  8.888889  0.144881  1.287828  3.991323
  9.000000  0.144881  1.303926  4.139856
  9.111111  0.144881  1.320023  4.283057
  9.222222  0.144881  1.336121  4.421467
  9.333333  0.144881  1.352219  4.555541
  9.444444  0.144881  1.368317  4.685665
  9.555556  0.144881  1.384415  4.812172
  9.666667  0.144881  1.400513  4.935350
  9.777778  0.144881  1.416610  5.055452
  9.888889  0.144881  1.432708  5.172699
  10.00000  0.144881  1.448806  5.287286
  10.11111  0.144881  1.464904  5.399388
  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    1.2           PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2           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
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 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
```

Disclaimer

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Appendix 5: Conveyance Analysis

Nothing is necessary for this appendix at this time

Appendix 6: Operations and Maintenance Manual

1. Operations and Maintenance Manual

July 24, 2024

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052
Office: 425.305.5104

City of Marysville Public Works Department
80 Columbia Avenue
Marysville, WA 98270
(360) 363-8100

RE: Operations and Maintenance Manual

Project: Camden Ridge (SGE# 23-0009)

Dear City of Marysville,

The proposed stormwater facilities consist of buried pipe networks, catch basins, detention vault, and Perkfilter water quality structures. Maintenance instructions for the proprietary structure are included in this Manual. Maintenance of these structures is crucial to their function and to meeting lifespan expectancies. Facility descriptions and maintenance procedures for all proposed facilities have been compiled from Appendix A of the 2019 DOE Manual, Oldcastle documentation for their proprietary structures. Inspection and maintenance procedures can be found on the following pages.

Regards,



Tom Abbott, P.E.
Principal Civil Engineer
Solid Ground Engineering

Appendix V-A: BMP Maintenance Tables

Ecology intends the facility-specific maintenance standards contained in this section to be conditions for determining if maintenance actions are required as identified through inspection. Recognizing that Permittees have limited maintenance funds and time, Ecology does not require that a Permittee perform all these maintenance activities on all their stormwater BMPs. We leave the determination of importance of each maintenance activity and its priority within the stormwater program to the Permittee. We do expect, however, that sufficient maintenance will occur to ensure that the BMPs continue to operate as designed to protect ground and surface waters.

Ecology doesn't intend that these measures identify the facility's required condition at all times between inspections. In other words, exceedance of these conditions at any time between inspections and/or maintenance does not automatically constitute a violation of these standards. However, based upon inspection observations, the Permittee shall adjust inspection and maintenance schedules to minimize the length of time that a facility is in a condition that requires a maintenance action.

Table V-A.1: Maintenance Standards - Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance and inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g.,rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults) (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.4: Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)
Catch Basin	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

PERKFILTER™

Inspection and Maintenance Guide



PerkFilter™ Media Filtration System

Description

The PerkFilter is a stormwater treatment device used to remove pollutants from urban runoff. Impervious surfaces and other urban and suburban landscapes generate a variety of contaminants that can enter stormwater and pollute downstream receiving waters. The PerkFilter is a media-filled cartridge filtration device designed to capture and retain sediment, gross solids, metals, nutrients, hydrocarbons, and trash and debris. As with any stormwater treatment system, the PerkFilter requires periodic maintenance to sustain optimum system performance.

Function

The PerkFilter is a water quality treatment system consisting of three chambers: an inlet chamber, a filter cartridge treatment chamber, and an outlet chamber (Figure 1). Stormwater runoff enters the inlet chamber through an inlet pipe, curb opening, or grated inlet. Gross solids are settled out, and floating trash and debris are trapped in the inlet chamber. Pretreated flow is then directed to the treatment chamber through an opening in the baffle wall between the inlet chamber and treatment chamber. The treatment chamber contains media-filled filter cartridges (Figure 2) that use physical and chemical processes to remove pollutants. During a storm event, runoff pools in the treatment chamber before passing radially through the cylindrical cartridges from the outside surface, through the media for treatment, and into the center of the cartridge. At the center of the cartridge is a center tube assembly designed to distribute the hydraulic load evenly across the surface of the filter cartridge and control the treatment flow rate. The center tube assembly discharges treated flow through the false floor and into the outlet chamber. A draindown feature built into each cartridge allows the treatment chamber to dewater between storm events.

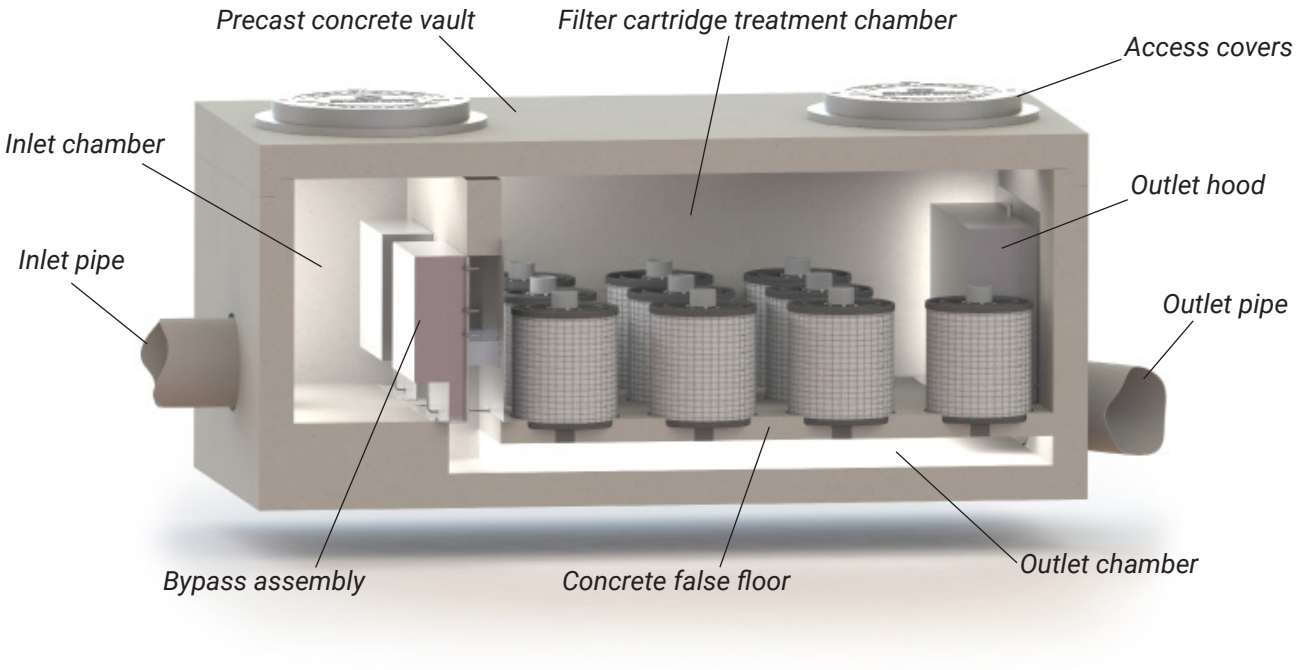


Figure 1. Schematic of the PerkFilter system.

All PerkFilter systems include a high-flow bypass assembly to divert flow exceeding the treatment capacity of the filter cartridges around the treatment chamber. The bypass assembly routes peak flow from the inlet chamber directly to the outlet chamber, bypassing the treatment chamber to prevent sediment and other captured pollutants from being scoured and re-entrained by high flow. Treated flow and bypass flow merge in the outlet chamber for discharge by a single outlet pipe.

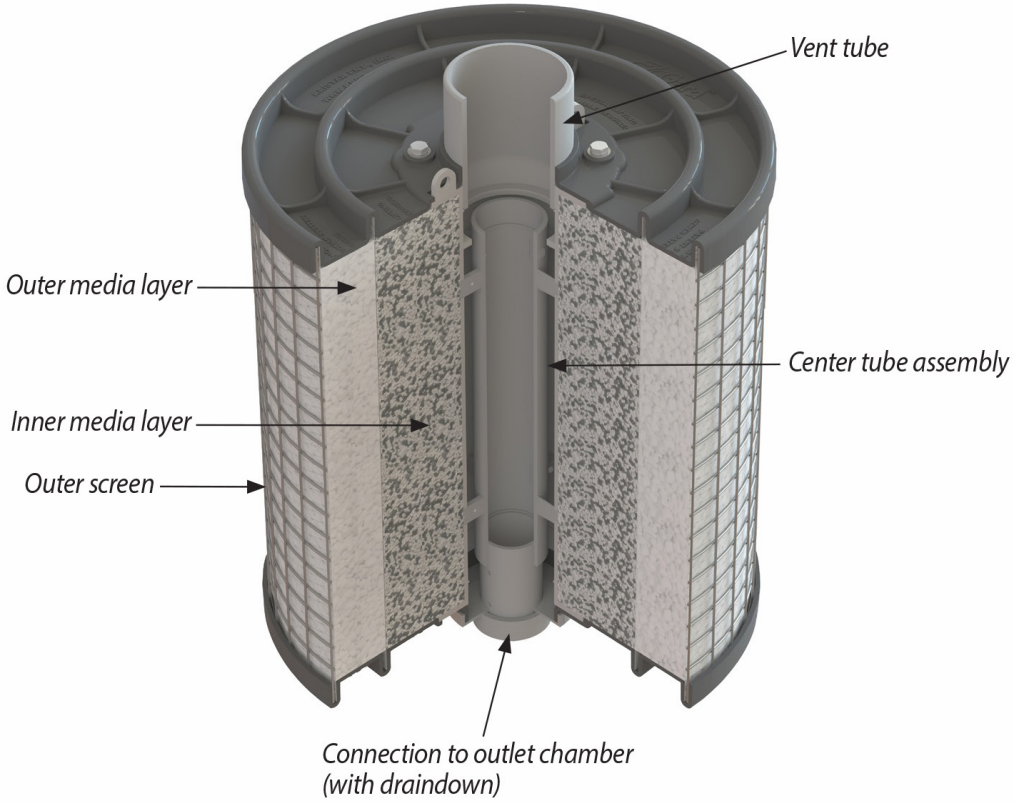


Figure 2. Schematic of PerkFilter cartridge.

Configuration

The PerkFilter structure may consist of a vault, manhole, or catch basin configuration. Catch basin units may be fabricated from concrete or steel. Internal components including the PerkFilter cartridges are manufactured from durable plastic and stainless steel components and hardware. All cartridges are 18 inches in diameter and are available in two heights: 12-inch and 18-inch. Cartridges may be used alone or may be stacked (Figure 3) to provide 24-inch and 30-inch combinations. The capacity of each cartridge or cartridge combination is dictated by the allowable operating rate of the media and the outer surface area of the cartridge. Thus, taller cartridges have greater treatment capacity than shorter cartridges, but they also require more hydraulic drop across the system. Cartridges may be filled with various media depending on the target pollutants and desired treatment rate, among other factors.

Access to an installed PerkFilter system is typically provided by ductile iron castings or hatch covers. The location and number of access appurtenances is dependent on the size and configuration of the system.

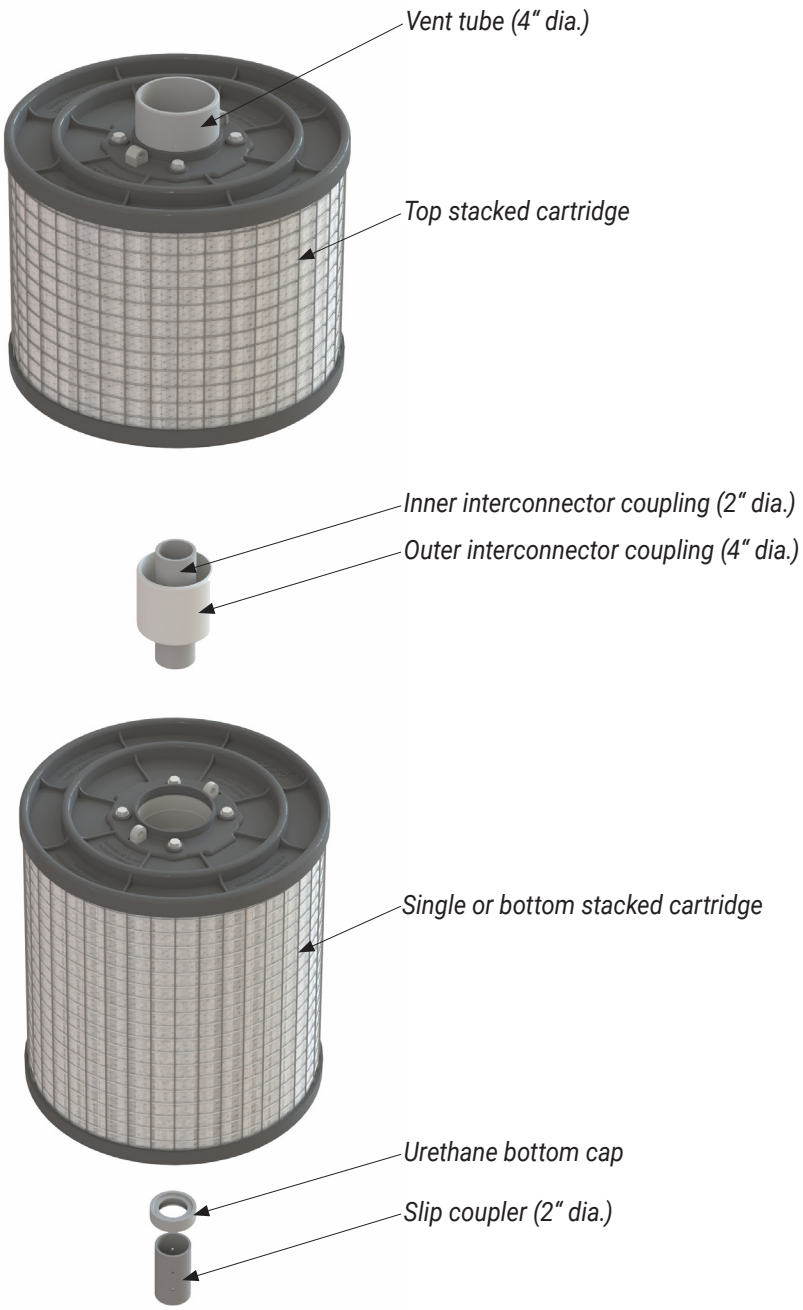


Figure 3. Schematic of stacked cartridges and connector components.

Maintenance Overview

State and local regulations require all stormwater management systems to be inspected on a periodic basis and maintained as necessary to ensure performance and protect downstream receiving waters. Maintenance prevents excessive pollutant buildup that can limit system performance by reducing the operating capacity and increasing the potential for scouring of pollutants during periods of high flow.

Inspection and Maintenance Frequency

The PerkFilter should be inspected on a periodic basis, typically twice per year, and maintained as required. Initially, inspections of a new system should be conducted more frequently to help establish an appropriate site-specific inspection frequency. The maintenance frequency will be driven by the amount of runoff and pollutant loading encountered by a given system. In most cases, the optimum maintenance interval will be one to three years. Inspection and maintenance activities should be performed only during dry weather periods.

Inspection Equipment

The following equipment is helpful when conducting PerkFilter inspections:

- Recording device (pen and paper form, voice recorder, iPad, etc.)
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Socket and wrench for bolt-down access covers
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Measuring stick or sludge sampler
- Long-handled net (optional)

Inspection Procedures

PerkFilter inspections are visual and may be conducted from the ground surface without entering the unit. To complete an inspection, safety measures including traffic control should be deployed before the access covers are removed. Once the covers have been removed, the following items should be checked and recorded (see form provided at the end of this document) to determine whether maintenance is required:

- Inspect the internal components and note whether there are any broken or missing parts. In the unlikely event that internal parts are broken or missing, contact Oldcastle Infrastructure at (800) 579-8819 to determine appropriate corrective action.
- Note whether the inlet pipe is blocked or obstructed. The outlet pipe is covered by a removable outlet hood and cannot be observed without entering the unit.
- Observe, quantify and record the accumulation of floating trash and debris in the inlet chamber. The significance of accumulated floating trash and debris is a matter of judgment. A long-handled net may be used to retrieve the bulk of trash and debris at the time of inspection if full maintenance due to accumulation of floating oils or settled sediment is not yet warranted.

- Observe, quantify and record the accumulation of oils in the inlet chamber. The significance of accumulated floating oils is a matter of judgment. However, if there is evidence of an oil or fuel spill, immediate maintenance by appropriate certified personnel is warranted.
- Observe, quantify and record the average accumulation of sediment in the inlet chamber and treatment chamber. A calibrated dipstick, tape measure, or sludge sampler may be used to determine the amount of accumulated sediment in each chamber. The depth of sediment may be determined by calculating the difference between the measurement from the rim of the PerkFilter to the top of the accumulated sediment, and the measurement from the rim of the PerkFilter to the bottom of the PerkFilter structure. Finding the top of the accumulated sediment below standing water takes some practice and a light touch, but increased resistance as the measuring device is lowered toward the bottom of the unit indicates the top of the accumulated sediment.
- Finally, observe, quantify and record the amount of standing water in the treatment chamber around the cartridges. If standing water is present, do not include the depth of sediment that may have settled out below the standing water in the measurement.

Maintenance Triggers

Maintenance should be scheduled if any of the following conditions are identified during the inspection:

- Internal components are broken or missing.
- Inlet piping is obstructed.
- The accumulation of floating trash and debris that cannot be retrieved with a net and/or oil in the inlet chamber is significant.
- There is more than 6” of accumulated sediment in the inlet chamber.
- There is more than 4” of accumulated sediment in the treatment chamber.
- There is more than 4” of standing water in the treatment chamber more than 24 hours after end of rain event.
- A hazardous material release (e.g. automotive fluids) is observed or reported.
- The system has not been maintained for 3 years (wet climates) to 5 years (dry climates).

Maintenance Equipment

The following equipment is helpful when conducting PerkFilter maintenance:

- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Socket and wrench for bolt-down access covers
- Manhole hook or pry bar
- Confined space entry equipment, if needed
- Flashlight
- Tape measure
- 9/16” socket and wrench to remove hold-down struts and filter cartridge tops
- Replacement filter cartridges
- Vacuum truck with water supply and water jet

Contact Oldcastle Infrastructure at (800) 579-8819 for replacement filter cartridges. A lead time of four weeks is recommended.

Maintenance Procedures

Maintenance should be conducted during dry weather when no flow is entering the system. Confined space entry is necessary to maintain vault and manhole PerkFilter configurations. Only personnel that are OSHA Confined Space Entry trained and certified may enter underground structures. Confined space entry is not required for catch basin PerkFilter configurations. Once safety measures such as traffic control are deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:

- Remove floating trash, debris and oils from the water surface in the inlet chamber using the extension nozzle on the end of the boom hose of the vacuum truck. Continue using the vacuum truck to completely dewater the inlet chamber and evacuate all accumulated sediment from the inlet chamber. Some jetting may be required to fully remove sediment. The inlet chamber does not need to be refilled with water after maintenance is complete. The system will fill with water when the next storm event occurs.
- Remove the hold-down strut from each row of filter cartridges and then remove the top of each cartridge (the top is held on by four 9/16" bolts) and use the vacuum truck to evacuate the spent media. When empty, the spent cartridges may be easily lifted off their slip couplers and removed from the vault. The couplers may be left inserted into couplings cast into the false floor to prevent sediment and debris from being washed into the outlet chamber during washdown.
- Once all the spent cartridges have been removed from the structure, the vacuum truck may be used to evacuate all accumulated sediment from the treatment chamber. Some jetting may be required to fully remove sediment. Take care not to wash sediment and debris through the openings in the false floor and into the outlet chamber. All material removed from the PerkFilter during maintenance including the spent media must be disposed of in accordance with local, state, and/or federal regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.
- Place a fresh cartridge in each cartridge position using the existing slip couplers and urethane bottom caps. If the vault is equipped with stacked cartridges, the existing outer and inner interconnector couplers must be used between the stacked cartridges to provide hydraulic connection. Transfer the existing vent tubes from the spent cartridges to the fresh cartridges. Finally, refit the struts to hold the fresh cartridges in place.
- Securely replace access covers, as appropriate.
- Make arrangements to return the empty spent cartridges to Oldcastle Infrastructure.

PerkFilter
Inspection and Maintenance Log

Location_____

Structure Configuration and Size:

Inspection Date_____

☐ Vault _____feet x _____feet
☐ Manhole _____feet diameter
☐ Catch Basin _____feet x _____feet

Number and Height of Cartridge Stacks:

Count____each ☐12" ☐ 18" ☐ 24" ☐ 30"

Media Type:

☐ ZPC ☐ Perlite ☐ Other_____

Condition of Internal Components ☐ Good ☐ Damaged ☐ Missing	Notes:
Inlet or Outlet Blockage or Obstruction ☐ Yes ☐ No	Notes:
Floating Trash and Debris ☐ Significant ☐ Not Significant	Notes:
Floating Oils ☐ Significant ☐ Not Significant ☐ Spill	Notes:
Sediment Depth in Inlet Chamber ☐ Inches of Sediment:_____	Notes:
Sediment Depth in Treatment Chamber ☐ Inches of Sediment:_____	Notes:
Standing Water in Treatment Chamber ☐ Inches of Standing Water:_____	Notes:

Maintenance Required

☐ **Yes - Schedule Maintenance** ☐ **No - Inspect Again in _____ Months**

PERKFILTER™

OUR MARKETS



BUILDING STRUCTURES



COMMUNICATIONS



WATER



ENERGY



TRANSPORTATION

Appendix 7: Special Reports and Studies

1. Critical Areas Report, Wetland Resources, Inc., dated January 25th, 2024
2. Geotechnical Engineering Design Study, Earth Solutions NW, dated January 25th, 2024

CRITICAL AREA STUDY
AND
BUFFER MITIGATION PLAN

FOR

TAYLOR LANE
MARYSVILLE, WA

Wetland Resources, Inc. Project #23124

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January 26, 2024

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1.0 INTRODUCTION

Wetland Resources, Inc. (WRI) completed a site investigation on September 20, 2023, to identify and evaluate wetlands and fish and wildlife habitat conservation areas on the property located at 4820 83rd Ave NE, in the city limits of Marysville, Washington. The site is composed of one 4.66-acre tax parcel (00590700013600), located within Section 35, Township 30N, Range 05E, W.M. The entire property is within the Snohomish River-Frontal Possession Sound subbasin of the Snohomish Watershed (WRIA 7).

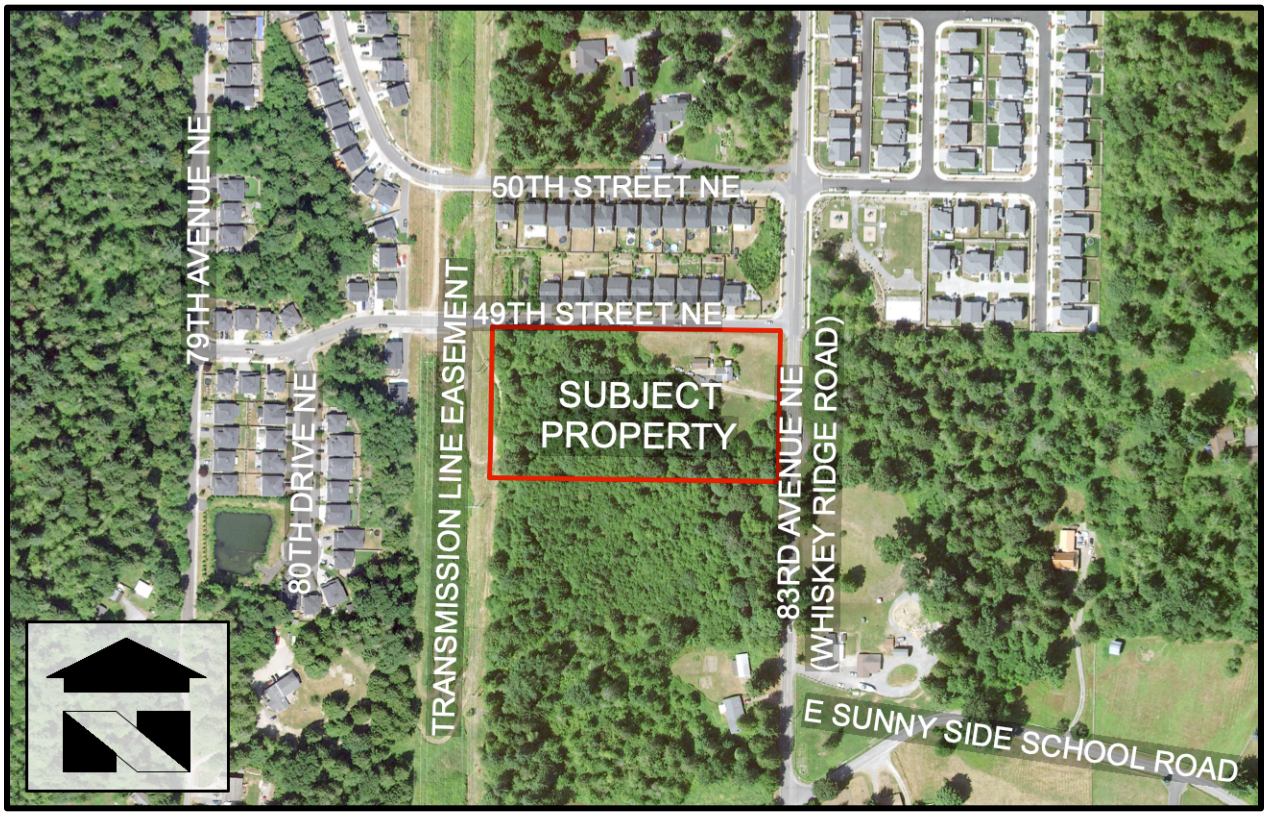


Figure 1 – Aerial view of the subject property

1.1 SITE DESCRIPTION

The subject property is situated in a residential area, surrounded by developments to the west, north, and northeast. The property directly south of the subject parcel is undeveloped, and the properties east and southeast consist of large-lot residential uses. A power transmission corridor parallels the western property boundary. The site has a general southern aspect, sloping towards a depression in the southern portion of the property.

The northeastern portion of the parcel is developed with a single-family residence (SFR) and associated structures. Vegetation within this area is limited to maintained lawn and some sporadic trees and ornamental shrubs. The remainder of the parcel is undeveloped and vegetated by a dense native forest canopy of Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*). The understory consists of salmonberry (*Rubus*

spectabilis), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum*), sword fern (*Polystichum munitum*), and a few sparse patches of Himalayan blackberry (*Rubus armeniacus*).

One wetland (Wetland A) was identified on site during the September 2023 investigation. Wetland A is a Category II wetland with a moderate (7) habitat score, receiving a standard buffer of 100-feet. The location of this feature is depicted on the attached *Critical Area Study and Buffer Mitigation Plan Map* (See appendix C).

1.2 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR and develop the northern portion of the property with a 21-lot residential subdivision and associated stormwater and access infrastructure. The applicant proposes to implement buffer averaging, buffer restoration for temporary impacts, enhancement of degraded buffer, and installation of permanent fencing and critical area signage.

2.0 WETLAND AND STREAM DETERMINATION

2.1 LIMIT OF STUDY

The proposed project occurs within one tax parcel. Lack of legal access prevents WRI staff from performing routine wetland and stream determinations in surrounding areas on adjacent parcels. Wetland and stream boundaries depicted outside of the subject parcel are based on visual observation from the edge of legal access, publicly available resources, fine-scale elevation contours, and best professional judgment.

2.2 INFORMATION REVIEW

Prior to conducting the site investigation, public resource information was reviewed to gather background information on the subject site and the surrounding area in regards to wetlands, streams, and other critical areas. These sources included the following:

- *USDA/NRCS Web Soil Survey:* The Web Soil Survey identifies the soils underlying the site as Tokul gravelly medial loam, 0 to 8 percent slopes. This unit is not a hydric soil.

- *USFWS National Wetlands Inventory (NWI)*: NWI does not map any features on or near the site.

- *Snohomish County PDS:* PDS maps a large wetland associated with King Creek near the southern property boundary, continuing off-site to the southwest. King Creek is mapped approximately 700 feet off-site to the south. This stream flows southwest, ultimately draining into Ebey Slough. The county maps the portion of King Creek nearest the property boundary as a Type F.

- *WDNR Forest Practices Application Mapping Tool FPAMT:* This resource maps King Creek in approximately the same location as Snohomish County PDS. The portion of this stream closest to the property is mapped as a Type F.

- *WDFW SalmonScape*: SalmonScape maps King Creek in approximately the same location as PDS and FPAMT. The portion of King Creek closest to the property is mapped as gradient-accessible to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*).

- *WDFW Priority Habitat and Species (PHS) Interactive Map:* PHS does not map any features on or near the site.

- *Washington State Department of Natural Resources (DNR) Wetland of High Conservation Value:* This resource does not depict any wetlands of high conservation value on or near the site.

- *City of Marysville Critical Areas Map*: The city of Marysville maps two Category III wetlands approximately 150 feet off-site to the west. King Creek is shown in approximately the same location as depicted by other resources; however, the headwaters are mapped approximately 700 feet south of the subject property.

2.3 METHODOLOGY

Wetland boundaries in western Washington are determined using the methodologies described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers 2010). Under the routine methodology, the process for making a wetland determination is based on three steps:

1.) Examination of the site for hydrophytic vegetation (species present and percent cover);
2.) Examination of the site for hydric soils;
3.) Determining the presence of wetland hydrology

2.3.1 Vegetation Criteria

The Corps Manual and 2010 Regional Supplement define hydrophytic vegetation as "*the assemblage of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence.*" Field indicators are used to determine whether the hydrophytic vegetation criteria have been met. Examples of these indicators include, but are not limited to, the rapid test for hydrophytic vegetation, a dominance test result of greater than 50%, and/or a prevalence index score less than or equal to 3.0.

2.3.2 Soils Criteria

The 2010 Regional Supplement (per the National Technical Committee for Hydric Soils) defines hydric soils as soils *"that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."* Field indicators are used to determine whether a given soil meets the definition for hydric soils. Indicators are numerous and include, but are not limited to, presence of a histosol or histic epipedon, a sandy gleyed matrix, depleted matrix, and redoximorphic depressions.

2.3.3 Hydrology Criteria

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface for a sufficient duration during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and chemically reducing conditions, respectively. The strongest indicators include the presence of surface water, a high-water table, and/or soil saturation within at least 12 inches of the soil surface.

2.4 WETLAND AND STREAM DETERMINATION FINDINGS

One wetland (Wetland A) was identified in the southern portion of the site during the September 2023 inspection. Wetland A is documented by publicly available resources as a headwater wetland to King Creek, which starts approximately 700 feet south of the subject property. Wetland A is classified per MMC 22E.010.060 and its buffer is designated by MMC 22E.010.100(4).

2.4.1 Wetland A

Jurisdiction: City of Marysville
HGM Class: Depressional
Cowardin Classification: PFO4E
City of Marysville Classification: Category II
City of Marysville Buffer: 100 feet

Wetland A is an approximately 13.6-acre depressional wetland located in the southern portion of the subject property and it extends off site to the south. Vegetation observed within the on-site portion of the wetland is dominated by a canopy of western red cedar (*Thuja plicata*; FAC) and red alder (*Alnus rubra*; FAC). Understory vegetation consists of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), twinberry (*Lonicera involucrata*; FAC), skunk cabbage (*Lysichiton americanus*; OBL), creeping buttercup (*Ranunculus repens*; FAC), piggyback plant (*Tolmiea menziesii*; FAC), and reed canarygrass (*Phalaris arundinacea*; FACW). Dominant vegetation in the area mapped as Wetland A is FAC or wetter, indicating a hydrophytic plant community is present.

Soils within the on-site portion of the wetland are generally black (10YR 2/1) sandy loam throughout the upper profile to a depth of at least 16 inches. Soils from six to 16 inches contain approximately three percent of dark yellowish-brown (10YR 3/4) redoximorphic concentrations. Wetland A meets the hydric soil indicator for redox dark surface (F6). Soils were dry during the September 2023 investigation, however the geomorphic position (D2) of the depression and dominance of hydrophytic vegetation (D5) are indicative of prolonged saturation during the wet season.



Figure 2 Photograph of Wetland A taken during September 2023 visit.

Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which would typically require expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). However, discussion with City staff indicates that installation of retaining walls along the standard buffer is adequate to satisfy this requirement and maintain the standard buffer width.

2.4.2 Non-wetland Areas

Vegetation in the non-wetland portions of the site consist of two distinct types. The northeastern portion of the site surrounding the existing residence is dominated by maintained lawn with a few sporadic trees and ornamental shrubs. The remainder of the property consists of forest dominated by a canopy of Douglas fir (*Pseudotsuga menziesii*; FACU), western red cedar (*Thuja plicata*; FAC), bigleaf maple (*Acer macrophyllum*; FACU), red alder (*Alnus rubra*; FAC), and bitter cherry (*Prunus emarginata*; FACU), and an understory of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), red elderberry (*Sambucus racemosa*; FACU), sword fern (*Polystichum munitum*; FACU), and pacific trailing blackberry (*Rubus ursinus*; FACU). A dense layer of Himalayan blackberry (*Rubus armeniacus*; FAC) and Japanese knotweed (*Fallopia japonica*) is present at the forested fringe between the two vegetation communities.

A power transmission corridor is located adjacent to the western property boundary. Maintenance activities have meandered onto the subject property, leaving a portion of the southwest corner of the property being dominated by maintained grasses and Himalayan blackberry.



Figure 3 Photograph taken at Wetland A boundary. Wetland area located to the right, non-wetland area located to the left.

Soils in the non-wetland areas are generally dark brown (10YR 3/3) sandy loam in the upper layer to a depth of approximately seven inches. Soils in the lower layer are typically dark yellowish-brown (10YR 4/4) sandy loam from approximately seven inches to at least 18 inches. Soils were dry at the time of the September 2023 site investigation. Non-wetland soils did not meet any hydric soil indicators and were generally dry.

2.4.3 King Creek

Jurisdiction: City of Marysville
HGM Class: Riverine
Cowardin Classification: Riverine, Unknown Perennial, Unconsolidated Bottom (R5UB)
City of Marysville Classification: Type F
City of Marysville Buffer: 150 feet

The headwaters of King Creek originate within Wetland A, approximately 700 feet south of the property boundary, and flows to the southwest, ultimately draining directly into Ebey Slough. SalmonScape maps the portion of King Creek closest to the property as containing gradient accessibility to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*). King Creek is classified as a Type F water and requires a standard buffer of 150 feet.

King Creek is a Type F stream, requiring a standard buffer of 150 feet, measured horizontally from its determined boundary. This feature is estimated to form approximately 700 feet south of the property, therefore its standard buffer does not project onto the property.

3.0 WILDLIFE

Mammalian species expected to use the site include: Eastern cottontail rabbit (*Sylvilagus floridanus*), black-tailed deer (*Odocoileus hemionus columbianus*), shrews (*Sorex spp.*), moles (*Scapanus spp.*), North American porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), skunks (*Mephitis spp*), squirrels (*Sciurus carolinensis*, *Tamiasciurus douglasii*), deer mouse (*Peromyscus maniculatus*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*).

Amphibian species that may utilize the site include: Pacific tree frog (*Hyla regilla*), rough-skinned newt (*Taricha granulosa*), and northwestern salamander (*Ambystoma gracile*).

Avian species likely to utilize the site include Song Sparrow (*Melospiza melodia*), Black-capped Chickadee (*Poecile atricapillus)*, Dark-eyed Junco (*Junco hyemalis*), Brown Creeper (*Certhia americana*), Spotted Towhee (*Pipilo maculatus),* American Robin (*Turdus migratorius*), Red-breasted Nuthatch (*Sitka canadensis*), Downy Woodpecker (*Picoides pubescens*), Stellar's Jay (*Cyanocitta stelleri*), American Crow (*Corvus brachyrhynchos*), Northern Flicker (*Colaptes auratus*), Hairy Woodpecker (*Picoides villosus*), and Downy Woodpecker (*Dendrocopus villosus*).

These lists are not meant to be all-inclusive of the species using the site, but is representative of common wildlife in the Marysville area. No threatened or endangered species are known to be associated with this site.

4.0 PROJECT DESCRIPTION, IMPACTS, AND BUFFER MITIGATION PLAN

4.1 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR, driveway, and associated utility structures and develop the northern portion of the property with a 21-lot residential subdivision, including necessary stormwater and access infrastructure. The applicant proposes altering portions of the wetland buffer area through buffer averaging, exceeding a 1:1 ratio. The proposed buffer will be demarcated by split-rail fencing with Native Growth Protection Area (NGPA) signs affixed every linear 100 feet.

Temporary buffer impacts associated with the installation of retaining walls along portions of the buffer will be restored with native trees and shrubs at a 1:1 ratio. Temporary impacts associated with the installation of a stormwater pipe across the buffer will avoid tree impacts and will be restored with native shrubs and herbs. Areas of degraded buffer will be enhanced with native trees and shrubs. Increasing the total area, species richness, and structural diversity of the on-site wetland buffer is expected to provide a lift in buffer functions over current conditions.

4.2 BUFFER WIDTH AVERAGING

In order to accommodate the proposed development, the applicant is proposing to modify the shape of the buffer through buffer width averaging. A total of 8,163 square feet of buffer is proposed to be reduced, and it will be replaced with 9,179 square feet of buffer addition. Therefore, the total buffer area after averaging will be 1,016 square feet larger than required by standard prescriptive

measures. Buffer averaging is allowed per MMC 22E.010.100(5)(a) and (5)(c). The criteria in this code section are cited below in italics with responses below each in standard text.

(5)(a) Buffer width averaging shall be allowed only where the applicant demonstrates to the community development department that the averaging will not impair or reduce the habitat, water quality purification and enhancement, storm water detention, ground water recharge, shoreline protection and erosion protection and other functions of the wetland and buffer.

Areas that are proposed for buffer reduction are composed of native forest with sparse patches of Himalayan blackberry. Buffer enhancement and restoration will ensure that buffer functions in areas proposed for buffer addition are equal or superior to proposed reduction areas. Buffer restoration and enhancement will increase species and structural diversity, which will provide more complex habitat for wildlife to forage and shelter. Buffer enhancement of sparsely vegetated areas in proposed buffer addition area will increase the ability to filter pollutants, attenuate flood flow, and provide wildlife habitat. The proposed buffer averaging plan will result in an increase in total buffer area of 1,016 square feet. The combination of an increase in buffer area and higher quality habitat will result in an overall increase in on-site buffer functions.

… that lower-intensity land uses would be located adjacent to areas where buffer width is reduced…

A stormwater detention vault will be located adjacent to the buffer within the southwest portion of development. Once constructed, this will be the lowest-intensity land use associated with the proposed development so that impacts to the buffer of Wetland A are minimized.

…and that the total area contained within the buffer after averaging is no less than that contained within the standard buffer prior to averaging;

A total of 8,163 square feet of buffer is proposed to be reduced and 9,179 square feet of buffer is proposed to be added, resulting in a net increase of 1,016 square feet of buffer area.

(5)(c) Notwithstanding the reductions permitted in subsections (5)(a) and (b) of this section, buffer widths shall not be reduced by more than 25 percent of the required buffer.

The maximum buffer width reduction proposed does not exceed 25 percent of the 100 foot buffer of Wetland A.

4.3 TEMPORARY BUFFER IMPACTS TO BE RESTORED

The applicant proposes to temporarily impact a total of 5,454 (810+602+2,209+1,833) square feet of area within the proposed buffer. A majority of temporary buffer impacts (3,621 SF) are from necessary clearing and grading associated with the installation of retaining walls along the edge of the wetland buffer. Buffer Restoration Areas 1 (810 SF), 2 (602 SF), and 3 (2,209 SF) will be restored with an assemblage of native trees and shrubs. A stormwater pipe is proposed to cross the northern portion of buffer, temporarily impacting 1,833 square feet of shrubs and herbaceous cover. Utilities are allowed in buffer areas per MMC 22E.010.100(9) due to site topography and the wetland position prohibiting an alternative location with less adverse impacts. The pipe will be

installed in a hand-dug trench, avoiding cutting of trees. Restoration Area 4 (1,833 SF) will be comprised with an assemblage of native shrubs and herbs, creating a corridor of increased species diversity.

In order to minimize topsoil export from the site and provide a rich planting medium in the buffer enhancement areas, topsoil from the areas outside of the buffer will be stripped and added to the buffer restoration areas prior to planting. Topsoil will not be added to the natively forested portions of the buffer not included in the planting areas.

Buffer Restoration Area 1 (810 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Shore pine	*Pinus contorta*	1 gallon	10'	3
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	2
Nootka rose	*Rosa nutkana*	1 gallon	5'	5
Snowberry	*Symphoricarpos albus*	1 gallon	5'	5
Salmonberry	*Rubus spectabilis*	1 gallon	5'	5
Sword fern	*Polystichum munitum*	1 gallon	5'	5
Total				25

Buffer Restoration Area 2 (602 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	2
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	2
Nootka rose	*Rosa nutkana*	1 gallon	5'	3
Snowberry	*Symphoricarpos albus*	1 gallon	5'	3
Salmonberry	*Rubus spectabilis*	1 gallon	5'	3
Sword fern	*Polystichum munitum*	1 gallon	5'	3
Total				16

Buffer Restoration Area 3 (2,209 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	6
Western hemlock	*Tsuga heterophylla*	1 gallon	10'	4
Western red cedar	*Thuja plicata*	1 gallon	10'	4
Big-leaf maple	*Acer macrophyllum*	1 gallon	10'	4
Vine maple	*Acer circinatum*	1 gallon	5'	10
Nootka rose	*Rosa nutkana*	1 gallon	5'	10
Snowberry	*Symphoricarpos albus*	1 gallon	5'	10
Elderberry	*Sambucus racemosa*	1 gallon	5'	10
Salmonberry	*Rubus spectabilis*	1 gallon	5'	10
Tall Oregon grape	*Mahonia aquifolium*	1 gallon	5'	10
Sword fern	*Polystichum munitum*	1 gallon	5'	10
Total				88

Buffer Restoration Area 4 (1,833 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Vine maple	*Acer circinatum*	1 gallon	5'	10
Nootka rose	*Rosa nutkana*	1 gallon	5'	10
Snowberry	*Symphoricarpos albus*	1 gallon	5'	10
Elderberry	*Sambucus racemosa*	1 gallon	5'	10
Salmonberry	*Rubus spectabilis*	1 gallon	5'	10
Tall Oregon grape	*Mahonia aquifolium*	1 gallon	5'	10
Sword fern	*Polystichum munitum*	1 gallon	5'	11
Total				71

4.4 BUFFER ENHANCEMENT PLAN

Pursuant to MMC 22E.010.220(2), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. Buffer Enhancement Area A is located within buffer addition area adjacent to Stormwater Tract 997 and the existing electrical utility corridor. This area is 1,446 square feet in size and consists of bare ground, highly maintained cover from utility encroachment, and/or invasive species including Himalayan blackberry and reed canarygrass.

Non-native and/or invasive species shall be removed from the buffer prior to planting where necessary. Once invasives are removed the following list of plants shall be installed within the designated enhancement area. All plants shall be marked with ribbons and mulched, as specified in the planting notes.

Buffer Enhancement Area (1,446 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	4
Shore pine	*Pinus contorta*	1 gallon	10'	3
Bigleaf maple	*Acer macrophyllum*	1 gallon	10'	3
Nootka rose	*Rosa nutkana*	1 gallon	5'	10
Snowberry	*Symphoricarpos albus*	1 gallon	5'	10
Salmonberry	*Rubus spectabilis*	1 gallon	5'	10
Thimbleberry	*Rubus parviflorus*	1 gallon	5'	10
Total				50

5.0 FUNCTIONS AND VALUES ASSESSMENT

Pursuant to requirements set forth in SCC 30.62A.140, critical area studies shall assess impacts to any critical areas or buffers within the project vicinity. The following assessment is intended to compare the current and post-mitigation functions and values provided by the on-site critical areas and buffers.

The methodology for this functions and values assessment is based on professional opinion developed through past field analyses and interpretation. This assessment pertains specifically to the wetland buffer impacted by this project, but is typical for assessments of similar systems common to Western Washington.

5.1 Functional Components of Wetland Buffers

Wetland buffers in Western Washington perform a variety of ecosystem functions. Included among the most important are: flood/stormwater control, base flow/groundwater support, erosion protection, water quality improvement, and overall wildlife habitat function.

Water Quality and Hydrology Functions
Vegetated buffers obstruct water flow, thereby decreasing water velocity, allowing infiltration into the soil, and reducing soil erosion potential. Healthy floodplains and buffers store water during wetter periods and release it during drier periods, thereby maintaining a steady base flow throughout the year. Buffer vegetation impedes the flow of runoff, increases the humus content of soil (greater adsorption capacity), and preserves soil composition as intense rainfall hits the ground. Wetland buffers improve water quality by acting as filters as water passes through them, trapping sediments and pollutants from surface water. Healthy vegetation also provides temperature moderation to adjacent aquatic areas. Shading by the forest canopy maintains cooler water temperatures and influences the availability of dissolved oxygen.

Wildlife Habitat Functions
Healthy vegetation within buffers helps maintain wildlife habitat function within and adjacent to aquatic areas. Buffer vegetation provides many crucial aspects of healthy habitat including shade, soil stabilization, nutrient cycling, and pollutant removal. Vegetated buffers also provide benefits to terrestrial wildlife including, refuge/cover, nesting, foraging, and resting habitat.

5.2 Existing Buffer Conditions

The buffer area surrounding Wetland A is dominated by a native forest with native trees and shrubs, interlaced with sporadic patches of Himalayan blackberry and reed canary grass. The forested buffer is able to sufficiently filter pollutants, control erosion, attenuate flood flow, and provide wildlife habitat. A small portion of proposed buffer has been historically maintained due to its proximity to an existing utility corridor. This area provides very limited ability to filter pollutants, attenuate flood flow, or allow for wildlife for forage and shelter.

5.3 Post Mitigation Buffer Functions and Values

After implementation of buffer averaging, restoration, and enhancement, a significant lift in functions and values is expected. The area proposed for buffer reduction consists of mainly native forest with small amounts of Himalayan blackberry. Areas of buffer addition consist of a similar vegetation community or will be restored/enhanced to have equal or superior functions. The project will result in a net buffer increase of 1,016 square feet, providing more area available to infiltrate runoff, filter pollutants, and provide wildlife habitat. Buffer enhancement of degraded buffer areas will provide high value in terms of slowing the rate of incoming surface flows, decreasing erosion potential, performing water quality improvement, and providing higher quality

wildlife habitat. Restoring the buffer area temporarily impacted from grading activities with an assemblage of native trees and shrubs will adequately restore buffer functions over time. Restoring temporary impacts from the installation of a stormwater pipe will result in a corridor of increased species diversity within the understory. Additionally, a dense patch of Himalayan blackberry and Japanese knotweed located at the forested fringe is proposed to be removed and replaced by the proposed development, eliminating the risk of spreading into native forested buffer.

Overall, the proposed project will result in a substantial net improvement in buffer function as compared to the current conditions on the site.

6.0 PROJECT MONITORING PROGRAM

6.1 INSPECTION AND REPORTING REQUIREMENTS

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage.

During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified.

Photo points
At least one photo point shall be established in each buffer restoration area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the restoration/enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:

1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation / restoration goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

6.2 PROJECT SUCCESS & COMPLIANCE

Criteria for Success
Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement and restoration areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive woody plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation, as described in the *Flagging* section of Section 3.6 "Planting Notes."

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met early, the City may consider the project to be successful and terminate the monitoring period at that time.

6.3 MAINTENANCE

The mitigation areas will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation

system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

6.4 CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

6.5 PROJECT NOTES

Pre-Construction Meeting
Mitigation projects are typically more complex to install than can be described in plans. Careful monitoring by a wetland professional for all portions of this project is strongly recommended. Construction timing and sequencing is important to the success of this type of project. There shall be a pre-construction meeting on this site between the Permittee, consulting wetland professional, and laborers. The objective will be to verify the location of erosion control facilities, verify the location of mitigation areas, and to discuss project sequencing.

Inspections
A wetland professional shall be contracted to periodically inspect the mitigation installation described in this plan. Minor adjustments to the original design may be necessary prior to and during construction due to unusual or hidden site conditions. A City of Marysville representative and/or the consulting professional will make these decisions during construction and any changes will be reflected in the As-built report.

6.6 PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

7.0 FENCING AND SIGNAGE

Pursuant to MMC 22E.010.370, split-rail fencing and signs designating the presence of a critical area will be constructed along the perimeter of the buffer. A split-rail fence will be installed along the perimeter of buffer on the subject property. A total of 8 Native Growth Protection Area (NGPA) signs will be affixed to the fence.

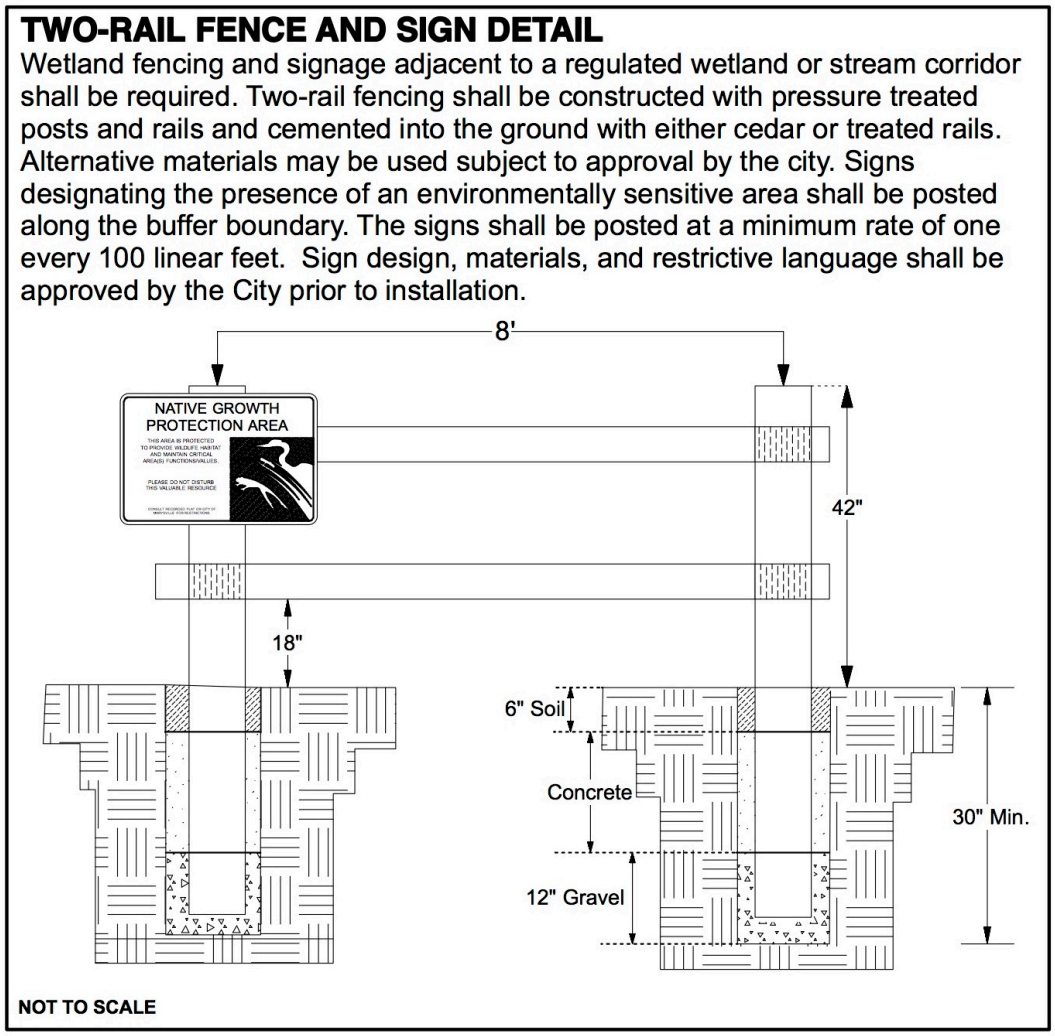


Figure 4 – Two-rail Fence and NGPA Sign Detail

8.0 PERFORMANCE AND MAINTENANCE BONDING

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	250 x $15.00/plant, installed	$3,750.00
Mulch	$50.00/CU x 8 CY	$400.00
Split rail fencing and signage	$8/foot x 818 feet	$6,544.00
Critical area signage	$30/sign x 8 signs	$240.00
Monitoring	$2,500.00/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$33,434.00**

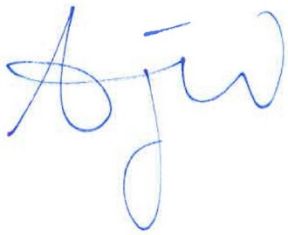
9.0 USE OF THIS REPORT

This report is supplied to Keystone Land, LLC, as a means of determining on-site wetland and stream conditions. It is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the Applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report and any implied representation or warranty is disclaimed.

Wetland Resources, Inc.



Alex Wachter
Associate Ecologist

10.0 REFERENCES

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APPENDIX A

USACE WETLAND DELINEATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S1

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): LRR A Lat: 48.039442 Long: -122.120978 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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 ☐ Hydric Soil Present? Yes ☑ No ☐ Wetland Hydrology Present? Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐

Remarks:

In pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. *Prunus emarginata	5	N	FACU
3.			
4.			
	65	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	80	Y	FAC
2. Sambucus racemosa	5	N	FACU
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	60	Y	FAC
2. Polystichum munitum	5	N	FACU
3. Rubus ursinus	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

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% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = 0
FACW species ____	x 2 = 0
FAC species ____	x 3 = 0
FACU species ____	x 4 = 0
UPL species ____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

Prunus emarginata rooted out of wetland however provides canopy coverage.

SOIL

Sampling Point: S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					Sandy loam	
6-16	10YR 2/1	97	10YR 3/4	3	C	M	Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S2

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): ~4%

Subregion (LRR): LRR A Lat: 48.039531 Long: -122.120945 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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:

Out pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. Acer macrophyllum	15	N	FACU
3. Prunus emarginata	5	N	FACU
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	75	Y	FAC
2. Rubus armeniacus	35	Y	FAC
3. Acer circinatum	5	N	FAC
4.			
5.			
	115	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	20	Y	FAC
2. Rubus ursinus	10	Y	FACU
3. Polystichum munitum	10	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/3	100					Sandy loam	
7-18	10YR 4/4	100					Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B

DEPARTMENT OF ECOLOGY (2023)
WETLAND RATING FORM AND FIGURES

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 9/20/2023

Rated by AW Trained by Ecology? ✔ Yes ___No Date of training 6/2022

HGM Class used for rating Depressional Wetland has multiple HGM classes? ✔ Y ____N

NOTE: **Form is not complete without the required figures** (figures can be combined).
Source of base aerial photo/map ESRI, SnoCo.

OVERALL WETLAND CATEGORY II (based on functions ✔ 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

_____**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	**8**			**7**			**7**			**22**

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	[✔]

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	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

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 total 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 total 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 total 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 sheet flow, 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).

Wetland name or number A_____

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.

   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	**2**
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	**3**
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	**2**
Total for D 1 Add the points in the boxes above	**7**

Rating of Site Potential If score is: __**12-16 = H** ✔ **6-11 = M** ___**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	**1**
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? [Yes = 1] No = 0	**1**
D 2.3. Are there septic systems within 250 ft of the wetland? [Yes = 1] No = 0	**1**
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	**3**

Rating of Landscape Potential If score is: ✔ **3 or 4 = H** ___**1 or 2 = M** ___**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	**1**
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 in development or in effect for the basin in which the unit is found.) Yes = 2 No = 0	**2**
Total for D 3 Add the points in the boxes above	**3**

Rating of Value If score is: ✔ **2-4 = H** ___**1 = M** ___**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:

- ☐ Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4
- ☑ Wetland has an intermittently flowing stream/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

2

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.

- ☐ 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

3

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 area of the wetland unit itself.

- ☐ 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

3

Total for D 4 — Add the points in the boxes above — **8**

Rating of Site Potential If score is: ___**12-16 = H** ✔ **6-11 = M** ___**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 — **1**

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 — **1**

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 — **1**

Total for D 5 — Add the points in the boxes above — **3**

Rating of Landscape Potential If score is: ✔ **3 = H** ___**1 or 2 = M** ___**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. Is the unit 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.

The wetland captures surface water that would otherwise flow downgradient 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 downgradient of unit. points = 2
- ☑ • Surface flooding problems are in a sub-basin farther downgradient. 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

1

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 — **1**

Rating of Value If score is: ___**2-4 = H** ✔ **1 = M** ___**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 if the unit is at least 2.5 ac, or more than 10% of the unit if it is smaller than 2.5 ac.

____Aquatic bed	4 structures or more: points = 4	**2**
_✔_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/groundcover) that each cover 20% within the Forested polygon

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 if the unit is < 2.5 ac, or ¼ ac if the unit is at least 2.5 ac to count (see text for descriptions of hydroperiods).

____Permanently flooded or inundated	4 or more types present: points = 3	**1**
_✔_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		
____Intermittently or seasonally flowing stream in, or adjacent to, the wetland		
____**Lake Fringe wetland**	**2 points**	
____**Freshwater tidal wetland**	**2 points**	

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, Canada thistle**

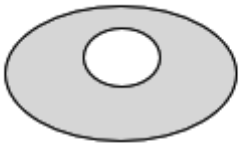
If you counted: > 19 species	points = 2	**2**
5 - 19 species	points = 1	
< 5 species	points = 0	

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

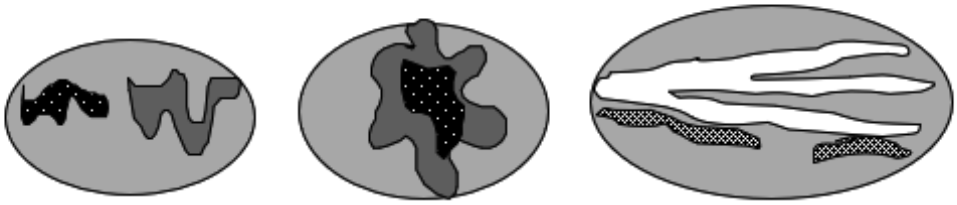


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **High** = 3 points



2

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 extend at least 3.3 ft (1 m) over open water or 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 above for the list of strata and H 1.5 in the manual for the list of aggressive plant species)	**5**
Total for H 1 Add the points in the boxes above	**12**

Rating of Site Potential If score is: __**15-18 = H** __✔__**7-14 = M** ___**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 polygons accessible from the wetland. *Calculate:* % relatively undisturbed habitat 13 + [(% moderate and low intensity land uses)/2] 5 = 18 % 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	**1**
H 2.2. Total habitat in 1 km Polygon around the wetland. *Calculate:* % relatively undisturbed habitat 18 + [(% moderate and low intensity land uses)/2] 17 = 35 % ☐ Total habitat > 50% of Polygon points = 3 ☐ Total habitat 10-50% and in 1-3 patches points = 2 ☑ Total habitat 10-50% and > 3 patches points = 1 ☐ Total habitat < 10% of 1 km Polygon points = 0	**1**
H 2.3. Land use intensity in 1 km Polygon: ☐ > 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	**2**

Rating of Landscape Potential If score is**: __4-6 = H** __✔__**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 data ☐ 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	**2**

Rating of Value If score is: __✔__**2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number A_____

WDFW Priority Habitats

See complete descriptions of Priority Habitats listed by WDFW, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008 (current year, as revised). Priority Habitat and Species List.[133] This list was updated for consistency with guidance from WDFW.

