



# CITY OF MUKILTEO

## REQUEST FOR COMMENTS

DATE: August 9, 2019

	Alderwood Water District – (Dan Sheil / Scott Smith)	X	Puget Sound Clean Air Agency (SEPA Email / Air Resource Specialist)
	Burlington Northern Santa Fe Railway (Marvinique Hill)	X	Puget Sound Energy (Dom Amor)
	City of Edmonds (Rob Chave)	X	Puget Sound Regional Council
X	City of Everett (Allan Giffen)		Seattle Dist. Corps of Engineers (Dept. Army-Reg. Branch)
X	City of Everett (Steve Ingalsbe)		Snohomish Co. Airport/Paine Field (A. Rardin/R. Zulauf)
	City of Lynnwood (Todd Hall)		Snohomish Co. Assessor's Office ( <i>Ordinances Only</i> )
	City of Mill Creek (Tom Rogers)		Snohomish Co. Conservation District
X	City of Mukilteo (Building Official)		Snohomish Co. PW/ Environmental (Shannon Flemming)
X	City of Mukilteo (Fire Chief)		Snohomish Co. Marine Res. Comm. (Kathleen Herrmann)
X	City of Mukilteo (Fire Marshal)	X	Snohomish Co. Planning & Dev. Svc. (Ryan Countryman)
X	City of Mukilteo (Engineering)	X	Snohomish Co. PUD: Dist. Eng. Services (Mary Wicklund)
X	City of Mukilteo (Com. Dev. Dir.)(Postcard/Notice only)		Snohomish Health District (Bruce A. Straughn)
X	City of Mukilteo ( Police, Cheol Kang, Myron Travis)		Sound Transit Authority (Perry Weinberg)
X	Comcast of Washington (Casey Brown, John Warrick)		South Snohomish Co. Fire Dist. (Kevin Zweber)
X	Community Transit (Kate Tourtellot)	X	Tulalip Tribes – (Zachary Lamebull)
	Dept. of Commerce (Growth Mgmt. Svcs Rev. Team)	X	Tulalip Tribes – (Richard Young)
	Dept. of Natural Resources (James Taylor)	X	United States Postal Service (Soon H. Kim)
	FAA/Air Traffic Division, ANM-0520 (Daniel Shoemaker)	X	Verizon Company of the NW, Inc. (Tim Rennick.)
	FEMA (John Graves)	X	Washington Dept. of Ecology (Peg Plummer)
	Island County MRC (Rex Porter) ( <i>Shoreline Only</i> )	X	Washington Dept of Fish & Wildlife (Jamie Bails)
	Master Builders King/Sno. Counties (Mike Pattison)	X	WSDOT (Scott Rodman)
X	Mukilteo Beacon (Editor) ( <i>Postcard/Notice only</i> )		WSDOT (Ramin Pazooki)
X	Mukilteo School District (Cindy Steigerwald)		WSDOT Ferries(Kevin Bartoy) ( <i>Shoreline Only</i> )
X	Mukilteo School District (Josette Fisher)	X	WRIA 7 Water Resources
X	Mukilteo Tribune (Editor) ( <i>Postcard/Notice only</i> )	X	Adjacent Property Owners
X	Mukilteo Water & Wastewater District (Jim Voetberg, Manager; Rick Matthews; Kendra Chapman)	X	Applicant/Contact Person ( <i>Notice Only</i> )
X	National Marine Fishery Service	X	Parties of Interest
X	Office of Archaeology & Historic Pres. (Allyson Brooks)		Parties of Record
	Ogden, Murphy, Wallace (Daniel Kenny) ( <i>Ordinances Only</i> )	X	Property Owners within 300' ( <i>Postcard/Notice Only</i> )
	Pilchuck Audubon Society (President)		Other:
	Port of Everett (Laura Gurley)		

FILE NO.: SP-2019-001

PROPOSER: Larry Throndsen

PROPOSAL NAME: Loney 2-Lot Short Plat

PROPOSAL DESCRIPTION: This is a proposal to subdivide 0.45 acres into two (2) lots on property zoned RD7.5 with associated grading, wetland buffer enhancement and drainage improvements.



FILE NO.: SP-2019-001

PROPONENT: Larry Throndsen

PROPOSAL NAME: Loney 2-Lot Short Plat

ATTACHED IS:

X	Notice of Application	X	Plat Map (Reduced)
X	Location Map	X	Site Plan (Reduced)
X	Application	X	Environmental Checklist
X	Geotechnical Engineering Evaluation – Revised prepared by Nelson Geotechnical Associates, Inc. dated December 2, 2016	X	Drainage Report for Loney 2-Lot Short Plat prepared by J.C. McDonnell Engineering, P.C. dated May 31, 2019
X	Critical Areas Study and Buffer Enhancement Plan prepared by Wetland Resources dated October 17, 2018		

NOTE: \_\_\_\_\_

\*\*\*\*\*

Please review this project as it relates to your area of concern and return your comments with this cover sheet by, Friday, August 23, 2019 to Linda Ritter, Senior Planner, City of Mukilteo, 11930 Cyrus Way, Mukilteo, WA 98275.

  
Linda Ritter  
Senior Planner

8/7/19  
Date

\*\*\*\*\*

RESPONSE SECTION:

☐ Comments Attached

☐ No Comments

COMMENTS: \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Company

**DO YOU WANT A COPY OF OUR NOTICE OF DECISION**

**YES** ☐ **NO** ☐





11930 Cyrus Way  
Mukilteo, WA 98275  
(425) 263-8000

## Notice of Application and Optional SEPA Notice

**Loney 2-Lot Short Plat**  
**SP 2019-001**  
1603 Debreton Lane

**Larry Throndsen** applied for a 2-lot Short Plat with the City of Mukilteo on June 18, 2019. The application became complete on July 25, 2019.

**Description of Proposal:** This is a proposal to subdivide 0.45 acres into two (2) lots on property zoned RD7.5 with associated grading, wetland buffer enhancement and drainage improvements.

**Location of Proposal:** 1603 Debreton Lane

### **Optional DNS Process to be Used:**

The City's State Environmental Policy Act (SEPA) responsible official has a reasonable basis for determining that significant adverse impacts are unlikely and/or can be mitigated, and expects to issue a Mitigated Determination of Non-Significance (MDNS) pursuant to the optional DNS process under Washington Administrative Code 197-11-355 and Mukilteo Municipal Code (MMC) 17.84.105. **This may be the only opportunity to comment on the environmental impacts of the proposal.** Project approval may include mitigation measures under MMC Chapter 13.12 – Drainage Management and MMC Chapter 17.52 – Critical Areas Regulations, 17.52B – Wetland Regulations and 17.52C - Fish and Wildlife Habitat Conservation Areas (Outside Shoreline Jurisdiction). Also, the project review process may incorporate or require mitigation measures regardless of whether an Environmental Impact Statement is prepared. A copy of the subsequent threshold determination for the proposal may be obtained upon request.

### **Environmental Documents Prepared for the Proposal:**

- Environmental Checklist prepared by Larry Throndsen dated June 25, 2019
- Critical Areas Study and Buffer Enhancement Plan prepared by Wetland Resources dated October 17, 2018
- Geotechnical Engineering Evaluation – Revised prepared by Nelson Geotechnical Associates, Inc. dated December 2, 2016
- Drainage Report for Loney 2-Lot Short Plat prepared by J.C. McDonnell Engineering, P.C. dated May 31, 2019

### **List of Required Permits:**

- Engineering
- Preliminary Short Plat Approval
- Any applicable State and Federal Permits



## Applicable Policies and Requirements

The project will be reviewed for consistency with the following policies, standards and regulations:

- |   |  |
|---|--|
| <input type="checkbox"/> Possession Shores Master Plan                        | <input type="checkbox"/> Sector Plan & Amendments                          |
| <input checked="" type="checkbox"/> Comprehensive Plan, Shoreline Master Plan | <input checked="" type="checkbox"/> Mukilteo Municipal Code                |
| <input type="checkbox"/> International Building Code (2015 Edition)           | <input checked="" type="checkbox"/> City of Mukilteo Development Standards |
| <input type="checkbox"/> International Fire Code (2015 Edition)               |  |

## Mitigation Measures Being Considered

Measures being considered to mitigate environmental impacts if an MDNS is issued include:

1. The applicant shall comply with the Critical Areas Study and Buffer Enhancement Plan prepared by Wetland Resources dated October 17, 2018, for any permanent or temporary impacts to the wetland and its associated buffer, unless the mitigation plan is otherwise subsequently modified and approved by all applicable regulatory agencies.
2. Mitigation plantings shall be installed in accordance with the approved Mitigation Plan, and shall be subject the following:
  - a. The mitigation and/or buffer enhancement site(s) shall be monitored for a minimum of five (5) years. The monitoring period required by the City may be extended an additional two (2) years if the wetland or stream buffer is not performing as expected by the mitigation or enhancement plan. The monitoring reports shall be submitted on August 1st of each year during the monitoring period. Monitoring reports shall follow the recommendations contained in the Department of Ecology's publication "Guidance on Wetland Mitigation in Washington State," Part Two.
  - b. The applicant shall be responsible for ensuring that the reports are prepared, submitted, and any corrections are made as required by the reports or the City.
  - c. Prior to issuance of an engineering permit, all plantings associated with a project permit shall require the submittal of an acceptable maintenance agreement to warrant all required plantings against defects in labor and materials for a period of five (5) years after acceptance of those improvements by the City.
  - d. All plantings shall be maintained in healthy growing condition. A final inspection will be performed at the end of the five-(5) year period and any dead, dying or diseased plant material shall be replaced prior to release from the agreement.
3. Minor modifications of the mitigation plans submitted may be approved by the Community Development Director if the modifications do not change the findings of fact or the conditions of approval.
4. A geotechnical addendum shall be prepared for the single-family residential lot with the submittal of a building permit application addressing soil characteristics, underlying geology, conclusions and recommendations for grading procedures, analysis of the overall slope stability, seismic stability in both dry and saturated conditions, a description of the hydrology of the lot, and recommendations and mitigation conditions regarding the lot. All development shall proceed in accordance with the recommendation of the report. A note to this effect shall be placed on the face of the Final Plat.
5. Noise from construction activity that is audible beyond the property lines of the project site shall not be allowed between the hours of six (6) p.m. to seven (7) a.m. on weekdays, six (6) p.m. to nine (9) a.m. on Saturdays and all day on Sundays and holidays.
6. Construction, grading, and associated site development shall follow recommendations presented in approved stormwater report prepared for the Loney 2-Lot Short Plat.



7. The applicant shall comply with all other applicable codes, regulations and requirements.

### **Comment Period**

This application and all supporting documents are available for public review at Mukilteo City Hall, 11930 Cyrus Way, Mukilteo WA 98275. (File No. PPR-2019-004). The public is invited to submit written comments on the project to the Community Development Department at the above address **by 4:30 PM on Friday, August 23, 2019.**

The City will not act on this application until the end of the 14-day public comment period. Upon completion of project review, the proposed application will be administratively approved, approved with conditions, or denied. You may request a copy of the final decision on the project by making a written request to the City contact person named below.

### **Public Hearing**

There will not be a public hearing conducted on this project.

### **Appeals**

The final decision on this project is administratively appealable. An appeal must be filed within 14 days after the final decision on the project is issued. Only parties of record may initiate an administrative appeal of a land use development permit application. Parties of record include the applicant, any person who testified at the open record hearing on the application (if a public hearing was held), and/or any person who submitted written comments concerning the application (excluding persons who have only signed petitions or mechanically produced form letters).

**Staff Contact:** Linda Ritter, Senior Planner

(425) 263-8043

Email: [lritter@mukilteowa.gov](mailto:lritter@mukilteowa.gov)

Signature:   
Linda Ritter, Senior Planner

Date: 8/7/19





**Date Issued:** Friday, August 9, 2019  
**Date Advertised:** Friday, August 9, 2019  
**End Comment Period:** Friday, August 23, 2019

pc:	Applicant/Representative	CDD Director	
	Reviewing Agencies	Permit Services Personnel	Property Owners (300')
	Interested Parties	Project File	

O:\Dev Review\2019\SHORT PLAT\SP-2019-001 1603 Debron Lane\Noticing\NOA\Loney SP NOA.docx





City of Mukilteo  
Land Use Permit Application

11930 Cyrus Way  
Mukilteo, WA 98275  
(425) 263-8000  
www.mukilteowa.gov

RECEIVED

Sp-2019-001

JUN 18 2019

GENERAL INFORMATION

CITY OF MUKILTEO

ADDRESS/LOCATION: 1603 Debreton Lane PARCEL NO: 28040300200200

DESCRIPTION OF WORK: 2 lot Subdivision

COMP PLAN DESIGNATION: SF Residential High Density ZONING: RD 7.5 SFIR

DATE OF PREAPPLICATION MEETING (if held): \_\_\_\_\_

APPLICANT INFORMATION

NAME: Larry Thronelsen PHONE: 425.478.4814 EMAIL: LThronelsen@MSN.COM

ADDRESS: 22630-88th Ave W CITY: Edmonds STATE: WA ZIP: 98026

PROPERTY OWNER INFORMATION ☐ Same as Above

NAME: David & Joan Lowery PHONE: 425.478.4814 EMAIL: LThronelsen@MSN.COM

ADDRESS: 12661 W San Juan Ct CITY: Litchfield Park STATE: AZ ZIP: \_\_\_\_\_

CONTACT INFORMATION ☐ Same as Above

NAME: Larry Thronelsen PHONE: 425.478.4814 EMAIL: LThronelsen@MSN.COM

ADDRESS: 22630-88th Ave W CITY: Edmonds STATE: WA ZIP: 98026

Project Type (check all that apply):

- |   |   |
|---|---|
| <input type="checkbox"/> Accessory Dwelling Unit*     | <input type="checkbox"/> Reasonable Use*          |
| <input type="checkbox"/> Binding Site Plan            | <input type="checkbox"/> Rezone*                  |
| <input type="checkbox"/> Comprehensive Plan Amendment | <input type="checkbox"/> Shoreline:               |
| <input type="checkbox"/> Conditional Use*             | <input type="checkbox"/> Conditional Use*         |
| <input type="checkbox"/> Lot Line Adjustment*         | <input type="checkbox"/> Exemption                |
|   | <input type="checkbox"/> Substantial Development* |
|   | <input type="checkbox"/> Variance*                |

- ☐ Special Use\*
- ☒ Subdivision\*:
- ☒ Preliminary Short
- ☐ Preliminary Long
- ☐ Final Short
- ☐ Final Long
- ☐ Amendment

\*Supplemental Application Required

- ☐ Variance\*
- ☐ Wireless Communication Facility
- ☐ Other: \_\_\_\_\_
- ☐ SEPA

SIGNATURE:

I/We certify that the information provided in this application, including all submittals and attachments, is true and correct under penalty of perjury by the laws of the State of Washington.

Applicant / Authorized Agent Signature Larry Thronelsen

Date

June 6, 2019

Owner Signature (required)

Date

6/06/19





CITY OF  
**MUKILTEO**

11930 Cyrus Way - Mukilteo, WA 98275

RECEIVED  
JUN 18 2010  
CITY OF MUKILTEO

## Supplemental Application Form

- ☐ Formal Subdivision      ☒ Short Subdivision      ☐ Cottage Development  
☐ Lot Line Adjustment      ☐ Binding Site Plan

1. Name of Project: Lowey Short Subdivision
2. Applicant is:      ☐ Owner      ☒ Authorized Agent for Owner  
Name: Larry Thronsdorn  
Address: 22630 - 88<sup>th</sup> Ave. W. Edmonds WA 98026  
Phone: 425.478.4814
3. Licensed Land Surveyor: PACIFIC GEOMATIC SERVICES  
Address: 6608 - 216<sup>th</sup> St. S.W. Suite 304, Mountlake Terr. WA 98043  
Phone: 425 - 778 - 5620  
License Number: 3597
4. Legal Description of Subdivision (may be attached): attached
5. Assessor's Tax Number of all property involved in the application:  
28040300200200
6. Existing Zoning: RD 7.5 SFR Number of Acres: 0.45 AC
7. Lots per Acre: 4.59 Approx. Size of Lots in Acres: 0.195
8. Number of Proposed Lots/Units: 1
9. Current Use of Property: VACANT



10. Amount of fill and/or excavation expected for the completed project:

CUT 205 FILL 60 (SEPA review may be required as part of the project's review for fill and excavation exceeding exempt levels.)

11. Dedications to Public:

A. Streets in lineal feet: N/A In Acres: \_\_\_\_\_

B. Parks in Acres: N/A

C. Waterfront Access in lineal feet: N/A

D. Other: N/A

12. Show method of handling utilities:

A. Check one: Public Water ☒ Other \_\_\_\_\_

B. Check one: Public Sewer ☒ Other \_\_\_\_\_

13. Describe the methodology used in the design of the stormwater detention / water quality system proposed for the development:

SITE IS less than 5000 SF New/REPLACED. DETENTION NOT REQD

LID NOT FEASIBLE EXCEPT PERVIOUS PAVEMENT.

Describe the type and size of the stormwater facility used in the proposed development:

PERVIOUS PAVEMENT DRIVEWAY + PIPE CONVEYANCE TO EXISTING

DOWNSTREAM STORM DRAIN.



This project is submitted to the City of Mukilteo for the purpose of obtaining its approval in accordance with the Laws of the State of Washington, Chapter 271, extraordinary session of the 1969 Legislature, and Ordinance No. 350 of the City of Mukilteo.

The information given is said to be true under the penalty of perjury by the Laws of the State of Washington.

Signatures: Owner\* David Voney Date 06/18/2019  
Owner\* Joan Loney Date 06/18/2019  
Agent for Owner LARRY O. THOMPSON Date 06/18/2019  
Engineer/Surveyor J. McDonnell Date 6/18/2019  
License Number WA 21137

Stamp - Land Surveyor or Civil Engineer:



\* NOTE: If legal owner is a corporation or partnership, proof of ability to sign for the corporation or partnership shall be submitted to the City of Mukilteo with this application.



## LEGAL DESCRIPTION:

(PER CHICAGO TITLE INSURANCE COMPANY GUARANTEE NO. 500041199, DATED APRIL 27, 2016 AT 08:00 AM)

THAT PORTION OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID GOVERNMENT LOT 3;  
THENCE EASTERLY ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR A DISTANCE OF 569.59 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 412.8 FEET;  
THENCE SOUTH 62°05'10" WEST A DISTANCE OF 35.0 FEET TO THE MOST EASTERLY CORNER OF TRACT DEEDED TO ELLIOT F. BROWN, JULY 18, 1957;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 40.00 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 90 FEET TO THE TRUE POINT OF BEGINNING OR THIS DESCRIPTION;  
THENCE CONTINUE SOUTH 32°10'50" EAST FOR A DISTANCE OF 100 FEET;  
THENCE NORTH 62°05'10" EAST FOR 190.0 FEET;  
THENCE NORTH 32°10'50" FOR A DISTANCE OF 100 FEET;  
THENCE SOUTH 62°10'10" WEST FOR A DISTANCE OF 190 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;

TOGETHER WITH A NON-EXCLUSIVE EASEMENT FOR INGRESS AND EGRESS AND FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH AND UPON THE FOLLOWING DESCRIBED PROPERTY:

A 50.00 FOOT WIDE STRIP OF LAND BEING 25.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE:  
BEGINNING AT THE NORTHWEST CORNER OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.;  
THENCE NORTH 89°06'20" EAST ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR 569.59 FEET;  
THENCE SOUTH 32°57'42" EAST 412.80 FEET;  
THENCE SOUTH 61°18'18" WEST FOR 35.00 FEET;  
THENCE SOUTH 32°57'42" EAST FOR 40.00 FEET;  
THENCE NORTH 61°18'18" EAST FOR 225.55 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;  
THENCE SOUTH 50°52'33" EAST FOR 132.04 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 100.00 FEET A CENTRAL ANGLE OF 67°51'10" FOR AN ARC LENGTH OF 118.42 FEET;  
THENCE SOUTH 16°58'37" WEST FOR 81.37 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 50.00 FEET A CENTRAL ANGLE OF 90°48'50" FOR AN ARC LENGTH OF 71.25 FEET;  
THENCE NORTH 72°12'33" WEST FOR 134.58 FEET TO THE TERMINUS OF THIS CENTERLINE DESCRIPTION.

TOGETHER WITH A PERPETUAL, NON-EXCLUSIVE EASEMENT FOR INGRESS, EGRESS FOR PEDESTRIAN AND MOTOR VEHICLE USE (A DRIVEWAY) AND FOR INSTALLATION, OPERATION, AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH, AND UPON THE FOLLOWING DESCRIBED PROPERTY, AS DISCLOSED IN DECLARATION OF EASEMENT RECORDING NO. 201407180273:

A STRIP OF LAND 20 00 FEET IN WIDTH, BEING 10.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE, LOCATED IN GOVERNMENT LOT 3, IN THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.:

COMMENCING AT THE MOST NORTHEASTERLY CORNER OF TRACT F, CITY OF MUKILTEO SHORT PLAT NO. SP2012-001, ACCORDING TO THE PLAT THEREOF AS RECORDED UNDER AUDITOR'S FILE NUMBER 201402105001, RECORDS OF SNOHOMISH COUNTY, WASHINGTON; THENCE SOUTH 48°42'13" EAST ALONG THE EAST LINE OF SAID TRACT F A DISTANCE OF 127.97 FEET TO THE CENTERLINE OF AN EXISTING ASPHALT DRIVEWAY, AND THE TRUE POINT OF BEGINNING OF THIS DESCRIBED CENTERLINE; THENCE SOUTH 54°36'01" WEST ALONG THE CENTERLINE OF SAID ASPHALT DRIVEWAY AND THE SOUTHWESTERLY PROJECTION THEREOF A DISTANCE OF 48.06 FEET TO A POINT ON THE EAST LINE OF THAT CERTAIN TRACT OF LAND CONVEYED TO ANDREW C. LAMAR BY QUITCLAIM DEED RECORDED UNDER RECORDING NUMBER 8306130222, RECORDS OF SNOHOMISH COUNTY, WASHINGTON AND THE TERMINUS OF THIS DESCRIBED CENTERLINE SAID TERMINAL POINT BEING 63.74 FEET NORTH OF THE SOUTHEAST CORNER OF SAID LAMAR TRACT AS MEASURED ALONG THE EAST LINE THEREOF THE SIDE LINES OF THIS DESCRIBED EASEMENT SHALL BE EXTENDED TO OR TRUNCATED AT THE EAST LINE OF SAID LAMAR TRACT AND THE EAST LINE OF AFOREMENTIONED TRACT F.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.





**NELSON GEOTECHNICAL  
ASSOCIATES, INC.**  
GEOTECHNICAL ENGINEERS & GEOLOGISTS

Main Office  
17311 - 135<sup>th</sup> Ave NE, A-500  
Woodinville, WA 98072  
(425) 486-1669 • FAX (425) 481-2510

Engineering-Geology Branch  
5526 Industry Lane, #2  
East Wenatchee, WA 98802  
(509) 665-7696 • FAX (509) 665-7692

December 2, 2016

Mr. and Mrs. David and Joan Loney  
c/o Larry Throndsen - LOT Design Group  
[lthrondsen@msn.com](mailto:lthrondsen@msn.com)

Geotechnical Engineering Evaluation - REVISED  
**Loney Residence Development**  
**1603 Debrelon Lane**  
**Mukilteo, Washington**  
NGA File No. 971416

Dear Mr. and Mrs. Loney:

We are pleased to submit the attached report titled "Geotechnical Engineering Evaluation – Loney Residence Development – 1603 Debrelon Lane – Mukilteo, Washington." Our services were completed in general accordance with the proposal signed by you on September 20, 2016.

The property is currently occupied by an existing single-family residence within an upper relatively level bench area within the western portion of the property. The ground surface below and to the east of the existing residence descends moderately to steeply down from the upper bench area to east to a lower gentle to moderately sloping area within the eastern portion of the property. We understand that the proposed development will subdivide the existing property into separate western and eastern lots, and constructing a new single-family residence within the lower eastern portion of the property. The existing residence will remain as a part of the overall development plans. Specific grading and stormwater plans were not available at the time this proposal was prepared.

We explored the site with seven track-hoe excavated test pits extending to depths in the range of 7.0 to 11.0 feet below the existing ground surface. We also performed one hand auger exploration within the steep slope above the proposed residence. Our explorations indicated that the proposed new residence area is generally underlain by loose to medium dense, undocumented fill soils with localized areas of the site underlain by medium dense or better, fine to medium sand with silt, which we interpreted as native advanced outwash soils.

It is our opinion from a geotechnical standpoint that the site is compatible with the planned development provided that our recommendations are incorporated into the design and construction of this project. In our opinion, the significant amount of undocumented fill soils that underlie a majority of the proposed residence are not suitable to provide adequate support for foundation and slab loads utilizing conventional shallow foundations, without experiencing significant settlement and distress to the structure. Based on our explorations, we recommend that the proposed residence be supported on a deep foundation system consisting of 4-inch driven pin piles in order to advance the structure loads through the loose upper soils, down to more competent native deposits interpreted to underlie the site at depth. Due to our explorations



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Figure 1 – Vicinity Map

Figure 2 – Site Plan

Figure 3 – Cross Section A-A'

Figure 4 – Cross Section B-B'

Figure 5 – Soil Classification Chart

Figures 6 through 8 – Exploration Logs



7. Perform grain-size sieve analysis on soil samples, as needed.
8. Provide recommendations for earthwork, foundation support, and slabs-on-grade.
9. Provide recommendations for retaining walls.
10. Provide recommendations for temporary and permanent slopes.
11. Provide recommendations for pavement subgrade.
12. Provide recommendations for site drainage and erosion control.
13. Document the results of our findings, conclusions, and recommendations in a written geotechnical report.

## **SITE CONDITIONS**

### **Surface Conditions**

The site consists of a rectangular-shaped parcel covering approximately 0.41 acres. The property is currently occupied by an existing single-family residence structure and attached garage located within the upper western portion of the site. There is an approximately twelve-foot-tall, block retaining wall located to the east of the existing residence. From the existing residence, driveway, and block retaining wall, the site slopes moderately to steeply down to the east to a gently sloping bench area and then continues to slope moderately down to the east to the eastern property line at gradients in the range of 7 to 28 degrees (12 to 53 percent) as shown on Cross Sections A-A' and B-B' in Figures 3 and 4, respectively. The site is generally vegetated with grass and landscaping vegetation with a few scattered young to mature deciduous trees. The property is bordered to the south and east by wooded areas and an access driveway, and to the north and west by existing single-family residences properties. We did not observe any surface water within the proposed development areas during our site visit on October 6, 2016.

### **Subsurface Conditions**

**Geology:** The Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington, by James P. Minard (USGS, 1982), was reviewed for this site. The site is mapped as Advance Outwash (Qva). The Advance Outwash deposits are described as mostly clean, gray, well stratified, unconsolidated sand with pebbles and some cobbles. Our explorations generally encountered medium dense to dense, brown, fine to medium sand with silt, on and directly adjacent to the steep slope area within the western portion of the property, which we interpreted as native advanced outwash deposits. Our explorations within the eastern portion of the property underlying the proposed building area encountered loose to medium dense, undocumented fill soils to the depths explored.



groundwater "table" within the upper soil horizons. Perched water tends to vary spatially and is dependent upon the amount of rainfall. We would expect the amount of groundwater to decrease during drier times of the year and increase during wetter periods.

## **SENSITIVE AREA EVALUATION**

### **Seismic Hazard**

We reviewed the 2015 International Building Code (IBC) for seismic site classification for this project. Since medium dense or better native glacial soils were encountered at depth in most of our explorations, the site conditions best fit the description for Site Class D.

Hazards associated with seismic activity include liquefaction potential and amplification of ground motion by soft deposits. Liquefaction is caused by a rise in pore pressures in a loose, fine sand deposit beneath the groundwater table. The loose to medium dense native soils and undocumented fill interpreted to underlie the site have a low to moderate potential for liquefaction or amplification of ground motion. The deep foundation systems recommended for residence support should alleviate such issues.

The medium dense or better outwash soil interpreted to form the core of the site slopes is considered stable with respect to deep-seated slope failures. All steep slopes have the potential for shallow sloughing failures during seismic events. Such events should not affect the planned residence provided the foundations are designed with the recommended setback values and the slope and drainage systems are maintained as described in this letter.

### **Erosion Hazard**

The criteria used for determining the erosion hazard for the site soils includes soil type, slope gradient, vegetation cover, and groundwater conditions. The erosion sensitivity is related to vegetative cover and the specific surface soil types, which are related to the underlying geologic soil units. The Soil Survey of Snohomish County Area, Washington, by the Soil Conservation Service (SCS), was reviewed to determine the erosion hazard of the on-site soils. The site surface soils were classified using the SCS classification system as Alderwood-Everett gravelly sandy loams, 25 to 70 percent slopes. The Alderwood-Everett gravelly sandy loam is listed as having a severe erosion hazard. It is our opinion that the site soils should have a slight to moderate hazard for erosion in areas that are not disturbed and where vegetation cover is not removed.



overall pile depths prior to finalizing the foundation plan. Depending on final grading plans, residence foundations within the western portion of the property may expose competent native glacial soils at the proposed subgrade. These foundations could possibly be supported on shallow conventional foundations, however, some minor settlement between the portion of the residence supported on the deep foundation system and the conventional foundations is possible. If desired, we can review grading and development plans as they are being finalized to better assess this potential.

We recommend that the slab-on-grade within the basement portion of the residence be designed as a structural slab and be supported on the deep foundation system. Other hard surfaces, such as paved areas, patios or walkways that are supported on the existing undocumented fill soil within the eastern portion of the property have some risk of future settlement, cracking, and the need for maintenance. To reduce this risk, we recommend over-excavating a minimum of two feet of the upper soil from these areas and replacing this material with compacted pit run or crushed rock structural fill. The subgrade should be compacted to a firm condition prior to placing the pit run. This recommendation is only for exterior hard surfaces to be supported on grade and does not apply for the interior slab.

It is also our opinion that the soils that underlie the site and form the core of the site slope should be stable with respect to deep-seated earth movements, due to their inherent strength and slope geometry. However, there is a potential for shallow sloughing and erosion events to occur on the moderate to steep slope along the western side of the site. Based on our site observations, it is our opinion that the proposed structure setback of 25 feet from the toe of the steep slopes should provide adequate protection for the proposed residence from shallow failures originating on the steep slopes above and help maintain the existing stability of the slopes. Proper setbacks, erosion and drainage control measures, along with long-term maintenance of the slope and drainage systems as recommended in this report, should reduce this potential. We recommend that we review the project plans after they have been developed.

Due to the moderately to steeply sloping nature of the overall site and the presence of a significant amount of unsuitable undocumented fill soils within the lower portion of the site, it is our opinion that onsite stormwater infiltration is not feasible for this project. We recommend that stormwater runoff from impervious surfaces at this site be managed per City of Mukilteo regulations. We understand that stormwater from the proposed development will likely be directed into the existing stormwater detention vault located immediately to the north of the site.



walkways, patios, or pavement by a minimum of two feet and the resulting overexcavation backfilled with crushed rock or granular pit-run soils compacted to structural fill specifications. The stripped material should be removed from the site. If the exposed soils after overexcavating the minimum two feet are deemed loose, they should be compacted to a non-yielding condition. Areas observed to pump or weave during compaction should be additionally overexcavated and replaced with rock spalls. If significant surface water flow is encountered during construction, this flow should be diverted around areas to be developed and the exposed subgrade maintained in a semi-dry condition. In wet conditions, the exposed subgrade should not be compacted, as compaction of a wet subgrade may result in further disturbance of the soils. A layer of crushed rock may be placed over the prepared areas to protect them from further disturbance.

The site soils are considered moisture sensitive and will disturb easily when wet. We recommend that earthwork construction take place during periods of extended dry weather, and suspended during periods of precipitation if possible. If work is to take place during periods of wet weather, care should be taken during site preparation not to disturb the site soils. This can be accomplished by utilizing large excavators equipped with smooth buckets and wide tracks to complete earthwork, and diverting surface and groundwater flow away from the prepared subgrades. Also, construction traffic should not be allowed on the exposed subgrade. A blanket of rock spalls should be used in construction access areas if wet conditions are prevalent. The thickness of this rock spall layer should be based on subgrade performance at the time of construction. For planning purposes, we recommend a minimum one-foot thick layer of rock spalls.

### **Temporary and Permanent Slopes**

Temporary cut slope stability is a function of many factors, including the type and consistency of soils, depth of the cut, surcharge loads adjacent to the excavation, length of time a cut remains open and the presence of surface or groundwater. It is exceedingly difficult under these variable conditions to estimate a stable, temporary, cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe slope configurations since they are continuously at the job site, able to observe the nature and condition of the cut slopes, and able to monitor the subsurface materials and groundwater conditions encountered.

The following information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Nelson Geotechnical Associates, Inc. assumes responsibility for job site safety. Job site safety is the sole responsibility of the project contractor.



the explorations, we recommend that one or more “test” piles be installed to verify design parameters and estimate an approximate depth of the piles that will be needed for budgeting purposes. The piles should be spaced a minimum of three feet apart to avoid a grouping effect on the piles.

Due to the relatively small slenderness ratio of pin piles, maintaining pin pile confinement and lateral support is essential in preventing pile buckling. Pin piles should be suitably embedded into the reinforced concrete. The structural engineer should design the connections of the piles to the foundations.

Vertically driven pin piles do not provide meaningful lateral capacity. Due to the rigid pile support, friction between the foundation and subgrade soil should not be considered as resisting lateral pressures on this structure. We recommend that all lateral loads be resisted on battered pin piles and/or passive resistance on the below-grade portions of the foundations. The upper foot of soil should be neglected when calculating the passive resistance. We recommend using an equivalent fluid density of 150 pcf for calculating the passive resistance.

### **Retaining Walls**

We understand that retaining walls may be incorporated into project plans. The lateral pressure acting on subsurface retaining walls is dependent on the nature and density of the soil behind the wall, the amount of lateral wall movement which can occur as backfill is placed, wall drainage conditions, the inclination of the backfill, and other possible surcharge loads. For walls that are free to yield at the top at least one thousandth of the height of the wall (active condition), soil pressures will be less than if movement is limited by such factors as wall stiffness or bracing (at-rest condition). We recommend that walls supporting horizontal backfill and not subjected to hydrostatic forces be designed using a triangular earth pressure distribution equivalent to that exerted by a fluid with a density of 40 pcf for yielding (active condition) walls, and 60 pcf for non-yielding (at-rest condition) walls.