This question is independent of the land use between the wetland unit and the Priority Habitat. All vegetated wetlands are by definition a Priority Habitat but are not included in this list because they are addressed by this rating system.

Count how many of the following Priority Habitats are within 330 ft (100 m) of the wetland unit:

☐ **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. This habitat automatically counts if mapped on the PHS online map within 100m of the wetland. If not mapped, a determination can be made in the field.

☐ **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.

☐ **Fresh Deepwater:** Lands permanently flooded with freshwater, including environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. Substrate does not support emergent vegetation. Do not select if Instream habitat is also present, or if the entire Deepwater feature is included in the wetland unit being rated (such as a pond with a vegetated fringe).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☑ **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. Do not select if Fresh Deepwater habitat is also present.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore.

☐ **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) diameter at breast height (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.

[133] http://wdfw.wa.gov/publications/00165/wdfw00165.pdf

Wetland name or number A_____

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important. For single oaks or oak stands <0.4 ha in urban areas, WDFW's Management Recommendations for Oregon White Oak[134] provides more detail for determining if they are Priority Habitats

☑ **Riparian:** The area adjacent to freshwater aquatic systems with flowing or standing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **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.

☐ **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.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie.

[134] https://wdfw.wa.gov/publications/00030/wdfw00030.pdf

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 chapter 4.8 in the manual. ☐ 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. Does the wetland overlap with any known or historical rare plant or rare & high-quality ecosystem polygons on the WNHP Data Explorer?[135] Yes **= Category I** No – Go to **SC 2.2** SC 2.2. Does the wetland have a rare plant species, rare ecosystem (e.g., plant community), or high-quality common ecosystem that may qualify the site as a WHCV? Contact WNHP for resources to help determine the presence of these elements. Yes – Submit data to WA Natural Heritage Program for determination,[136] Go to **SC 2.3** No **= Not a WHCV** SC 2.3. Did WNHP review the site within 30 days and determine that it has a rare plant or ecosystem that meets their criteria? 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 = **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 = **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 = **Category I bog** No **= Not a bog**	**Cat. I**

[135] https://www.dnr.wa.gov/NHPdata

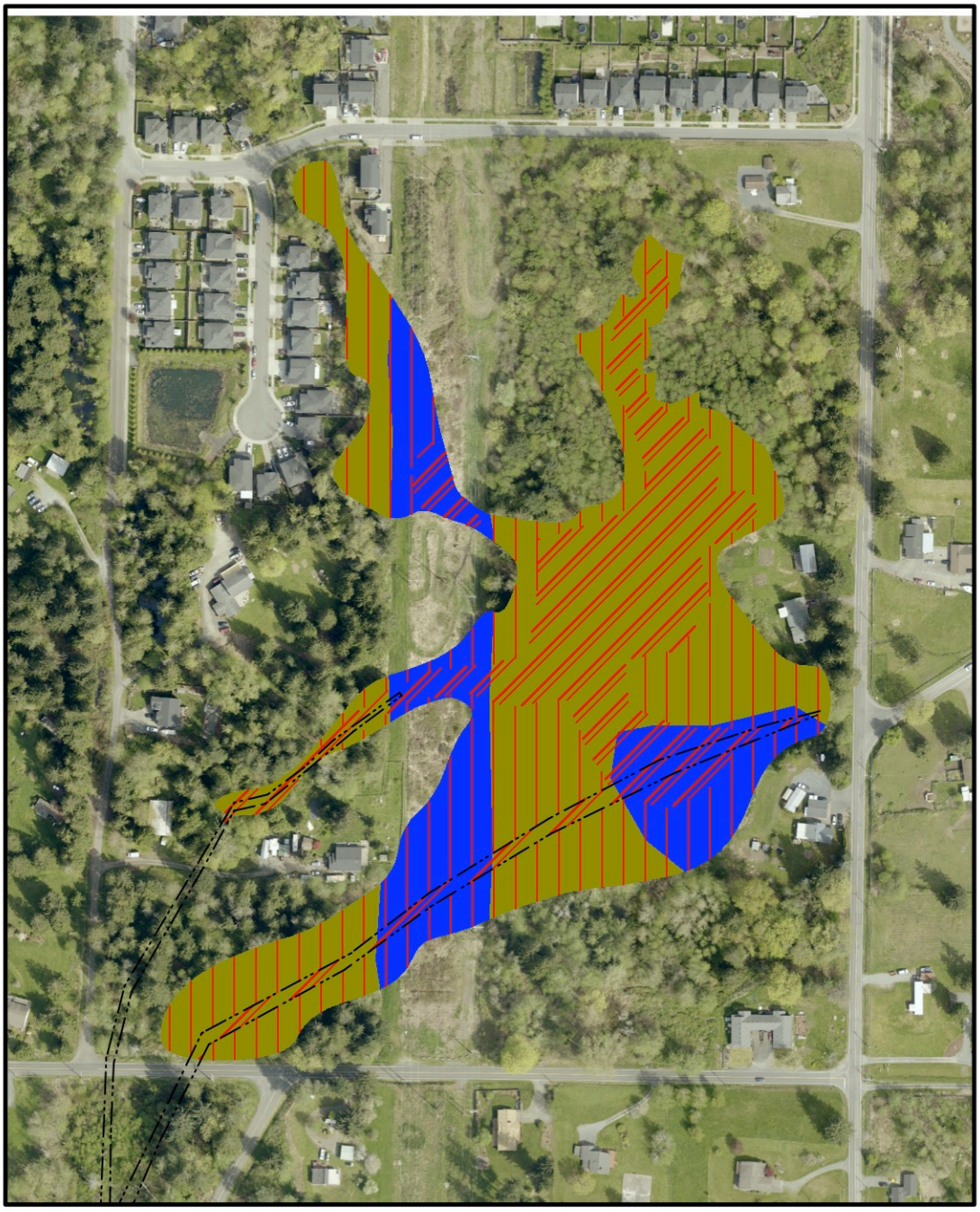
[136] https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf

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)* ☐ The lagoon retains some of its surface water at low tide during spring tides 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 in H 1.5 in the manual). ☐ 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 and Ocean Shores Blvd SW, including lands west of E. Oceans Shores Blvd SW. 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	

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 1- WETLAND A



LEGEND

- EMERGENT VEGETATION
- FORESTED VEGETATION
- SATURATED ONLY
- SEASONALLY FLOODED
- 150' FROM WL BOUNDARY
- INTERMITTENT STREAM

Scale 1" = 300'

0 150 300 450 600

Wetland Resources, Inc.

Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance

9505 19th Avenue S.E. Suite 106 Everett, Washington 98208

Phone: (425) 337-3174

Fax: (425) 337-3045

Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland A

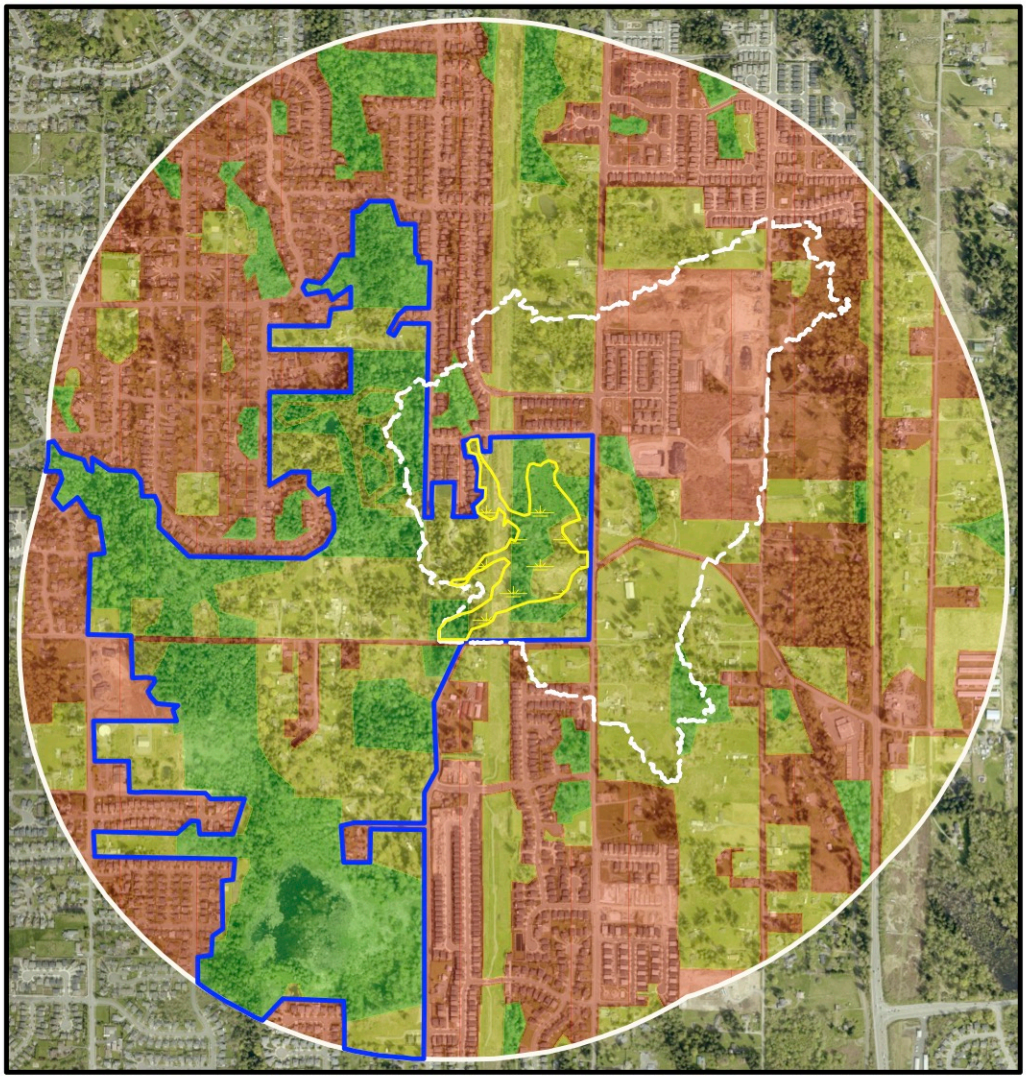
Figure A-1

WRI Job # 1

Rated by

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 2- WETLAND A



LEGEND

- RELATIVELY UNDISTURBED
- LOW/MOD. INTENSITY
- HIGH INTENSITY
- ACCESSIBLE HABITAT
- WETLAND
- 1 KM FROM WETLAND
- CONTRIBUTING BASIN

CONTRIBUTING BASIN AREA RELATIVE TO WETLAND UNIT IS 14:1

Scale 1" = 1,500'

0 1,500 3,000

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Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland A

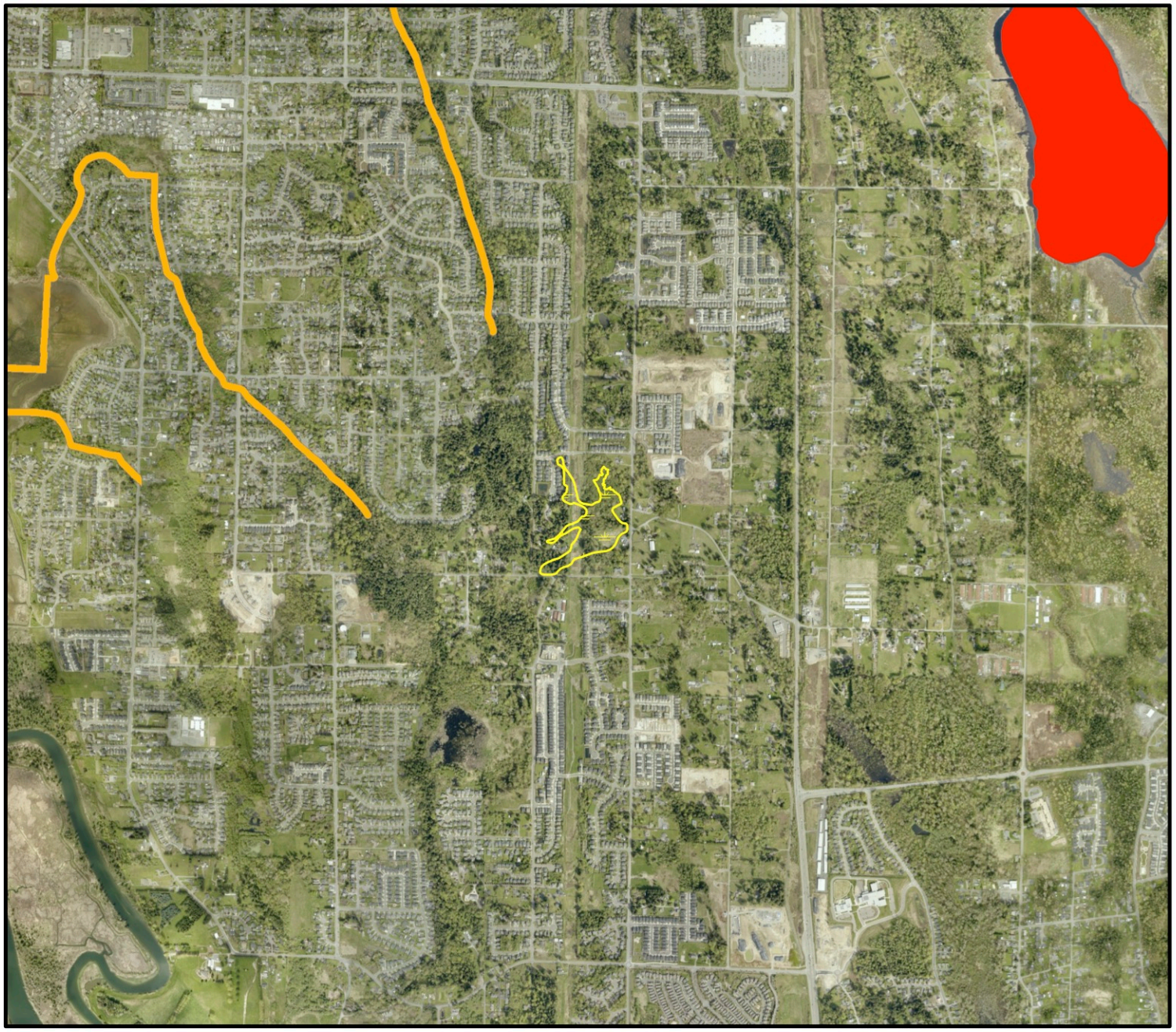
Figure A-2

WRI Job # 2

Rated b

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 3- WETLAND A



LEGEND

WETLAND

AQUATIC RESOURCES ON THE 303(d) LIST

CONTAINS TMDL

Scale 1" = 2,000'

0 2,000 4,000

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Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett, Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

WETLAND RATING
Wetland A

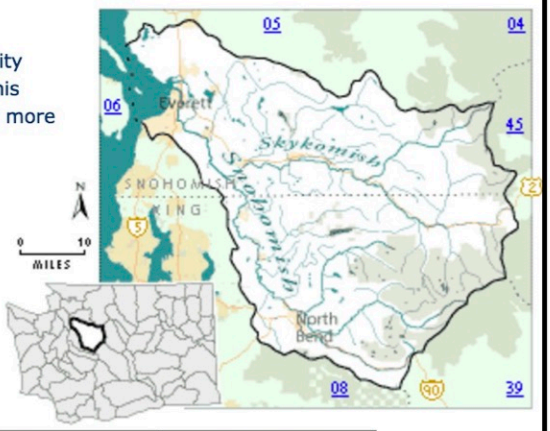
Figure A-3
WRI Job # 2
Rated b

WRIA 7: Snohomish

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

Counties

- King
- Snohomish



Waterbody Name	Pollutant(s)	Status**	TMDL Lead
Lake Loma	Total Phosphorus	Straight to implementation project under development	Tricia Shoblom 425-649-7288
Snohomish River	French Creek / Pilchuck River • Dissolved Oxygen • Temperature	Under development	Ralph Svrjcek 425-649-7165
	Dioxin	EPA approved	Ralph Svrjcek 425-649-7165
	Estuary • Ammonia • BOD	EPA approved	Ralph Svrjcek 425-649-7165
	Tributaries • Fecal Coliform Tributaries: • Allen Creek • Quilceda Creek • French Creek • Woods Creek • Pilchuck River • Marshlands (Wood Creek) {2}	EPA approved	Ralph Svrjcek 425-649-7165
	Snoqualmie River • Ammonia-N • BOD (5-day) • Fecal Coliform Temperature	EPA approved EPA approved Has an implementation plan	Ralph Svrjcek 425-649-7165

** ***Status*** *will be listed as one of the following: Approved by EPA, Under Development or Implementation*

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Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

WETLAND RATING
Wetland A

Figure A-4
WRI Job # 7
Rated by

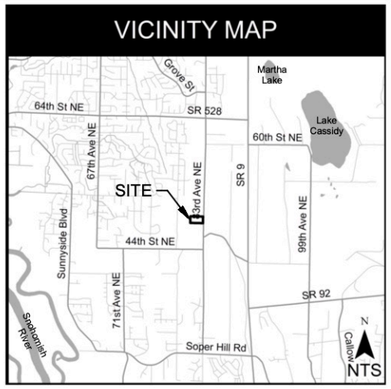
APPENDIX C

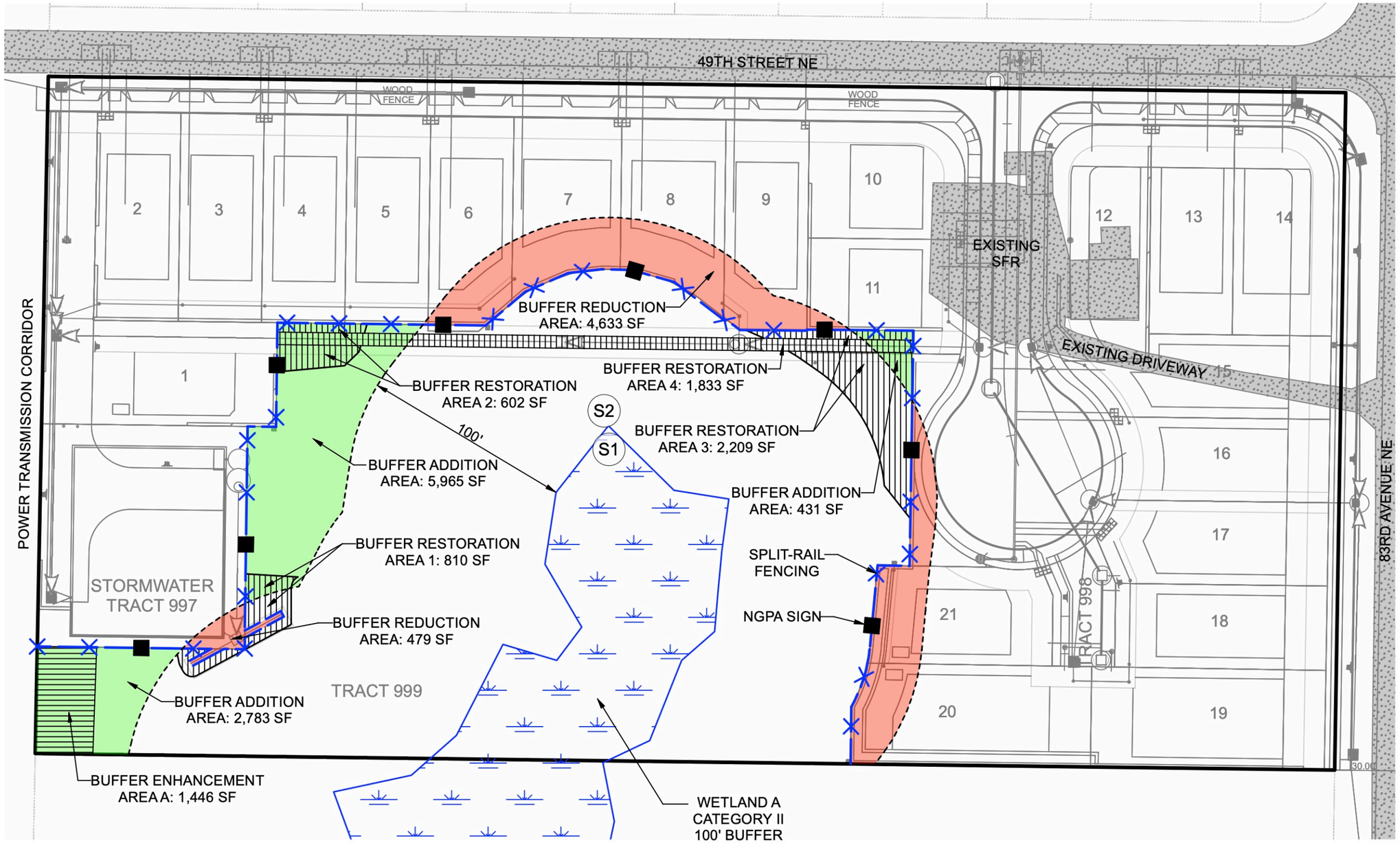
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

KEYSTONE LAND - TAYLOR LANE

PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.





Scale 1" = 50'

0 25 50 75 100

LEGEND

- WETLAND
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- TEMPORARY BUFFER IMPACT & RESTORATION
- BUFFER ENHANCEMENT
- FINAL BUFFER
- SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

Wetland Resources, Inc.
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Phone: (425) 337-3174
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Email: mailbox@wetlandresources.com

CRITICAL AREA STUDY & BUFFER MITIGATION PLAN MAP
TAYLOR LANE
MARYSVILLE, WA

Keystone Land, LLC
13805 Smokey Pt Blvd #102
Marysville, WA 98271

Sheet 1/1
WRI #: 23124
Drawn by: AW
Date: 1/26/2

Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services



GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
MARYSVILLE, WASHINGTON

ES-7386.01

15365 NE 90th Street, Suite 100 • Redmond, WA 98052 • (425) 449-4704
3130 Varney Lane, Suite 105 • Pasco, WA 99301 • (509) 905-0275
esnw.com

PREPARED FOR

KEYSTONE LAND, LLC

January 30, 2024
Updated March 27, 2024



Samuel E. Suruda, L.G.
Senior Staff Geologist



03/27/2024

Henry T. Wright, P.E.
Associate Principal Engineer

GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
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esnw.com

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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Earth Solutions NW LLC

Geotechnical Engineering, Construction
Observation/Testing and Environmental Services

January 30, 2024
Updated March 27, 2024
ES-7386.01

Keystone Land, LLC
13805 Smokey Point Boulevard, Suite 102
Marysville, Washington 98271

Attention: Joe Long

Dear Joe:

Earth Solutions NW, LLC (ESNW), is pleased to present this geotechnical engineering study to support the proposed residential development. Based on the results of our investigation, the proposed project is feasible from a geotechnical standpoint. Our study indicates the site is underlain primarily by competent native soil. This study has been updated to further evaluate slope stability for the currently proposed grading plan.

The site will be mass graded to create access drives and building pads. New structural fill should be placed on competent soil. The subgrade of the existing sloped areas of the site will need to be keyed and benched prior to placing new structural fill; drainage measures may be necessary prior to placing new fill on the benched subgrade. If earthwork activities occur during wet weather, additional drainage measures, cement treatment of native soil, and/or the use of select fill material will likely be necessary. After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Pertinent geotechnical recommendations are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC



Samuel E. Suruda, L.G.
Senior Staff Geologist

cc: Perkls Properties, LLC
Attention: Nate Perkl

Solid Ground Engineering
Attention: Tom Abbott, P.E.

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ES-7386.01

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GEOTECHNICAL ENGINEERING STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
4820 – 83RD AVENUE NORTHEAST
MARYSVILLE, WASHINGTON

ES-7386.01

INTRODUCTION

General

This geotechnical engineering study (study) was prepared for the proposed residential development to be constructed at 4820 – 83rd Avenue Northeast, in Marysville, Washington. The purpose of this study was to develop geotechnical recommendations for the project. This study was updated to further evaluate slope stability for the currently proposed grading plans. The following tasks were completed as part of our scope of services for this project:

- Observation of test pits and borings to characterize soil and groundwater conditions.
- Laboratory testing of soil samples collected at the test locations.
- Engineering analyses and recommendations for the proposed development.
- Preparation of this report.

Project Description

The proposed project is currently pursuing redevelopment of the existing parcel for the construction of a new 21-lot residential plat. The existing single-family residence will remain, and the remainder of the associated improvements will be redeveloped into 20 additional single-family residences. A stormwater detention vault is proposed for the southwestern corner of the site.

Based on the referenced civil plans, site grading will include fills of up to about 28 feet and cuts of up to about 6 feet to achieve the proposed finish grade elevations. Block retaining walls and rockeries are proposed to facilitate grade changes where necessary. Cuts of up to about 15 feet will be required to construct the proposed detention vault. Earthwork will also include installation of underground utilities.

Based on our experience with similar projects, the proposed residential structures will likely be two to three stories in height and constructed utilizing relatively lightly loaded wood framing supported on conventional foundations. Perimeter footing loads will likely be 1 to 2 kips per linear foot, isolated footing loads will be less than 20 kips, and we anticipate slab-on-grade loading of 150 pounds per square foot (psf).

If the above design assumptions either change or are incorrect, ESNW should be contacted to review the recommendations provided in this report. ESNW should review final designs to confirm that our geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is directly southwest of the intersection between 83rd Avenue Northeast and 49th Street Northeast in Marysville, Washington. The approximate site location is illustrated on Plate 1 (Vicinity Map). The property is comprised of a single tax parcel (Snohomish County Parcel Number 00590700013600), totaling roughly 4.66 acres. Topography across the subject site generally descends to the south-southwest, with some gently sloped areas and some moderately to steeply sloped areas. There is approximately 60 feet of total elevation change present across the parcel. The subject site is bordered by 83rd Avenue Northeast to the east, 49th Street Northeast to the north, a single-family residence to the south, and a powerline easement to the west. Vegetation within the subject site primarily consists of mature trees, forest undergrowth, landscaping, and some areas overgrown with invasive vegetation. We understand that a delineated Category 3 wetland is present on the south portion of the subject site, this study has been produced under the assumption that the buffers pertaining to the wetland will be maintained.

Subsurface

An ESNW representative observed, logged, and sampled five test pits on October 2, 2023. The test pits were excavated at accessible site locations, using an operator and mini trackhoe retained by ESNW. Additionally, two borings were completed on October 5, 2023 using an operator and machine retained by ESNW. The subsurface exploration was completed to evaluate soil and groundwater conditions within the proposed development area. The maximum exploration depth was approximately 46.5 feet below the existing ground surface (bgs). The primary purposes of the borings were to evaluate slope stability for the proposed regrading of the sloped area. The approximate locations of the explorations are depicted on Plate 2 (Subsurface Exploration Plan). Please refer to the logs provided in Appendix A for a more detailed description of subsurface conditions. Representative soil samples collected at the exploration locations were analyzed in general accordance with Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) methods and procedures.

Topsoil

Topsoil, where present, was observed at depths of 6 to 12 inches bgs. The topsoil was characterized by its dark brown color, the presence of fine organic material, and small root intrusions.

Fill

Fill was not encountered during our subsurface explorations. Based on the existing topography on site throughout the areas of improvements, we anticipate some fill may be encountered during mass grading. If significant amounts of fill are encountered within the subject site, ESNW should be evaluate the materials for potential applications on site.

Native Soil

Underlying the topsoil, native soil encountered at the test pit locations were observed primarily as medium dense to dense silty sand with varying amounts of gravel (USCS: SM). Density was observed to increase at depths of roughly four to six feet bgs across the subject site, and the soil was observed to transition to a weakly cemented and unweathered state. The borings indicate somewhat variable fines content and soil density within the upper 20 to 40 feet which was underlain by very dense silty sand at the bottom of each boring.

Geologic Setting

Geologic mapping identifies Vashon glacial till (Qvt) across the site and the nearby area. Vashon glacial till consists primarily of a nonsorted mixture of silt, sand, and sub-rounded to well-rounded gravels, commonly referred to as “hardpan.” The till was deposited directly from the glacier as it advanced over bedrock and older Quaternary sediment.

The referenced Web Soil Survey (WSS) identifies Tokul gravelly medial loam as the primary unit underlying the subject site. The Tokul series formed in hillslopes and glacial till plains. Based on our field observations, on-site native soils are similar to the typical makeup of glacial till but the variability encountered within the upper 20 to 40 feet may be more representative of transitional bed deposits.

Groundwater

Groundwater seepage was encountered at boring B-2 at a depth of approximately 18 feet, roughly at the transition from the loose silt material to the dense silty sand. Light groundwater seepage was also encountered at test pit location TP-3 at a depth of approximately two feet bgs. Groundwater seepage rates and elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. Groundwater seepage flow rates are typically higher during the winter, spring, and early summer months. Therefore, perched groundwater seepage should be expected in site excavations, particularly if excavations are made in winter, spring, and early summer months.

GEOLOGIC HAZARD AREAS EVALUATION

As part of this geotechnical engineering study, ESNW reviewed available geologic hazard mapping and the geologic hazard areas section of the Marysville Municipal Code. Based on review of the topographic survey, the site contains some areas with slope gradients of 15 to 40 percent.

Landslide Hazard

With respect to landslide hazards, section 22A.020.130 of the Marysville Municipal Code defines landslide hazard areas as follows:

(1) Low Hazard. Areas with slopes of less than 15 percent.

(2) Moderate Hazard. Areas with slopes of between 15 and 40 percent and that are underlain by soils consisting largely sand, gravel, bedrock or glacial till.

(3) High Hazard. Areas with slopes between 15 and 40 percent that are underlain by soils consisting largely of silt and clay, and all areas sloping more steeply than 40 percent.

(4) Very High Hazard. Areas with slopes over 40 percent and areas of known mappable landslide deposits.

Based on the above definition, the areas of the site with slopes between 15 and 40 percent classify as moderate to high landslide hazard areas.

The proposed project will include construction of mechanically stabilized earth (MSE) retaining walls within or near areas sloped between 15 and 40 percent. The subgrade of these sloped areas should be prepared in accordance with the recommendations in the *Slope Fill* section of this report. As part of the engineering of the proposed MSE walls, global stability analysis should be completed, because geogrid strengths and lengths may be dictated by global stability.

Based on the results of our study, it is our opinion that the risk of damage from the proposed project, both on-site and off-site, is minimal subject to the conditions set forth in this report, and the proposed project will not increase the risk of occurrence of a geologic hazard, and measures to reduce risks have been incorporated into the recommendations of this report.

Slope Stability Analysis

As part of preparation of this updated study, we evaluated slope stability within two representative critical cross-sections. Global slope stability analyses were completed using the GeoStudio Slope/W modeling program to reflect existing and proposed geometries in both static and seismic scenarios. The cross-section lines are depicted on Plate 2 (Subsurface Exploration Plan). Slope stability models and related modeling parameters are attached to this report.

Soil stratigraphy was modeled based on relatively conservative extrapolation of the conditions observed at the boring and test pit locations; soil strength parameters were based on relatively conservative estimates using published correlations in the referenced Geotechnical Design Manual (GDM). Soil cohesion values were applied for short-term seismic loading applications and reduced or eliminated (as applicable) for static loading conditions, generally consistent with the guidelines outlined in the referenced GDM. Soil strength parameters utilized in the stability models are outlined in the table below.

Our analyses indicate the proposed development and site modification will improve global slope stability – the project as planned will not decrease slope stability or pose an unreasonable threat to persons or property either on or off site. The slope stability analysis results suggest that the slope areas will maintain factors of safety of at least 1.2 in dynamic loading conditions and 1.5 in static conditions. The results of the slope stability analysis were also utilized to verify the proposed mechanically stabilized earth wall design (geogrid lengths, strengths, and intervals) will satisfy global stability.

In our opinion, the proposed development is considered feasible and acceptable from a geotechnical standpoint, and additional landslide hazard area mitigation measures are not necessary for this project. However, the most pertinent recommendations with respect to global slope stability for this site are regarding retaining wall foundation support and overall site drainage.

Erosion Hazard

With respect to erosion hazards, section 22.A.020.060 of the Marysville Municipal Code defines erosion hazard areas as follows:

(1) Low Hazard. Areas sloping less than 15 percent.

(2) Moderate Hazard. Areas sloping between 15 and 40 percent and underlain by soils that consist predominantly of silt, clay, bedrock or glacial till.

(3) High Hazard. Areas sloping between 15 and 40 percent that are underlain by soils consisting largely of sand and gravel, and all areas sloping more steeply than 40 percent.

Based on the above definition, the areas of the site with slopes between 15 and 40 percent classify as moderate erosion hazard areas.

During our visual slope reconnaissance, no signs of large-scale erosion features were observed. It is our opinion, with proper implementation of erosion control BMPs, the proposed development presents a low erosion hazard.

DISCUSSION AND RECOMMENDATIONS

General

Based on the results of our investigation, construction of the proposed residential development is feasible from a geotechnical standpoint. The primary geotechnical considerations associated with the proposed development include site preparation and earthwork, engineered slope cuts and fills, engineered retaining walls, utility installation, foundation support, slab-on-grade subgrade support, drainage, and the suitability of using on-site soils as structural fill.

The site will be mass graded to create access drives and building pads. New structural fill should be placed on competent soil. The subgrade of the existing sloped areas of the site will need to be keyed and benched prior to placing new structural fill; drainage measures may be necessary prior to placing new fill on the benched subgrade. If earthwork activities occur during wet weather, additional drainage measures, cement treatment of native soil, and/or the use of select fill material will likely be necessary. After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, and site clearing and stripping activities. Subsequent earthwork activities will involve mass site grading and installation of infrastructure and stormwater management improvements.

Temporary Erosion Control

The following temporary erosion and sediment control (TESC) best management practices (BMPs) are offered:

- Temporary construction entrances and drive lanes, consisting of at least six inches of quarry spalls, should be considered to both minimize off-site soil tracking and provide a stable access entrance surface. Placing geotextile fabric underneath the quarry spalls will provide greater stability, if needed.

- Silt fencing should be placed around the construction site perimeter.

- When not in use, soil stockpiles should be covered or otherwise protected.

- Temporary measures for controlling surface water runoff, such as interceptor trenches, sumps, or swales, should be installed prior to beginning earthwork activities.

- Dry soils disturbed during construction should be wetted to minimize dust and airborne soil erosion.

- When appropriate, permanent planting or hydroseeding will help to stabilize on-site soil.

Additional TESC BMPs, as specified by the project civil engineer and indicated on the plans, should be incorporated into construction activities. TESC BMPs may be modified during construction as site conditions require and as approved by the site erosion control lead.

Stripping

Topsoil was encountered within the upper 6 to 12 inches, and root intrusions generally extended below the topsoil into the upper weathered soil. Stripping may need to extend deeper where loose existing fill needs to be recompacted or removed and replaced with structural fill. The organic-rich topsoil should be stripped and segregated into a stockpile for later use on site or to haul off site. The material remaining immediately below the topsoil may have some root zones and will likely be variable in composition, density, and/or moisture content. The material exposed after initial topsoil stripping will likely not be suitable for direct structural support as is and will likely need to either be compacted in place or stripped and stockpiled for reuse as fill; depending on the time of year stripping occurs, the soil exposed below the topsoil may be too wet to compact and may need to be aerated or treated. ESNW should observe initial stripping activities to provide recommendations regarding stripping depths and material suitability.

Excavations and Slopes

Excavation activities on site are likely to expose medium dense to dense native soil within the upper four to six feet of existing grades. Based on the soil conditions observed at the test locations, the following maximum allowable temporary slope inclinations may be used. The applicable Federal Occupation Safety and Health Administration and Washington Industrial Safety and Health Act soil classifications are also provided:

- Areas exposing groundwater 1.5H:1V (Type C)
- Loose soil 1.5H:1V (Type C)
- Medium dense soil 1H:1V (Type B)
- Dense to very dense “hardpan” native soil 0.75H:1V (Type A)

Permanent slopes should be planted with vegetation to both enhance stability and minimize erosion and should maintain a gradient of 2H:1V or flatter. The presence of perched groundwater may cause localized sloughing of temporary slopes. An ESNW representative should observe temporary and permanent slopes to confirm the slope inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope recommendations, as necessary. If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations.

Slope Fill

Structural fill within sloping areas (where a “sloping area” is defined as an area inclined at 15 percent or steeper) should be placed on a level bench as depicted on Plate 3 (Slope Fill Detail). Benches must be “keyed” into the slope and subsequently filled and compacted with suitable structural fill before continuing to the next bench; the need for drainage below the new structural fill should be evaluated during construction. Sloping finish grades should be “overbuilt” using a bench-style fill and cut to the design gradient to ensure a compacted slope face is maintained. ESNW should observe structural fill placement to confirm subgrade conditions and provide additional drainage recommendations, as necessary.

In-situ and Imported Soil

The on-site soil is moisture sensitive, and successful use of the on-site soil as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Remedial measures may be necessary as part of site grading and earthwork activities. If the on-site soil cannot be successfully compacted, the use of an imported soil may be necessary. In our opinion, a contingency should be provided in the project budget for the export of soil that cannot be successfully compacted as structural fill, particularly if grading activities take place during periods of rainfall. In general, soils with appreciable fines contents (greater than 5 percent) typically degrade rapidly when exposed to periods of rainfall.

Imported soil intended for use as structural fill should consist of a well-graded, granular soil with a moisture content that is at (or slightly above) the optimum level. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Structural Fill

Structural fill is defined as compacted soil placed in foundation, slab-on-grade, roadway, permanent slope, retaining wall, and utility trench backfill areas. Structural fill placed and compacted during site grading activities should meet the following specifications and guidelines:

- Structural fill material — Granular soil*
- Moisture content — At or slightly above optimum**
- Relative compaction*** — 95 percent (Modified Proctor)
- Loose lift thickness (maximum) — 12 inches

* *Existing soil may not be suitable for use as structural fill unless at (or slightly above) the optimum moisture content at the time of placement and compaction.*
** *Soil shall not be placed dry of optimum and should be evaluated by ESNW during construction.*
*** *Relative compaction of 90 percent can be considered for mass grading activities and should be evaluated by ESNW during construction.*

With respect to underground utility installations and backfill, local jurisdictions may dictate the soil type(s) and compaction requirements. Areas of otherwise unsuitable material and debris should be removed from structural areas and replaced with structural fill.

Foundations

After completing earthwork activities in accordance with recommendations in this report, the proposed structures can be supported on conventional spread and continuous foundations bearing on undisturbed, competent native soil, compacted native soil, or new structural fill. If structural building pads are disturbed during wet weather, remediation measures such as cement treatment or overexcavation and replacement with rock may be necessary in some areas.

Provided the structures will be supported as described above, the following parameters may be used for design of the new foundations:

- Allowable soil bearing capacity — 2,500 psf
- Passive earth pressure — 300 pcf
- Coefficient of friction — 0.40

A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. The passive earth pressure and coefficient of friction values include a safety factor of 1.5. With structural loading as expected, total settlement in the range of one inch is anticipated, with differential settlement of about one-half inch. Most of the anticipated settlement should occur during construction as dead loads are applied.

Seismic Design

The 2018 International Building Code (2018 IBC) recognizes the most recent edition of the Minimum Design Loads for Buildings and Other Structures manual (ASCE 7-16) for seismic design, specifically with respect to earthquake loads. Based on the soil conditions encountered at the test pit and boring locations, the parameters and values provided below are recommended for seismic design per the 2018 IBC.

Parameter	Value
Site Class	C*
Mapped short period spectral response acceleration, S_S (*g*)	1.098
Mapped 1-second period spectral response acceleration, S_1 (*g*)	0.39
Short period site coefficient, F_a	1.2
Long period site coefficient, F_v	1.5
Adjusted short period spectral response acceleration, S_{MS} (*g*)	1.317
Adjusted 1-second period spectral response acceleration, S_{M1} (*g*)	0.585
Design short period spectral response acceleration, S_{DS} (*g*)	0.878
Design 1-second period spectral response acceleration, S_{D1} (*g*)	0.39

* *Assumes very dense soil conditions, encountered to a maximum depth of 46.5 feet bgs during the field exploration, remain very dense to at least 100 feet bgs. Based on our experience with the project geologic setting (glacial till) across the Puget Sound region, soil conditions are likely consistent with this assumption.*

Liquefaction

Liquefaction is a phenomenon that can occur within a soil profile as a result of an intense ground shaking or loading condition. Most commonly, liquefaction is caused by ground shaking during an earthquake. Sand or silt soil profiles that are loose, cohesionless, and present below the groundwater table are most susceptible to liquefaction. During the ground shaking, the soil contracts, and porewater pressure increases. The increased porewater pressure occurs quickly and without sufficient time to dissipate, resulting in water flowing upward to the ground surface and a liquefied soil condition. Soil in a liquefied condition possesses very little shear strength in comparison to the drained condition, which can result in a loss of foundation support for structures.

In our opinion, the liquefaction potential for the site should be considered low. The soil composition, relative density, and the absence of an established shallow groundwater table are the primary bases for this opinion.

Slab-on-Grade Floors

Slab-on-grade floors for the proposed structures should be supported on firm and unyielding subgrades. Unstable or yielding subgrade areas should be recompacted or overexcavated and replaced with suitable structural fill prior to slab construction.

A capillary break consisting of a minimum of four inches of free-draining crushed rock or gravel should be placed below each slab. The free-draining material should have a fines content of 5 percent or less (percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of a vapor barrier below the slab should be considered. If a vapor barrier is to be utilized, it should be a material specifically designed for use as a vapor barrier and should be installed per manufacturer specifications.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for design:

- Active earth pressure (unrestrained condition) — 35 pcf (equivalent fluid)
- At-rest earth pressure (restrained condition) — 55 pcf
- Traffic surcharge* (passenger vehicles) — 70 psf (rectangular distribution)
- Passive earth pressure — 300 pcf (equivalent fluid)
- Coefficient of friction — 0.40
- Seismic surcharge — 8H psf**

* *Where applicable.*
** *Where H equals the retained height (in feet).*

The above passive earth pressure and coefficient of friction values include a safety factor of 1.5 and are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along with the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of less permeable soil if desired. A sheet drain may be considered instead of free-draining backfill. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 4. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Based on our field observations, groundwater seepage should be anticipated within site excavations, particularly utility and stormwater detention excavations. Temporary measures to control surface water runoff and groundwater seepage during construction will be critical to minimizing the potential for on-site soils to degrade. ESNW should be consulted during preliminary grading to identify areas of seepage and provide recommendations to reduce the potential for seepage-related instability.

Finish grades must be designed to direct surface drain water away from structures and slopes. Water must not be allowed to pond adjacent to structures or slopes. Grades adjacent to buildings should be sloped away from the buildings at a gradient of either at least 2 percent for a horizontal distance of 10 feet or the maximum allowed by adjacent structures. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 5.

Infiltration Evaluation

As indicated in the *Subsurface* section of this report, the native soil encountered during our fieldwork is generally considered to be low permeability. Additionally, the site is generally moderately sloped, and stability of proposed retaining walls and slopes could be negatively impacted by concentrated stormwater infiltration. From a geotechnical standpoint, stormwater infiltration on the subject site should be considered infeasible due to the slope gradients on site, and the relative low permeability of the site soil.

Stormwater Vault Design

We understand a stormwater vault will be constructed to manage stormwater. Interflow groundwater seepage into the vault excavation should be anticipated, particularly if completed during the wet season. The vault foundations should be supported on dense native soil or crushed rock placed on dense native soil. Final stormwater vault designs must incorporate adequate buffer space from property boundaries such that temporary excavations to construct the vault structure can be successfully completed. Perimeter drains should be installed around the vault and conveyed to an approved discharge point.

The following parameters can be used for stormwater vault design:

- Allowable soil bearing capacity (dense native soil) 5,000 psf
- Active earth pressure (unrestrained) 35 pcf
- Active earth pressure (unrestrained, hydrostatic) 80 pcf
- At-rest earth pressure (restrained) 55 pcf
- At-rest earth pressure (restrained, hydrostatic) 100 pcf
- Coefficient of friction 0.40
- Passive earth pressure 300 pcf
- Seismic Surcharge 8H*

* *Where H equals the retained height.*

The vault walls should be backfilled with free-draining material or suitable sheet drainage that extends along the height of the walls. The upper one foot of the wall backfill can consist of a less permeable soil, if desired. A perforated drain pipe should be placed along the base of the wall and connected to an approved discharge location. If the elevation of the vault bottom is such that gravity flow to an outlet is not possible, the portion of the vault below the drain should be designed to include hydrostatic pressure. Design values accounting for hydrostatic pressure are included above. The above passive earth pressure and coefficient of friction values include a safety factor of 1.5.

ESNW should observe grading operations for the vault and the subgrade conditions prior to concrete forming and pouring to confirm conditions are as anticipated, and to provide supplemental recommendations as necessary. Additionally, ESNW should be contacted to review final vault designs to confirm that appropriate geotechnical parameters have been incorporated.

Vault backfill should be placed and compacted in accordance with the recommendations provided in the *Structural Fill* section of this report.

Preliminary Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and/or placement of thicker crushed rock or structural fill sections, prior to pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of two inches of hot-mix asphalt (HMA) placed over four inches of crushed rock base (CRB).

- A minimum of two inches of HMA placed over three inches of asphalt-treated base (ATB).

Heavier traffic areas generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. For preliminary design purposes, the following pavement sections for occasional truck traffic and access roadways may be considered:

- Three inches of HMA placed over six inches of CRB, or;

- Three inches of HMA placed over four and one-half inches of ATB.

The HMA, ATB, and CRB materials should conform to WSDOT and/or the City of Marysville specifications. All soil base material should be compacted to a relative compaction of 95 percent, based on the laboratory maximum dry density as determined by ASTM D1557. Final pavement design recommendations, including recommendations for heavy traffic areas, access roads, and frontage improvement areas, can be provided once final traffic loading has been determined. Road standards utilized by the City may supersede the recommendations provided in this report.

If an inverted crown will be used for roadway surfaces, drainage measures should be included in the design to prevent accumulation of water in the subgrade adjacent to catch basins. Such measures may consist of finger drains extending from the catch basins.

Utility Support and Trench Backfill

In our opinion, the on-site soil will generally be suitable for support of utilities. However, remedial measures may be necessary in some areas to provide support for utilities, such as overexcavation and replacement with structural fill and/or placement of geotextile fabric. Groundwater seepage may be encountered within utility excavations, and caving of trench walls may occur where groundwater or unsuitable fill are encountered. Depending on the time of year and conditions encountered, dewatering and/or temporary trench shoring may be necessary during utility excavation and installation.

The on-site soil may not be suitable for use as structural backfill throughout utility trench excavations unless the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Moisture conditioning of the soil may be necessary at some locations prior to use as structural fill. Each section of the utility lines must be adequately supported in the bedding material. Utility trench backfill should be placed and compacted to the structural fill specifications previously detailed in this report or to the applicable specifications of the presiding jurisdiction.

LIMITATIONS

This study has been prepared for the exclusive use of Keystone Land, LLC and its representatives. The recommendations and conclusions provided in this study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. No warranty, express or implied, is made. Variations in the subsurface conditions observed at the test locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this study if variations are encountered.

Additional Services

ESNW should have an opportunity to review the final design with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.

REFERENCES

The following documents were reviewed as part of the preparation of this study:

- Preliminary Road and Grading, prepared by Solid Ground Engineering, dated January 26, 2024

- Geologic Map of the Lake Stevens Quadrangle, Snohomish County, Washington, prepared by James P. Minard, dated 1983

- Chapter 22E.10 Article IV – Geologic Hazard Areas, provided the City of Marysville, updated September 26, 2023

- Washington State Department of Transportation GDM – Chapter 5

- Stormwater Management Manual for Western Washington, adopted by the City of Marysville, dated 2019

- WSS, provided by the USDA, Natural Resources Conservation Service



Reference:
Snohomish County, Washington
OpenStreetMap.org

NORTH

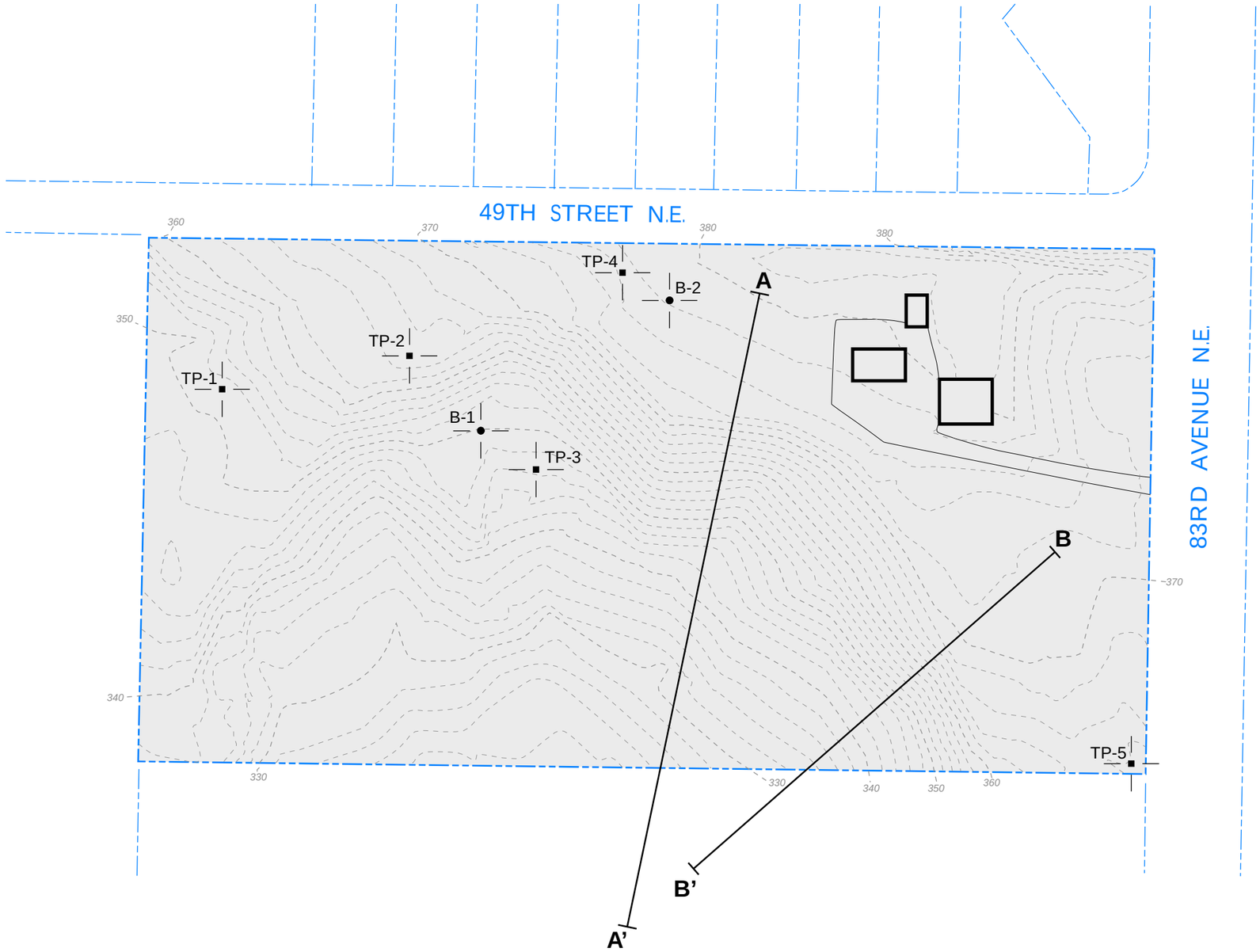
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Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/02/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 1



LEGEND

- TP-1 — Approximate Location of ESNW Test Pit, Proj. No. ES-7386.01, Oct. 2023
- B-1 — Approximate Location of ' ESNW Boring, Proj. No. ES-7386.01, Oct. 2023
- Subject Site
- Existing Building
- Cross-Section

NORTH

1"=100' 0 50 100 200 Scale in Feet

NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

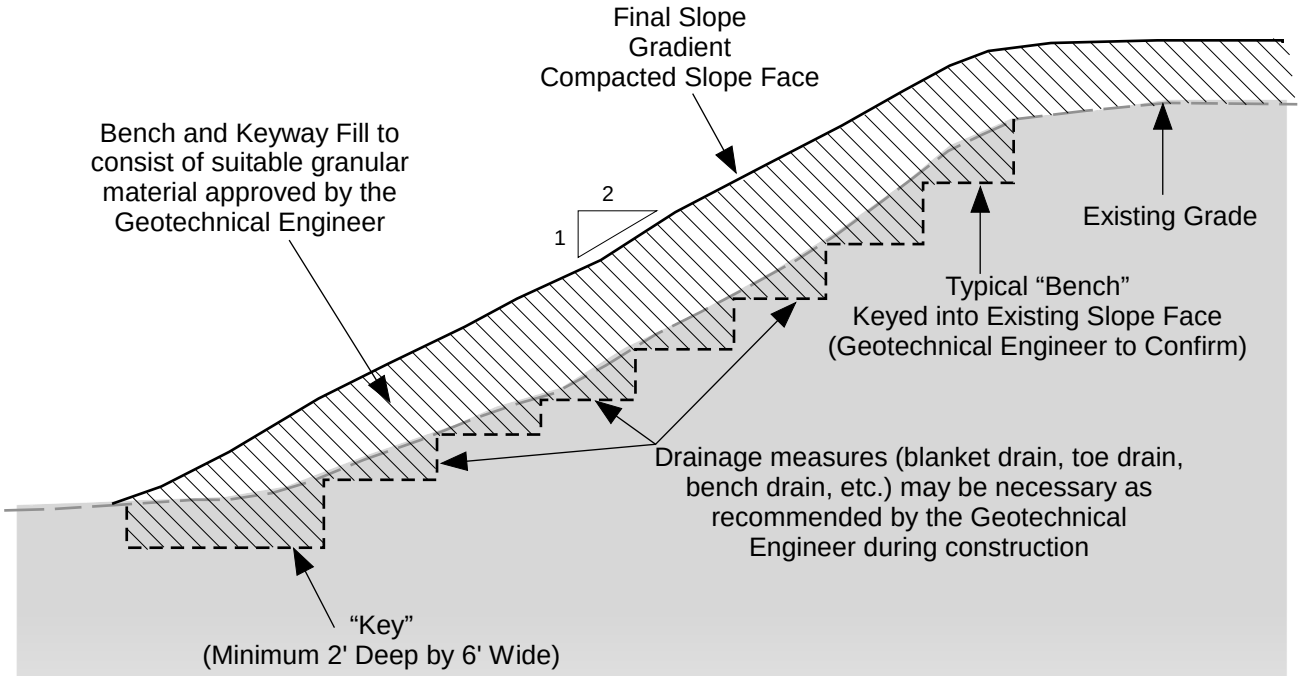
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Subsurface Exploration Plan
Taylor 83rd
Marysville, Washington

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Drawn	MRS
Checked	SES
Date	03/27/2024
Proj. No.	7386.01
Plate	2

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING



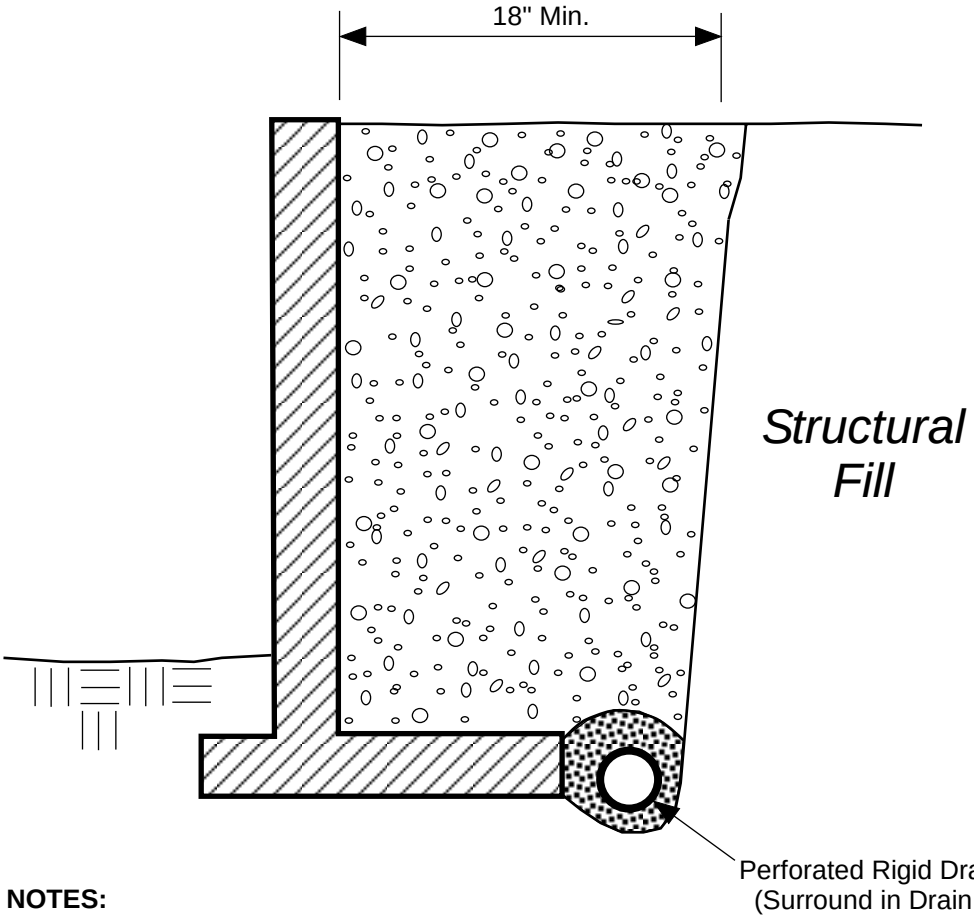
NOTES:

- Slope should be stripped of topsoil and unsuitable materials prior to excavating Keyway or benches.
- Benches will typically be equal to a bulldozer blade width of approximately 8 feet but shall be at least 4 feet.
- Final slope gradient should be 2H : 1V.
- Final slope face should be densified by over-building with compacted fill and trimming back to shape or by compaction with a bulldozer or vibratory drum roller.
- Planting or hydroseeding slope face with a rapid growth deep-rooted vegetative mat will reduce erosion potential of slope area.
- Use of pegged-in-place jute matting or geotechnical fabric will help maintain the seed and mulch in place until the root system has an opportunity to germinate.
- Structural fill should be placed in thin loose lifts not exceeding 12 inches in thickness. Each lift should be compacted to no less than the degree specified in the "Site Preparation and Earthwork" section of this report. No additional lift should be placed until compaction is achieved.

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Slope Fill Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 3



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Free-draining Structural Backfill

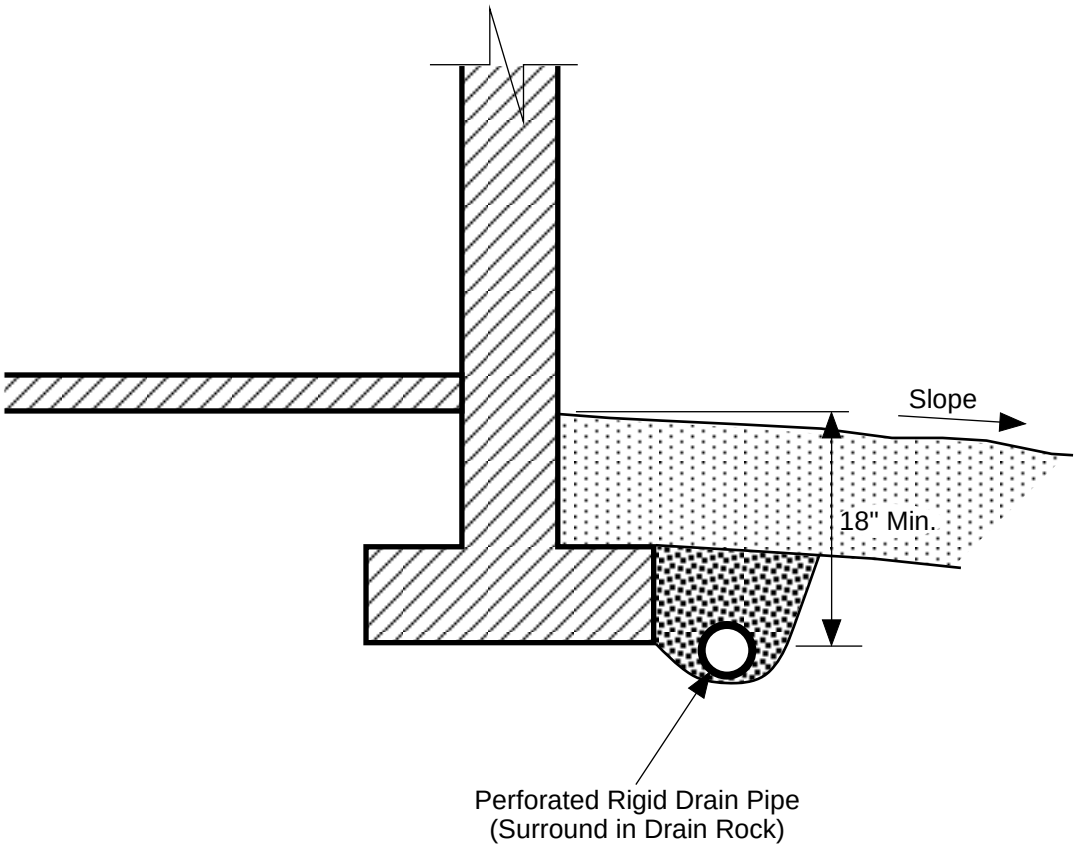
1-inch Drain Rock

Earth Solutions NW LLC

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Retaining Wall Drainage Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 4



NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Surface Seal: native soil or other low-permeability material.

1-inch Drain Rock

Earth Solutions NW LLC
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Footing Drain Detail
Taylor 83rd
Marysville, Washington

Drawn MRS	Date 11/06/2023	Proj. No. 7386.01
Checked SES	Date Nov. 2023	Plate 5

Appendix A

Subsurface Exploration Logs

ES-7386.01

Subsurface conditions at the subject site were explored on October 2, 2023 and October 5, 2023. Five test pits were excavated and two borings were advanced using equipment and operators retained by ESNW. The approximate locations of the explorations are illustrated on Plate 2 of this study. The boring and test pit logs are provided in this Appendix. The maximum exploration depth was approximately 46.5 feet bgs.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

Coarse-Grained Soils - More Than 50% Retained on No. 200 Sieve	Gravels - More Than 50% of Coarse Fraction Retained on No. 4 Sieve	< 5% Fines	GW	Well-graded gravel with or without sand, little to no fines
			GP	Poorly graded gravel with or without sand, little to no fines
		> 12% Fines	GM	Silty gravel with or without sand
			GC	Clayey gravel with or without sand
	Sands - 50% or More of Coarse Fraction Passes No. 4 Sieve	< 5% Fines	SW	Well-graded sand with or without gravel, little to no fines
			SP	Poorly graded sand with or without gravel, little to no fines
		> 12% Fines	SM	Silty sand with or without gravel
			SC	Clayey sand with or without gravel
Fine-Grained Soils - 50% or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML	Silt with or without sand or gravel; sandy or gravelly silt
			CL	Clay of low to medium plasticity; lean clay with or without sand or gravel; sandy or gravelly lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt with or without sand or gravel; sandy or gravelly elastic silt
			CH	Clay of high plasticity; fat clay with or without sand or gravel; sandy or gravelly fat clay
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils
Fill			FILL	Made Ground

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch

Damp - Perceptible moisture, likely below optimum MC

Moist - Damp but no visible water, likely at/near optimum MC

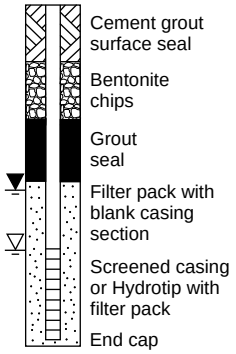
Wet - Water visible but not free draining, likely above optimum MC

Saturated/Water Bearing - Visible free water, typically below groundwater table

Symbols

ATD = At time of drilling

Static water level (date)



Terms Describing Relative Density and Consistency

Coarse-Grained Soils:

Density	SPT blows/foot
Very Loose	< 4
Loose	4 to 9
Medium Dense	10 to 29
Dense	30 to 49
Very Dense	≥ 50

Fine-Grained Soils:

Consistency	SPT blows/foot
Very Soft	< 2
Soft	2 to 3
Medium Stiff	4 to 7
Stiff	8 to 14
Very Stiff	15 to 29
Hard	≥ 30

Test Symbols & Units

Fines = Fines Content (%)

MC = Moisture Content (%)

DD = Dry Density (pcf)

Str = Shear Strength (tsf)

PID = Photoionization Detector (ppm)

OC = Organic Content (%)

CEC = Cation Exchange Capacity (meq/100 g)

LL = Liquid Limit (%)

PL = Plastic Limit (%)

PI = Plasticity Index (%)

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

Modifier Definitions

Percentage by Weight (Approx.)	Modifier
< 5	Trace (sand, silt, clay, gravel)
5 to 14	Slightly (sandy, silty, clayey, gravelly)
15 to 29	Sandy, silty, clayey, gravelly
≥ 30	Very (sandy, silty, clayey, gravelly)

Classifications of soils in this geotechnical report and as shown on the exploration logs are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D2487 and D2488 were used as an identification guide for the Unified Soil Classification System.

Earth Solutions NW LLC
15365 NE 90th Street, Suite 100
Redmond, WA 98052
Office (425) 449-4704 | esnw.com
Branch Office: Pasco, WA

BORING NUMBER B-1

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.04009 **LONGITUDE** -122.12093
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0							Brown silty SAND, dense, damp
	SS	67	18-25-31 (56)	MC = 9.1			
5							-becomes gray
	SS	56	5-10-14 (24)	MC = 13.9			-becomes medium dense, moist
	SS	56	7-21-26 (47)	MC = 9.9			-becomes dense to very dense
10					SM		
	SS	89	12-26-27 (53)	MC = 10.2			
15							-becomes dense
	SS	78	13-17-20 (37)	MC = 16.4			
20							20.0

(Continued Next Page)

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LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	78	13-7-12 (19)	MC = 13.0	SM		Gray silty SAND, medium dense, damp
							-increasing sand
25	SS	78	7-9-11 (20)	MC = 14.1			-becomes moist
30	SS	78	5-5-5 (10)	MC = 13.2 Fines = 43.0			[USDA Classification: gravelly LOAM]
35	SS	100	4-5-10 (15)	MC = 13.2			
40							40.0

(Continued Next Page)

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DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.04009 **LONGITUDE** -122.12093
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SS	100	23-50/6"	MC = 12.4	SM		Gray silty SAND, very dense, moist
45	SS	80	28-40-50/3"	MC = 10.5			
							46.5

Boring terminated at 46.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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BORING NUMBER B-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.03983 **LONGITUDE** -122.12118
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					SM		Brown silty SAND, dense, damp
	SS	89	6-15-19 (34)	MC = 8.5			
5							-becomes medium dense
	SS	67	2-7-20 (27)	MC = 13.5			
							6.5
					ML		Dark brown sandy SILT, loose, wet
	SS	100	2-4-4 (8)	MC = 16.4			
10							
	SS	100	3-6-6 (12)	MC = 19.6 Fines = 60.6			[USDA Classification: slightly gravelly LOAM]
							-becomes gray
15							
	SS	100	5-5-3 (8)	MC = 14.4			
							18.0
					SM		Gray silty SAND, dense, moist to wet
20							-groundwater seepage

(Continued Next Page)

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BORING NUMBER B-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/5/23 **COMPLETED** 10/5/23 **GROUND ELEVATION**
DRILLING CONTRACTOR Geologic Drill Partners **LATITUDE** 48.03983 **LONGITUDE** -122.12118
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF DRILLING**
SURFACE CONDITIONS Duff **AFTER DRILLING**

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
20	SS	67	17-22-22 (44)	MC = 12.7			Gray silty SAND, dense, moist to wet *(continued)*
							-becomes very dense
25	SS	100	50/6"	MC = 16.1	SM		
30	SS	100	50/5"	MC = 12.0			
							30.5

Boring terminated at 30.5 feet below existing grade. Groundwater seepage encountered at 18.0 feet during drilling. Boring backfilled with bentonite.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-1

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03987 **LONGITUDE** -122.12192
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, root intrusions to 2'
				1.0	Brown silty SAND, medium dense, moist
		MC = 8.5			
					-becomes dense
5					
					-becomes gray, increasing sand
			SM		
		MC = 10.7 Fines = 47.1			[USDA Classification: slightly gravelly LOAM]
10		MC = 9.0		10.0	

Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-2

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.04008 **LONGITUDE** -122.12145
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, shallow root intrusions
					1.0
					Brown silty SAND, medium dense, moist
		MC = 8.6			
					-becomes gray, dense
5			SM		
					-becomes very dense
10		MC = 9.9			10.0
					Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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TEST PIT NUMBER TP-3

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03979 **LONGITUDE** -122.12097
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff on slope **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL
				0.5	Dark brown silty SAND, loose, wet
		MC = 29.2 Fines = 38.8			-light groundwater seepage at 2' [USDA Classification: gravelly LOAM]
			SM		
5					-becomes medium dense, moist
		MC = 15.8			
					-becomes dense, weakly cemented
		MC = 13.0		7.0	

Test pit terminated at 7.0 feet below existing grade. Groundwater seepage encountered at 2.0 feet during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Branch Office: Pasco, WA

TEST PIT NUMBER TP-4

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd
DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**
EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.04012 **LONGITUDE** -122.12098
LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**
NOTES ▽ **AT TIME OF EXCAVATION**
SURFACE CONDITIONS Duff **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, minimal root intrusions
0.5					Brown silty SAND, medium dense, damp
		MC = 7.0			
5			SM		-becomes dense, moist, weakly cemented
9.0		MC = 9.6			

Test pit terminated at 9.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

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Branch Office: Pasco, WA

TEST PIT NUMBER TP-5

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd

DATE STARTED 10/2/23 **COMPLETED** 10/2/23 **GROUND ELEVATION**

EXCAVATION CONTRACTOR NW Excavating **LATITUDE** 48.03944 **LONGITUDE** -122.11980

LOGGED BY SES **CHECKED BY** HTW **GROUND WATER LEVEL:**

NOTES ▽ **AT TIME OF EXCAVATION**

SURFACE CONDITIONS **AFTER EXCAVATION**

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			TPSL		Dark brown TOPSOIL, root intrusions to 2'
				0.5	Brown silty SAND with gravel, medium dense, moist
		MC = 9.5 Fines = 16.2			[USDA Classification: gravelly loamy coarse SAND]
5		MC = 10.5	SM		-becomes gray, dense
					-weakly cemented
10		MC = 10.4		10.0	

Test pit terminated at 10.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

LIMITATIONS: Ground elevation (if listed) is approximate; the test location was not surveyed. Coordinates are approximate and based on the WGS84 datum. Do not rely on this test log as a standalone document. Refer to the text of the geotechnical report for a complete understanding of subsurface conditions.

Appendix B

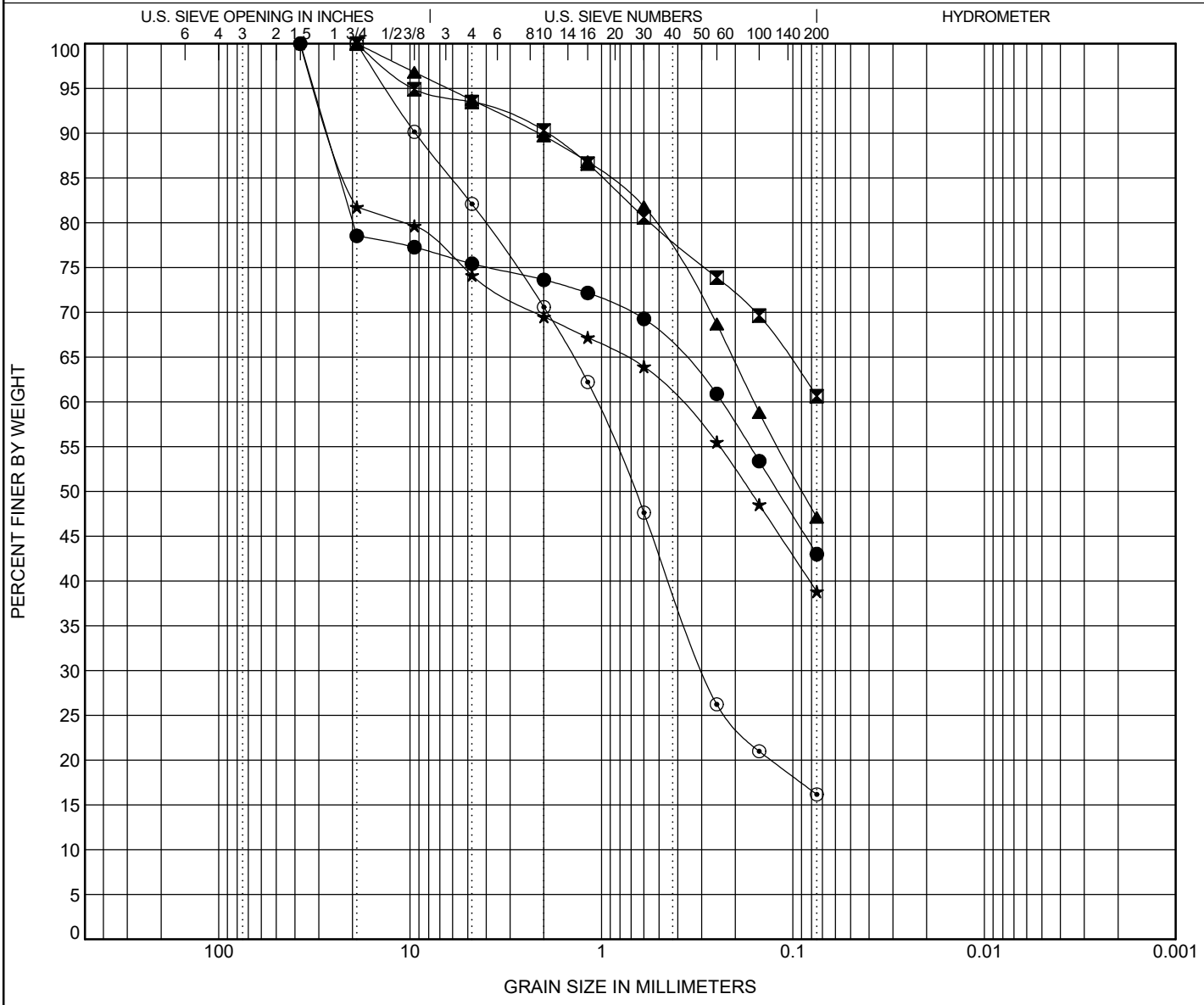
Laboratory Test Results

ES-7386.01

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Redmond, WA 98052
Office (425) 449-4704 | esnw.com
Branch Office: Pasco, WA

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-7386.01 **PROJECT NAME** Taylor 83rd



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	B-01	30.00ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		
⊠	B-02	10.00ft.	USDA: Dk Brown Slightly Gravelly Loam. USCS: Sandy ML.		
▲	TP-01	6.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: SM.		
★	TP-03	2.00ft.	USDA: Dk Brown Gravelly Loam. USCS: SM with Gravel.		
⊙	TP-05	2.00ft.	USDA: Brown Gravelly Loamy Coarse Sand. USCS: SM with Gravel.		

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	B-01	30.0ft.	37.5	0.235						43.0	
⊠	B-02	10.0ft.	19							60.6	
▲	TP-01	6.0ft.	19	0.159						47.1	
★	TP-03	2.0ft.	37.5	0.399						38.8	
⊙	TP-05	2.0ft.	19	1.065	0.292					16.2	

GRAIN SIZE USDA ES-7386.01 TAYLOR 83RD.GPJ GINT US LAB.GDT 10/25/23

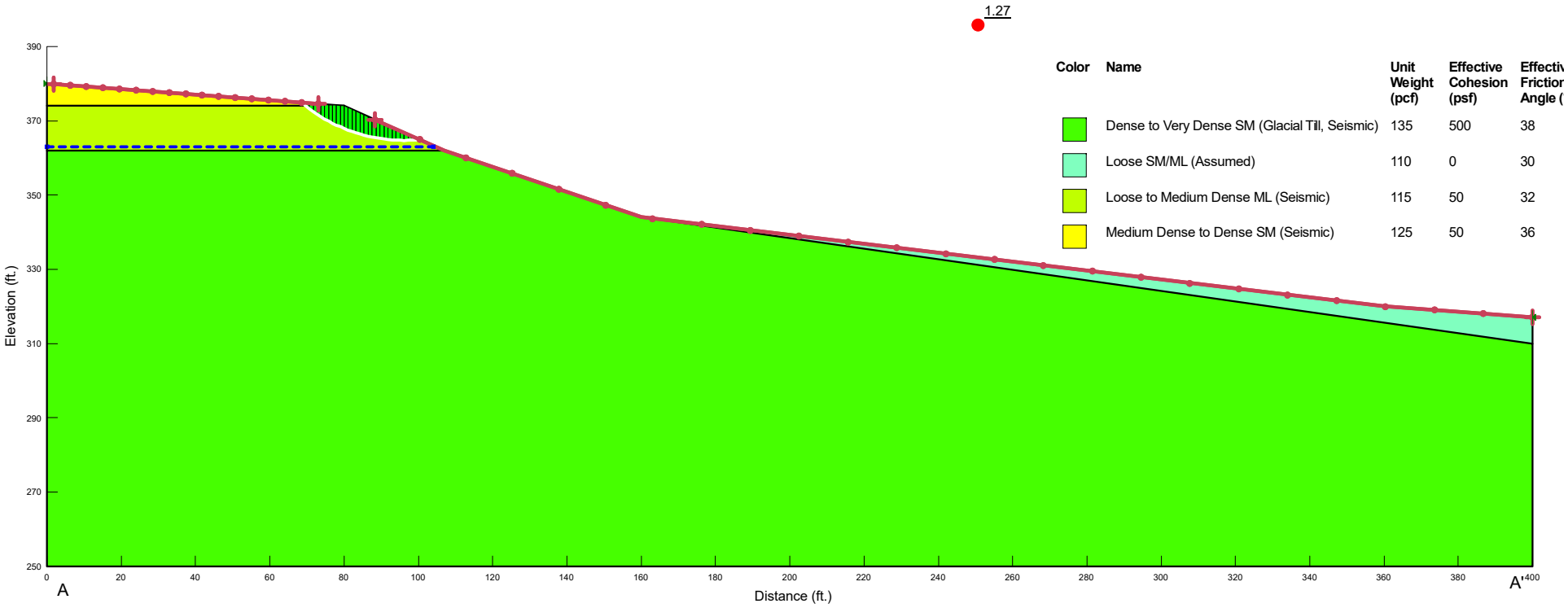
Appendix C

Slope Stability Analysis Results

ES-7386.01

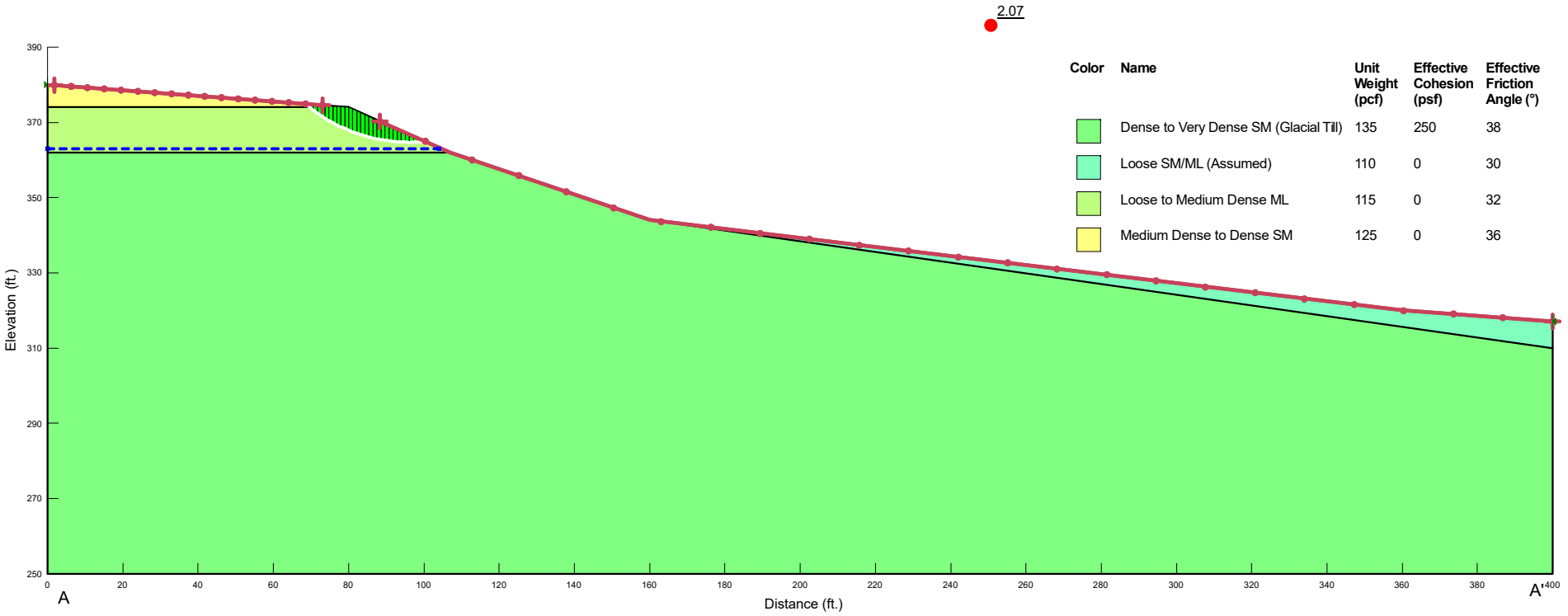
ES-7386.02
Taylor 83rd
HTW

Existing Condition A-A'
Seismic



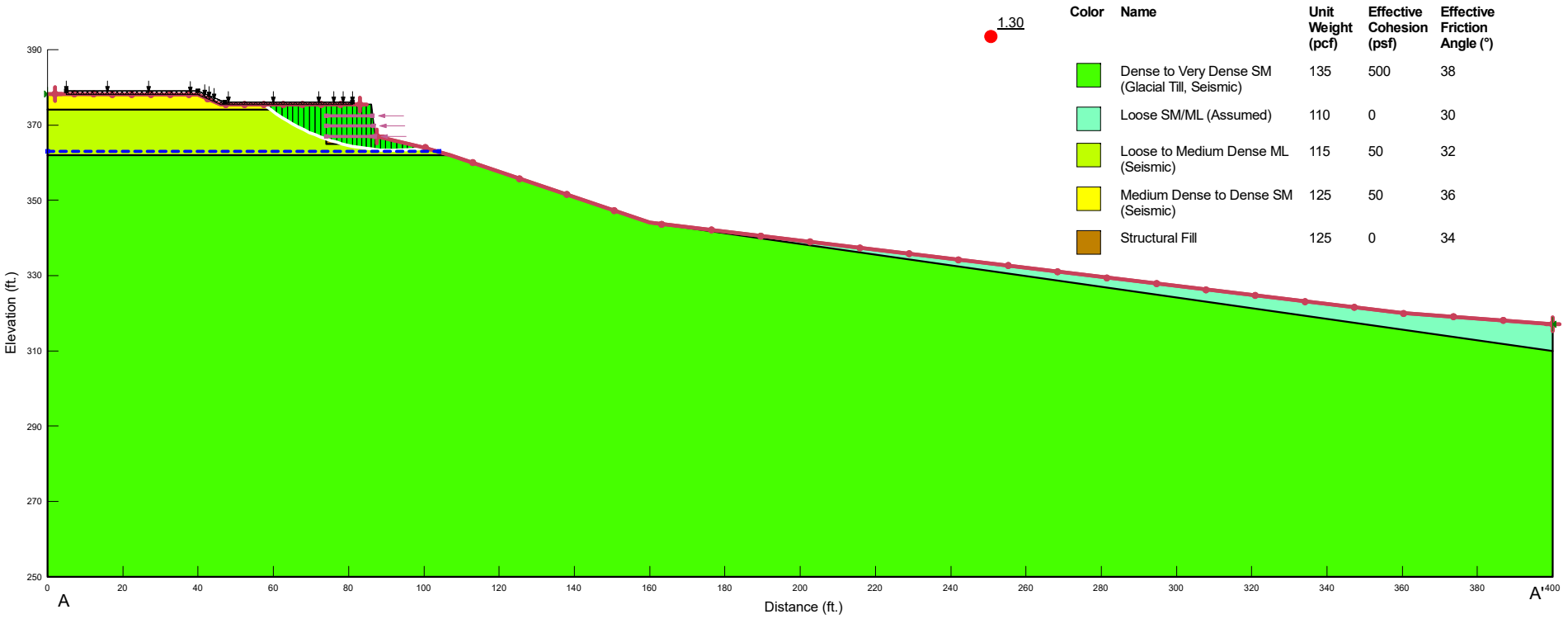
ES-7386.02
Taylor 83rd
HTW

Existing Condition A-A'
Static



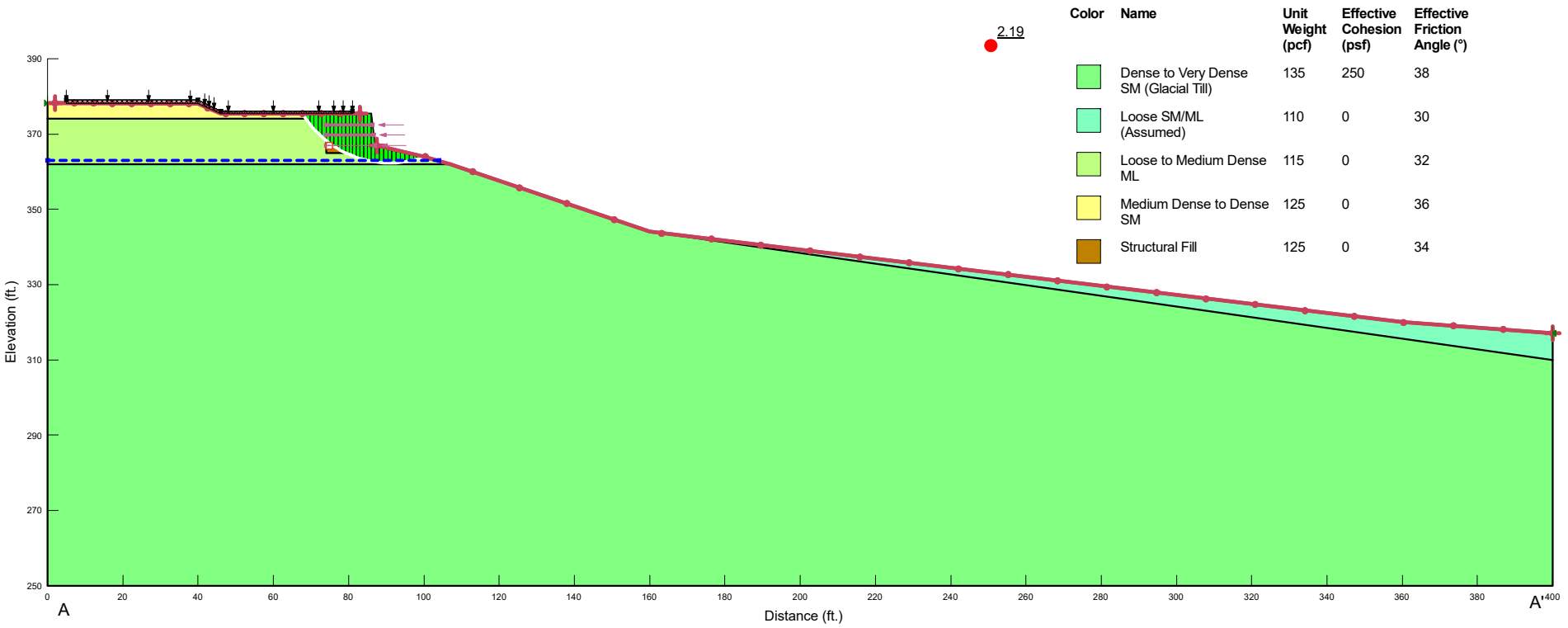
ES-7386.02
Taylor 83rd
HTW

Proposed Condition A-A'
Seismic



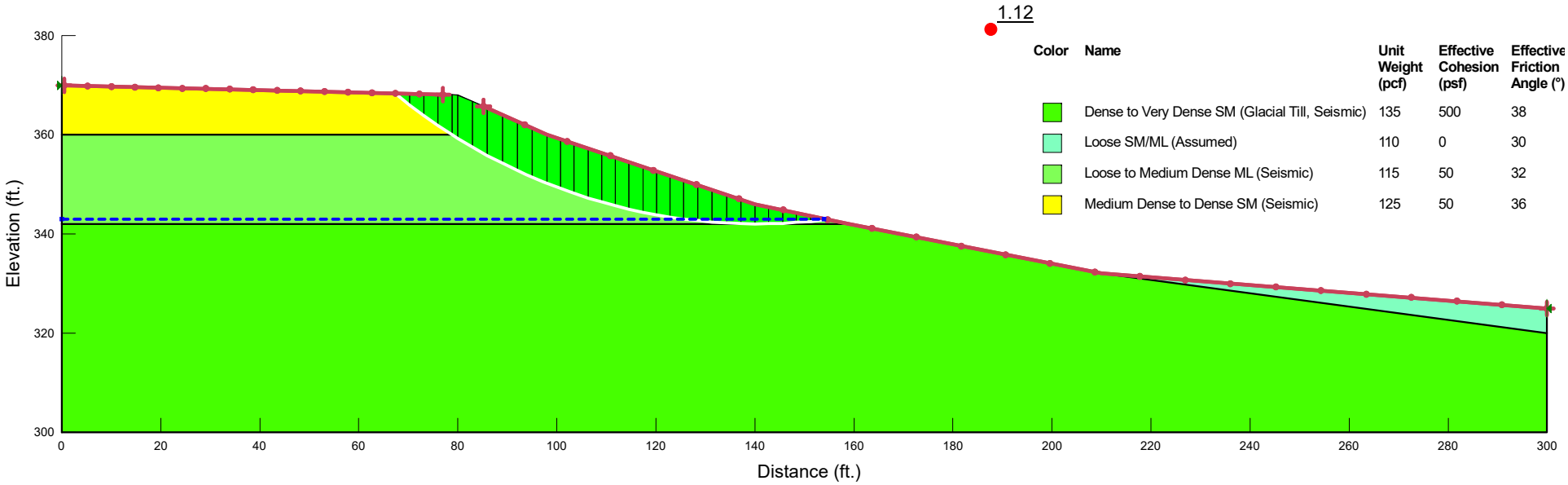
ES-7386.02
Taylor 83rd
HTW

Proposed Condition A-A'
Static



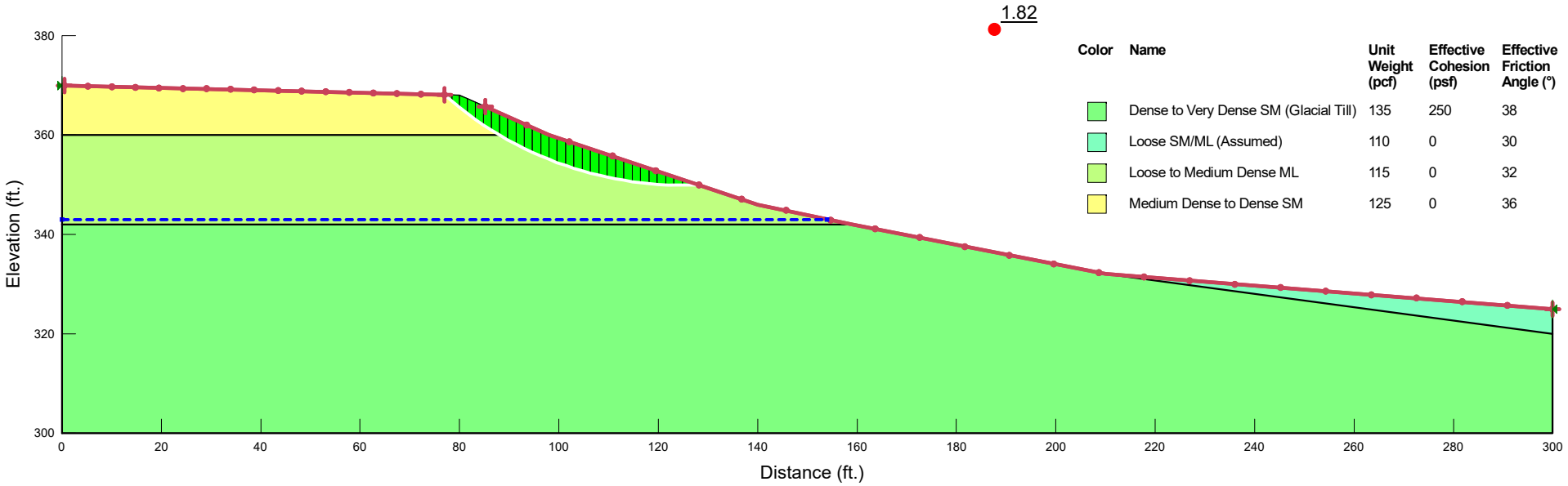
ES-7386.02
Taylor 83rd
HTW

Existing Condition B-B'
Seismic



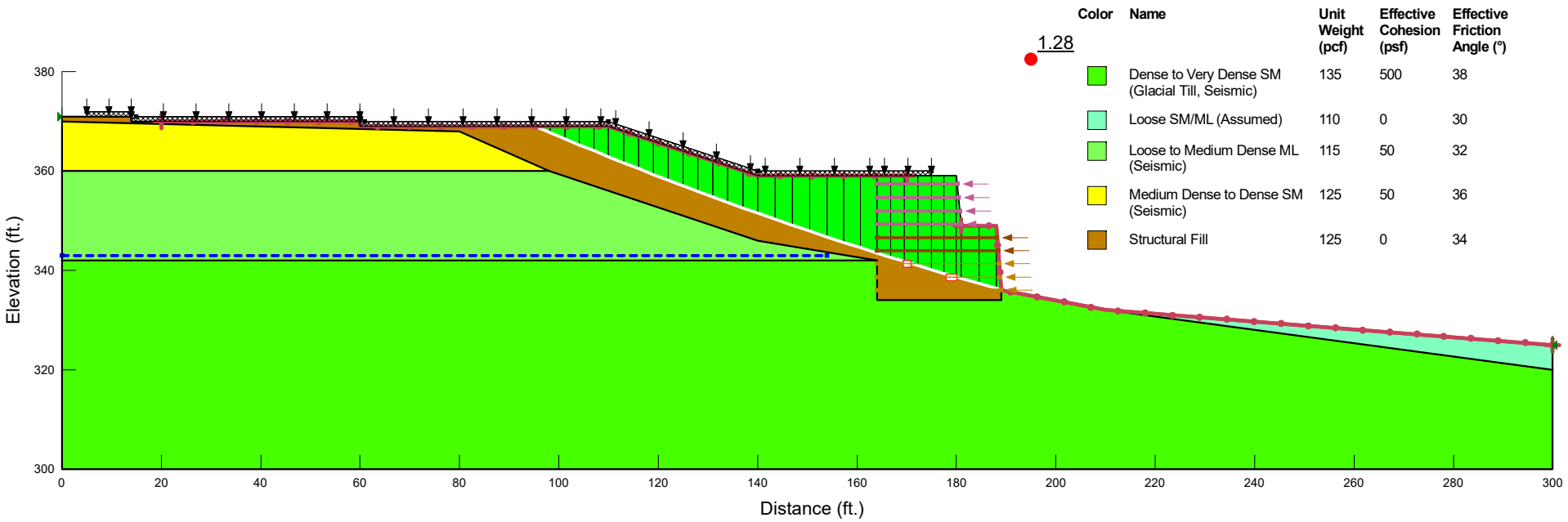
ES-7386.02
Taylor 83rd
HTW

Existing Condition B-B'
Static



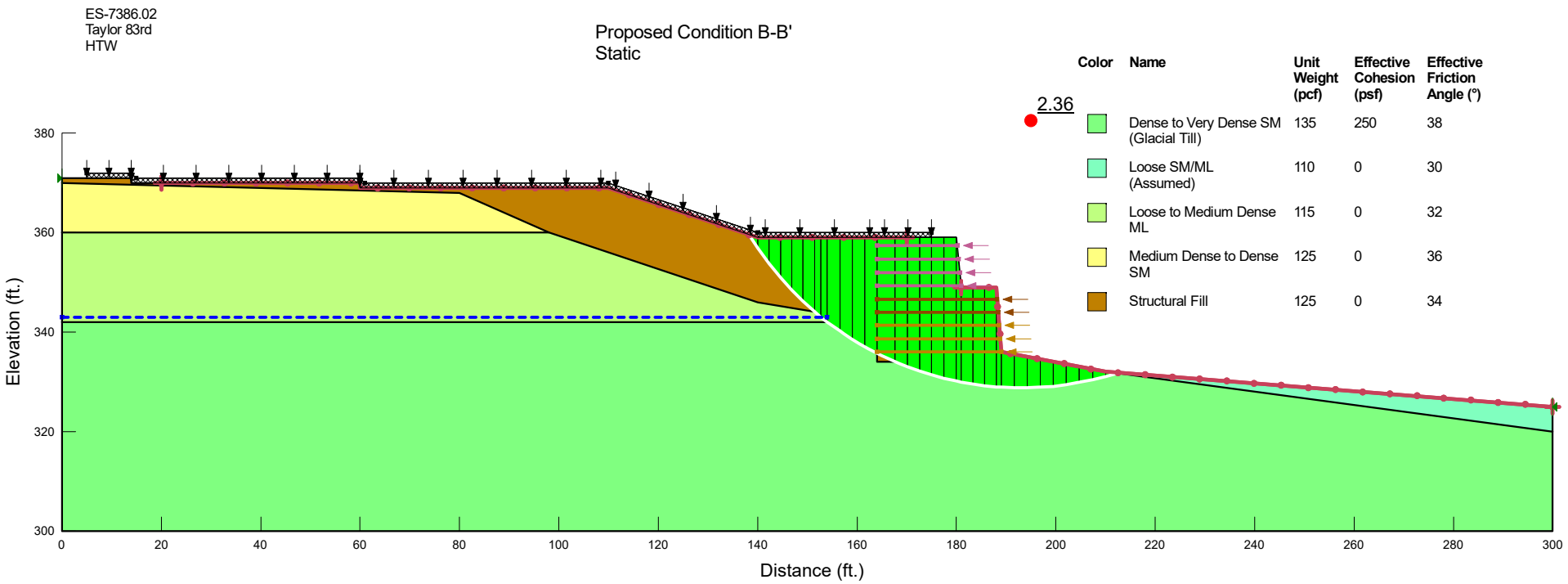
ES-7386.02
Taylor 83rd
HTW

Proposed Condition B-B'
Seismic



ES-7386.02
Taylor 83rd
HTW

Proposed Condition B-B'
Static



Existing A-A' Seismic

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File Information

File Version: 11.00
Title: Taylor 83rd A-A'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 37
Date: 03/27/2024
Time: 09:53:47 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd A-A'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 09:53:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Existing A-A' Seismic

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Medium Dense to Dense SM (Seismic)

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 36 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Loose to Medium Dense ML (Seismic)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till, Seismic)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1.7774, 379.86669) ft
Left-Zone Right Coordinate: (73, 374.525) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (88.34954, 370.28909) ft
Right-Zone Right Coordinate: (400, 317) ft
Right-Zone Increment: 24

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 380) ft
Right Coordinate: (400, 317) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	363 ft
Coordinate 2	104 ft	363 ft

Seismic Coefficients

Horz Seismic Coef.: 0.28

Geometry

Name: Existing Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	380 ft
Point 2	80 ft	374 ft
Point 3	160 ft	344 ft
Point 4	360 ft	320 ft
Point 5	400 ft	317 ft
Point 6	0 ft	250 ft
Point 7	400 ft	250 ft
Point 8	0 ft	374 ft
Point 9	0 ft	362 ft
Point 10	107 ft	362 ft
Point 11	400 ft	310 ft

Regions

	Material	Points	Area
Region 1	Dense to Very Dense SM (Glacial Till, Seismic)	10,3,11,7,6,9	35,923 ft²
Region 2	Loose SM/ML (Assumed)	4,3,11,5	660 ft²
Region 3	Loose to Medium Dense ML (Seismic)	2,10,9,8	1,122 ft²
Region 4	Medium Dense to Dense SM (Seismic)	1,2,8	240 ft²

Slip Results

Slip Surfaces Analysed: 1991 of 2125 converged

Current Slip Surface

Slip Surface: 1,882
Factor of Safety: 1.27
Volume: 119.11865 ft³
Weight: 13,743.312 lbf
Resisting Moment: 406,674.91 lbf·ft
Activating Moment: 320,292.06 lbf·ft
Resisting Force: 8,953.4112 lbf
Activating Force: 7,053.1895 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (100.45488, 364.90894) ft
Entry: (68.548588, 374.85886) ft
Radius: 42.99183 ft
Center: (96.294288, 407.69898) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	69.073438 ft	374.42943 ft	-713.54134 psf	9.1024973 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 2	70.118374 ft	373.60075 ft	-661.80683 psf	48.436806 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 3	71.158545 ft	372.82663 ft	-613.47812 psf	81.74851 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 4	72.198716 ft	372.09973 ft	-568.0978 psf	111.32018 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 5	73.238887 ft	371.41722 ft	-525.48834 psf	138.09133 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 6	74.279059 ft	370.77662 ft	-485.49584 psf	162.89604 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 7	75.31923 ft	370.17579 ft	-447.98609 psf	186.48786 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 8	76.359401 ft	369.61285 ft	-412.84143 psf	209.55624 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 9	77.399572 ft	369.08613 ft	-379.95829 psf	232.73495 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 10	78.439743 ft	368.59417 ft	-349.2452 psf	256.60231 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Slice 11	79.479914 ft	368.13567 ft	-320.62111 psf	281.67246 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 12	80.538286 ft	367.70259 ft	-293.58346 psf	298.94519 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 13	81.614859 ft	367.29497 ft	-268.13578 psf	308.06211 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 14	82.691431 ft	366.91984 ft	-244.71657 psf	318.09507 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 15	83.768004 ft	366.57632 ft	-223.27028 psf	328.60623 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 16	84.844576 ft	366.26361 ft	-203.74778 psf	338.93812 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 17	85.921148 ft	365.98102 ft	-186.10579 psf	348.20657 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 18	86.997721 ft	365.72795 ft	-170.30629 psf	355.32236 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 19	88.074293 ft	365.50385 ft	-156.3161 psf	359.05221 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 20	89.150866 ft	365.30828 ft	-144.10652 psf	358.12388 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 21	90.227438 ft	365.14084 ft	-133.65297 psf	351.3694 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 22	91.304011 ft	365.00119 ft	-124.93479 psf	337.88729 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 23	92.380583 ft	364.88907 ft	-117.93497 psf	317.19221 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 24	93.457155 ft	364.80426 ft	-112.64004 psf	289.31599 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 25	94.533728 ft	364.74659 ft	-109.03989 psf	254.82917 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 26	95.6103 ft	364.71596 ft	-107.1277 psf	214.76995 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 27	96.686873 ft	364.71231 ft	-106.89984 psf	170.49191 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 28	97.763445 ft	364.73563 ft	-108.35591 psf	123.4656 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Slice 29	98.840018 ft	364.78597 ft	-111.49863 psf	75.082894 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 30	99.91659 ft	364.86342 ft	-116.33396 psf	26.510046 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Existing A-A' Static

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File Information

File Version: 11.00
Title: Taylor 83rd A-A'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 37
Date: 03/27/2024
Time: 09:53:47 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd A-A'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 09:53:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Existing A-A' Static

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Medium Dense to Dense SM

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 36 °
Phi-B: 0 °

Loose to Medium Dense ML

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 38 °
Phi-B: 0 °

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1.7774, 379.86669) ft
Left-Zone Right Coordinate: (73, 374.525) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (88.34954, 370.28909) ft
Right-Zone Right Coordinate: (400, 317) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 380) ft
Right Coordinate: (400, 317) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	363 ft
Coordinate 2	104 ft	363 ft

Geometry

Name: Existing Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	380 ft
Point 2	80 ft	374 ft
Point 3	160 ft	344 ft
Point 4	360 ft	320 ft
Point 5	400 ft	317 ft
Point 6	0 ft	250 ft
Point 7	400 ft	250 ft
Point 8	0 ft	374 ft
Point 9	0 ft	362 ft
Point 10	107 ft	362 ft
Point 11	400 ft	310 ft

Regions

	Material	Points	Area
Region 1	Dense to Very Dense SM (Glacial Till)	10,3,11,7,6,9	35,923 ft²
Region 2	Loose SM/ML (Assumed)	4,3,11,5	660 ft²
Region 3	Loose to Medium Dense ML	2,10,9,8	1,122 ft²
Region 4	Medium Dense to Dense SM	1,2,8	240 ft²

Slip Results

Slip Surfaces Analysed: 1992 of 2125 converged

Current Slip Surface

Slip Surface: 1,882
Factor of Safety: 2.07
Volume: 119.11865 ft³
Weight: 13,743.312 lbf
Resisting Moment: 359,012.85 lbf·ft
Activating Moment: 173,566.83 lbf·ft
Resisting Force: 7,872.9056 lbf
Activating Force: 3,804.5381 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (100.45488, 364.90894) ft
Entry: (68.548588, 374.85886) ft
Radius: 42.99183 ft
Center: (96.294288, 407.69898) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	69.073438 ft	374.42943 ft	0 psf	27.140291 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 2	70.118374 ft	373.60075 ft	-661.80683 psf	67.997615 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 3	71.158545 ft	372.82663 ft	-613.47812 psf	106.37332 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 4	72.198716 ft	372.09973 ft	-568.0978 psf	142.19079 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 5	73.238887 ft	371.41722 ft	-525.48834 psf	175.96981 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 6	74.279059 ft	370.77662 ft	-485.49584 psf	208.14921 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 7	75.31923 ft	370.17579 ft	-447.98609 psf	239.09341 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 8	76.359401 ft	369.61285 ft	-412.84143 psf	269.09671 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 9	77.399572 ft	369.08613 ft	-379.95829 psf	298.38572 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 10	78.439743 ft	368.59417 ft	-349.2452 psf	327.12012 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 11	79.479914 ft	368.13567 ft	-320.62111 psf	355.39219 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 12	80.538286 ft	367.70259 ft	-293.58346 psf	371.49781 psf	0 psf	0 psf	Loose to Medium Dense ML

Slice 13	81.614859 ft	367.29497 ft	-268.13578 psf	374.78014 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 14	82.691431 ft	366.91984 ft	-244.71657 psf	376.52509 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 15	83.768004 ft	366.57632 ft	-223.27028 psf	376.4616 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 16	84.844576 ft	366.26361 ft	-203.74778 psf	374.28756 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 17	85.921148 ft	365.98102 ft	-186.10579 psf	369.68286 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 18	86.997721 ft	365.72795 ft	-170.30629 psf	362.32574 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 19	88.074293 ft	365.50385 ft	-156.3161 psf	351.91239 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 20	89.150866 ft	365.30828 ft	-144.10652 psf	338.17868 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 21	90.227438 ft	365.14084 ft	-133.65297 psf	320.92265 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 22	91.304011 ft	365.00119 ft	-124.93479 psf	300.02564 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 23	92.380583 ft	364.88907 ft	-117.93497 psf	275.46945 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 24	93.457155 ft	364.80426 ft	-112.64004 psf	247.34692 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 25	94.533728 ft	364.74659 ft	-109.03989 psf	215.86385 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 26	95.6103 ft	364.71596 ft	-107.1277 psf	181.33084 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 27	96.686873 ft	364.71231 ft	-106.89984 psf	144.145 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 28	97.763445 ft	364.73563 ft	-108.35591 psf	104.7629 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 29	98.840018 ft	364.78597 ft	-111.49863 psf	63.667248 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 30	99.91659 ft	364.86342 ft	-116.33396 psf	21.331015 psf	0 psf	0 psf	Loose to Medium Dense ML

Proposed A-A' Seismic

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File Information

File Version: 11.00
Title: Taylor 83rd A-A'
Created By: Henry Wright
Last Edited By: Henry Wright
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File Name: Taylor 83rd A-A'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 09:53:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed A-A' Seismic

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Structural Fill

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Medium Dense to Dense SM (Seismic)

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 36 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Loose to Medium Dense ML (Seismic)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till, Seismic)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

Miragrid 5XT

Type: TenCate

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (2, 378.19) ft
Left-Zone Right Coordinate: (83, 375.4) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (87.4382, 366.89888) ft
Right-Zone Right Coordinate: (400, 317) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 378.2) ft
Right Coordinate: (400, 317) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	363 ft
Coordinate 2	104 ft	363 ft

Seismic Coefficients

Horz Seismic Coef.: 0.28

Reinforcement Lines

Reinforcement Line 1

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (87, 367) ft
Inside Point: (74, 367) ft
Length: 13 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf

Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 2

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (86.680995, 369.67964) ft
Inside Point: (74.000005, 369.67964) ft
Length: 12.68099 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 3

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (86.36512, 372.33299) ft
Inside Point: (74, 372.33299) ft
Length: 12.36512 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	5 ft	379 ft
	40 ft	379 ft
	47 ft	376 ft
	81 ft	376 ft

Geometry

Name: Proposed Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	160 ft	344 ft
Point 2	360 ft	320 ft
Point 3	400 ft	317 ft
Point 4	0 ft	250 ft
Point 5	400 ft	250 ft
Point 6	0 ft	374 ft
Point 7	0 ft	362 ft
Point 8	107 ft	362 ft
Point 9	400 ft	310 ft
Point 10	0 ft	378.2 ft
Point 11	40 ft	378 ft
Point 12	46 ft	375.4 ft
Point 13	86 ft	375.4 ft
Point 14	87 ft	367 ft
Point 15	100 ft	364 ft
Point 16	87 ft	365 ft
Point 17	74 ft	365 ft
Point 18	74 ft	375.4 ft
Point 19	74 ft	374 ft

Regions

	Material	Points	Area
Region 1	Dense to Very Dense SM (Glacial Till, Seismic)	8,1,9,5,4,7	35,923 ft²
Region 2	Loose SM/ML (Assumed)	2,1,9,3	660 ft²
Region 3	Medium Dense to Dense SM (Seismic)	10,11,12,18,19,6	219.4 ft²
Region 4	Loose to Medium Dense ML (Seismic)	7,8,15,14,16,17,19,6	979.5 ft²
Region 5	Structural Fill	13,14,16,17,19,18	131 ft²

Slip Results

Slip Surfaces Analysed: 1816 of 2125 converged

Current Slip Surface

Slip Surface: 1,382
Factor of Safety: 1.30
Volume: 248.5678 ft³
Weight: 30,087.446 lbf
Resisting Moment: 1,187,828.1 lbf·ft
Activating Moment: 916,823.42 lbf·ft
Resisting Force: 20,630.303 lbf
Activating Force: 15,930.585 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (100.33195, 363.90516) ft
Entry: (57.518879, 375.4) ft
Radius: 54.883921 ft
Center: (91.944961, 418.14447) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	58.426165 ft	374.7 ft	-730.43321 psf	104.27435 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 2	60.066778 ft	373.47664 ft	-654.0589 psf	155.98024 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 3	61.533433 ft	372.46507 ft	-590.90604 psf	201.05499 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 4	63.000088 ft	371.52158 ft	-532.00367 psf	241.24071 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 5	64.466743 ft	370.64211 ft	-477.09807 psf	278.27938 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 6	65.933398 ft	369.82315 ft	-425.97063 psf	313.73319 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 7	67.400053 ft	369.06168 ft	-378.43195 psf	349.04827 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 8	68.866708 ft	368.35506 ft	-334.31714 psf	385.59381 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 9	70.333363 ft	367.70097 ft	-293.48213 psf	424.67664 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 10	71.800018 ft	367.09739 ft	-255.8007 psf	467.52812 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 11	73.266673 ft	366.54255 ft	-221.16205 psf	515.25707 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 12	74.706155 ft	366.04346 ft	-190.00382 psf	650.86254 psf	0 psf	0 psf	Structural Fill
Slice 13	76.118464 ft	365.59713 ft	-162.1393 psf	718.0686 psf	0 psf	0 psf	Structural Fill
Slice 14	77.530773 ft	365.19222 ft	-136.8609 psf	792.7271 psf	0 psf	0 psf	Structural Fill
Slice 15	78.927696 ft	364.83134 ft	-114.33076 psf	802.30342 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 16	80.309232 ft	364.51281 ft	-94.444957 psf	875.59491 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 17	81.625 ft	364.24328 ft	-77.618183 psf	831.93084 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 18	82.875 ft	364.01888 ft	-63.609112 psf	895.9554 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Slice 19	84.125 ft	363.82418 ft	-51.453457 psf	957.15245 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 20	85.375 ft	363.65884 ft	-41.131338 psf	1,012.4066 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 21	86.5 ft	363.53362 ft	-33.31409 psf	710.67257 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 22	87.722222 ft	363.42803 ft	-26.722097 psf	357.22729 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 23	89.166667 ft	363.33568 ft	-20.956831 psf	343.91321 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 24	90.611111 ft	363.28152 ft	-17.575058 psf	319.49058 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 25	92.055556 ft	363.26541 ft	-16.569713 psf	285.05823 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 26	93.5 ft	363.28734 ft	-17.938704 psf	242.62854 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 27	94.944444 ft	363.34735 ft	-21.684882 psf	194.71848 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 28	96.388889 ft	363.44555 ft	-27.816076 psf	143.86396 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 29	97.833333 ft	363.58217 ft	-36.345173 psf	92.22085 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 30	99.277778 ft	363.75749 ft	-47.290258 psf	41.363881 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 31	100.16598 ft	363.88001 ft	-54.93922 psf	10.324926 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Proposed A-A' Static

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File Information

File Version: 11.00
Title: Taylor 83rd A-A'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 37
Date: 03/27/2024
Time: 09:53:47 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd A-A'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 09:53:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed A-A' Static

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Medium Dense to Dense SM

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 36 °
Phi-B: 0 °

Loose to Medium Dense ML

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 38 °
Phi-B: 0 °

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Structural Fill

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

Miragrid 5XT

Type: TenCate

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (2, 378.19) ft
Left-Zone Right Coordinate: (83, 375.4) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (87.4382, 366.89888) ft
Right-Zone Right Coordinate: (400, 317) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 378.2) ft
Right Coordinate: (400, 317) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	363 ft
Coordinate 2	104 ft	363 ft

Seismic Coefficients

Horz Seismic Coef.: 0

Reinforcement Lines

Reinforcement Line 1

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (87, 367) ft
Inside Point: (74, 367) ft
Length: 13 ft
Orientation: 180 °
Slip Surface Intersection: (75.787659, 367) ft
Max. Pullout Force: 2,373.7359 lbf
Available Length: 1.7876592 ft
Required Length: 1.6533717 ft
Pullout Force: 2,373.7359 lbf
Pullout Force per Length: 1,435.694 lbf/ft
Governing Component: Tensile Capacity

Reinforcement Line 2

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes

Outside Point: (86.680995, 369.67964) ft
Inside Point: (74.000005, 369.67964) ft
Length: 12.68099 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 3

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (86.36512, 372.33299) ft
Inside Point: (74, 372.33299) ft
Length: 12.36512 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	5 ft	379 ft
	40 ft	379 ft
	46 ft	376 ft
	81 ft	376 ft

Geometry

Name: Proposed Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	160 ft	344 ft
Point 2	360 ft	320 ft
Point 3	400 ft	317 ft

Point 4	0 ft	250 ft
Point 5	400 ft	250 ft
Point 6	0 ft	374 ft
Point 7	0 ft	362 ft
Point 8	107 ft	362 ft
Point 9	400 ft	310 ft
Point 10	0 ft	378.2 ft
Point 11	40 ft	378 ft
Point 12	46 ft	375.4 ft
Point 13	86 ft	375.4 ft
Point 14	87 ft	367 ft
Point 15	100 ft	364 ft
Point 16	87 ft	365 ft
Point 17	74 ft	365 ft
Point 18	74 ft	375.4 ft
Point 19	74 ft	374 ft

Regions

	Material	Points	Area
Region 1	Dense to Very Dense SM (Glacial Till)	8,1,9,5,4,7	35,923 ft²
Region 2	Loose SM/ML (Assumed)	2,1,9,3	660 ft²
Region 3	Medium Dense to Dense SM	10,11,12,18,19,6	219.4 ft²
Region 4	Loose to Medium Dense ML	7,8,15,14,16,17,19,6	979.5 ft²
Region 5	Structural Fill	13,14,16,17,19,18	131 ft²

Slip Results

Slip Surfaces Analysed: 1828 of 2125 converged

Current Slip Surface

Slip Surface: 1,633
Factor of Safety: 2.19
Volume: 195.21549 ft³
Weight: 23,761.286 lbf
Resisting Moment: 445,582.77 lbf·ft
Activating Moment: 203,132.08 lbf·ft
Resisting Force: 14,499.395 lbf
Activating Force: 6,610.428 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (100.33195, 363.90516) ft
Entry: (67.711327, 375.4) ft
Radius: 27.489847 ft
Center: (91.123596, 389.80685) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	68.172072 ft	374.7 ft	0 psf	111.87117 psf	0 psf	0 psf	Medium Dense to Dense SM

Slice 2	69.169535 ft	373.28674 ft	-642.20308 psf	172.48249 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 3	70.242972 ft	371.94602 ft	-558.50144 psf	238.124 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 4	71.316408 ft	370.7604 ft	-484.48307 psf	297.51608 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 5	72.389845 ft	369.70212 ft	-418.41483 psf	352.64364 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 6	73.463282 ft	368.75182 ft	-359.08733 psf	404.99579 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 7	74.527827 ft	367.90175 ft	-306.01696 psf	517.8634 psf	0 psf	0 psf	Structural Fill
Slice 8	75.58348 ft	367.13998 ft	-258.45989 psf	601.83578 psf	0 psf	0 psf	Structural Fill
Slice 9	76.639133 ft	366.45078 ft	-215.43255 psf	664.99624 psf	0 psf	0 psf	Structural Fill
Slice 10	77.694787 ft	365.82784 ft	-176.54282 psf	727.95581 psf	0 psf	0 psf	Structural Fill
Slice 11	78.75044 ft	365.26612 ft	-141.47456 psf	790.92346 psf	0 psf	0 psf	Structural Fill
Slice 12	79.7087 ft	364.80349 ft	-112.59237 psf	794.16586 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 13	80.569567 ft	364.42799 ft	-89.149387 psf	839.38864 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 14	81.504237 ft	364.06059 ft	-66.212942 psf	798.97696 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 15	82.512712 ft	363.70585 ft	-44.066145 psf	848.30296 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 16	83.521187 ft	363.39436 ft	-24.619915 psf	896.21848 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 17	84.529661 ft	363.12461 ft	-7.7795056 psf	942.00294 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 18	85.516949 ft	362.89935 ft	6.2837242 psf	981.7742 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 19	86.5 ft	362.71337 ft	17.894412 psf	684.91462 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 20	87.567405 ft	362.554 ft	27.843707 psf	307.55574 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 21	88.702216 ft	362.42978 ft	35.599064 psf	302.24569 psf	0 psf	0 psf	Loose to Medium Dense

							ML
Slice 22	89.837026 ft	362.353 ft	40.392128 psf	293.4893 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 23	90.971836 ft	362.32328 ft	42.247768 psf	280.83763 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 24	92.106647 ft	362.34045 ft	41.175536 psf	263.98709 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 25	93.241457 ft	362.40462 ft	37.169917 psf	242.83308 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 26	94.376267 ft	362.5161 ft	30.210186 psf	217.50816 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 27	95.511078 ft	362.67548 ft	20.259865 psf	188.39624 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 28	96.645888 ft	362.88362 ft	7.2657443 psf	156.11776 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 29	97.677744 ft	363.11404 ft	-7.1196169 psf	119.84504 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 30	98.606647 ft	363.35949 ft	-22.443336 psf	79.944147 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 31	99.535549 ft	363.64022 ft	-39.968891 psf	38.159394 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 32	100.16598 ft	363.84734 ft	-52.899698 psf	8.466202 psf	0 psf	0 psf	Loose to Medium Dense ML

Existing B-B' Seismic

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File Information

File Version: 11.00
Title: Taylor 83rd B-B'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 23
Date: 03/27/2024
Time: 10:24:23 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd B-B'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 10:24:24 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Existing B-B' Seismic

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Dense to Very Dense SM (Glacial Till, Seismic)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Medium Dense to Dense SM (Seismic)

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 36 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Loose to Medium Dense ML (Seismic)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (0.4688, 369.98828) ft
Left-Zone Right Coordinate: (77, 368.075) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (85.17542, 365.69981) ft
Right-Zone Right Coordinate: (300, 325) ft
Right-Zone Increment: 24

Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 370) ft
Right Coordinate: (300, 325) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	343 ft
Coordinate 2	154 ft	343 ft

Seismic Coefficients

Horz Seismic Coef.: 0.28

Geometry

Name: Existing Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	370 ft
Point 2	80 ft	368 ft
Point 3	140 ft	346 ft
Point 4	210 ft	332 ft
Point 5	300 ft	320 ft
Point 6	0 ft	300 ft
Point 7	300 ft	300 ft
Point 8	0 ft	360 ft
Point 9	0 ft	342 ft
Point 10	98 ft	360 ft
Point 11	159 ft	342 ft
Point 12	300 ft	325 ft

Regions

	Material	Points	Area
Region 1	Medium Dense to Dense SM (Seismic)	1,2,10,8	792 ft²
Region 2	Loose to Medium Dense ML (Seismic)	9,11,3,10,8	2,264 ft²
Region 3	Dense to Very Dense SM (Glacial Till, Seismic)	6,7,5,4,11,9	10,905 ft²

Region 4	Loose SM/ML (Assumed)	12,5,4	225 ft²

Slip Results

Slip Surfaces Analysed: 1959 of 2125 converged

Current Slip Surface

Slip Surface: 1,792
Factor of Safety: 1.12
Volume: 607.41682 ft³
Weight: 71,141.908 lbf
Resisting Moment: 5,074,877.8 lbf·ft
Activating Moment: 4,519,283.7 lbf·ft
Resisting Force: 41,626.365 lbf
Activating Force: 37,084.629 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (154.69369, 342.90659) ft
Entry: (67.4336, 368.31416) ft
Radius: 114.79817 ft
Center: (140.53533, 456.82832) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	68.862863 ft	367.17159 ft	-1,509.0371 psf	49.072713 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 2	71.72139 ft	364.95845 ft	-1,370.8705 psf	176.21734 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 3	74.579916 ft	362.88444 ft	-1,241.3892 psf	293.39156 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 4	77.438443 ft	360.9405 ft	-1,120.0285 psf	402.94175 psf	50 psf	0 psf	Medium Dense to Dense SM (Seismic)