These recommended lateral earth pressures are for a drained granular backfill and are based on the assumption of a horizontal ground surface behind the wall for a distance of at least the subsurface height of the wall, and do not account for surcharge loads. Additional lateral earth pressures should be considered for surcharge loads acting adjacent to subsurface walls and within a distance equal to the subsurface height of the wall. This would include the effects of surcharges such as traffic loads, floor slab and foundation loads, slopes, or other surface loads. Also, hydrostatic and buoyant forces should be included if the walls could not be drained. We could consult with the structural engineer regarding



two percent of optimum so that a readily compactable condition exists. It may be necessary to over-excavate and remove wet soils in cases where drying to a compactable condition is not feasible. All compaction should be accomplished by equipment of a type and size sufficient to attain the desired degree of compaction.

### **Basement Slab**

As mentioned earlier, we recommend that the basement floor slab be designed as a structural slab and fully supported on pin piles. We recommend that slabs be underlain by at least six inches of free-draining gravel with less than three percent by weight passing the Sieve #200 for use as a capillary break. We recommend that the capillary break be hydraulically connected to the footing drain system to allow free drainage from under the slab. A suitable vapor barrier, such as heavy plastic sheeting (6-mil minimum), should be placed over the capillary break material. An additional 2-inch-thick moist sand layer may be used to cover the vapor barrier. This sand layer may be used to protect the vapor barrier membrane and to aid in curing the concrete; however, this sand layer is optional and is intended to protect the vapor barrier membrane during construction. Other slabs and hard surfaces that may be supported on the existing soils should be underlain by a minimum of two feet of crushed rock or pit-run soils in addition to the capillary break and vapor barrier.

### **Pavement Subgrade and Other Exterior Hard Surfaces**

Pavement and walkway subgrade preparation should be completed as recommended in the **Site Preparation and Grading** and **Structural Fill** subsections of this report. Due to the presence of undocumented fill soils and depending on tolerance to cracking, we recommend that at least the upper two feet of the existing material be removed and replaced with granular structural fill or crushed rock. If possible, the subgrades should be proof-rolled with a heavy, rubber-tired piece of equipment, to identify soft or yielding areas that may require repair prior to placing any structural fill and prior to placing the pavement base course. We should be retained to observe the proof-rolling and to recommend repairs prior to placement of the asphalt or hard surfaces. The hard surface section should be thickened and reinforced with rebar where applicable to further reduce the effects of settlement due to the loose/soft soils, but potential long-term cracking should still be expected. Some cracking and long-term settlement should still be anticipated.



activities comply with contract plans and specifications. We should be contacted a minimum of one week prior to construction activities and could attend pre-construction meetings if requested.

### **USE OF THIS REPORT**

NGA has prepared this report for David and Joan Loney and their agents, for use in the planning and design of the development planned on this site only. The scope of our work does not include services related to construction safety precautions and our recommendations are not intended to direct the contractors' methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. There are possible variations in subsurface conditions between the explorations and also with time. Our report, conclusions, and interpretations should not be construed as a warranty of subsurface conditions. A contingency for unanticipated conditions should be included in the budget and schedule.

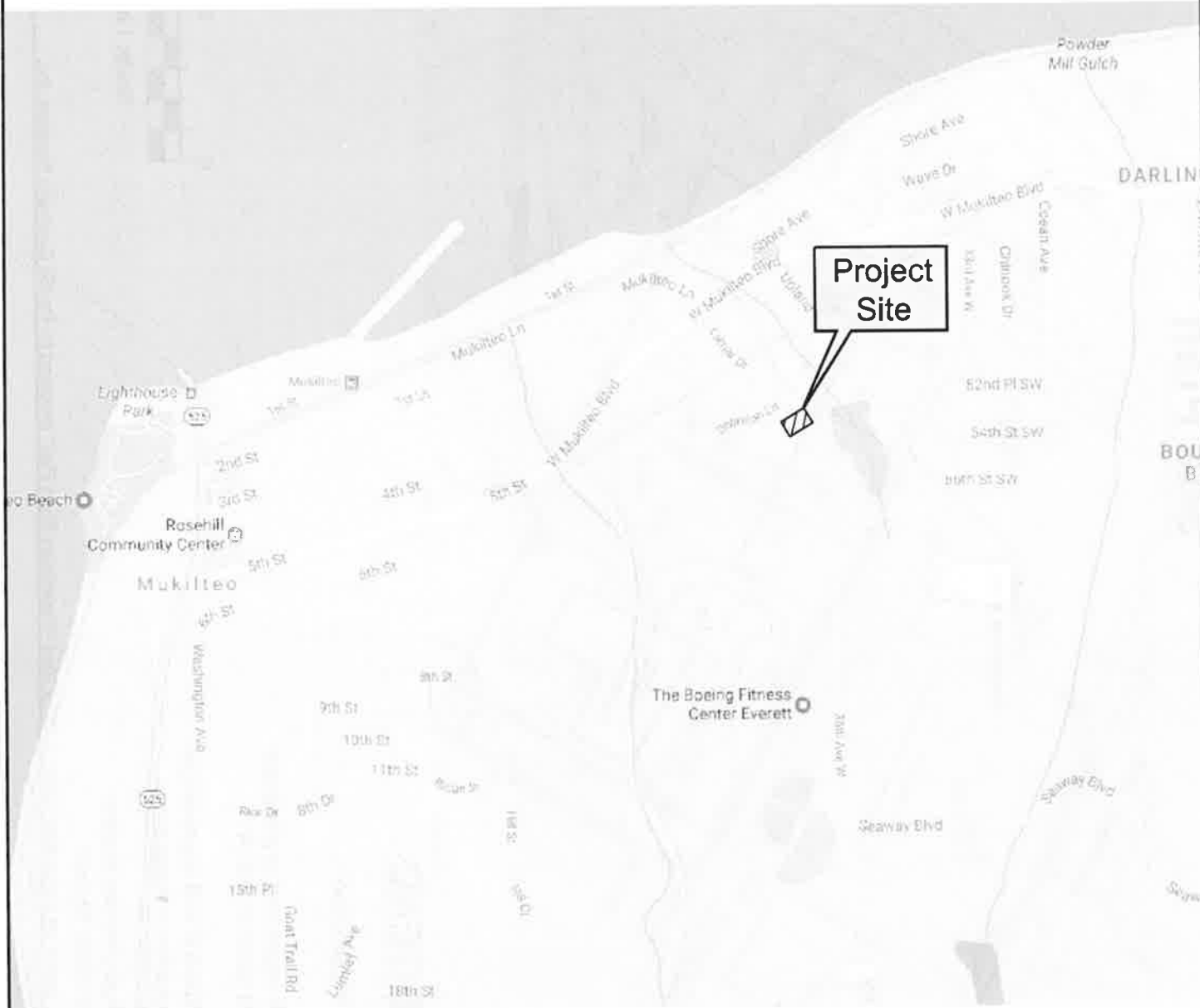
Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time this report was prepared. No other warranty, expressed or implied, is made. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the owner.

O-O-O



# VICINITY MAP

Not to Scale



**Mukilteo, WA**

Project Number  
971416

Figure 1

Loney Residence  
Development  
Vicinity Map



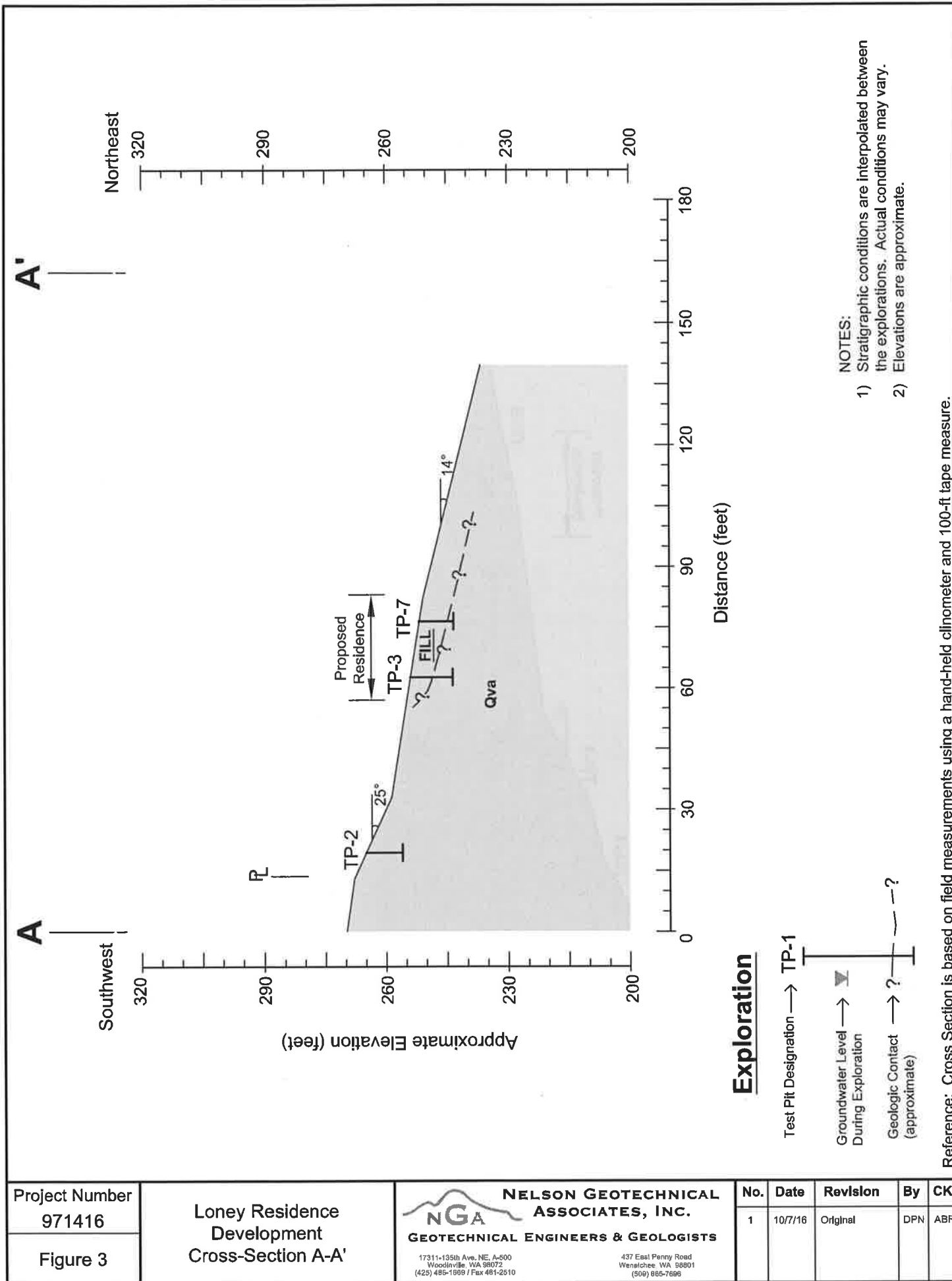
**NELSON GEOTECHNICAL  
ASSOCIATES, INC.**  
GEOTECHNICAL ENGINEERS & GEOLOGISTS

17311-135th Ave, NE A-500  
Woodinville, WA 98072  
(425) 486-1669 / Fax 481-2510

Snohomish County (425) 339-1669  
Wenatchee/Chelan (509) 685-7696  
www.nelsongeotech.com

No.	Date	Revision	By	CK
1	10/7/16	Original	DPN	ABR





Project Number 971416	Loney Residence Development Cross-Section A-A'	<b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> <b>GEOTECHNICAL ENGINEERS &amp; GEOLOGISTS</b> <small>17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 485-1888 / Fax 481-2510</small> <small>437 East Penny Road Wenatchee, WA 98801 (509) 865-7696</small>	No.	Date	Revision	By	CK
Figure 3			1	10/7/16	Original	DPN	ABR



# UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS  MORE THAN 50 % RETAINED ON NO. 200 SIEVE	GRAVEL  MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND  MORE THAN 50 % OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS  MORE THAN 50 % PASSES NO. 200 SIEVE	SILT AND CLAY  LIQUID LIMIT LESS THAN 50 %	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY  LIQUID LIMIT 50 % OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FLAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

## NOTES:

- 1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
- 2) Soil classification using laboratory tests is based on ASTM D 2488-93.
- 3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

## SOIL MOISTURE MODIFIERS:

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

Moist - Damp, but no visible water.

Wet - Visible free water or saturated, usually soil is obtained from below water table

Project Number 971416	Loney Residence Development Soil Classification Chart	 <b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> <b>GEOTECHNICAL ENGINEERS &amp; GEOLOGISTS</b> <small>17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510</small>	No.	Date	Revision	By	CK
Figure 5			1	10/7/16	Original	DPN	ABR



## LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
<b>TEST PIT FOUR</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 0.5		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
0.5 – 9.0		BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE WEATHERING, METAL SCRAPS, PLASTIC GARBAGE, AND IRON-OXIDE WEATHERING (LOOSE TO MEDIUM DENSE, MOIST) ( <u>FILL</u> )
9.0 – 10.0		GRAY, SILT WITH FINE SAND INTERMIXED WITH BROWN, FINE TO MEDIUM SAND WITH SILT, WOOD DEBRIS (BURIED LOG) AND TRACE GRAVEL (LOOSE TO MEDIUM DENSE, MOIST) ( <u>FILL</u> )
		SAMPLES WERE COLLECTED AT 2.5, 5.5, 8.3, AND 10.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 10.0 FEET ON 10/6/16
<b>TEST PIT FIVE</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 1.0		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH IRON-OXIDE STAINING, ROOTS, AND TRACE GRAVEL (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
1.0 – 9.5		BROWN TO ORANGE-BROWN, FINE TO MEDIUM SAND WITH SILT, GRAVEL, WOOD DEBRIS, ORGANICS, AND INTERMIXED SILT WITH FINE SAND LAYERS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>FILL</u> )
9.5 – 10.5		GRAY-BROWN TO ORANGE BROWN, FINE TO MEDIUM SAND WITH SILT, GRAVEL, COARSE SAND POCKETS, AND IRON-OXIDE WEATHERING (MEDIUM DENSE TO DENSE) ( <u>FILL</u> )
		SAMPLES WERE COLLECTED AT 4.0, 8.5, 9.4, AND 10.5 GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 10.5 FEET ON 10/6/16
<b>TEST PIT SIX</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 0.8		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
0.8 – 11.0		ORANGE-BROWN TO GRAY-BROWN, FINE TO MEDIUM SAND WITH SILT, INTERMIXED GRAVELLY FINE TO COARSE SAND POCKETS AND SILT WITH FINE SAND LENSES, ASPHALT GRINDINGS AT APPROXIMATELY 1.0 FEET, ORGANIC DEBRIS, BURIED LOG AT APPROXIMATELY 6.0 FEET, AND IRON-OXIDE STAINING (LOOSE TO MEDIUM DENSE, MOIST) ( <u>FILL</u> )
		SAMPLES WERE COLLECTED AT 4.0, 6.0, 10.5, AND 11.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 11.0 FEET ON 10/6/16





**CRITICAL AREAS STUDY  
AND  
BUFFER ENHANCEMENT PLAN**

**FOR**

**1603 DEBRELOH LANE**  
**MUKILTEO, WA**

*Wetland Resources, Inc. Project #17079*

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

Prepared For  
LOT Design Group  
Attn: Larry Throndsen  
22630 88<sup>th</sup> Avenue W  
Edmonds, WA 98026

October 17, 2018



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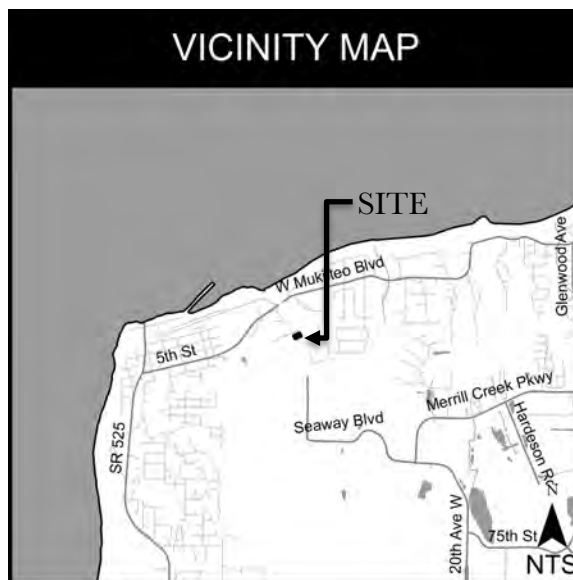
## 1.0 INTRODUCTION

Wetland Resources, Inc. (WRI) performed a site investigation on April 6, 2017 to determine the presence of any critical areas on or in the vicinity of Snohomish County Tax Parcel # 228040300200200 at 1603 Debreton Lane in the City of Mukilteo, Washington. The investigation area is located slightly south of Mukilteo Blvd. Site access is from the east, through an access easement running across the adjacent parcel, off a private road portion of Debreton Lane. The Public Land Survey System (PLSS) locator for the property is Section 10, Township 24N, Range 5E, W.M. This property is located within the Snohomish Watershed, Water Resources Inventory Area (WRIA) 7.

The 0.41-acre subject property is within a suburban single-family neighborhood, itself being developed as a single-family residence in the western-most portion of the site. A steeply-sloped area in the middle of the parcel separates the eastern half of the property from the single-family residence above. The eastern portion of the site is topographically lower than the existing residence and is currently maintained as lawn space. East of the site, past the access road (Debreton Lane), is a forested area that eventually slopes down into a ravine containing a tributary (Type 5: seasonal, non-fish) to Edgewater Creek. An off-site Category IV wetland is present within this forested area as well. The buffer widths associated with these off-site features do not extend onto the subject site. An on-site portion of a second Category IV wetland (Wetland A) is located in the southeastern corner of the property, emanating from the base of a forested slope south of the site. In the City of Mukilteo, Category IV wetlands typically receive 40-foot buffers, pursuant to Mukilteo Municipal Code (MMC) 17.52B.100.



**Figure 1:** Aerial view of the subject property



**Figure 2:** Vicinity of the subject site



## 2.0 PROJECT DETAILS

LOT Design Group, hereafter referred to as the applicant, is proposing to subdivide the subject parcel and subsequently construct a single-family residence in the eastern half. The proposed house footprint will be located within the northeast corner of the site, with a driveway installed to connect to an existing paved driveway on the adjacent parcel to the east. A proposed retaining wall will be constructed along the base of the steeply-sloped area's southern on-site portion. This wall is necessary to comply with steep slope setback requirements in MMC 17.52A.050. The home design has been developed specifically to avoid the on-site wetland buffer entirely. Additionally, a 5-foot separation between Wetland A and the southeast corner of the house (the closest point of the proposed structure to the wetland) will be maintained. No impacts are proposed to any critical areas or their associated buffers.

Pursuant to 17.52B.100(D)(3), the degraded buffer area (1,824 square feet) shall be planted with native vegetation to enhance its provided functions.

## 3.0 CRITICAL AREAS DETERMINATION

### 3.1 REVIEW OF EXISTING INFORMATION

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

- USFWS National Wetlands Inventory (NWI)
- USDA/NRCS Web Soil Survey (WSS)
- Snohomish County PDS Map Portal (PDS)
- WDNR Forest Practices Application Mapping Tool (FPAMT)
- WDFW Priority Habitat and Species (PHS) Interactive Map
- WDFW SalmonScape online map
- StreamNet Mapper

#### *Streams, Lakes, and Marine Areas*

The subject site is located approximately 0.34 of a mile south of Possession sound, which along the coast in this area NWI describes as an Estuarine Intertidal wetland area. WDFW's PHS system shows that this intertidal area serves as Hardshell Clam habitat. Edge Water Creek Flows from south to north over 250 feet to the east of the property (FPAMT). Multiple publicly available resources confirm this location. Snohomish PDS depicts the channel as a seasonal, non-fish stream. The StreamNet Mapper appears to support this designation, as no fish distribution is recorded. However, the FPAMT system shows that the stream is fish-bearing downstream of a fish break in the vicinity of the subject site. SalmonScape depicts this break further downstream of the property, as there is no recorded or modeled salmonid presence above where Edgewater Creek crosses under Mukilteo Blvd (approximately 0.2 mile north of the site). A tributary to Edgewater Creek flows on the opposite side of Debreton Lane from the subject parcel, approximately 115 feet to the east. This tributary is depicted only on PDS, which depicts



is as unclassified. However, the channel is non-fish given the grade, and is seasonal considering the intermittent nature of Edgewater Creek. No lakes are present in the vicinity of the site.

#### *Wetlands*

No wetlands are depicted in the vicinity of the subject site by any of the listed publicly available resources. However, a public records request with the city revealed the presence of an off-site Category IV wetland east of the site, near the tributary to Edgewater Creek. The surveyed wetland boundary is over 100 feet northeast of the subject site.

#### *Wildlife Habitat*

No priority habitats are depicted on or adjacent to the subject parcel by any of the listed publicly available resources..

#### *Soils and Geologic Conditions*

The topography of the sites has a generally northeastern aspect (via PDS). The entire site is mapped as Alderwood-Everett gravelly Sandy Loam, 25 to 70 percent slopes (via WSS). This is consistent with the on-site topography.

### **3.2 FIELD METHODOLOGY**

WRI staff conducted a site visit on April 6, 2017 to locate any streams, lakes, and/or wetlands occurring within and near the project site.

Ordinary High Water Mark (OHWM) boundaries of streams, lakes, and marine waters are determined through use of methodology presented in The Washington State Department of Ecology document *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson et al 2016). Designation of streams and lakes is consistent with the water typing system established in the Washington Administrative Code (WAC) 222-16-030.

Wetland boundaries were determined using the routine approach 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

#### **3.2.1 Hydrophytic 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.

### **3.2.2 Soils Criteria and Mapped Description**

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.

### **3.2.3 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.

## **3.3 RESULTS OF THE SITE INVESTIGATION**

Based on the results of the site investigation and review of existing information, one wetland (Wetland A) extends onto the southeastern corner of the subject site. Wetland A lies at the bottom of a sloped forested tract to the south, southeast of the property, extending into the grassy area adjacent to and on the property. A tributary to Edgewater Creek and an off-site wetland are located across the road and are well away from the subject site.

In the City of Mukilteo, streams are typed through application of the Washington State Interim Water Typing system (WAC 222-16-031). Wetlands are classified based on categories determined through application of the *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014).

Streams, lakes, marine waters, and wetlands are all additionally classified using the U.S. Fish and Wildlife Service (USFWS) document, *Classifications of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), also known as the “Cowardin Classification System.” The U.S. Army Corps of Engineers manual, *A Hydrogeomorphic Classification for Wetlands* (Brinson 1993), or HGM system, is also used for further wetland classification.



### 3.3.1 Wetland A

*City of Mukilteo Rating:* Category IV

*Size:* Approximately ~0.01 acres (406 S.F.)

*Cowardin Classification:* Palustrine, Emergent, Persistent, Saturated (PEM1B)

*HGM Class:* Slope

*Standard Buffer:* 40 feet [per MMC 17.52B.100(3)]

Wetland A receives 14 total points based on all functions. Wetlands that score between 9 and 15 total points are rated as Category IV, and typically receive 40-foot standard buffers in the City of Mukilteo.

Dominant vegetation within the off-site wetland appears to be composed of red alder (*Alnus rubra*; FAC), Pacific willow (*Salix lucida*; FACW), creeping buttercup (*Ranunculus repens*; FAC), and perennial ryegrass (*Lolium perenne*; FAC). All of the dominant species within the wetland have an indicator status of facultative (FAC) or wetter, which meets the hydrophytic vegetation criteria per the Corps Manual and the 2010 Regional Supplement.

Soils with the area described as wetland have a Munsell color of very dark grayish brown (2.5Y 3/2) with a sandy loam texture for the first 4 inches below the surface. From 4 to 9 inches below the surface, soil matrix color and texture remain the same, but prominent brown (7.5YR 4/4) redoximorphic features are present. From 9 to 15 inches below the surface, soils are a dark gray (5Y 4/1) loamy sand with prominent olive brown (2.5Y 4/4) and prominent strong brown (7.5YR 4/6) redoximorphic features. Below 15 inches of depth, soils were a light gray (2.5Y 7/1) clay with prominent yellowish brown (10YR 5/6) redoximorphic features, and had inclusions of greenish gray (5GY 6/1) clay with dark yellowish brown (10YR 4/6) redoximorphic features. These conditions meet the Depleted Below Dark Surface (A11), Depleted Matirx (F3), and Redox Dark Surface (F6) hydric soil indicators.

During our site April 2017 site investigation, soils were saturated to the surface and the water table was observed 12 inches below. These conditions meet the High Water Table (A2) and Saturation (A3) wetland hydrology indicators.

Given that the dominant vegetation is a hydrophytic community, soils meet hydric conditions, and wetland hydrology is present, this area meets wetland criteria.

### 3.3.2 Off-site Wetland

*City of Mukilteo Rating:* Category IV

*Size:* Approximately 0.04 acres (~1,780 S.F.)

*Cowardin Classification:* Palustrine, Forested, Seasonally Flooded / Saturated (PFOE)

*HGM Class:* Slope

*Standard Buffer:* 40 feet [per MMC 17.52B.100(3)]

The off-site wetland was not accessible. Therefore, this analysis is based on visual observations from the subject site and publicly available information. Particularly the wetland's recorded category (IV) with the City of Mukilteo.



The off-site area where the wetland is located was previously assessed by Curran Environmental Services. The wetland was rated as a Category IV, which typically receive 40-foot standard buffers in the City of Mukilteo.

Dominant vegetation within the off-site wetland appears to have an overstory composed of mature deciduous and coniferous trees. Observations from Debreton Lane are consistent with the vegetation recorded as rooted within the wetland area. The dominant species include red alder (FAC), red osier dogwood (*Cornus sericea*; FAC), Osoberry (*Oemleria cerasiformis*; FACU), and Himalayan blackberry (*Rubus armeniacus*; FAC). Vegetation was not directly assessed due to lack of site access.

Soils within the wetland were not able to be sampled due to lack of access. Similarly, hydrology was not directly observable. However, the topography and geomorphic position of the area suggest a high probability of wetland hydrology, consistent with the recorded designation.

### ***Tributary to Edgewater Creek***

*WA State Water Interim Typing Classification:* Type 5 (analogous to Type Ns)

*Cowardin Classification:* Riverine, Upper Perennial, Unconsolidated Bottom, Seasonally Flooded (R3UBC)

*Standard Buffer:* 50 feet [per MMC 17.52C.090(A)(1)]

The tributary to Edgewater Creek is an intermittent non-fish stream flowing from southwest to northeast, approximately 115 feet east of the subject property, continuing into Edgewater Creek and eventually out to possession sound. The gradient is well above 16-percent, not meeting the WAC definition of a fish-bearing stream. The streambed is assumed to be unconsolidated bottom given the grade and surrounding soil conditions. Edgewater Creek is classified as seasonal in Snohomish County PDS. Therefore, any tributary to this system is also seasonal. Non-fish-bearing, seasonal streams are classified as Type 5 waters in the City of Mukilteo, which typically receive 50-foot standard buffers.

### ***On-site Characteristics (Non-wetland)***

The majority of on-site vegetation is maintained lawn. The soils on the subject site were primarily dark brown (10YR 3/3) sandy loam throughout the matrix. The site has a long history of grading manipulation, and the soils are correspondingly disturbed, with high a significant level of fill present.. the geomorphic position of the site does not indicate wetland hydrologic conditions, with the exception of the southeast corner where Wetland A extends onto the parcel. Soils were slightly moist at the time of our visit, but no saturation was seen on the site (outside of Wetland A).

The off-site forested area just southeast of the site was also investigated for wetland conditions. As discussed above, Wetland A is present at the lowest portion of this forested slope. Immediately uphill of Wetland A, within the forested area, there is a small area showing signs of increased hydrology but does not meet wetland criteria. This area, while wetter than surrounding upland forest, is not inundated for a long enough duration throughout the year to develop wetland conditions. Dominant vegetation is comprised of red alder (FAC), red



elderberry (*Sambucus racemosa*; FACU), club mosses (*Lycopodium* spp; FAC), and creeping buttercup (FAC). The majority of the vegetation is facultative or wetter, indicating a hydrophytic community. Soils are a very dark brown (10YR 2/2) sandy loam to about 10 inches of depth, underlain by dark brown (10YR 3/3) loamy sand. Some dark yellowish brown (10YR 4/6) redoximorphic features are present, but infrequently to meet hydric soil indicators. Soils were only slightly moist over most of this area. While a hydrophytic community is present, soils and hydrologic wetland conditions are not met.

## **4.0 COMPLIANCE WITH MMC 17.52.035**

In the City of Mukilteo, regulated streams, wetlands and their buffers are designated collectively as Native Growth Protection Areas (NGPAs). All Native Growth Protection Areas (in this case, Wetland A and its associated buffer) shall be shown on the development site plans or final plat maps, and shall be noted as follows, per MMC 17.52.035:

*Any area in which development is prohibited by these critical areas regulations shall be set aside in a native growth protection area. NGPAs shall be placed in a separate tract on which development is prohibited, protected by execution of an easement, dedicated to a conservation organization or land trust, or similarly preserved through a permanent protective mechanism acceptable to the city. The location and limitation associated with the critical area and its buffer shall be shown on the face of the deed, site plan, or plat applicable to the property and shall be recorded with the Snohomish County assessor's office.*

*B. Native growth protection areas and buffers shall not be used for storage or deposit of construction debris or material, or deposit of vegetative spoils.*

*C. All native growth protection areas shall be shown on the development site plans or final plat maps, and shall be noted as follows:*

*There shall be no clearing, excavation, or fill within a native growth protection area shown on the face of this site plan/plat, with the exception of required utility installation, removal of dangerous trees, thinning of woodlands for the benefit of the woodlands as determined by a certified landscape architect or arborist, and removal of obstructions on drainage courses, or as allowed under Section 17.52A.070, Vegetation management on steep slopes.*

*D. A temporary sign shall be placed at the boundary of all native growth protection areas during periods of construction, clearing, grading, or excavation on adjacent property. The sign shall describe the limitations of on-site disturbance and development within the native growth protection area. A permanent sign shall be placed at the boundary of all native growth protection areas describing the limitation on development. NGPA signs shall be spaced fifty feet on center along the periphery of the critical area.*

### **4.1.1 NGPA Signage**

Signs designating the presence of the NGPA are required to be posted along the NGPA boundary, which in this case is the outer boundary of the on-site wetland buffer. Signs must be placed at approximately 50-foot intervals around the perimeter of a NGPA. A single type 1 sign will meet this requirement on the subject site. An example of type 1 sign language is as follows:



**NATIVE GROWTH PROTECTION AREA**  
THIS WETLAND AND UPLAND BUFFER ARE PROTECTED TO  
PROVIDE WILDLIFE HABITAT AND MAINTAIN WATER QUALITY.  
PLEASE DO NOT DISTURB THIS VALUABLE RESOURCE.  
\*SEE RECORDED PLAT FOR RESTRICTIONS

The sign shall be constructed of aluminum or similar durable material. It shall be secured to 4" x 4" x 7' (minimum) pressure treated post buried a minimum of two feet in quick setting concrete.

## **5.0 BUFFER ENHANCEMENT PLAN**

The buffer associated with Wetland A will be enhanced with native trees and shrubs in order to comply with MMC 17.52B.100(D)(3), which states that "if the existing buffer is unvegetated, sparsely vegetated, or vegetated with invasive species that do not perform needed functions, the buffer should either be planted to create the appropriate plant community or the buffer should be widened to ensure that adequate functions of the buffer are provided." Given that there is insufficient space to increase the width of the buffer, it's on-site portion shall be enhanced.

Enhancement of the on-site buffer will provide a functional lift to water quality, hydrologic, and habitat functions associated with Wetland A. Further, the installed native vegetation will additionally act as a protective barrier between residential activity and the wetland.

### **5.1 VEGETATIVE BUFFER ENHANCEMENT AREA**

A total of 1,824 square-foot area of on-site buffer associated with Wetland A will be enhanced with the following native plant species as specified:

COMMON NAME	LATIN NAME	SIZE	SPACING	QUANTITY
1. Western red cedar	<i>Thuja plicata</i>	2 gallon	10'	9
2. Douglas fir	<i>Pseudotsuga menziesii</i>	2 gallon	10'	9
3. Snowberry	<i>Symphoricarpos alba</i>	1 gallon	3.5'	14
4. Salal	<i>Gaultheria shallon</i>	1 gallon	3.5'	14
5. Oregon grape	<i>Mahonia aquifolium</i>	1 gallon	3.5'	14
6. Nootka rose	<i>Rosa nutkana</i>	1 gallon	3.5'	13
<b>Total:</b>				<b>73</b>

#### **5.1.2 Soil Stabilization**

Mulch or woodchips shall be applied to any disturbed soil within buffer areas. However, disturbance to buffer areas is not expected.



## 5.2 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 limited species substitution may be allowed, only with the agreement of the landscape designer, wetland biologist, 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 environmental professional shall occur to resolve any questions that may arise. During this meeting a discussion regarding plant spacing and locations of plant species including wetland verses buffer species shall occur between the landscape contractor or owners, and the consulting environmental professional.

### *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.

### *Handling*

Plants shall be handled so as to avoid all damage, including: breaking, bruising, root damage, sunburn, drying, freezing or other injury. Plants must be covered during transport. Plants shall not be bound with wire or rope in a manner that could damage branches. Protect plant roots with shade and wet soil in the time period between delivery and installation. Do not lift container stock by trunks, stems, or tops. Do not remove from containers until ready to plant. Water all plants as necessary to keep moisture levels appropriate to the species horticultural requirements. Plants shall not be allowed to dry out. All plants shall be watered thoroughly immediately upon installation. Soak all containerized plants thoroughly prior to installation. Bare root plants are subject to the following special requirements, and shall not be used unless planted between November 15 and February 15, and only with the permission of consulting biologist and/or City staff. Bare root plants must have enough fibrous root to ensure plant survival. Roots must be covered at all times with: mud and/or wet straw, moss, or other suitable packing material until time of installation. Plants whose roots have dried out from exposure will not be accepted at installation inspection.

### *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 biologist and/or landscape designer prior to installation.

### *Damaged plants*

Damaged, dried out, or otherwise mishandled plants will be rejected at 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, consulting biologist, 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, bare root, or whips as specified in the mitigation plan planting schedules, unless explicitly authorized by the consulting biologist. Rootbound plants or 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 if installed between November 15 and February 15, and with permission from the consulting biologist 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, and branching 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.

### *Timing of Planting*

Unless otherwise determined by 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.



### *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. Any burlap shall be removed from the planting pit. Backfill shall be worked back into holes such that air pockets are removed without adversely compacting down soils.

### *Soil Amendments*

Unless otherwise specified and approved by the City of Mukilteo, organic matter (compost or approved equal) will be incorporated into all planting pits, not including areas inside the dripline of existing trees and shrubs. One unit of loose, well-composted organic material should be incorporated with two units of silt loam topsoil to a depth of eight to ten inches (only three to four inches within three feet of existing drip lines) and mixed thoroughly.

### *Site conditions*

The contractor shall immediately notify the landscape designer and/or consulting biologist 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.

### *Fertilizer*

Slow release fertilizer may only be used if determined to be necessary and must be approved by the City of Mukilteo. Fertilizers shall be applied only at the base of plantings underneath the top layer of soil (that does not make contact with stems of the plants). No fertilizers will be placed in planting holes. Fertilizer will not be used in the first year after installation.

### *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 landscape designer, wetland biologist, and/or City staff.

#### *Inspection(s)*

A consulting biologist 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 woodchips after planting. Woodchips shall be kept well away (at least 2 inches) from the trunks and stems of woody plants.

### **5.3 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), and the replacement of plant mortality for each maintenance period. Chemical control, only if approved by City of Mukilteo 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 and reed canary grass, and any other allowable measures needed to ensure plant survival.

#### *Survival*

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

#### *Installation Timing for Replacement Plants*

Replacement plants shall be installed between October 15 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.

### *Reflagging*

Any installed mitigation planting that has deteriorated flagging shall have that flagging replaced with highly visible flagging tape. Clear identification of mitigation plants will aide in future assessments of performance standards during monitoring visits.

### *Herbicides / Pesticides*

Unless deemed absolutely necessary by the consulting biologist, chemical controls shall not be used in the mitigation area, sensitive 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 (June 1 through October 15) for the first two years after any mitigation plant installation to ensure plant survival and establishment. A temporary above ground automated irrigation system shall provide water. Water should be applied at a rate of 1" of water twice per week for the first year following any plant installation, and 1" per week during the second year following any plant installation. If mitigation plantings are installed to replace mortality, this irrigation schedule restarts. Irrigation may be required after the first two years to maintain plant survival.

### *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.

## **5.4 GENERAL PROJECT NOTES**

### *Pre-Construction Meeting*

Mitigation projects are typically more complex to install than can be described in plans. Careful monitoring by a consulting biologist for all portions of this project is strongly recommended. Construction timing and sequencing is important to the success of this type of project. There will be a pre-construction meeting on this site between the Permittee, consulting biologist, 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 qualified consulting biologist 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 Mukilteo representative and/or the consulting professional will make these decisions during construction.



## **6.0 PROJECT MONITORING PROGRAM**

### **6.1 PROGRAM DETAILS**

#### **6.1.1 Inspection and Reporting Requirements**

Initial compliance/as-built report will be prepared at completion of the mitigation installation.

Annual site inspection will occur once per year, in the late spring/early summer for 5 years.

Annual monitoring reports will be submitted by August 1<sup>st</sup> of each monitored year for 5 years, including a final report.

#### **6.1.2 Monitoring Components**

##### *Purpose for Monitoring*

The purpose for monitoring this mitigation project shall be to evaluate its success. Success will be determined if monitoring shows, at the end of the monitoring period, 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 landscaper, wetland specialist, and/or the City of Mukilteo during the period of the bond or until the project is evaluated as successful. Monitoring shall be performed once per year.

##### *Monitoring*

Monitoring shall be conducted for five years 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 of Mukilteo staff (or contracted biologist) inspects the site and issues approval of the installation.

##### *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 must be identified on the mitigation site plans in the first monitoring report (they may be drawn on approved plans by hand). Each sampling point shall detail herbaceous, shrub, and tree coverage. Monitoring of vegetation sampling points shall occur once annually in the fall (prior to leaf drop) as detailed in section 6.1.1 of this report, unless otherwise specified.

##### *Photo points*

No less than three permanent photo points will be established within the mitigation area. Photographs will be taken from these points to visually record condition of the enhancement area. Photos shall be taken annually between in the fall (prior to leaf drop), unless otherwise specified.

##### *Monitoring Report Contents*

Monitoring reports shall be submitted by November 31 of each year during the monitoring period. 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. Current condition/need for replacement of flagging that identifies mitigation plantings
5. Wetland and buffer conditions, e.g., surrounding land use, use by humans, and/or wild and domestic creatures
6. Observed wildlife, including amphibians, avians, and others
7. Assessment of nuisance / exotic biota and recommendations for management
8. Receipts for any structural repair or replacement
9. Color photographs taken from permanent photo-points that shall be depicted on the monitoring report map

## 6.2 PROJECT SUCCESS & COMPLIANCE

### 6.2.1 Criteria for Success

Upon completion of the proposed mitigation project installation, an inspection by a qualified consulting biologist shall be made to determine plan compliance. An as-built report will be supplied to The City of Mukilteo within thirty-one (31) days after the completion of planting, to show compliance with the mitigation plan. The qualified consulting biologist will perform condition monitoring of the plantings and provide reports according to the schedule described in Section 6.1.1.

#### Goal

To enhance the functions and values provided by the wetland and buffer.

#### Objectives

Objective 1: Enhance 1,824 square feet of buffer area with 18 native trees and 55 native shrubs.

**Definition of Success:** The planting areas shall be considered successful if they meet the following performance standards:

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Survivorship*</b>	100%	>90%	>80%	>80%	>80%
<b>Native species cover**</b>	>20%	>30%	>40%	>60%	>80%
<b>Invasive species cover</b>	<10%	<15%	<20%	<20%	<20%

\*Only applies to installed native plantings.

\*\*Native volunteer species may be included to meet native cover requirements.

## 6.3 CONTINGENCY PLAN

If 20% of the plants are severely stressed during any of the inspections, or it appears 20% may not survive, additional plantings of the same or similar species may be added to the planting area as directed by the consulting biologist. Additionally, presence of invasive species, failure or



conditions likely to cause failure to achieve current performance standards, or other detrimental site conditions may trigger a contingency plan as deemed necessary by the consulting biologist. Elements of a contingency plan may include, but will not be limited to: more aggressive weed and invasive species control, pest control, replanting with larger plant material, species substitution, soil amendments, installation of habitat features, and/or irrigation.

## 7.0 PERFORMANCE BOND

The following is a cost estimate for plant materials, labor, and an as-built inspection/report. This does not represent an actual bid. The bond, in the amount of 150% of expected mitigation project costs, shall be held until the City of Mukilteo approves a final mitigation monitoring report of mitigation project success of the buffer enhancement plan.

### Plants

\$11.50/1 gallon container or bare root (73 plants)	\$839.50
Labor/Installation:	\$600.00
<b>Subtotal:</b>	\$1,439.50
10.4% Sales Tax:	\$149.71
<b>Total cost:</b>	\$1,589.21
<b>150% of cost (bond amount):</b>	2,383.81



## 8.0 USE OF THIS REPORT

This Critical Areas Study and Buffer Enhancement Plan has been prepared for LOT Design Group to assist with identifying on-site and nearby critical areas and applying appropriate mitigation as required by the City of Mukilteo. 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 critical areas 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.

This report conforms to the standard of care employed by 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.*

A handwritten signature in black ink that reads "Scott Walters". The signature is written in a cursive, flowing style.

Scott Walters  
*Associate Ecologist*



## 9.0 REFERENCES

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**APPENDIX A**  
U.S. CORPS OF ENGINEERS  
WETLAND DETERMINATION DATA FORMS



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

Project/Site: 17079 LOT Design City/County: Mukilteo/Snohomish Sampling Date: 4/6/17  
 Applicant/Owner: LOT Design Group State: WA Sampling Point: S1  
 Investigator(s): SW Section, Township, Range: S3, T28N, R04RE  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): >2%  
 Subregion (LRR): LRR-A Lat: 47.9482573 Long: -122.2834080 Datum: NAD83  
 Soil Map Unit Name: Alderwood-Everett gravelly sandy loams NWI classification: none

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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks:	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m <sup>2</sup> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>Alnus rubra</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species _____ x 3 = <u>0</u> FACU species _____ x 4 = <u>0</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>0</u> (A) <u>0</u> (B)  Prevalence Index = B/A = _____
<u>30</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: 3m <sup>2</sup> )				
1. <u>Rubus spectabilis</u>	<u>Trace</u>	<u>N</u>	<u>FAC</u>	
2. <u>Rosa nutkana</u>	<u>Trace</u>	<u>N</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants <sup>1</sup> <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>Trace</u> = Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Herb Stratum (Plot size: 1m <sup>2</sup> )				
1. <u>Lycopodium sp.</u>	<u>75</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Ranunculus repens</u>	<u>75</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Geum macrophyllum</u>	<u>15</u>	<u>N</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
4. <u>Urtica dioica</u>	<u>10</u>	<u>N</u>	<u>FAC</u>	
5. <u>Galium trifidum</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<u>180</u> = Total Cover				
Woody Vine Stratum (Plot size: 3m <sup>2</sup> )				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<u>0</u> = Total Cover				
% Bare Ground in Herb Stratum <u>0</u>				
Remarks: <u>Lycopodium sp. assumed to be FAC</u>				



# SOIL

Sampling Point: S1

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

Depth (inches)	Matrix		Redox Features			Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>			
0-4	10YR 2/2	100					Loam	
4-9	10YR 3/2	100					Sandy Loam	
9-12	10YR 3/3	100					Loamy Sand	
12-15	10YR 2/2	100					Sandy Loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |  |
|--|--|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Redox (S5)                                  |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)                              |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1) ( <b>except MLRA 1</b> ) |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)                          |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3)                              |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Dark Surface (F6)                           |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Depleted Dark Surface (F7)                        |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          | <input type="checkbox"/> Redox Depressions (F8)                            |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>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)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Water-Stained Leaves (B9) ( <b>except MLRA 1, 2, 4A, and 4B</b> ) |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Salt Crust (B11)  |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                                       |
| <input type="checkbox"/> Water Marks (B1)                          | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)  |
| <input type="checkbox"/> Sediment Deposits (B2)                    | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)                     |
| <input type="checkbox"/> Drift Deposits (B3)                       | <input type="checkbox"/> Presence of Reduced Iron (C4)                                     |
| <input type="checkbox"/> Algal Mat or Crust (B4)                   | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)                        |
| <input type="checkbox"/> Iron Deposits (B5)                        | <input type="checkbox"/> Stunted or Stressed Plants (D1) ( <b>LRR A</b> )                  |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Other (Explain in Remarks)  |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) |  |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)   |  |

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? Yes ☐ No ☒ Depth (inches): \_\_\_\_\_  
(includes capillary fringe)

**Wetland Hydrology Present?** Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Moist soils



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

Project/Site: 17079 LOT Design City/County: Mukilteo/Snohomish Sampling Date: 4/6/17  
 Applicant/Owner: LOT Design Group State: WA Sampling Point: S2  
 Investigator(s): SW Section, Township, Range: S3, T28N, R04RE  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): >2%  
 Subregion (LRR): LRR-A Lat: 47.9482573 Long: -122.2834080 Datum: NAD83  
 Soil Map Unit Name: Alderwood-Everett gravelly sandy loams NWI classification: none

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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks:	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m <sup>2</sup> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>2</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>Alnus rubra</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species _____ x 3 = <u>0</u> FACU species _____ x 4 = <u>0</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>0</u> (A) <u>0</u> (B)  Prevalence Index = B/A = _____
<u>50</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: 3m <sup>2</sup> )				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants <sup>1</sup> <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>0</u> = Total Cover				
Herb Stratum (Plot size: 1m <sup>2</sup> )				
1. <u>Lycopodium sp.</u>	<u>75</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Ranunculus repens</u>	<u>20</u>	<u>N</u>	<u>FAC</u>	
3. <u>Geum macrophyllum</u>	<u>20</u>	<u>N</u>	<u>FAC</u>	
4. <u>Urtica dioica</u>	<u>15</u>	<u>N</u>	<u>FAC</u>	
5. <u>Galium trifidum</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
<u>135</u> = Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Woody Vine Stratum (Plot size: 3m <sup>2</sup> )				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
% Bare Ground in Herb Stratum <u>0</u> <u>0</u> = Total Cover				
Remarks:				
Lycopodium sp. assumed to be FAC				



# SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features			Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>			
0-9	10YR 2/2	100					Loam	
9-15	2.5Y 2.5/1	100					Sandy Clay Loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b> <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) ( <b>except MLRA 1</b> ) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b> <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)  <sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
--	--	--

<b>Restrictive Layer (if present):</b> Type: _____ Depth (inches): _____	<b>Hydric Soil Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks:	

# HYDROLOGY

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one required; check all that apply)			Secondary Indicators (2 or more required)		
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) ( <b>except MLRA 1, 2, 4A, and 4B</b> ) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) ( <b>LRR A</b> ) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) ( <b>MLRA 1, 2, 4A, and 4B</b> ) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) ( <b>LRR A</b> ) <input type="checkbox"/> Frost-Heave Hummocks (D7)			

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present?    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): 9 (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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: 17079 LOT Design City/County: Mukilteo/Snohomish Sampling Date: 4/6/17  
 Applicant/Owner: LOT Design Group State: WA Sampling Point: S3  
 Investigator(s): SW Section, Township, Range: S3, T28N, R04RE  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): >2%  
 Subregion (LRR): LRR-A Lat: 47.9482573 Long: -122.2834080 Datum: NAD83  
 Soil Map Unit Name: Alderwood-Everett gravelly sandy loams NWI classification: none

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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks:	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m <sup>2</sup> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>Alnus rubra</u>	<u>100</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species _____ x 3 = <u>0</u> FACU species _____ x 4 = <u>0</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>0</u> (A) <u>0</u> (B)  Prevalence Index = B/A = _____
<u>100</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: 3m <sup>2</sup> )				
1. <u>Sambucus racemosa</u>	<u>15</u>	<u>Y</u>	<u>FACU</u>	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants <sup>1</sup> <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>15</u> = Total Cover				
Herb Stratum (Plot size: 1m <sup>2</sup> )				
1. <u>Lycopodium spp.</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Ranunculus repens</u>	<u>40</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Geum macrophyllum</u>	<u>20</u>	<u>N</u>	<u>FAC</u>	
4. <u>Tolmiea menziesii</u>	<u>15</u>	<u>N</u>	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
<u>125</u> = Total Cover				
Woody Vine Stratum (Plot size: 3m <sup>2</sup> )				
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
<u>0</u> = Total Cover				
% Bare Ground in Herb Stratum <u>0</u>				
Remarks: <u>Lycopodium sp. assumed to be FAC</u>				



## SOIL

Sampling Point: S3

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

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-10.5	10YR 2/2	99	10YR 4/6	1	C	M	Sandy Loam	
10.5/17.5	10YR 3/3	97	10YR 4/6	3	C	N	Loamy sand	Charcoal in soil

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

<sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |  |
|--|--|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Redox (S5)                                  |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)                              |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1) ( <b>except MLRA 1</b> ) |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)                          |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3)                              |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Dark Surface (F6)                           |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Depleted Dark Surface (F7)                        |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          | <input type="checkbox"/> Redox Depressions (F8)                            |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

<sup>3</sup>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)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Water-Stained Leaves (B9) ( <b>except MLRA 1, 2, 4A, and 4B</b> ) |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Salt Crust (B11)  |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                                       |
| <input type="checkbox"/> Water Marks (B1)                          | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)  |
| <input type="checkbox"/> Sediment Deposits (B2)                    | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)                     |
| <input type="checkbox"/> Drift Deposits (B3)                       | <input type="checkbox"/> Presence of Reduced Iron (C4)                                     |
| <input type="checkbox"/> Algal Mat or Crust (B4)                   | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)                        |
| <input type="checkbox"/> Iron Deposits (B5)                        | <input type="checkbox"/> Stunted or Stressed Plants (D1) ( <b>LRR A</b> )                  |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Other (Explain in Remarks)  |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) |  |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)   |  |

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? Yes ☐ No ☒ Depth (inches): \_\_\_\_\_  
(includes capillary fringe)

**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: 17079 LOT Design City/County: Mukilteo/Snohomish Sampling Date: 4/6/17  
 Applicant/Owner: LOT Design Group State: WA Sampling Point: S3  
 Investigator(s): SW Section, Township, Range: S3, T28N, R04RE  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): >2 to 5  
 Subregion (LRR): LRR-A Lat: 47.9482573 Long: -122.2834080 Datum: NAD83  
 Soil Map Unit Name: Alderwood-Everett gravelly sandy loams NWI classification: none

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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks:	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 5m <sup>2</sup> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. <u>Alnus rubra</u>	<u>15</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species _____ x 3 = <u>0</u> FACU species _____ x 4 = <u>0</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>0</u> (A) <u>0</u> (B)  Prevalence Index = B/A = _____
<u>15</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: 3m <sup>2</sup> )				
1. <u>Salix lucida</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Rubus spectabilis</u>	<u>Trace</u>	<u>N</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Wetland Non-Vascular Plants <sup>1</sup> <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. <u>Rubus armeniacus</u>	<u>Trace</u>	<u>N</u>	<u>FAC</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>5</u> = Total Cover				
Herb Stratum (Plot size: 1m <sup>2</sup> )				
1. <u>Ranunculus repens</u>	<u>60</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Lolium perenne</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Galium trifidum</u>	<u>15</u>	<u>N</u>	<u>FACW</u>	
4. <u>Geum macrophyllum</u>	<u>15</u>	<u>N</u>	<u>FAC</u>	
5. <u>Equisetum telmateia</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
<u>95</u> = Total Cover				
Woody Vine Stratum (Plot size: 3m <sup>2</sup> )				
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
<u>0</u> = Total Cover				
% Bare Ground in Herb Stratum <u>0</u>				
Remarks:				



# SOIL

Sampling Point: S3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)									
Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	
	Color (moist)	%	Color (moist)	%					
0-4	2.5Y 3/2	100					Sandy Loam		
4-9	2.5Y 3/2	97	7.5YR 4/4	3	C	M	Sandy Loam		
9-15	5Y 4/1	89	2.5Y 4/4	7	C	M	Loamy Sand		
			7.5YR 4/6	4	C	M	Loamy Sand		
15+	2.5Y 7/1	80	10YR 5/6	20	C	M	Clay		
15+	5GY 6/1	88	10YR 4/6	12	C	M	Clay	inclusion	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input checked="" type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

<b>Restrictive Layer (if present):</b> Type: _____ Depth (inches): _____	<b>Hydric Soil Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
--	---

Remarks:

# HYDROLOGY

Wetland Hydrology Indicators:	
<b>Primary Indicators (minimum of one required; check all that apply)</b> <input type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<b>Secondary Indicators (2 or more required)</b> <input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)

<b>Field Observations:</b> Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): 12 Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): Surface (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



# **APPENDIX B**

DEPARTMENT OF ECOLOGY WETLAND RATING FORM



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Wetland name or number A

## RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: April 6, 2017  
Rated by S. Walters Trained by Ecology? ☒ Yes ☐ No Date of training March 2015  
HGM Class used for rating SLOPE Wetland has multiple HGM classes? ☐ Y ☒ N

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

**OVERALL WETLAND CATEGORY IV** (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	<input type="checkbox"/> L	H	M	<input type="checkbox"/> L	H	M	<input type="checkbox"/> L	
Landscape Potential	H	<input checked="" type="checkbox"/> M	L	H	M	<input type="checkbox"/> L	<input type="checkbox"/> H	M	L	
Value	H	M	<input type="checkbox"/> L	H	M	<input type="checkbox"/> L	<input type="checkbox"/> H	M	L	
Score Based on Ratings	4			3			7			TOTAL
										14

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	<input checked="" type="checkbox"/>



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

### 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 ( <i>can be added to another figure</i> )	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream ( <i>can be added to another figure</i> )	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

### Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland ( <i>can be added to another figure</i> )	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

### Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	A1
Hydroperiods	H 1.2	A1
Plant cover of <b>dense</b> trees, shrubs, and herbaceous plants	S 1.3	A5
Plant cover of <b>dense, rigid</b> trees, shrubs, and herbaceous plants ( <i>can be added to figure above</i> )	S 4.1	A5
Boundary of 150 ft buffer ( <i>can be added to another figure</i> )	S 2.1, S 5.1	A1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	A2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	A3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	A4



## HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

**NO** – go to 2

**YES** – the wetland class is **Tidal Fringe** – go to 1.1

- 1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

**NO** – **Saltwater Tidal Fringe (Estuarine)**

**YES** – **Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

**NO** – go to 3

**YES** – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

At least 30% of the open water area is deeper than 6.6 ft (2 m).

**NO** – go to 4

**YES** – The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

✓ The wetland is on a slope (*slope can be very gradual*),

✓ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

✓ The water leaves the wetland **without being impounded**.

**NO** – go to 5

**YES** – The wetland class is **Slope**

**NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

\_\_\_ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

\_\_\_ The overbank flooding occurs at least once every 2 years.



Wetland name or number A

NO – go to 6

**YES** – The wetland class is **Riverine**

**NOTE:** The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

**YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

**YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*



Wetland name or number A

### **SLOPE WETLANDS**

#### **Water Quality Functions - Indicators that the site functions to improve water quality**

<b>S 1.0. Does the site have the potential to improve water quality?</b>		
<b>S 1.1. Characteristics of the average slope of the wetland: (<i>a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance</i>)</b> <input type="checkbox"/> Slope is 1% or less <span style="float: right;">points = 3</span> <input type="checkbox"/> Slope is > 1%-2% <span style="float: right;">points = 2</span> <input checked="" type="checkbox"/> Slope is > 2%-5% <span style="float: right;">points = 1</span> <input type="checkbox"/> Slope is greater than 5% <span style="float: right;">points = 0</span>		<b>1</b>
<b>S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions):</b> Yes = 3 <input type="checkbox"/> No = 0		<b>0</b>
<b>S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants:</b> Choose the points appropriate for the description that best fits the plants in the wetland. <i>Dense means you have trouble seeing the soil surface (&gt;75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.</i> <input type="checkbox"/> Dense, uncut, herbaceous plants > 90% of the wetland area <span style="float: right;">points = 6</span> <input type="checkbox"/> Dense, uncut, herbaceous plants > ½ of area <span style="float: right;">points = 3</span> <input type="checkbox"/> Dense, woody, plants > ½ of area <span style="float: right;">points = 2</span> <input type="checkbox"/> Dense, uncut, herbaceous plants > ¼ of area <span style="float: right;">points = 1</span> <input checked="" type="checkbox"/> Does not meet any of the criteria above for plants <span style="float: right;">points = 0</span>		<b>0</b>
<b>Total for S 1</b> <span style="float: right;">Add the points in the boxes above</span>		<b>1</b>

**Rating of Site Potential** If score is: 12 = H 6-11 = M ☒ 0-5 = L

*Record the rating on the first page*

<b>S 2.0. Does the landscape have the potential to support the water quality function of the site?</b>		
<b>S 2.1. Is &gt; 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants?</b> <span style="float: right;">Yes = 1 <input type="checkbox"/> No = 0</span>	<b>1</b>	
<b>S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1?</b> Other sources _____ <span style="float: right;">Yes = 1 <input type="checkbox"/> No = 0</span>	<b>0</b>	
<b>Total for S 2</b> <span style="float: right;">Add the points in the boxes above</span>		<b>1</b>

**Rating of Landscape Potential** If score is: ☒ 1-2 = M 0 = L

*Record the rating on the first page*

<b>S 3.0. Is the water quality improvement provided by the site valuable to society?</b>		
<b>S 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?</b> <span style="float: right;">Yes = 1 <input type="checkbox"/> No = 0</span>	<b>0</b>	
<b>S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? <i>At least one aquatic resource in the basin is on the 303(d) list.</i></b> <span style="float: right;">Yes = 1 <input type="checkbox"/> No = 0</span>	<b>0</b>	
<b>S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? <i>Answer YES if there is a TMDL for the basin in which unit is found.</i></b> <span style="float: right;">Yes = 2 <input type="checkbox"/> No = 0</span>	<b>0</b>	
<b>Total for S 3</b> <span style="float: right;">Add the points in the boxes above</span>		<b>0</b>

**Rating of Value** If score is: 2-4 = H 1 = M ☒ 0 = L

*Record the rating on the first page*

Question S 3.2 uses "basin" or "sub-basin" to refer to contributing basins of a downstream aquatic resource. Wetland A is not upstream of an aquatic resource on the 303d list, only adjacent.

Question S 3.3: There is no TMDL for the Edgewater Creek Basin.



Wetland name or number A

### SLOPE WETLANDS

#### Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?

S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually  $> \frac{1}{8}$  in), or dense enough, to remain erect during surface flows.*

- ☐ Dense, uncut, **rigid** plants cover  $> 90\%$  of the area of the wetland  
☒ All other conditions

points = 1  
points = 0

**0**

**Rating of Site Potential** If score is: 1 = M ✓ 0 = L

*Record the rating on the first page*

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?

S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff?

Yes = 1 ☐ No = 0

**0**

**Rating of Landscape Potential** If score is: 1 = M ✓ 0 = L

*Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?

S 6.1. Distance to the nearest areas downstream that have flooding problems:

- ☐ The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2  
☐ Surface flooding problems are in a sub-basin farther down-gradient points = 1  
☒ No flooding problems anywhere downstream points = 0

**0**

S 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 S 6

Add the points in the boxes above

**0**

**Rating of Value** If score is: 2-4 = H 1 = M ✓ 0 = L

*Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:



Wetland name or number A

**These questions apply to wetlands of all HGM classes.**

**HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat

**H 1.0. Does the site have the potential to provide habitat?**

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

- |   |                                  |          |
|---|----------------------------------|----------|
| <input type="checkbox"/> Aquatic bed  | 4 structures or more: points = 4 | <b>1</b> |
| <input checked="" type="checkbox"/> Emergent  | 3 structures: points = 2         |          |
| <input checked="" type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover)   | 2 structures: points = 1         |          |
| <input type="checkbox"/> Forested (areas where trees have > 30% cover)  | 1 structure: points = 0          |          |
| <i>If the unit has a Forested class, check if:</i>  |                                  |          |
| <input type="checkbox"/> The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon |                                  |          |

**H 1.2. Hydroperiods**

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

- |  |                                     |          |
|--|-------------------------------------|----------|
| <input type="checkbox"/> Permanently flooded or inundated                                    | 4 or more types present: points = 3 | <b>0</b> |
| <input type="checkbox"/> Seasonally flooded or inundated                                     | 3 types present: points = 2         |          |
| <input type="checkbox"/> Occasionally flooded or inundated                                   | 2 types present: points = 1         |          |
| <input checked="" type="checkbox"/> Saturated only   | 1 type present: points = 0          |          |
| <input type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland |                                     |          |
| <input type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland           |                                     |          |
| <input type="checkbox"/> <b>Lake Fringe wetland</b>  | <b>2 points</b>                     |          |
| <input type="checkbox"/> <b>Freshwater tidal wetland</b>                                     | <b>2 points</b>                     |          |

**H 1.3. Richness of plant species**

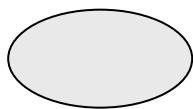
Count the number of plant species in the wetland that cover at least 10 ft<sup>2</sup>.

*Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. **Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

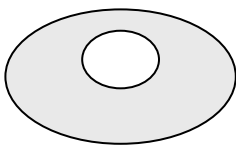
- |                              |            |          |
|------------------------------|------------|----------|
| If you counted: > 19 species | points = 2 | <b>1</b> |
| 5 - 19 species               | points = 1 |          |
| < 5 species                  | points = 0 |          |

**H 1.4. Interspersion of habitats**

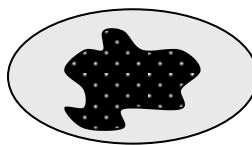
Decide from the diagrams below whether interspersions among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



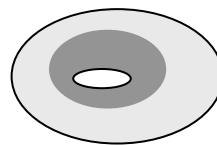
**None** = 0 points



**Low** = 1 point

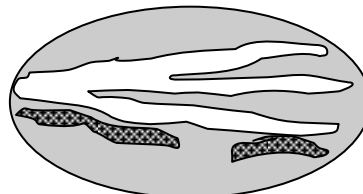
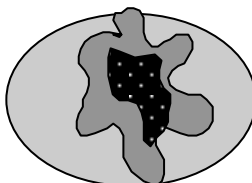
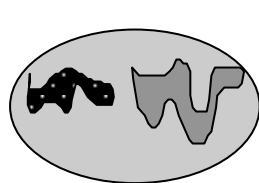


**Moderate** = 2 points



**2**

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





Wetland name or number A

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input type="checkbox"/> Large, downed, woody debris within the wetland (&gt; 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh &gt; 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) <b>and/or</b> overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (&gt; 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>		<b>1</b>
Total for H 1	Add the points in the boxes above	<b>5</b>

**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?		
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p>Calculate: % undisturbed habitat <u>31</u> + [(% moderate and low intensity land uses)/2] <u>1</u> = <u>32</u> %</p> <p>If total accessible habitat is:</p> <p><input type="checkbox"/> &gt; 1/3 (33.3%) of 1 km Polygon points = 3</p> <p><input checked="" type="checkbox"/> 20-33% of 1 km Polygon points = 2</p> <p><input type="checkbox"/> 10-19% of 1 km Polygon points = 1</p> <p><input type="checkbox"/> &lt; 10% of 1 km Polygon points = 0</p>		<b>2</b>
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p>Calculate: % undisturbed habitat <u>42</u> + [(% moderate and low intensity land uses)/2] <u>7</u> = <u>49</u> %</p> <p><input type="checkbox"/> Undisturbed habitat &gt; 50% of Polygon points = 3</p> <p><input checked="" type="checkbox"/> Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p><input type="checkbox"/> Undisturbed habitat 10-50% and &gt; 3 patches points = 1</p> <p><input type="checkbox"/> Undisturbed habitat &lt; 10% of 1 km Polygon points = 0</p>		<b>2</b>
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p><input type="checkbox"/> &gt; 50% of 1 km Polygon is high intensity land use points = (- 2)</p> <p><input checked="" type="checkbox"/> ≤ 50% of 1 km Polygon is high intensity points = 0</p>		<b>0</b>
Total for H 2	Add the points in the boxes above	<b>4</b>

**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?		
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <p><input checked="" type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page)</p> <p><input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)</p> <p><input type="checkbox"/> It is mapped as a location for an individual WDFW priority species</p> <p><input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources</p> <p><input type="checkbox"/> 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</p> <p><input type="checkbox"/> Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p><input type="checkbox"/> Site does not meet any of the criteria above points = 0</p>		<b>2</b>

**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

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** *This question is independent of the land use between the wetland unit and the priority habitat.*

- ☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ☒ **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- ☐ **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ☒ **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ☒ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.