Slice 5	79.433853 ft	359.64405 ft	-1,039.0914 psf	418.07188 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 6	81.5 ft	358.38854 ft	-960.70955 psf	440.60095 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 7	84.5 ft	356.64994 ft	-852.16852 psf	453.60225 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 8	87.5 ft	355.02944 ft	-751.00006 psf	464.50297 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 9	90.5 ft	353.52146 ft	-656.85673 psf	473.83841 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Slice 10	93.5 ft	352.12114 ft	-569.43463 psf	481.92183 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 11	96.5 ft	350.82421 ft	-488.46706 psf	488.82378 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 12	99.382232 ft	349.67026 ft	-416.42568 psf	505.38427 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 13	102.14669 ft	348.64893 ft	-352.66363 psf	532.10037 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 14	104.91116 ft	347.70718 ft	-293.87004 psf	558.02884 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 15	107.67562 ft	346.84297 ft	-239.91719 psf	582.56292 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 16	110.44008 ft	346.05448 ft	-190.69168 psf	604.79696 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 17	113.20455 ft	345.3401 ft	-146.09315 psf	623.53085 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 18	115.96901 ft	344.69843 ft	-106.03309 psf	637.3065 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 19	118.73347 ft	344.1282 ft	-70.43394 psf	644.48548 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 20	121.49794 ft	343.62835 ft	-39.228235 psf	643.37118 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 21	124.2624 ft	343.19795 ft	-12.357961 psf	632.36991 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 22	127.08017 ft	342.83056 ft	10.577955 psf	601.183 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 23	129.95124 ft	342.5282 ft	29.454719 psf	550.56326 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 24	132.82232 ft	342.29859 ft	43.789054 psf	491.11367 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 25	135.69339 ft	342.14131 ft	53.608258 psf	423.34668 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 26	138.56446 ft	342.05605 ft	58.930906 psf	348.32984 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 27	141.4 ft	342.04195 ft	59.811486 psf	282.13736 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Slice 28	144.2 ft	342.09721 ft	56.361349 psf	226.3426 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 29	147 ft	342.2209 ft	48.639496 psf	167.50713 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 30	149.8 ft	342.41323 ft	36.632064 psf	106.86326 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 31	152.6 ft	342.67456 ft	20.317377 psf	45.521285 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)
Slice 32	154.34685 ft	342.86456 ft	0 psf	13.073665 psf	50 psf	0 psf	Loose to Medium Dense ML (Seismic)

Existing B-B' Static

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File Information

File Version: 11.00
Title: Taylor 83rd B-B'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 23
Date: 03/27/2024
Time: 10:24:23 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd B-B'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 10:24:24 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Existing B-B' Static

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Medium Dense to Dense SM

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 36 °
Phi-B: 0 °

Loose to Medium Dense ML

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 38 °
Phi-B: 0 °

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (0.4688, 369.98828) ft
Left-Zone Right Coordinate: (77, 368.075) ft
Left-Zone Increment: 16
Right Type: Range
Right-Zone Left Coordinate: (85.17542, 365.69981) ft
Right-Zone Right Coordinate: (300, 325) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 370) ft
Right Coordinate: (300, 325) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	343 ft
Coordinate 2	154 ft	343 ft

Seismic Coefficients

Horz Seismic Coef.: 0

Geometry

Name: Existing Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	370 ft
Point 2	80 ft	368 ft
Point 3	140 ft	346 ft
Point 4	210 ft	332 ft
Point 5	300 ft	320 ft
Point 6	0 ft	300 ft
Point 7	300 ft	300 ft
Point 8	0 ft	360 ft
Point 9	0 ft	342 ft
Point 10	98 ft	360 ft
Point 11	159 ft	342 ft
Point 12	300 ft	325 ft

Regions

	Material	Points	Area
Region 1	Medium Dense to Dense SM	1,2,10,8	792 ft²
Region 2	Loose to Medium Dense ML	9,11,3,10,8	2,264 ft²
Region 3	Dense to Very Dense SM (Glacial Till)	6,7,5,4,11,9	10,905 ft²
Region 4	Loose SM/ML (Assumed)	12,5,4	225 ft²

Slip Results

Slip Surfaces Analysed: 1957 of 2125 converged

Current Slip Surface

Slip Surface: 2,027
Factor of Safety: 1.82
Volume: 187.15284 ft³
Weight: 22,065.315 lbf
Resisting Moment: 982,466.89 lbf·ft
Activating Moment: 539,348.69 lbf·ft
Resisting Force: 12,544.124 lbf
Activating Force: 6,883.3317 lbf
Slip Rank: 1 of 2,125 slip surfaces
Exit: (128.16052, 349.94649) ft
Entry: (77, 368.075) ft
Radius: 72.470524 ft
Center: (125.02393, 422.34911) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	77.75 ft	367.42941 ft	0 psf	41.804392 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 2	79.25 ft	366.17271 ft	0 psf	122.88165 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 3	80.80839 ft	364.93899 ft	0 psf	179.40635 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 4	82.425171 ft	363.72894 ft	0 psf	211.90836 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 5	84.041952 ft	362.58714 ft	0 psf	240.7574 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 6	85.658733 ft	361.50972 ft	0 psf	266.40751 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 7	87.275514 ft	360.49333 ft	0 psf	289.20005 psf	0 psf	0 psf	Medium Dense to Dense SM
Slice 8	88.910246 ft	359.52499 ft	-1,031.6581 psf	267.04572 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 9	90.562929 ft	358.60326 ft	-974.11417 psf	276.99262 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 10	92.215611 ft	357.73694 ft	-920.03003 psf	284.9316 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 11	93.868294 ft	356.92384 ft	-869.26809 psf	290.83935 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 12	95.520976 ft	356.16199 ft	-821.7058 psf	294.62591 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 13	97.173659 ft	355.44965 ft	-777.23375 psf	296.14087 psf	0 psf	0 psf	Loose to Medium Dense

							ML
Slice 14	98.837792 ft	354.78095 ft	-735.48707 psf	302.98122 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 15	100.51338 ft	354.15514 ft	-696.4176 psf	315.30603 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 16	102.18896 ft	353.57584 ft	-660.25197 psf	325.15788 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 17	103.86455 ft	353.04189 ft	-626.9173 psf	332.2308 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 18	105.54013 ft	352.55225 ft	-596.34857 psf	336.18412 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 19	107.21572 ft	352.10598 ft	-568.48791 psf	336.66199 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 20	108.8913 ft	351.70226 ft	-543.28395 psf	333.31688 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 21	110.56688 ft	351.34038 ft	-520.69137 psf	325.83636 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 22	112.24247 ft	351.01968 ft	-500.67038 psf	313.97116 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 23	113.91805 ft	350.73963 ft	-483.18643 psf	297.56213 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 24	115.59364 ft	350.49973 ft	-468.20981 psf	276.56272 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 25	117.26922 ft	350.2996 ft	-455.71548 psf	251.054 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 26	118.94481 ft	350.1389 ft	-445.68278 psf	221.24926 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 27	120.62039 ft	350.01736 ft	-438.09531 psf	187.48652 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 28	122.29598 ft	349.9348 ft	-432.94073 psf	150.20884 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 29	123.97156 ft	349.89107 ft	-430.21072 psf	109.93382 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 30	125.64715 ft	349.88611 ft	-429.90091 psf	67.215513 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 31	127.32273 ft	349.9199 ft	-432.01078 psf	22.603017 psf	0 psf	0 psf	Loose to Medium Dense

							ML

Proposed B-B' Seismic

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File Information

File Version: 11.00
Title: Taylor 83rd B-B'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 23
Date: 03/27/2024
Time: 10:24:23 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd B-B'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 10:24:24 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed B-B' Seismic

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Structural Fill

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till, Seismic)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 38 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Medium Dense to Dense SM (Seismic)

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 36 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Loose to Medium Dense ML (Seismic)

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 50 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

Miragrid 5XT
Type: TenCate

Miragrid 7XT
Type: TenCate

Miragrid 10XT
Type: TenCate

Slip Surface Entry and Exit
Left Type: Range
Left-Zone Left Coordinate: (20, 370) ft
Left-Zone Right Coordinate: (170, 359) ft
Left-Zone Increment: 24
Right Type: Range
Right-Zone Left Coordinate: (181, 349) ft
Right-Zone Right Coordinate: (300, 325) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits
Left Coordinate: (0, 371) ft
Right Coordinate: (300, 325) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	343 ft
Coordinate 2	154 ft	343 ft

Seismic Coefficients
Horz Seismic Coef.: 0.28

Reinforcement Lines

Reinforcement Line 1
Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (189, 336) ft
Inside Point: (164, 336) ft

Length: 25 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 2

Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (188.79462, 338.66991) ft
Inside Point: (163.9988, 338.66991) ft
Length: 24.79582 ft
Orientation: 180 °
Slip Surface Intersection: (180.05273, 338.66991) ft
Max. Pullout Force: 4,797.9806 lbf
Available Length: 8.7418905 ft
Required Length: 2.0451075 ft
Pullout Force: 4,797.9806 lbf
Pullout Force per Length: 2,346.0774 lbf/ft
Governing Component: Tensile Capacity

Reinforcement Line 3

Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (188.58656, 341.37467) ft
Inside Point: (164, 341.37467) ft
Length: 24.58656 ft
Orientation: 180 °
Slip Surface Intersection: (170.90328, 341.37467) ft
Max. Pullout Force: 4,797.9806 lbf
Available Length: 6.9032791 ft
Required Length: 1.6116143 ft
Pullout Force: 4,797.9806 lbf
Pullout Force per Length: 2,977.127 lbf/ft
Governing Component: Tensile Capacity

Reinforcement Line 4

Reinforcement: Miragrid 7XT
Lock to Ground Surface: Yes
Outside Point: (188.38824, 343.95294) ft
Inside Point: (164, 343.95294) ft
Length: 24.38824 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 5

Reinforcement: Miragrid 7XT
Lock to Ground Surface: Yes
Outside Point: (188.18406, 346.60724) ft
Inside Point: (164, 346.60724) ft
Length: 24.18406 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 6

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.96733, 349.32673) ft
Inside Point: (164, 349.32673) ft
Length: 16.96733 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 7

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.70297, 351.9703) ft
Inside Point: (164, 351.9703) ft
Length: 16.70297 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 8

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.43861, 354.61386) ft
Inside Point: (164, 354.61386) ft
Length: 16.43861 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft

Governing Component: (none)

Reinforcement Line 9

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.16535, 357.34653) ft
Inside Point: (164, 357.34653) ft
Length: 16.16535 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	5 ft	372 ft
	14 ft	372 ft
	15 ft	371 ft
	60 ft	371 ft
	61 ft	370 ft
	110 ft	370 ft
	140 ft	360 ft
	175 ft	360 ft

Geometry

Name: Proposed Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	370 ft
Point 2	80 ft	368 ft
Point 3	140 ft	346 ft
Point 4	210 ft	332 ft
Point 5	300 ft	320 ft
Point 6	0 ft	300 ft
Point 7	300 ft	300 ft

Point 8	0 ft	360 ft
Point 9	0 ft	342 ft
Point 10	98 ft	360 ft
Point 11	300 ft	325 ft
Point 12	14 ft	371 ft
Point 13	0 ft	371 ft
Point 14	14 ft	370 ft
Point 15	60 ft	370 ft
Point 16	60 ft	369 ft
Point 17	110 ft	369 ft
Point 18	140 ft	359 ft
Point 19	180 ft	359 ft
Point 20	181 ft	349 ft
Point 21	188 ft	349 ft
Point 22	189 ft	334 ft
Point 23	164 ft	334 ft
Point 24	164 ft	359 ft
Point 25	189 ft	336 ft
Point 26	164 ft	342 ft

Regions

	Material	Points	Area
Region 1	Loose SM/ML (Assumed)	11,5,4	225 ft²
Region 2	Dense to Very Dense SM (Glacial Till, Seismic)	9,26,23,22,25,4,5,7,6	10,792 ft²
Region 3	Structural Fill	24,19,20,21,25,22,23,26	533.5 ft²
Region 4	Structural Fill	13,12,14,15,16,17,18,24,26,3,10,2,1	1,046 ft²
Region 5	Medium Dense to Dense SM (Seismic)	8,10,2,1	792 ft²
Region 6	Loose to Medium Dense ML (Seismic)	9,8,10,3,26	2,274 ft²

Slip Results

Slip Surfaces Analysed: 2920 of 3125 converged

Current Slip Surface

Slip Surface: 1,521
Factor of Safety: 1.28
Volume: 921.45604 ft³
Weight: 115,182 lbf
Resisting Moment: 58,352,302 lbf·ft
Activating Moment: 45,665,618 lbf·ft
Resisting Force: 77,583.481 lbf
Activating Force: 60,708.607 lbf
Slip Rank: 1 of 3,125 slip surfaces
Exit: (188.98788, 336.15753) ft
Entry: (95.311388, 369) ft
Radius: 713.5936 ft
Center: (377.67044, 1,024.3543) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	96.780249 ft	368.37104 ft	-1,583.9187 psf	181.09793 psf	0 psf	0 psf	Structural Fill
Slice 2	99.717972 ft	367.12088 ft	-1,505.8708 psf	264.62253 psf	0 psf	0 psf	Structural Fill
Slice 3	102.65569 ft	365.88619 ft	-1,428.7893 psf	342.25131 psf	0 psf	0 psf	Structural Fill
Slice 4	105.59342 ft	364.6669 ft	-1,352.6688 psf	414.44015 psf	0 psf	0 psf	Structural Fill
Slice 5	108.53114 ft	363.46292 ft	-1,277.504 psf	481.78902 psf	0 psf	0 psf	Structural Fill
Slice 6	111.5 ft	362.26173 ft	-1,202.5132 psf	515.12926 psf	0 psf	0 psf	Structural Fill
Slice 7	114.5 ft	361.06356 ft	-1,127.7113 psf	517.38755 psf	0 psf	0 psf	Structural Fill
Slice 8	117.5 ft	359.88109 ft	-1,053.8899 psf	520.15617 psf	0 psf	0 psf	Structural Fill
Slice 9	120.5 ft	358.71425 ft	-981.04377 psf	523.90917 psf	0 psf	0 psf	Structural Fill
Slice 10	123.5 ft	357.56295 ft	-909.16773 psf	529.09883 psf	0 psf	0 psf	Structural Fill
Slice 11	126.5 ft	356.42711 ft	-838.2568 psf	536.13468 psf	0 psf	0 psf	Structural Fill
Slice 12	129.5 ft	355.30664 ft	-768.30606 psf	545.35905 psf	0 psf	0 psf	Structural Fill
Slice 13	132.5 ft	354.20148 ft	-699.3107 psf	557.02031 psf	0 psf	0 psf	Structural Fill
Slice 14	135.5 ft	353.11155 ft	-631.26599 psf	571.24602 psf	0 psf	0 psf	Structural Fill
Slice 15	138.5 ft	352.03677 ft	-564.16731 psf	588.01895 psf	0 psf	0 psf	Structural Fill
Slice 16	141.75 ft	350.89012 ft	-492.58168 psf	642.84547 psf	0 psf	0 psf	Structural Fill
Slice 17	145.25 ft	349.67422 ft	-416.67295 psf	737.29599 psf	0 psf	0 psf	Structural Fill
Slice 18	148.75 ft	348.47864 ft	-342.0323 psf	836.63904 psf	0 psf	0 psf	Structural Fill
Slice 19	152.25 ft	347.30325 ft	-268.65301 psf	940.94516 psf	0 psf	0 psf	Structural Fill
Slice 20	155.66667 ft	346.17501 ft	0 psf	1,047.1204 psf	0 psf	0 psf	Structural Fill
Slice 21	159 ft	345.09289 ft	0 psf	1,153.9942 psf	0 psf	0 psf	Structural Fill
Slice 22	162.33333 ft	344.02881 ft	0 psf	1,262.9324 psf	0 psf	0 psf	Structural Fill
Slice 23	165.375 ft	343.07281 ft	0 psf	1,363.0109 psf	0 psf	0 psf	Structural Fill
Slice 24	168.125 ft	342.22196 ft	0 psf	1,452.965 psf	0 psf	0 psf	Structural Fill
Slice 25	170.875 ft	341.38323 ft	0 psf	1,642.2784 psf	0 psf	0 psf	Structural Fill

Slice 26	173.625 ft	340.5566 ft	0 psf	1,695.3379 psf	0 psf	0 psf	Structural Fill
Slice 27	176.25 ft	339.77852 ft	0 psf	1,589.7211 psf	0 psf	0 psf	Structural Fill
Slice 28	178.75 ft	339.0479 ft	0 psf	1,634.8657 psf	0 psf	0 psf	Structural Fill
Slice 29	180.5 ft	338.54132 ft	0 psf	1,690.5106 psf	0 psf	0 psf	Structural Fill
Slice 30	182.75 ft	337.90065 ft	0 psf	967.44694 psf	0 psf	0 psf	Structural Fill
Slice 31	186.25 ft	336.91644 ft	0 psf	946.02601 psf	0 psf	0 psf	Structural Fill
Slice 32	188.49394 ft	336.29334 ft	0 psf	461.7506 psf	0 psf	0 psf	Structural Fill

Proposed B-B' Static

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File Information

File Version: 11.00
Title: Taylor 83rd B-B'
Created By: Henry Wright
Last Edited By: Henry Wright
Revision Number: 23
Date: 03/27/2024
Time: 10:24:23 AM
Tool Version: 11.0.0.21118
File Name: Taylor 83rd B-B'.gsz
Directory: C:\Users\henry.wright\Documents\SlopeW\7386.02\
Last Solved Date: 03/27/2024
Last Solved Time: 10:24:26 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Proposed B-B' Static

Kind: SLOPE/W
Method: Morgenstern-Price
Settings
- Side Function
  - Interslice force function option: Half-Sine
- PWP Conditions from: Piezometric Line
  - Apply Phreatic Correction: No
  - Use Staged Rapid Drawdown: No
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Advanced
- Geometry Settings
  - Minimum Slip Surface Depth: 5 ft
  - Number of Slices: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Medium Dense to Dense SM

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 36 °
Phi-B: 0 °

Loose to Medium Dense ML

Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 32 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Dense to Very Dense SM (Glacial Till)

Model: Mohr-Coulomb
Unit Weight: 135 pcf
Effective Cohesion: 250 psf
Effective Friction Angle: 38 °
Phi-B: 0 °

Loose SM/ML (Assumed)

Model: Mohr-Coulomb
Unit Weight: 110 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Structural Fill

Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Reinforcements

Miragrid 5XT

Type: TenCate

Miragrid 7XT
Type: TenCate

Miragrid 10XT
Type: TenCate

Slip Surface Entry and Exit
Left Type: Range
Left-Zone Left Coordinate: (20, 370) ft
Left-Zone Right Coordinate: (170, 359) ft
Left-Zone Increment: 24
Right Type: Range
Right-Zone Left Coordinate: (181, 349) ft
Right-Zone Right Coordinate: (300, 325) ft
Right-Zone Increment: 24
Radius Increments: 4

Slip Surface Limits
Left Coordinate: (0, 371) ft
Right Coordinate: (300, 325) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X	Y
Coordinate 1	0 ft	343 ft
Coordinate 2	154 ft	343 ft

Seismic Coefficients
Horz Seismic Coef.: 0

Reinforcement Lines

Reinforcement Line 1
Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (189, 336) ft
Inside Point: (164, 336) ft
Length: 25 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf

Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 2

Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (188.79462, 338.66991) ft
Inside Point: (163.9988, 338.66991) ft
Length: 24.79582 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 3

Reinforcement: Miragrid 10XT
Lock to Ground Surface: Yes
Outside Point: (188.58656, 341.37467) ft
Inside Point: (164, 341.37467) ft
Length: 24.58656 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 4

Reinforcement: Miragrid 7XT
Lock to Ground Surface: Yes
Outside Point: (188.38824, 343.95294) ft
Inside Point: (164, 343.95294) ft
Length: 24.38824 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 5

Reinforcement: Miragrid 7XT
Lock to Ground Surface: Yes
Outside Point: (188.18406, 346.60724) ft
Inside Point: (164, 346.60724) ft
Length: 24.18406 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft

Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 6

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.96733, 349.32673) ft
Inside Point: (164, 349.32673) ft
Length: 16.96733 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 7

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.70297, 351.9703) ft
Inside Point: (164, 351.9703) ft
Length: 16.70297 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 8

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.43861, 354.61386) ft
Inside Point: (164, 354.61386) ft
Length: 16.43861 ft
Orientation: 180 °
Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Reinforcement Line 9

Reinforcement: Miragrid 5XT
Lock to Ground Surface: Yes
Outside Point: (180.16535, 357.34653) ft
Inside Point: (164, 357.34653) ft
Length: 16.16535 ft
Orientation: 180 °

Max. Pullout Force: 0 lbf
Available Length: 0 ft
Required Length: 0 ft
Pullout Force: 0 lbf
Pullout Force per Length: 0 lbf/ft
Governing Component: (none)

Surcharge Loads

Surcharge Load 1

Surcharge (Unit Weight): 250 pcf
Direction: Vertical

Coordinates

	X	Y
	5 ft	372 ft
	14 ft	372 ft
	15 ft	371 ft
	60 ft	371 ft
	61 ft	370 ft
	110 ft	370 ft
	140 ft	360 ft
	175 ft	360 ft

Geometry

Name: Proposed Condition

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	370 ft
Point 2	80 ft	368 ft
Point 3	140 ft	346 ft
Point 4	210 ft	332 ft
Point 5	300 ft	320 ft
Point 6	0 ft	300 ft
Point 7	300 ft	300 ft
Point 8	0 ft	360 ft
Point 9	0 ft	342 ft
Point 10	98 ft	360 ft
Point 11	300 ft	325 ft
Point 12	14 ft	371 ft
Point 13	0 ft	371 ft
Point 14	14 ft	370 ft
Point 15	60 ft	370 ft

Point 16	60 ft	369 ft
Point 17	110 ft	369 ft
Point 18	140 ft	359 ft
Point 19	180 ft	359 ft
Point 20	181 ft	349 ft
Point 21	188 ft	349 ft
Point 22	189 ft	334 ft
Point 23	164 ft	334 ft
Point 24	164 ft	359 ft
Point 25	189 ft	336 ft
Point 26	164 ft	342 ft

Regions

	Material	Points	Area
Region 1	Loose SM/ML (Assumed)	11,5,4	225 ft²
Region 2	Dense to Very Dense SM (Glacial Till)	9,26,23,22,25,4,5,7,6	10,792 ft²
Region 3	Structural Fill	24,19,20,21,25,22,23,26	533.5 ft²
Region 4	Structural Fill	13,12,14,15,16,17,18,24,26,3,10,2,1	1,046 ft²
Region 5	Medium Dense to Dense SM	8,10,2,1	792 ft²
Region 6	Loose to Medium Dense ML	9,8,10,3,26	2,274 ft²

Slip Results

Slip Surfaces Analysed: 2883 of 3125 converged

Current Slip Surface

Slip Surface: 2,418
Factor of Safety: 2.36
Volume: 1,045.6831 ft³
Weight: 132,594.71 lbf
Resisting Moment: 7,662,788.9 lbf·ft
Activating Moment: 3,249,126.4 lbf·ft
Resisting Force: 109,581.79 lbf
Activating Force: 46,470.774 lbf
Slip Rank: 1 of 3,125 slip surfaces
Exit: (212.47249, 331.80769) ft
Entry: (138.29577, 359.56808) ft
Radius: 63.969002 ft
Center: (192.99269, 392.73856) ft

Slip Slices

	X	Y	PWP	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Slice 1	139.14789 ft	358.23818 ft	-951.32253 psf	172.50297 psf	0 psf	0 psf	Structural Fill
Slice 2	141.14542 ft	355.32114 ft	-769.21107 psf	318.26361 psf	0 psf	0 psf	Structural Fill
Slice 3	143.43626 ft	352.32929 ft	-582.42933 psf	483.80369 psf	0 psf	0 psf	Structural Fill

Slice 4	145.72711 ft	349.66762 ft	-416.26047 psf	632.00436 psf	0 psf	0 psf	Structural Fill
Slice 5	148.01795 ft	347.27747 ft	-267.04356 psf	768.34108 psf	0 psf	0 psf	Structural Fill
Slice 6	150.30879 ft	345.11764 ft	-132.20441 psf	896.88968 psf	0 psf	0 psf	Structural Fill
Slice 7	152.11059 ft	343.54548 ft	-34.054556 psf	928.26816 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 8	153.38348 ft	342.51379 ft	30.354238 psf	969.66077 psf	0 psf	0 psf	Loose to Medium Dense ML
Slice 9	155.26346 ft	341.10437 ft	0 psf	1,299.1298 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 10	157.77243 ft	339.35935 ft	0 psf	1,478.4282 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 11	160.26346 ft	337.7956 ft	0 psf	1,657.8247 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 12	162.75449 ft	336.38533 ft	0 psf	1,840.0196 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 13	165.82931 ft	334.8585 ft	0 psf	1,748.5274 psf	0 psf	0 psf	Structural Fill
Slice 14	168.88218 ft	333.50198 ft	0 psf	2,242.1955 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 15	171.32931 ft	332.56348 ft	0 psf	2,428.8521 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 16	173.77644 ft	331.73755 ft	0 psf	2,615.8903 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 17	176.25 ft	331.01305 ft	0 psf	2,618.6 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 18	178.75 ft	330.38846 ft	0 psf	2,795.0476 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 19	180.5 ft	330.00335 ft	0 psf	2,428.9415 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 20	182.16667 ft	329.70342 ft	0 psf	2,028.9577 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 21	184.5 ft	329.34675 ft	0 psf	2,138.3069 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 22	186.83333 ft	329.07757 ft	0 psf	2,230.3781 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 23	188.5 ft	328.92949 ft	0 psf	1,596.9244 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)

Slice 24	190.3125 ft	328.83923 ft	0 psf	923.44272 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 25	192.9375 ft	328.78305 ft	0 psf	889.4448 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 26	195.5625 ft	328.8347 ft	0 psf	830.97383 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 27	198.1875 ft	328.99444 ft	0 psf	748.40306 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 28	200.8125 ft	329.26309 ft	0 psf	643.39728 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 29	203.4375 ft	329.64205 ft	0 psf	518.8147 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 30	206.0625 ft	330.13332 ft	0 psf	378.42272 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 31	208.6875 ft	330.73958 ft	0 psf	226.47164 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 32	211.08372 ft	331.39142 ft	0 psf	94.658451 psf	250 psf	0 psf	Dense to Very Dense SM (Glacial Till)
Slice 33	212.31997 ft	331.75935 ft	0 psf	4.160346 psf	0 psf	0 psf	Loose SM/ML (Assumed)

TRAFFIC IMPACT ANALYSIS

TAYLOR LANE

JURISDICTION: CITY OF MARYSVILLE, WA
LOCATION: 49TH STREET NE, WEST OF 83RD AVENUE NE

Prepared for:
Keystone Land
13805 Smokey Point Boulevard
Suite 102
Marysville, Washington 98258

Prepared by:
Kimley»Horn

August 2024
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Kimley»Horn

TRAFFIC IMPACT ANALYSIS

FOR

TAYLOR LANE

Prepared for:
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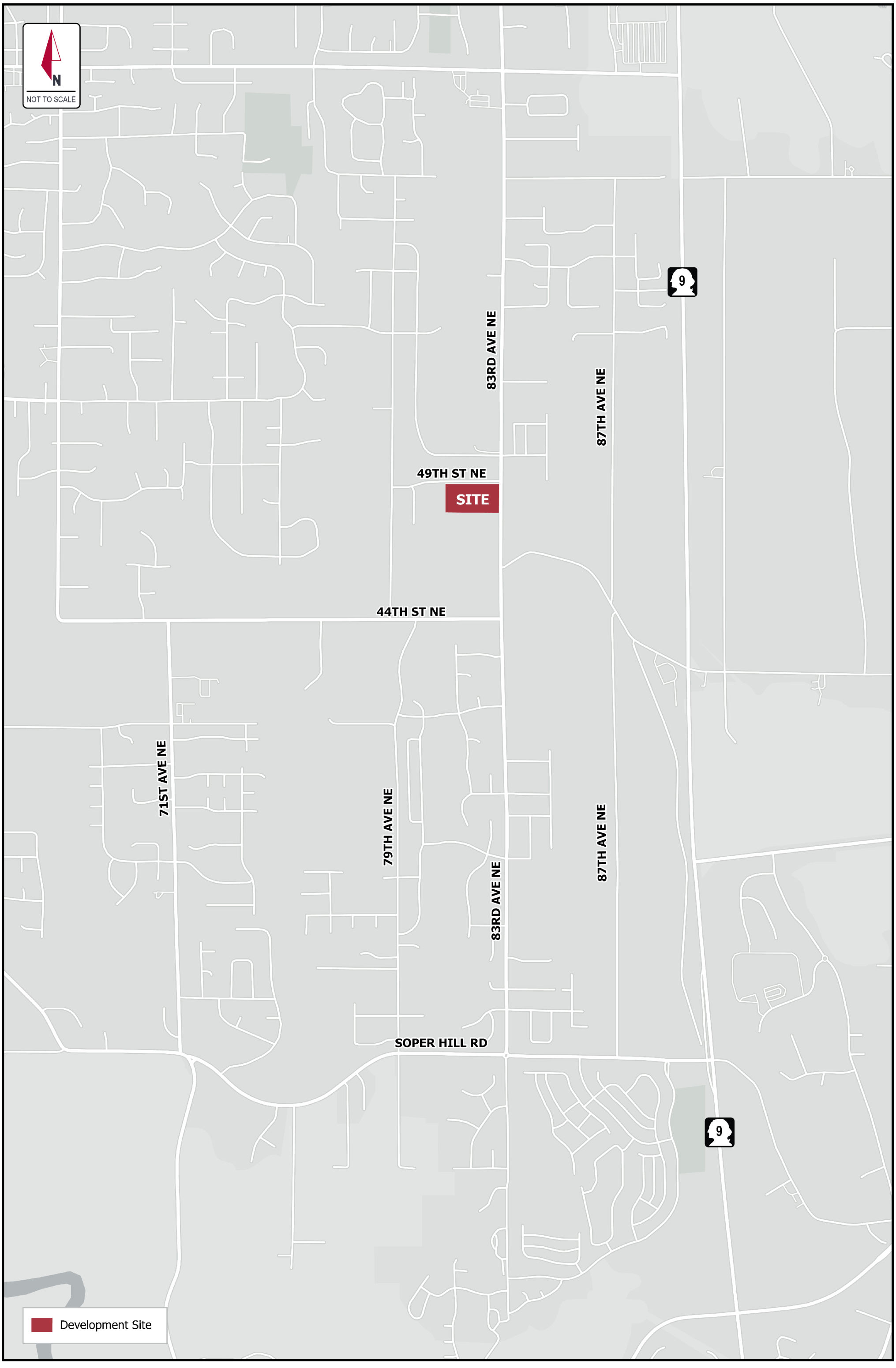
LIST OF APPENDICES

TRIP DISTRIBUTION ..... A

1. DEVELOPMENT IDENTIFICATION

Kimley-Horn and Associates, Inc. (Kimley-Horn) has been retained to provide a traffic impact analysis for the Taylor Property Development (Development). This report is intended to provide the City of Marysville (City) and Snohomish County (County) with the necessary traffic generation, trip distribution, and mitigation fee determination to facilitate their reviews of the Development. The Development is located on the south side of 49th Street NE, west of 83rd Avenue NE. A site vicinity map is included in **Figure 1**. The Development is proposed to consist of 14 single-family detached residential units. The site is currently listed as developed with one single-family detached unit per the *Snohomish County Online Property Information (SCOPI)* web map which will remain on-site. The site will have access 49th Street NE via direct access and a public road.

Brad Lincoln, responsible for this report and traffic analysis, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of the Institute of Transportation Engineers (ITE).



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FIGURE 1: SITE VICINITY MAP

TAYLOR LANE - CITY OF MARYSVILLE, WA (090223155 4

2. TRIP GENERATION

The Development is proposed to consist of 14 total single-family detached units. The site is currently developed with one single-family detached unit that will remain, resulting in 13 new single-family residential units. The trip generation calculations have been performed using data published by the ITE *Trip Generation Manual, 11st Edition* (*2021*) and Marysville Municipal Code (MMC). The average trip generation rates for ITE Land Use Codes (LUC) 210, Single-Family Detached Housing, have been used for the average daily trips (ADTs) and AM peak-hour trip generation calculations. The rate of 1.0 PM peak-hour trip per unit has been used as identified in the MMC Chapter 22A.020. The trip generation calculations for the Development are summarized in **Table 1**.

Table 1: Trip Generation Summary

13 Units Single-Family Detached Housing	Average Daily Trips (ADTs)			AM Peak-Hour Trips			PM Peak-Hour Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Generation Rate	9.43 trips per unit			0.70 trips per unit			1.00 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	62	61	123	2	7	9	8	5	13

The Development is anticipated to generate approximately 123 new ADTs with approximately 9 new AM peak-hour trips and 13 new PM peak-hour trips.

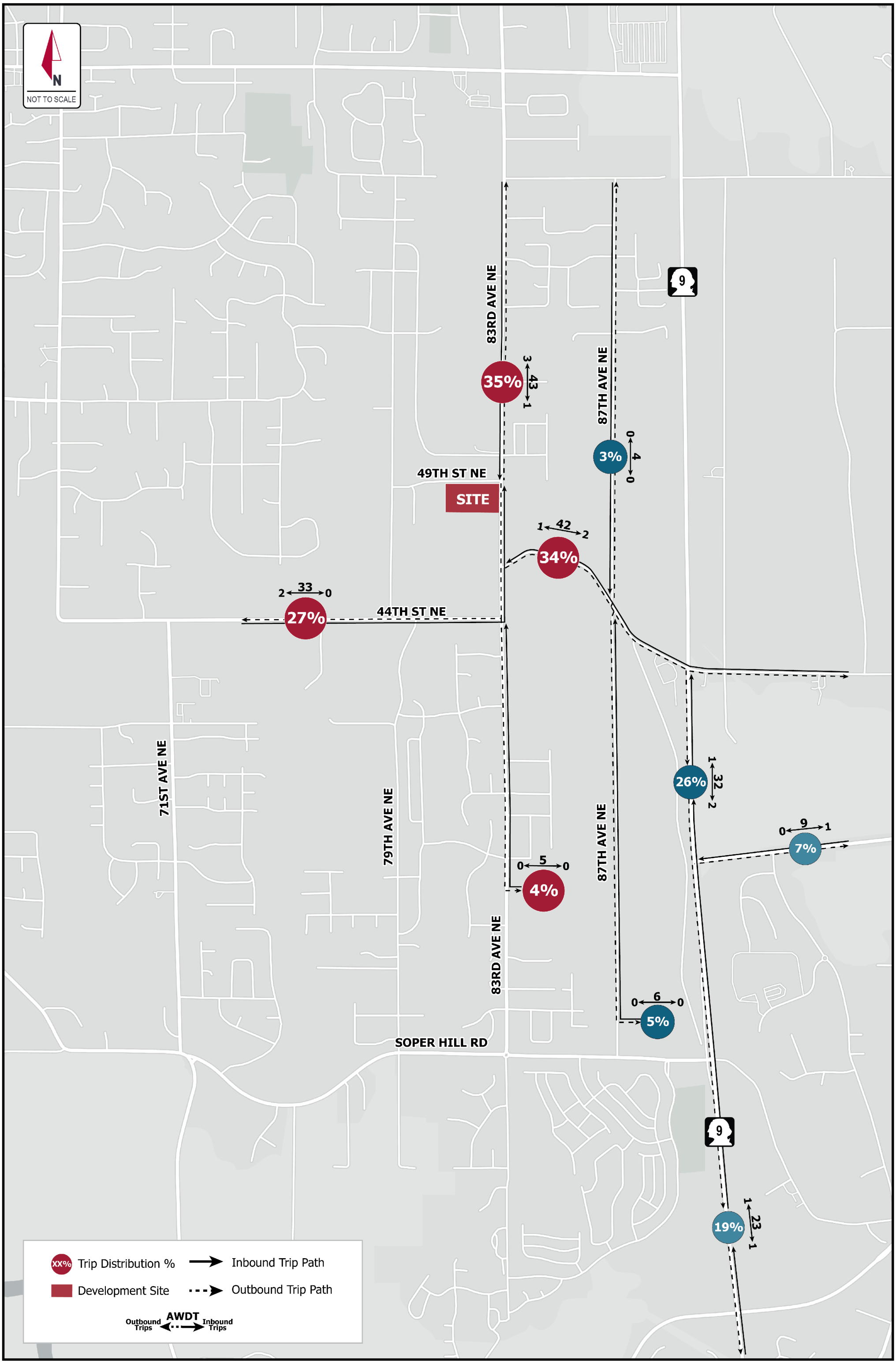
3. TRIP DISTRIBUTION

The trip distribution for the Development is based on the Whiskey Ridge North distributions established by the City which has the same values for both the opening-year and horizon-year conditions. The trip distribution for the Development is:

- 35% to and from the north along 83rd Avenue NE
- 34% to and from the east
  - 19% to and from the south along SR-9
  - 7% to and from the east along SR-92
  - 5% to and from the south along 87th Avenue NE
  - 3% to and from the north along SR-9
- 27% to and from the west along 44th Street NE
- 4% to and from the south along 83rd Avenue NE

Detailed trip distributions for the AM peak-hour and PM peak-hour are shown in **Figure 2** and **Figure 3**, respectively. The established distributions are provided in **Appendix A**.

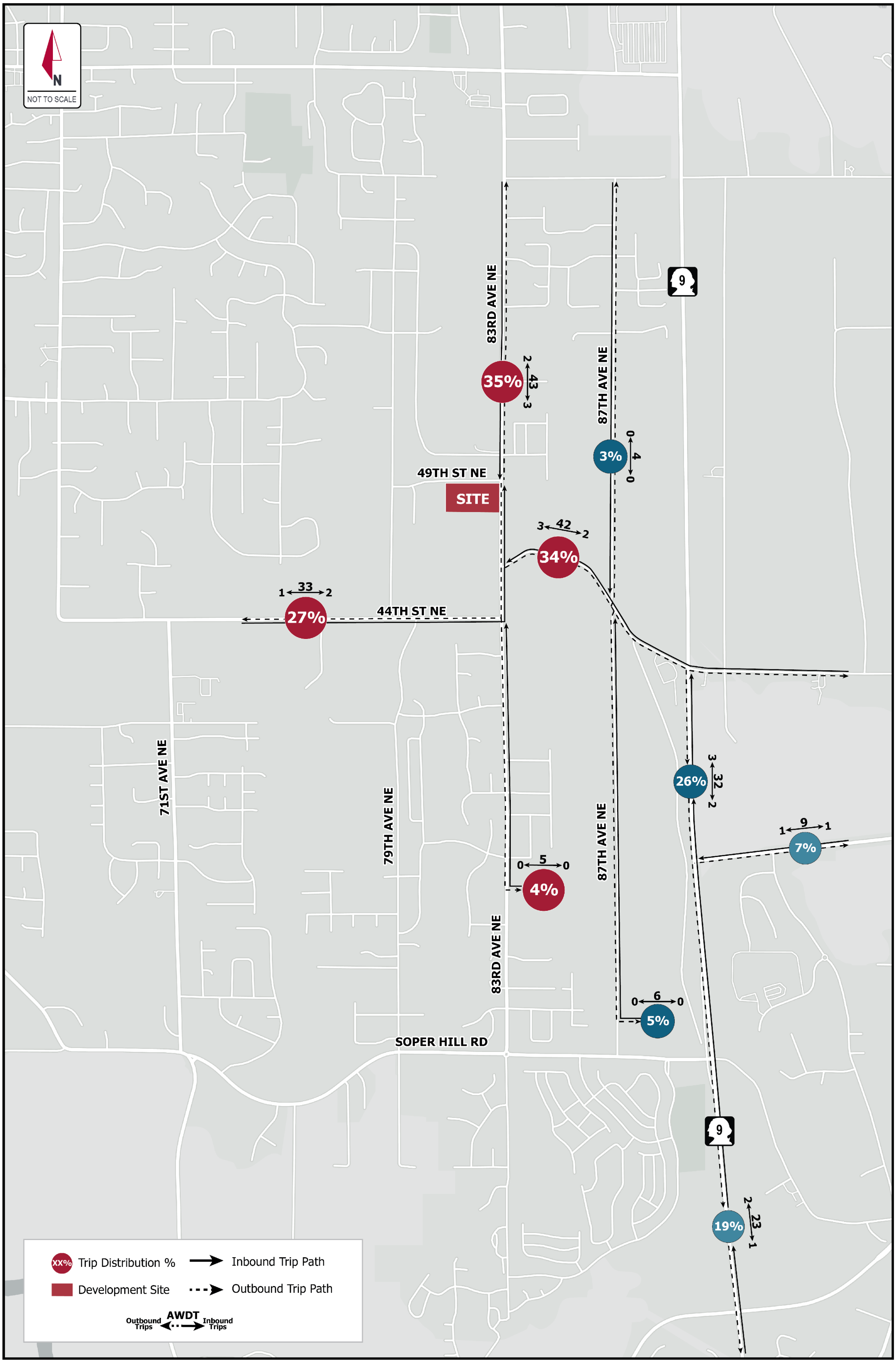
The trip distribution shows that there are not any intersections that are impacted by 25 PM peak-hour trips generated by the Development. Intersection level of service should therefore not be required by the City.



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FIGURE 2: TRIP DISTRIBUTION - AM PEAK HOUR

TAYLOR LANE - CITY OF MARYSVILLE, WA (090223155**6**



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FIGURE 3: TRIP DISTRIBUTION - PM PEAK HOUR

TAYLOR LANE - CITY OF MARYSVILLE, WA (0902231557

3.1. Snohomish County Intersections

The interlocal agreement between the City and County requires detailed development trip turning movement data at County key intersections impacted with three or more directional trips on an approach or departure. The trips generated by the Development will not impact any key intersection during the AM or PM Peak-hour. Key intersection impacts should therefore not be required by the City.

4. SITE ACCESS

The Development is proposed to have individual driveways for eight units along 49th Street NE and three shared driveways that will access two units each. It is anticipated that the majority of the trips generated by the Development will travel along 83rd Avenue NE.

5. TRANSPORTATION IMPACT FEES

The City has interlocal agreements with the County and Washington State Department of Transportation (WSDOT) for transportation impact fees. These transportation impact fees are based on the area wide traffic mitigation fee or actual impacts to improvement projects.

5.1. City of Marysville

The City traffic mitigation fees have been calculated using the residential rate of $6,300 per new single-family unit. The Development is anticipated to construct 13 new single-family units after credit for the existing unit on the site that will remain. The City traffic mitigation fees for the Development should therefore be $81,900.00.

5.2. Snohomish County

The City and County have an interlocal agreement that provides for the payment of traffic mitigation for impacts to County roadways by City developments. Traffic mitigation fees are based on predetermined area impacts or impacts to actual improvement projects. The only County improvement project in the area is along 88th Street NE, between approximately 44th Drive NE to 66th Drive NE. This improvement project is not anticipated to be impacted by three directional PM peak-hour trips generated by the Development. County traffic mitigation fees should therefore not be required for the Development.

5.3. Washington State Department of Transportation

The WSDOT mitigation fees are based on impacts to improvement projects identified in the Exhibit C List included in the interlocal agreement between the County and WSDOT. There are not any WSDOT intersections on the Exhibit C List that will be impacted by three directional PM peak-hour trips generated by the Development. WSDOT transportation impact fees should therefore not be required for the Development.

6. CONCLUSIONS

The Development is proposed to consist of 14 single-family detached residential units. The site is currently listed as occupied with one single-family detached unit, resulting in 13 new single-family residential units. The Development is anticipated to generate approximately 123 new ADTs with approximately 9 new AM peak-hour trips and 13 new PM peak-hour trips. The City traffic mitigation fees for the Development should therefore be $81,900.00. Neither County nor WSDOT traffic mitigation fees should be required for the Development.

APPENDIX A

TRIP DISTRIBUTION

WHISKEY RIDGE NORTH - EXISTING

City of Marysville

November 2017

- Marysville City Limits
- Other City Limits
- Urban Growth Boundary
- Tulalip Reservation
- Parks and open space
- Interstate Highway
- State Highway
- Arterial
- Schools

N

0 2,000 4,000 6,000 Feet

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WHISKEY RIDGE NORTH - EXISTING

N

City of Marysville

City Limits
City of Marysville Urban Growth Area
Tulalip Reservation
Park
City Park

Fire Station
Police Station
School
Street
Burlington Northern RR
Trails

Marysville Street Classification
Interstate
State Highway
Principal Arterial
Minor Arterial
Collector Arterial
Future Arterial

0 1,250 2,500 5,000 7,500 10,000 Feet

Map Plotted: May, 2018

CITY OF Marysville WASHINGTON

THE CITY OF MARYSVILLE DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS OF THIS MAP FOR ANY PARTICULAR PURPOSE, EITHER EXPRESSED OR IMPLIED. NO REPRESENTATION OR WARRANTY IS MADE CONCERNING THE ACCURACY, CURRENCY, COMPLETENESS OR QUALITY OF DATA DEPICTED. ANY USER OF THIS MAP ASSUMES ALL RESPONSIBILITY FOR USE THEREOF, AND FURTHER AGREES TO HOLD THE CITY OF MARYSVILLE HARMLESS FROM AND AGAINST ANY DAMAGE, LOSS, OR LIABILITY ARISING FROM ANY USE OF THIS MAP.

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COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue ◆ Marysville, WA 98270
(360) 363-8000

September 6, 2024

Tom Abbott
Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

Re: Taylor Lane Subdivision – PA24-002 – Technical Review 2
4820 83rd Ave NE – APN(s) 00590700013600

Dear Tom,

After preliminary review of the above referenced proposal, the following comment(s) are provided:

CITY OF MARYSVILLE COMMUNITY DEVELOPMENT – PLANNING

Emily Morgan, Senior Planner
360.363.8216 | emorgan@marysvillewa.gov

SUBDIVISION COMMENTS

1. Include File Number PA24-002 on all future correspondence, in addition to all site, civil and landscape plans.
2. The western portion of proposed Lot 6 is completely isolated from the eastern portion.

   Further, given that the eastern portion of proposed Lot 6 would be under 4,000 sq. ft. Lots 6 – 8 would ultimately need to be reduced into (2) lots and the western portion of proposed Lot 6 be absorbed into Lot 5.
3. All lots under 5,000 sq. ft. would be required to be meet the development provision of MMC 22C.010.310 for *Small lot single-family dwelling development standards.*

CRITICAL AREAS COMMENTS

4. Staff has reviewed and concurs with the findings in the revised Critical Area Study and Buffer Mitigation Plan, prepared by Wetland Resources, dated August 16, 2024.

   4.1. Prior to issuing any ground disturbing activity permits, the applicant is required to obtain all necessary permits and approvals from Federal, State and local agencies for the proposed critical areas impacts.

   4.2. Prior to any ground disturbing activities, all wetland buffer areas shall be temporarily fenced between the construction activity and the buffer area with highly visible and durable protective barrier(s). Said barriers shall be retained during construction to prevent access and sedimentation from disturbed areas from entering the wetland or its buffer.

LANDSCAPE PLAN COMMENTS

Prior to civil construction plan approval, a detailed landscape plan depicting all the applicable elements outline in MMC 22C.120 and MMC 22G.090.570 shall be approved. **With the resubmittal, no updated landscape plan was provided. Staff has the following comments:**

5. Significant trees, which include evergreen trees eight inches in diameter or greater and/or deciduous trees 12 inches in diameter or greater measured four and one-half feet above grade, shall be retained as follows:

    5.1. Perimeter landscaped areas that do not constitute a safety hazard shall be retained.

    5.2. To provide the best protection for significant trees during the construction stage, the applicant shall install a temporary, five-foot-high, orange clearing limits construction fence in a line generally corresponding to the dripline of any significant tree(s) to be retained. All such fencing shall be installed and inspected by the community development department prior to commencement of site work.

6. Street trees are required to be planted along 49th Street NE, 83rd Ave NE, and joint use/shared driveways at a rate of one tree for every thirty (30) feet and shall comply with the following:

    6.1. Street trees shall be a minimum of one and one-half inches in caliper and six to eight feet high at the time of planting, and shall be planted behind the sidewalk in root barriers made of pre-cast concrete sections or similar impermeable durable materials that extends at least 24-inches below grade.

    6.2. Tree species should be consistent to what is currently installed adjacent to the project site or selected from the City's recommended street trees listed in the Administrative Landscaping Guidelines.

    6.3. When planting street trees, the location of existing utilities, lighting and existing and proposed signs.

    Proposed street trees should be similar in species to the trees along the north side of 49th St NE

7. Stormwater management facilities are required to have a 5ft. L5 landscape buffer. Planting areas may incorporate no more than 30 percent deciduous plantings due to maintenance and pond performance constraints. Please provide confirmation that the proposed planted buffer would meet this standard.

Enclosed are the review comments received from other departments and agencies. After you have had an opportunity to review, please let me know what technical review comments you need clarification on. Once received I can set up a conference meeting with all of the applicable city and agency representatives, if needed. If you have any questions, please do not hesitate to contact me at 360.363.8216, or by e-mail at emorgan@marysvillewa.gov.

Sincerely,

Emily Morgan

Emily Morgan
Senior Planner

PUBLIC WORKS DEPARTMENT
501 Delta Ave. ◆ Marysville, WA 98270
(360) 363-8100 ◆ (360) 651-5099 FAX

MEMORANDUM

To: Emily Morgan, Senior Planner

From: Shane Whitney, Civil Plan Reviewer

RE: Taylor Subdivision, File# PA24-002
14 Lot Subdivision
4820 83rd Ave & Parcel # 00590700013600

Date: 9/6/2024

The following comments are offered after review of the above referenced revised application. New comments shall be in a ***bold italic*** font. Many of the original comments will remain as they will not change in the life of the project.

1. **Existing utilities**:
    a. Sanitary sewer: The sewer main in 49th is shown on record drawing RD227.
    b. Water: The water main and storm system in 49th is also on record drawing RD227.

2. Per MMC 14.03.250, utilities are to be extended along the street frontages of the proposed project.
    a. Storm drainage will need to be provided for the widened sections of 83rd Ave and 49th Street.

3. **Frontage Improvements:** Frontage improvements are required per MMC 12.02A.090 on all projects. Frontage improvements are described as curbs, gutters, and sidewalks; underground storm drainage facilities; patching the street from its preexisting edge to the new curb line; and overlayment of the existing public street to its centerline.
    a. 49th Street NE is classified as a local access street. Buildout is to match the section to the west of the project. This will include connecting the sidewalk and widening to the west of the site within the PUD powerline easement.
    b. 83rd Ave is an arterial, a 6 foot planter and 6 foot sidewalk is required. Widening shall align with the project to the north.

4. **Dedication Requirements:**
    a. Dedication on 49th street shall give a total right-of-way width of at least 50 feet. Should additional area be necessary, the project will be required to dedicate it.

b. For 83rd Ave NE, a 35 foot half width will be necessary.

5. **Access**:
   a. No direct lot access is permitted to 83rd Ave NE as it is an arterial (EDDS 3-301). None appears to be proposed.
   b. The minimum width of a residential driveway is 12-feet and the maximum is 26-feet. Curb cuts shall be limited to a 20 foot maximum.
   c. Based on the length of some of the shared driveways, the Fire Marshall may require fire sprinkler systems for those homes.

6. **Drainage:** All projects in the city of Marysville must comply with requirements stipulated under the MMC 14.15.040 and 14.15.050.
   a. Stormwater drainage: The city has adopted the 2019 Ecology Manual. Projects above the 2,000 square feet threshold must comply with requirements stipulated in Volume I, Chapter 2 of the Stormwater Management Manual for Western Washington. ***The supplied report demonstrates the project is capable of being compliant with applicable standards. A complete review will be completed with the civil plan review.***
   b. A geotechnical report has been supplied.
   c. The maximum allowed impervious surface coverage for the Zoning designation is 50%.