Wetland name or number A

## CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
<b>SC 1.0. Estuarine wetlands</b> Does the wetland meet the following criteria for Estuarine wetlands? <input type="checkbox"/> The dominant water regime is tidal, <input type="checkbox"/> Vegetated, and <input type="checkbox"/> With a salinity greater than 0.5 ppt      Yes –Go to <b>SC 1.1</b> No= <b>Not an estuarine wetland</b>	
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? <div style="text-align: right;">Yes = <b>Category I</b>    No - Go to <b>SC 1.2</b></div>	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? <input type="checkbox"/> 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 <i>Spartina</i> , see page 25) <input type="checkbox"/> At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or unmowed grassland. <input type="checkbox"/> The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. <div style="text-align: right;">Yes = <b>Category I</b>    No = <b>Category II</b></div>	Cat. I      Cat. II
<b>SC 2.0. Wetlands of High Conservation Value (WHCV)</b> SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? <div style="text-align: right;">Yes – Go to <b>SC 2.2</b>      No – Go to <b>SC 2.3</b></div> SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? <div style="text-align: right;">Yes = <b>Category I</b>      No = <b>Not a WHCV</b></div> SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? <a href="http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf">http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf</a> <div style="text-align: right;">Yes – Contact <b>WNHP/WDNR</b> and go to <b>SC 2.4</b>      No = <b>Not a WHCV</b></div> SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? <div style="text-align: right;">Yes = <b>Category I</b>      No = <b>Not a WHCV</b></div>	Cat. I
<b>SC 3.0. Bogs</b> Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i> 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? <div style="text-align: right;">Yes – Go to <b>SC 3.3</b>      No – Go to <b>SC 3.2</b></div> 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? <div style="text-align: right;">Yes – Go to <b>SC 3.3</b>      No = <b>Is not a bog</b></div> 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? <div style="text-align: right;">Yes = <b>Is a Category I bog</b>      No – Go to <b>SC 3.4</b></div> <p><b>NOTE:</b> 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.</p> 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? <div style="text-align: right;">Yes = <b>Is a Category I bog</b>      No = <b>Is not a bog</b></div>	Cat. I



Wetland name or number A

<p><b>SC 4.0. Forested Wetlands</b></p> <p>Does the wetland have at least <u>1 contiguous acre</u> of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? <i><b>If you answer YES you will still need to rate the wetland based on its functions.</b></i></p> <p><input type="checkbox"/> <b>Old-growth forests</b> (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.</p> <p><input type="checkbox"/> <b>Mature forests</b> (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).</p> <p style="text-align: right;">Yes = <b>Category I</b>      No = <b>Not a forested wetland for this section</b></p>	<p><b>Cat. I</b></p>
<p><b>SC 5.0. Wetlands in Coastal Lagoons</b></p> <p>Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?</p> <p><input type="checkbox"/> 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</p> <p><input type="checkbox"/> The lagoon in which the wetland is located contains ponded water that is saline or brackish (&gt; 0.5 ppt) during most of the year in at least a portion of the lagoon (<i>needs to be measured near the bottom</i>)</p> <p style="text-align: right;">Yes – Go to <b>SC 5.1</b>      No = <b>Not a wetland in a coastal lagoon</b></p> <p><b>SC 5.1.</b> Does the wetland meet all of the following three conditions?</p> <p><input type="checkbox"/> The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).</p> <p><input type="checkbox"/> At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or unmowed grassland.</p> <p><input type="checkbox"/> The wetland is larger than 1/10 ac (4350 ft<sup>2</sup>)</p> <p style="text-align: right;">Yes = <b>Category I</b>      No = <b>Category II</b></p>	<p><b>Cat. I</b></p> <p><b>Cat. II</b></p>
<p><b>SC 6.0. Interdunal Wetlands</b></p> <p>Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? <i><b>If you answer yes you will still need to rate the wetland based on its habitat functions.</b></i></p> <p>In practical terms that means the following geographic areas:</p> <p><input type="checkbox"/> Long Beach Peninsula: Lands west of SR 103</p> <p><input type="checkbox"/> Grayland-Westport: Lands west of SR 105</p> <p><input type="checkbox"/> Ocean Shores-Copalis: Lands west of SR 115 and SR 109</p> <p style="text-align: right;">Yes – Go to <b>SC 6.1</b>      No = <b>not an interdunal wetland for rating</b></p> <p><b>SC 6.1.</b> 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)?</p> <p style="text-align: right;">Yes = <b>Category I</b>      No – Go to <b>SC 6.2</b></p> <p><b>SC 6.2.</b> Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?</p> <p style="text-align: right;">Yes = <b>Category II</b>      No – Go to <b>SC 6.3</b></p> <p><b>SC 6.3.</b> 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?</p> <p style="text-align: right;">Yes = <b>Category III</b>      No = <b>Category IV</b></p>	<p><b>Cat I</b></p> <p><b>Cat. II</b></p> <p><b>Cat. III</b></p> <p><b>Cat. IV</b></p>
<p><b>Category of wetland based on Special Characteristics</b></p> <p>If you answered No for all types, enter "Not Applicable" on Summary Form</p>	<p><b>N/A</b></p>

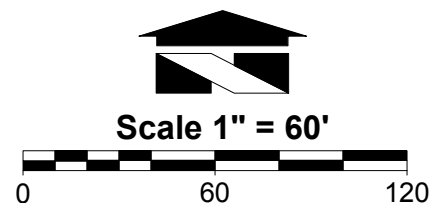
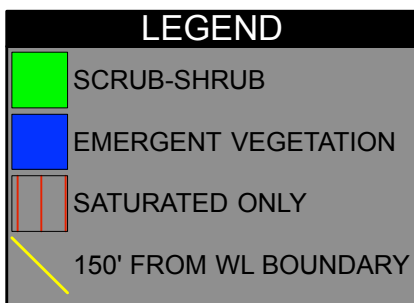
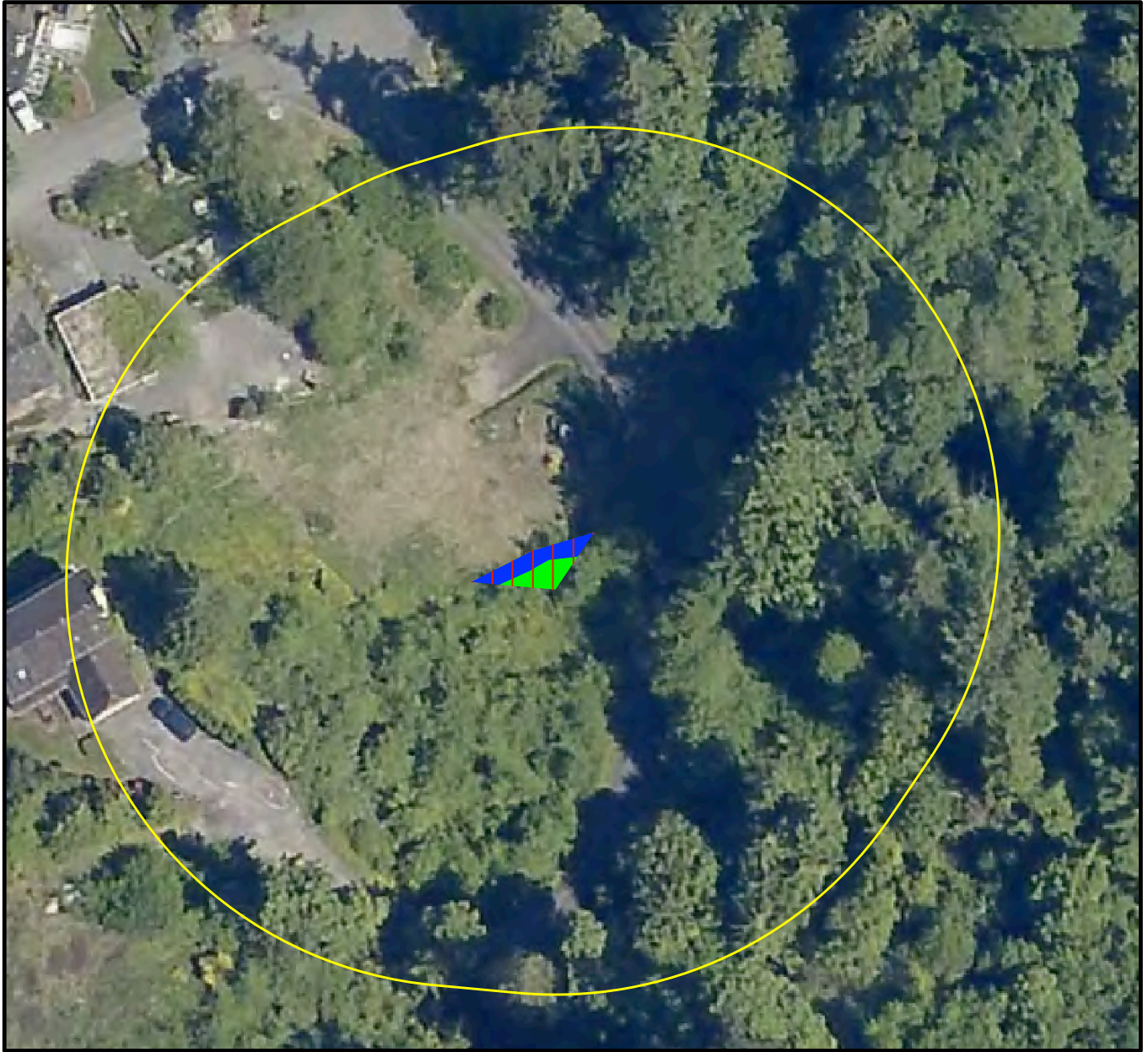


Wetland name or number \_\_\_\_\_

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17079 LOT DESIGN - DEBRELOAN LANE  
WETLAND RATING FIGURE A1 - WETLAND A



*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**

LOT Design Group  
Attn: Larry Thronsdon  
22630 88th Avenue W  
Edmonds, WA 98026

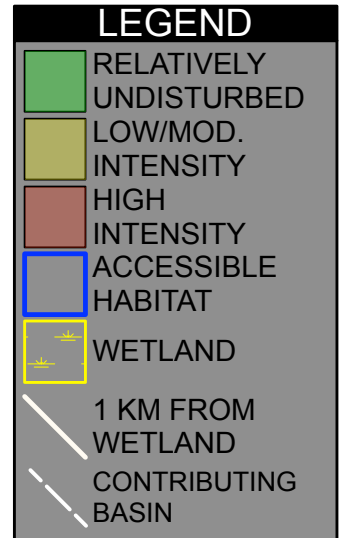
Figure A1  
WRI Job # 17079  
Drawn by: SW



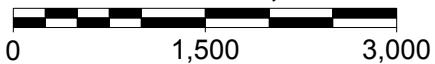
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17079 LOT DESIGN - DEBRELOAN LANE  
WETLAND RATING FIGURE A2 - WETLAND A



Scale 1" = 1,500'



*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**

LOT Design Group  
Attn: Larry Throndsen  
22630 88th Avenue W  
Edmonds, WA 98026

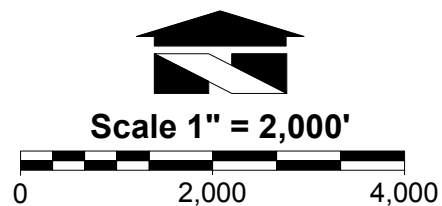
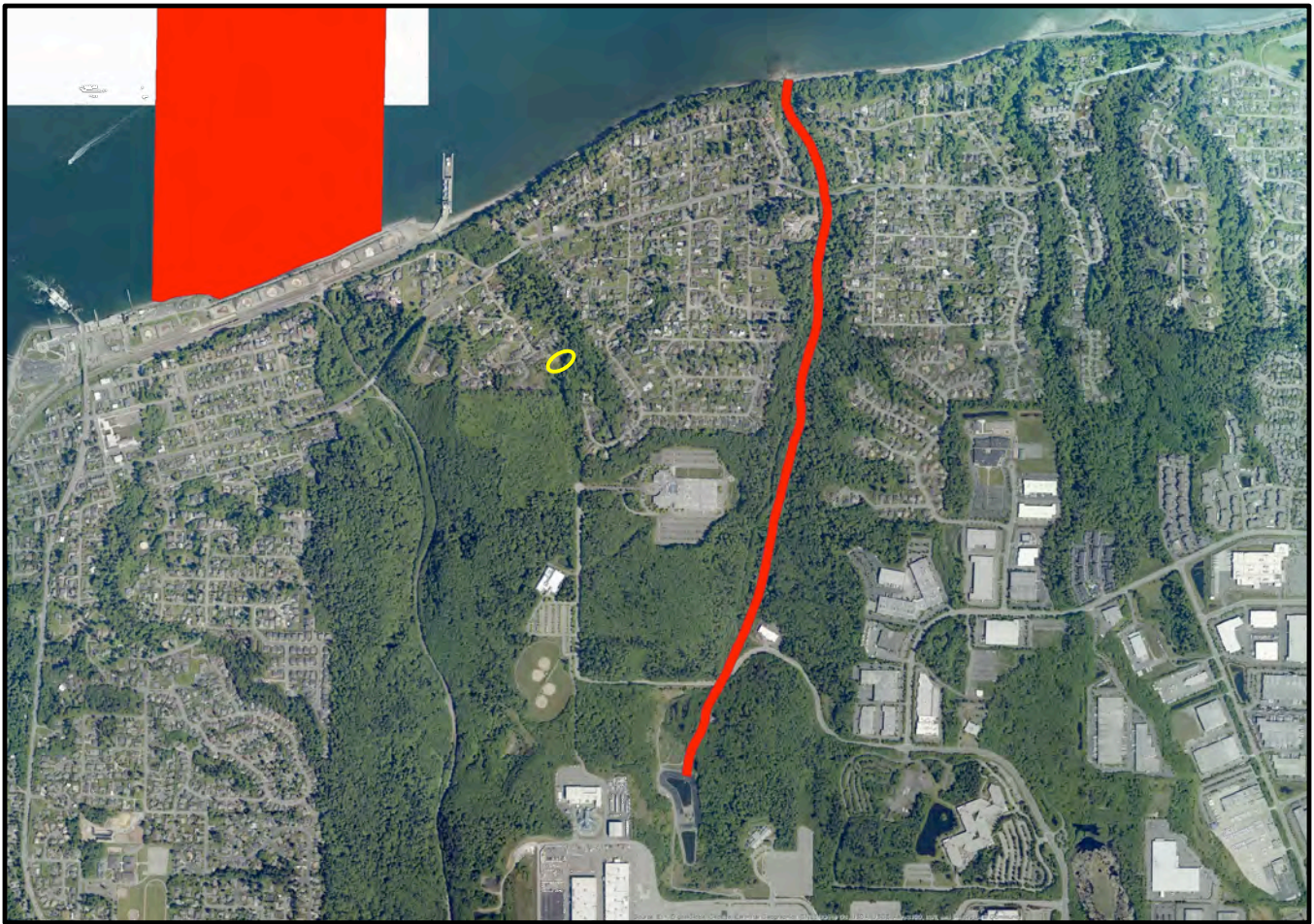
Figure A2  
WRI Job # 17079  
Drawn by: SW



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17079 LOT DESIGN - DEBRELOAN LANE  
WETLAND RATING FIGURE A3 - WETLAND A



Scale 1" = 2,000'

**LEGEND**

 WETLAND  
LOCATION

 AQUATIC RESOURCES  
ON THE 303(d) LIST

*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**

LOT Design Group  
Attn: Larry Thronsdon  
22630 88th Avenue W  
Edmonds, WA 98026

Figure A3  
WRI Job # 17079  
Drawn by: SW



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# 17079 LOT DESIGN - DEBRELOAN LANE

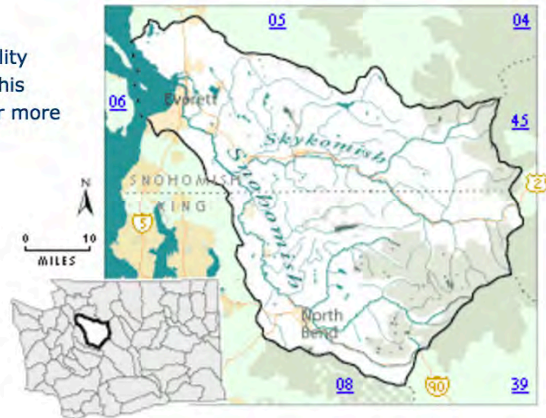
## WETLAND RATING FIGURE A4 - WETLAND A

### 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
<a href="#">Lake Loma</a>	Total Phosphorus	Straight to implementation project under development	<a href="#">Tricia Shoblom</a> 425-649-7288
<a href="#">Snohomish River</a>	<a href="#">French Creek / Pilchuck River</a>	Under development	<a href="#">Ralph Svrcek</a> 425-649-7165
	<ul style="list-style-type: none"> <li>• Dissolved Oxygen</li> <li>• Temperature</li> </ul>		
	<a href="#">Dioxin</a>	EPA approved	<a href="#">Ralph Svrcek</a> 425-649-7165
	<a href="#">Estuary</a>	EPA approved	<a href="#">Ralph Svrcek</a> 425-649-7165
	<ul style="list-style-type: none"> <li>• Ammonia</li> <li>• BOD</li> </ul>		
<a href="#">Tributaries</a>	<ul style="list-style-type: none"> <li>• Fecal Coliform</li> </ul>	EPA approved	<a href="#">Ralph Svrcek</a> 425-649-7165
	Tributaries: <ul style="list-style-type: none"> <li>• Allen Creek</li> <li>• Quilceda Creek</li> <li>• French Creek</li> <li>• Woods Creek</li> <li>• Pilchuck River</li> <li>• Marshlands (Wood Creek) {2}</li> </ul>		
<a href="#">Snoqualmie River</a>	<ul style="list-style-type: none"> <li>• Ammonia-N</li> <li>• BOD (5-day)</li> <li>• Fecal Coliform</li> </ul>	EPA approved	<a href="#">Ralph Svrcek</a> 425-649-7165
	Temperature	EPA approved Has an implementation plan	

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







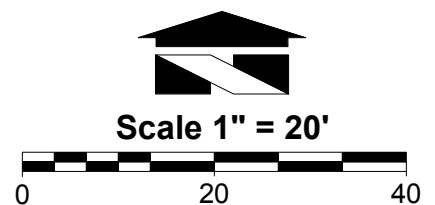
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17079 LOT DESIGN - DEBRELOON LANE  
WETLAND RATING FIGURE A5 - WETLAND A



LEGEND	
	WETLAND
	DENSE WOODY
	DENSE UNCUT HERBACEOUS
	DENSE UNCUT RIDGID



*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

<b>WETLAND RATING</b> <b>Wetland A</b>	
LOT Design Group	Figure A5
Attn: Larry Thronsdon	WRI Job # 17079
22630 88th Avenue W	Edmonds, WA 98026
	Drawn by: SW



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**APPENDIX C**  
CRITICAL AREAS STUDY  
AND  
BUFFER ENHANCEMENT PLAN MAP  
(SHEET 1/1)



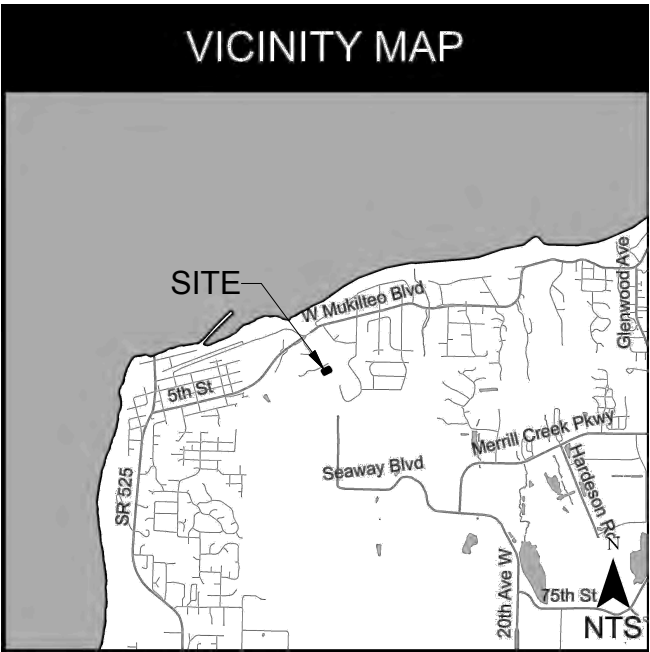
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CRITICAL AREAS STUDY AND MITIGATION PLAN MAP

**1603 DEBRELON LANE**

PORTION OF SECTION 03, TOWNSHIP 28N, RANGE 04E, W.M.



OFF-SITE WETLAND  
CATEGORY IV  
40' BUFFER

TRIBUTARY TO  
EDGEWATER CREEK  
50' BUFFER

PROPOSED  
RESIDENCE

DEBRELON LANE

WETLAND A  
CATEGORY IV  
40' BUFFER

PROPOSED  
SUBDIVISION  
LINE

5'

40'

BUFFER  
ENHANCEMENT  
(1,824 SF)

PROPOSED  
RETAINING  
WALL

LEGEND

- WETLAND
- BUFFER ENHANCEMENT
- BUFFER
- STREAM (APPROXIMATE)
- PROPOSED BOUDARY LINE
- TYPE 1 NGPA SIGN

Scale 1" = 30'



**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

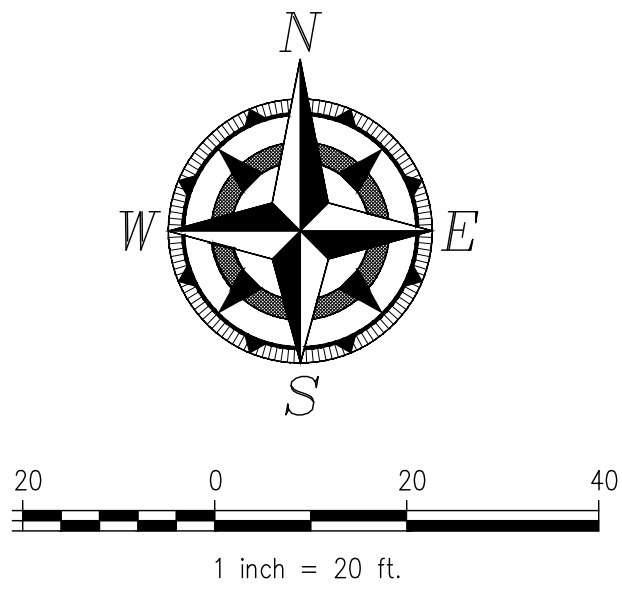
CRITICAL AREAS STUDY AND  
MITIGATION PLAN MAP  
**1603 Debreton Lane**  
Mukilteo, Washington

LOT Design Group  
Attn: Larry Throndsen  
22630 88th Avenue W  
Edmonds, WA 98026

Sheet 1/1  
WRI Job#: 17079  
Drawn by: S. Walters  
Date: Oct. 17, 2018



NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E



**HORIZONTAL DATUM:**

THE VERTICAL DATUM FOR THIS SURVEY IS NAVD 88, BASED ON PUBLISHED ELEVATIONS FOR WSDOT MONUMENTS:

'GP31525-133' MONUMENT ID 2955  
ELEVATION: 10.883 FEET

'TIDAL 5 1971' MONUMENT ID 3756:  
ELEVATION:12.766 FEET

**HORIZONTAL DATUM:**

THE HORIZONTAL DATUM FOR THIS SURVEY IS NAD 83/11, BASED ON PUBLISHED COORDINATES FOR WSDOT MONUMENTS:

'GP31525-133' MONUMENT ID 2955  
NORTHING:349415.390 FEET  
EASTING: 1279511.250 FEET

'TIDAL 5 1971' MONUMENT ID 3756:  
NORTHING:349524.268 FEET  
EASTING: 1279424.469 FEET

**LEGEND**

- PROPOSED CONCRETE
- PROPOSED ASPHALT

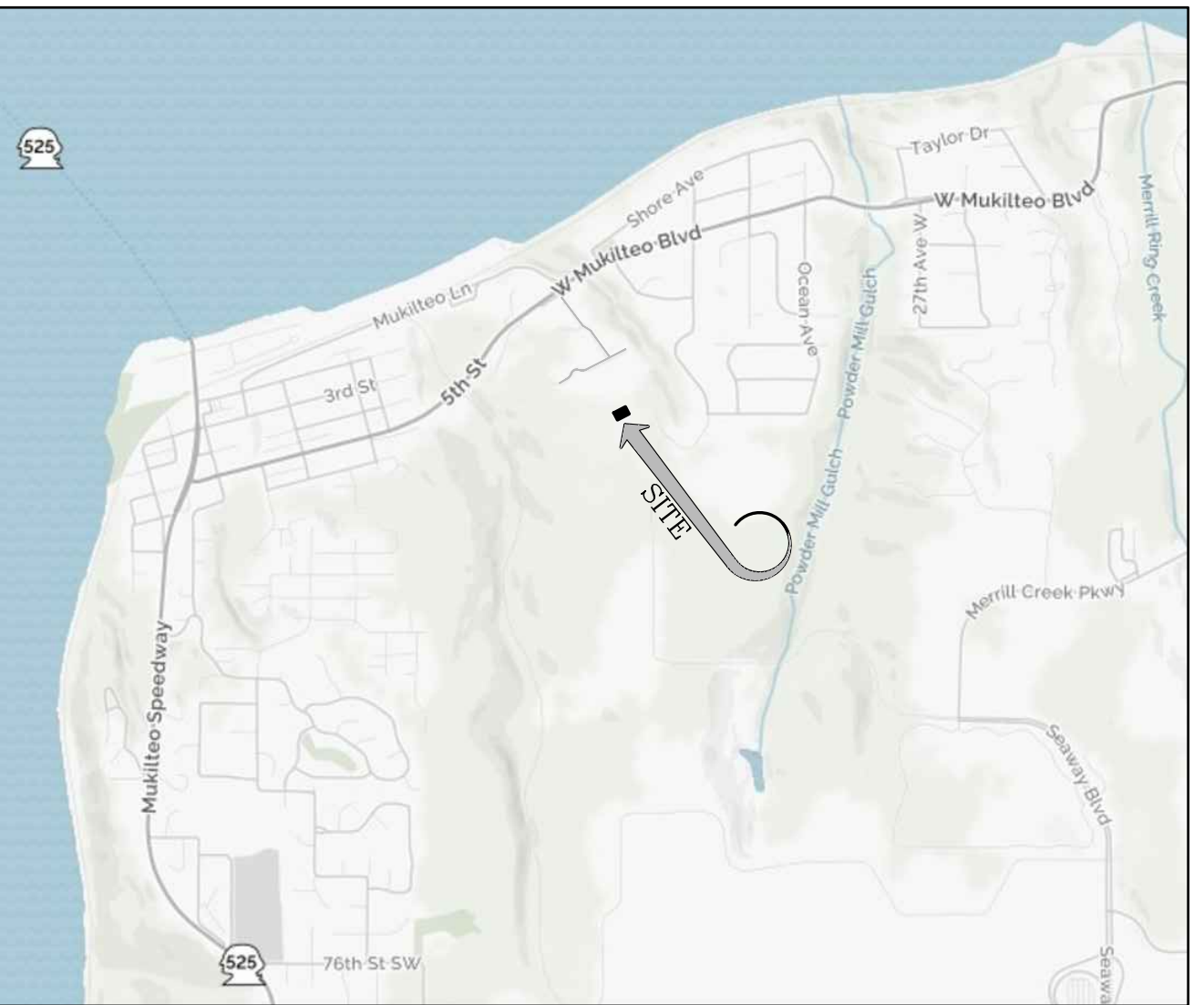
**SITE DATA**

LOT SURFACE = 8,500 SF (0.195 AC)  
EXIST IMPERVIOUS = 0

NEW SITE DEVELOPMENT SA = 7,595 SF (0.1744 AC)  
PROPOSED ROOFTOP SA = 2,038 SF (0.0468 AC)  
PROPOSED CONC WALK SA = 127 SF (0.0029 AC)  
NET IMP AFTER DEVELOPMENT  
SA = 2,165 SF (0.0497 AC)

IMPERVIOUS COVERAGE = 28.51%

ROOFTOP COVERAGE = 26.83%



**VICINITY MAP**

SCALE: 1" = 2000'

<b>APPLICANT/OWNER</b>	DAVID & JOAN LONEY 12661 WEST SAN JUAN COURT LITCHFIELD PARK, AZ 85340
<b>PROJECT ARCHITECT</b>	LOT DESIGN GROUP 22630 - 88TH AVE W EDMONDS, WA 98026 (TEL) 425-478-4814 CONTACT: LARRY THRONDSSEN
<b>SURVEYOR</b>	PACIFIC GEOMATIC SERVICES, INC. 6608 216TH ST SW, SUITE 304 MOUNTLAKE TERRACE, WA 98043 (TEL) 425-778-5620 pgs@pacgeoinc.com
<b>PROJECT ENGINEER</b>	J.C. McDONNELL ENGINEERING, PC 6608 216TH ST SW, SUITE 306 MOUNTLAKE TERRACE, WA 98043 (TEL) 425-744-0916 (FAX) 425-744-0946 john@jcmedon.com

**LEGAL DESCRIPTION:**  
(PER CHICAGO TITLE INSURANCE COMPANY GUARANTEE NO. 500041199, DATED APRIL 27, 2016 AT 08:00 AM)  
THAT PORTION OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS:  
BEGINNING AT THE NORTHWEST CORNER OF SAID GOVERNMENT LOT 3;  
THENCE EASTERLY ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR A DISTANCE OF 569.59 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 412.8 FEET;  
THENCE SOUTH 62°05'10" WEST A DISTANCE OF 35.0 FEET TO THE MOST EASTERLY CORNER OF TRACT DECEDED TO ELLIOT F. BROWN, JULY 18, 1957;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 40.0 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 90 FEET TO THE TRUE POINT OF BEGINNING OR THIS DESCRIPTION;  
THENCE CONTINUE SOUTH 32°10'50" EAST FOR A DISTANCE OF 100 FEET;  
THENCE NORTH 62°05'10" EAST FOR 190.0 FEET;  
THENCE NORTH 32°10'50" FOR A DISTANCE OF 100 FEET;  
THENCE SOUTH 62°10'10" WEST FOR A DISTANCE OF 190 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;  
TOGETHER WITH A NON-EXCLUSIVE EASEMENT FOR INGRESS AND EGRESS AND FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH AND UPON THE FOLLOWING DESCRIBED PROPERTY:  
A 50.00 FOOT WIDE STRIP OF LAND BEING 25.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE:  
BEGINNING AT THE NORTHWEST CORNER OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.;  
THENCE NORTH 89°06'20" EAST ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR 569.59 FEET;  
THENCE SOUTH 32°57'42" EAST 412.80 FEET;  
THENCE SOUTH 61°18'18" WEST FOR 35.00 FEET;  
THENCE SOUTH 32°57'42" EAST FOR 40.00 FEET;  
THENCE NORTH 61°18'18" EAST FOR 225.55 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;  
THENCE SOUTH 50°52'33" EAST FOR 132.04 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 100.00 FEET A CENTRAL ANGLE OF 67°51'10" FOR AN ARC LENGTH OF 118.42 FEET;  
THENCE SOUTH 16°58'37" WEST FOR 81.37 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 50.00 FEET A CENTRAL ANGLE OF 90°48'50" FOR AN ARC LENGTH OF 71.25 FEET;  
THENCE NORTH 72°12'33" WEST FOR 134.58 FEET TO THE TERMINUS OF THIS CENTERLINE DESCRIPTION.  
TOGETHER WITH A PERPETUAL, NON-EXCLUSIVE EASEMENT FOR INGRESS, EGRESS FOR PEDESTRIAN AND MOTOR VEHICLE USE (A DRIVEWAY) AND FOR INSTALLATION, OPERATION, AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH, AND UPON THE FOLLOWING DESCRIBED PROPERTY, AS DISCLOSED IN DECLARATION OF EASEMENT RECORDING NO. 201407180273:  
A STRIP OF LAND 20.00 FEET IN WIDTH, BEING 10.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE, LOCATED IN GOVERNMENT LOT 3, IN THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.:  
COMMENCING AT THE MOST NORTHEASTERLY CORNER OF TRACT F, CITY OF MUKILTEO SHORT PLAT NO. SP2012-001, ACCORDING TO THE PLAT THEREOF AS RECORDED UNDER AUDITOR'S FILE NUMBER 201402105001, RECORDS OF SNOHOMISH COUNTY, WASHINGTON; THENCE SOUTH 48°42'13" EAST ALONG THE EAST LINE OF SAID TRACT F A DISTANCE OF 127.97 FEET TO THE CENTERLINE OF AN EXISTING ASPHALT DRIVEWAY, AND THE TRUE POINT OF BEGINNING OF THIS DESCRIBED CENTERLINE; THENCE SOUTH 54°36'01" WEST ALONG THE CENTERLINE OF SAID ASPHALT DRIVEWAY AND THE SOUTHWESTERLY PROJECTION THEREOF A DISTANCE OF 48.06 FEET TO A POINT ON THE EAST LINE OF THAT CERTAIN TRACT OF LAND CONVEYED TO ANDREW C. LAMAR BY QUITCLAIM DEED RECORDED UNDER RECORDING NUMBER 8306130222, RECORDS OF SNOHOMISH COUNTY, WASHINGTON AND THE TERMINUS OF THIS DESCRIBED CENTERLINE SAID TERMINUS POINT BEING 63.74 FEET NORTH OF THE SOUTHEAST CORNER OF SAID LAMAR TRACT AS MEASURED ALONG THE EAST LINE THEREOF THE SIDE LINES OF THIS DESCRIBED EASEMENT SHALL BE EXTENDED TO OR TRUNCATED AT THE EAST LINE OF SAID LAMAR TRACT AND THE EAST LINE OF SAID GOVERNMENT LOT 3.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

<b>TAX ACCOUNT NO.:</b>	<b>SITE ADDRESS:</b>
28040300200200	1603 DEBRELOE LANE, MUKILTEO, WA 98275

**SITE PLAN**  
**LONEY SHORT PLAT**  
**NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E**  
**SNOHOMISH COUNTY, WASHINGTON**

DRAWN BY	DATE	REV. BY	DATE	PROJECT MANAGER	SCALE
TJW	01/24/2017	TJW	05/31/2019	J.C. McDonnell	AS SHOWN
DRAWING FILE NAME	CHK. BY	F.B. NO.	JOB NO.	SHT. NO.	
5999-Loney PlanSet.dwg	JCM		5999	SP 1 of 1	



Know what's below.  
Call before you dig.

1	REVISED PER CITY COMMENTS	TJW	05/31/19
REV. NO.	DESCRIPTION	INITIALS	DATE

**UTILITY CONFLICT NOTE:**

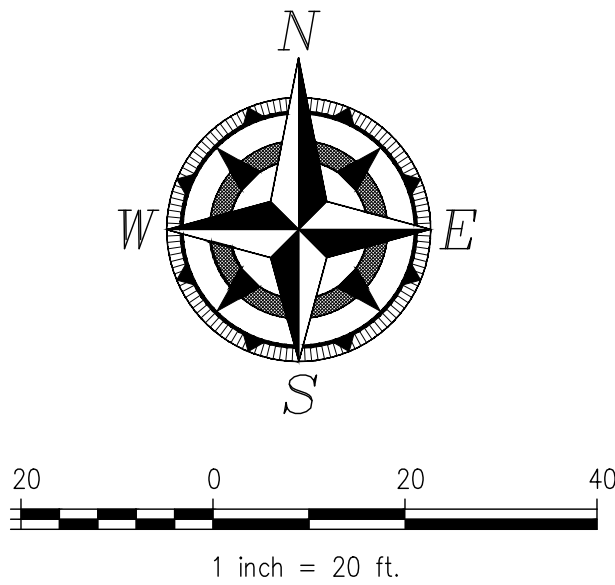
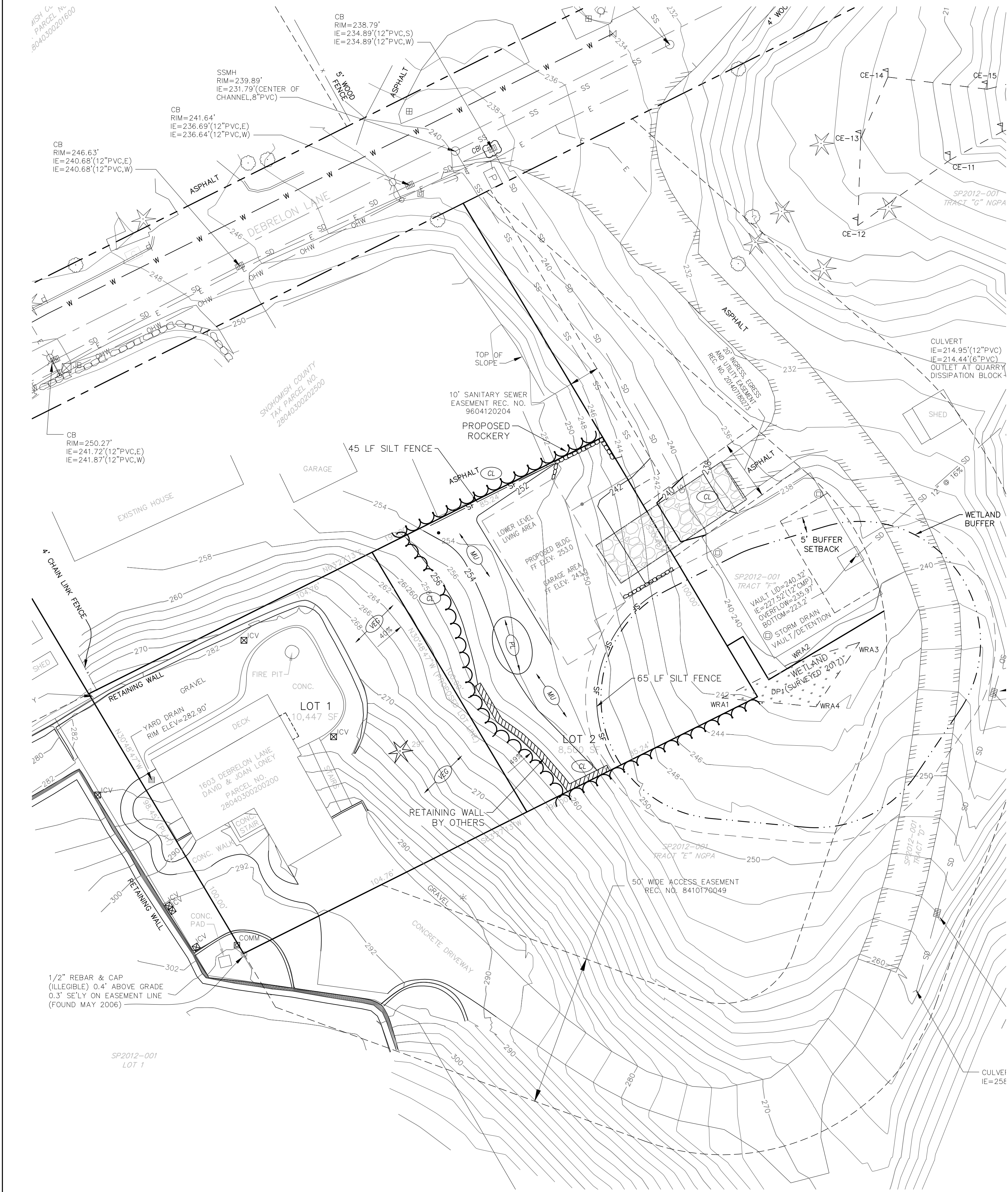
**CAUTION:**  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT J.C. McDONNELL ENGINEERING, PC TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.



**J.C. McDONNELL**  
**ENGINEERING, PC**  
**civil engineers**  
P.O. BOX 13199, MILL CREEK, WASHINGTON TEL: (425) 744-0916  
FAX: (425) 744-0946



NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E



**HORIZONTAL DATUM:**  
THE VERTICAL DATUM FOR THIS SURVEY IS NAVD 88, BASED ON PUBLISHED ELEVATIONS FOR WSDOT MONUMENTS:

'GP31525-133' MONUMENT ID 2955  
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EASTING: 1279511.250 FEET

'TIDAL 5 1971' MONUMENT ID 3756:  
NORTHING:349524.268 FEET  
EASTING: 1279424.469 FEET

**T.E.S.C. LEGEND**

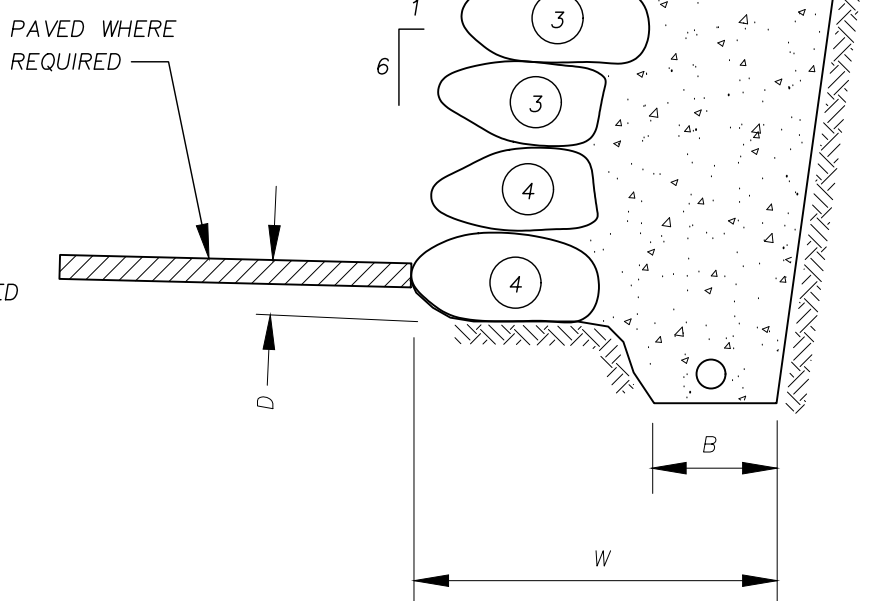
- VEG RETAIN EXISTING VEGETATION WHEN FEASIBLE
- CL CLEARING LIMITS
- MU MULCH &/OR STRAW MATTING
- PL PLASTIC COVER
- SF SILT FENCE
- TEMPORARY CONSTRUCTION ENTRANCE
- CBI CATCH BASIN INLET PROTECTION

**LEGEND**

- 2 INCH TO 4 INCH QUARRY SPALLS FREE OF ORGANIC WITH LESS THAN 5 PERCENT FINES (SILT AND CLAY PARTICLES PASSING THE NO. 200 MESH SIEVE)
- SURFACE SEAL; MAY CONSIST OF IMPERVIOUS SOIL OR A FINE FREE DRAINING GRANULAR MATERIAL, BOTH OVER FILTER FABRIC, OR LEAN CONCRETE
- UNDISTURBED FIRM NATIVE SOIL
- DESIGNATED SIZE OF ROCK REQUIRED ie. 4 MAN
- MINIMUM 4 INCH DIAMETER UNDERDRAIN PIPE CONFORMING TO SECTION 7-01 OF THE WSDOT/APWA SPECIFICATIONS. SUCH PIPE SHALL BE BEDDED ON AND SURROUNDED BY 2 INCH TO 4 INCH QUARRY SPALLS AS DESCRIBED ABOVE

**NOTES:**

- ROCK WALLS (ROCKERIES) SHALL COMPLY WITH THE PROVISIONS OF SECTION 3.6.7 OF THE CITY OF MUKILTEO DEVELOPMENT STANDARDS.
- MAXIMUM INCLINATION OF THE SLOPES ABOVE AND BEHIND ROCKERIES SHOULD BE 2:1(HORIZONTAL: VERTICAL).
- MINIMUM THICKNESS OF ROCK FILTER LAYER B=12 INCHES.
- MINIMUM EMBEDMENT D=12 INCHES UNDISTURBED NATIVE SOIL OR COMPACTED FILL PLACED IN ACCORDANCE WITH GEOTECHNICAL REPORT RECOMMENDATIONS.
- ROCKERIES GREATER THAN 8 FEET IN HEIGHT TO BE INSTALLED UNDER PERIODIC OR FULL TIME OBSERVATION OF THE GEOTECHNICAL ENGINEER.
- ROCK SHALL BE PLACED TO GRADUALLY DECREASE IN SIZE WITH INCREASING WALL HEIGHT IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
- MINIMUM WIDTH OF KEYWAY EXCAVATION, W, SHALL BE EQUAL TO THE THICKNESS OF THE BASAL ROCK(AS DETERMINED BY THE GEOTECHNICAL ENGINEER'S DESIGN) PLUS B.
- THE LONG DIMENSION OF THE ROCKS SHALL EXTEND PERPENDICULAR TO THE ROCK FACE TO PROVIDE MAXIMUM STABILITY.
- ROCKS SHALL BE PLACED TO AVOID CONTINUOUS JOINT PLANES IN VERTICAL OR LATERAL DIRECTIONS. EACH ROCK SHALL BEAR ON TWO OR MORE ROCKS BELOW IT, WITH GOOD FLAT-TO-FLAT CONTACT.



SIZE	APPROX. WT - LBS.	APPROX. DIA.
1 MAN	50-200	12"-18"
2 MAN	200-700	18"-28"
3 MAN	700-2000	28"-36"
4 MAN	2000-4000	36"-48"
5 MAN	4000-6000	48"-54"
6 MAN	6000-8000	54"-60"

**ROCKERY DETAIL**

NO SCALE

**SHEET INDEX**

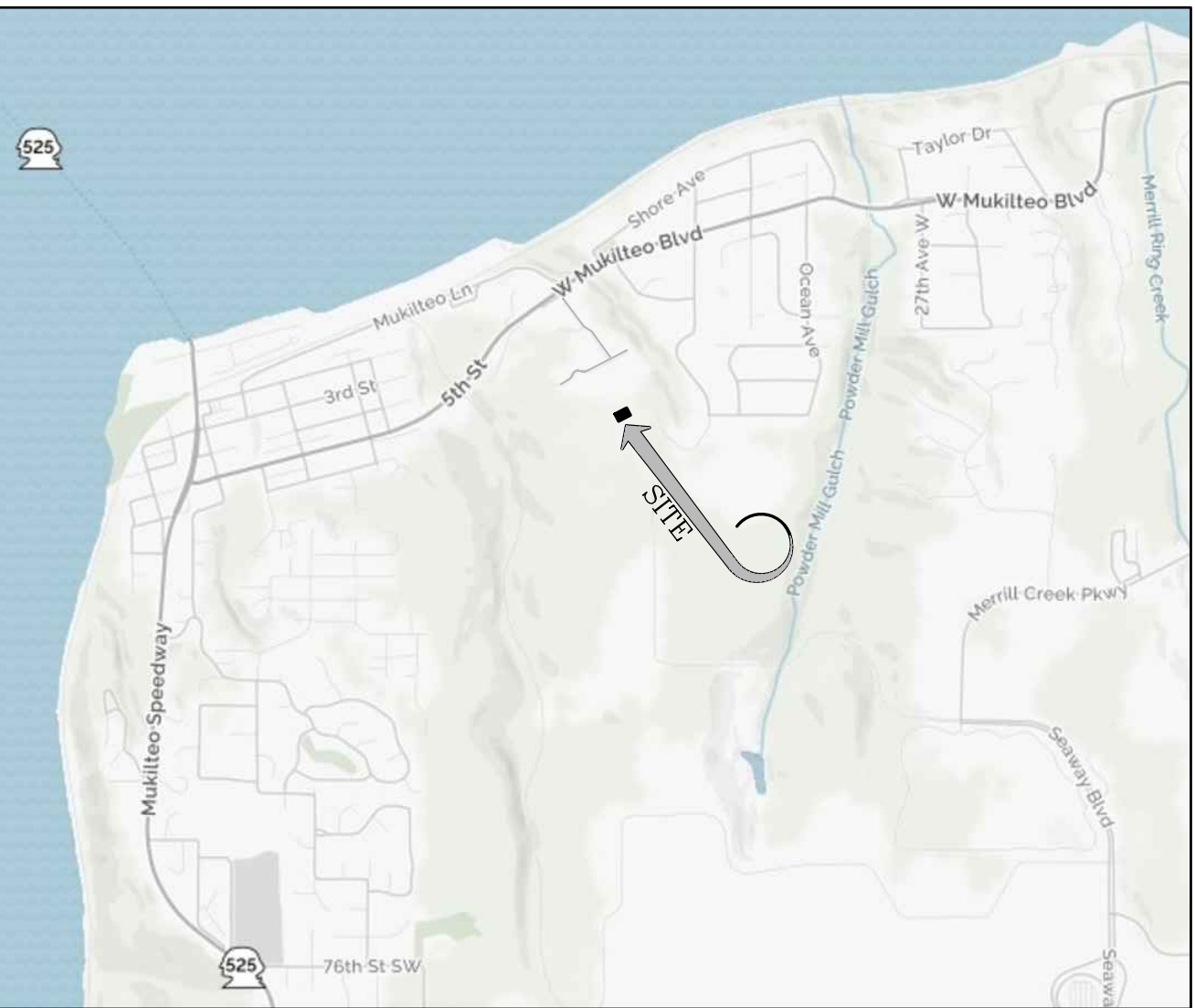
- C1 OF 4 TESC AND GRADING PLAN
- C2 OF 4 DRAINAGE AND UTILITY PLAN
- C3 OF 4 NOTES AND DETAILS
- C4 OF 4 UTILITY

**CITY ENGINEER**  
**MUKITEO PUBLIC WORKS DEPARTMENT**  
**APPROVED FOR CONSTRUCTION**

BY: \_\_\_\_\_

FOR: \_\_\_\_\_

R/W PERMIT NUMBER: \_\_\_\_\_



**VICINITY MAP**

SCALE: 1" = 2000'

<b>APPLICANT/OWNER</b>	DAVID & JOAN LONEY 12661 WEST SAN JUAN COURT LITCHFIELD PARK, AZ 85340
<b>PROJECT ARCHITECT</b>	LOT DESIGN GROUP 22630 - 88TH AVE W EDMONDS, WA 98026 (TEL) 425-478-4814 CONTACT: LARRY THRONDSSEN
<b>SURVEYOR</b>	PACIFIC GEOMATIC SERVICES, INC. 6608 216TH ST SW, SUITE 304 MOUNTLAKE TERRACE, WA 98043 (TEL) 425-778-5620 pgs@pacgeoinc.com
<b>PROJECT ENGINEER</b>	J.C. McDONNELL ENGINEERING, PC 6608 216TH ST SW, SUITE 306 MOUNTLAKE TERRACE, WA 98043 (TEL) 425-744-0916 (FAX) 425-744-0946 john@jcmcdon.com

**LEGAL DESCRIPTION:**

(PER CHICAGO TITLE INSURANCE COMPANY GUARANTEE NO. 500041199, DATED APRIL 27, 2016 AT 08:00 AM)

THAT PORTION OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID GOVERNMENT LOT 3;  
THENCE EASTERLY ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR A DISTANCE OF 569.59 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 412.8 FEET;  
THENCE SOUTH 62°05'10" WEST A DISTANCE OF 35.0 FEET TO THE MOST EASTERLY CORNER OF TRACT DECEDED TO ELLIOT F. BROWN, JULY 18, 1957;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 40.00 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 90 FEET TO THE TRUE POINT OF BEGINNING OR THIS DESCRIPTION;  
THENCE CONTINUE SOUTH 32°10'50" EAST FOR A DISTANCE OF 100 FEET;  
THENCE NORTH 62°05'10" EAST FOR 190.0 FEET;  
THENCE NORTH 32°10'50" FOR A DISTANCE OF 100 FEET;  
THENCE SOUTH 62°10'10" WEST FOR A DISTANCE OF 190 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;

TOGETHER WITH A NON-EXCLUSIVE EASEMENT FOR INGRESS AND EGRESS AND FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH AND UPON THE FOLLOWING DESCRIBED PROPERTY:

A 50.00 FOOT WIDE STRIP OF LAND BEING 25.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE:  
BEGINNING AT THE NORTHWEST CORNER OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.;  
THENCE NORTH 89°06'20" EAST ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR 569.59 FEET;  
THENCE SOUTH 32°57'42" EAST 412.80 FEET;  
THENCE SOUTH 61°18'18" WEST FOR 35.00 FEET;  
THENCE SOUTH 32°57'42" EAST FOR 40.00 FEET;  
THENCE NORTH 61°18'18" EAST FOR 225.55 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;  
THENCE SOUTH 50°52'33" EAST FOR 132.04 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 100.00 FEET A CENTRAL ANGLE OF 67°51'10" FOR AN ARC LENGTH OF 118.42 FEET;  
THENCE SOUTH 16°58'33" WEST FOR 81.37 FEET;  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 50.00 FEET A CENTRAL ANGLE OF 90°48'50" FOR AN ARC LENGTH OF 71.25 FEET;  
THENCE NORTH 72°12'33" WEST FOR 134.58 FEET TO THE TERMINUS OF THIS CENTERLINE DESCRIPTION.

TOGETHER WITH A PERPETUAL, NON-EXCLUSIVE EASEMENT FOR INGRESS, EGRESS FOR PEDESTRIAN AND MOTOR VEHICLE USE (A DRIVEWAY) AND FOR INSTALLATION, OPERATION, AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH, AND UPON THE FOLLOWING DESCRIBED PROPERTY, AS DISCLOSED IN DECLARATION OF EASEMENT RECORDING NO. 201407180273:

A STRIP OF LAND 20.00 FEET IN WIDTH, BEING 10.00 FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTERLINE, LOCATED IN GOVERNMENT LOT 3, IN THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.:

COMMENCING AT THE MOST NORTHEASTERLY CORNER OF TRACT F, CITY OF MUKILTEO SHORT PLAT NO. SP2012-001, ACCORDING TO THE PLAT THEREOF AS RECORDED UNDER AUDITOR'S FILE NUMBER 201402105001, RECORDS OF SNOHOMISH COUNTY, WASHINGTON; THENCE SOUTH 48°42'13" EAST ALONG THE EAST LINE OF SAID TRACT F A DISTANCE OF 127.97 FEET TO THE CENTERLINE OF AN EXISTING ASPHALT DRIVEWAY, AND THE TRUE POINT OF BEGINNING OF THIS DESCRIBED CENTERLINE; THENCE SOUTH 54°36'01" WEST ALONG THE CENTERLINE OF SAID ASPHALT DRIVEWAY AND THE SOUTHWESTERLY PROJECTION THEREOF A DISTANCE OF 48.06 FEET TO A POINT ON THE EAST LINE OF THAT CERTAIN TRACT OF LAND CONVEYED TO ANDREW C. LAMAR BY QUITCLAIM DEED RECORDED UNDER RECORDING NUMBER 8306130222, RECORDS OF SNOHOMISH COUNTY, WASHINGTON AND THE TERMINUS OF THIS DESCRIBED CENTERLINE SAID TERMINAL POINT BEING 63.74 FEET NORTH OF THE SOUTHEAST CORNER OF SAID LAMAR TRACT AS MEASURED ALONG THE EAST LINE THEREOF THE SIDE LINES OF THIS DESCRIBED EASEMENT SHALL BE EXTENDED OR TRUNCATED AT THE EAST LINE OF SAID LAMAR TRACT AND THE EAST LINE OF AFOREMENTIONED TRACT F.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

<b>TAX ACCOUNT NO.:</b> 28040300200200	<b>SITE ADDRESS:</b> 1603 DEBRELOAN LANE, MUKILTEO, WA 98275
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**T.E.S.C AND GRADING PLAN**  
**LONEY SHORT PLAT**  
**NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E**  
**SNOHOMISH COUNTY, WASHINGTON**

DRAWN BY TJW	DATE 01/24/2017	REV. BY TJW	DATE 05/31/2019	PROJECT MANAGER J.C. McDonnell	SCALE AS SHOWN
DRAWING FILE NAME 5999-Loney Plans.dwg	CHK. BY JCM	F.B. NO.	JOB NO. 5999	SHT. NO. C1 of 4	

**GRADING QUANTITIES:**

CUT: 205 Cu.Yds.  
FILL: 60 Cu.Yds.

(GRADING QUANTITIES ARE ROUGH CALCULATIONS WHICH DO NOT ACCOUNT FOR SOIL SWELLING & SHRINKAGE.)

1.) EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.

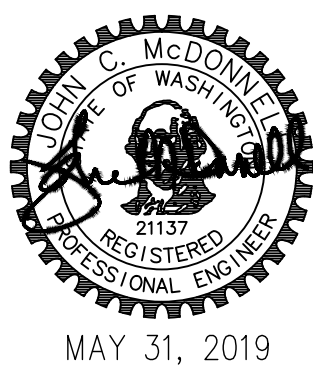
2.) ANY SOIL REMOVED FROM THE SITE MUST BE HAULED TO A CITY APPROVED SITE.



Know what's below.  
Call before you dig.

**UTILITY CONFLICT NOTE:**

**CAUTION:**  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT J.C. McDONNELL ENGINEERING, PC TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.

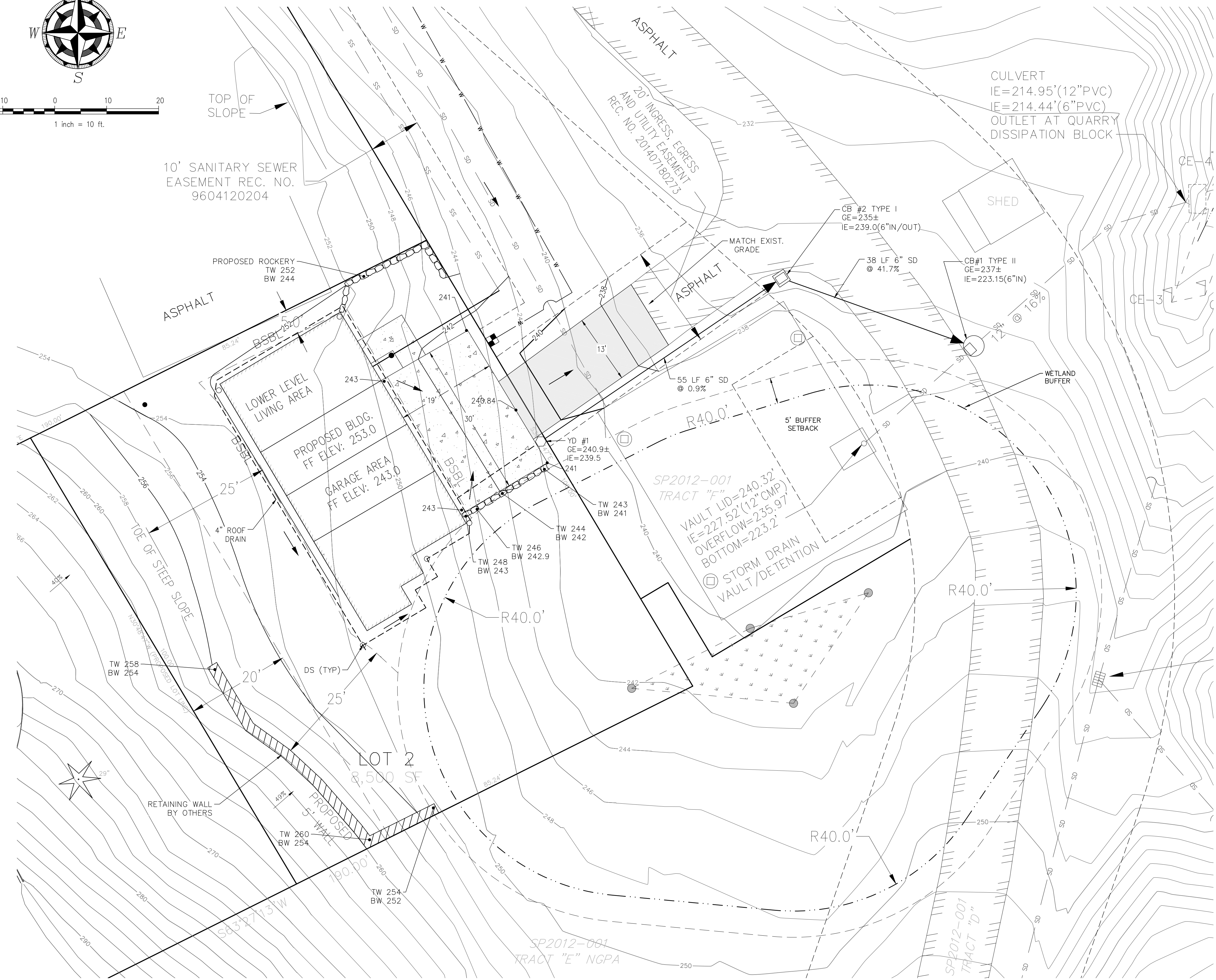
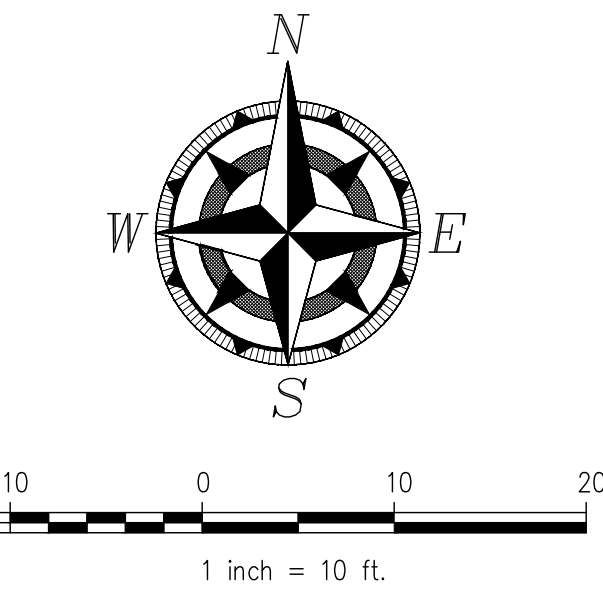


**J.C. McDONNELL**

**ENGINEERING, PC**  
**civil engineers**

P.O. BOX 13199, MILL CREEK, WASHINGTON TEL: (425) 744-0916  
FAX: (425) 744-0946





LEGEND

- PROPOSED CONCRETE
- PROPOSED ASPHALT
- PROPOSED ROOF DRAIN
- PROPOSED STORM DRAIN
- PROPOSED SPOT ELEVATION FINISH GRADE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE



REV. NO.	DESCRIPTION	INITIALS	DATE
1	REVISED PER CITY COMMENTS	TJW	05/31/19

**UTILITY CONFLICT NOTE:**  
**CAUTION:**  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT J.C. McDONNELL ENGINEERING, PC TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.



**J.C.McDONNELL**  
ENGINEERING, PC  
**civil engineers**  
P.O. BOX 13199, MILL CREEK, WASHINGTON TEL: (425) 744-0916  
FAX: (425) 744-0946

<b>CITY ENGINEER</b> MUKITEO PUBLIC WORKS DEPARTMENT APPROVED FOR CONSTRUCTION BY: _____ FOR: _____ R/W PERMIT NUMBER: _____		<b>TAX ACCOUNT NO.:</b> 28040300200200	<b>SITE ADDRESS:</b> 1603 DEBRELOD LANE, MUKILTEO, WA 98275
<b>DRAINAGE / UTILITIES PLAN</b> <b>LONEY SHORT PLAT</b> <b>NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E</b> <b>SNOHOMISH COUNTY, WASHINGTON</b>			
DRAWN BY TJW	DATE 01/24/2017	REV. BY TJW	DATE 05/31/2019
DRAWING FILE NAME 5999-Loney PlanSet.dwg	CHK. BY JCM	F.B. NO. 5999	PROJECT MANAGER J.C. McDonnell
SCALE AS SHOWN		SHT. NO. C2 of 4	



GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT CITY OF MUKILTEO DEVELOPMENT STANDARDS, THE CURRENT EDITION OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION; AND THE ADOPTED EDITION OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
2. ALL WORK WITHIN THE PLAT AND CITY RIGHT-OF-WAY SHALL BE SUBJECT TO THE INSPECTION OF THE CITY.
3. PRIOR TO ANY SITE CONSTRUCTION INCLUDING CLEARING/LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS **PACIFIC GEOMATIC SERVICES, INC. (TEL) 425-778-5620**.
4. THE DEVELOPER, CONTRACTOR AND PROJECT ENGINEER IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS **JC McDONNELL ENGINEERING, PC 425-744-0916**.
5. PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE CITY OF MUKILTEO PLANNING & COMMUNITY DEVELOPMENT AT 425-263-8000 TO SCHEDULE A PRECONSTRUCTION CONFERENCE.
6. ENGINEERED AS-BUILT DRAWINGS IN ACCORDANCE WITH THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE SHALL BE REQUIRED PRIOR TO FINAL SITE APPROVAL.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS FOR UTILITY, ROAD, AND RIGHT-OFWAY CONSTRUCTION. THE CONTRACTOR FOR THIS PROJECT IS  
CONTACT PERSON: \_\_\_\_\_  
PHONE: \_\_\_\_\_  
MOBILE: \_\_\_\_\_  
24-HOUR EMERGENCY CONTACT AND PHONE: \_\_\_\_\_
8. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPP) FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PLANS PRIOR TO ANY GRADING OR LAND CLEARING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED. SEDIMENT LADEN WATERS SHALL NOT ENTER THE NATURAL DRAINAGE SYSTEM.
9. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) OR SWPPP SUPERVISOR SHALL BE RESPONSIBLE FOR MAINTAINING THE CONSTRUCTION SWPP FACILITIES, AS OUTLINED IN THE APPROVED SWPPP, OR AS MODIFIED FROM TIME TO TIME. CONTACT INFORMATION FOR THE CESCL (OR SWPPP SUPERVISOR) FOR THE PROJECT SHALL BE GIVEN TO THE CITY.
10. NONCOMPLIANCE WITH THE REQUIREMENTS FOR EROSION CONTROLS, WATER QUALITY AND CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVAL, AND BOND FORECLOSURES.
11. TRENCH BACKFILL OF NEW UTILITIES AND STORM DRAINAGE FACILITIES SHALL BE COMPACTED TO 95% MAXIMUM DENSITY (MODIFIED PROCTOR) UNDER ROADWAYS AND 90% MAXIMUM DENSITY (MODIFIED PROCTOR) OFF ROADWAYS. COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) AND 2-03.3(14) OF THE WSDOT STANDARD SPECIFICATIONS.
12. THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. LOCATION OF UTILITIES SHOWN ON CONSTRUCTION PLANS ARE BASED ON BEST RECORDS AVAILABLE AND ARE SUBJECT TO VARIATION. FOR ASSISTANCE IN UTILITY LOCATION, CALL 811.
13. PRIOR TO CONSTRUCTION THE OWNER AND/OR CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE PUBLIC WORKS DIRECTOR WHEN CONFLICTS EXIST BETWEEN THE PLANS AND FIELD CONDITIONS. CONFLICTS SHALL BE RESOLVED (INCLUDING PLAN AND PROFILE REVISIONS) AND RESUBMITTED FOR APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.
14. THE CONTRACTOR SHALL KEEP TWO SETS OF PLANS ON SITE AT ALL TIMES FOR RECORDING AS-BUILT INFORMATION; ONE SET SHALL BE SUBMITTED TO THE PROJECT ENGINEER, AND ONE SET SHALL BE SUBMITTED TO THE CITY AT COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL ACCEPTANCE OF WORK.
15. A GRADING PERMIT ISSUED PURSUANT TO THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE, AND APPROVAL OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE OBTAINED FROM THE PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT PRIOR TO ANY ON-SITE GRADING WORK NOT EXPRESSLY EXEMPT BY THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE.

STORM DRAINAGE NOTES

1. ALL PIPE SHALL BE PLACED ACCORDING DIVISION 7 OF THE WSDOT STANDARD SPECIFICATIONS.
2. BACKFILL SHALL BE PLACED EQUALLY ON BOTH SIDES OF THE PIPE OR PIPE-ARCH IN 6 AVERAGE DEPTH LOOSE LIFTS. MAXIMUM LIFT DEPTH SHALL NOT EXCEED 9". EACH LIFT SHALL BE THOROUGHLY COMPACTED. COMPACTED LIFTS MUST EXTEND AT LEAST ONE PIPE DIAMETER ON EACH SIDE OF THE PIPE OR TO THE SIDE OF THE TRENCH. BACKFILL OVER THE PIPE SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) THE WSDOT STANDARD SPECIFICATIONS.
3. ALL GRATES LOCATED IN THE GUTTER FLOW LINE (INLET AND CATCH BASIN) SHALL BE DEPRESSED 0.1 FEET BELOW PAVEMENT LEVEL.
4. ALL CATCH BASINS ARE TO BE TYPE I UNLESS OTHERWISE APPROVED BY THE CITY OR DESIGNATED REPRESENTATIVE. THE USE AND INSTALLATION OF INLETS IS NOT ALLOWED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL MANHOLE, INLET AND CATCH BASIN FRAMES AND GRATES TO GRADE JUST PRIOR TO CURB INSTALLATION AND/OR PAVING.
6. ALL CATCH BASINS WITH A DEPTH OF 5 FEET OR GREATER TO THE FLOW LINE SHALL BE TYPE II CATCH BASINS.
7. VANED GRATES ARE REQUIRED ON ALL STORM STRUCTURES. ALL CATCH BASINS AND MANHOLES SHALL HAVE LOCKING LIDS. ROLLED GRATES ARE NOT APPROVED FOR USE.
8. POLYPROPYLENE SAFETY STEPS AND LADDER STEPS SHALL BE PROVIDED IN ALL MANHOLES AND SHALL BE POSITIONED CORRECTLY WITH THE BOLT AREAS ON THE RIM.
9. CATCH BASIN FRAMES AND GRATES SHALL BE OLYMPIC FOUNDRY MODEL SM60, SM52, OR SM44. LOCKING TYPE OR EQUIVALENT. MODEL SM52 SHALL BE REFERRED TO AS A THROUGH CURB INLET ON THE PLANS.
10. DETENTION PONDS WITH SIDE SLOPES STEEPER THAN 3:1 OR WITH A MAXIMUM WATER DEPTH GREATER THAN 3 FEET SHALL REQUIRE A VINYL COATED CHAIN LINK PERIMETER FENCE. SIDE SLOPE AVERAGING SHALL NOT BE ALLOWED. ALL INLET AND OUTFALL PIPES SHALL HAVE A TRASH RACK INSTALLED AND A MORTARED RIPRAP HEADWALL.
11. PRIOR TO SIDEWALK CONSTRUCTION: LOT DRAINAGE SYSTEMS, STUB-OUTS AND ANY BEHIND SIDEWALK DRAINS MUST BE INSTALLED AS REQUIRED. PIPE SHALL BE PVC 3034, OR SDR-35. STUB-OUTS SHALL BE MARKED WITH A 2" X 4" WITH 3 FEET VISIBLE ABOVE GRADE AND MARKED "STORM". LOCATIONS OF THESE INSTALLATIONS SHALL BE SHOWN ON THE AS-BUILT CONSTRUCTION PLANS SUBMITTED TO THE CITY.
12. STORM WATER RETENTION/DETENTION FACILITIES, STORM DRAINAGE PIPE AND CATCH BASINS SHALL BE FLUSHED AND CLEANED BY THE DEVELOPER PRIOR TO:
- A. CITY OF MUKILTEO FINAL ACCEPTANCE OF THE PROJECT AND;
- B. UPON COMMENCEMENT AND COMPLETION OF THE 2 YEAR WARRANTY PERIOD FOR THE STORM DRAINAGE SYSTEM. AN INVOICE DETAILING THE FLUSHING AND CLEANING SHALL BE PROVIDED TO THE CITY.
13. ALL PIPES SHALL BE INSTALLED WITH RUBBER GASKETS AS PER MANUFACTURER'S RECOMMENDATIONS.
14. COVERAGE REQUIREMENTS FOR 12 DIAMETER PIPE:
- BACKFILL OVER PIPE LESS THAN 12 REQUIRES RCP CLASS IV.  
BACKFILL OVER PIPE LESS THAN 24 REQUIRES RCP MINIMUM.  
BACKFILL OVER PIPE GREATER THAN 24 REQUIRES 16 GAGE CMP MINIMUM.
15. CORRUGATED POLYETHYLENE PIPE (CPP):
- A. ALL PIPE SHALL BE SMOOTH INTERIOR. CPP SHALL BE DOUBLE-WALLED. ALL PIPE SHALL MEET AASHTO AND ASTM SPECIFICATIONS.
- B. UPON REQUEST BY THE CITY INSPECTOR, ALL PIPE RUNS SHALL PASS THE LOW PRESSURE AIR TEST REQUIREMENTS OF SECTION 7-04.3(1) E & F OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION. PIPE RUNS SHALL BE TESTED WITH PIPE LOADED AND COMPACTED TO FINISH GRADE.
- C. UPON REQUEST BY THE CITY INSPECTOR, PIPE SHALL BE SUBJECT TO MANDREL TESTING (MANDREL SIZE = 90% OF NOMINAL PIPE DIAMETER).
- D. PIPE SHALL BE STORED ON SITE IN SHIPPING BUNKS ON A FLAT LEVEL SURFACE. THIS REQUIREMENT WILL BE STRICTLY ENFORCED; FAILURE TO COMPLY MAY RESULT IN REJECTION OF THE PIPE AND/OR FUTURE RESTRICTION ON USE OF MATERIAL.
- E. MINIMUM DEPTH OF COVER SHALL BE 2 FEET.
- F. COUPLINGS SHALL BE INTEGRAL BELL AND SPIGOT OR DOUBLE BELL SEPARATE COUPLINGS. SPLIT COUPLINGS WILL NOT BE ALLOWED.
- G. BACKFILL SHALL COMPLY WITH SECTION 7-08.3(3) OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION WITH THE EXCEPTION THAT THE SECOND PARAGRAPH OF SECTION 7-08.3(3) IS DELETED AND REPLACED WITH:  
THE MATERIAL USED FOR BACKFILLING AROUND AND TO A POINT 1 FOOT ABOVE THE TOP OF THE PIPE SHALL BE CLEAN EARTH OR SAND, FREE FROM CLAY, ANY GRAVEL OR STONES INCLUDED IN THE BACKFILL SHALL PASS THROUGH A 1" INCH SIEVE.