Other Comments:

7. Survey control datum NAVD-88 and NAD-83 are required to be used. Civil construction plans will not be accepted in any other datum.

8. Trench restoration is to be completed in accordance with section 3-703 of the EDDS. A full lane or full street overlay may be required.

9. The onsite grading and placement of any retaining walls must be compliant with section 22D.050.030 of the MMC. Grading will need to match the grades on adjacent parcels to the extent feasible.

10. A right of way use permit for all work proposed within City right of way is required. Cost for the ROW permit is $648.00. ROW permit fees must be paid before right of way permit issuance.

11. The applicant is responsible for identifying any existing well or septic systems on site or on adjacent properties. If there are any existing septic systems on site they need to be decommissioned based on the Snohomish Health District standards. If there are any wells on site they need to be decommissioned based on Department of Ecology standards.

12. Engineering construction plan review fees will be due prior to starting the review of the civil construction plans.
    Engineering construction plan review per MMC 22G.030.020:
    $976 plus a $2000 deposit are due for submittal of the grading permit.
    Review fee of $130 per hour will be charged against the deposit.

13. Engineering construction inspection fees will be due prior to issuance of the grading permit.
    Engineering construction inspection fees per MMC 22G.030.020:
    Inspection is charged at $130 per hour with a $2500 deposit required.

1. **All civil construction plan submittals are to be completed through our online permit portal at the following link:**
   https://permits.marysvillewa.gov/PermitApplication/confirmation.aspx **Once the submittal is complete, please email the permit tech's at msvlpermits@marysvillewa.gov**
   a. Review timing:
      i. First review = 5 weeks
      ii. Second review = 3 weeks
      iii. Third review = 3 weeks
      iv. Subsequent reviews will be 3 weeks.

2. Please be advised these comments are in reference to specific items and do not imply a full review of the proposed application. Additional comments which may change the design requirements will be provided during the civil construction plan review process.

If you have additional questions regarding the above comments, please contact me at swhitney@marysvillewa.gov or at (360) 363-8227.

cc: Ken McIntyre, PE, Engineering Services Manager

MEMORANDUM

TO: Emily Morgan – Senior Planner

FROM: Danny Hagen – Associate Traffic Engineer

DATE: September 4th, 2024

SUBJECT: PA 24-002 – Taylor Property

I have reviewed the plans for the 14-lot single family residential for the proposed Taylor Property at 4820 83rd Ave NE and have the following comments:

1) Traffic impact fees will be required from the City and depending on trip generation/distribution, may be required from the County and State.
    a. Projected impact fees of $81,900 are accepted.
2) A Traffic Impact Analysis (TIA) will be required.
    a. TIA is accepted.
3) A signing and channelization plan shall be required as part of civil construction plans.
    a. 49th ST NE:
        i. Driveways shall be placed staggered from existing driveways upon north side of 49th ST NE to enable staggered parking upon either side of residential street.
            1. Proposed driveway placement is acceptable.
    b. 83rd Ave NE:
        i. Channelization Plan shall be provided with 83rd Ave NE to include ultimate planned channelization to extent feasible including bike lanes and two-way left turn lane.
        ii. No Parking signs installed on 83rd Ave shall follow proposed EDDS Standard Plan 3-508-001
    c. A signing and marking plan shall be required as part of civil construction plans.
        i. Stop Signs with stop bars and 50' of painted centerline on all residential street approaches to an arterial. Intersections of two residential streets should not have stop signs except in special circumstances.
        ii. Street Name signs at all intersections and where a street's name changes.
        iii. Speed Limit signs at entrances to residential developments from arterials or where speed limits change.
        iv. Only one (1) "No Parking in Cul-De-Sac" sign at all entrances to cul-de-sacs.

MARYSVILLE
PUBLIC WORKS

(360) 363-8100

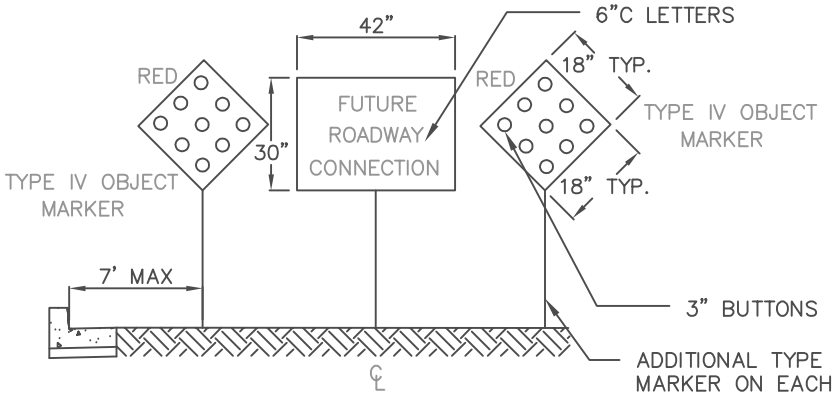
Public Works
80 Columbia Avenue
Marysville, WA 98270

v. Parking restrictions will be required along one side of a roadway when pavement is less than 28'.

vi. A "Dead End" sign shall be installed approximately 25' from the entry/exit to a single street segments with a cul-de-sac or no turnaround

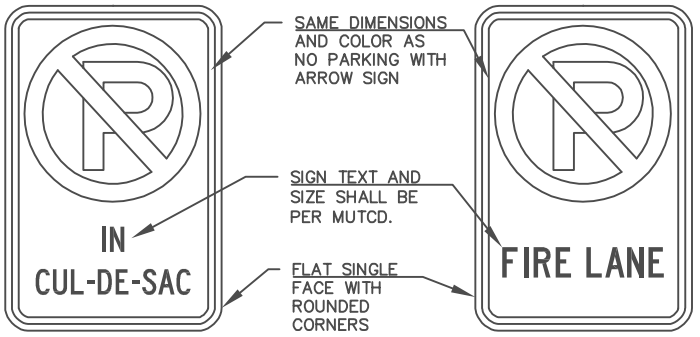
vii. A "No Outlet" sign shall be installed approximately 25' from the single entry/exit to a closed street system (multiple road segments)

viii. Minimize signing within residential neighborhoods to minimum to reduce sign clutter.



FIXED (PERMANENT)
END OF TEMPORARY CUL-DE-SAC

NOTE:
FOR DIMENSIONS NOT SHOWN, SEE TABLE.

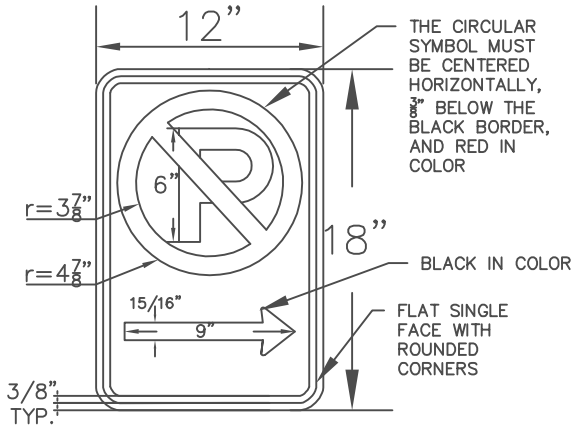


NO PARKING IN CUL-DE-SAC SIGN

SEE SEC. 3-5.07 AND MUTCD SEC.6C-8.

BARRICADE NOTES:			
TYPE	I	II	III
WIDTH OF RAIL	8" MIN. 12" MAX.	8" MIN. 12" MAX.	8" MIN. 12" MAX.
LENGTH OF RAIL	2' MIN.	2' MIN.	4' MIN.
HEIGHT	3' MIN.	3' MIN.	5' MIN.
TYPE OF FRAME	DEMOUNTABLE OR HEAVY "A"	LIGHT "A" FRAME	POST OR SKIDS
FLEXIBILITY	ESSENTIALLY MOVABLE	PORTABLE	ESSENTIALLY PERMANENT

PARKING SIGN NOTES:
1. REFER TO STANDARD PLAN 3-805-001 FOR DIRECTION ON MOUNTING OF SIGNS WITHIN ROW. CONCRETE SHALL NOT BE USED FOR SIGN POST ANCHORS.
2. THE BACKGROUND MUST BE WHITE. ARROW SYMBOL AND "P" MUST BE BLACK. THE CIRCULAR SYMBOL MUST BE RED. ANY TEXT SHALL BE RED OR BLACK.
3. SIGN SHALL HAVE ASTM D4956-01 TYPE IV RETROREFLECTIVE SHEETING. ALL SIGNS SHALL HAVE ANTI-GRAFFITI SIGN COATING CONSISTING OF 3M-1160 PREMIUM PROTECTIVE OVERLAY FILM OR EQUAL.



NO PARKING WITH ARROW SIGN



MOVABLE (TEMPORARY)
TYPE III BARRICADE

STRIPE NOTES:
1. ORANGE & WHITE. REFLECTORIZED.
2. SLANT DOWNWARD, RIGHT OR LEFT, IN DIRECTION TRAFFIC WILL PASS.
3. SLANT BOTH DIRECTIONS FROM MIDDLE IF TRAFFIC PASSES BOTH ENDS.
4. WIDTH 6" EXCEPT 4" IF RAILS ARE LESS THAN 3' LONG.
5. SLANT DOWNWARD TO MIDDLE AT END DIRECTION TRAFFIC WILL PASS.

NOTE:
USE OF TYPE III BARRICADE ONLY UPON APPROVAL BY PROJECT ENGINEER. ONLY FOR USE DURING CONSTRUCTION.

APPROVED BY

N/A

MARYSVILLE CITY ENGINEER DATE

CITY OF Marysville WASHINGTON

BARRICADES AND SIGNAGE

STANDARD PLAN 3-5.01

LAST REVISED 11/30/23

MARYSVILLE FIRE DISTRICT
REGIONAL FIRE AUTHORITY
Fire Marshal's Office
1635 Grove St. Marysville, WA 98270 - (360) 363-8500
MFInspectors@MFDRFA.org - www.marysvillefiredistrict.org

To: Emily Morgan, Senior Planner
From: Brian Merkley, Assistant Fire Marshal
Date: August 30, 2024
Subject: PA24-002 ~ Taylor Lane Subdivision ~ 4820 83rd Ave NE

I have completed a 2nd review of the plans for this project proposing a residential development for a proposed 14-lot single family subdivision.

Additional comments related to fire code compliance for this project are noted below:

1. **GENERAL INFORMATION:**
   a. The project shall comply with current fire code requirements (2018 IFC) including WA State and local City of Marysville amendments to the fire code, city design standards, and all applicable NFPA standards, including IFC Chapter 33 and NFPA 241 construction codes.
   b. Fire marshal approval of fire access and fire hydrant/water supply systems is required as part of the civil construction plan review and approval process.

2. **WATER RELATED:**
   a. It is the developer's responsibility to see that adequate water for fire protection is attainable. The minimum required fire flow is determined using IFC Appendix B, and depends upon building sizes, construction types, and sprinkler systems. Proof of fire flow will be required. *No fire flow information provided at this time, must be provided prior to approval of civil plans.*
   b. The minimum required fire flow for hydrants protecting SFR dwellings is 1,000 gpm (with 20-psi minimum residual pressure) for dwellings not exceeding 3,600 SF in size.
   c. The minimum required fire flow for dwellings exceeding 3,600 SF is 1,500 gpm.
   d. Maximum hydrant spacing for the proposed SF use is 600 ft. *Plan show 2 existing hydrants on 49th St NE in acceptable locations.*
   e. Fire hydrants shall comply with city Water Design Standard 2-060 Hydrants, including 5" Storz fittings, with blue reflective hydrant markers to be provided in the roadways, located four inches off the centerline on the hydrant side of the road.
   f. Fire hydrants with approved water supply must be in service prior to building construction.
   g. Future homes to be constructed may require residential sprinkler installation for a number of reasons, including: if homes are three or more stories tall, if fire flow from hydrants does not meet fire code requirements, if any part of homes is further than 200' from the public road ROW with no hydrant provided on-site, or to mitigate access deficiencies.

h. Where residential fire sprinklers may be required the developer should install a water service per Standard Plan 2-090-001 Full ¾" x 1" Meter Service. Under this plan a 1" tap is made at the water main and 1" piping is run to the 1" meter setter. If in the end a ¾" water meter will suffice then all that is required is to install two reducer bushings with the ¾" water meter. A single service tap should be used where sprinklers are required, not a double service installation. *Plans confirm that lots 1, 2, 11, 12, 13, and 14 will require fire sprinklers.*

3. **ACCESS RELATED**:
   a. An adequate access route for fire apparatus must be in service prior to any building construction.
   b. Access for firefighting operations along all sides of all buildings is required. A minimum 5' wide access is required for SF dwellings. All parts of building exteriors should be accessible for firefighting by an approved route around the building, and be within 150 feet of a minimum 20' wide fire apparatus access. *Access appears acceptable.*
   c. "**NO PARKING - FIRE LANE**" signs are required on both sides of all roads that are 26 feet wide or less. The signage shall be identified on the approved Civil Plans. (MMC 9.04.101, 2018 IFC Appendix D103.6.1) *No signage present on preliminary civil plans.*
   d. The city address committee will determine road names and address numbers for the lots.

MEMORANDUM

TO: Emily Morgan, Senior Planner

FROM: David Jackson, NPDES Coordinator

DATE: 8/29/2024

SUBJECT: PA24-002 Taylor Lane Subdivision

1. For residential projects triggering minimum requirements #6 Runoff Treatment and #7 Flow Control, the stormwater facility lot will be dedicated to the HOA, and the HOA will be responsible to maintain the landscaping and amenities. The City will receive an easement to inspect, maintain, or repair the facility, if determined necessary. This policy may be modified depending on facility design. Please complete the tool attached to this memo to complete this step.

If you have questions regarding these comments, please contact me at (360) 363-8288 or djackson@marysvillewa.gov.

cc: Nate Dickey, Storm/Sewer Supervisor

MARYSVILLE
PUBLIC WORKS

(360) 363-8100

Public Works
80 Columbia Avenue
Marysville, WA 98270

Stormwater Covenant and Easement

Community Development Department 80 Columbia Avenue Marysville, WA 98270

(360) 363 -8100 Phone (360) 651-5099 FAX Office Hours: Monday – Friday 7:30 AM -4:00 PM

Instructions Page

For the Developer:

Does your Project trigger minimum requirements #6 Runoff Treatment, or #7 Flow Control AND the facility(ies) will be on private property?

If “no” then this covenant does not need to be recorded.

Otherwise, please complete the enclosed documents. The draft document should be submitted for review with the other civil plan documents. It does not need signatures at that time. Exhibit B-Facilities Maintenance Plan should include a map showing where the storm water features are located on the property and describe the maintenance requirements. Once the infrastructure is built, review the document. If construction altered the stormwater utility layout update the appropriate information. The documents must be signed by all parties with an ownership interest in the property (include additional signature blocks and notary acknowledgement forms as necessary). Have the final document signatures notarized. Record before final occupancy is issued.

Recording notes:

- Do not write within the one-inch border
- Type or print legibly and in an easily readable font
- Print documents single sided and provide original copies with original signatures

When Recorded, Return to:

City of Marysville
Community Development
80 Columbia Ave
Marysville, WA 98270

Stormwater Covenant and Easement
(MMC 14.15.155)

DOCUMENT TITLE: *Project Name* Stormwater Covenant and Easement
Grantor: *Property Owner Name*
Grantee: CITY OF MARYSVILLE, a Municipal Corporation
Legal Description (abbreviated):
Assessor's Parcel(s):
Address:
Reference Number(s):
City of Marysville Project No: City of Marysville Building Permit No:
****Note**** The Auditor/Recorder will rely on the information provided on this form. City staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

Stormwater Covenant and Easement
(MMC 14.15.155)

This Stormwater Covenant and Easement (the "Agreement") is executed in favor of the City of Marysville (the "City") by the undersigned owner(s) (the "Grantor") of the following described real property situated in the City of Marysville, Snohomish County, State of Washington (the "Property") (insert complete legal description):

(attach Exhibit A if necessary to fit full legal description)

WHEREAS, pursuant to Marysville Municipal Code Chapter 14.15, as may be hereafter amended, a condition of developing the Property requires that it have adequate stormwater drainage; and

WHEREAS, the Grantor has installed a private storm drainage system for the Property; and

WHEREAS, such a private storm drainage system will require ongoing maintenance as detailed in the approved Facility Maintenance Plan to ensure it operates as designed;

WHEREAS, the private storm drainage system includes the following specified drainage control facilities, which are documented in the drainage control plan drawing(s), as amended by record drawing(s) on file with the City of Marysville. The following runoff treatment or flow control facilities are onsite:

	Detention or Infiltration Pond		BMP T8.20 Sand Filter vault
	Detention or Infiltration Vault		BMP T8.30 Linear Sand Filter
	BMP T5.15 Permeable Pavements		BMP T8.40 Media Filter Drain
	Detention Tank/Pipes		BMP T9.10 Basic Biofiltration Swale
	BMP T5.16 Tree Retention and Tree Planting		BMP T9.20 Wet Biofiltration Swale
	BMP T5.17 Vegetated Roofs		BMP T9.30 Continuous Inflow biofiltration Swale
	BMP T5.20 Rainwater Harvesting		BMP T9.40 Basic Filter Strip
	BMP T5.30 Full Dispersion area		BMP T10.10 Wetponds-Basic and Large
	BMP T6.10 Presettling Basin		BMP T10.20 Wetvaults
	BMP T7.10 Infiltration Basins		BMP T10.30 Stormwater Treatment Wetlands
	BMP T7.20 Infiltration trenches		BMP T10.40 Combined Detention and Wetpool Facilities
	BMP T7.30 Bioretention Cells, Swales and Planter Boxes		BMP T11.10 API (Baffle type) Separator bay
	BMP T7.40: Compost-amended Vegetated Filter Strips (CAVFS)		BMP T11.11 Coalescing Plate (CP) Separator Bay

	BMP T8.10 Basic Sand Filter basin		Ecology approved Emerging Technology Manufacturer: Device Name:
	BMP T8.11 Large Sand Filter basin		

Now, therefore, the Grantor, on behalf of Grantor and Grantor's heirs, successors, and assigns, agrees to the following and hereby creates a covenant running with the land that shall be binding upon all parties and their heirs, successors, and assigns forever:

(1) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, agrees to and shall:

(a) inspect and maintain the above described drainage control facilities in accordance with the provisions of Marysville Municipal Code (MMC) Title 14, the approved Facility Maintenance Plan (attached hereto as Exhibit B and incorporated by this reference), and any other provisions applicable to the facilities, as now and hereafter in effect;

(b) implement the terms of the drainage control plan required for development; and

(c) inform all future purchasers, heirs, successors, and assigns of the existence of the drainage control facilities and other elements of the drainage control plan and the limitations of the drainage control facilities.

(2) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, hereby grants permission for authorized representatives of the City of Marysville to enter onto the Property for inspection, monitoring, correction, or abatement of conditions related to the Property's drainage control plan, drainage control facilities, MMC Title 14, or any other MMC provision applicable to drainage control, as now and hereafter in effect.

(3) If the private storm drainage system is not maintained in accordance with the approved or record drawing design, the Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns grants the City the right to inspect and repair the system and assess reasonable costs for the work that may be charged against the Property, the Property owner, or any beneficiary.

(4) The Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns:

(a) Agrees and acknowledges that the City is not responsible for the adequacy or performance of the drainage control plan or the drainage control facilities;

(b) Agrees to accept any and all risks of harm, loss, injury, or damage related to the drainage control plan or the drainage control facilities; and

(c) Hereby waives any right to assert any and all present and future claims against the City, whether known or unknown, for any harm, loss, injury, or damage occurring either on or off the Property, related to the drainage control plan, the drainage control facilities, or drainage

or erosion on the Property, except only for such harm, loss, injury, or damage that directly results from the sole negligence of the City.

(5) This Agreement shall be recorded in the real estate records of the Auditor's Office of Snohomish County, Washington. If any provision of this Agreement is held invalid, the remainder of the Agreement is not affected.

(6) The obligations of the Grantor and each of the Grantor's heirs, successors, and assigns under this Agreement shall terminate when that person sells, devises, or transfers the Property, or his or her interest therein, unless the obligation arises out of a claim of negligence or intentional act of that person.

Now, therefore, to this end, the Grantor, on behalf of the Grantor and the Grantor's heirs, successors, and assigns, hereby grants a perpetual easement to the City of Marysville and its authorized representatives to enter the Property, inspect the private storm drainage system, and make necessary repairs, with any expenses incurred being chargeable against the Property, the Property owner, and any beneficiary.

By: _____ Date: _____

Type signer's name here, Type signer's title or affiliation

Type company name here

Type address here

Type City, State, Zip here

By: _____ Date: _____

Type signer's name here, Type signer's title or affiliation

Type company name here

Type address here

Type City, State, Zip here

ACKNOWLEDGEMENT

(Individual)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument and acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at _____

My commission expires _____

(Entity)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at _____

My commission expires _____

ACKNOWLEDGEMENT

(Individual)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument and acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at _____

My commission expires _____

(Entity)

STATE OF WASHINGTON)

)ss.

COUNTY OF SNOHOMISH)

I certify that I know or have satisfactory evidence that _____

_____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED this _____ day of _____, 20_____.

_____

_____

(Legibly print name of notary)

NOTARY PUBLIC in and for the State of

Washington, residing at _____

My commission expires _____

EXHIBIT A

LEGAL DESCRIPTION

(Insert complete legal description):

Situated in the City of Marysville, County of Snohomish, State of Washington.

EXHIBIT B

FACILITIES MAINTENANCE PLAN

EST. 1891
MARYSVILLE
WASHINGTON

PUBLIC WORKS DEPARTMENT
TRAFFIC DIVISION
80 Columbia Avenue ◆ Marysville, WA 98270
(360) 363-8100 ◆ (360) 363-8284 FAX

September 10, 2024

Keystone Land, LLC
Attn: Joe Long
13805 Smokey Point Blvd.
Marysville, WA 98271

Re: **Taylor Lane – *PA 24-002* – Concurrency *Recommendation***

Dear Mr. Long,

The applicant is proposing the development of thirteen (13) single family detached homes upon 4.66 acres located along 83rd Ave Avenue NE and 49th ST NE on parcel(s) with APN(s): 00590700013600. The existing one (1) single family detach home located on site shall remain.

Based on the Traffic Impact Analysis (TIA) prepared by Kimley-Horn & Associates, Inc., dated January 2024, the proposed development would generate the following Average Daily Trips (ADT), AM peak hour trips (AMPHT), and PM peak hour trips (PMPHT):

USE	**Building Units** (new)	ADT	AMPHT	PMPHT
Land Use Code 210 – Single Family Detached Housing	13	123	9	13

Based on our review of existing conditions, as well as other applicable supplemental information submitted with the application, and on file with the City, the following impacts and mitigation obligations are required for the Taylor Lane development:

1. The applicant shall be required to construct frontage improvements along 83rd Avenue NE prior to recording the final subdivision, in accordance with MMC 12.02A.090, *Frontage Improvements Required*. Roadway improvements, channelization, site access and street lighting plans shall be required to be reviewed and approved by the City Engineer, prior to construction plan approval.

   1.1. 83rd Avenue NE shall be built as a three lane Minor Arterial with bike lanes compliant with SP 3-201-004.

2. The applicant shall be required to construct frontage improvements along 49th Street NE prior to recording the final subdivision, in accordance with MMC 12.02A.090, *Frontage Improvements Required*. Roadway improvements, channelization, site access and street lighting plans shall be required to be reviewed and approved by the City Engineer, prior to construction plan approval.

   2.1. 49th ST NE shall be built as a Local Access Street compliant with EDDS SP 3-202-002.

3. The applicant shall be required to dedicate public right-of-way in order to accommodate the required frontage improvements, in accordance with MMC 12.02A.110(1)(c), *Dedication of Road right-of-way – Required setbacks*. Right-of-way widths and required dedication shall be determined by the City Engineer.

4. In order to mitigate traffic impacts upon the future capacity of the road system, the applicant shall be required to submit payment to the City of Marysville, on a proportionate share cost of the future capacity improvements as set forth in MMC 22D.030.070(3), for the development. **Traffic impact fees shall be vested at a rate of $6,300.00, per PMPHT, with 13 new PMPHTs totaling $81,900.**

Marysville Municipal Code (MMC) 22D.030.070(1)(d), requires an applicant to make a written proposal for mitigation of a development's traffic impacts to the Public Works Director, prior to finalizing a concurrency determination and conditions of approval. If you have any questions, regarding the developments impacts and recommended mitigation obligations outlined above, please contact either Emily Morgan, Senior Planner, at emorgan@marysvillewa.gov or by phone at 360.363.8216 or Jesse Hannahs, P.E., Traffic Engineering Manager, at jhannahs@marysvillewa.gov or via phone at 360-363-8287.

Sincerely,

Jesse L. Hannahs, P.E.
Traffic Engineering Manager

cc: Emily Morgan, Senior Planner
Max T. Phan, PE, Assistant Public Works Director/City Engineer
Ken McIntyre, PE, Development Services Manager
Haylie Miller, Community Development Director
Chris Holland, Planning Manager

Keystone Land, LLC
13805 Smokey Pt. Blvd., Suite 102
Marysville, WA 98271
360-659-9444

September 10, 2024

Emily Morgan, Senior Planner
City of Marysville
501 Delta Ave.
Marysville, WA 98270

RE: Taylor Lane - PA 24-002

Dear Emily,

This letter is to confirm Keystone Land's acceptance of the Serenity Trails Concurrency Recommendations per the City of Marysville Public Works letter dated September 10, 2024.

Please contact me if you need any additional information.

Thank you,



Joe Long - EVP
Keystone Land, LLC
Joe@keystoneland.com

October 1, 2024

City of Marysville Public Works Department
ATTN: Emily Morgan
501 Delta Ave
Marysville, WA 98270
(360) 363-8100

RE: Taylor Subdivision (PA 24-002) 1st Preliminary Review Comment/Response Letter

Project: Taylor Lane (SGE #23-0009)

Emily,

Please find below responses to all comments as received from the City of Marysville. All comments have now been addressed and responses to each comment are outlined below.

Subdivision Comments from Emily Morgan – City Planner

1. Include file number PA24-002 on all future correspondence, in additional to all site, civil and landscape plans.

   Response: This has been added to the updated plans.

2. The western portion of proposed lot 6 is completely isolated from the eastern portion. Further, given that the eastern portion of proposed lot 6 would be under 4,000 SF, lots 6-8 would ultimately need to be reduced into 2 lots and the western portion of the proposed lot 6 be absorbed into lot 5.

   Response: It is the opinion of the applicant team that City staff is incorrect in its interpretation of City code requirements on this issue. The two portions of previously proposed lot 6 were contiguous and connected by a 6" (minimum width) portion of area between the proposed lot lines. Per MMC 22A.020.130 under the definition of "Lot", there is no requirement as to minimum lot dimensions that determine ownership or maintenance. Correspondence with City staff has indicated that the City's stance of this previously proposed 6" contiguous strip would be treated as a panhandle portion of the lot. This is an incorrect interpretation as under the definition of "lot area" MMC 22A.020.130 notes:

   > ***"Lot area" means the total horizontal area within the boundary lines of a lot, excluding any access easements or panhandles. For purposes of this definition, a "panhandle" means a narrow strip of land designed for access purposes which does not, itself, meet the full frontage or width requirements of a lot***

   As the proposed 6" width lot 6 strip is not "designed for access purposes" (as specifically noted above for panhandles), it is not to be removed from the proposed lot area. Thus, lot 6 as previously proposed contains contiguous lot area meeting all lot and dimensional requirements of the MMC.

   However, the applicant team has discussed the City's comment and has willfully chosen to remove the lot and adjust dimensions similar to the request of the City in the comment in order to not belabor plat approvals. This has been done under the applicants firm stance that lot 6 as previously proposed is a code-compliant lot. The project now proposes 13 total lots.

3. All lots under 5,000 SF would be required to meet the development portion of MMC 22C.010.310 for Small lot single family dwelling development standards.

   Response: This is noted and will be addressed during building permits.

All other comments are related to items that will be addressed during subsequent civil reviews.

Thank you for your review. Let us know if you have any questions or if you need any additional information. We are happy to discuss this project further with you as necessary.

Regards,



Tom Abbott, P.E.
Principal Civil Engineer
Solid Ground Engineering

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON

TAYLOR LANE
PRELIMINARY PLANS
MARYSVILLE, WA

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION
●	SET 1/2" X 24" REBAR W/CAP "PCS 37536"
○	EXISTING CORNER MONUMENT AS NOTED
	QUARTER SECTION TIE
	SECTION TIE
	BLOW-OFF VALVE
	CATCH BASIN
	FIRE HYDRANT
	GAS VALVE
	GUY ANCHOR
	LIGHT STANDARD
	MAILBOX
	SANITARY SEWER MANHOLE
	SIGN POST
	STORM DRAIN MANHOLE
	UTILITY/ POLE
	WATER METER
	WATER VALVE
	WETLAND FLAG
	CONIFEROUS TREE
	DECIDUOUS TREE

ABBREVIATIONS	
CPP	CORRUGATED PLASTIC PIPE
IE	INVERT ELEVATION
INV	INVERT ELEVATION
OHP	OVERHEAD POWER LINE
TPM	TELEPHONE PAINT MARK
B	BIRCH
C	CEDAR
F	FIR
M	MAPLE
S	SPRUCE
W	WILLOW

PROPOSED STORM SYMBOLS

SYMBOL	DESCRIPTION
	SD CAP
	TYPE 1 CATCH BASIN, GRATED LID
	TYPE 1 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN, GRATED LID
	TYPE 2 CATCH BASIN, SOLID LID
	BEEHIVE MANHOLE COVER
	SQUARE YARD DRAIN
	ROUND YARD DRAIN
	STORM CLEAN OUT
	STORM PIPE

PROPOSED SEWER SYMBOLS

SYMBOL	DESCRIPTION
	SEWER CAP
	SEWER CLEANOUT
	SEWER MANHOLE
	SEWER PIPE

PROPOSED WATER SYMBOLS

SYMBOL	DESCRIPTION
	WATER CAP
	CONCRETE BLOCKING
	11.25° BEND
	22.5° BEND
	45° BEND
	90° BEND
	VALVE
	HYDRANT ASSEMBLY
	BLOW-OFF VALVE
	REDUCER
	AIR-VAC ASSEMBLY
	WATER METER
	WATER PIPE

PROPOSED SURVEY SYMBOLS

SYMBOL	DESCRIPTION
	SURVEY MONUMENT IN PROPOSED ROAD

CONTACT LIST

DEVELOPER:
KEYSTONE LAND, LLC
13805 SMOKEY POINT BLVD #102
MARYSVILLE, WA 98271
CONTACT: JOE LONG
PHONE: (425) 268-6373
EMAIL: joe@cornerstonehomes.com

CIVIL ENGINEER:
SOLID GROUND ENGINEERING
8105 166TH AVE NE
REDMOND, WA 98052
CONTACT: TOM ABBOTT, PE
PHONE: (425) 281-8324
EMAIL: tabbott@solidgroundpnw.com

GEOTECHNICAL ENGINEER:
EARTH SOLUTIONS NW
15365 NE 90TH ST #100
REDMOND, WA 98052
CONTACT: HENRY WRIGHT, PE
PHONE: (425) 449-4704
EMAIL: Henryw@esnw.com

LANDSCAPE ARCHITECT:
PAUL JAY LANDSCAPE ARCHITECT
1115 BRIDGE ROAD
EASTHAM, MA 02642
CONTACT: PAUL JAY
PHONE: (425) 210-1986
EMAIL: Pauljayla@gmail.com

SURVEYOR:
PACIFIC COAST SURVEYS, INC.
P.O. BOX 13619
MILL CREEK, WASHINGTON 98082
CONTACT: DARREN RIDDLE, PLS
PHONE: (425) 512-7099
FAX: (425) 357-3577
EMAIL: darren@pcsurveys.net

WETLAND BIOLOGIST:
WETLAND RESOURCES
9505 19TH AVE SE, STE 106
EVERETT, WASHINGTON 98208
CONTACT: JOHN LAUFENBURG
PHONE: (425) 337-3174
FAX: (425) 337-3045
EMAIL: john@wetlandresources.com

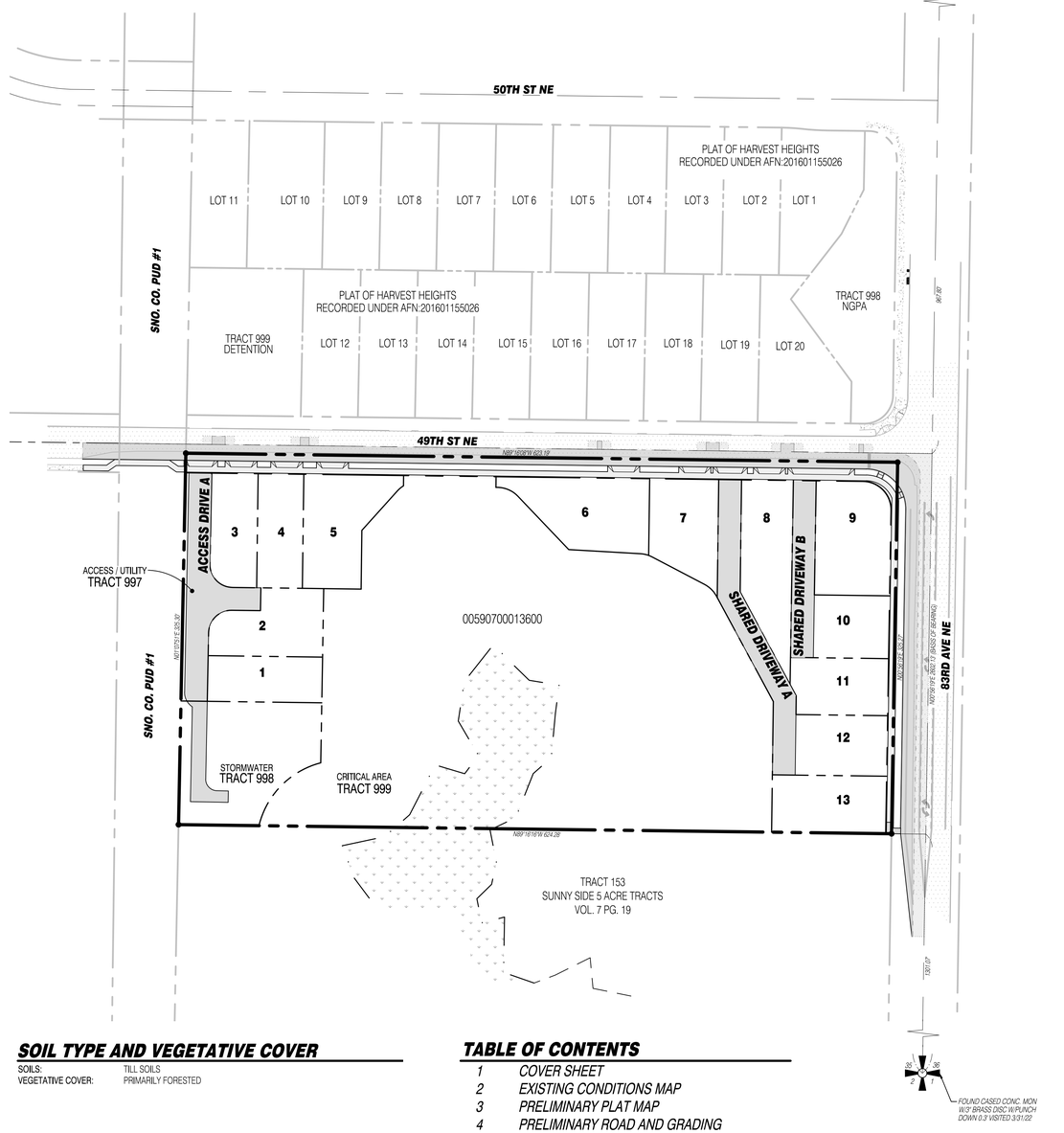
EARTHWORK QUANTITIES

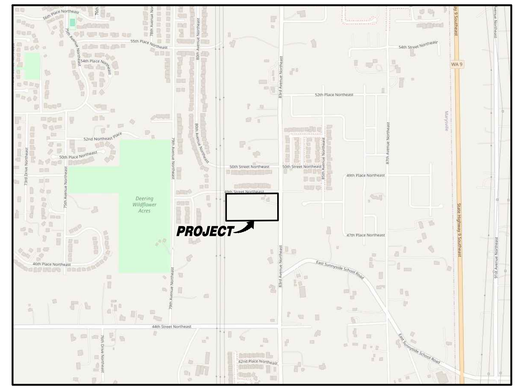
STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	128,697 SF (2.95 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

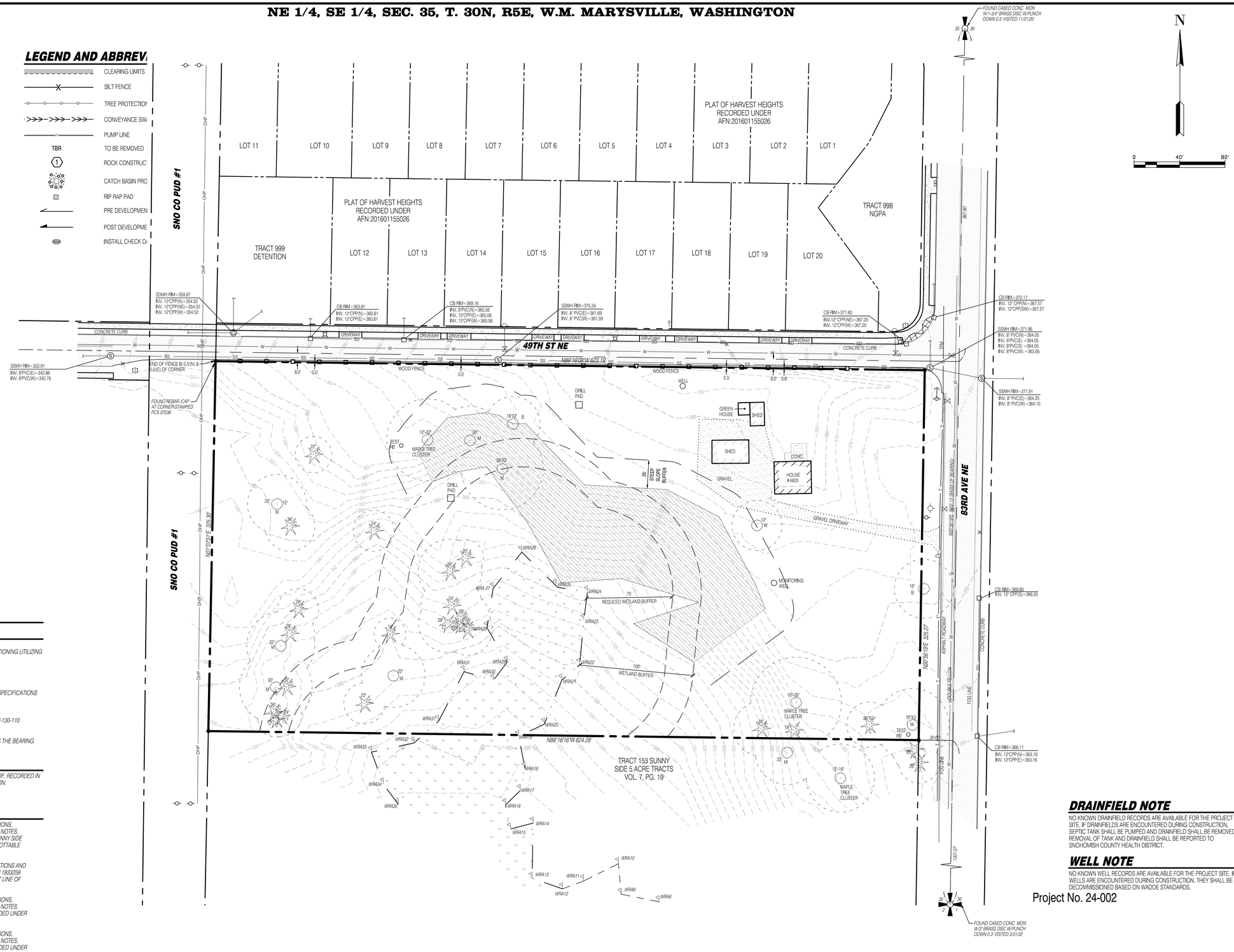
PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	13 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA




PROJECT
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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



SURVEY INFORMATION

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE AND REAL TIME KINEMATIC GPS POSITIONING UTILIZING THE HxGN SMARTNET NETWORK

INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
LEICA VIVA GNSS GS08 RECEIVER
ALL EQUIPMENT HAS BEEN MAINTAINED IN ADJUSTMENT TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC 331-130-100

PRECISION:
MEETS OR EXCEEDS STATE STANDARDS SET BY WAC 332-130-080 THROUGH 332-130-110

BASIS OF BEARING:
THE MONUMENTED EAST LINE OF THE SOUTHEAST QUARTER OF SECTION 35 AS THE BEARING NORTH 005619' EAST

LEGAL DESCRIPTION

TRACT 136, SUNNY SIDE FIVE ACRES TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

EASEMENT AND RESTRICTIONS

1. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON THE PLAT OF SUNNY SIDE FIVE ACRE TRACTS, AS RECORDED UNDER RECORDING NUMBER 122901 (NO PLOTTABLE ENCUMBRANCES).

2. SUBJECT TO EASEMENT FOR TREE TRIMMING, INCLUDING THE TERMS, CONDITIONS AND PROVISIONS CONTAINED THEREIN, AS RECORDED UNDER RECORDING NUMBER 1933259 (EASEMENT DIMENSIONS ARE NOT DEFINED IN DOCUMENT, ADJACENT TO WEST LINE OF PROPERTY).

3. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601045005 (NO PLOTTABLE ENCUMBRANCES).

4. SUBJECT TO COVENANTS, CONDITIONS, RESTRICTIONS, RECITALS, RESERVATIONS, EASEMENTS, EASEMENT PROVISIONS, DEDICATIONS, BUILDING SETBACK LINES, NOTES, STATEMENTS, AND OTHER MATTERS, IF ANY, AS SET FORTH ON SURVEY RECORDED UNDER RECORDING NUMBER 9601185006 (NO PLOTTABLE ENCUMBRANCES).

VERTICAL DATUM

NAVD 88 (NAVD88 -3.67'= NGVD29)

FOUND CASED MON WITH 3" BRASS DISC WITH PUNCH AT THE INTERSECTION OF 83RD AVE NE AND 44TH ST NE. ELEVATION = 358.93' PER GPS OBSERVATIONS

SURVEY REFERENCES

(R1) PLAT OF HARVEST HEIGHTS - AFN 201601155026
(R2) PLAT OF SUNNY SIDE FIVE ACRE TRACTS - VOL. 7, PG. 19
(R3) HARVEST HILLS PHASE 2 - AFN 201503135002

DRAINFIELD NOTE

NO KNOWN DRAINFIELD RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF DRAINFIELDS ARE ENCOUNTERED DURING CONSTRUCTION, SEPTIC TANK SHALL BE PUMPED AND DRAINFIELD SHALL BE REMOVED. REMOVAL OF TANK AND DRAINFIELD SHALL BE REPORTED TO SNOHOMISH COUNTY HEALTH DISTRICT.

WELL NOTE

NO KNOWN WELL RECORDS ARE AVAILABLE FOR THE PROJECT SITE. IF WELLS ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE DECOMMISSIONED BASED ON WADOE STANDARDS.

Project No. 24-002

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

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THOMAS P. ABBOTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 9-23-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION
1	8-30-24	REVISED PER CITY COMMENTS
2	9-23-24	REVISED PER CITY COMMENTS

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

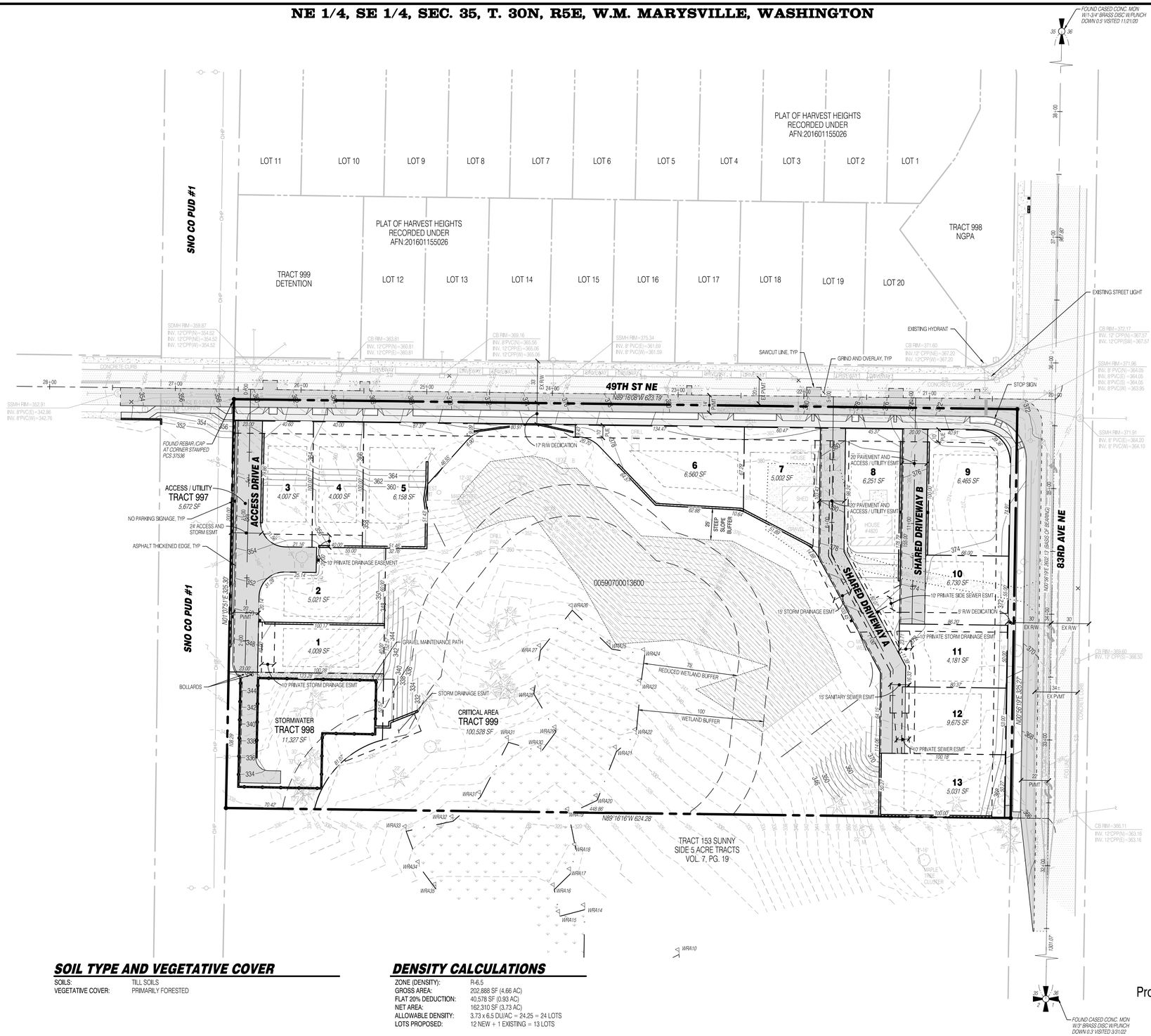
DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

EC-01

2 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

NOTES

1.) LOTS 1, 2, 10, 11, 12 AND 13 WILL REQUIRE FIRE SPRINKERS.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	13 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	12 NEW + 1 EXISTING = 13 LOTS

UTILITY NOTE

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Project No. 24-002

THOMAS P. ABBOTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 9-23-24

ENGINEER'S STAMP

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2	9-23-24	REVISED PER CITY COMMENTS

SGG
Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

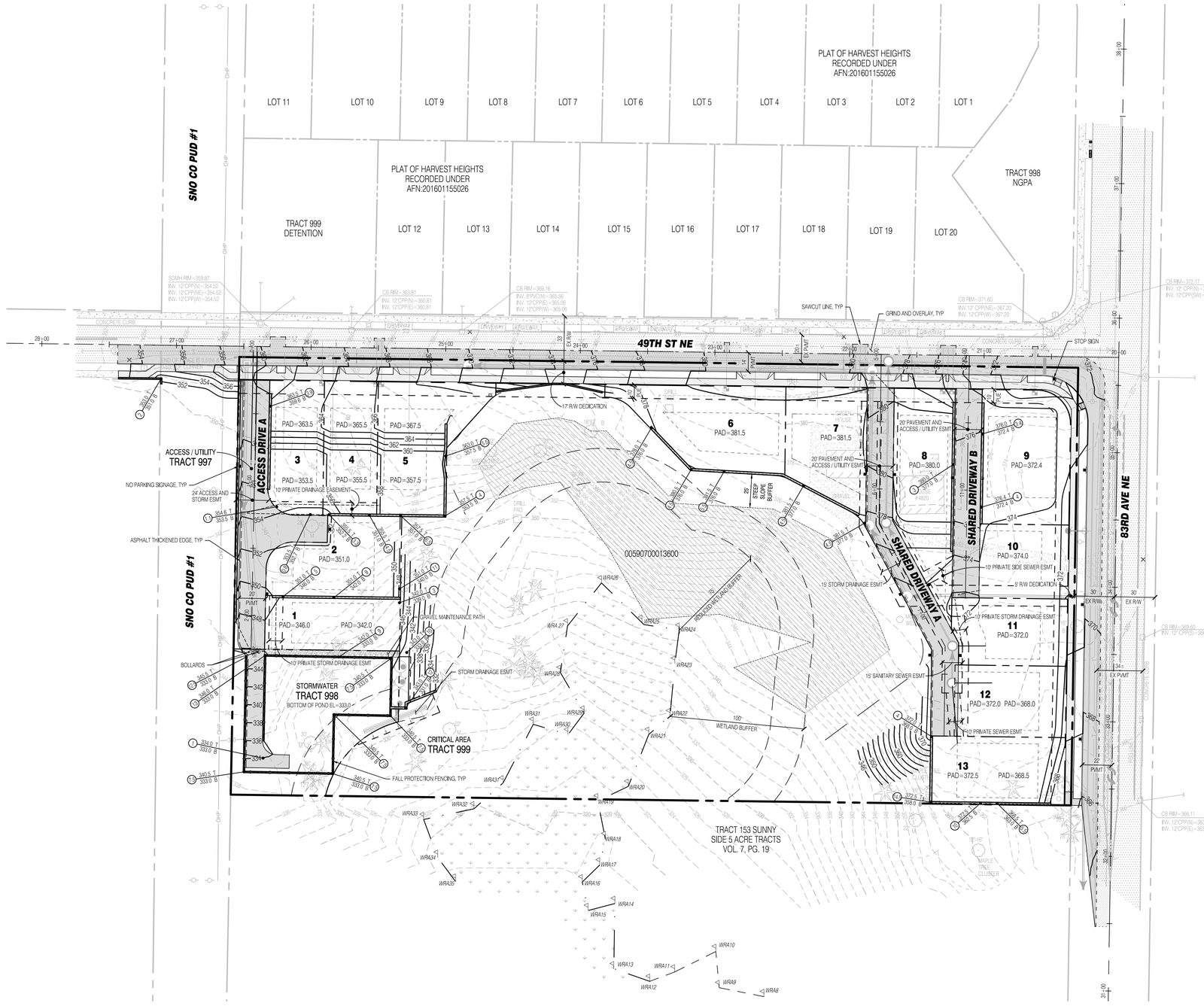
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PP-01

3 OF 8

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

EARTHWORK QUANTITIES

STRIPPING:	4,000 CY
CUT:	4,500 CY
FILL:	18,000 CY
NET:	13,500 CY (FILL)
DISTURBED AREA:	128,697 SF (2.95 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

ROAD AND GRADING NOTES

1. GRADING AND PLACEMENT OF WALLS MUST BE IN CONFORMANCE WITH 220.50.030 OF THE MMC.
2. ALL DISTURBED PERVIOUS AREAS TO BE UNDERLAIN WITH BMP T5.13 SOILS.
3. TRENCH RESTORATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 3-703 OF THE EDDS.
4. ALL OVERHEAD UTILITIES ARE TO BE PLACED UNDERGROUND.
5. ALL WALLS OVER 48" REQUIRE A SEPARATE BUILDING PERMIT.
6. ALL WALLS OVER 30" REQUIRE FALL PROTECTION FENCING.
7. ALL WALLS TO BE 2' OR LESS AT TERMINATION.
8. ALL PAVEMENT CUTS SHALL BE RESTORED PER APPENDIX B OF EDDS CHAPTER 3. TACK AND SEAL SHALL BE EMULSIFIED ASPHALT GRADE CSS-1 AS SPECIFIED IN SECTION 9-02.1(6) OF THE STANDARD SPECIFICATIONS AND SHALL BE APPLIED TO THE EXISTING PAVEMENT AND EDGES OF SAWCUTS AS SPECIFIED IN SECTION 5-04 OF THE STANDARD SPECIFICATIONS.

UTILITY NOTE

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Solid Ground Engineering
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PRELIMINARY ROAD AND GRADING

KEYSTONE LAND, LLC.