16. ALL NON-PERFORATED METAL PIPE SHALL HAVE NEOPRENE GASKETS AT THE JOINTS. O-RING GASKETS MAY BE USED FOR TYPE-F COUPLING BAND.
17. CULVERT ENDS SHALL BE BEVELED TO MATCH SIDE SLOPES. FIELD CUTTING OF CULVERT ENDS IS PERMITTED WHEN APPROVED BY THE CITY.
18. ALL FIELD CUT CULVERT PIPE SHALL BE TREATED AS REQUIRED IN THE STANDARD SPECIFICATIONS OR GENERAL SPECIAL PROVISIONS.

SITE GRADING AND SWPPP NOTES

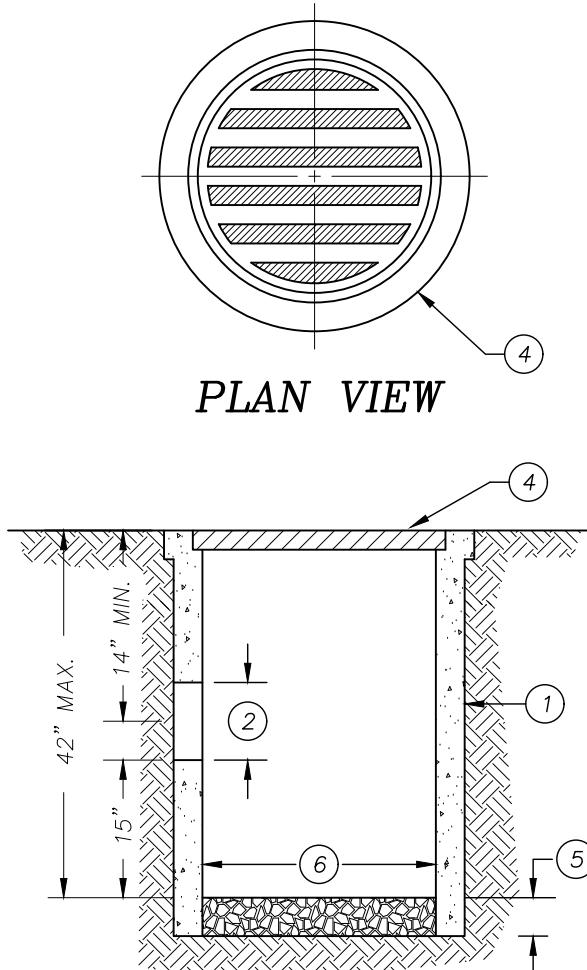
1. PRIOR TO ANY SITE WORK, INCLUDING CLEARING, LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS **PACIFIC GEOMATIC SERVICES, INC. (TEL) 425-778-5620**.
2. SOILS IN MUKILTEO OFTEN CONTAIN FINER PARTICLES WHICH WILL PASS THROUGH SEDIMENT TRAPS UNTRAPPED AND HAVE EXTREMELY LONG SETTLING TIMES. THEREFORE, THE NEED TO CONTROL EROSION FROM THE SITE IS THE FIRST PRIORITY AND SHOULD BE EMPHASIZED.
3. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PRIOR TO ANY GRADING OR EXTENSIVE LAND CLEARING. AN INSPECTION BY THE CITY OF THESE FACILITIES SHALL BE ARRANGED FOR BY THE CONTRACTOR PRIOR TO ANY GRADING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED.
4. STOCKPILES ARE TO BE LOCATED IN SAFE AREAS AND ADEQUATELY PROTECTED BY TEMPORARY SEEDING AND MULCHING. HYDROSEEDING IS PREFERRED.
5. THE DEVELOPER (OR PROJECT ENGINEER) IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS .
6. IF THE PROJECT WILL DISTURB MORE THAN ONE (1) ACRE OF LAND, THEN A CONSTRUCTION NPDES PERMIT IS REQUIRED AND A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE ASSIGNED TO THE SITE. THE CESCL'S NAME, PHONE NUMBER, AND CESCL CERTIFICATE NUMBER IS
7. ALL SITE WORK MUST BE PERFORMED IN ACCORDANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
8. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARDS. A PRECONSTRUCTION SOILS INVESTIGATION MAY BE REQUIRED TO EVALUATE SOILS STABILITY.
9. IF CUT AND FILL SLOPES EXCEED A MAXIMUM OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL, A ROCK OR CONCRETE RETAINING WALL MAY BE REQUIRED. ALL ROCK RETAINING WALLS GREATER THAN FOUR (4) FEET IN HEIGHT ARE TO BE DESIGNED AND CERTIFIED BY A PROFESSIONAL ENGINEER EXPERIENCED IN SOIL MECHANICS.
10. THE SURFACE OF ALL SLOPES SHALL BE COMPACTED. THIS MAY BE ACCOMPLISHED BY OVER-BUILDING THE SLOPES, THEN CUTTING BACK TO FINAL GRADES; OR BY COMPACTING EACH LIFT AS THE SLOPE IS BEING CONSTRUCTED. ALL SLOPES SHALL BE COMPACTED BY THE END OF EACH WORKING DAY.
11. ALL STRUCTURAL FILLS SHALL BE COMPACTED TO A MINIMUM OF 95% MAXIMUM DENSITY IN THE UPPER 4 FEET & 90% MAXIMUM DENSITY BELOW 4 FEET AS DETERMINED BY MODIFIED PROCTOR.
12. NONCOMPLIANCE WITH THE EROSION CONTROL REQUIREMENTS, WATER QUALITY REQUIREMENTS AND CLEARING LIMITS VIOLATIONS MAY RESULT IN REVOCATION OF PROJECT PERMITS AND PLAN APPROVAL AND BOND FORECLOSURES.
13. UPON COMPLETION OF WORK, FINAL REPORTS MUST BE SUBMITTED TO THE CITY IN CONFORMANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
14. A WET WEATHER EROSION CONTROL PLAN MUST BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON OR BEFORE SEPTEMBER 1. IF THE PROJECT IS PROPOSING TO ACTIVELY CLEAR, GRADE, OR OTHERWISE DISTURB 1,000 SQUARE FEET OR MORE OF SOIL DURING THE PERIOD BETWEEN OCTOBER 1 AND APRIL 30, OTHER THRESHOLDS FOR A WET WEATHER EROSION CONTROL PLAN INCLUDE PROJECTS THAT:
- A. HAVE AREA(S) THAT DRAIN, BY PIPE, OPEN DITCH, SHEET FLOW, OR A COMBINATION OF THESE TO A TRIBUTARY WATER, AND THE TRIBUTARY WATER IS ONE-QUARTER MILE OR LESS DOWNSTREAM; OR
- B. HAVE SLOPES STEEPER THAN 15 PERCENT ADJACENT OR ON-SITE; OR
- C. HAVE HIGH POTENTIAL FOR SEDIMENT TRANSPORT, AS DETERMINED BY THE CONSTRUCTION SITE SEDIMENT TRANSPORT POTENTIAL WORKSHEET; OR
- D. HAVE A CRITICAL AREA OR CRITICAL AREA BUFFER ON-SITE, OR WITHIN 50 FEET OF THE SITE; OR
- E. HAVE HIGH GROUNDWATER TABLE OR SPRINGS.

MAINTENANCE OF SILTATION BARRIERS

1. SILTATION BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED EROSION CONTROL ELEMENTS, ESPECIALLY END-RUNS AND SEDIMENT BUILD-UP. NECESSARY REPAIRS TO BARRIERS SHALL BE ACCOMPLISHED THE SAME DAY.
2. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RAINFALL. SEDIMENT DEPOSITS MUST BE REMOVED WHEN THE SEDIMENT LEVEL REACHES APPROXIMATELY ONE-HALF THE SILTATION BARRIER HEIGHT.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE CHECK DAM IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

TEMPORARY SEEDING GENERAL NOTES

1. USE SEEDING THROUGHOUT THE PROJECT ON DISTURBED AREAS THAT HAVE REACHED FINAL GRADE OR THAT WILL REMAIN UNWORKED FOR MORE THAN 30 DAYS.
2. THE OPTIMUM SEEDING WINDOWS ARE APRIL 1 THROUGH JUNE 30 AND SEPTEMBER 1 THROUGH OCTOBER 1.
3. BETWEEN OCTOBER 1 AND MARCH 30 SEEDING REQUIRES A COVER OF MULCH WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
4. REVIEW ALL DISTURBED AREAS IN LATE AUGUST TO EARLY SEPTEMBER AND COMPLETE ALL SEEDING BY THE END OF SEPTEMBER.
- A. MULCH IS REQUIRED AT ALL TIMES FOR SEEDING. MULCH CAN BE APPLIED ON TOP OF THE SEED OR SIMULTANEOUSLY BY HYDROSEEDING (SEE ECOLOGY BMP C121 MULCHING FOR SPECIFICATIONS).
- B. SEED AND MULCH ALL DISTURBED AREAS NOT OTHERWISE VEGETATED AT FINAL SITE STABILIZATION.



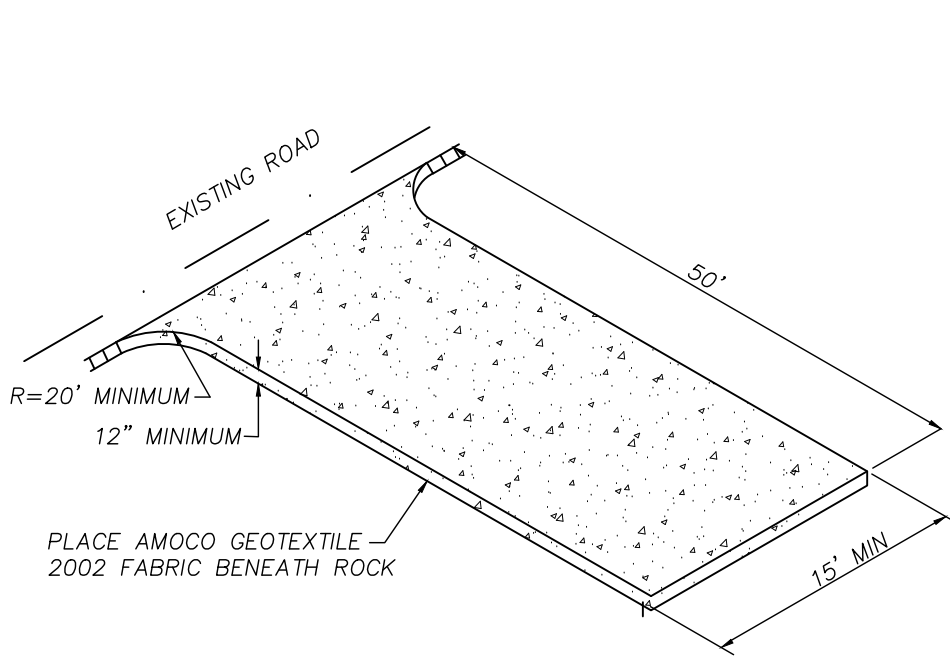
NOTES

- ① YARD DRAINS TO BE CONSTRUCTED FROM CONCRETE PIPE IN ACCORDANCE WITH ASTM C-14 UNLESS OTHERWISE SHOWN ON THE PLANS OR NOTED IN SPECIFICATIONS.
- ② CUTOUT HOLE SIZE IN EQUAL TO OUTLET PIPE OUTSIDE DIAMETER PLUS YARD DRAIN WALL THICKNESS.
- ③ CONNECTION TO OUTLET PIPE TO BE MORTARED AND MADE FLUSH WITH INSIDE OF THE YARD DRAIN WALL.
- ④ CAST IRON BELL GRADE FITS INTO BELL RECESS AND EXTENDS FLUSH WITH FACE OF BELL. THE GRADE SHALL HAVE SLOTS (HOLES) THAT CONSTITUTE 50 PERCENT OPEN AREA FOR DRAINAGE. INLET BELL SURFACE SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
- ⑤ WASHED DRAIN ROCK - 6 INCHES MINIMUM DEPTH
- ⑥ VARIES 12 OR 18 INCHES
- ⑦ SPECIAL CAST YARD DRAIN MAY BE REQUIRED FOR MULTIPLE PIPE CONNECTIONS.

YARD DRAIN DETAIL

NOT TO SCALE

NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E

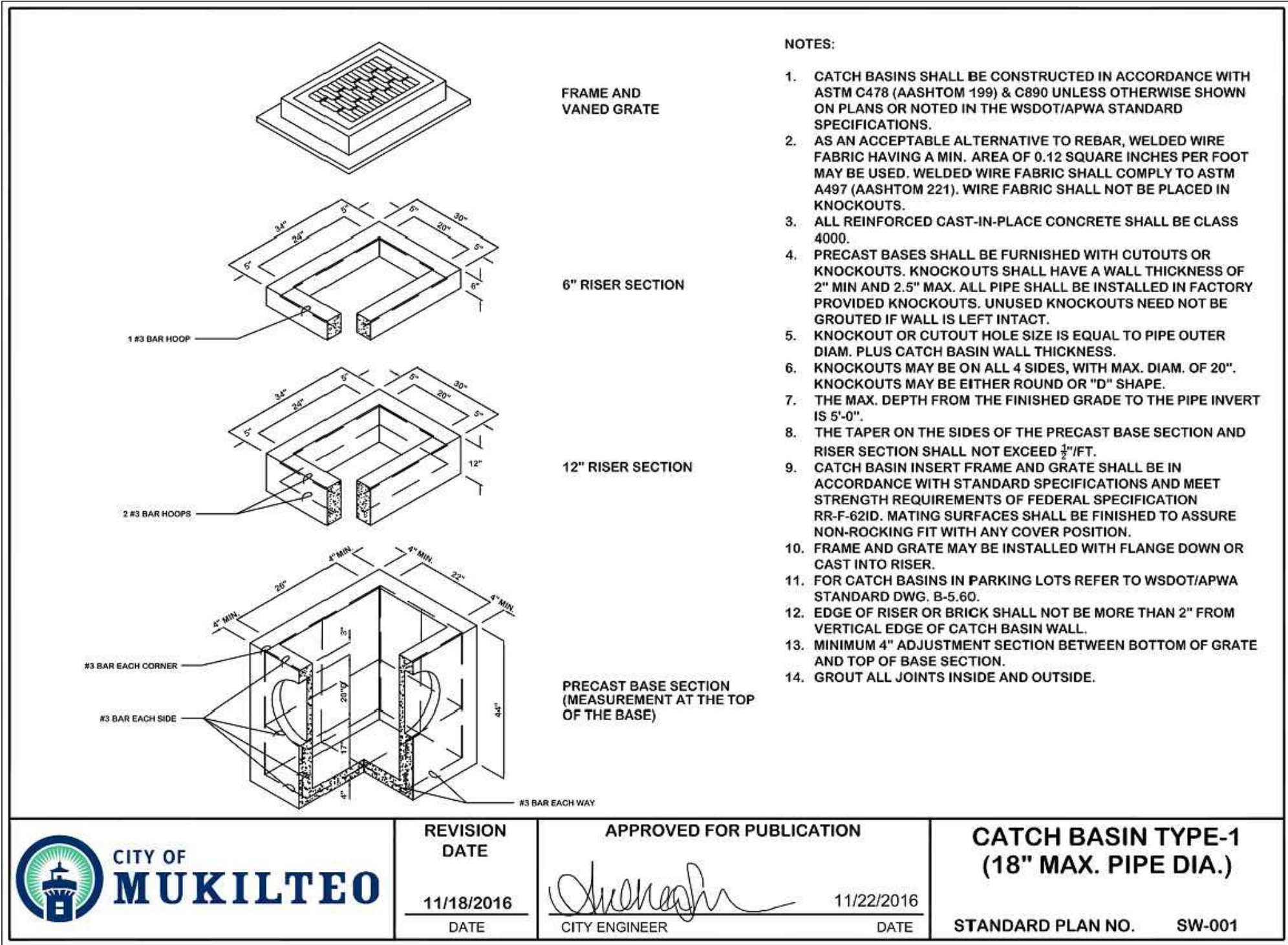


NOTES:

1. INSTALLATION: THE AREA OF THE ENTRANCE SHOULD BE CLEARED OF ALL VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL. THE GRAVEL SHALL BE PLACED TO THE SPECIFIED DIMENSIONS. ANY DRAINAGE FACILITIES REQUIRED BECAUSE OF WASHING SHOULD BE CONSTRUCTED ACCORDING TO SPECIFICATIONS IN THE PLAN. IF WASH RACKS ARE USED, THEY SHOULD BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. AGGREGATE: 4\"
3. ENTRANCE DIMENSIONS: THE AGGREGATE LAYER MUST BE AT LEAST 6 INCHES THICK. IT MUST EXTEND THE FULL WIDTH OF THE VEHICULAR INGRESS AND EGRESS AREA. THE LENGTH OF THE ENTRANCE MUST BE AT LEAST 50 FEET.
4. WASHING: IF CONDITIONS ON THE SITE ARE SUCH THAT MOST OF THE MUD IS NOT REMOVED FROM VEHICLE TIRES BY CONTACT WITH THE GRAVEL, THEN THE TIRES MUST BE WASHED BEFORE VEHICLES ENTER A PUBLIC ROAD. WASH WATER MUST BE CARRIED AWAY FROM THE ENTRANCE TO A SETTLING AREA TO REMOVE SEDIMENT. A WASH RACK MAY ALSO BE USED TO MAKE WASHING MORE CONVENIENT AND EFFECTIVE.
5. MAINTENANCE: THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 2-INCH STONE, AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEAN OUT OF ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAY OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.

TEMPORARY CONSTRUCTION ENTRANCE

NOT TO SCALE

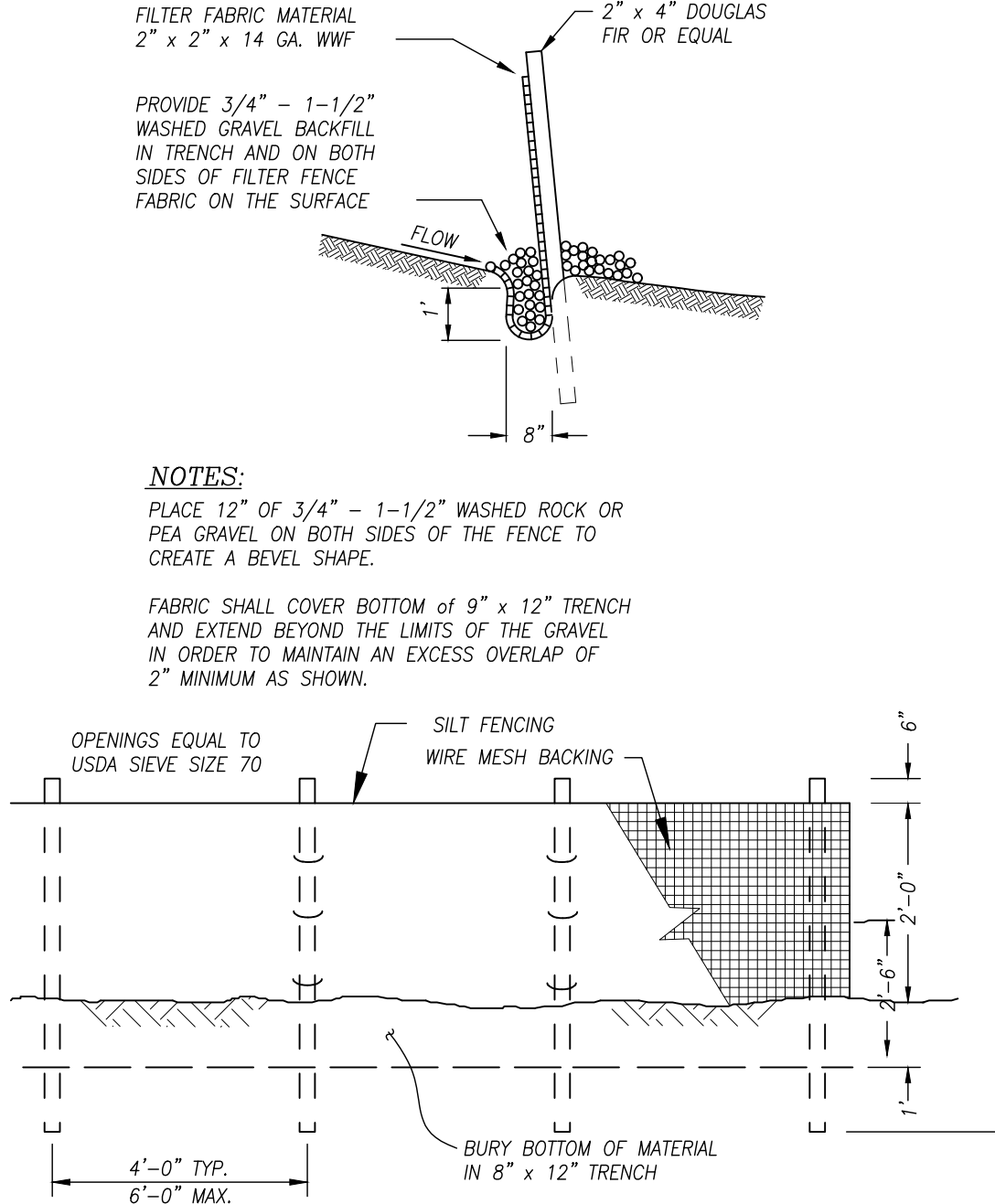


NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTOM 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2\"
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
6. KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIAM. OF 20\"
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 9\"0\".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 2\"/FT.
9. CATCH BASIN INSERT FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-620D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
11. FOR CATCH BASINS IN PARKING LOTS REFER TO WSDOT/APWA STANDARD DWG. B-5-60.
12. EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2\" FROM VERTICAL EDGE OF CATCH BASIN WALL.
13. MINIMUM 4\" ADJUSTMENT SECTION BETWEEN BOTTOM OF GRATE AND TOP OF BASE SECTION.
14. GROUT ALL JOINTS INSIDE AND OUTSIDE.

SILT FENCE DETAIL

NOT TO SCALE



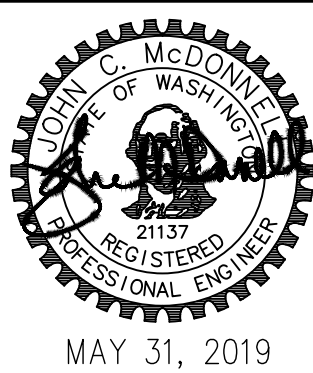
Know what's below.  
Call before you dig.

REV. NO.	DESCRIPTION	INITIALS	DATE
1	REVISED PER CITY COMMENTS	TJW	05/31/19

UTILITY CONFLICT NOTE:

CAUTION:

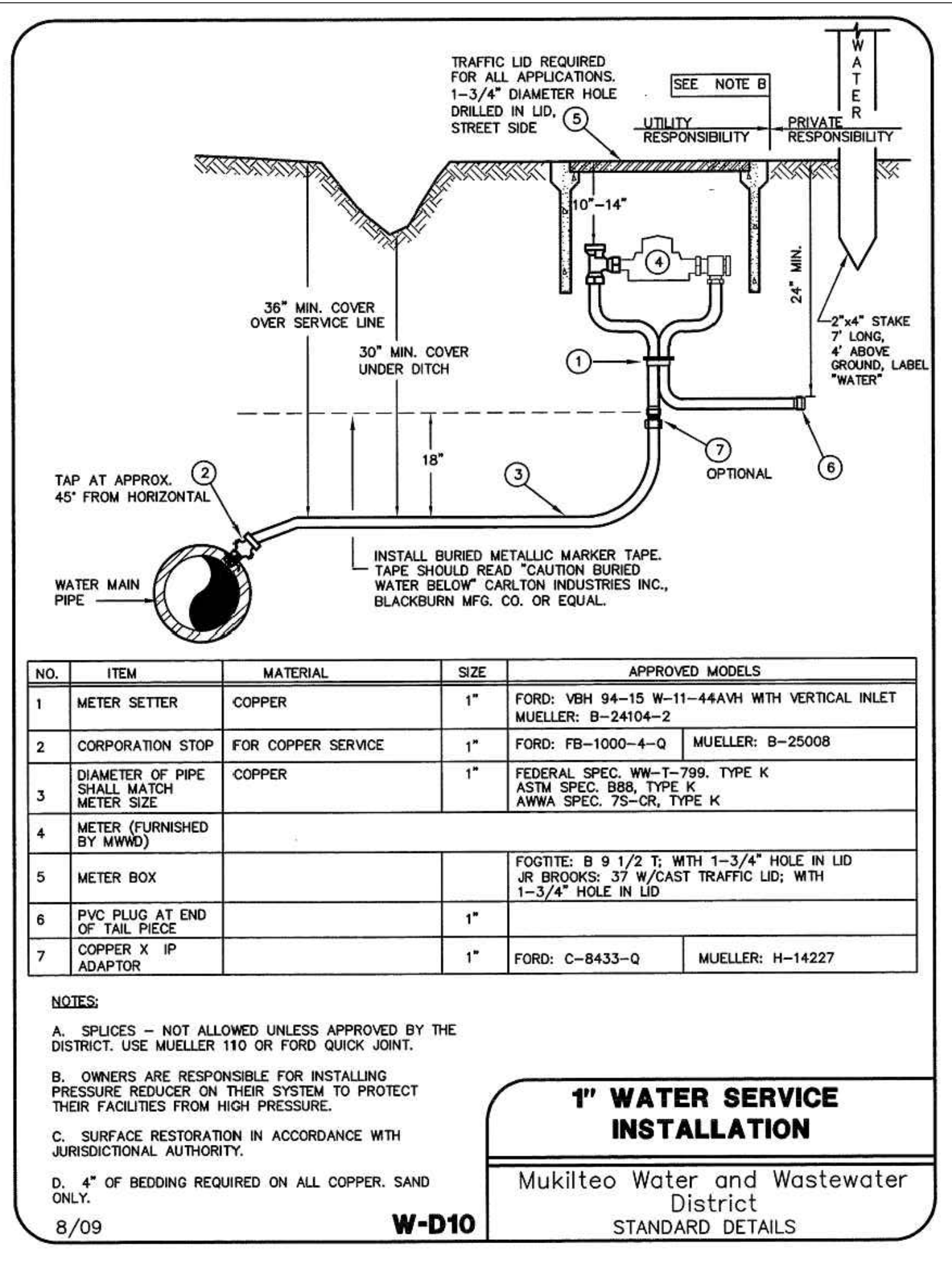
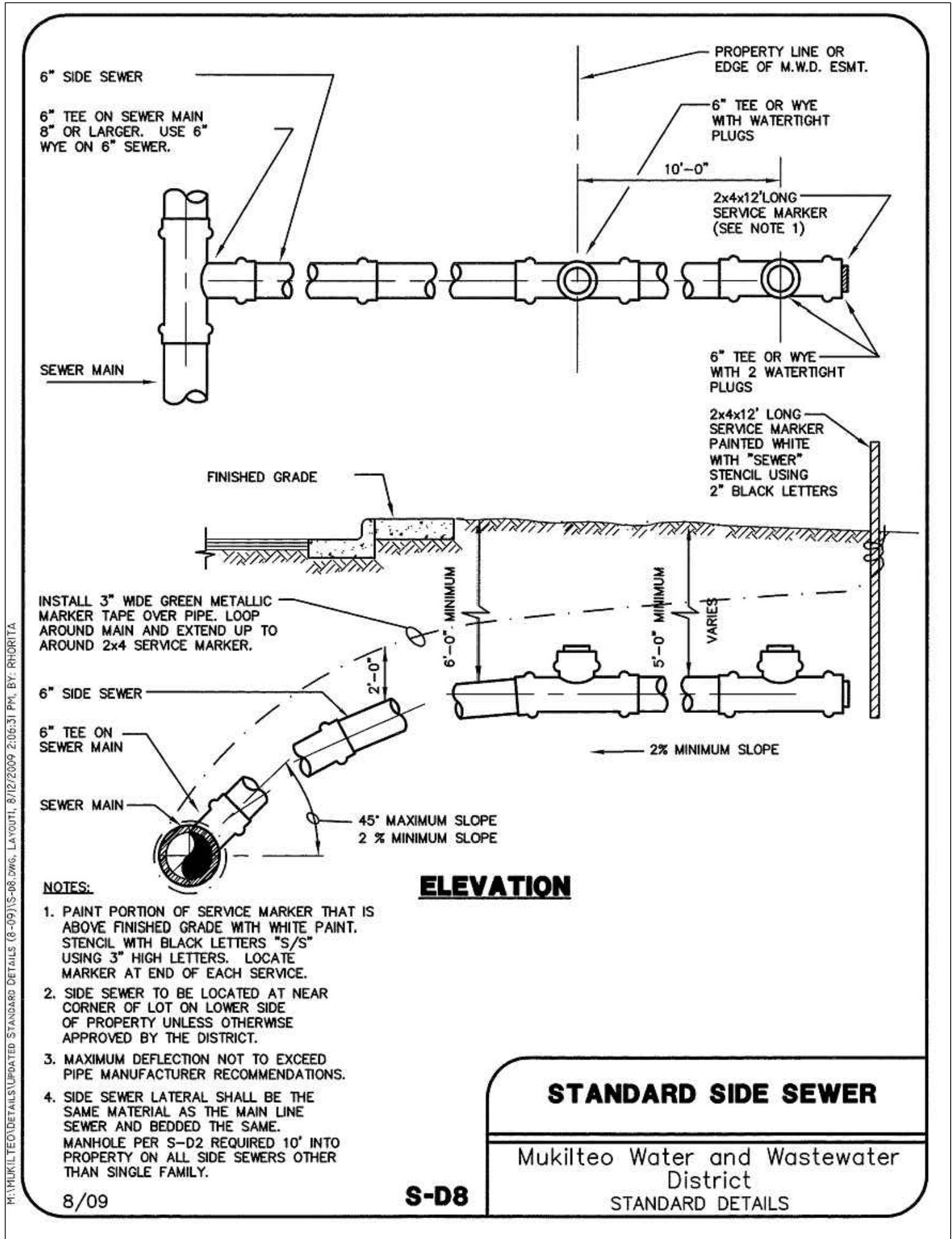
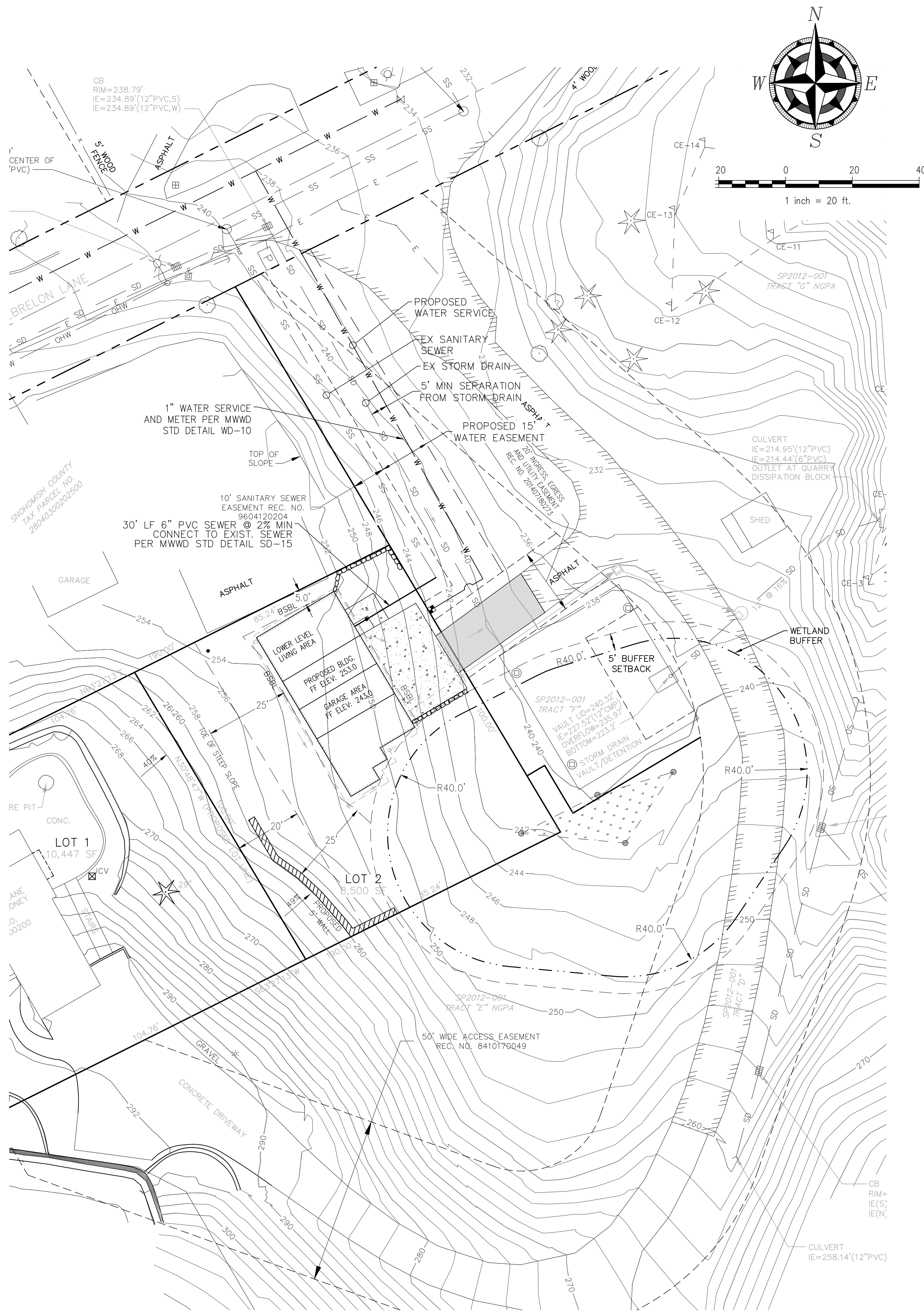
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BY POTHOLES THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POTHOLES ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT J.C. McDONNELL ENGINEERING, PC TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.



**J.C. McDONNELL**  
ENGINEERING, PC  
civil engineers  
P.O. BOX 13199, MILL CREEK, WASHINGTON TEL: (425) 744-0916  
FAX: (425) 744-0946

<u>TAX ACCOUNT NO.:</u> 28040300200200		<u>SITE ADDRESS:</u> 1603 DEBRELON LANE, MUKILTEO, WA 98275	
<hr/>			
NOTES AND DETAILS LONEY SHORT PLAT NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E SNOHOMISH COUNTY, WASHINGTON			
DRAWN BY TJW	DATE 01/24/2017	REV. BY TJW	DATE 05/31/2019
DRAWING FILE NAME 5999-Loney Planset.dwg	CHK. BY JCM	F.B. NO. 5999	PROJECT MANAGER J.C. McDonnell
			SCALE NONE
			SHT. NO. C3 of 4





LEGEND

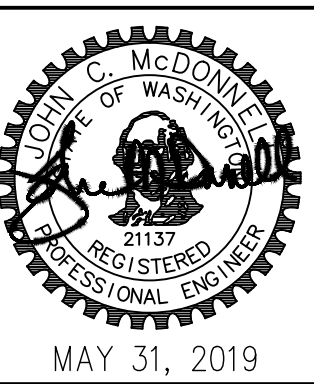
- RD PROPOSED ROOF DRAIN
- SD PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN CLEANOUT
- SS PROPOSED SEWER LINE
- W PROPOSED WATER LINE
- PROPOSED SEWER CLEANOUT
- PROPOSED WATER METER
- 391.8 PROPOSED SPOT ELEVATION
- 384 — EXISTING CONTOUR LINE
- 384 — PROPOSED CONTOUR LINE

MUKILTEO WATER AND WASTEWATER DISTRICT  
7824 MUKILTEO SPEEDWAY  
MUKILTEO, WA 98275  
425-355-3355



REV. NO.	DESCRIPTION	INITIALS	DATE
1	REVISED PER CITY COMMENTS	TJW	05/31/19

**UTILITY CONFLICT NOTE:**  
**CAUTION:**  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BY POT-HOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POT-HOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT J.C. McDONNELL ENGINEERING, PC TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.

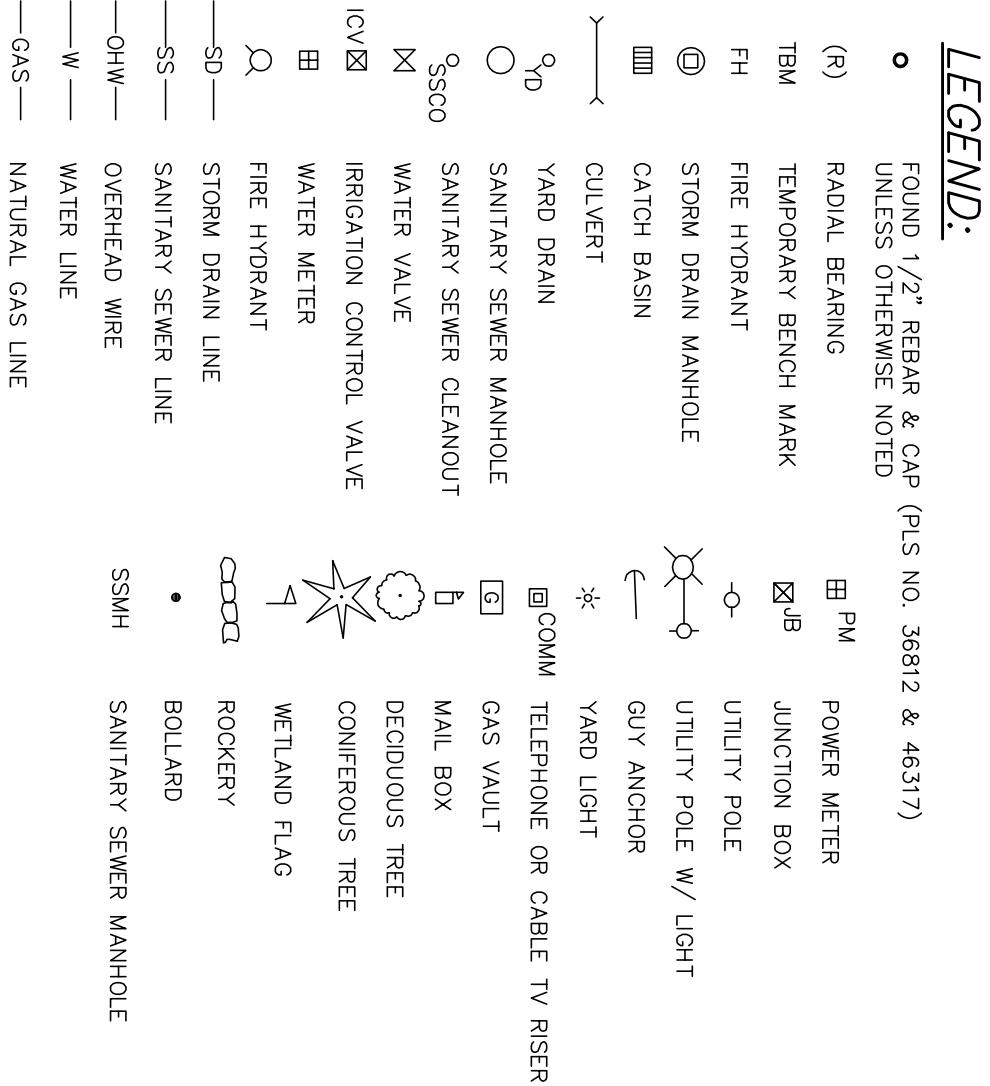


**J.C. McDONNELL**  
ENGINEERING, PC  
civil engineers  
P.O. BOX 13199, MILL CREEK, WASHINGTON TEL: (425) 744-0916  
FAX: (425) 744-0946

CITY ENGINEER MUKILTEO PUBLIC WORKS DEPARTMENT APPROVED FOR CONSTRUCTION		TAX ACCOUNT NO.: 28040300200200		SITE ADDRESS: 1603 DEBRELON LANE, MUKILTEO, WA 98275	
UTILITY PLAN LONEY SHORT PLAT NW SECTION 03, TOWNSHIP 28 N, RANGE 04 E SNOHOMISH COUNTY, WASHINGTON					
DRAWN BY TJW	DATE 01/24/2017	REV. BY TJW	DATE 05/31/2019	PROJECT MANAGER J.C. McDonnell	SCALE AS SHOWN
DRAWING FILE NAME 5999-Loney Planset.dwg	CHK. BY JCM	F.B. NO. 5999	JOB NO. 5999	SHT. NO. C4 OF 4	



GOV'T LOT 3, SEC. 03, T. 28 N., R. 4 E., W.M.  
SNOHOMISH COUNTY, WASHINGTON



THE HORIZONTAL DATUM FOR THIS SURVEY IS NAD 83/11, BASED ON PUBLISHED COORDINATES FOR WSDOT MONUMENTS:

THE VERTICAL DATUM FOR THIS SURVEY IS NAVD 88, BASED ON PUBLISHED ELEVATIONS FOR WSDOT MONUMENTS:

'GP31525-133'	MONUMENT ID 2955
ELEVATION:	10.883 FEET
'TIDAL 5 1971'	MONUMENT ID 3756:
ELEVATION:	12.766 FEET

'TIDAL 5 1971' MONUMENT ID 375  
NORTHING: 349524.268 FEET  
EASTING: 1279424.469 FEET

CITY OF MUKILTEO SHORT PLAT NO. SP2012-001, AUDITOR'S FILE NUMBER 2014021050001  
PLAT OF SEA BELO, VOLUME 26 OF PLATS AT PAGE 75  
PRELIMINARY PLAT OF KALASH HEIGHTS (2009)

(PER CHICAGO TITLE INSURANCE COMPANY GUARANTEE NO. 500041199, DATED APRIL 27, 2016 AT 08:00 AM)  
THAT PORTION OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS:

THAT PORTION OF GOVERNMENT LOT 3, SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS

THENCE EASTERLY ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR A DISTANCE OF 569.59 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 412.8 FEET;  
THENCE SOUTH 62°05'10" WEST A DISTANCE OF 35.0 FEET TO THE MOST EASTERLY CORNER OF TRACT DECEDED TO ELLIOT F.

THENCE SOUTH 32°05'00" EAST A DISTANCE OF 40.00 FEET;  
THENCE SOUTH 32°10'50" EAST A DISTANCE OF 90 FEET TO THE TRUE POINT OF BEGINNING OR THIS DESCRIPTION  
THENCE CONTINUE SOUTH 32°10'50" EAST FOR A DISTANCE OF 100 FEET;  
THENCE NORTH 62°05'10" EAST FOR 190.0 FEET;

TOGETHER WITH A NON-EXCLUSIVE EASEMENT FOR INGRESS AND EGRESS AND FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF UTILITIES OVER, UNDER, ACROSS, THROUGH AND UPON THE FOLLOWING DESCRIBED PROPERTY:

THENCE NORTH 89°06'20" EAST ALONG THE NORTH LINE OF SAID GOVERNMENT LOT 3 FOR 569.59 FEET;  
THENCE SOUTH 32°57'42" EAST 412.80 FEET;

THESE SOUTH 50°52'33" EAST FOR 132.04 FEET,  
THENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 100.00 FEET A CENTRAL ANGLE OF 67°51'10" FOR AN ARC LENGTH OF  
18.42 FEET;

THEENCE ON A CURVE TO THE LEFT HAVING A RADIUS OF 50.00 FEET A CENTRAL ANGLE OF 90°48'50" FOR AN ARC LENGTH OF 71.25 FEET.  
 THENCE NORTH 72°12'33" WEST FOR 134.58 FEET TO THE TERMINUS OF THIS CENTERLINE DESCRIPTION.

THE FOLLOWING DESCRIBED PROPERTY, AS DISCLOSED IN DECLARATION OF EASEMENT RECORDING NO. 2014071802733:

IN GOVERNMENT LOT 3, IN THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 28 NORTH, RANGE 4 EAST, W.M.:

[illegible]

REVISIONS				 <i>6-22-16</i>	 <b>PGS INC</b>	<b>PACIFIC GEOMATIC SERVICES, INC.</b>  LAND SURVEYING & MAPPING SERVICES QUALITY SERVICE - CREATIVE SOLUTIONS  6808 216TH STREET SW. STE. 304 MOUNTLAKE TERRACE, WA 98043 PHONE: (425) 778-5620 FAX: (425) 775-2849 WEB: www.PacGeomInc.com	SHEET TITLE:		DRAWN BY: KAM	CHECKED BY: JNM	
REV.	DESCRIPTION		BY				DATE	PRELIMINARY SHORT PLAT		SCALE: 1" = 20'	DRAWING NAME:
1	ADDED WETLAND FLAGS WRA1-WRA4		CMH				05/16/2017			DATE: 06/22/2016	1601101_C3D.DWG
								CLIENT:  <b>DAVID &amp; JOAN LONEY</b> <b>MUKILTEO, WASHINGTON</b>	JOB NUMBER:	SHEET:	
									16-011-01	1 OF 1	



Loney

RECEIVED

JUN 27 2010

CITY OF MUKILTEO



# CITY OF MUKILTEO

## ENVIRONMENTAL CHECKLIST

### ***Purpose of checklist:***

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

### ***Instructions for applicants:***

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

### ***Instructions for Lead Agencies:***

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

### ***Use of checklist for nonproject proposals:*** [help]

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements—that do not contribute meaningfully to the analysis of the proposal.



## A. Background [\[help\]](#)

1. Name of proposed project, if applicable: [\[help\]](#)

*Loney Short Flat*

2. Name of applicant: [\[help\]](#)

*David & Joan Loney*

3. Address and phone number of applicant and contact person: [\[help\]](#)

*1603 Nebrelon Ln, Mukilton, WA*

4. Date checklist prepared: [\[help\]](#)

*06/25/2019*

5. Agency requesting checklist: [\[help\]](#)

*Mukilton*

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

*T. B. D.*

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

*NO*

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

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. [\[help\]](#)

*Critical Areas Study & Buffer Enhancement Plan - Westland Resources.*

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

[\[help\]](#)

*not applicable*

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) [\[help\]](#)

*Loney Short Flat, SP 2016-001, 1603 Nebrelon Lane.*

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. [\[help\]](#)



## B. ENVIRONMENTAL ELEMENTS [\[help\]](#)

### 1. Earth [\[help\]](#)

a. General description of the site: [\[help\]](#)

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other \_\_\_\_\_

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

49

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [\[help\]](#)

Top Soil, Sand, gravel

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [\[help\]](#) none

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [\[help\]](#)

2500 sq ft - footprint of house & driveway

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [\[help\]](#) no

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

2038 2165 sq ft

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

Temporary Silt Fence as required

### 2. Air [\[help\]](#)

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. [\[help\]](#)

none

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

none

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

none



3. **Water** [\[help\]](#)

a. **Surface Water:**

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into. [\[help\]](#)

*none*

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. [\[help\]](#)

*not applicable*

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. [\[help\]](#)

*none*

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

*no*

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

*no*

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. [\[help\]](#)

*no*

b. **Ground Water:**

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [\[help\]](#)

*no*

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. [\[help\]](#)

*none*



c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow?

Will this water flow into other waters? If so, describe. [\[help\]](#)

*see civil engineering lab - J.C. McDonnell*

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

*no*

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. [\[help\]](#)

*no*

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: [\[help\]](#)

*none*

4. Plants [\[help\]](#)

- a. Check the types of vegetation found on the site: [\[help\]](#)

- ☒ deciduous tree: alder, maple, aspen, other  
☐ evergreen tree: fir, cedar, pine, other  
☐ shrubs  
☒ grass  
☐ pasture  
☐ crop or grain  
☐ Orchards, vineyards or other permanent crops.  
☐ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other  
☐ water plants: water lily, eelgrass, milfoil, other  
☐ other types of vegetation

- b. What kind and amount of vegetation will be removed or altered? [\[help\]](#)

*grass - 2500 ft*

- c. List threatened and endangered species known to be on or near the site. [\[help\]](#)

*none*

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

*New grass,*



- e. List all noxious weeds and invasive species known to be on or near the site. [help]

*none*

5. **Animals** [help]

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. [help]

Examples include:

birds: hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other \_\_\_\_\_

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

*none*

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

*no*

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

*none*

- e. List any invasive animal species known to be on or near the site. [help]

*none*

6. **Energy and Natural Resources** [help]

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. [help]

*natural gas - heating  
electric - lighting*

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

*no*

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: [help]

*will comply with Washington state  
energy code*



## 7. Environmental Health [\[help\]](#)

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe. [\[help\]](#) *none*

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

[\[help\]](#)

*none*

- 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. [\[help\]](#)

*none*

- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project. [\[help\]](#)

*none*

- 4) Describe special emergency services that might be required. [\[help\]](#)

*none*

- 5) Proposed measures to reduce or control environmental health hazards, if any: [\[help\]](#)

*not applicable*

## b. Noise [\[help\]](#)

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

*none*

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. [\[help\]](#)

*construction - 8 AM - 5 PM.*

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

*as required*

## 8. Land and Shoreline Use [\[help\]](#)

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [\[help\]](#)

*current site - vacant  
adjacent property - residential*



b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? [\[help\]](#)

*no*

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: [\[help\]](#)

*no*

c. Describe any structures on the site. [\[help\]](#)

*none*

d. Will any structures be demolished? If so, what? [\[help\]](#)

*no*

e. What is the current zoning classification of the site? [\[help\]](#)

*residential*

f. What is the current comprehensive plan designation of the site? [\[help\]](#)

*residential*

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

*N/A*

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

*no*

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

*2 - 4 people*

j. Approximately how many people would the completed project displace? [\[help\]](#)

*none*

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

*N/A*

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

*N/A*

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any: [\[help\]](#)

*N/A*



9. **Housing** [help]

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

one

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

none

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

N/A

10. **Aesthetics** [help]

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

25 feet tall  
wood exterior

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

none

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

N/A

11. **Light and Glare** [help]

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

none

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

no

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

N/A

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

N/A



**12. Recreation** [\[help\]](#)

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

*none*

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

*no*

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

*N/A*

**13. Historic and cultural preservation** [\[help\]](#)

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [\[help\]](#)

*N/A*

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [\[help\]](#)

*N/A*

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [\[help\]](#)

*N/A*

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required. [\[help\]](#)

*N/A*

**14. Transportation** [\[help\]](#)

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [\[help\]](#)

*Private driveway*

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [\[help\]](#)

*no*

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? [\[help\]](#)

*3 parking spaces  
none eliminated*



- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [\[help\]](#)

*no*

- e. Describe the existing condition of the proposed access road, including width of easement, width of pavement or roadway, curbs, gutters, and/or sidewalks.

*private driveway - 15' wide*

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

*no/*

- g. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? [\[help\]](#)

*2 trips per day.*

- h. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. [\[help\]](#)

*no*

- i. Proposed measures to reduce or control transportation impacts, if any: [\[help\]](#)

*N/A*

#### 15. Public Services [\[help\]](#)

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. [\[help\]](#)

*no*

- b. Proposed measures to reduce or control direct impacts on public services, if any. [\[help\]](#)

*N/A*

#### 16. Utilities [\[help\]](#)

- a. Circle utilities currently available at the site: [\[help\]](#)

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other \_\_\_\_\_

- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. [\[help\]](#)

*Temporary service -*



### C. Signature [\[help\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee

LARRY THRONSDALEN

(425-478-484)

Position and Agency/Organization

agent for owner

Date Submitted:

06/25/2019

L THRONSDALEN@MSN.COM.



## D. supplemental sheet for nonproject actions [\[help\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:



5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.



**J.C. Mc DONNELL ENGINEERING, P.C.**

**Consulting Civil Engineers**

**P.O. Box 13199**

**Mill Creek, WA. 98082**

**DRAINAGE REPORT**

**FOR**

**Loney 2-Lot Short Plat**

**PFN: \_\_\_\_\_**

**IN**

**CITY OF MUKILTEO, WA.**

**SITE ADDRESS:**

1603 Debreton Lane

Sec. 03, T 28 N, R 4E WM

Snohomish County, Washington

**TAX ID:** 2804300200200

**DATE:** MAY 31, 2019

**REVISED:**

**LEGAL DESCRIPTION:**

SEC 03 TWP 28 RGE 04 BEG AT NW COR GOVT LOT 3 TH ELY ALG N LN SD GOVT LOT 3 DIST 569.59FT TH S32\*10 50E DIST 412.8FT TH S62\*05 10W DIST 35FT TO MOST ELY COR TR DEEDED TO ELLIOT F. BROWN JULY 18,1957TH S32\*10 50E DIST 40FT TH S32\*10 50E DIST 90FT TPB TH CONT S32\*10 50E DIST OF 100FT TH N62\*05 10E DIST 190FT TH N32\*10 50W FOR DIST 100FT TH S62\*10 10W DIST 190FT TO TPB

**OWNER:** LONEY DAVID/JOAN

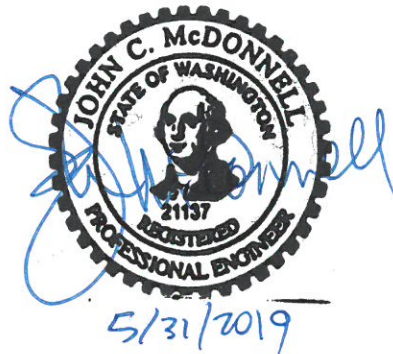
**ADDRESS:** 12661 WEST SAN JUAN COURT,  
LITCHFIELD PARK, AZ 85340

**PREPARED BY:**

John McDonnell, MS, PE

**LAND SURVEYOR:**

PGIS INC. – RON HILLIARD, PLS  
(425) 778-5620





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## SECTION I - PROJECT OVERVIEW

Project Description: The Loney SP is located on the east end of Debreton at 1603 Debreton. The 0.435 AC project lot was created in a prior three lot Mukilteo subdivision . The subject lot is remote to the south from the Debreton frontage and is accessed by a long curving easement driveway to the east and south on property described as NGPA or "To Remain Undeveloped". There is an existing Concrete Detention Vault off the SE corner of the Loney lot, which was originally designed to serve the Kailash Heights plat of 8-lots was used to serve the subsequent project known as the Kari Short Plat, a project constructed to the west of the Loney's. See discussion on the following pages. The Lot-2 access proposed will be via an existing paved driveway apron constructed off of the existing Lot access driveway adjacent to the detention vault.

There is an existing house on the west half of the parcel and a large vacant area on the east half of the parcel. The vacant area will become a new 8,500 SF lot with a building envelope facing east and access provided from the ASPH apron mentioned above. A tiered elevation of the Lot, stepping up the slope to the new house, will require that access be taken from the apron into a basement garage.

The 0.435 acre parcel is to be subdivided into 2 lots. The existing house will be described as Lot 1. The proposed Lot will be described as Lot 2.

Drainage Concept: The Geotechnical Engineer has required that infiltration **not be used** based upon the steep embankment east of the building site and the fill nature of the soils involved. Therefore, the overall drainage concept for the roof areas will direct the roof runoff to the downstream conveyance, the pipe discharging from the existing detention vault located at the southeast corner of the property. This is in conformance with Section 3.1.1 of the 2012 DOE Storm Drainage Manual. The driveway area will be diverted via existing Storm Drain into the detention vault as elevation permits. *Since the Site is generally not suitable for LID by Geotechnical determination. Since the Project does not meet the threshold of 10,000 sf of new or replacement Impervious Surface for detention under the 2014 Department of Ecology manual requirement, it is totally appropriate to route the site stormwater through the available proven storm conveyance to the Downstream Channel. Q100 flow is far less than 0.15 cfs so impacts to the facility are expected to be insignificant.*

Therefore, runoff from the proposed building rooftop will be directly discharged into the existing pipe conveyance east of the vault without restriction. The total area of roof top is 1,377 sf. Affected driveway surface is 673 SF. Total proposed impervious is 2,050 SF.

Runoff quality control: Runoff from Pollution Generating Surfaces (PGIS) will not receive treatment for water quality as the 673 SF driveway and concrete surfaces are much less in square footage than the 5,000 SF treatment threshold. Thus no water quality or detention is actually required.



Soil Conditions: Soil exploration indicated that the site area was generally underlain by loose to medium dense undocumented fill soils with localized areas underlain by medium dense sand or better, fine to medium sand with silt interpreted by the Geotechnical Engineers as native standard outwash soils. Based upon the fill conditions, it was further recommended by Nelson Geotechnical Group, that the structure be developed on 4-inch driven piles to place building loads on deeper "more competent native deposits.

The geotechnical Storm Drainage recommendation was to collect surface water into a storm collection system and safely discharge into an appropriate drainage system. Specifically, infiltration was not recommended on the site based upon the nature of the fill and the upstream and downstream slopes. Therefore, LID compliance cannot be achieved based upon the Geotechnical recommendations. The remainder of this report discusses the details.

There is an existing Concrete Detention Vault off the SE corner of the Loney lot, which was originally designed to serve the Kailash Heights plat of 8-lots was used to serve the subsequent project known as the Kari Short Plat, a project constructed to the west of the Loney's. The situation was clearly discussed in the Kari SP Drainage Report by MAC Engineering. Our evaluation of the vault with WWHM2012 indicates there is no extra volume available in this vessel to serve the proposed house development. OHowever, one potential alternative not evaluated is to direct the flow from the proposed surfaces thorough the Vault as a Bypass or overflow to the downstream. This option would accomplish the same purpose as the option selected with a much lower construction cost.



## SECTION II – CONDITIONS AND REQUIREMENT SUMMARY

2012 Stormwater Management Manual for Western Washington:

### **Minimum Requirement #1: Preparation of Stormwater Site Plans**

The final engineering plans include existing conditions, a SWPPP, road / lot grading and how the storm water runoff will either be collected and routed to drainage facilities for detention and restricted discharge in conjunction with this Drainage Report.

### **Minimum Requirement #2: Construct Stormwater Prevention Plan (SWPPP)**

A SWPPP has been prepared as part of the final construction plans and addresses the following:

- a) Safe Construction access will be established for construction traffic.
- b) Haul-out trucks will be confined to travelling on pavement and maintained surfaces. Construction truck routing will be limited to Debreton.
- c) Sediment controls may include silt traps in CB's and silt fencing as needed. The volume of silt collection needed is expected to be small based upon the COM "Determining Construction Site Sediment Damage Potential" worksheet (Attached in Section V, Special Report).

### **Minimum Requirement #3: Source Control of Pollution**

Pollution control is not required for this project as the proposed driveway surface is much less than the 5,000 SF threshold triggering a treatment response.

### **Minimum Requirement #4: Preservation of Natural Drainage Systems & Outfalls**

The Short Plat project creates a single new residential lot, which currently drains by sheet flow to the downstream. The site has already been cleared as part of the construction of the existing house.

### **Minimum Requirement #5: On-site Stormwater Management**

Geotechnical Site Analysis and Infiltration Assessment: The Report by Nelson admonishes Contractors to collect ground water and surface drainage to be discharged through appropriate drainage systems. No infiltration is permitted on these soils.

### **Geotechnical Site Analysis and Infiltration Assessment:**

A Geotechnical Engineering Study has been completed by Nelson Geotechnical Associates and is discussed in Section V of this report. The report was required by the City of Mukilteo to evaluate the suitability of the Site regarding development and slope issues. Infiltration and the design of Low Impact Development features were not addressed directly in the original Report.



**Minimum Requirement #5: On-site Stormwater Management (cont.)**

Based upon verbal contacts with the Geotechnical firm, they did not recommend consideration of on-site infiltration for this project. Detention was determined to be the Drainage Management technique of choice by the geotechnical engineer, if necessary. Circumstantially, however, detention is not required by the Ecology 2012 Stormwater Management Manual (SWMMWW) for projects of this size, i.e. developments of less than 10,000 SF on new impervious. This project is 2,050 sf of new impervious.

**Lawn and landscaped areas:**

Post-Construction Soil Quality and Depth shall be managed in accordance with BMP T5.13 in Chapter 5 of Volume V, DOE 2012. By increasing the depth and water holding capacity of the topsoil, yard areas meeting the guidelines of BMP T5.13 may be modeled as "Pasture" rather than "Lawn".

**Roofs,**

1. Full Dispersion is not recommended by the Project Geotechnical Engineers on this project because of steep slopes nearby and underlying fill soil conditions. Paved areas are below the plane of the house development but are routable to the downstream storm system via a proposed Storm Drain .There is no suitable path for dispersion
2. **Bioretention facilities are specifically rejected due** to the transitional slopes in question, unavailable useable land area for the footprint, proximity of "wetland & buffer" and the soil conditions previously identified.
3. Downspout Dispersion Systems in accordance with BMP T5.10B in Chapter 3 of the manual. ***Downspout Dispersion is not proposed for the project due to the lack of enough vegetated flow path.***
4. **Perforated Stub-out Connections in accordance with BMP T5.10C in Section 3.1.3 in Chapter 3 of DOE 2012 Volume III.**

***Perforated stub-out connections are NOT feasible for roof drain connections in the landscaping. Dispersion is not recommended by the Geotechnical Engineer due to the fill soils on the site and other related issues.***



## SECTION II – CONDITIONS AND REQUIREMENT SUMMARY (cont.)

### Driveway:

1. Full Dispersion in accordance with BMP T5.30 in Chapter 5 of DOE 2012 Volume V  
*Full dispersion is not proposed because there is not any suitable vegetated flow path available.*
2. Permeable pavement in accordance with BMP T5.15 in chapter 5 of Volume V.  
*Permeable pavement is not proposed due to the fill characteristics if the property.*
3. Bioretention BMP's (See Chapter 7, Volume V) are not selected due to the specific geotechnical characterizations of the Site.  
*Bioretention is not proposed for the project. No suitable site area available.*
4. Sheet Flow Dispersion in accordance with BMP T5.12,  
*Sheet Flow Dispersion is not proposed for roadway surfaces due to the limited or unavailable flow paths.*



## **SECTION III– OFFSITE ANALYSIS**

### **TASK 1: Upstream Analysis:**

Field reconnaissance shows that potential upstream flows are very limited and will not be considered in the proposed development.

### **TASK 2: Downstream Analysis:**

The Kari Short Plat Drainage Report explains that the entire hillside surrounding this proposed lot drains east into the large Ravine that drains from the Boeing Everett facility and Paine Field directly to Puget Sound.

McCall, et al. explains: “The Boeing airfield and plant site south of the site contribute runoff to the Ravine that flows north through the undeveloped portion of the site. The Ravine discharges to the Puget Sound at an oval culvert (24" wide by 28" high) crossing the existing railroad right-of-way lines approximately 1800 feet downstream of the site. The culvert has an 8-foot potential headwater depth. The Ravine banks are vegetated with native 2nd and 3rd growth forest with thick underbrush. Natural dead fall litters the stream throughout the majority of the downstream system. Sloughing of the ravine banks was noted along the drainage course, however no sloughing was observed within the stream bed itself. Numerous above ground culvert discharge to the ravine from public and private offsite drainage systems that contribute runoff to this stream. “

Therefore, no adverse impacts to the upstream or downstream drainage courses are anticipated with the addition of a single residence in the Loney Short Plat.

### **TASK 3: Drainage System and Problem Description:**

Based upon the WWHM2012 Hydraulic Analysis of the impact of the proposed 2 lot development, there should be no impact by one individual house development on the existing downstream conveyance system. Low flow portions will infiltrate via the routing of roof runoff through the pervious roof drain connection pipes to the existing Detention Vault.



## SECTION IV – FLOW CONTROL AND WATER QUALITY ANALYSIS AND DESIGN

### EXISTING CONDITIONS OF PROPERTY

Exist Property SA	=	18,947 SF (0.435 AC)
Exist IMPERVIOUS	=	2,944 SF (0.0676 AC)
Exist PERVIOUS	=	<u>16,003 SF (0.3674 AC)</u>
TOTAL SITE	=	18,947 SF (0.435 AC)

Lot Slopes are steep on the front & back of the Lot #2 as proposed for a new building lot. Soils are medium sand to a depth of 3-4 feet. Deeper soils were described as either silt or fine/medium sand.

### PROPOSED CONDITIONS

Lot #1 = 10,447 SF (0.2349 AC) This EXISTING CONDITION will remain  
and will be considered outside the DEVELOPMENT AREA.

#### DEVELOPMENT AREA

Lot #2 = 8,500 SF (0.195 AC)

ROOFTOP	=	1,377 SF
CONCRETE DRIVE	=	<u>673 SF</u>
PROPOSED IMPERVIOUS	=	2,050 SF (0.0471AC)
PROPOSED PERVIOUS	=	6,444 SF (0.1479 AC)

This Site is unable to provide complete Infiltration on-site based upon the recommendations of the Geotechnical Engineer, Nelson Geotechnical Associates, Inc. The Site is classified as a Tributary Area (Sub-Basin 4) flowing into the existing Detention Vault for the Kari Short Plat (aka the Kailash Heights Plat, City File SD 2008-04). Therefore, it is proposed that the Site roof drain will be directed through a conventional “yard drain” structure into the existing Concrete Vault for Bypass into the controlled downstream discharge.

The Detention Vault was designed and constructed for the previously failed 8-lot the Kailash Heights project and was subsequently used for a 4-lot short plat development called the Kari Short Plat. Therefore, it is reasonable to expect that there remains excess detention capacity in the existing vault sufficient to manage runoff from one additional house. Since the SFR project does not trigger the appropriate thresholds in the DOE Manual, no hydraulic analysis beyond determination of undeveloped and developed flows (Delta Q100 << 0.1 cfs) is proposed at this writing to document said capacity.

**Delta Q100 = 0.075 – 0.0068 = 0.068 cfs <<< 0.150 CFS**



#### Conclusion:

Since the Site is not suitable for LID by Geotechnical determination and since the Project does not meet the detention threshold of 10,000 sf NPGIS for detention under the 2014 Department of Ecology manual requirement, it is totally appropriate to route the site stormwater through the available storm conveyance to the downstream. Q100 flow is far less than 0.15 cfs allowed by the Ecology Manual so impacts to the drainage system are expected to be insignificant.

#### Pipe Capacity

A 6" conveyance pipe is selected to carry the roof and driveway water in the road row to the 12" Storm Drain discharge line from the vault. A 6" pipe at 0.9 % has capacity of 0.57 cfs flowing full compared to a calculated Q100 runoff of 0.075 cfs. At the second run pipe slope increases to 421% for a full capacity of 3.89 cfs. Pipes can easily contain the project runoff.

#### **WATER QUALITY**

Runoff treatment will not be required for this Project in accordance with Section 2.5.6, Volume 1, Minimum Technical Requirements. Water Quality Design Storm Volume has been calculated in this drainage report.