TAYLOR LANE

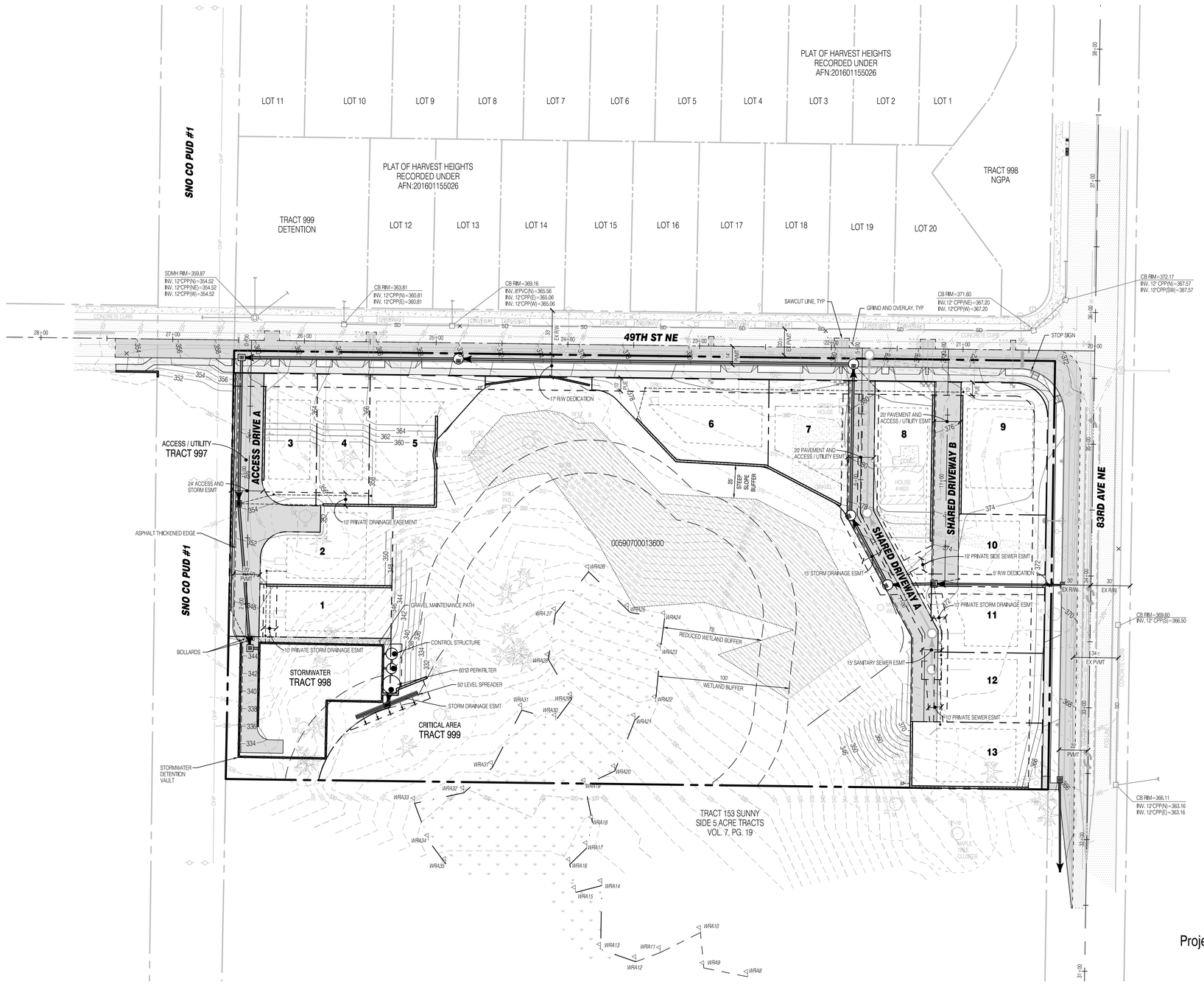
MARYSVILLE, WA

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JOB NUMBER:	23-0009

RG-01

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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING
	STORM MAIN PIPE
	SEWER MAIN PIPE
	WATER MAIN PIPE
	DRAIN PIPE
	FRENCH DRAIN
	FIRE HYDRANT
	SEWER MANHOLE
	SEWER CLEANOUT
	TYPE 1 CATCH BASIN W/ SOLID LID
	TYPE 1 CATCH BASIN W/ OPEN GRATE
	TYPE 2 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN W/ OPEN GRATE
•	STORM CLEAN OUT

Project No. 24-002

UTILITY NOTE

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SURVEY DISCLAIMER

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PRELIMINARY DRAINAGE PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

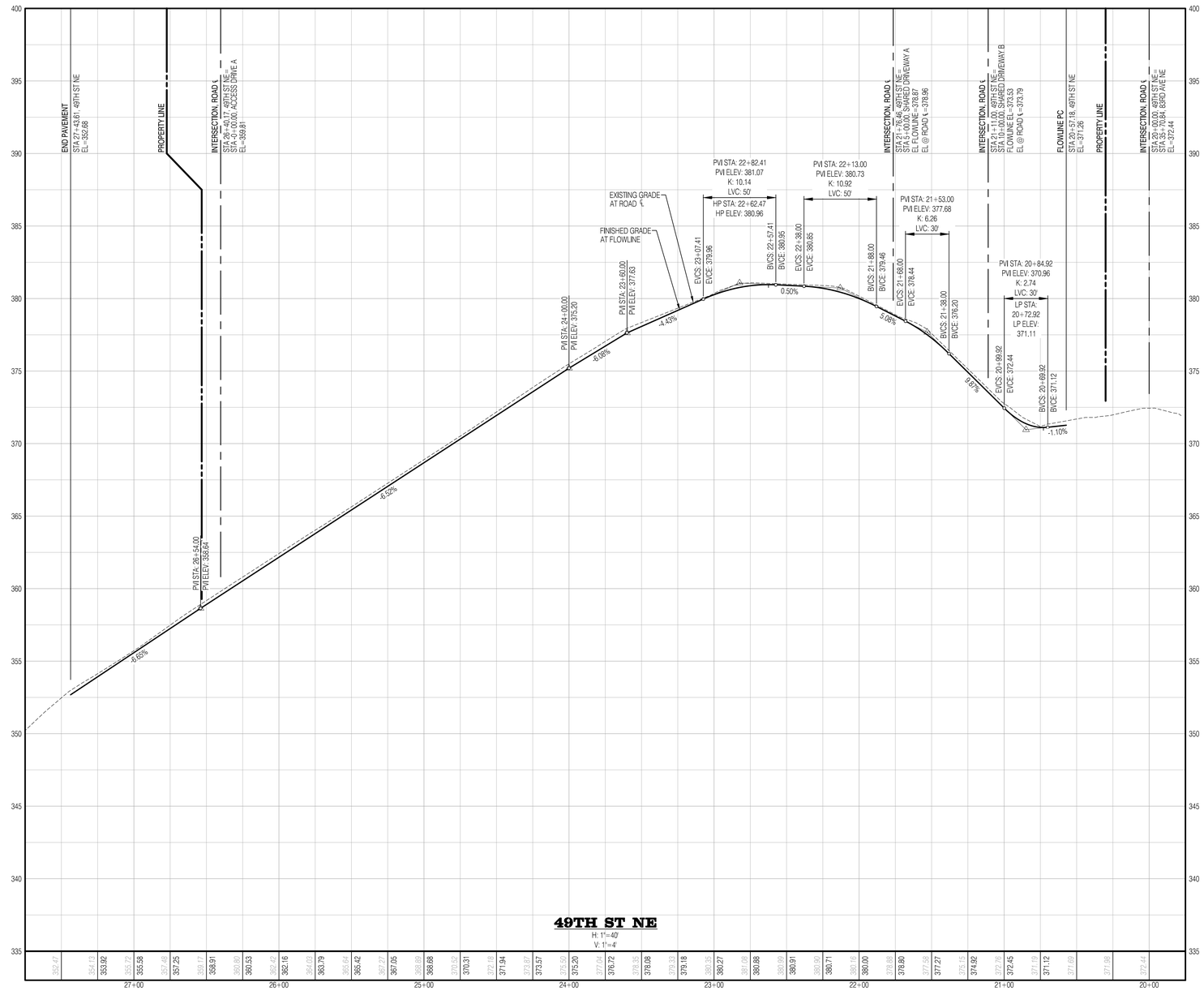
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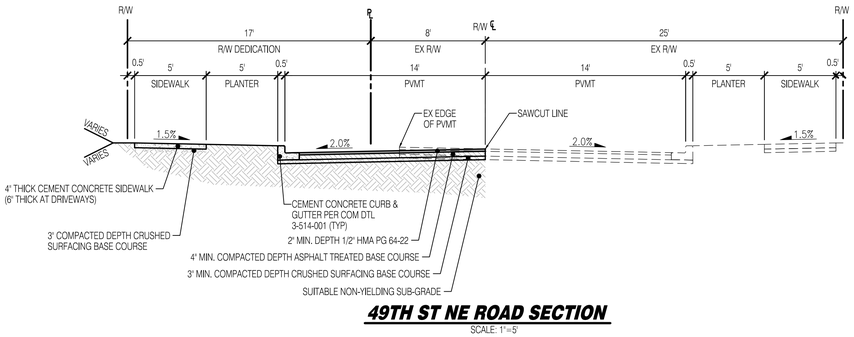
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NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON





49TH ST NE ROAD SECTION

SCALE: 1"=5'

Project No. 24-002

UTILITY NOTE

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Redmond, WA 98052

PRELIMINARY ROAD PROFILES AND SECTIONS

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

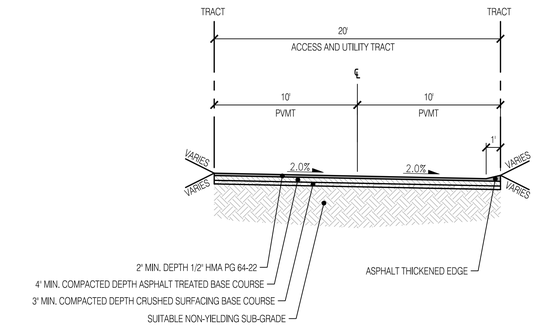
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PR-01

6 OF 8

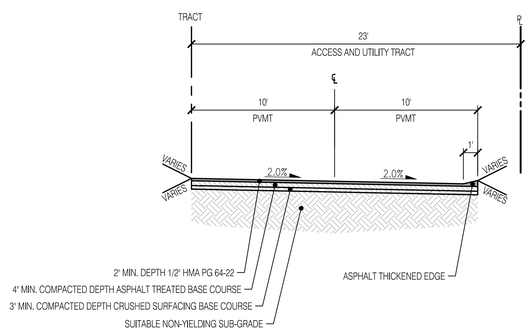
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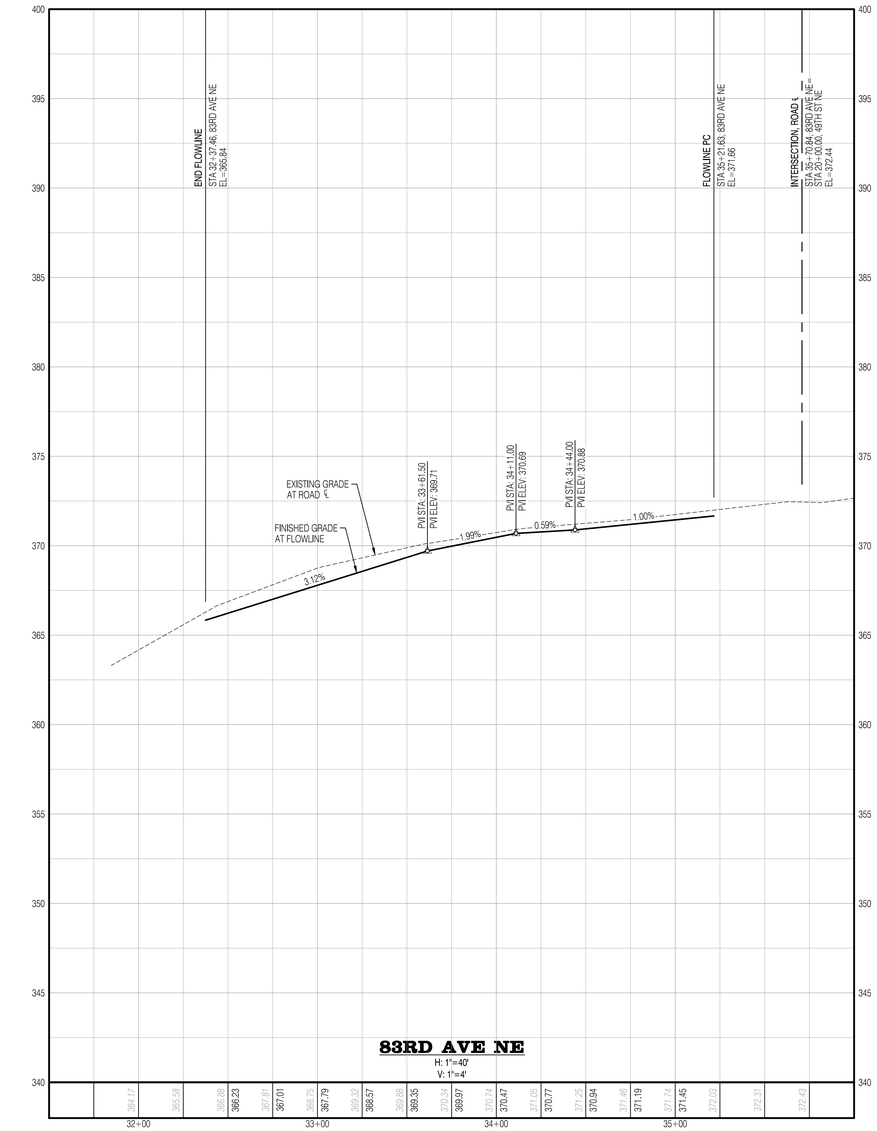
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SCALE: 1"=5'



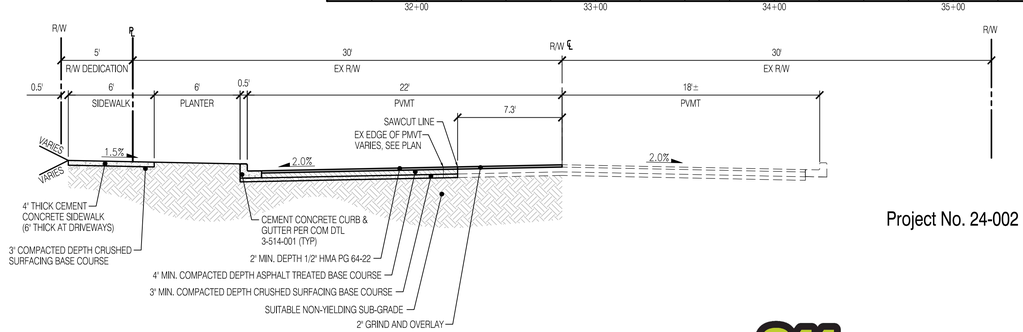
ACCESS DRIVE A

SCALE: 1"=5'



83RD AVE NE

H: 1"=40'
V: 1"=4'



83RD AVE NE ROAD SECTION

SCALE: 1"=5'

UTILITY NOTE

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PRELIMINARY ROAD PROFILES AND SECTIONS

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

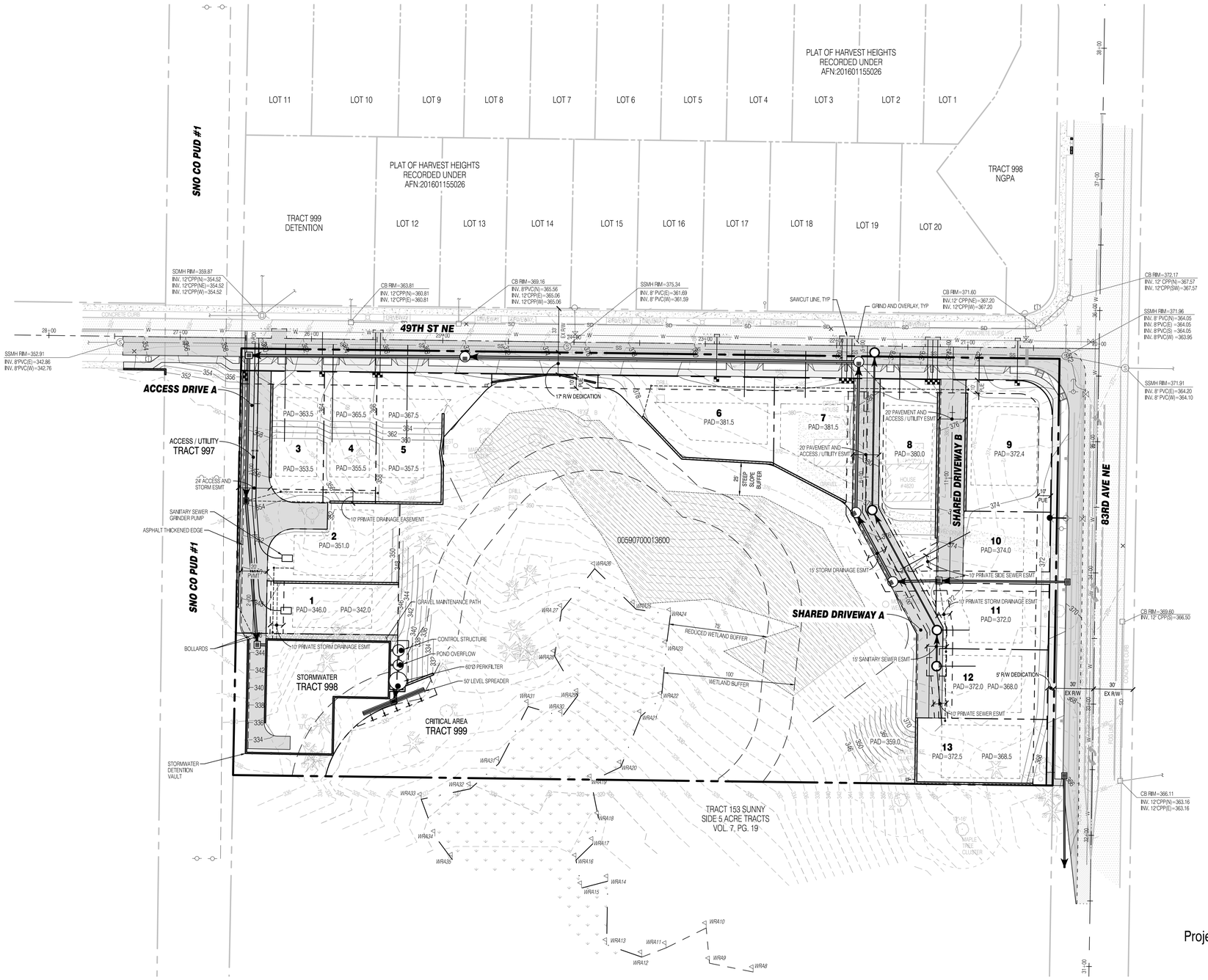
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JOB NUMBER:	23-0009

PR-02

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LEGEND

SYMBOLS	DESCRIPTION
	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING
	STORM MAIN PIPE
	SEWER MAIN PIPE
	WATER MAIN PIPE
	DRAIN PIPE
	FRENCH DRAIN
	FIRE HYDRANT
	SEWER MANHOLE
	SEWER CLEANOUT
	TYPE 1 CATCH BASIN W/ SOLID LID
	TYPE 1 CATCH BASIN W/ OPEN GRATE
	TYPE 2 CATCH BASIN, SOLID LID
	TYPE 2 CATCH BASIN W/ OPEN GRATE
	STORM CLEAN OUT

UTILITY NOTES

1. RESIDENTIAL SANITARY SEWER GRINDER PUMPS TO BE USED TO SERVE LOT 1 AND 2.
2. LOTS 1, 2, 10, 11, 12 AND 13 WILL REQUIRE FIRE SPRINKERS.

UTILITY NOTE

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PRELIMINARY UTILITY PLAN

KEYSTONE LAND, LLC.

TAYLOR LANE

MARYSVILLE, WA

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DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

UT-01

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CRITICAL AREA STUDY
AND
BUFFER MITIGATION PLAN

FOR

TAYLOR LANE
MARYSVILLE, WA

Wetland Resources, Inc. Project #23124

Prepared By
Wetland Resources, Inc.
9505 19th Avenue SE, Suite 106
Everett, WA 98208
(425) 337-3174

Prepared For
Keystone Land, LLC
13805 Smokey Point Boulevard, #102
Marysville, WA 98271

Revision 1: October 1, 2024
Original submittal: January 26, 2024

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Appendix B: Dept of Ecology Wetland Rating Form and Figures
Appendix C: Critical Area Study and Buffer Mitigation Plan Map

1.0 INTRODUCTION

Wetland Resources, Inc. (WRI) completed a site investigation on September 20, 2023, to identify and evaluate wetlands and fish and wildlife habitat conservation areas on the property located at 4820 83rd Ave NE, in the city limits of Marysville, Washington. The site is composed of one 4.66-acre tax parcel (00590700013600), located within Section 35, Township 30N, Range 05E, W.M. The entire property is within the Snohomish River-Frontal Possession Sound subbasin of the Snohomish Watershed (WRIA 7).

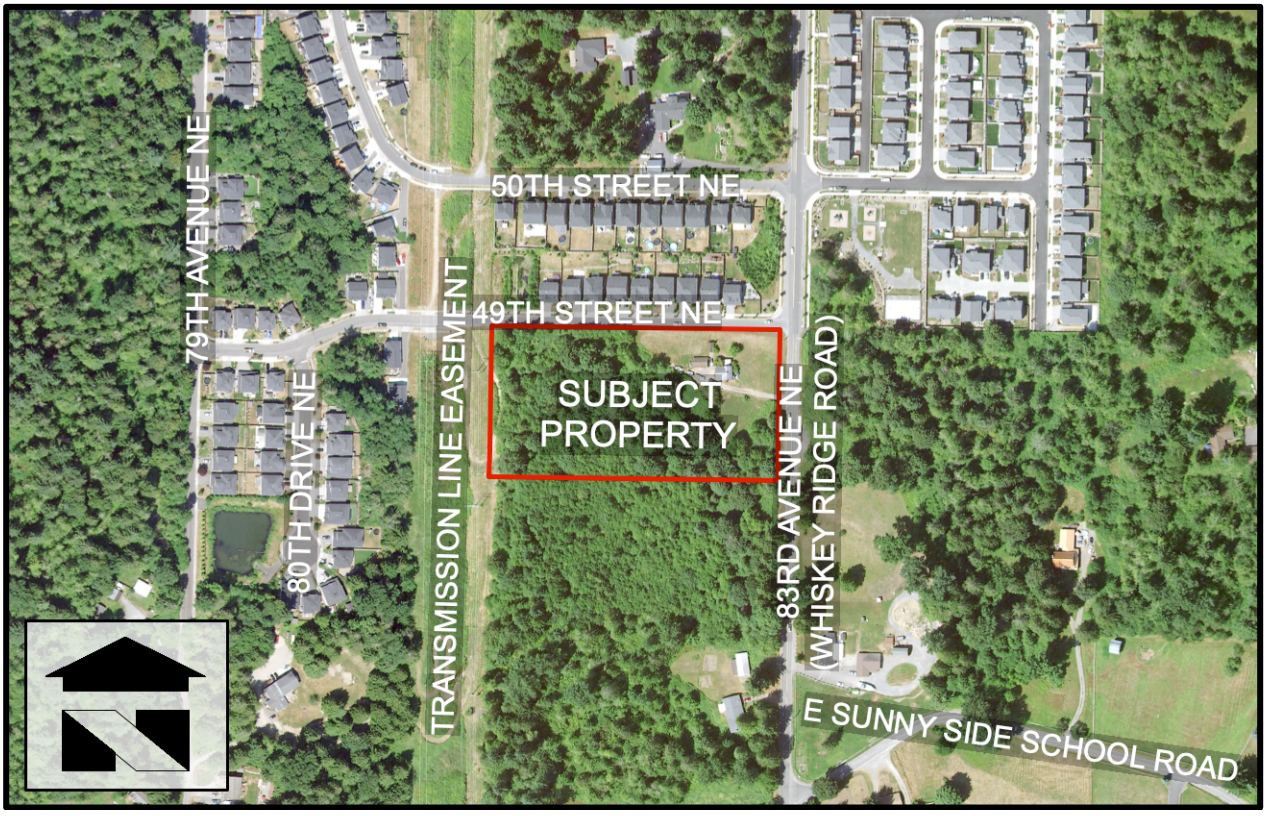


Figure 1 – Aerial view of the subject property

1.1 SITE DESCRIPTION

The subject property is situated in a residential area, surrounded by developments to the west, north, and northeast. The property directly south of the subject parcel is undeveloped, and the properties east and southeast consist of large-lot residential uses. A power transmission corridor parallels the western property boundary. The site has a general southern aspect, sloping towards a depression in the southern portion of the property.

The northeastern portion of the parcel is developed with a single-family residence (SFR) and associated structures. Vegetation within this area is limited to maintained lawn and some sporadic trees and ornamental shrubs. The remainder of the parcel is undeveloped and vegetated by a dense native forest canopy of Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*). The understory consists of salmonberry (*Rubus*

spectabilis), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum*), sword fern (*Polystichum munitum*), and a few sparse patches of Himalayan blackberry (*Rubus armeniacus*).

1.2 CRITICAL AREA SUMMARY

One wetland (Wetland A) was identified on site during the September 2023 investigation. Wetland A is a Category II wetland with a moderate (7) habitat score, receiving a standard buffer of 100-feet. The location of this feature is depicted on the attached *Critical Area Study and Buffer Mitigation Plan Map* (See appendix C).

1.3 PROJECT DESCRIPTION SUMMARY

The applicant is proposing to demolish the existing SFR and develop the eastern and western portions of the property with a 13-lot residential subdivision with associated stormwater, access infrastructure, and frontage improvements along 49th Street NE. To achieve this, the applicant proposes to implement buffer averaging, enhancement of degraded buffer, and installation of permanent fencing and critical area signage.

2.0 WETLAND AND STREAM DETERMINATION

2.1 LIMIT OF STUDY

The proposed project occurs within one tax parcel. Lack of legal access prevents WRI staff from performing routine wetland and stream determinations in surrounding areas on adjacent parcels. Wetland and stream boundaries depicted outside of the subject parcel are based on visual observation from the edge of legal access, publicly available resources, fine-scale elevation contours, and best professional judgment.

2.2 INFORMATION REVIEW

Prior to conducting the site investigation, public resource information was reviewed to gather background information on the subject site and the surrounding area in regards to wetlands, streams, and other critical areas. These sources included the following:

- *USDA/NRCS Web Soil Survey:* The Web Soil Survey identifies the soils underlying the site as Tokul gravelly medial loam, 0 to 8 percent slopes. This unit is not a hydric soil.

- *USFWS National Wetlands Inventory (NWI)*: NWI does not map any features on or near the site.

- *Snohomish County PDS:* PDS maps a large wetland associated with King Creek near the southern property boundary, continuing off-site to the southwest. King Creek is mapped approximately 700 feet off-site to the south. This stream flows southwest, ultimately draining into Ebey Slough. The county maps the portion of King Creek nearest the property boundary as a Type F.

- *WDNR Forest Practices Application Mapping Tool FPAMT:* This resource maps King Creek in approximately the same location as Snohomish County PDS. The portion of this stream closest to the property is mapped as a Type F.

- *WDFW SalmonScape*: SalmonScape maps King Creek in approximately the same location as PDS and FPAMT. The portion of King Creek closest to the property is mapped as gradient-accessible to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*).

- *WDFW Priority Habitat and Species (PHS) Interactive Map:* PHS does not map any features on or near the site.

- *Washington State Department of Natural Resources (DNR) Wetland of High Conservation Value:* This resource does not depict any wetlands of high conservation value on or near the site.

- *City of Marysville Critical Areas Map*: The city of Marysville maps two Category III wetlands approximately 150 feet off-site to the west. King Creek is shown in approximately the same location as depicted by other resources; however, the headwaters are mapped approximately 700 feet south of the subject property.

2.3 METHODOLOGY

Wetland boundaries in western Washington are determined using the methodologies described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers 2010). Under the routine methodology, the process for making a wetland determination is based on three steps:

1.) Examination of the site for hydrophytic vegetation (species present and percent cover);
2.) Examination of the site for hydric soils;
3.) Determining the presence of wetland hydrology

2.3.1 Vegetation Criteria

The Corps Manual and 2010 Regional Supplement define hydrophytic vegetation as "*the assemblage of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence.*" Field indicators are used to determine whether the hydrophytic vegetation criteria have been met. Examples of these indicators include, but are not limited to, the rapid test for hydrophytic vegetation, a dominance test result of greater than 50%, and/or a prevalence index score less than or equal to 3.0.

2.3.2 Soils Criteria

The 2010 Regional Supplement (per the National Technical Committee for Hydric Soils) defines hydric soils as soils *"that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."* Field indicators are used to determine whether a given soil meets the definition for hydric soils. Indicators are numerous and include, but are not limited to, presence of a histosol or histic epipedon, a sandy gleyed matrix, depleted matrix, and redoximorphic depressions. The entire property is mapped by the NRCS as being underlain by Tokul gravelly medial loam, 0 to 8 percent slopes, which is not a hydric soil.

2.3.3 Hydrology Criteria

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface for a sufficient duration during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and chemically reducing conditions, respectively. The strongest indicators include the presence of surface water, a high-water table, and/or soil saturation within at least 12 inches of the soil surface.

An AgACIS WETS table analysis indicates that the climatic conditions three months leading up to the September 2023 inspection were normal when compared to the 30-year average (1992-2022).

	Long-Term Rainfall Records							
Month	Normal/ Average	30% Chance Will Have Less Than	30% Chance Will Have More Than	Observed Precipitation	Condition (Dry, Normal, Wet)	Condition Value*	Month Weight Value	Product (Condition Value, Month Value)
June	2.29	1.44	2.77	1.1	Dry	1	1	1
July	0.9	0.32	1.06	0.34	Normal	2	2	4
August	0.96	0.34	1.15	0.59	Normal	2	3	6
WETS Station: EVERETT, WA, Period of Record: 1992-2022							**Total**	11
Observed Precipitation Station: Everett, WA								
Form Adapted From NRCS Engineering Field Handbook, Chapter 19, Hydrology Tools for Wetland Determination								

If Sum is:	Then:	*Condition Value:
6-9	Prior Period Has Been Drier Than Normal	Dry = 1
10-14	Prior Period Has Been Normal	Normal = 2
15-18	Prior Period Has Been Wetter Than Normal	Wet = 3

Figure 2 AgACIS WETS table analysis indicates September 2023 climatic conditions normal.

2.4 WETLAND AND STREAM DETERMINATION FINDINGS

One wetland (Wetland A) was identified in the southern portion of the site during the September 2023 inspection. Wetland A is documented by publicly available resources as a headwater wetland to King Creek, which starts approximately 700 feet south of the subject property. Wetland A is classified per MMC 22E.010.060 and its buffer is designated by MMC 22E.010.100(4). Wetland delineation was completed during the growing season, which typically occurs between February and November in Western Washington.

2.4.1 Wetland A

Jurisdiction: City of Marysville
HGM Class: Depressional
Cowardin Classification: PFO4E
City of Marysville Classification: Category II
City of Marysville Buffer: 100 feet

Wetland A is an approximately 13.6-acre depressional wetland located in the southern portion of the subject property and it extends off site to the south. Vegetation observed within the on-site portion of the wetland is dominated by a canopy of western red cedar (*Thuja plicata*; FAC) and red alder (*Alnus rubra*; FAC). Understory vegetation consists of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), twinberry (*Lonicera involucrata*; FAC), skunk cabbage (*Lysichiton americanus*; OBL), creeping buttercup (*Ranunculus repens*; FAC), piggyback plant (*Tolmiea menziesii*; FAC), and reed canarygrass (*Phalaris arundinacea*; FACW). Dominant vegetation in the area mapped as Wetland A is FAC or wetter, indicating a hydrophytic plant community is present.

Soils within the on-site portion of the wetland are generally black (10YR 2/1) sandy loam throughout the surface layer to a depth of at least 16 inches. Soils from six to 16 inches contain approximately three percent of dark yellowish-brown (10YR 3/4) redoximorphic concentrations. Wetland A meets the hydric soil indicator for redox dark surface (F6).

Soils at near the boundary of Wetland A were dry during the September 2023 investigation, however met geomorphic positioning (D2) and hydrophytic vegetation (D5) indicators. Soil saturation was observed interior of the wetland.



Figure 3 Photograph of Wetland A taken during September 2023 visit.

Wetland A scores a total of 22 points for functions and 7 points for habitat. Wetland A is a Category II wetland and requires a standard buffer of 100 feet measured horizontally from its delineated boundary. The standard buffer of Wetland A falls onto areas of steep slopes (≥25 percent), which requires expansion of the buffer 25 feet beyond where the slope becomes 25 percent or less per MMC 25E.010.100(6)(d)(ii). The boundary of steep slopes has been surveyed and is depicted on the *Critical Area Study and Buffer Mitigation Map* (See appendix C) as "top-of-slope".

2.4.2 Non-wetland Areas

Vegetation in the non-wetland portions of the site consist of two distinct types. The northeastern portion of the site surrounding the existing residence is dominated by maintained lawn with a few sporadic trees and ornamental shrubs. The remainder of the property consists of forest dominated by a canopy of Douglas fir (*Pseudotsuga menziesii*; FACU), western red cedar (*Thuja plicata*; FAC), bigleaf maple (*Acer macrophyllum*; FACU), red alder (*Alnus rubra*; FAC), and bitter cherry (*Prunus emarginata*; FACU), and an understory of salmonberry (*Rubus spectabilis*; FAC), Himalayan blackberry (*Rubus armeniacus*; FAC), vine maple (*Acer circinatum*; FAC), red elderberry (*Sambucus racemosa*; FACU), sword fern (*Polystichum munitum*; FACU), and pacific trailing blackberry (*Rubus ursinus*; FACU). A dense layer of Himalayan blackberry (*Rubus armeniacus*; FAC) and Japanese knotweed (*Fallopia japonica*) is present at the forested fringe between the two vegetation communities.

A power transmission corridor is located adjacent to the western property boundary. Maintenance activities have meandered onto the subject property, leaving a portion of the southwest corner of the property being dominated by maintained grasses and Himalayan blackberry.



Figure 4 Photograph taken at Wetland A boundary. Wetland area located to the right, non-wetland area located to the left.

Soils in the non-wetland areas are generally dark brown (10YR 3/3) sandy loam in the upper layer to a depth of approximately seven inches. Soils in the lower layer are typically dark yellowish-brown (10YR 4/4) sandy loam from approximately seven inches to at least 18 inches. Soils were dry at the time of the September 2023 site investigation. Non-wetland soils did not meet any primary or secondary hydric soil indicators and were generally dry.

2.4.3 King Creek

Jurisdiction: City of Marysville
HGM Class: Riverine
Cowardin Classification: Riverine, Unknown Perennial, Unconsolidated Bottom (R5UB)
City of Marysville Classification: Type F
City of Marysville Buffer: 150 feet

The headwaters of King Creek originate within Wetland A, approximately 700 feet south of the property boundary, and flows to the southwest, ultimately draining directly into Ebey Slough. SalmonScape maps the portion of King Creek closest to the property as containing gradient accessibility to the following salmonid species: Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Chum (*O. keta*), Steelhead (*O. mykiss*), and Pink (*O. gorbuscha*). King Creek is classified as a Type F water and requires a standard buffer of 150 feet.

King Creek is a Type F stream, requiring a standard buffer of 150 feet, measured horizontally from its determined boundary. This feature is estimated to form approximately 700 feet south of the property, therefore its standard buffer does not project onto the property.

3.0 WILDLIFE

Wetlands and their buffers often contain resources such as food, water, thermal cover and hiding cover in close proximity, which wildlife species need to thrive. Birds, small mammals, and amphibians likely utilize and reside within the project vicinity.

Mammalian species expected to use the site include: Eastern cottontail rabbit (*Sylvilagus floridanus*), black-tailed deer (*Odocoileus hemionus columbianus*), shrews (*Sorex spp.*), moles (*Scapanus spp.*), North American porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), skunks (*Mephitis spp*), squirrels (*Sciurus carolinensis*, *Tamiasciurus douglasii*), deer mouse (*Peromyscus maniculatus*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*).

Amphibian species that may utilize the site include: Pacific tree frog (*Hyla regilla*), rough-skinned newt (*Taricha granulosa*), and northwestern salamander (*Ambystoma gracile*).

Avian species likely to utilize the site include Song Sparrow (*Melospiza melodia*), Black-capped Chickadee (*Poecile atricapillus)*, Dark-eyed Junco (*Junco hyemalis*), Brown Creeper (*Certhia americana*), Spotted Towhee (*Pipilo maculatus),* American Robin (*Turdus migratorius*), Red-breasted Nuthatch (*Sitka canadensis*), Downy Woodpecker (*Picoides pubescens*), Stellar's Jay (*Cyanocitta stelleri*), American Crow (*Corvus brachyrhynchos*), Northern Flicker (*Colaptes auratus*), Hairy Woodpecker (*Picoides villosus*), and Downy Woodpecker (*Dendrocopus villosus*).

These lists are not meant to be all-inclusive of the species using the site, but is representative of common wildlife in the Marysville area. No threatened or endangered species are known to be associated with this site.

4.0 PROJECT DESCRIPTION, IMPACTS, AND BUFFER MITIGATION PLAN

4.1 PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR, driveway, and associated utility structures and develop the western and eastern portions of the property with a 13-lot residential subdivision, including necessary stormwater, access infrastructure, and frontage improvements along 49th Street NE. The applicant proposes altering portions of the wetland buffer area through buffer averaging at a 1:1 ratio. The proposed buffer will be demarcated by split-rail fencing with Native Growth Protection Area (NGPA) signs affixed every linear 100 feet.

A total of 13,300 square feet of degraded buffer will be enhanced with an assemblage of native trees and shrubs. Increasing the total area, species richness, and structural diversity of the on-site wetland buffer is expected to provide a significant lift in buffer functions over current conditions.

4.2 BUFFER WIDTH AVERAGING

In order to accommodate the proposed development, the applicant is proposing to modify the shape of the buffer through buffer width averaging. A total of 3,721 square feet of buffer is proposed to be reduced, and it will be replaced with 3,721 (2,191 + 360 + 1,170) square feet of buffer addition. Therefore, the total buffer area after averaging will be maintained and no buffer functions will be lost. Buffer averaging is allowed per MMC 22E.010.100(5)(a) and (5)(c). The criteria in this code section are cited below in italics with responses below each in standard text.

(5)(a) Buffer width averaging shall be allowed only where the applicant demonstrates to the community development department that the averaging will not impair or reduce the habitat, water quality purification and enhancement, storm water detention, ground water recharge, shoreline protection and erosion protection and other functions of the wetland and buffer.

Areas of buffer reduction and buffer addition are both composed of native forest with sparse patches of Himalayan blackberry, which will provide equivalent ability to filter pollutants, attenuate flood flow, and provide wildlife habitat.

… that lower-intensity land uses would be located adjacent to areas where buffer width is reduced…

A stormwater detention vault and dispersion trench, allowed in MMC 22E.010.100(10), will be located within the reduced buffer area at the southwest portion of development. Once constructed, this will be the lowest-intensity land use associated with the overall proposed development.

…and that the total area contained within the buffer after averaging is no less than that contained within the standard buffer prior to averaging;

A total of 3,721 feet of buffer is proposed to be reduced and 3,721 square feet of buffer is proposed to be added, resulting in no net loss of buffer area

(5)(c) Notwithstanding the reductions permitted in subsections (5)(a) and (b) of this section, buffer widths shall not be reduced by more than 25 percent of the required buffer.

The maximum buffer width reduction proposed does not exceed 25 percent of the 100 foot buffer of Wetland A.

4.3 BUFFER ENHANCEMENT PLAN

Pursuant to MMC 22E.010.100(3), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. The applicant proposes to enhance a total of 13,300 square feet of degraded buffer, divided into two sections based on observed conditions.

4.3.1 Buffer Enhancement Area 1

Buffer Enhancement Area 1 is located within the eastern portion of wetland buffer, adjacent to lots 8 through 12. This area is approximately 7,500 square feet in size and is dominated by Japanese knotweed (*Fallopia japonica*) and Himalayan blackberry (*Rubus armeniacus*). This area is to be cleared of all invasives and planted with a dense assemblage of native trees and shrubs. All plants shall be marked with ribbons and mulched, as specified in the planting notes.

Buffer Enhancement Area 1 (7,500 square feet)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10’	23
Shore pine	*Pinus contorta*	1 gallon	10’	23
Bigleaf maple	*Acer macrophyllum*	1 gallon	10’	22
Nootka rose	*Rosa nutkana*	1 gallon	5’	58
Snowberry	*Symphoricarpos albus*	1 gallon	5’	58
Salmonberry	*Rubus spectabilis*	1 gallon	5’	58
Thimbleberry	*Rubus parviflorus*	1 gallon	5’	58
Total				**300**

4.3.2 Buffer Enhancement Area 2

Buffer Enhancement Area 2 is located along the northern buffer, adjacent to 49th Street NE, where a native canopy of red alder (*Alnus rubra*) is underlain by a dense thicket of Himalayan blackberry (*Rubus armeniacus)*. After invasive species are removed, an estimated 70-percent of the area will be interspersed around any existing native vegetation.

Buffer Enhancement Area 2 (5,800 square feet; plant 70% area)

Common Name	**Latin Name**	**Size**	**Spacing**	**Quantity**
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10’	12
Shore pine	*Pinus contorta*	1 gallon	10’	12
Bigleaf maple	*Acer macrophyllum*	1 gallon	10’	12
Nootka rose	*Rosa nutkana*	1 gallon	5’	36
Snowberry	*Symphoricarpos albus*	1 gallon	5’	36
Salmonberry	*Rubus spectabilis*	1 gallon	5’	36
Thimbleberry	*Rubus parviflorus*	1 gallon	5’	36
Total				**180**

5.0 FUNCTIONS AND VALUES ASSESSMENT

Pursuant to requirements set forth in SCC 30.62A.140, critical area studies shall assess impacts to any critical areas or buffers within the project vicinity. The following assessment is intended to compare the current and post-mitigation functions and values provided by the on-site critical areas and buffers.

The methodology for this functions and values assessment is based on professional opinion developed through past field analyses and interpretation. This assessment pertains specifically to the wetland buffer impacted by this project, but is typical for assessments of similar systems common to Western Washington.

5.1 FUNCTIONAL COMPONENTS OF WETLAND BUFFERS

Wetland buffers in Western Washington perform a variety of ecosystem functions. Included among the most important are: flood/stormwater control, base flow/groundwater support, erosion protection, water quality improvement, and overall wildlife habitat function.

Water Quality and Hydrology Functions
Vegetated buffers obstruct water flow, thereby decreasing water velocity, allowing infiltration into the soil, and reducing soil erosion potential. Healthy floodplains and buffers store water during wetter periods and release it during drier periods, thereby maintaining a steady base flow throughout the year. Buffer vegetation impedes the flow of runoff, increases the humus content of soil (greater adsorption capacity), and preserves soil composition as intense rainfall hits the ground. Wetland buffers improve water quality by acting as filters as water passes through them, trapping sediments and pollutants from surface water. Healthy vegetation also provides temperature moderation to adjacent aquatic areas. Shading by the forest canopy maintains cooler water temperatures and influences the availability of dissolved oxygen.

Wildlife Habitat Functions
Healthy vegetation within buffers helps maintain wildlife habitat function within and adjacent to aquatic areas. Buffer vegetation provides many crucial aspects of healthy habitat including shade, soil stabilization, nutrient cycling, and pollutant removal. Vegetated buffers also provide benefits to terrestrial wildlife including, refuge/cover, nesting, foraging, and resting habitat.

5.2 EXISTING BUFFER CONDITIONS

The buffer area surrounding Wetland A is dominated by a native forest with native trees and shrubs, interlaced with sporadic patches of Himalayan blackberry and reed canary grass. The forested buffer is able to sufficiently filter pollutants, control erosion, attenuate flood flow, and provide wildlife habitat. A portion of buffer has been historically maintained due to its proximity to the existing SFR development and 49th Street NE. This area provides limited ability to filter pollutants, attenuate flood flow, or allow for wildlife for forage and shelter.

5.3 Post Mitigation Buffer Functions and Values

After implementation of buffer averaging and enhancement, a significant lift in functions and values is expected. The area proposed for buffer reduction consists of mainly native forest with small amounts of Himalayan blackberry. Areas of buffer addition consist of a similar vegetation community, which will provide similar water quality, flood control, and wildlife habitat functions.

Enhancing areas of degraded buffer by removing invasive species and planting an assemblage of native trees and shrubs will provide high value in terms of slowing the rate of incoming surface flows, decreasing erosion potential, performing water quality improvement, and providing higher quality wildlife habitat. Overall, the proposed project will result in a substantial net improvement in buffer function as compared to the current conditions on the site.

6.0 Project Monitoring Program

6.1 Inspection and Reporting Requirements

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage. During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified.

Photo points
At least one photo point shall be established in each buffer enhancement area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:
1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

6.2 PROJECT SUCCESS & COMPLIANCE

Criteria for Success
Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive woody plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation.

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met early, the City may consider the project to be successful and terminate the monitoring period at that time.

6.3 MAINTENANCE

The mitigation areas will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation

system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

6.4 CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

6.5 PROJECT NOTES

Pre-Construction Meeting
Mitigation projects are typically more complex to install than can be described in plans. Careful monitoring by a wetland professional for all portions of this project is strongly recommended. Construction timing and sequencing is important to the success of this type of project. There shall be a pre-construction meeting on this site between the Permittee, consulting wetland professional, and laborers. The objective will be to verify the location of erosion control facilities, verify the location of mitigation areas, and to discuss project sequencing.

Inspections
A wetland professional shall be contracted to periodically inspect the mitigation installation described in this plan. Minor adjustments to the original design may be necessary prior to and during construction due to unusual or hidden site conditions. A City of Marysville representative and/or the consulting professional will make these decisions during construction and any changes will be reflected in the As-built report.

6.6 PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

7.0 FENCING AND SIGNAGE

Pursuant to MMC 22E.010.370, split-rail fencing and signs designating the presence of a critical area will be constructed along the perimeter of the buffer. A split-rail fence will be installed along the perimeter of buffer on the subject property. A total of 10 Native Growth Protection Area (NGPA) signs will be affixed to 950 linear feet of fence.

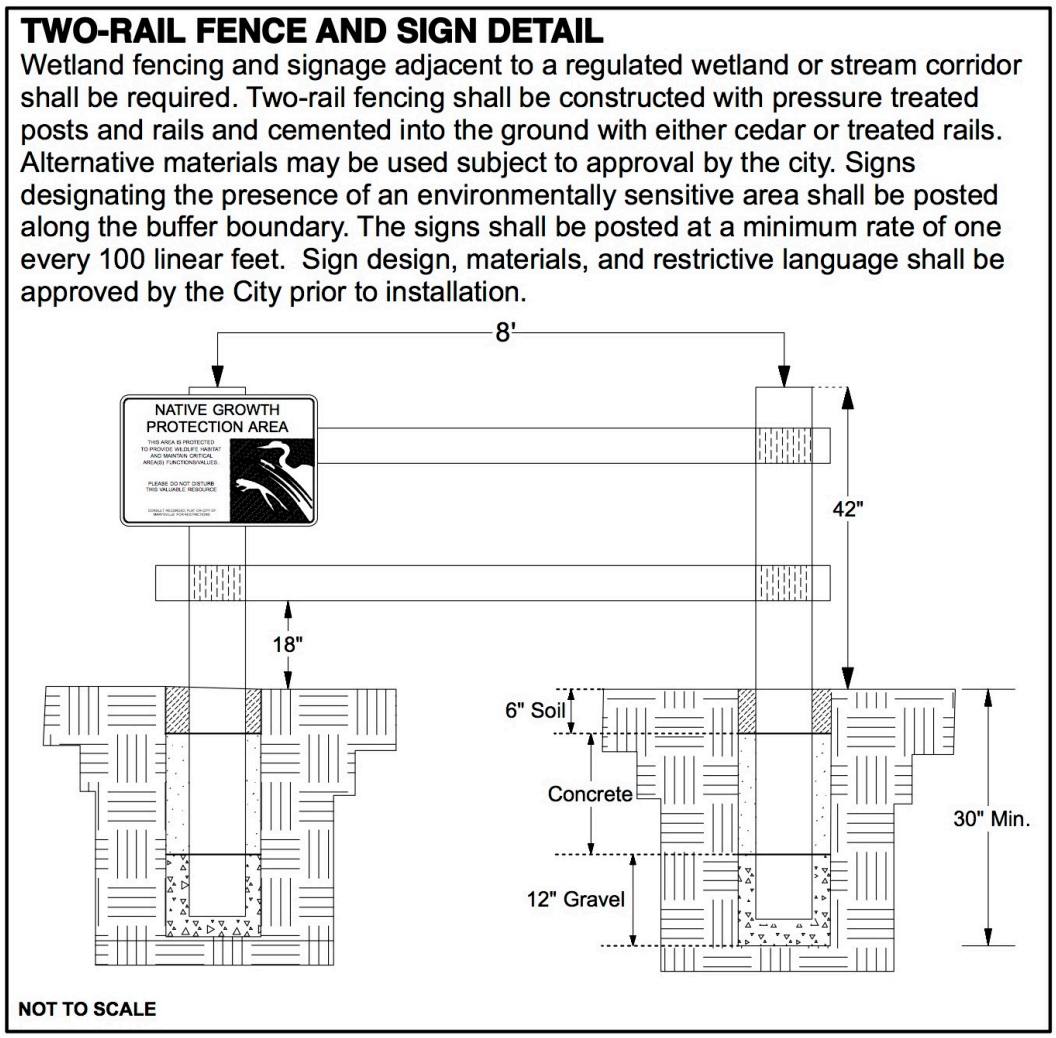


Figure 5 – Two-rail Fence and NGPA Sign Detail

8.0 PERFORMANCE AND MAINTENANCE BONDING

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	480 x $15.00/plant, installed	$7,200.00
Mulch	$50.00/CU x 16 CY	$800.00
Split rail fencing and signage	$8/foot x 954 feet	$7,632.00
Critical area signage	$30/sign x 10 signs	$300.00
Monitoring	$2,500.00/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$38,232.00**

9.0 USE OF THIS REPORT

This Critical Area Study and Buffer Mitigation Plan is supplied to Keystone Land, LLC, as a means of determining on-site wetland and stream conditions, and to provide adequate mitigation for proposed buffer impacts. Determinations are based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the Applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report and any implied representation or warranty is disclaimed.

Wetland Resources, Inc.



Alex Wachter
Associate Ecologist

10.0 REFERENCES

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APPENDIX A

USACE WETLAND DELINEATION DATA FORMS (S1-S2)

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S1

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): LRR A Lat: 48.039442 Long: -122.120978 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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:

In pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. *Prunus emarginata	5	N	FACU
3.			
4.			
	65	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	80	Y	FAC
2. Sambucus racemosa	5	N	FACU
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	60	Y	FAC
2. Polystichum munitum	5	N	FACU
3. Rubus ursinus	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

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% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = 0
FACW species ____	x 2 = 0
FAC species ____	x 3 = 0
FACU species ____	x 4 = 0
UPL species ____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

Prunus emarginata rooted out of wetland however provides canopy coverage.

SOIL

Sampling Point: S1

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
0-6	10YR 2/1	100					Sandy loam	
6-16	10YR 2/1	97	10YR 3/4	3	C	M	Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: WRI #23124 Taylor Lane City/County: City of Marysville Sampling Date: 9/20/2023

Applicant/Owner: Keystone Land, LLC State: WA Sampling Point: S2

Investigator(s): AW, EC Section, Township, Range: Sec 35, Twp 30N, Rge 05E, W.M.

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): ~4%

Subregion (LRR): LRR A Lat: 48.039531 Long: -122.120945 Datum: NAD83

Soil Map Unit Name: Tokul gravelly medial loam, 0 to 8 percent slopes 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 ☐ Hydric Soil Present? Yes ☐ No ☑ Wetland Hydrology Present? Yes ☐ No ☑	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑

Remarks:

Out pit, near WRA-32

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	Y	FAC
2. Acer macrophyllum	15	N	FACU
3. Prunus emarginata	5	N	FACU
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m^2)			
1. Rubus spectabilis	75	Y	FAC
2. Rubus armeniacus	35	Y	FAC
3. Acer circinatum	5	N	FAC
4.			
5.			
	115	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Tolmiea menziesii	20	Y	FAC
2. Rubus ursinus	10	Y	FACU
3. Polystichum munitum	10	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 3m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = 0
FACW species ____	x 2 = 0
FAC species ____	x 3 = 0
FACU species ____	x 4 = 0
UPL species ____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:

SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/3	100					Sandy loam	
7-18	10YR 4/4	100					Sandy 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 Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ 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:

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 along 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 (2 or more 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, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B

DEPARTMENT OF ECOLOGY
WETLAND RATING FORM AND FIGURES

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 9/20/2023

Rated by AW Trained by Ecology? ✔ Yes ___No Date of training 6/2022

HGM Class used for rating **Depressional** Wetland has multiple HGM classes? ✔ Y ____N

NOTE: **Form is not complete without the required figures** (figures can be combined).
Source of base aerial photo/map ESRI, SnoCo.

OVERALL WETLAND CATEGORY **II** (based on functions ✔ 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

_____**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	**8**			**7**			**7**			**22**

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	✔

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	1
Hydroperiods	D 1.4, H 1.2	1
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	1
Map of the contributing basin	D 4.3, D 5.3	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and total habitat	H 2.1, H 2.2, H 2.3	2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	4

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 total 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 total 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 total 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 sheet flow, 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).

Wetland name or number A_____

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.

   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

2

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

3

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

2

Total for D 1 — Add the points in the boxes above — **7**

Rating of Site Potential If score is: __**12-16 = H** ✔ **6-11 = M** ___**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 — **1**

D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? [Yes = 1] No = 0 — **1**

D 2.3. Are there septic systems within 250 ft of the wetland? [Yes = 1] No = 0 — **1**

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 — **3**

Rating of Landscape Potential If score is: ✔ **3 or 4 = H** ___**1 or 2 = M** ___**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 — **1**

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 in development or in effect for the basin in which the unit is found.) Yes = 2 No = 0 — **2**

Total for D 3 — Add the points in the boxes above — **3**

Rating of Value If score is: ✔ **2-4 = H** ___**1 = M** ___**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:

- ☐ Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4
- ☑ Wetland has an intermittently flowing stream/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

2

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.

- ☐ 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

3

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 area of the wetland unit itself.

- ☐ 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

3

Total for D 4 — Add the points in the boxes above — **8**

Rating of Site Potential If score is: ___**12-16 = H** ___✔**6-11 = M** ___**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 — **1**

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 — **1**

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 — **1**

Total for D 5 — Add the points in the boxes above — **3**

Rating of Landscape Potential If score is: ___✔**3 = H** ___**1 or 2 = M** ___**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. Is the unit 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.

The wetland captures surface water that would otherwise flow downgradient 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 downgradient of unit. points = 2
- ☑ • Surface flooding problems are in a sub-basin farther downgradient. 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

1

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 — **1**

Rating of Value If score is: ___**2-4 = H** ___✔**1 = M** ___**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 if the unit is at least 2.5 ac, or more than 10% of the unit if it is smaller than 2.5 ac.

____Aquatic bed	4 structures or more: points = 4	**2**
_✔_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/groundcover) that each cover 20% within the Forested polygon

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 if the unit is < 2.5 ac, or ¼ ac if the unit is at least 2.5 ac to count (see text for descriptions of hydroperiods).

____Permanently flooded or inundated	4 or more types present: points = 3	**1**
_✔_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		
____Intermittently or seasonally flowing stream in, or adjacent to, the wetland		
____**Lake Fringe wetland**	**2 points**	
____**Freshwater tidal wetland**	**2 points**	

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, Canada thistle**

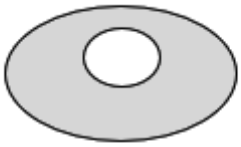
If you counted:	> 19 species	points = 2 **2**
	5 - 19 species	points = 1
	< 5 species	points = 0

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. **2**

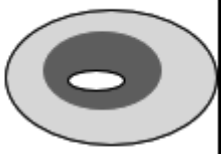


None = 0 points



Low = 1 point



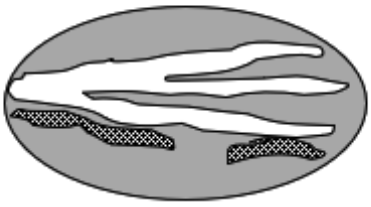


Moderate = 2 points

All three diagrams in this row are **High** = 3 points







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 extend at least 3.3 ft (1 m) over open water or 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 above for the list of strata and H 1.5 in the manual for the list of aggressive plant species)	**5**
Total for H 1 Add the points in the boxes above	**12**

Rating of Site Potential If score is: ___**15-18 = H** ✔ **7-14 = M** ___**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 polygons accessible from the wetland. *Calculate:* % relatively undisturbed habitat 13 + [(% moderate and low intensity land uses)/2] 5 = 18 % 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	**1**
H 2.2. Total habitat in 1 km Polygon around the wetland. *Calculate:* % relatively undisturbed habitat 18 + [(% moderate and low intensity land uses)/2] 17 = 35 % ☐ Total habitat > 50% of Polygon points = 3 ☐ Total habitat 10-50% and in 1-3 patches points = 2 ✔ Total habitat 10-50% and > 3 patches points = 1 ☐ Total habitat < 10% of 1 km Polygon points = 0	**1**
H 2.3. Land use intensity in 1 km Polygon: ☐ > 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	**2**

Rating of Landscape Potential If score is: ___**4-6 = H** ✔ **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 data ☐ 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	**2**

Rating of Value If score is: ✔ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number A_____

WDFW Priority Habitats

See complete descriptions of Priority Habitats listed by WDFW, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008 (current year, as revised). Priority Habitat and Species List.[133] This list was updated for consistency with guidance from WDFW.

This question is independent of the land use between the wetland unit and the Priority Habitat. All vegetated wetlands are by definition a Priority Habitat but are not included in this list because they are addressed by this rating system.

Count how many of the following Priority Habitats are within 330 ft (100 m) of the wetland unit:

☐ **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. This habitat automatically counts if mapped on the PHS online map within 100m of the wetland. If not mapped, a determination can be made in the field.

☐ **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.

☐ **Fresh Deepwater:** Lands permanently flooded with freshwater, including environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. Substrate does not support emergent vegetation. Do not select if Instream habitat is also present, or if the entire Deepwater feature is included in the wetland unit being rated (such as a pond with a vegetated fringe).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☑ **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. Do not select if Fresh Deepwater habitat is also present.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore.

☐ **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) diameter at breast height (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.

[133] http://wdfw.wa.gov/publications/00165/wdfw00165.pdf

Wetland name or number A_____

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important. For single oaks or oak stands <0.4 ha in urban areas, WDFW's Management Recommendations for Oregon White Oak[134] provides more detail for determining if they are Priority Habitats

☑ **Riparian:** The area adjacent to freshwater aquatic systems with flowing or standing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **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.

☐ **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.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie.

[134] https://wdfw.wa.gov/publications/00030/wdfw00030.pdf

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 chapter 4.8 in the manual. ☐ 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. Does the wetland overlap with any known or historical rare plant or rare & high-quality ecosystem polygons on the WNHP Data Explorer?[135] Yes **= Category I** No – Go to **SC 2.2** SC 2.2. Does the wetland have a rare plant species, rare ecosystem (e.g., plant community), or high-quality common ecosystem that may qualify the site as a WHCV? Contact WNHP for resources to help determine the presence of these elements. Yes – Submit data to WA Natural Heritage Program for determination,[136] Go to **SC 2.3** No **= Not a WHCV** SC 2.3. Did WNHP review the site within 30 days and determine that it has a rare plant or ecosystem that meets their criteria? 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 = **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 = **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 = **Category I bog** No **= Not a bog**	**Cat. I**

[135] https://www.dnr.wa.gov/NHPdata

[136] https://www.dnr.wa.gov/Publications/amp_nh_sighting_form.pdf

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)*

☐ The lagoon retains some of its surface water at low tide during spring tides

Yes – Go to **SC 5.1** | No = **Not a wetland in a coastal lagoon**

Cat. I

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 in H 1.5 in the manual).

☐ 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. 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 and Ocean Shores Blvd SW, including lands west of E. Oceans Shores Blvd SW.

Cat I

Yes – Go to **SC 6.1** | No = **Not an interdunal wetland for rating**

Cat. II

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?

Cat. III

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**

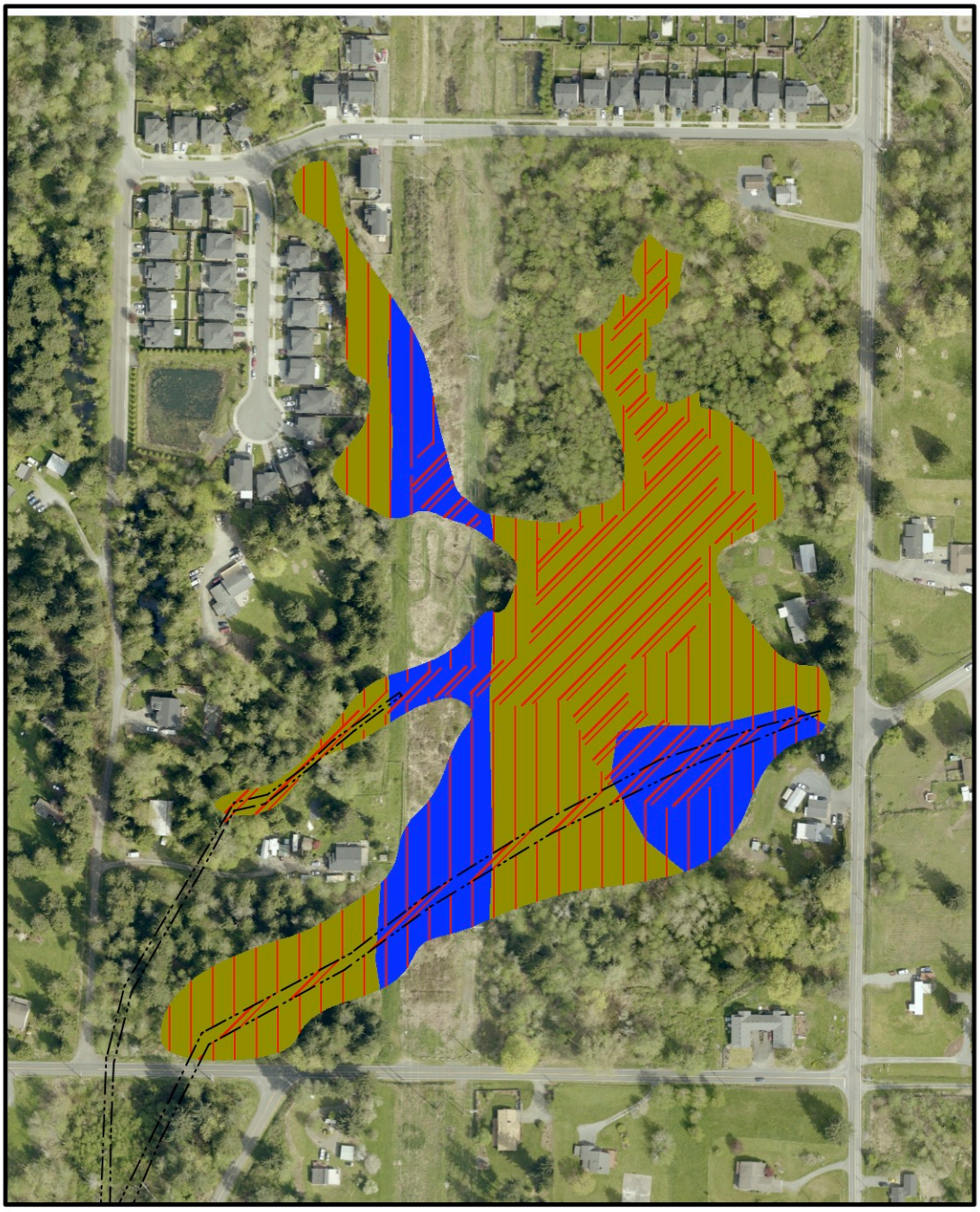
Cat. IV

Category of wetland based on Special Characteristics

If you answered No for all types, enter "Not Applicable" on Summary Form

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 1- WETLAND A



LEGEND

- EMERGENT VEGETATION
- FORESTED VEGETATION
- SATURATED ONLY
- SEASONALLY FLOODED
- 150' FROM WL BOUNDARY
- INTERMITTENT STREAM

Scale 1" = 300'

0 150 300 450 600

Wetland Resources, Inc.

Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance

9505 19th Avenue S.E. Suite 106 Everett, Washington 98208

Phone: (425) 337-3174

Fax: (425) 337-3045

Email: mailbox@wetlandresources.com

WETLAND RATING

Wetland A

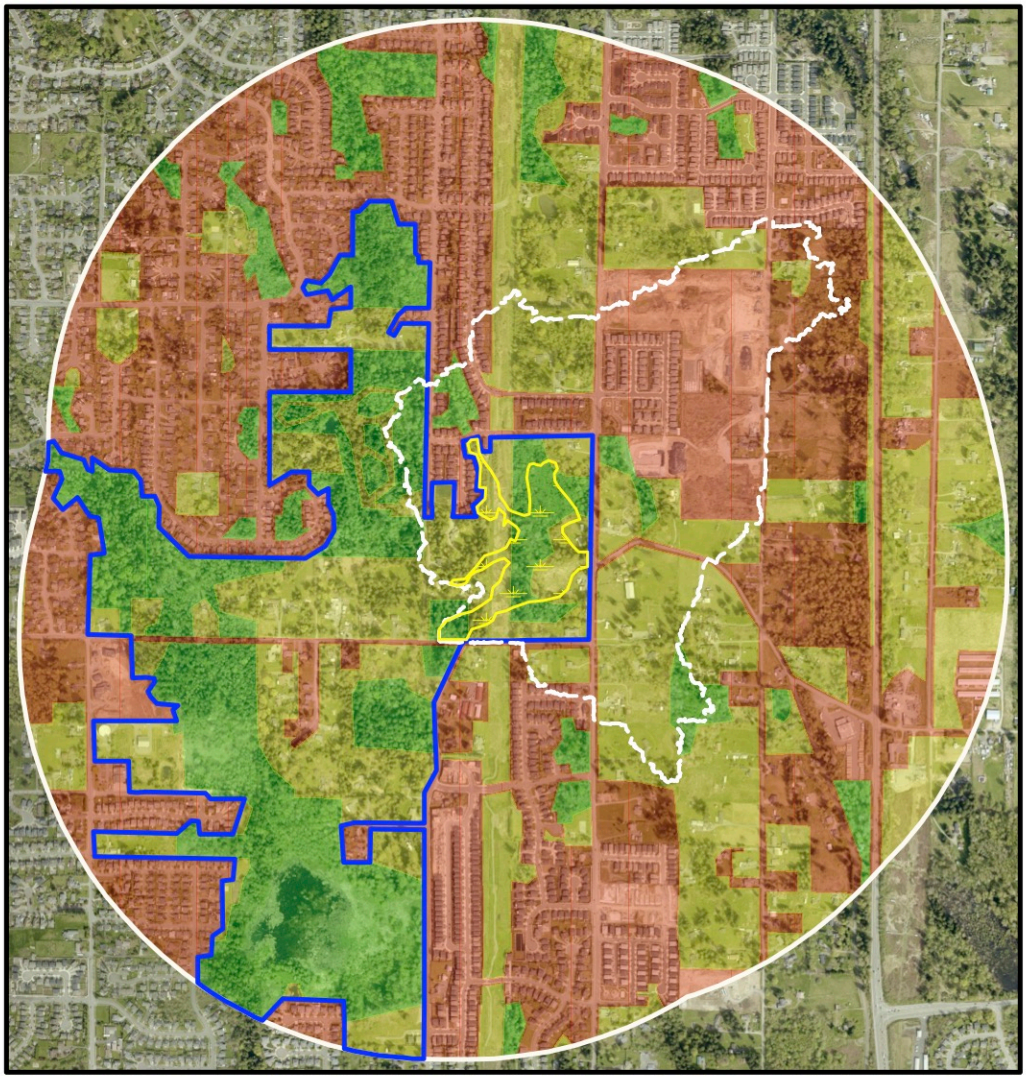
Figure A-1

WRI Job # 2

Rated by

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 2- WETLAND A



LEGEND

- RELATIVELY UNDISTURBED
- LOW/MOD. INTENSITY
- HIGH INTENSITY
- ACCESSIBLE HABITAT
- WETLAND
- 1 KM FROM WETLAND
- CONTRIBUTING BASIN

CONTRIBUTING BASIN AREA RELATIVE TO WETLAND UNIT IS 14:1

Scale 1" = 1,500'

0 1,500 3,000

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WETLAND RATING

Wetland A

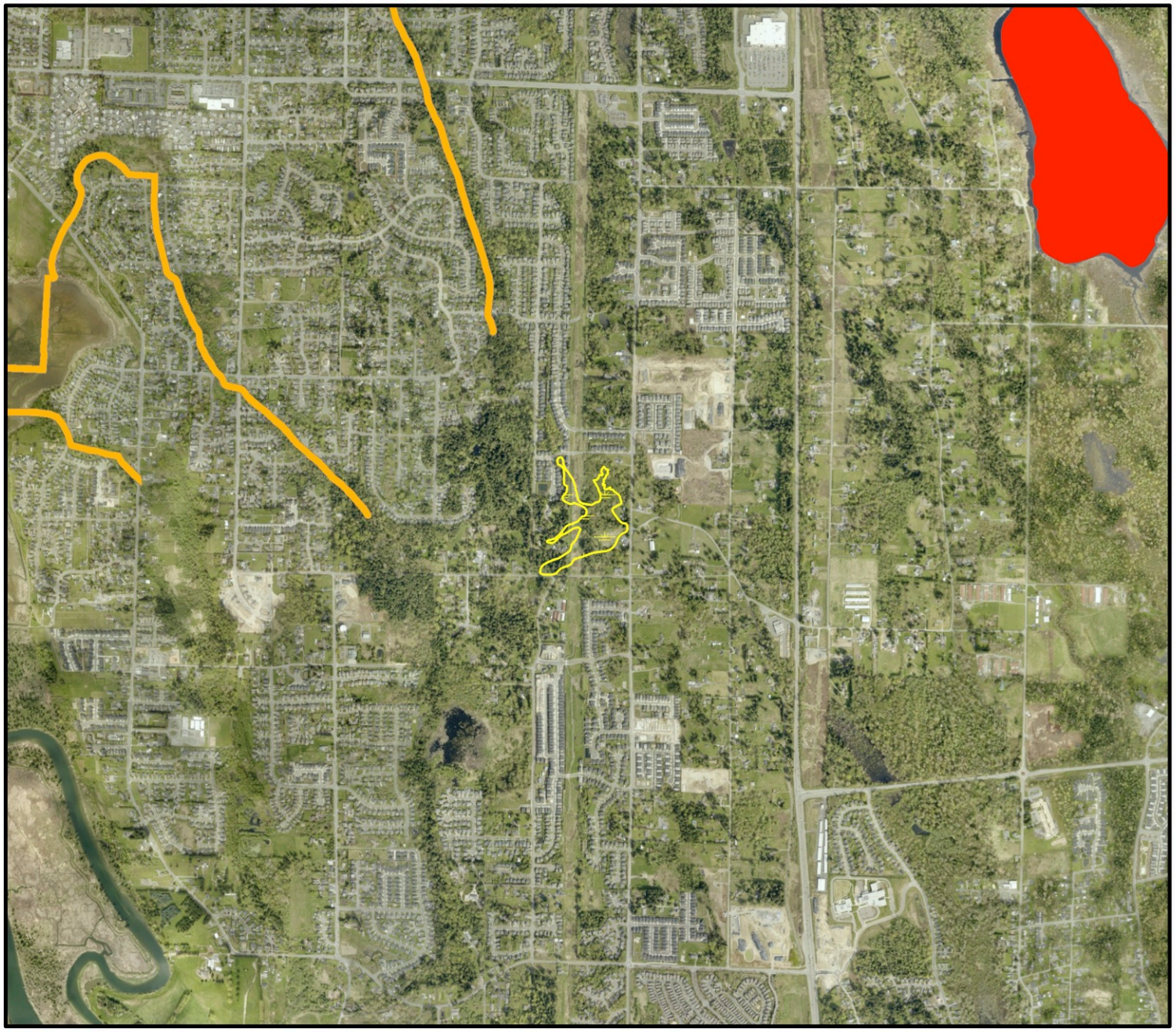
Figure A-2

WRI Job # 2

Rated by

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 3- WETLAND A



LEGEND

- WETLAND
- AQUATIC RESOURCES ON THE 303(d) LIST
- CONTAINS TMDL

Scale 1" = 2,000'

0 2,000 4,000

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WETLAND RATING

Wetland A

Figure A-3

WRI Job # 2

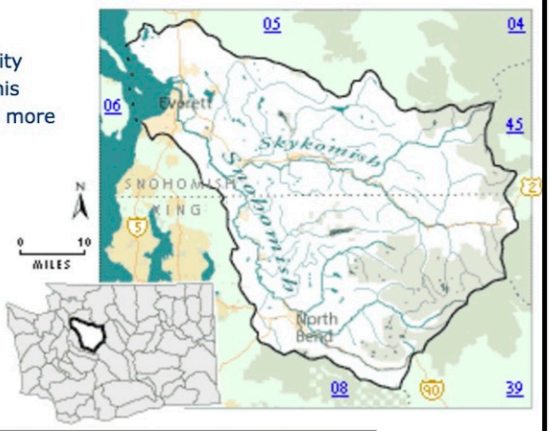
Rated by

KEYSTONE LAND - TAYLOR LANE

WETLAND RATING FIGURE 4- WETLAND A

WRIA 7: Snohomish

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.



Counties

- King
- Snohomish

Waterbody Name	Pollutant(s)	Status**	TMDL Lead
Lake Loma	Total Phosphorus	Straight to implementation project under development	Tricia Shoblom 425-649-7288
Snohomish River	French Creek / Pilchuck River • Dissolved Oxygen • Temperature	Under development	Ralph Svrjcek 425-649-7165
	Dioxin	EPA approved	Ralph Svrjcek 425-649-7165
	Estuary • Ammonia • BOD	EPA approved	Ralph Svrjcek 425-649-7165
	Tributaries • Fecal Coliform Tributaries: • Allen Creek • Quilceda Creek • French Creek • Woods Creek • Pilchuck River • Marshlands (Wood Creek) {2}	EPA approved	Ralph Svrjcek 425-649-7165
	Snoqualmie River • Ammonia-N • BOD (5-day) • Fecal Coliform Temperature	EPA approved EPA approved Has an implementation plan	Ralph Svrjcek 425-649-7165

** ***Status*** *will be listed as one of the following: Approved by EPA, Under Development or Implementation*

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett, Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources.com

WETLAND RATING
Wetland A

Figure A-4
WRI Job # 7
Rated by

APPENDIX C

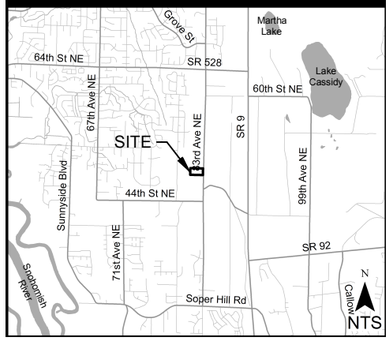
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

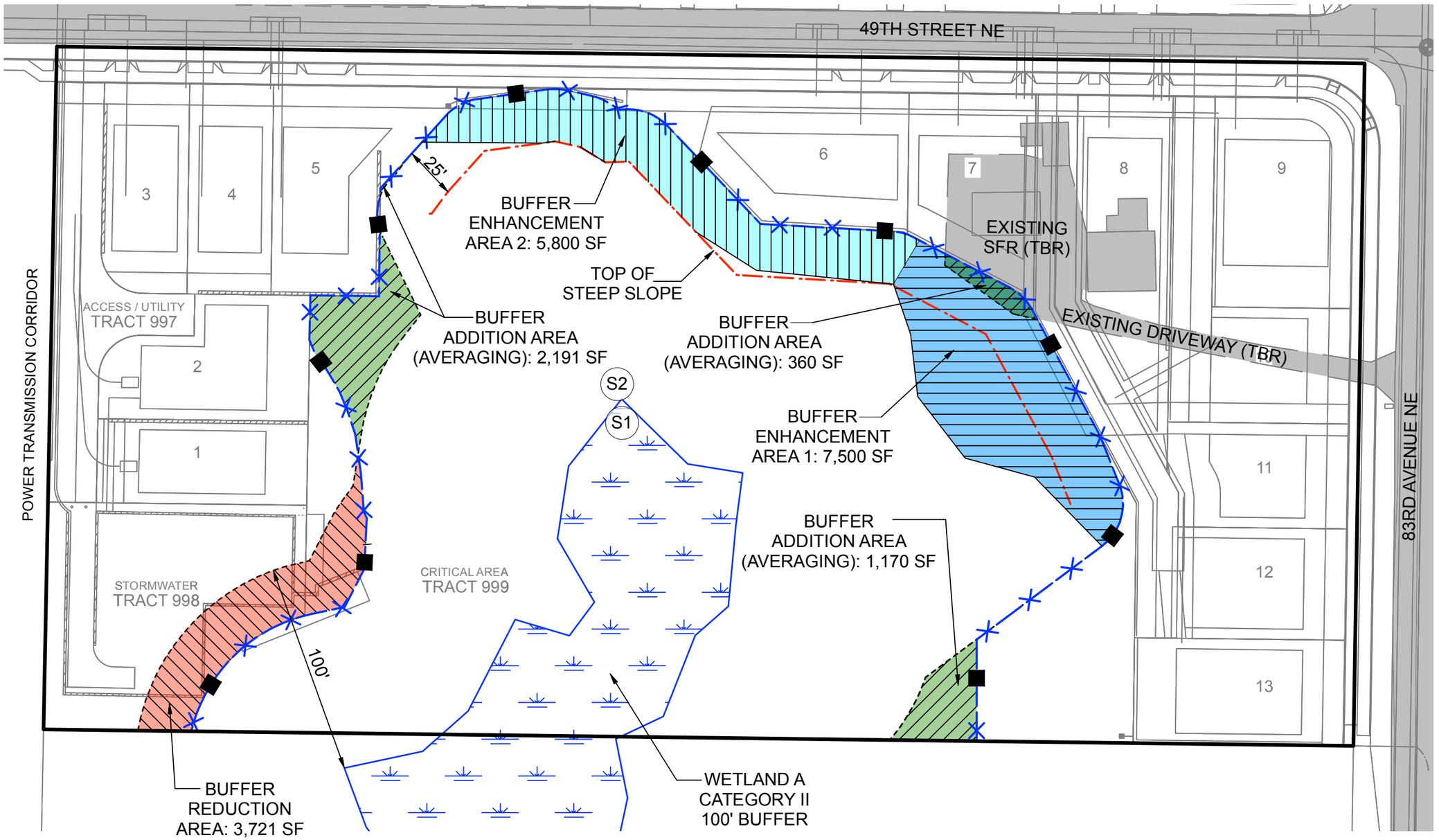
CRITICAL AREA STUDY AND BUFFER MITIGATION PLAN MAP

KEYSTONE LAND - TAYLOR LANE

PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

VICINITY MAP





Scale 1" = 50'

0 25 50 75 100

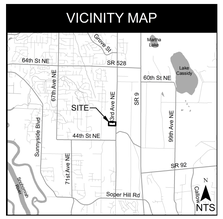
LEGEND

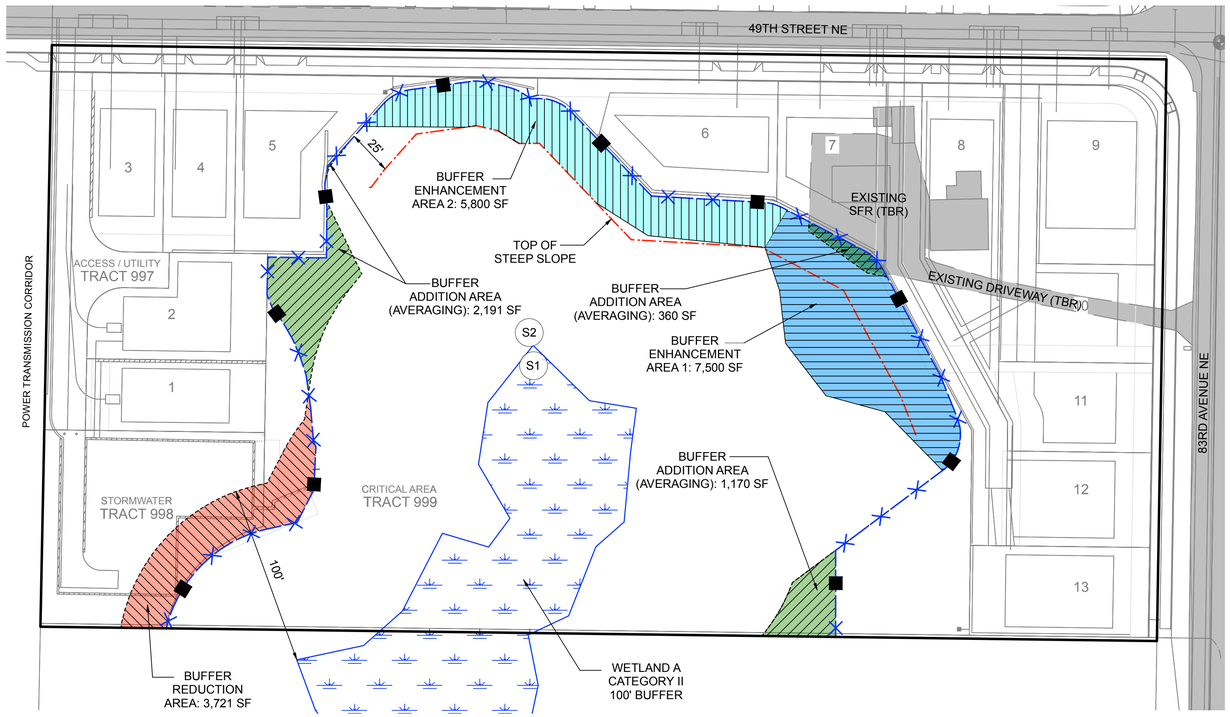
- WETLAND
- TOP OF STEEP SLOPE
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- BUFFER ENHANCEMENT (FULL)
- BUFFER ENHANCEMENT (INTERSPERSED)
- FINAL BUFFER AND SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

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CRITICAL AREA STUDY & BUFFER MITIGATION PLAN MAP
TAYLOR LANE
MARYSVILLE, WA Sheet 1/1
WRI #: 23124
Keystone Land, LLC Drawn by: AW
13805 Smokey Pt Blvd #102 Rev1Date: 10/1/2021
Marysville, WA 98271 *Orig. Date: 1/26/2* **646**

VICINITY MAP





Scale 1" = 40'

0 20 40 60 80

LEGEND

- WETLAND
- TOP OF STEEP SLOPE
- STANDARD BUFFER
- BUFFER REDUCTION (AVERAGING)
- BUFFER ADDITION (AVERAGING)
- BUFFER ENHANCEMENT (FULL)
- BUFFER ENHANCEMENT (INTERSPERSED)
- FINAL BUFFER AND SPLIT-RAIL FENCING
- NGPA SIGN
- S1 DATA SITES (S1-S2)
- EXISTING IMPERVIOUS

SITE DESCRIPTION

The subject property (Parcel#00590700013600) is 4.66 acres in size. It is located at 4820 83rd Ave NE, in the city limits of Marysville, Washington (Section 35, Township 30N, Range 05E, W.M.). The northeastern corner of the property is developed with an existing Single Family Residence (SFR) with an associated shed, driveway, and utilities.

One wetland (Wetland A) is located at the center of the property and continues off-site to the south. Wetland A is classified per MMC 22E.010.060 as a Category II wetland with a moderate (7) habitat score and requires a standard 100-foot protective buffer per MMC 22E.010.100(4).

PROJECT DESCRIPTION

The applicant is proposing to demolish the existing SFR and develop the northern portion of the property with a 13-lot residential subdivision with associated stormwater and access infrastructure. The applicant proposes to implement buffer averaging, enhancement of degraded buffer, and installation of permanent fencing and critical area signage. This project is expected to result in an overall uplift in buffer functions.

AVERAGING
To accommodate for the proposed development, a total of 3,721 square feet of buffer is proposed to be reduced for stormwater infrastructure and 3,721 square feet (2,191+360+1,170) of buffer will be added, as allowed per MMC 22E.010.100(5)(a) and (5)(c), and MMC 22E.010.100(10). No net loss of buffer area will occur and vegetation of reduction and addition areas are similar. Buffer functions are expected to be maintained as a result of buffer averaging.

ENHANCEMENT
Pursuant to MMC 22E.010.100(3), where buffer areas have minimal vegetative cover and cannot provide minimum water quality or habitat functions, buffer enhancement is required. This includes areas where non-native or invasive species provide the dominant cover. The applicant proposes to enhance a total of 13,300 square feet of degraded buffer, divided into two sections based on observed conditions.

Buffer Enhancement Area 1 is located within the eastern portion of wetland buffer, adjacent to lots 7 through 11. This area is approximately 7,500 square feet in size and is dominated by Japanese knotweed (*Fallopia japonica*) and Himalayan blackberry (*Rubus armeniacus*). This area is to be cleared of all invasives and planted with a dense assemblage of native trees and shrubs.

Buffer Enhancement Area 2 is located along the northern buffer, adjacent to Lots 5 and 6 and 49th Street NE, where a native canopy of red alder (*Alnus rubra*) is underlain by a dense thicket of Himalayan blackberry (*Rubus armeniacus*). After invasive species are removed, an estimated 70-percent of the area will be interspersed around any existing native vegetation.

CRITICAL AREA DEMARCATION
MMC 22E.010.370 requires that two-rail fencing is installed along the buffer edge and NGPA signs shall be posted along the buffer edge at least every 100 feet, as shown on this plan. A total of ten signs will be palced on 954 lineal feet of fencing.

MAINTENANCE

The enhancement area will require periodic maintenance to remove undesirable species and replace vegetation mortality. Maintenance shall occur in accordance with the approved plans. Maintenance may include, but will not be limited to: removal of competing grasses (by hand if necessary), irrigation, fertilization (if necessary), replacement of plant mortality, and the replacement of mulch for each maintenance period. Chemical control, only if approved by City staff, shall be applied by a licensed applicator following all label instructions.

Duration and Extent
In order to achieve performance standards, the permittee shall be responsible for maintaining the mitigation area for the duration of the five-year monitoring period. Maintenance will include: watering, weeding around the base of installed plants, pruning, replacement, re-staking, removal of all classes of noxious weeds (see Washington State Noxious Weeds List, WAC 16-750-005) as well as Himalayan blackberry, cutting down competing grasses, and any other measures needed to ensure plant survival.

Survival
The permittee shall be responsible for the health of 100 percent of all newly installed plants for one growing season after installation has been accepted by the City of Marysville. A growing season for these purposes is defined as occurring from spring to spring (March 15 to March 14 of the following year). For fall installation (if required), the growing season will begin the following spring. The permittee shall replace any plants that are failing, weak, defective in manner of growth, dead, or missing during the first growing season.

Installation Timing for Replacement Plants
Replacement plants shall be installed between November 1 and March 15, unless otherwise determined.

Standards for Replacement Plants
Replacement plants shall meet the same standards for size and type as those specified for the original installation, unless otherwise directed by a qualified professional.

Replanting
Plants that have settled in their planting pits too deep, too shallow, loose, or crooked shall be replanted.

Herbicides / Pesticides
Unless deemed absolutely necessary by the consulting biologist and/or the City, chemical controls shall not be used in the mitigation area, critical areas, or their buffers. Any chemical controls used shall be applied by a licensed applicator following all label instructions.

Irrigation / Watering
Water shall be provided during the dry season (July 1 through October 15) for the first two years after installation to ensure plant survival and establishment. A temporary above-ground irrigation system shall provide water at a rate of one inch (1") of water twice per week for year one and one inch (1") per week during year two. Adjustments to this schedule may be recommended by the wetland professional during the monitoring period.

General
The permittee shall include in general maintenance activities the replacement of any vandalized or damaged signs, habitat features, fences, or other structural components of this mitigation site.

GOAL, OBJECTIVES, AND PERFORMANCE STANDARDS

Upon completion of the proposed mitigation project, an inspection by a qualified wetland professional shall be made to determine plan compliance. An as-built report will be supplied to the City of Marysville within thirty (30) days after the completion of planting to show compliance with the mitigation plan. The qualified wetland professional will perform condition monitoring of the plantings and provide reports according to the approved schedule.

Goal
To mitigate the impacts to functions and values from the proposed development.

Objectives
Objective 1: To establish a diverse, native plant community in the buffer that will persist and create an appropriate vegetative matrix.

Objective 2: To have significant native vegetative cover throughout the buffer.

Objective 3: To remove and replace existing invasive species and limit the establishment and spread of those species in the buffer.

Definition of Success
The mitigation project goal will be deemed successful when objectives are met, as evidenced through the observation of set performance standards.

Performance Standards
The objectives will be considered successfully met when the following performance standards are observed in all enhancement and restoration areas:

Performance Standard 1
End of Year 1: 90 percent survival of installed species and no more than 5 percent cover by invasive woody plant species.

Performance Standard 2
End of Year 2: at least 80 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 3
End of Year 3: at least 70 percent survival of installed plant species and no more than 10 percent cover by invasive plant species.

Performance Standard 4
End of Year 4: at least 40 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

Performance Standard 5
End of Year 5*: at least 50 percent aerial coverage by native species and groundcover, and no more than 10 percent cover by invasive plant species.

When assessing areal coverage, native volunteer plants may be included when making calculations. However, for the purpose of assessing survival of installed plant species, only installed plantings shall be considered. Installed plantings shall be clearly marked with flagging during installation.

In the event that a performance standard is not met by the time specified, maintenance and/or contingency actions shall be implemented promptly to work toward meeting the standard.

*If Year 5 performance standards are met by the end of Year 3 or Year 4, the City may consider the project to be successful and terminate the monitoring period at that time.

PROJECT MONITORING PROGRAM

1. Initial compliance/as-built report at completion of construction
2. Inspection and brief status report 30 days after planting
3. Inspection and brief status report early in the first growing season
4. Inspection and brief status report and the end of the first growing season
5. Inspection and brief status report early in the second growing season
6. Inspection and brief status report and the end of the second growing season
7. Annual site inspection (once per year in the fall) in years 3-5
8. Annual reports (one report submitted in the fall of each monitored year) for years 3-5

Purpose for Monitoring
The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows that the definitions of success stated below are met. The property owner shall grant access to the mitigation area for inspection and maintenance to the contracted landscape and/or wetland specialist and City of Marysville staff during the monitoring period, until the project is evaluated as successful.

Monitoring
Monitoring shall be conducted in accordance with the approved Mitigation Plan. The monitoring period will begin once the City receives written notification confirming the mitigation plan has been implemented and City staff inspects the site and issues approval of the installation. The monitoring period is proposed to last for five years, however, if the site meets the Year 5 performance standards in earlier years, the monitoring program can be completed early. If the site does not meet the Year 5 performance standards at the end of Year 5, contingency actions may be necessary and monitoring may be extended one year at a time until the Year 5 performance standards are met.

Vegetation Monitoring
Sampling points or transects will be established for vegetation monitoring and photo points will be established from which photos will be taken throughout the monitoring period. Permanent sampling points shall be identified in the field and on the monitoring map in the first monitoring report. Each sampling point or transect shall detail tree, shrub, and herbaceous aerial coverage. During Years 3 through 5, vegetation monitoring shall occur between May 15 and September 30 (prior to leaf drop), unless otherwise specified. The native grass seeding area is not part of the buffer enhancement measures and will not be monitored.

Photo points
At least one photo point shall be established in each buffer restoration area and at least four permanent photo points shall be established within each buffer enhancement area. Photographs will be taken from these points to visually record the condition of the restoration/enhancement area. Photos shall be taken between May 15 and September 30 (prior to leaf drop), unless otherwise specified. Photo points shall be identified on the monitoring map in the first monitoring report.

Monitoring Report Contents
During Years 3 through 5, monitoring reports shall be submitted by October 31 of each year. As applicable, monitoring reports must include descriptions / data for:
1. Site plan and vicinity map
2. Historic description of project, including date of installation, current year of monitoring, restatement of mitigation / restoration goals, and performance standards
3. Plant survival, vigor, and areal coverage for every plant community (transect or sampling point data), and explanation of monitoring methodology in the context of assessing performance standards
4. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
5. Observed wildlife, including amphibians, avians, and others
6. Assessment of nuisance / exotic biota and recommendations for management
7. Descriptions of any structural repair or replacement (i.e. fencing, signs, etc.)
8. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, contingency actions may be necessary. Elements of a contingency plan may include, but are not be limited to: replacing plants, more aggressive weed and invasive species control, pest control, mulching, replanting with larger plant material, species substitution, fertilization, soil amendments, and/or irrigation.

PERFORMANCE AND/OR MAINTENANCE BOND

Performance and/or maintenance bonds, or other assurance device, shall be provided to the City of Marysville, in an amount to be determined by the City. The following is an estimate of the cost to install the mitigation measures.

One-gallon plants	$15.00/plant x 480 installed	$ 7,200.00
Split rail fencing and signage	$8/foot x 954 feet	$ 7,632.00
Critical area signage	$30/sign x 10 signs	$ 300.00
Mulch	$50.00/CY x 16CY	$ 800.00
Monitoring	$2,500/year x 5 years	$12,500.00
Maintenance	$2,000.00/year x 5 years	$10,000.00
Total Estimated Cost		**$38,232.00**

USE OF THIS PLAN

This Final Mitigation Plan is supplied to Keystone Land, LLC as a means of mitigating for buffer impacts. This report is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report, and any implied representation or warranty is disclaimed.

WRI Project # 23214

SCALE 1" = 40'

Drawn By: A. Wachter

Original Date: 01.06.2024

Revision 1: 10.01.2024

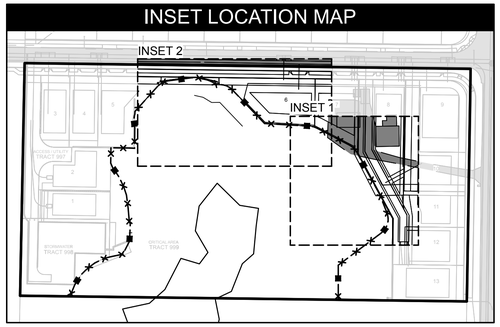
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PREPARED FOR:
Keystone Land, LLC
13805 Smokey Blvd #102
Marysville, WA 98271

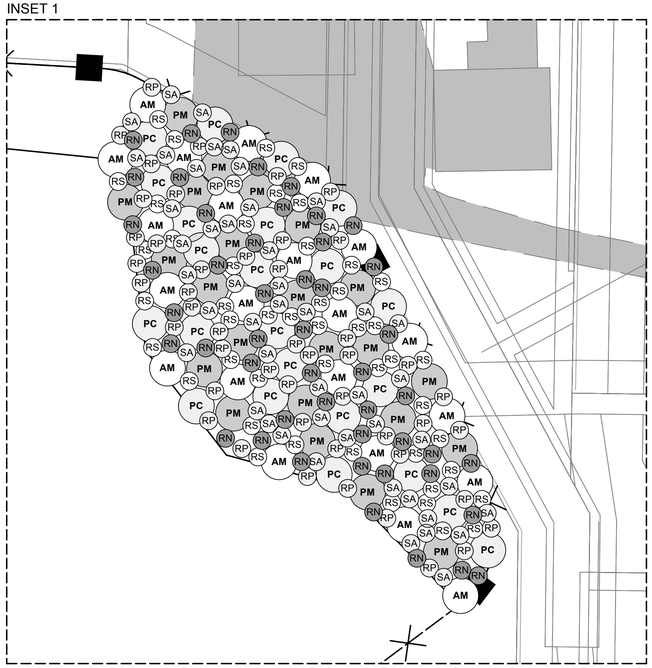
FINAL MITIGATION PLAN
TAYLOR LANE
MARYSVILLE, WASHINGTON
PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

FMP-1

INSET LOCATION MAP



INSET 1



LEGEND

PC	Shore pine
PM	Douglas fir
AM	Big-leaf maple
RS	Salmonberry
SA	Snowberry
RP	Thimbleberry
RN	Nootka rose

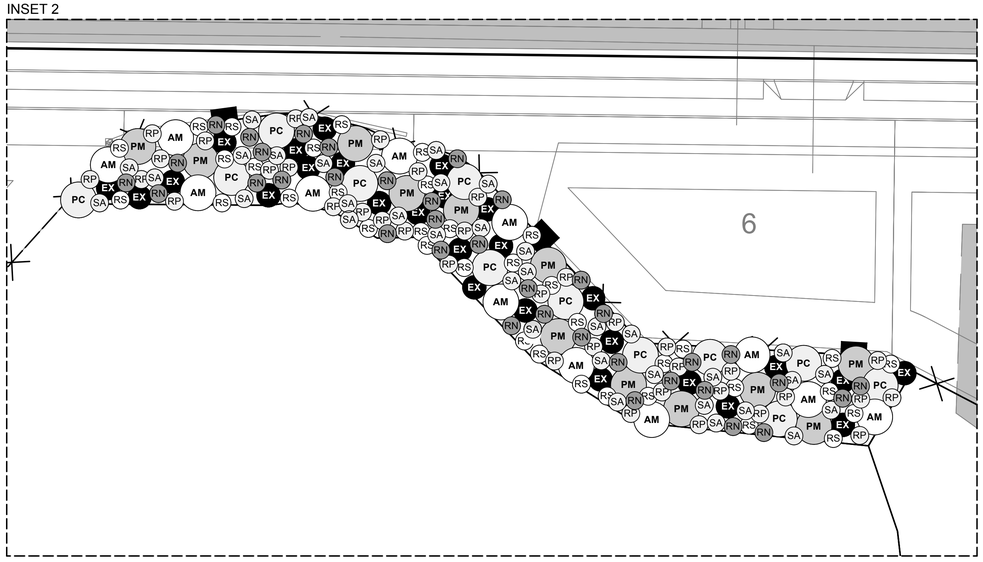
Inset Scale 1" = 20'

0 10 20 30 40

Buffer Enhancement Area 1 (7,500 square feet)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	23
Shore pine	*Pinus contorta*	1 gallon	10'	23
Bigleaf maple	*Acer macrophyllum*	1 gallon	10'	22
Nootka rose	*Rosa nutkana*	1 gallon	5'	58
Snowberry	*Symphoricarpos albus*	1 gallon	5'	58
Salmonberry	*Rubus spectabilis*	1 gallon	5'	58
Thimbleberry	*Rubus parviflorus*	1 gallon	5'	58
Total				**300**

INSET 2



LEGEND

PC	Shore pine
PM	Douglas fir
AM	Big-leaf maple
RS	Salmonberry
SA	Snowberry
RP	Thimbleberry
RN	Nootka rose
EX	Existing Native Vegetation

Inset Scale 1" = 20'

0 10 20 30 40

Buffer Enhancement Area 2 (5,800 square feet; plant 70% area)

Common Name	Latin Name	Size	Spacing	Quantity
Douglas fir	*Pseudotsuga menziesii*	1 gallon	10'	12
Shore pine	*Pinus contorta*	1 gallon	10'	12
Bigleaf maple	*Acer macrophyllum*	1 gallon	10'	12
Nootka rose	*Rosa nutkana*	1 gallon	5'	36
Snowberry	*Symphoricarpos albus*	1 gallon	5'	36
Salmonberry	*Rubus spectabilis*	1 gallon	5'	36
Thimbleberry	*Rubus parviflorus*	1 gallon	5'	36
Total				**180**

PLANTING NOTES

Plant in the early spring or late fall and obtain all plants from a reputable nursery. Care and handling of all plant materials is extremely important to the overall success of the project. The origin of all plant materials specified in this plan shall be native plants, nursery grown in the Puget Sound region of Washington. Some species substitution may be allowed due to the availability of plants, only with the agreement of the wetland professional and/or City staff.

Pre-Planting Meeting
Prior to control of invasive species or installation of mitigation plantings, a site meeting between the contracted landscaper and the consulting wetland professional shall occur to discuss the intent of the project and resolve any questions. During this meeting, a discussion regarding plant spacing and locations of plant species shall occur.

Storage
Plants stored by the Permittee for longer than one month prior to planting shall be planted in nursery rows and treated in a manner suitable to those species' horticultural requirements. Plants must be re-inspected by the wetland professional prior to installation.

Damaged plants
Damaged, dried out, or otherwise mishandled plants will be rejected at the installation inspection. All rejected plants shall be immediately removed from the site.

Quality and condition
Plants shall be normal in pattern of growth, healthy, well-branched, vigorous, with well-developed root systems, and free of pests and diseases. Damaged, diseased, pest-infested, scraped, bruised, dried out, burned, broken, or defective plants will be rejected. Plants with pruning wounds over 1" in diameter will be rejected.

Roots
All plants shall be containerized or balled and burlapped (B&B), unless explicitly authorized by the wetland professional. Rootbound plants or B&B plants with damaged, cracked, or loose rootballs (major damage) will be rejected. Immediately before installation, plants with minor root damage (some broken and / or twisted roots) must be root-pruned. Matted or circling roots of containerized plantings must be pruned or straightened and the sides of the root ball must be roughened from top to bottom to a depth of approximately half an inch in two to four places. Bare root plantings of woody material are allowed only with permission from the wetland professional and/or City staff.

Sizes
Plant sizes shall be the size indicated in the plant schedule in approved plans. Larger stock may be acceptable provided that it has not been cut back to the size specified and that the root ball is proportionate to the size of the plant. Smaller stock may be acceptable, and preferable under some circumstances, based on site-specific conditions. Measurements, caliper, branching, and balling and burlapping shall conform to the American Standard of Nursery Stock by the American Association of Nurserymen (latest edition).

Form
Evergreen trees shall have single trunks and symmetrical, well-developed form. Deciduous trees shall be single-trunked unless specified as multi-stem in the plant schedule. Shrubs shall have multiple stems and be well-branched.

Flagging
All mitigation plantings shall be clearly flagged with highly visible flagging tape at the time of the installation. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

Mulch
All landscaped areas denuded of vegetation and soil surface surrounding all planting pit areas shall receive no less than 2 to 4 inches of organic compost or certified weed free straw after planting. A layer of woodchips will be placed around the base of each plant in a 3-foot radius and at a depth of 2 to 4 inches. Mulch and woodchips shall not be allowed to contact plant stems in order to avoid plant decay and rot.

PLANTING NOTES (CON'T)

Timing of Planting
Unless otherwise determined by the consulting biologist and City staff, initial planting shall occur between October 15 and March 15. Overall, the earlier plants go into the ground during the dormant period the more time they have to adapt to the site and extend their root systems before the water demands of spring and summer.

Weeding
Existing and exotic vegetation in the mitigation areas will be hand-weeded from around all newly installed plants at the time of installation and on a routine basis throughout the monitoring period. No chemical control of vegetation on any portion of the site is recommended.

Site conditions
The contractor shall immediately notify the wetland professional of drainage or soil conditions likely to be detrimental to the growth or survival of plants. Planting operations shall not be conducted under the following conditions: freezing weather, when the ground is frozen, excessively wet weather, excessively windy weather, or in excessive heat.

Planting Pits
Planting pits shall be circular or square with vertical sides, and shall be 6" deeper and 12" larger in diameter than the root ball of the plant. Break up the sides of the pit in compacted soils. Set plants upright in pits. Burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting soils.

Plant Names
Plant names shall comply with those generally accepted in the native plant nursery trade. Any question regarding plant species or variety shall be referred to the landscape designer, wetland professional, or City staff. All plant materials shall be true to species and variety and legibly tagged.

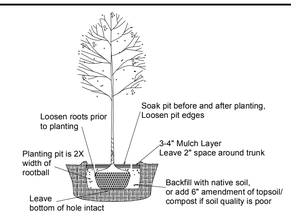
Fertilizer
Slow release fertilizer may be used if pre-approved by the City of Marysville. Fertilizers shall be applied only at the base of plantings underneath the required covering of mulch (that does not make contact with stems of the plants). No soil amendment or fertilizers will be placed in planting holes.

Staking
Most shrubs and many trees DO NOT require any staking. If the plant can stand alone without staking in a moderate wind, do not use a stake. If the plant needs support, then strapping or webbing should be used as low as possible on the trunk to loosely brace the tree with two stakes. Do not brace the tree tightly or too high on the trunk. If the tree is unable to sway, it will further lose the ability to support itself. Do not use wire in a rubber hose for strapping as it exerts too much pressure on the bark. As soon as supporting the plant becomes unnecessary, remove the stakes. All stakes must be removed within two (2) years of installation.

Plant Location
Colored surveyors ribbon or other appropriate marking shall be attached to the installed plants to assist in locating the plants while removing the competing non-native vegetation and during the monitoring period.

Arrangement and Spacing
The plants shall be arranged in a pattern with the appropriate numbers, sizes, species, and distribution that are required in accordance with the approved plans. The actual placement of individual plants shall mimic natural, asymmetric vegetation patterns found on similar undisturbed sites in the area. Spacing of the plantings may be adjusted to maintain existing vegetation with the agreement of the wetland professional and/or City staff.

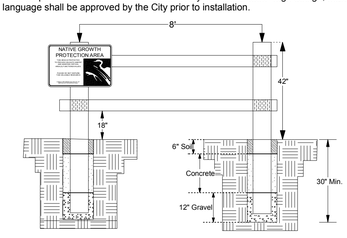
Inspection(s)
A wetland professional shall be present on site to inspect the plants prior to planting. Minor adjustments to the original design may be required prior to and during construction.



TREE & SHRUB PLANTING DETAIL
No Scale

TWO-RAIL FENCE AND SIGN DETAIL

Wetland fencing and signage adjacent to a regulated wetland or stream corridor shall be required. Two-rail fencing shall be constructed with pressure treated posts and rails and cemented into the ground with either cedar or treated rails. Alternative materials may be used subject to approval by the city. Signs designating the presence of an environmentally sensitive area shall be posted along the buffer boundary. The signs shall be posted at a minimum rate of one every 100 linear feet. Sign design, materials, and restrictive language shall be approved by the City prior to installation.



NOT TO SCALE

WRI Project # 23214
INSET SCALE 1" = 20'
Drawn By: A. Wachter
Original Date: 01.06.2024
Revision 1: 10.01.2024

Wetland Resources, Inc.
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PREPARED FOR:
Keystone Land, LLC
13805 Smokey Blvd #102
Marysville, WA 98271

FINAL MITIGATION PLAN
TAYLOR LANE
MARYSVILLE, WASHINGTON
PORTION OF SECTION 35, TOWNSHIP 30N, RANGE 5E, W.M.

FMP-2

MARYSVILLE
COMMUNITY DEVELOPMENT

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that open record public hearing will be held before the Hearing Examiner on **Wednesday, October 30th at 6:00 PM** at 501 Delta Avenue, 2nd Floor – Council Chambers for the following proposal:

File Number: PA 24-002

Project Title: Taylor Lane Subdivision

Applicant: Keystone Land, LLC

Project Agent: Tom Abbott, Solid Ground Engineering
8105 166th Ave NE, Redmond, WA 98052

Project Location: 4820 83rd Ave NE

APN(s): 00590700013600

Scan to View Project Materials

Project Description: The applicant is proposing a 13-lot single family residential subdivision; the existing residence is to be retained on proposed lot 9. The project site includes a portion of a Category II wetland and its associated buffer along with geological hazard areas for steep slopes. The applicant has the intent of using buffer width averaging to accommodate portions of the proposed development; compensatory mitigation via buffer addition and enhancement is proposed.

Open Record Public Hearing: The public hearing will take place in person at 501 Delta Avenue, 2nd Floor – Council Chambers and via Zoom/teleconference. The Hearing Examiner and the City's project manager will attend in person; however, other staff, the applicant, and the public may attend either in person or via Zoom.

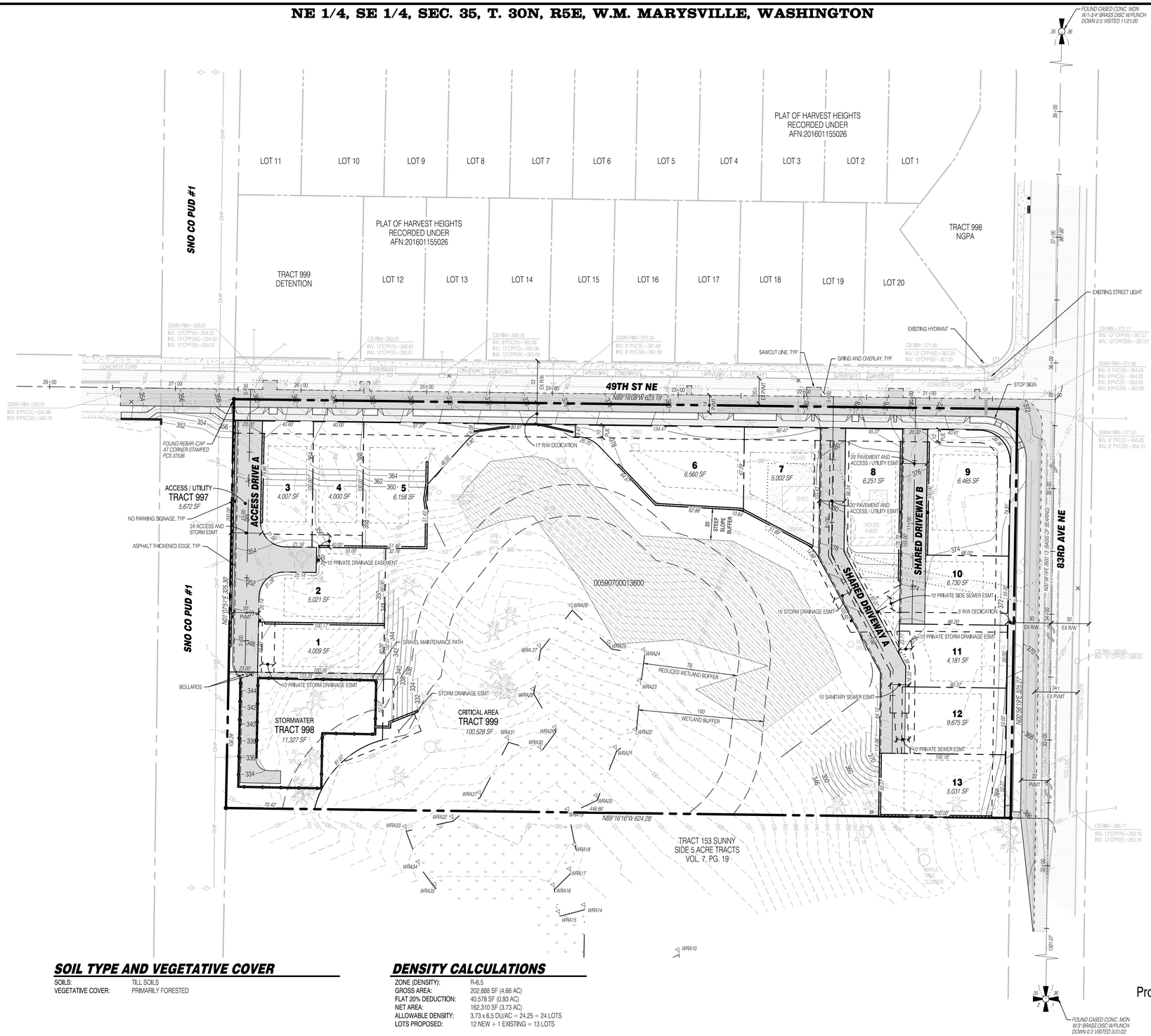
- **Zoom Meeting Link:** https://us06web.zoom.us/j/84494899392?pwd=6Rdg7K2ryaOcRQVBPOQETDpaME82wf.1
  - **Passcode:** 555684
- To listen to the meeting without providing public comment:
  - **Dial in:** 1.253.215.8782
  - **Meeting ID:** 838 1746 9833

Document Availability: http://docs.marysvillewa.gov/htcomnet/public/?folder=7f88ad36

For Project Information: Emily Morgan, Senior Planner - 360.363.8216 or emorgan@marysvillewa.gov
Community Development Department, 501 Delta Ave, Marysville, WA 98270

THIS NOTICE IS NOT TO BE REMOVED CONCEALED OR DESTROYED

NE 1/4, SE 1/4, SEC. 35, T. 30N, R5E, W.M. MARYSVILLE, WASHINGTON



LEGEND

SYMBOLS	DESCRIPTION
•	REMOVABLE BOLLARD
	'NO PARKING' SIGN UNLESS OTHERWISE NOTED
	RETAINING WALL
	ASPHALT PAVEMENT
	ASPHALT GRIND AND OVERLAY
	CONCRETE PAVEMENT
	FALL PROTECTION FENCING

NOTES

1.) LOTS 1, 2, 10, 11, 12 AND 13 WILL REQUIRE FIRE SPRINKERS.

PROJECT INFORMATION

TAX PARCELS:	00590700013600
SITE ADDRESS:	4820 83RD AVE NE, MARYSVILLE, WA 98270
SITE AREA:	202,889 SF (4.66 AC)
PROPOSED ZONING:	R6.5
PROPOSED LAND USE:	DETACHED SINGLE FAMILY HOMES
FUTURE LAND USE: (PER COMP PLAN)	URBAN LOW RESIDENTIAL
PROPOSED LOTS:	13 LOTS
BUILDING SETBACKS:	20' FRONT 5' SIDE / 11' WHEN ADJACENT TO R/W 20' REAR 10' NGPA
WATER:	CITY OF MARYSVILLE
SEWER:	CITY OF MARYSVILLE
POWER:	SNOHOMISH COUNTY PUD
GAS:	CASCADE NATURAL GAS
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	LAKE STEVENS SCHOOL DISTRICT #4
FIRE DISTRICT:	MARYSVILLE FIRE DISTRICT RFA

SOIL TYPE AND VEGETATIVE COVER

SOILS:	TILL SOILS
VEGETATIVE COVER:	PRIMARILY FORESTED

DENSITY CALCULATIONS

ZONE (DENSITY):	R-6.5
GROSS AREA:	202,888 SF (4.66 AC)
FLAT 20% DEDUCTION:	40,578 SF (0.93 AC)
NET AREA:	162,310 SF (3.73 AC)
ALLOWABLE DENSITY:	3.73 x 6.5 DU/AC = 24.25 = 24 LOTS
LOTS PROPOSED:	12 NEW + 1 EXISTING = 13 LOTS

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA, ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

811 SAFETY IS IN YOUR HANDS. EVERY DIG. EVERY TIME.

Project No. 24-002

THOMAS P. ARBUTT — STATE OF WASHINGTON — 54921 — REGISTERED PROFESSIONAL ENGINEER — 9-23-24

ENGINEER'S STAMP

REVISIONS

#	DATE	DESCRIPTION
1	8-30-24	REVISED PER CITY COMMENTS
2	9-23-24	REVISED PER CITY COMMENTS

SGG
Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

PRELIMINARY PLAT MAP

KEYSTONE LAND, LLC.
TAYLOR LANE
MARYSVILLE, WA

DRAWN BY:	AJP
CHECKED BY:	TPA
DATE:	1-26-24
JURISDICTION:	CITY OF MARYSVILLE
JOB NUMBER:	23-0009

PP-01
3 OF 8

C:\Users\ryan\OCA\Docs\Solid Ground Engineering\23-0009 Taylor Lane\Project Files\Drawings\PreliminaryPlat\preliminary23-0009P-PP-01.dwg 9/23/2024 8:44:47 AM

650

STAFF RECOMMENDATION

Community Development Department ◆ 501 Delta Avenue ◆ Marysville, WA 98270
Office Hours: Mon - Fri 8:00 AM - 4:30 PM ◆ Phone: (360) 363-8000

PROJECT INFORMATION			
Project Title	Taylor Lane Subdivision	**Date of Report**	October 18, 2024
File Number	PA24-002	**Attachments**	Public Hearing Exhibits (1 - 31)
Administrative Recommendation	Approve the preliminary 13-lot subdivision		

BACKGROUND SUMMARY									
Applicant	Joe Long, Keystone Land, LLC / Tom Abbott, Solid Ground Engineering								
Request	Preliminary Subdivision for the construction of a 13-lot single family residential subdivision								
SEPA Status	Exempt per MMC 22E.030.090								
Site Address	4820 83rd Ave NE			**APN**(s)	00590700013600				
Legal Description (abbreviated)	Tract 136 of Sunnyside Acre Tracts			**Section**	35	**Township**	30	**Range**	05E
Comprehensive Plan	SFH	**Zoning**	R-6.5	**Shoreline Environment**	N/A				
Water Supply	**Current**	**Proposed**		**Sewer Supply**	**Current**	**Proposed**			
	Marysville	Marysville			Marysville	Marysville			

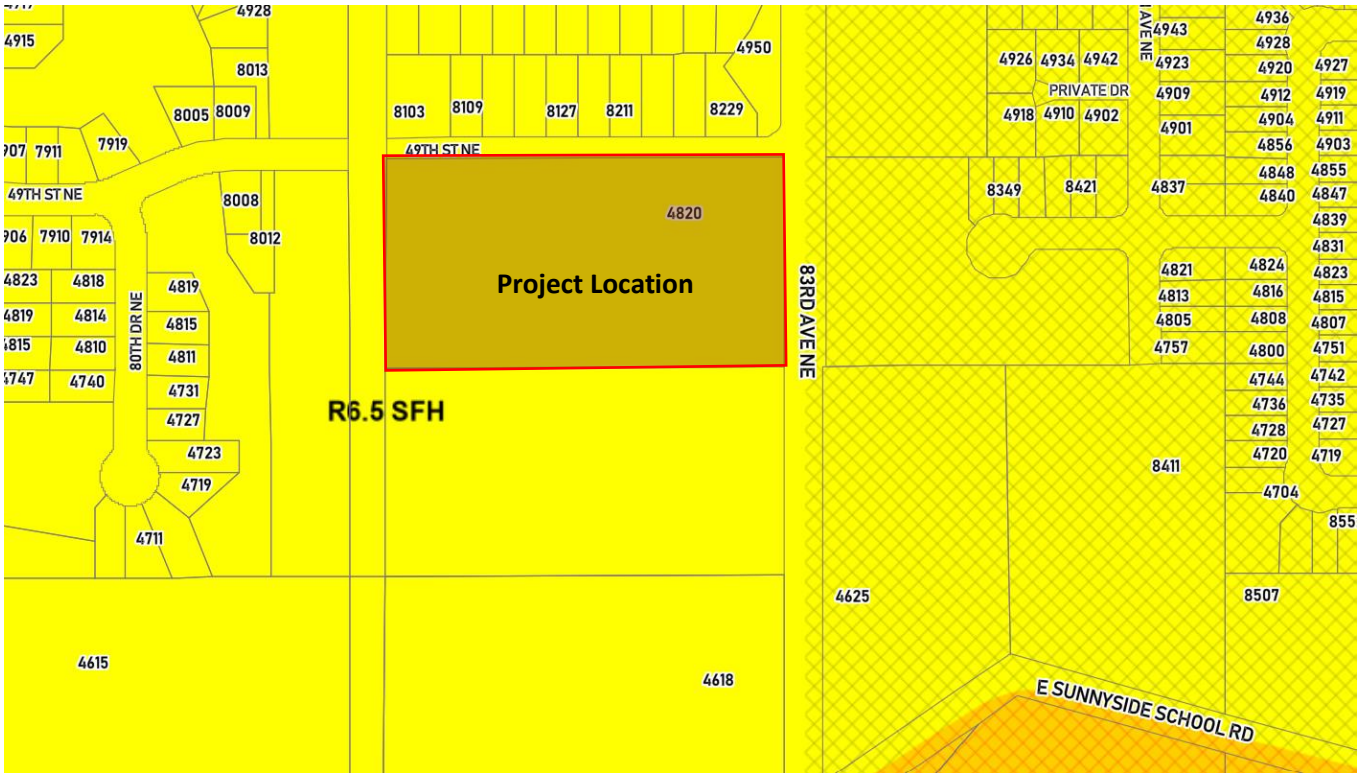
REVIEWING AGENCIES				
Marysville	**Local Agencies**	**State & Federal**	**County**	**Other**
☒ Building ☒ Parks ☐ Police ☒ PW – Dev. Services ☒ PW – Engineering ☒ PW – Operations ☒ PW – Solid Waste ☒ PW – Streets ☒ PW – Traffic Eng. ☒ PW – Water Res. ☒ PW – WWTP	☐ Arlington (city) ☐ Community Transit ☐ Everett (city) ☒ Comcast ☒ Lake Stevens SD ☒ PUD No. 1 ☒ Ziply ☒ Marysville Fire District	☒ US Army Corps of Engineers ☐ BNSF ☒ DAHP ☒ DOE ☒ WDFW ☐ WSDOT ☐ USDFW	☐ Health District ☐ Planning ☐ Public Works - Land Development ☐ Public Works	☐ Olympic Pipeline ☐ Puget Sound Energy ☒ Tulalip Tribes ☒ Stillaguamish Tribe

ACTION				
☐ **Administrative**	☐ **City Council**	☒ **Quasi-Judicial**	☐ **Planning Commission**	
Date of Hearing	October 30, 2024	☐ **Approved**	☐ **Denied**	☐ **Continued**

STAFF			
Name Emily Morgan	**Title** Senior Planner	**Phone** 360.363.8216	**E-mail** emorgan@marysvillewa.gov

SURROUNDING USES			
	Comprehensive Plan	**Zoning**	**Land Use**
North	Single Family High	R-6.5	Single family residential – Harvest Heights
East	WR – Single Family High	WR-R-4-8	Forrester Trails Subdivision
South	Single Family High	R-6.5	Large undeveloped critical area parcel
West	Single Family High	R-6.5	Harvest Hills HOA Common Area / Snohomish County PUD Utility Corridor

VICINITY MAP



- General Commercial
- Downtown Commercial
- Community Business
- Neighborhood Business
- Mixed Use
- 88 - Mixed Use
- General Industrial
- Light Industrial
- R28 Multi-Family High
- R18 Multi-Family Medium
- R12 Multi-Family Low
- R6-18 Multi-Family Low
- R8 Single Family High Small Lot
- R6.5 Single Family High
- R4-8 Single Family High
- R4.5 Single Family Medium
- Public-Institutional
- Recreation
- Open

FINDINGS AND CONCLUSIONS

1. **Description of Proposal.** An application was submitted for a Preliminary Subdivision for the construction of a 13-lot single family residential subdivision. There is an existing residence to be retained on proposed Lot 8.

   1.1. Major subdivisions require a quasi-judicial decision action; therefore, a public hearing is required per MMC 22G.090.

2. **Project Location.** The proposed development is located at 4820 83rd Ave NE and is identified as Assessor's Parcel Number (APN) 0059700013600.

3. **Site Description.** The project site is approximately 4.66 acres in size with the upland portion being relatively level. The site does slope moderately then steeply towards the center of the site, with the southern portion of the site being sloped to a depressional wetland. There is approximately 60 ft. of total elevation change present across the project site. Vegetation within the subject site primarily consists of mature trees, forest undergrowth, landscaping, and some areas overgrown with invasive vegetation.

4. **Project History.** A pre-application request (PreA 23-030) was submitted on June 22, 2023, with comments provided to the applicant, dated July 31, 2023.

5. **Letter of Completeness.** A letter of completeness was issued February 6, 2024 and provided to the applicant in accordance with MMC 22G.010.050.

6. **Public Notice.** Public notice of the development application was provided in accordance with MMC 22G.010.090.

   6.1. The public hearing for the proposed request was advertised in accordance with MMC 22G.010.110, *Notice of public hearing*.

7. **Request for Review.** A Request for Review of the proposed development was sent to the Local, County, State & Federal Agencies and Districts identified on page 1 of this report. The following comments were received; if above-referenced agencies are not listed below, no comments were received:

	Nature of Comment
Public Works, Traffic	• *Requirements and recommendations are addressed in the approved Traffic Concurrency Recommendation, dated September 10, 2024.*
Public Works, Development Services	• *Provided information regarding the required improvements which are to be further reviewed with Civil Plan Review.* • *The project is vested under the 2019 Stormwater Management Manual for Western Washington. Formal drainage review will be conducted during Civil Plan Review.* • *Capital facility fees would be required to be paid prior to issuance of the building permit.*
Marysville Fire District	• *Lots 1, 2, 11, 12, and 13 will require 13D fire sprinklers*

	• *Fire hydrants shall be provided along the new and existing roadways at approved locations, at all intersections and with maximum spacing of 600 ft. apart. The location of fire hydrants requires fire marshal approval on civil construction plans.* • *"NO PARKING - FIRE LANE" signs are required on both sides of all roads that are 26 feet wide or less. The signage shall be identified on the approved Civil Plans.*
Building Department	*Provided requirements for the building permit submittal.*
Snohomish County PUD	• *Snohomish County PUD has adequate system capacity to serve the proposed development, but upgrades may be needed. Securing of easements for the necessary utilities would be required, if applicable.* • *The PUD requires a minimum 14 ft. clearance from any structure to accommodate workers, scaffolding, and ladders. Minimum worker safety clearance from 115kC transmission wires is 20 ft.*
WA Dept. of Ecology	*DOE originally had concerns on the initial proposed layout of the project. The project has been amended to be reduced in scope and no further concerns have been expressed by DOE.*
Public Works, Surface Water	*Provided guidance for stormwater requirements as well as dedication documents for conveying the stormwater facility to the City.*

8. **Public Comments:** The following comments have been received to date and included in Exhibit 016:

   8.1. Will Brandt voiced concerns over the access and safety of added traffic onto 49th St NE.

   Staff finds that as conditioned, these concerns will be mitigated through the widening and improvements to 49th St NE.

9. **State Environmental Policy Act Review.** Pursuant to MMC 22E.030.090, the proposed subdivision is exempt from SEPA Review as it does not exceed the flexible threshold, which allows for up to 30 single-family dwelling units.

10. **Critical Areas.** Based on the revised Critical Area Study and Buffer Mitigation Plan (Exhibit 028), prepared by Wetland Resources, Inc., dated October 1, 2024, the project site contains a Category II wetland and an off-site Type F, fish bearing stream. Per the Geotechnical Engineering Study (Exhibit 006), prepared by Earth Solutions NW, LLC, dated January 20, 2024 along with GIS data, the project site has identified areas of geological hazard for steep slopes. Category II wetlands typically require a 100 ft. protective buffer, however, per MMC 22E.010.100(6)(d), when the minimum buffer for a wetland extends into an area with a slope greater than 25%, the buffer must either be increased by 25% or a required 25 ft. setback from the toe/top of slope must be applied, whichever is greater. Pursuant to MMC 22E.010.030(1), areas that are subject to multiple critical area regulations, the regulations which provide

greater protection to environmentally critical areas shall apply. The protective provisions regulating wetlands per MMC 22E.010.100 would offer the greatest protection and would therefore be applied to the proposed development. Therefore, areas within the proposed development are subject to the more restrictive 25 ft. setback from the top of slope rather than the 100 ft. wetland buffer.

With the development, a portion of the buffer is proposed to be reduced in order to accommodate a stormwater facility. A portion of the stormwater detention facility along with a dispersion trench is proposed to be located within the wetland buffer, outside of the geohazard area. Pursuant to MMC 22E.010.100 (10), *stormwater management facilities, such as biofiltration swales and dispersion facilities, may be located within the outer 25% of wetland buffers only if they will have no negative effect on the functions and purpose the buffers serve for the wetland or on the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated beneficial uses*. As proposed, the stormwater facilities will be positioned within the outer 25% of the 100 ft. wetland buffer. Compensatory mitigation in the form of buffer addition and buffer enhancement is proposed to ensure no net loss of ecological function would occur due to the area of buffer reduction/encroachment to accommodate the proposed stormwater facility.

11. **Access and Circulation.** The main point of access would be through the widening and improvements to 49th St NE. Lots 3 through 9 would access directly from 49th St NE. Lots 1 and 2 would be accessed by a shared access off of 49th St NE which would also service the stormwater facility on Tract 998. Lots 10 and 11 along with Lots 12 and 13 would each be accessed via shared driveways.

12. **Traffic Impacts.** A traffic impact analysis (TIA) was prepared by Kimley Horn, dated January 2024. According to the TIA, the proposed development would generate approximately 123 Average Daily Trips (ADT), 9 AM peak hour trips (AMPHT), and 13 PM peak hour trips (PMPHT).

    The City's Traffic Engineering Manager reviewed the TIA, and issued a written concurrency recommendation dated September 10, 2024 (Exhibit 024), informing the developer of the project's impacts and mitigation obligation pursuant to MMC 22D.030, *Traffic Impact Fees and Mitigation*. Pursuant to MMC 22D.030.070(1)(d), an applicant is required to make a written proposal for mitigation of traffic impacts based on the concurrency recommendation. The applicant accepted the requirements outlined in the traffic concurrency recommendation on September 11, 2024 (Exhibit 025).

13. **Utilities.** Per MMC 14.03.250, utilities are to be extended along the street frontages of the proposed project. Extensions of sewer and water mains as well as a storm drain system for the roadway extension will be required. The following utilities will be provided to the site:

    Storm Drainage: According to the Preliminary Drainage Report, prepared by Solid Ground Engineering, dated August 2024, the project is designed to comply with the Department of Ecology 2019 Stormwater Management Manual for Western Washington. The on-site stormwater would be mitigated via a stormwater detention pond. Stormwater runoff for the site will be treated through a perkfilter cartridge filtration unit. Once treated, the detained runoff will be discharged to the on site wetland area.

    Water: The applicant is proposing to tie into the existing 8-inch ductile iron water main within 49th St to service the proposed lots.

Sewer: The applicant is proposing to tie into the existing 8-inch PVC sewer main within 49th St NE to service the proposed lots.

14. **Park Impacts.** Pursuant to MMC 22D.020, the applicant shall mitigate City of Marysville parks impacts through payment of the park impact fee in effect at the time of building permit application.

15. **School Impacts.** Pursuant to MMC 22D.040, the applicant shall mitigate Lake Stevens School District No. 4 impacts through the payment of the school impact fee in effect at the time of building permit application.

16. **Application Review.** MMC 22G.010.140(3) requires the City to determine whether or not the project is consistent with the following items described in the applicable plans and regulations:

    16.1. *Type of land use permitted at the site, including uses that may be allowed under certain circumstances, such as planned residential development and conditional uses, if the criteria for their approval have been satisfied.*

    Staff Comment: The proposed subdivision is for the creation of single family residential lots. Per MMC 22C.010.060, single family detached units are permitted outright in the R-6.5 zone; therefore, the proposed development would comply with this provision.

    16.2. *Density of residential development in urban growth areas.*

    Staff Comment: The base density allowed in the R-6.5 zone is 6.5 dwelling units per net project acre. The gross site area is approximately 4.66 acres (202,888 sq. ft.).

    Per the site plan of record, the applicant applied a flat deduction of 20% per the definition of "Net Project Area" in MMC 22A.020.150; therefore, the proposed site has a net project area of 3.73 acres (162,310 sq. ft.), which would allow for the construction of 24 single family residences (3.73 acres x 6.5 d.u. per acre).

    16.3. *Availability and adequacy of public facilities identified in the Comprehensive Plan.*

    Staff Comment: The Comprehensive Plan designation for the subject property is High Density Single Family. The proposed development and subsequent use of the property would be consistent with the pertinent development policies outlined in the Marysville Comprehensive Plan and is located within the East Sunnyside Neighborhood Planning Area 4.

    Planning Area 4 demonstrates that adequate water and sewer is available to this development and is located within the Lake Stevens School District.

    The following development policies outlined in the Comprehensive Plan that are specifically pertinent to the overall subdivision request, and were used to establish appropriate conditions, are as follows:

    - **LAND USE ELEMENT – Policies:** LU-3, LU-5, LU-6, LU-20, LU-21, LU-23, LU-28, LU-29, LU-30, LU-31, LU-33, LU-34, LU-38, LU-42
    - **HOUSING ELEMENT – Policies:** HO-18, HO-19, HO-22, HO-25, HO-30, HO-32, HO-37

- **ENVIRONMENTAL ELEMENT – Policies:** EN-20, EN-21, EN-26, EN-27, 28, EN-29, EN-30, EN-32, EN-40, EN-41
- **TRANSPORTATION ELEMENT – Policies:** T-3, T-7, T-8, T-25, T-26, T-27, T-29, T-30, T-40, T-41, T-46, T-47, T-48
- **UTILITIES ELEMENT – Policies**: UT-1, UT-3, UT-8, UT-9, UT-10, UT-14
- **PUBLIC FACILITIES & SERVICES ELEMENT – Policies:**
  - **Police, Fire, Library:** PS-1, PS-10, PS-11
  - **Schools:** SC-6
  - **Water, Sewer, Storm Drainage, Solid Waste:** PF-1, PF-2, PF-7, PF-9, PF-10, PF-19, PF-20, PF-23, PF-26, PF-28

Staff finds that the proposed development, as conditioned, is consistent with the City of Marysville Comprehensive Plan.

16.4. *Development Standards*

Staff Comment: The project site is currently zoned R-6.5. The R-6.5 zone allows single-family residences at base density of 6.5 dwelling units per acre.

Due to the presence of critical areas, the applicant is utilizing MMC 22E.010.360 which allows the transfer of density attributable to the critical area and associated buffer to another noncritical portion of the same site. The bulk and dimensional standards of the next highest zoning may be utilized to accommodate the transfer of density; therefore, the project site may be designed to meet the dimensional standards of the R-8 zone as outlined in MMC 22C.010.080.

The proposed development and subsequent use of the property would comply with the intent of the R-6.5 and R-8 zone, and as conditioned herein, complies with all of the applicable design and development standards outlined in Title 22, *Unified Development Code*.

As conditioned, the proposed development makes appropriate provisions for the public use and interest, health, safety and general welfare.

17. **Hearing Examiner – Required Findings.** MMC 22G.010.170(3) requires that the Hearing Examiner not approve a proposed development without first making the following findings and conclusions:

17.1. *The development is consistent with the comprehensive plan and meets the requirements and intent of the Marysville Municipal Code.*

Staff Comment: The Comprehensive Plan designation for the subject property is High Density Single Family. The proposed development and subsequent use of the property would be consistent with the pertinent development policies outlined in the Marysville Comprehensive Plan and the intent of the Marysville Municipal Code, as conditioned herein.

17.2. *The development makes adequate provisions for open space, environmentally sensitive areas, drainage, streets and other public ways, transit stops, water supply,*

sanitary wastes, public utilities and infrastructure, parks and recreation facilities, playgrounds, sites for schools and school grounds.

Staff Comment: Based on a review of the preliminary plat map and application materials, the development makes adequate provisions for open space, environmentally sensitive areas, drainage, streets and other public ways, transit stops, water supply, sanitary wastes, public utilities and infrastructure, parks and recreation facilities, playgrounds, sites for schools and school grounds.

17.3. *The development is beneficial to the public health, safety and welfare and is in the public interest*.

Staff Comment: Per Finding 15, the proposed subdivision would be beneficial to the public health, safety and welfare and would be in the public interest as the subdivision has been designed in accordance with applicable Marysville Municipal Code requirements.

17.4. *The development does not lower the level of service of transportation and/or neighborhood park facilities below the minimum standards established within the comprehensive plan. If the development results in a level of service lower than those set forth in the comprehensive plan, the development may be approved if improvements or strategies to raise the level of service above the minimum standard are made concurrent with the development. For the purpose of this section, "concurrent with the development" is defined as the required improvements or strategies in place at the time of occupancy, or a financial commitment is in place to complete the improvements or strategies within six years of approval of the development*.

Staff Comment: As conditioned, the development would not lower the level of service of transportation and/or neighborhood park facilities below the minimum standards established within the comprehensive plan.

17.5. *The area, location and features of land proposed for dedication are a direct result of the development proposal, are reasonably needed to mitigate the effects of the development, and are proportional to the impacts created by the development*.

Staff Comment: As conditioned, the area, location and features of land proposed for dedication are a direct result of the development proposal, are reasonably needed to mitigate the effects of the development, and are proportional to the impacts created by the development.

18. **Preliminary Subdivision Review, Public Hearing – Elements Considered.** MMC 22G.090.130 requires the hearing examiner provide a basis for approval or disapproval of a proposed subdivision, as follows:

18.1. ***Public Use and Interest.*** *Evaluation of the proposed subdivision to determine whether the public use and interest are served by permitting the proposed subdivision*.

Staff Comment: After evaluation of the application materials and other supporting documentation available to the City, staff concludes that, as conditioned, the public use and interest are served by the proposed subdivision.

18.2. ***Public Health, Safety and General Welfare***. *Evaluation of the proposed subdivision to determine whether the public health, safety and general welfare have been served*.

Staff Comment: After evaluation of the application materials and other supporting documentation available to the City, staff concludes that, as conditioned, the public health, safety and general welfare have been served and that the subdivision is consistent with the requirements of RCW 58.17.110.

18.3. ***Comprehensive Plan.*** *Evaluation of all elements of the comprehensive plan and its consistency with the proposed subdivision*.

Staff Comment: The proposed subdivision and development of the parcel relate to all elements of the Comprehensive Plan. Compliance with the various elements of the Comprehensive Plan is specifically demonstrated in Finding 15.3.

18.4. ***Existing Zoning***. *Evaluation of existing zoning and its compliance with the proposed subdivision and MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The existing zoning and its compliance with the proposed subdivision and Article V of this chapter, Land Division Requirements has been evaluated. Compliance with specific zoning regulations is demonstrated in Finding 15.2.

18.5. ***Natural Environment.*** *Evaluation of the impacts and provision for mitigation of all impacts on all elements of the natural environment including topography, vegetation, soils, geology and all environmental issues as defined in the State Environmental Policy Act, Chapter 197-11 WAC, and MMC 22G.090, Article V , Land Division Requirements*.

Staff Comment: The project site is not subject to environmental review via the SEPA review process pursuant to MMC 22E.030.090(1)(a) and WAC 197-11-800(6); therefore, this provision would not apply.

However, staff reviewed impacts on all elements of the natural environment including topography, vegetation, soils, geology, and all environmental issues, and determined compliance with MMC 22G.090, Article V, Land Division Requirements, as conditioned herein.

Drainage. *Evaluation of all drainage impacts and provisions made for mitigation of all drainage impacts as defined in the city's drainage codes, and MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: All drainage impacts have been evaluated, and adequate provisions have been made to mitigate for all drainage impacts as defined in the City's drainage codes, and MMC 22G.090, Article V, Land Division Requirements.

18.6. ***Open Space.*** *Evaluation of all impacts and provision for open space as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: As a condition of final plat, the applicant must submit copies of restrictions and covenants for the maintenance of the common open space areas pursuant to MMC 22G.090.240.

Further, no division or redivision of land shall be approved unless appropriate provisions are made for, but not limited to, the public health, safety and general welfare, relating to open space, drainage ways, streets, alleys, other public ways, water supplies, sanitary wastes, parks, school facilities and other standards as may be required by this title.

18.7. ***Public Systems Capacity***. *Evaluation of all impacts and provisions made for mitigation of impacts on public systems including parks, schools, and community facilities as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The applicant is required to pay mitigation fees for each new dwelling unit in accordance with MMC 22D.020 and 22D.040 in order to mitigate potential impacts on parks, schools, and community facilities.

18.8. ***Public Services***. *Evaluation of all impacts and provisions made for mitigation of impacts on public services including streets, all public utilities, and fire and police protection as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The proposed subdivision would construct streets providing appropriate access and circulation to all proposed new lots. Public utilities are to be extended to serve all new units in accordance with City standards. Appropriate improvements for fire safety in accordance with the city's fire code would be provided. Capital improvement fees are required to be collected for water, sewer, and stormwater.

18.9. ***Floodplain.*** *Identification of subdivisions proposed in the floodplain and compliance with requirements of this chapter and MMC 22E.020, Floodplain Management*.

Staff Comment: The project is not located within an identified floodplain; therefore, this provision would not apply.

RECOMMENDATION

Based on the foregoing findings and conclusions, review of the application materials and other supporting documentation available to the Community Development Department, and the City's regulatory authority to implement the policies, standards, and regulations of the Marysville Comprehensive Plan and Marysville Municipal Code, the Community Development Department respectfully recommends that the Hearing Examiner ***APPROVE*** the proposed Preliminary Plat, subject to the following conditions:

1. The preliminary subdivision configuration (Exhibit 031) shall be the approved plat configuration. The final subdivision shall be processed in strict compliance with the provisions of Article III Final Subdivision Review and Article V Land Division Requirements of MMC 22G.090.
2. The final subdivision shall be approved and recorded within 5 years of the date of preliminary approval. A 2-year extension may be granted in accordance with MMC 22G.090.170.
3. Prior to final subdivision approval, the applicant shall submit to the City for its approval, covenants, deed restrictions, homeowners' association bylaws, and other documents providing for preservation and maintenance of all common open space, parking areas,

walkways, landscaping, signs, lights, roads, and community facilities consistent with MMC 22G.090.240. All common areas and facilities shall be continuously maintained at a minimum standard at least equal to that required by the City, and shall be approved by the City at the time of initial occupancy. Said restrictive covenants shall also include provisions to address parking enforcement and a statement from a private attorney as to the adequacy of the covenants to fulfill the requirement of the subdivision.

4. Residential fire sprinklers shall be required for Lots 1, 2, 10, 11, 12 and 13, unless adequate alternative provisions are reviewed and approved by the Marysville Fire Marshal.

5. Lots 10 through 13 shall be oriented with the front façade facing toward 83rd Ave NE.

6. Pursuant to MMC 22C.010.090(13), the proposed development shall utilize the bulk and dimensional standards of the R-8 zone. Compliance with this provision shall be demonstrated at time of building permit submittal.

7. A final landscape plan shall be required to be approved, prior to civil construction plan approval, and designed to comply with the applicable provisions outlined in MMC 22C.120, *Landscaping and Screening* and MMC 22G.090.570

    7.1. All required landscaping shall be bonded prior to final plat approval per MMC 22C.120.060.

8. Prior to civil plan approval, the applicant shall demonstrate compliance with the off-street parking standards and requirements of MMC 22C.130.030, *Table 1: Minimum Required Parking Spaces*.

9. Pursuant to MMC 22D.030.070(6)(a)(ii), the traffic concurrency determination and the project's impacts and mitigation obligations shall expire upon expiration of the subdivision. The project is subject to the traffic mitigation obligations as required by the Traffic Concurrency Recommendation (Exhibit 024), dated September 10, 2024.

10. All ground disturbing activities shall be in strict compliance with the approved site plan and as outlined in the approved Critical Area Study and Buffer Mitigation Plan, prepared by Wetland Resources, Inc, dated October 1, 2024 (Exhibit 028), or as amended and approved by Community Development.

11. Prior to recording of the final plat, all mitigation measures as proposed in the approved Buffer Mitigation Plan, shall be implemented with final approval by Community Development. Security for performance and/ or maintenance of the required mitigation and monitoring shall be in strict compliance with MMC 22E.010.160.

12. The onsite wetland and buffer area that will be retained must be placed in a separate Native Growth Protection Area (NGPA) tract. The boundary of the tract shall be delineated by the installation of City approved fencing and signage.

13. Prior to issuing any ground disturbing activity permits, the applicant is required to obtain all necessary permits and approvals from Federal, State and local agencies for the proposed critical areas impacts.

14. Prior to any ground disturbing activities, all wetland buffer areas shall be temporarily fenced between the construction activity and the buffer area with highly visible and durable protective barrier(s). Said barriers shall be retained during construction to prevent access and sedimentation from disturbed areas from entering the wetland or its buffer.

15. The applicant shall submit payment to the City of Marysville for park impacts caused by the development in accordance with MMC 22D.020, Parks, Recreation, Open Space and Trail Impact Fees and Mitigation. Park mitigation fees will be based on the fee schedules in effect at the time an individual building permit application is accepted by the City, and will be required to be paid prior to building permit issuance unless deferred until a time preceding final building inspections being granted.

16. The applicant shall submit payment to Lake Stevens School District for school impacts caused by the development in accordance with MMC 22D.040, School Impact Fees and Mitigation. School mitigation fees will be based on the fee schedules in effect at the time an individual building permit application is accepted by the City, and will be required to be paid prior to building permit issuance unless deferred until a time preceding final building inspections being granted.

17. All necessary power lines, telephones wires, television cables, fire alarm systems and other communication wires, cables or shall be placed in underground location either by direct burial or by means of conduit or duct. All such underground installations or systems shall be approved by the appropriate utility company and shall adhere to all governing applicable regulations including, but not limited to, the applicable City and State regulations and specific requirements of the appropriate utility pursuant to MMC 22G.090.710(1).

Prepared by: *Emily* **Reviewed by**: *Chris*

EXHIBITS

The following Exhibits can be accessed electronically via the link provided in the exhibit header below:

PA24-002 – Taylor Lane Subdivision

01) Land Use Application
02) Project Narrative
03) Title Report/Legal Description
04) Critical Area Report
05) Traffic Impact Analysis
06) Geotechnical Report
07) Drainage Report
08) Landscape Plan
09) Plat Map
010) Preliminary Civil Plans
011) EDDS Variance Request – withdrawn
012) Letter of Completeness
013) Request for Review
014) Notice of Application
015) Affidavit of Publication, NOA
016) Technical Review Comments #1
017) Resubmittal Letter
018) Preliminary Civil Plans, Revision 1
019) Critical Area Report, Revision 1
020) Buffer Mitigation Planting Plan
021) Drainage Report, Revision 1
022) Traffic Impact Analysis, Revision 1
023) Technical Review Comments #2
024) Concurrency Recommendation
025) Concurrency Acceptance
026) Resubmittal Letter
027) Preliminary Civils, Revision 2
028) Critical Area Report, Revision 2
029) Buffer Mitigation Planting Plan, Revision 1
030) Notice of Public Hearing
031) Site Plan of Record

Agenda Bill

HEARING EXAMINER AGENDA ITEM REPORT

DATE:	October 30, 2024
SUBMITTED BY:	Marisa Nishmura, Community Development
ITEM TYPE:	Discussion Item
AGENDA SECTION:	Discussion Items
SUBJECT:	Discussion items for PA24-002 (2)
SUGGESTED ACTION:	
SUMMARY:	

ATTACHMENTS:
E033 - Affidavit of Publication - PA24-002.pdf
E034 - Staff Recommendation - PA24-002.pdf

Everett Daily Herald

Affidavit of Publication

State of Washington }
County of Snohomish } ss

Michael Gates being first duly sworn, upon oath deposes and says: that he/she is the legal representative of the Everett Daily Herald a daily newspaper. The said newspaper is a legal newspaper by order of the superior court in the county in which it is published and is now and has been for more than six months prior to the date of the first publication of the Notice hereinafter referred to, published in the English language continually as a daily newspaper in Snohomish County, Washington and is and always has been printed in whole or part in the Everett Daily Herald and is of general circulation in said County, and is a legal newspaper, in accordance with the Chapter 99 of the Laws of 1921, as amended by Chapter 213, Laws of 1941, and approved as a legal newspaper by order of the Superior Court of Snohomish County, State of Washington, by order dated June 16, 1941, and that the annexed is a true copy of EDH1003950 NOPH PA 24-002 as it was published in the regular and entire issue of said paper and not as a supplement form thereof for a period of 1 issue(s), such publication commencing on 10/17/2024 and ending on 10/17/2024 and that said newspaper was regularly distributed to its subscribers during all of said period.

The amount of the fee for such publication is $72.24.

Subscribed and sworn before me on this 17th day of October, 2024.

Randie Pospical

Notary Public in and for the State of Washington.

COMM DEVEL - CITY OF MARYSVILLE | 88522148
MARISA NISHIMURA

RANDIE POSPICAL
Commission Expires 10-20-2027
NOTARY PUBLIC
License Number 23034934
STATE OF WASHINGTON

MARYSVILLE

CITY OF MARYSVILLE
COMMUNITY DEVELOPMENT DEPARTMENT
501 Delta Avenue • Marysville, WA 98270 • (360) 363-8000

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that open record public hearing will be held before the Hearing Examiner on Wednesday, October 30th at 6:00 PM at 501 Delta Avenue, 2nd Floor – Council Chambers for the following proposal:

File Number: PA 24-002
Project Title: Taylor Lane Subdivision
Applicant: Keystone Land, LLC
Project Agent: Tom Abbott, Solid Ground Engineering
8105 166th Ave NE, Redmond, WA 98052
Project Location: 4820 83rd Ave NE
APNs: 00590700013600

Project Description: The applicant is proposing a 13-lot single family residential subdivision; the existing residence is to be retained on proposed lot 9. The project site includes a portion of a Category II wetland and its associated buffer along with geological hazard areas for steep slopes. The applicant has the intent of using buffer width averaging to accommodate portions of the proposed development; compensatory mitigation via buffer addition and enhancement is proposed.

Open Record Public Hearing: The public hearing will take place in person at 501 Delta Avenue, 2nd Floor – Council Chambers and via Zoom/teleconference. The Hearing Examiner and the City's project manager will attend in person; however, other staff, the applicant, and the public may attend either in person or via Zoom.

Zoom Meeting Link:
https://us06web.zoom.us/j/84948999392?pwd=6Rdq7K2rvaQcRQVBPOQETDpaME82wf.1
• Passcode: 555684
• To listen to the meeting without providing public comment:
• Dial in: 1.253.215.8782
• Meeting ID: 838 1746 9833

Document Availability:
http://docs.marysvillewa.gov/htcomnet/public/?folder=7f88ad36

For Project Information: Emily Morgan, Senior Planner - 360.363.8216 or emorgan@marysvillewa.gov
Community Development Department, 501 Delta Ave, Marysville, WA 98270

Published: October 17, 2024. EDH1003950

Proofed by Pospical, Randie, 10/17/2024 08:46:25 am

STAFF RECOMMENDATION

Community Development Department ◆ 501 Delta Avenue ◆ Marysville, WA 98270
Office Hours: Mon - Fri 8:00 AM - 4:30 PM ◆ Phone: (360) 363-8000

PROJECT INFORMATION			
Project Title	Taylor Lane Subdivision	**Date of Report**	October 18, 2024
File Number	PA24-002	**Attachments**	Public Hearing Exhibits (1 - 31)
Administrative Recommendation	Approve the preliminary 13-lot subdivision		

BACKGROUND SUMMARY									
Applicant	Joe Long, Keystone Land, LLC / Tom Abbott, Solid Ground Engineering								
Request	Preliminary Subdivision for the construction of a 13-lot single family residential subdivision								
SEPA Status	Exempt per MMC 22E.030.090								
Site Address	4820 83rd Ave NE			**APN**(s)	00590700013600				
Legal Description (abbreviated)	Tract 136 of Sunnyside Acre Tracts			**Section**	35	**Township**	30	**Range**	05E
Comprehensive Plan	SFH	**Zoning**	R-6.5	**Shoreline Environment**	N/A				
Water Supply	**Current**	**Proposed**		**Sewer Supply**	**Current**	**Proposed**			
	Marysville	Marysville			Marysville	Marysville			

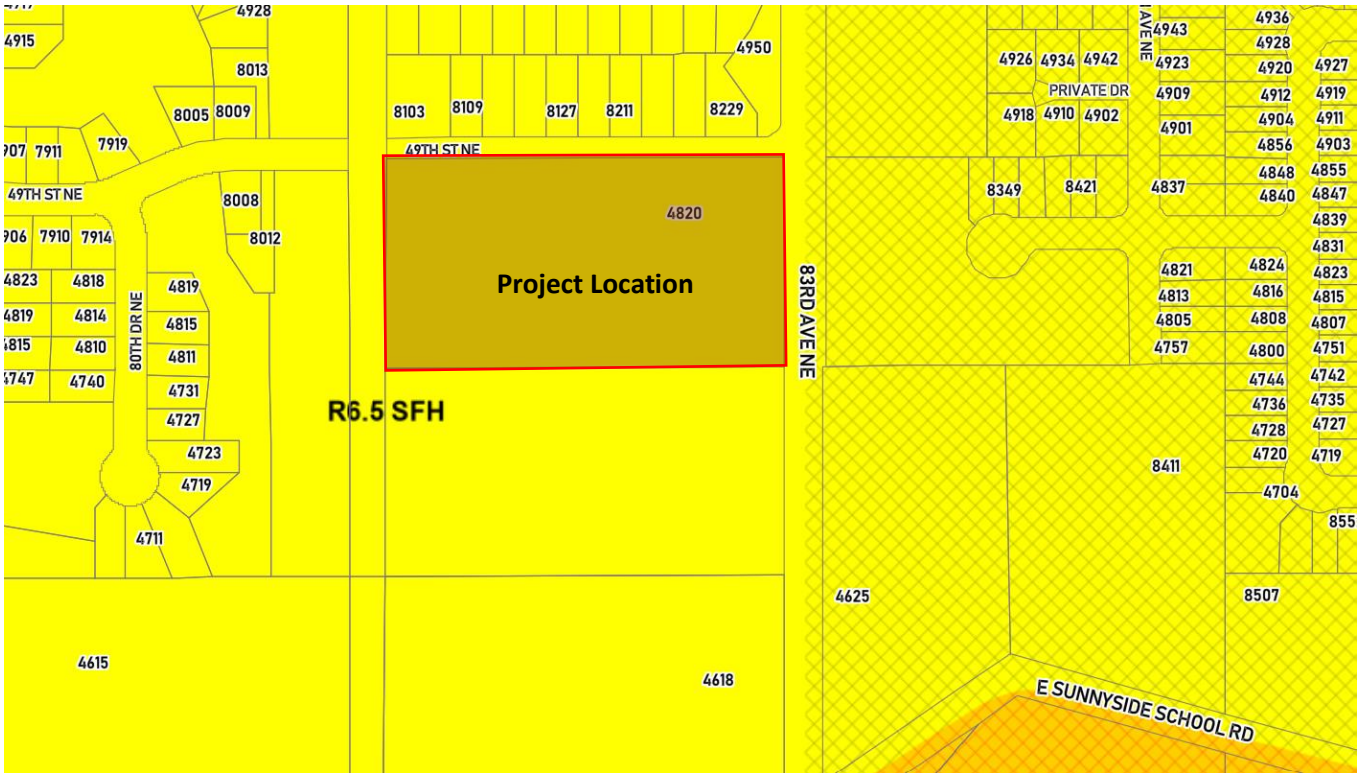
REVIEWING AGENCIES				
Marysville	**Local Agencies**	**State & Federal**	**County**	**Other**
☒ Building ☒ Parks ☐ Police ☒ PW – Dev. Services ☒ PW – Engineering ☒ PW – Operations ☒ PW – Solid Waste ☒ PW – Streets ☒ PW – Traffic Eng. ☒ PW – Water Res. ☒ PW – WWTP	☐ Arlington (city) ☐ Community Transit ☐ Everett (city) ☒ Comcast ☒ Lake Stevens SD ☒ PUD No. 1 ☒ Ziply ☒ Marysville Fire District	☒ US Army Corps of Engineers ☐ BNSF ☒ DAHP ☒ DOE ☒ WDFW ☐ WSDOT ☐ USDFW	☐ Health District ☐ Planning ☐ Public Works - Land Development ☐ Public Works	☐ Olympic Pipeline ☐ Puget Sound Energy ☒ Tulalip Tribes ☒ Stillaguamish Tribe

ACTION				
☐ **Administrative**	☐ **City Council**	☒ **Quasi-Judicial**	☐ **Planning Commission**	
Date of Hearing	October 30, 2024	☐ **Approved**	☐ **Denied**	☐ **Continued**

STAFF			
Name Emily Morgan	**Title** Senior Planner	**Phone** 360.363.8216	**E-mail** emorgan@marysvillewa.gov

SURROUNDING USES			
	Comprehensive Plan	**Zoning**	**Land Use**
North	Single Family High	R-6.5	Single family residential – Harvest Heights
East	WR – Single Family High	WR-R-4-8	Forrester Trails Subdivision
South	Single Family High	R-6.5	Large undeveloped critical area parcel
West	Single Family High	R-6.5	Harvest Hills HOA Common Area / Snohomish County PUD Utility Corridor

VICINITY MAP



- General Commercial
- Downtown Commercial
- Community Business
- Neighborhood Business
- Mixed Use
- 88 - Mixed Use
- General Industrial
- Light Industrial
- R28 Multi-Family High
- R18 Multi-Family Medium
- R12 Multi-Family Low
- R6-18 Multi-Family Low
- R8 Single Family High Small Lot
- R6.5 Single Family High
- R4-8 Single Family High
- R4.5 Single Family Medium
- Public-Institutional
- Recreation
- Open

FINDINGS AND CONCLUSIONS

1. **Description of Proposal.** An application was submitted for a Preliminary Subdivision for the construction of a 13-lot single family residential subdivision. There is an existing residence to be retained on proposed Lot 8.

   1.1. Major subdivisions require a quasi-judicial decision action; therefore, a public hearing is required per MMC 22G.090.

2. **Project Location.** The proposed development is located at 4820 83rd Ave NE and is identified as Assessor's Parcel Number (APN) 0059700013600.

3. **Site Description.** The project site is approximately 4.66 acres in size with the upland portion being relatively level. The site does slope moderately then steeply towards the center of the site, with the southern portion of the site being sloped to a depressional wetland. There is approximately 60 ft. of total elevation change present across the project site. Vegetation within the subject site primarily consists of mature trees, forest undergrowth, landscaping, and some areas overgrown with invasive vegetation.

4. **Project History.** A pre-application request (PreA 23-030) was submitted on June 22, 2023, with comments provided to the applicant, dated July 31, 2023.

5. **Letter of Completeness.** A letter of completeness was issued February 6, 2024 and provided to the applicant in accordance with MMC 22G.010.050.

6. **Public Notice.** Public notice of the development application was provided in accordance with MMC 22G.010.090.

   6.1. The public hearing for the proposed request was advertised in accordance with MMC 22G.010.110, *Notice of public hearing*.

7. **Request for Review.** A Request for Review of the proposed development was sent to the Local, County, State & Federal Agencies and Districts identified on page 1 of this report. The following comments were received; if above-referenced agencies are not listed below, no comments were received:

	Nature of Comment
Public Works, Traffic	• *Requirements and recommendations are addressed in the approved Traffic Concurrency Recommendation, dated September 10, 2024.*
Public Works, Development Services	• *Provided information regarding the required improvements which are to be further reviewed with Civil Plan Review.* • *The project is vested under the 2019 Stormwater Management Manual for Western Washington. Formal drainage review will be conducted during Civil Plan Review.* • *Capital facility fees would be required to be paid prior to issuance of the building permit.*
Marysville Fire District	• *Lots 1, 2, 11, 12, and 13 will require 13D fire sprinklers*

	• *Fire hydrants shall be provided along the new and existing roadways at approved locations, at all intersections and with maximum spacing of 600 ft. apart. The location of fire hydrants requires fire marshal approval on civil construction plans.* • *"NO PARKING - FIRE LANE" signs are required on both sides of all roads that are 26 feet wide or less. The signage shall be identified on the approved Civil Plans.*
Building Department	*Provided requirements for the building permit submittal.*
Snohomish County PUD	• *Snohomish County PUD has adequate system capacity to serve the proposed development, but upgrades may be needed. Securing of easements for the necessary utilities would be required, if applicable.* • *The PUD requires a minimum 14 ft. clearance from any structure to accommodate workers, scaffolding, and ladders. Minimum worker safety clearance from 115kC transmission wires is 20 ft.*
WA Dept. of Ecology	*DOE originally had concerns on the initial proposed layout of the project. The project has been amended to be reduced in scope and no further concerns have been expressed by DOE.*
Public Works, Surface Water	*Provided guidance for stormwater requirements as well as dedication documents for conveying the stormwater facility to the City.*

8. **Public Comments:** The following comments have been received to date and included in Exhibit 016:

   8.1. Will Brandt voiced concerns over the access and safety of added traffic onto 49th St NE.

   Staff finds that as conditioned, these concerns will be mitigated through the widening and improvements to 49th St NE.

9. **State Environmental Policy Act Review.** Pursuant to MMC 22E.030.090, the proposed subdivision is exempt from SEPA Review as it does not exceed the flexible threshold, which allows for up to 30 single-family dwelling units.

10. **Critical Areas.** Based on the revised Critical Area Study and Buffer Mitigation Plan (Exhibit 028), prepared by Wetland Resources, Inc., dated October 1, 2024, the project site contains a Category II wetland and an off-site Type F, fish bearing stream. Per the Geotechnical Engineering Study (Exhibit 006), prepared by Earth Solutions NW, LLC, dated January 20, 2024 along with GIS data, the project site has identified areas of geological hazard for steep slopes. Category II wetlands typically require a 100 ft. protective buffer, however, per MMC 22E.010.100(6)(d), when the minimum buffer for a wetland extends into an area with a slope greater than 25%, the buffer must either be increased by 25% or a required 25 ft. setback from the toe/top of slope must be applied, whichever is greater. Pursuant to MMC 22E.010.030(1), areas that are subject to multiple critical area regulations, the regulations which provide

greater protection to environmentally critical areas shall apply. The protective provisions regulating wetlands per MMC 22E.010.100 would offer the greatest protection and would therefore be applied to the proposed development. Therefore, areas within the proposed development are subject to the more restrictive 25 ft. setback from the top of slope rather than the 100 ft. wetland buffer.

With the development, a portion of the buffer is proposed to be reduced in order to accommodate a stormwater facility. A portion of the stormwater detention facility along with a dispersion trench is proposed to be located within the wetland buffer, outside of the geohazard area. Pursuant to MMC 22E.010.100 (10), *stormwater management facilities, such as biofiltration swales and dispersion facilities, may be located within the outer 25% of wetland buffers only if they will have no negative effect on the functions and purpose the buffers serve for the wetland or on the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated beneficial uses*. As proposed, the stormwater facilities will be positioned within the outer 25% of the 100 ft. wetland buffer. Compensatory mitigation in the form of buffer addition and buffer enhancement is proposed to ensure no net loss of ecological function would occur due to the area of buffer reduction/encroachment to accommodate the proposed stormwater facility.

11. **Access and Circulation.** The main point of access would be through the widening and improvements to 49th St NE. Lots 3 through 9 would access directly from 49th St NE. Lots 1 and 2 would be accessed by a shared access off of 49th St NE which would also service the stormwater facility on Tract 998. Lots 10 and 11 along with Lots 12 and 13 would each be accessed via shared driveways.

12. **Traffic Impacts.** A traffic impact analysis (TIA) was prepared by Kimley Horn, dated January 2024. According to the TIA, the proposed development would generate approximately 123 Average Daily Trips (ADT), 9 AM peak hour trips (AMPHT), and 13 PM peak hour trips (PMPHT).

    The City's Traffic Engineering Manager reviewed the TIA, and issued a written concurrency recommendation dated September 10, 2024 (Exhibit 024), informing the developer of the project's impacts and mitigation obligation pursuant to MMC 22D.030, *Traffic Impact Fees and Mitigation*. Pursuant to MMC 22D.030.070(1)(d), an applicant is required to make a written proposal for mitigation of traffic impacts based on the concurrency recommendation. The applicant accepted the requirements outlined in the traffic concurrency recommendation on September 11, 2024 (Exhibit 025).

13. **Utilities.** Per MMC 14.03.250, utilities are to be extended along the street frontages of the proposed project. Extensions of sewer and water mains as well as a storm drain system for the roadway extension will be required. The following utilities will be provided to the site:

    Storm Drainage: According to the Preliminary Drainage Report, prepared by Solid Ground Engineering, dated August 2024, the project is designed to comply with the Department of Ecology 2019 Stormwater Management Manual for Western Washington. The on-site stormwater would be mitigated via a stormwater detention pond. Stormwater runoff for the site will be treated through a perkfilter cartridge filtration unit. Once treated, the detained runoff will be discharged to the on site wetland area.

    Water: The applicant is proposing to tie into the existing 8-inch ductile iron water main within 49th St to service the proposed lots.

Sewer: The applicant is proposing to tie into the existing 8-inch PVC sewer main within 49th St NE to service the proposed lots.

14. **Park Impacts.** Pursuant to MMC 22D.020, the applicant shall mitigate City of Marysville parks impacts through payment of the park impact fee in effect at the time of building permit application.

15. **School Impacts.** Pursuant to MMC 22D.040, the applicant shall mitigate Lake Stevens School District No. 4 impacts through the payment of the school impact fee in effect at the time of building permit application.

16. **Application Review.** MMC 22G.010.140(3) requires the City to determine whether or not the project is consistent with the following items described in the applicable plans and regulations:

    16.1. *Type of land use permitted at the site, including uses that may be allowed under certain circumstances, such as planned residential development and conditional uses, if the criteria for their approval have been satisfied.*

    Staff Comment: The proposed subdivision is for the creation of single family residential lots. Per MMC 22C.010.060, single family detached units are permitted outright in the R-6.5 zone; therefore, the proposed development would comply with this provision.

    16.2. *Density of residential development in urban growth areas.*

    Staff Comment: The base density allowed in the R-6.5 zone is 6.5 dwelling units per net project acre. The gross site area is approximately 4.66 acres (202,888 sq. ft.).

    Per the site plan of record, the applicant applied a flat deduction of 20% per the definition of "Net Project Area" in MMC 22A.020.150; therefore, the proposed site has a net project area of 3.73 acres (162,310 sq. ft.), which would allow for the construction of 24 single family residences (3.73 acres x 6.5 d.u. per acre).

    16.3. *Availability and adequacy of public facilities identified in the Comprehensive Plan.*

    Staff Comment: The Comprehensive Plan designation for the subject property is High Density Single Family. The proposed development and subsequent use of the property would be consistent with the pertinent development policies outlined in the Marysville Comprehensive Plan and is located within the East Sunnyside Neighborhood Planning Area 4.

    Planning Area 4 demonstrates that adequate water and sewer is available to this development and is located within the Lake Stevens School District.

    The following development policies outlined in the Comprehensive Plan that are specifically pertinent to the overall subdivision request, and were used to establish appropriate conditions, are as follows:

    - **LAND USE ELEMENT – Policies:** LU-3, LU-5, LU-6, LU-20, LU-21, LU-23, LU-28, LU-29, LU-30, LU-31, LU-33, LU-34, LU-38, LU-42
    - **HOUSING ELEMENT – Policies:** HO-18, HO-19, HO-22, HO-25, HO-30, HO-32, HO-37

- **ENVIRONMENTAL ELEMENT – Policies:** EN-20, EN-21, EN-26, EN-27, 28, EN-29, EN-30, EN-32, EN-40, EN-41
- **TRANSPORTATION ELEMENT – Policies:** T-3, T-7, T-8, T-25, T-26, T-27, T-29, T-30, T-40, T-41, T-46, T-47, T-48
- **UTILITIES ELEMENT – Policies**: UT-1, UT-3, UT-8, UT-9, UT-10, UT-14
- **PUBLIC FACILITIES & SERVICES ELEMENT – Policies:**
  - **Police, Fire, Library:** PS-1, PS-10, PS-11
  - **Schools:** SC-6
  - **Water, Sewer, Storm Drainage, Solid Waste:** PF-1, PF-2, PF-7, PF-9, PF-10, PF-19, PF-20, PF-23, PF-26, PF-28

Staff finds that the proposed development, as conditioned, is consistent with the City of Marysville Comprehensive Plan.

16.4. *Development Standards*

Staff Comment: The project site is currently zoned R-6.5. The R-6.5 zone allows single-family residences at base density of 6.5 dwelling units per acre.

Due to the presence of critical areas, the applicant is utilizing MMC 22E.010.360 which allows the transfer of density attributable to the critical area and associated buffer to another noncritical portion of the same site. The bulk and dimensional standards of the next highest zoning may be utilized to accommodate the transfer of density; therefore, the project site may be designed to meet the dimensional standards of the R-8 zone as outlined in MMC 22C.010.080.

The proposed development and subsequent use of the property would comply with the intent of the R-6.5 and R-8 zone, and as conditioned herein, complies with all of the applicable design and development standards outlined in Title 22, *Unified Development Code*.

As conditioned, the proposed development makes appropriate provisions for the public use and interest, health, safety and general welfare.

17. **Hearing Examiner – Required Findings.** MMC 22G.010.170(3) requires that the Hearing Examiner not approve a proposed development without first making the following findings and conclusions:

17.1. *The development is consistent with the comprehensive plan and meets the requirements and intent of the Marysville Municipal Code.*

Staff Comment: The Comprehensive Plan designation for the subject property is High Density Single Family. The proposed development and subsequent use of the property would be consistent with the pertinent development policies outlined in the Marysville Comprehensive Plan and the intent of the Marysville Municipal Code, as conditioned herein.

17.2. *The development makes adequate provisions for open space, environmentally sensitive areas, drainage, streets and other public ways, transit stops, water supply,*

sanitary wastes, public utilities and infrastructure, parks and recreation facilities, playgrounds, sites for schools and school grounds.

Staff Comment: Based on a review of the preliminary plat map and application materials, the development makes adequate provisions for open space, environmentally sensitive areas, drainage, streets and other public ways, transit stops, water supply, sanitary wastes, public utilities and infrastructure, parks and recreation facilities, playgrounds, sites for schools and school grounds.

17.3. *The development is beneficial to the public health, safety and welfare and is in the public interest*.

Staff Comment: Per Finding 15, the proposed subdivision would be beneficial to the public health, safety and welfare and would be in the public interest as the subdivision has been designed in accordance with applicable Marysville Municipal Code requirements.

17.4. *The development does not lower the level of service of transportation and/or neighborhood park facilities below the minimum standards established within the comprehensive plan. If the development results in a level of service lower than those set forth in the comprehensive plan, the development may be approved if improvements or strategies to raise the level of service above the minimum standard are made concurrent with the development. For the purpose of this section, "concurrent with the development" is defined as the required improvements or strategies in place at the time of occupancy, or a financial commitment is in place to complete the improvements or strategies within six years of approval of the development*.

Staff Comment: As conditioned, the development would not lower the level of service of transportation and/or neighborhood park facilities below the minimum standards established within the comprehensive plan.

17.5. *The area, location and features of land proposed for dedication are a direct result of the development proposal, are reasonably needed to mitigate the effects of the development, and are proportional to the impacts created by the development*.

Staff Comment: As conditioned, the area, location and features of land proposed for dedication are a direct result of the development proposal, are reasonably needed to mitigate the effects of the development, and are proportional to the impacts created by the development.

18. **Preliminary Subdivision Review, Public Hearing – Elements Considered.** MMC 22G.090.130 requires the hearing examiner provide a basis for approval or disapproval of a proposed subdivision, as follows:

18.1. ***Public Use and Interest.*** *Evaluation of the proposed subdivision to determine whether the public use and interest are served by permitting the proposed subdivision*.

Staff Comment: After evaluation of the application materials and other supporting documentation available to the City, staff concludes that, as conditioned, the public use and interest are served by the proposed subdivision.

18.2. ***Public Health, Safety and General Welfare***. *Evaluation of the proposed subdivision to determine whether the public health, safety and general welfare have been served*.

Staff Comment: After evaluation of the application materials and other supporting documentation available to the City, staff concludes that, as conditioned, the public health, safety and general welfare have been served and that the subdivision is consistent with the requirements of RCW 58.17.110.

18.3. ***Comprehensive Plan.*** *Evaluation of all elements of the comprehensive plan and its consistency with the proposed subdivision*.

Staff Comment: The proposed subdivision and development of the parcel relate to all elements of the Comprehensive Plan. Compliance with the various elements of the Comprehensive Plan is specifically demonstrated in Finding 15.3.

18.4. ***Existing Zoning***. *Evaluation of existing zoning and its compliance with the proposed subdivision and MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The existing zoning and its compliance with the proposed subdivision and Article V of this chapter, Land Division Requirements has been evaluated. Compliance with specific zoning regulations is demonstrated in Finding 15.2.

18.5. ***Natural Environment.*** *Evaluation of the impacts and provision for mitigation of all impacts on all elements of the natural environment including topography, vegetation, soils, geology and all environmental issues as defined in the State Environmental Policy Act, Chapter 197-11 WAC, and MMC 22G.090, Article V , Land Division Requirements*.

Staff Comment: The project site is not subject to environmental review via the SEPA review process pursuant to MMC 22E.030.090(1)(a) and WAC 197-11-800(6); therefore, this provision would not apply.

However, staff reviewed impacts on all elements of the natural environment including topography, vegetation, soils, geology, and all environmental issues, and determined compliance with MMC 22G.090, Article V, Land Division Requirements, as conditioned herein.

Drainage. *Evaluation of all drainage impacts and provisions made for mitigation of all drainage impacts as defined in the city's drainage codes, and MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: All drainage impacts have been evaluated, and adequate provisions have been made to mitigate for all drainage impacts as defined in the City's drainage codes, and MMC 22G.090, Article V, Land Division Requirements.

18.6. ***Open Space.*** *Evaluation of all impacts and provision for open space as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: As a condition of final plat, the applicant must submit copies of restrictions and covenants for the maintenance of the common open space areas pursuant to MMC 22G.090.240.

Further, no division or redivision of land shall be approved unless appropriate provisions are made for, but not limited to, the public health, safety and general welfare, relating to open space, drainage ways, streets, alleys, other public ways, water supplies, sanitary wastes, parks, school facilities and other standards as may be required by this title.

18.7. ***Public Systems Capacity***. *Evaluation of all impacts and provisions made for mitigation of impacts on public systems including parks, schools, and community facilities as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The applicant is required to pay mitigation fees for each new dwelling unit in accordance with MMC 22D.020 and 22D.040 in order to mitigate potential impacts on parks, schools, and community facilities.

18.8. ***Public Services***. *Evaluation of all impacts and provisions made for mitigation of impacts on public services including streets, all public utilities, and fire and police protection as defined in MMC 22G.090, Article V, Land Division Requirements*.

Staff Comment: The proposed subdivision would construct streets providing appropriate access and circulation to all proposed new lots. Public utilities are to be extended to serve all new units in accordance with City standards. Appropriate improvements for fire safety in accordance with the city's fire code would be provided. Capital improvement fees are required to be collected for water, sewer, and stormwater.

18.9. ***Floodplain.*** *Identification of subdivisions proposed in the floodplain and compliance with requirements of this chapter and MMC 22E.020, Floodplain Management*.

Staff Comment: The project is not located within an identified floodplain; therefore, this provision would not apply.

RECOMMENDATION

Based on the foregoing findings and conclusions, review of the application materials and other supporting documentation available to the Community Development Department, and the City's regulatory authority to implement the policies, standards, and regulations of the Marysville Comprehensive Plan and Marysville Municipal Code, the Community Development Department respectfully recommends that the Hearing Examiner ***APPROVE*** the proposed Preliminary Plat, subject to the following conditions:

1. The preliminary subdivision configuration (Exhibit 031) shall be the approved plat configuration. The final subdivision shall be processed in strict compliance with the provisions of Article III Final Subdivision Review and Article V Land Division Requirements of MMC 22G.090.
2. The final subdivision shall be approved and recorded within 5 years of the date of preliminary approval. A 2-year extension may be granted in accordance with MMC 22G.090.170.
3. Prior to final subdivision approval, the applicant shall submit to the City for its approval, covenants, deed restrictions, homeowners' association bylaws, and other documents providing for preservation and maintenance of all common open space, parking areas,

walkways, landscaping, signs, lights, roads, and community facilities consistent with MMC 22G.090.240. All common areas and facilities shall be continuously maintained at a minimum standard at least equal to that required by the City, and shall be approved by the City at the time of initial occupancy. Said restrictive covenants shall also include provisions to address parking enforcement and a statement from a private attorney as to the adequacy of the covenants to fulfill the requirement of the subdivision.

4. Residential fire sprinklers shall be required for Lots 1, 2, 10, 11, 12 and 13, unless adequate alternative provisions are reviewed and approved by the Marysville Fire Marshal.

5. Lots 10 through 13 shall be oriented with the front façade facing toward 83rd Ave NE.

6. Pursuant to MMC 22C.010.090(13), the proposed development shall utilize the bulk and dimensional standards of the R-8 zone. Compliance with this provision shall be demonstrated at time of building permit submittal.

7. A final landscape plan shall be required to be approved, prior to civil construction plan approval, and designed to comply with the applicable provisions outlined in MMC 22C.120, *Landscaping and Screening* and MMC 22G.090.570

   7.1. All required landscaping shall be bonded prior to final plat approval per MMC 22C.120.060.

8. Prior to civil plan approval, the applicant shall demonstrate compliance with the off-street parking standards and requirements of MMC 22C.130.030, *Table 1: Minimum Required Parking Spaces*.

9. Pursuant to MMC 22D.030.070(6)(a)(ii), the traffic concurrency determination and the project's impacts and mitigation obligations shall expire upon expiration of the subdivision. The project is subject to the traffic mitigation obligations as required by the Traffic Concurrency Recommendation (Exhibit 024), dated September 10, 2024.

10. All ground disturbing activities shall be in strict compliance with the approved site plan and as outlined in the approved Critical Area Study and Buffer Mitigation Plan, prepared by Wetland Resources, Inc, dated October 1, 2024 (Exhibit 028), or as amended and approved by Community Development.

11. Prior to recording of the final plat, all mitigation measures as proposed in the approved Buffer Mitigation Plan, shall be implemented with final approval by Community Development. Security for performance and/ or maintenance of the required mitigation and monitoring shall be in strict compliance with MMC 22E.010.160.

12. The onsite wetland and buffer area that will be retained must be placed in a separate Native Growth Protection Area (NGPA) tract. The boundary of the tract shall be delineated by the installation of City approved fencing and signage.

13. Prior to issuing any ground disturbing activity permits, the applicant is required to obtain all necessary permits and approvals from Federal, State and local agencies for the proposed critical areas impacts.

14. Prior to any ground disturbing activities, all wetland buffer areas shall be temporarily fenced between the construction activity and the buffer area with highly visible and durable protective barrier(s). Said barriers shall be retained during construction to prevent access and sedimentation from disturbed areas from entering the wetland or its buffer.

15. The applicant shall submit payment to the City of Marysville for park impacts caused by the development in accordance with MMC 22D.020, Parks, Recreation, Open Space and Trail Impact Fees and Mitigation. Park mitigation fees will be based on the fee schedules in effect at the time an individual building permit application is accepted by the City, and will be required to be paid prior to building permit issuance unless deferred until a time preceding final building inspections being granted.

16. The applicant shall submit payment to Lake Stevens School District for school impacts caused by the development in accordance with MMC 22D.040, School Impact Fees and Mitigation. School mitigation fees will be based on the fee schedules in effect at the time an individual building permit application is accepted by the City, and will be required to be paid prior to building permit issuance unless deferred until a time preceding final building inspections being granted.

17. All necessary power lines, telephones wires, television cables, fire alarm systems and other communication wires, cables or shall be placed in underground location either by direct burial or by means of conduit or duct. All such underground installations or systems shall be approved by the appropriate utility company and shall adhere to all governing applicable regulations including, but not limited to, the applicable City and State regulations and specific requirements of the appropriate utility pursuant to MMC 22G.090.710(1).

18. Credit for impact fees shall be given to compensate for the existing single family residence to be retained during development. Therefore, impact fee credits shall be given to proposed Lot 1.

Prepared by: *Emily* **Reviewed by:** *Chris*

EXHIBITS

The following Exhibits can be accessed electronically via the link provided in the exhibit header below:

PA24-002 – Taylor Lane Subdivision

01) Land Use Application
02) Project Narrative
03) Title Report/Legal Description
04) Critical Area Report
05) Traffic Impact Analysis
06) Geotechnical Report
07) Drainage Report
08) Landscape Plan
09) Plat Map
010) Preliminary Civil Plans
011) EDDS Variance Request – withdrawn
012) Letter of Completeness
013) Request for Review
014) Notice of Application
015) Affidavit of Publication, NOA
016) Technical Review Comments #1
017) Resubmittal Letter
018) Preliminary Civil Plans, Revision 1
019) Critical Area Report, Revision 1
020) Buffer Mitigation Planting Plan
021) Drainage Report, Revision 1
022) Traffic Impact Analysis, Revision 1
023) Technical Review Comments #2
024) Concurrency Recommendation
025) Concurrency Acceptance
026) Resubmittal Letter
027) Preliminary Civils, Revision 2
028) Critical Area Report, Revision 2
029) Buffer Mitigation Planting Plan, Revision 1
030) Notice of Public Hearing
031) Site Plan of Record