## **SECTION V– SPECIAL REPORTS**

- A. GEOTECHNICAL ENGINEERING STUDY by Nelson Geotechnical, Inc dated January 8, 2016.
- B. AMENDED DRAINAGE REPORT FOR KARI SHORT PLAT dated 11/19/2012





**NELSON GEOTECHNICAL  
ASSOCIATES, INC.**  
**GEOTECHNICAL ENGINEERS & GEOLOGISTS**

Main Office  
17311 – 135<sup>th</sup> Ave NE, A-500  
Woodinville, WA 98072  
(425) 486-1669 · FAX (425) 481-2510

Engineering-Geology Branch  
5526 Industry Lane, #2  
East Wenatchee, WA 98802  
(509) 665-7696 · FAX (509) 665-7692

November 3, 2016

Mr. and Mrs. David and Joan Loney  
c/o Larry Throndsen - LOT Design Group  
[lthronsdn@msn.com](mailto:lthronsdn@msn.com)

Geotechnical Engineering Evaluation  
**Loney Residence Development**  
**1603 Debrelon Lane**  
**Mukilteo, Washington**  
NGA File No. 971416

Dear Mr. and Mrs. Loney:

We are pleased to submit the attached report titled "Geotechnical Engineering Evaluation – Loney Residence Development – 1603 Debrelon Lane – Mukilteo, Washington." Our services were completed in general accordance with the proposal signed by you on September 20, 2016.

The property is currently occupied by an existing single-family residence within an upper relatively level bench area within the western portion of the property. The ground surface below and to the east of the existing residence descends moderately to steeply down from the upper bench area to east to a lower gentle to moderately sloping area within the eastern portion of the property. We understand that the proposed development will subdivide the existing property into separate western and eastern lots, and constructing a new single-family residence within the lower eastern portion of the property. The existing residence will remain as a part of the overall development plans. Specific grading and stormwater plans were not available at the time this proposal was prepared.

We explored the site with seven track-hoe excavated test pits extending to depths in the range of 7.0 to 11.0 feet below the existing ground surface. We also performed one hand auger exploration within the steep slope above the proposed residence. Our explorations indicated that the proposed new residence area is generally underlain by loose to medium dense, undocumented fill soils with localized areas of the site underlain by medium dense or better, fine to medium sand with silt, which we interpreted as native advanced outwash soils.

It is our opinion from a geotechnical standpoint that the site is compatible with the planned development provided that our recommendations are incorporated into the design and construction of this project. In our opinion, the significant amount of undocumented fill soils that underlie a majority of the proposed residence are not suitable to provide adequate support for foundation and slab loads utilizing conventional shallow foundations, without experiencing significant settlement and distress to the structure. Based on our explorations, we recommend that the proposed residence be supported on a deep foundation system consisting of 4-inch driven pin piles in order to advance the structure loads through the loose upper soils, down to more competent native deposits interpreted to underlie the site at depth. Due to our explorations



being generally unable to encounter medium dense or better soils to the depths explored, we would recommend that one or more test piles be installed within the proposed residence area to confirm design assumptions and estimate overall pile depths, prior to finalizing the foundation plan. We also recommend that if a basement slab-on-grade is proposed, it should also be supported on pin piles and be designed as a structural slab.

It is also our opinion that the soils that underlie the site and form the core of the site slopes should be stable with respect to deep-seated earth movements, due to their inherent strength and slope geometry. However, there is a potential for shallow sloughing and erosion events to occur on the steeper site slopes within the property. Based on our site observations, it is our opinion that the proposed structure setback of 25 feet from the toe of the steep slopes should provide adequate protection for the proposed residence from shallow failures originating on the steep slopes above, and help maintain the existing stability of the slopes. In the attached report, we have also included recommendations for site grading, foundation support, retaining walls and site drainage.

We should be retained to review and comment on final development plans and observe the earthwork phase of construction. We also recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications.

We appreciate the opportunity to provide service to you on this project. Please contact us if you have any questions regarding this report or require further information.

Sincerely,

**NELSON GEOTECHNICAL ASSOCIATES, INC.**



Khaled M. Shawish, PE  
**Principal**



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**Geotechnical Engineering Evaluation  
Loney Residence Development  
1603 Debreton Lane  
Mukilteo, Washington**

## **INTRODUCTION**

This report presents the results of our geotechnical engineering investigation and evaluation of the Loney Residence Development project located at 1603 Debreton Lane in Mukilteo, Washington, as shown on the Vicinity Map in Figure 1. The purpose of this study is to explore and characterize the site's surface and subsurface conditions and to provide geotechnical recommendations for site development. For our use in preparing this report, we have been provided with a plan set titled "Preliminary Short Plat," dated June 22, 2016 and prepared by Pacific Geomatic Services, Inc., showing the existing site conditions and proposed development.

The site consists of a relatively level upper bench within the western portion of the property where a single-family residence and attached garage are located. The site extends moderately to steeply down from the bench to the east. The site is bounded to the south and east by wooded areas, and to the north and west by existing single-family residences properties. We understand development plans consist of subdividing the property into two separate western and eastern lots. A new single-family residence will be constructed with the lower eastern lot. Specific grading and stormwater handling plans were not available at the time this report was prepared. The existing site conditions and proposed development areas are shown on the Schematic Site Plan in Figure 2.

## **SCOPE**

The purpose of this study is to explore and characterize the site surface and subsurface conditions, and provide opinions and recommendations for the proposed site development. Specifically, our scope of services included the following:

1. Review available soil and geologic maps of the area.
2. Explore the subsurface soil and groundwater conditions within the site with backhoe/trackhoe excavated test pits. Backhoe/trackhoe was subcontracted by NGA.
3. Map the conditions on the slope, evaluate current slope stability conditions.
4. Perform shallow hand explorations on the site slopes, as needed.
5. Provide our opinion regarding the stability conditions of the site slopes.
6. Provide recommendations for setbacks from the steep slopes.



7. Perform grain-size sieve analysis on soil samples, as needed.
8. Provide recommendations for earthwork, foundation support, and slabs-on-grade.
9. Provide recommendations for retaining walls.
10. Provide recommendations for temporary and permanent slopes.
11. Provide recommendations for pavement subgrade.
12. Provide recommendations for site drainage and erosion control.
13. Document the results of our findings, conclusions, and recommendations in a written geotechnical report.

## **SITE CONDITIONS**

### **Surface Conditions**

The site consists of a rectangular-shaped parcel covering approximately 0.41 acres. The property is currently occupied by an existing single-family residence structure and attached garage located within the upper western portion of the site. There is an approximately twelve-foot-tall, block retaining wall located to the east of the existing residence. From the existing residence, driveway, and block retaining wall, the site slopes moderately to steeply down to the east to a gently sloping bench area and then continues to slope moderately down to the east to the eastern property line at gradients in the range of 7 to 28 degrees (12 to 53 percent) as shown on Cross Sections A-A' and B-B' in Figures 3 and 4, respectively. The site is generally vegetated with grass and landscaping vegetation with a few scattered young to mature deciduous trees. The property is bordered to the south and east by wooded areas and an access driveway, and to the north and west by existing single-family residences properties. We did not observe any surface water within the proposed development areas during our site visit on October 6, 2016.

### **Subsurface Conditions**

**Geology:** The Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington, by James P. Minard (USGS, 1982), was reviewed for this site. The site is mapped as Advance Outwash (Qva). The Advance Outwash deposits are described as mostly clean, gray, well stratified, unconsolidated sand with pebbles and some cobbles. Our explorations generally encountered medium dense to dense, brown, fine to medium sand with silt, on and directly adjacent to the steep slope area within the western portion of the property, which we interpreted as native advanced outwash deposits. Our explorations within the eastern portion of the property underlying the proposed building area encountered loose to medium dense, undocumented fill soils to the depths explored.



**Explorations:** The subsurface conditions within the site were explored on October 6, 2016 with seven track-hoe excavated test pits and one hand-augered exploration. The approximate locations of our explorations are shown on the Schematic Site Plan in Figure 2.

A geologist from NGA was present during the explorations, examined the soils and geologic conditions encountered, obtained samples of the different soil types, and maintained logs of the explorations. The soils were visually classified in general accordance with the Unified Soil Classification System, presented in Figure 5. The logs of our explorations are attached to this report and are presented as Figures 6 through 8. We present a brief summary of the subsurface conditions in the following paragraph. For a detailed description of the subsurface conditions, the boring logs should be reviewed.

At the surface of Hand Auger 1 and Test Pits 1 through 2 we encountered approximately 0.6 to 3.3 feet of surficial grass and topsoil. Underlying the topsoil, we encountered medium dense or better gray brown, fine to medium sand with silt, gravel, and iron-oxide weathering. We interpreted these soils to be native advanced outwash deposits. Hand Auger 1 and Test Pits 1 and 2 were terminated within the native advanced outwash soils at respective depths of 7.5, 9.0, and 7.0 feet below the existing ground surface.

Within Test Pits 3 through 7, we encountered approximately 0.5 to 1.8 feet of surficial grass and topsoil. Underlying the topsoil in Test Pits 3 through 7, we generally encountered approximately 3.7 to 10.5 feet of loose to medium dense, dark brown to gray silty fine to medium sand and silt with sand and varying amounts of organics and debris that we interpreted as undocumented fill soils. Underlying the undocumented fill soils in Test Pit 3 and 7 at 5.5 and 7.0 feet below the existing ground surface respectively, we encountered medium dense/very stiff to dense/hard, gray-brown fine to medium sand with silt and trace gravel, and gray-brown silt with fine sand and gravel that we interpreted as native advance outwash soils. Test Pits 3 and 7 were terminated within competent native glacial soils at depths of 10.5 and 8.5 feet below the existing ground surface, respectively. Test Pits 4 through 6 were terminated within the undocumented fill soils at depths in the range of 10.0 and 11.0 feet below the existing ground surface.

### **Hydrogeologic Conditions**

Groundwater seepage was not encountered in our explorations. However, we anticipate that perched water conditions could develop on this site during extended periods of wet weather. Perched water occurs when surface water infiltrates through less dense, more permeable soils, such as topsoil and the weathered horizon, and accumulates on top of a less permeable soil. Perched water does not represent a regional



groundwater "table" within the upper soil horizons. Perched water tends to vary spatially and is dependent upon the amount of rainfall. We would expect the amount of groundwater to decrease during drier times of the year and increase during wetter periods.

## **SENSITIVE AREA EVALUATION**

### **Seismic Hazard**

We reviewed the 2015 International Building Code (IBC) for seismic site classification for this project. Since medium dense or better native glacial soils were encountered at depth in most of our explorations, the site conditions best fit the description for Site Class D.

Hazards associated with seismic activity include liquefaction potential and amplification of ground motion by soft deposits. Liquefaction is caused by a rise in pore pressures in a loose, fine sand deposit beneath the groundwater table. The loose to medium dense native soils and undocumented fill interpreted to underlie the site have a low to moderate potential for liquefaction or amplification of ground motion. The deep foundation systems recommended for residence support should alleviate such issues.

The medium dense or better outwash soil interpreted to form the core of the site slopes is considered stable with respect to deep-seated slope failures. All steep slopes have the potential for shallow sloughing failures during seismic events. Such events should not affect the planned residence provided the foundations are designed with the recommended setback values and the slope and drainage systems are maintained as described in this letter.

### **Erosion Hazard**

The criteria used for determining the erosion hazard for the site soils includes soil type, slope gradient, vegetation cover, and groundwater conditions. The erosion sensitivity is related to vegetative cover and the specific surface soil types, which are related to the underlying geologic soil units. The Soil Survey of Snohomish County Area, Washington, by the Soil Conservation Service (SCS), was reviewed to determine the erosion hazard of the on-site soils. The site surface soils were classified using the SCS classification system as Alderwood-Everett gravelly sandy loams, 25 to 70 percent slopes. The Alderwood-Everett gravelly sandy loam is listed as having a severe erosion hazard. It is our opinion that the site soils should have a slight to moderate hazard for erosion in areas that are not disturbed and where vegetation cover is not removed.



## **Landslide Hazard/Slope Stability**

The criteria used for evaluation of landslide hazards include soil type, slope gradient, and groundwater conditions. The ground surface within the proposed development area slopes gently to steeply from the west to the east within the proposed property at gradients in the range of 7 to 28 degrees (12 to 53 percent). We did not observe evidence of significant slope instability within the site slopes or within the immediate vicinity of the property during our investigation, such as deep-seated landsliding. We also did not observe groundwater seepage or recent indications of erosion or sloughing on the steep slopes at the time of our visit.

The core of the steep slopes is inferred to consist primarily of competent native glacial outwash soils. Inclinations of up to 28 degrees on the site slopes indicate high internal strength within the underlying soils. Relatively shallow sloughing failures as well as surficial erosion are natural processes and should be expected on the steeper site slopes during extreme weather conditions or a seismic event, especially in areas with surficial undocumented fill soils. It is our opinion that while there is potential for erosion, soil creep, and shallow failures within the loose surficial soils on the steeper site slopes and steep west-facing slope below and to the west of the site, there is not a significant potential for deep-seated slope failures under current site conditions. Proper site grading and drainage, as well as foundation placement and setbacks as recommended in this report, should help maintain current stability conditions.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **General**

It is our opinion that the planned development within the property is feasible from a geotechnical standpoint. Our explorations indicate that the proposed residence area is underlain by loose to medium dense undocumented fill soils along the eastern portion of the proposed development area to the depth explored. However, we did encounter competent native glacial soils within the very western portion of the proposed development area. In our opinion, the undocumented fill soils that underlie a majority of the proposed development area are not suitable to provide adequate support for foundation and slab loads utilizing conventional foundations, without experiencing significant settlement and distress to the structure. Based on our explorations, we recommend that the proposed residence be supported on a deep foundation system consisting of 4-inch driven pin piles in order to advance the structure loads through the loose fill soils down to more competent native deposits at depth. Due to our explorations being unable to encounter medium dense or better soils to the depths explored, we would recommend that one or more test piles be installed within the proposed residence area to confirm design assumptions and estimate



overall pile depths prior to finalizing the foundation plan. Depending on final grading plans, residence foundations within the western portion of the property may expose competent native glacial soils at the proposed subgrade. These foundations could possibly be supported on shallow conventional foundations, however, some minor settlement between the portion of the residence supported on the deep foundation system and the conventional foundations is possible. If desired, we can review grading and development plans as they are being finalized to better assess this potential.

We recommend that the slab-on-grade within the basement portion of the residence be designed as a structural slab and be supported on the deep foundation system. Other hard surfaces, such as paved areas, patios or walkways that are supported on the existing undocumented fill soil within the eastern portion of the property have some risk of future settlement, cracking, and the need for maintenance. To reduce this risk, we recommend over-excavating a minimum of two feet of the upper soil from these areas and replacing this material with compacted pit run or crushed rock structural fill. The subgrade should be compacted to a firm condition prior to placing the pit run. This recommendation is only for exterior hard surfaces to be supported on grade and does not apply for the interior slab.

It is also our opinion that the soils that underlie the site and form the core of the site slope should be stable with respect to deep-seated earth movements, due to their inherent strength and slope geometry. However, there is a potential for shallow sloughing and erosion events to occur on the moderate to steep slope along the western side of the site. Based on our site observations, it is our opinion that the proposed structure setback of 25 feet from the toe of the steep slopes should provide adequate protection for the proposed residence from shallow failures originating on the steep slopes above and help maintain the existing stability of the slopes. Proper setbacks, erosion and drainage control measures, along with long-term maintenance of the slope and drainage systems as recommended in this report, should reduce this potential. We recommend that we review the project plans after they have been developed.

The soils encountered on this site are considered moisture-sensitive, and will disturb when wet. We recommend that construction take place during the drier summer months, if possible. If construction is to take place during wet weather, the soils may disturb and additional expenses and delays may be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls to protect exposed subgrades and construction traffic areas. Some of the more granular non-organic on-site soils could be used as structural fill provided they could be compacted to specifications. This will depend on the moisture content of the soils at the time of construction. NGA should be retained to determine if the on-site soils can be used as structural fill material during construction.



## **Erosion Control**

The erosion hazard for the on-site soils is interpreted to be slight for exposed soils, but actual erosion potential will be dependent on how the site is graded and how water is allowed to concentrate. Best Management Practices (BMPs) should be used to control erosion. Areas disturbed during construction should be protected from erosion. Erosion control measures may include diverting surface water away from the stripped or disturbed areas. Silt fences and/or straw bales should be erected to prevent muddy water from leaving the site. Disturbed areas should be planted as soon as practical and the vegetation should be maintained until it is established. The erosion potential of areas not stripped of vegetation should be low.

Protection of the setback and steep slope area should be performed as required by the City of Mukilteo. Specifically, we recommend that the setback area and toe of slope not be disturbed or modified through placement of any fill or removal of the existing vegetation. No additional material of any kind should be placed on the slope or be allowed to reach the slope, such as excavation spoils, lawn clippings, and other yard waste, trash, and soil stockpiles. Trees should not be cut down or removed from the slope unless a mitigation plan is developed, such as the replacement of vegetation for erosion protection. Vegetation should not be removed from the slopes. Replacement of vegetation should be performed in accordance with City of Mukilteo code. Any proposed development within the slope setback area, should be the subject of a specific geotechnical evaluation. Under no circumstances should water be allowed to concentrate on the steep slopes above the proposed development area.

## **Site Preparation and Grading**

Plans for site grading should be devised such that cuts and fills are kept to a minimum if possible. Site preparation should consist of excavating the residence footprint down to planned elevations. Site preparation should also consist of overexcavating subgrades for future hard surfaces such as exterior walkways, patios, or pavement by a minimum of two feet and the resulting overexcavation backfilled with crushed rock or granular pit-run soils compacted to structural fill specifications. The stripped material should be removed from the site. If the exposed soils after overexcavating the minimum two feet are deemed loose, they should be compacted to a non-yielding condition. Areas observed to pump or weave during compaction should be additionally overexcavated and replaced with rock spalls. If significant surface water flow is encountered during construction, this flow should be diverted around areas to be developed and the exposed subgrade maintained in a semi-dry condition. In wet conditions, the exposed subgrade should not be compacted, as compaction of a wet subgrade may result in further



disturbance of the soils. A layer of crushed rock may be placed over the prepared areas to protect them from further disturbance.

The site soils are considered moisture sensitive and will disturb easily when wet. We recommend that earthwork construction take place during periods of extended dry weather, and suspended during periods of precipitation if possible. If work is to take place during periods of wet weather, care should be taken during site preparation not to disturb the site soils. This can be accomplished by utilizing large excavators equipped with smooth buckets and wide tracks to complete earthwork, and diverting surface and groundwater flow away from the prepared subgrades. Also, construction traffic should not be allowed on the exposed subgrade. A blanket of rock spalls should be used in construction access areas if wet conditions are prevalent. The thickness of this rock spall layer should be based on subgrade performance at the time of construction. For planning purposes, we recommend a minimum one-foot thick layer of rock spalls.

### **Temporary and Permanent Slopes**

Temporary cut slope stability is a function of many factors, including the type and consistency of soils, depth of the cut, surcharge loads adjacent to the excavation, length of time a cut remains open and the presence of surface or groundwater. It is exceedingly difficult under these variable conditions to estimate a stable, temporary, cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe slope configurations since they are continuously at the job site, able to observe the nature and condition of the cut slopes, and able to monitor the subsurface materials and groundwater conditions encountered.

The following information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Nelson Geotechnical Associates, Inc. assumes responsibility for job site safety. Job site safety is the sole responsibility of the project contractor.

For planning purposes, we recommend that temporary cuts in the on-site undocumented fill and native glacial soils be no steeper than two units horizontal to one unit vertical (2H:1V). If the groundwater table is encountered, we would expect that significantly flatter inclinations would be necessary. We should be retained to specifically review proposed geometry for significant cuts planned on this site. We recommend that cut slopes be protected from erosion. Erosion control measures may include covering cut slopes with plastic sheeting and diverting surface water runoff away from the top of cut slopes. We do



not recommend vertical slopes for cuts deeper than four feet, if worker access is necessary. We recommend that cut slope heights and inclinations conform to appropriate OSHA/WISHA regulations.

Permanent cut and fill slopes above the groundwater table should be no steeper than 3H:1V. However, flatter inclinations may be required in areas where loose soils are encountered. Permanent slopes should be covered with erosion control matting and vegetated. The vegetative cover should be maintained until established. We should specifically review all plans for grading on this project.

### **Foundation Support**

We recommend that the proposed residence be supported on 4-inch pin piles to transfer foundation loads through the upper loose undocumented fill soils to the underlying native competent materials interpreted to underlie the site at depth. Our explorations did encounter some organic debris within the upper soils that have the possibility to impede some of the piles. There should be contingencies in the budget and design for additional/relocated piles to replace piles that may be obstructed by debris. We also recommend that excavation equipment be available on site during pile installation so that shallow obstructions can be removed from the planned pile locations.

We recommend that the four-inch pipe piles be utilized and should be driven using a tractor-mounted hydraulic hammer, with an energy rating of at least 1,100 foot-lb. For this pile and hammer size, we recommend a design capacity of eight tons for each pile driven to refusal. The refusal criterion for this pile and hammer size is defined as less than one-inch of movement during 15 seconds of continuous driving at a rate of 550 blows per minute or higher. We recommend using galvanized schedule 40 pipe for the 4-inch pin piles. Maintaining these recommendations for minimum hammer size and refusal criteria is essential for obtaining a successful outcome.

Final pile depths should be expected to vary and will depend on the depth to competent soils. Our explorations performed as a part of this evaluation were unable to encounter competent native soils to the depths explored within the eastern portion of the proposed development area. Due to the limited nature of the explorations, we recommend that one or more "test" piles be installed to verify design parameters and estimate an approximate depth of the piles that will be needed for budgeting purposes. The piles should be spaced a minimum of three feet apart to avoid a grouping effect on the piles.

Due to the relatively small slenderness ratio of pin piles, maintaining pin pile confinement and lateral support is essential in preventing pile buckling. Pin piles should be suitably embedded into the reinforced concrete. The structural engineer should design the connections of the piles to the foundations.



Vertically driven pin piles do not provide meaningful lateral capacity. Due to the rigid pile support, friction between the foundation and subgrade soil should not be considered as resisting lateral pressures on this structure. We recommend that all lateral loads be resisted on battered pin piles and/or passive resistance on the below-grade portions of the foundations. The upper foot of soil should be neglected when calculating the passive resistance. We recommend using an equivalent fluid density of 150 pcf for calculating the passive resistance.

### **Retaining Walls**

We understand that retaining walls may be incorporated into project plans. The lateral pressure acting on subsurface retaining walls is dependent on the nature and density of the soil behind the wall, the amount of lateral wall movement which can occur as backfill is placed, wall drainage conditions, the inclination of the backfill, and other possible surcharge loads. For walls that are free to yield at the top at least one thousandth of the height of the wall (active condition), soil pressures will be less than if movement is limited by such factors as wall stiffness or bracing (at-rest condition). We recommend that walls supporting horizontal backfill and not subjected to hydrostatic forces be designed using a triangular earth pressure distribution equivalent to that exerted by a fluid with a density of 40 pcf for yielding (active condition) walls, and 60 pcf for non-yielding (at-rest condition) walls.

These recommended lateral earth pressures are for a drained granular backfill and are based on the assumption of a horizontal ground surface behind the wall for a distance of at least the subsurface height of the wall, and do not account for surcharge loads. Additional lateral earth pressures should be considered for surcharge loads acting adjacent to subsurface walls and within a distance equal to the subsurface height of the wall. This would include the effects of surcharges such as traffic loads, floor slab and foundation loads, slopes, or other surface loads. Also, hydrostatic and buoyant forces should be included if the walls could not be drained. We could consult with the structural engineer regarding additional loads on retaining walls during final design, if needed. Retaining walls that are part of the residence should be supported on pin piles as described above.

All wall backfill should be well compacted; however, care should be taken to prevent the buildup of excess lateral soil pressures, due to over-compaction of the wall backfill. This can be accomplished by placing wall backfill in thin loose lifts and compacting it with small, hand-operated compactors within a distance behind the wall equal to at least one-half the height of the wall. The thickness of the loose lifts should be reduced to accommodate the lower compactive energy of the hand-operated equipment.



Permanent drainage systems should be installed for retaining walls. Recommendations for these systems are found in the **Subsurface Drainage** subsection of this report. We recommend that we be retained to evaluate the proposed wall drain backfill material and drainage system installation.

### **Structural Fill**

**General:** Fill placed beneath foundations, pavement, or other settlement-sensitive structures should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is monitored by an experienced geotechnical professional or soils technician. Field monitoring procedures would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction. The area to receive the fill should be suitably prepared as described in the **Site Preparation and Grading** subsection prior to beginning fill placement.

**Materials:** Structural fill should consist of a good quality, granular soil, free of organics and other deleterious material, and be well graded to a maximum size of about three inches. All-weather fill should contain no more than five-percent fines (soil finer than U.S. No. 200 sieve, based on that fraction passing the U.S. 3/4-inch sieve). Some of the more granular on-site soils may be suitable for use as structural fill depending on the moisture content of the soil during construction. We should be retained to evaluate all proposed structural fill material prior to placement.

**Fill Placement:** Following subgrade preparation, placement of structural fill may proceed. All filling should be accomplished in uniform lifts up to eight inches thick. Each lift should be spread evenly and be thoroughly compacted prior to placement of subsequent lifts. All structural fill underlying building areas and pavement subgrade should be compacted to a minimum of 95 percent of its maximum dry density. Maximum dry density, in this report, refers to that density as determined by the ASTM D-1557 Compaction Test procedure. The moisture content of the soils to be compacted should be within about two percent of optimum so that a readily compactable condition exists. It may be necessary to over-excavate and remove wet soils in cases where drying to a compactable condition is not feasible. All compaction should be accomplished by equipment of a type and size sufficient to attain the desired degree of compaction.



### **Basement Slab**

As mentioned earlier, we recommend that the basement floor slab be designed as a structural slab and fully supported on pin piles. We recommend that slabs be underlain by at least six inches of free-draining gravel with less than three percent by weight passing the Sieve #200 for use as a capillary break. We recommend that the capillary break be hydraulically connected to the footing drain system to allow free drainage from under the slab. A suitable vapor barrier, such as heavy plastic sheeting (6-mil minimum), should be placed over the capillary break material. An additional 2-inch-thick moist sand layer may be used to cover the vapor barrier. This sand layer may be used to protect the vapor barrier membrane and to aid in curing the concrete; however, this sand layer is optional and is intended to protect the vapor barrier membrane during construction. Other slabs and hard surfaces that may be supported on the existing soils should be underlain by a minimum of two feet of crushed rock or pit-run soils in addition to the capillary break and vapor barrier.

### **Pavement Subgrade and Other Exterior Hard Surfaces**

Pavement and walkway subgrade preparation should be completed as recommended in the **Site Preparation and Grading** and **Structural Fill** subsections of this report. Due to the presence of undocumented fill soils and depending on tolerance to cracking, we recommend that at least the upper two feet of the existing material be removed and replaced with granular structural fill or crushed rock. If possible, the subgrades should be proof-rolled with a heavy, rubber-tired piece of equipment, to identify soft or yielding areas that may require repair prior to placing any structural fill and prior to placing the pavement base course. We should be retained to observe the proof-rolling and to recommend repairs prior to placement of the asphalt or hard surfaces. The hard surface section should be thickened and reinforced with rebar where applicable to further reduce the effects of settlement due to the loose/soft soils, but potential long-term cracking should still be expected. Some cracking and long-term settlement should still be anticipated.

### **Site Drainage**

**Surface Drainage:** The finished ground surface should be graded such that stormwater is directed to an appropriate stormwater collection system. Water should not be allowed to stand in any areas where footings, slabs, or pavements are to be constructed. Final site grades should allow for drainage away from the residence. We suggest that the finished ground be sloped at a minimum gradient of three percent, for a distance of at least 10 feet away from the residence. Surface water should be collected by permanent



catch basins and drain lines, and be discharged into an appropriate discharge system. The overflow water should be dispersed to discharge into an appropriate location.

**Subsurface Drainage:** If groundwater is encountered during construction, we recommend that the contractor slope the bottom of the excavation and collect the water into ditches and small sump pits where the water can be pumped out and routed into a permanent storm drain.

We recommend the use of footing drains around the structures. Footing drains should be installed at least one foot below planned finished floor elevation. The drains should consist of a minimum 4-inch-diameter, rigid, slotted or perforated, PVC pipe surrounded by free-draining material wrapped in a filter fabric. We recommend that the free-draining material consist of an 18-inch-wide zone of clean (less than three-percent fines), granular material placed along the back of walls. Pea gravel is an acceptable drain material. The free-draining material should extend up the wall to one foot below the finished surface. The top foot of backfill should consist of impermeable soil placed over plastic sheeting or building paper to minimize surface water or fines migration into the footing drain. Footing drains should discharge into tightlines leading to an appropriate collection and discharge point with convenient cleanouts to prolong the useful life of the drains. Roof drains should not be connected to wall or footing drains.

## **CONSTRUCTION MONITORING**

We recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications. We should be contacted a minimum of one week prior to construction activities and could attend pre-construction meetings if requested.

## **USE OF THIS REPORT**

NGA has prepared this report for David and Joan Loney and their agents, for use in the planning and design of the development planned on this site only. The scope of our work does not include services related to construction safety precautions and our recommendations are not intended to direct the contractors' methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. There are possible variations in subsurface conditions between the explorations and also with time. Our report, conclusions, and interpretations should not be construed as a



warranty of subsurface conditions. A contingency for unanticipated conditions should be included in the budget and schedule.

Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time this report was prepared. No other warranty, expressed or implied, is made. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the owner.

O-O-O



It has been a pleasure to provide service to you on this project. If you have any questions or require further information, please call.

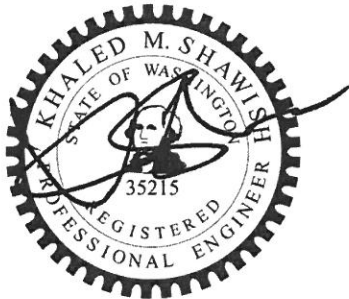
Sincerely,

**NELSON GEOTECHNICAL ASSOCIATES, INC.**



LEE S. BELLAH

Lee S. Bellah, LG  
Project Geologist



Exp. July 28, 2017

Khaled M. Shawish, PE  
Principal

ABR:LSB:KMS:dy

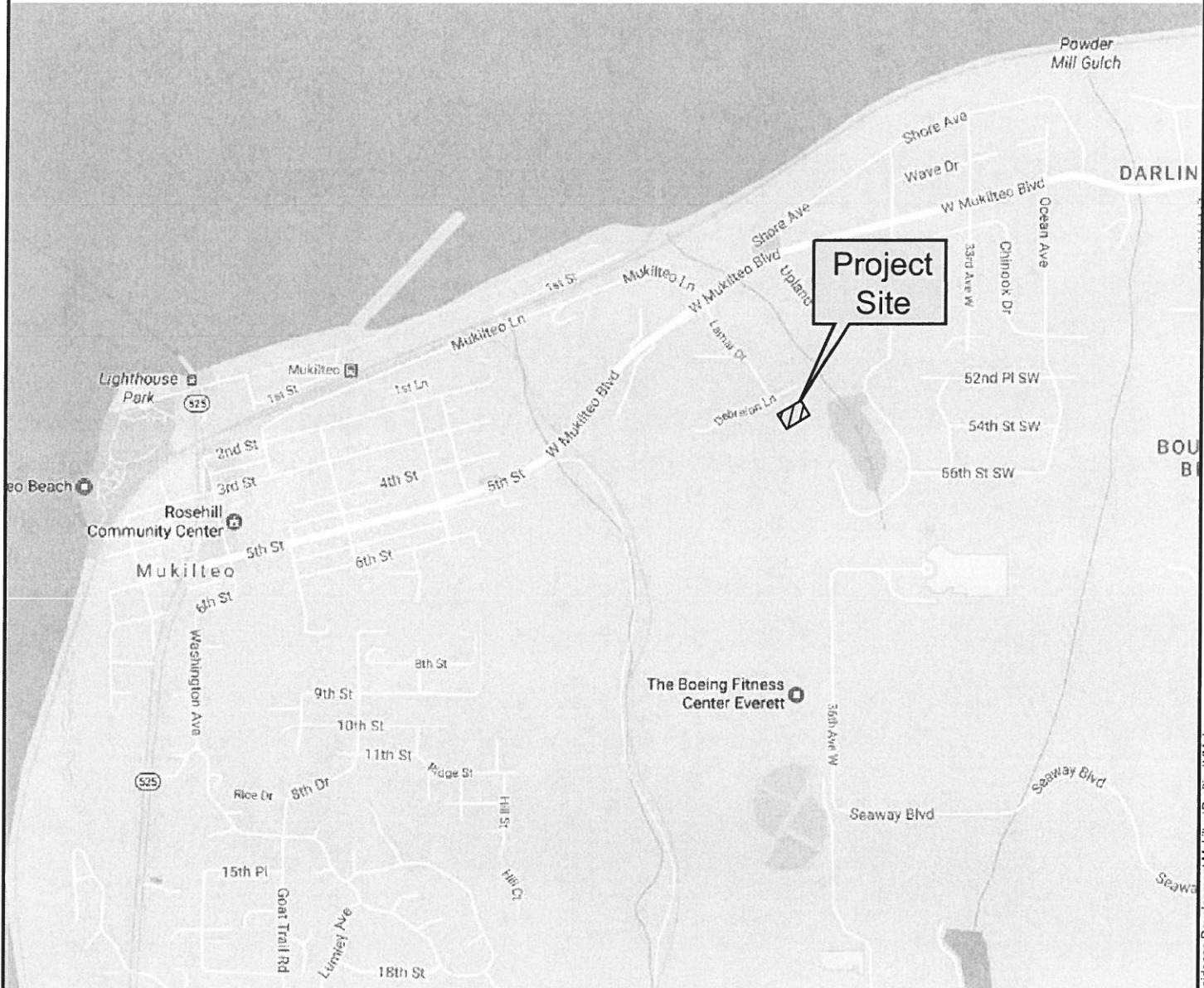
Eight Figures Attached

**NELSON GEOTECHNICAL ASSOCIATES, INC.**



# VICINITY MAP

Not to Scale



## Mukilteo, WA

Project Number  
971416

Figure 1

Loney Residence  
Development  
Vicinity Map



**NELSON GEOTECHNICAL  
ASSOCIATES, INC.**  
GEOTECHNICAL ENGINEERS & GEOLOGISTS

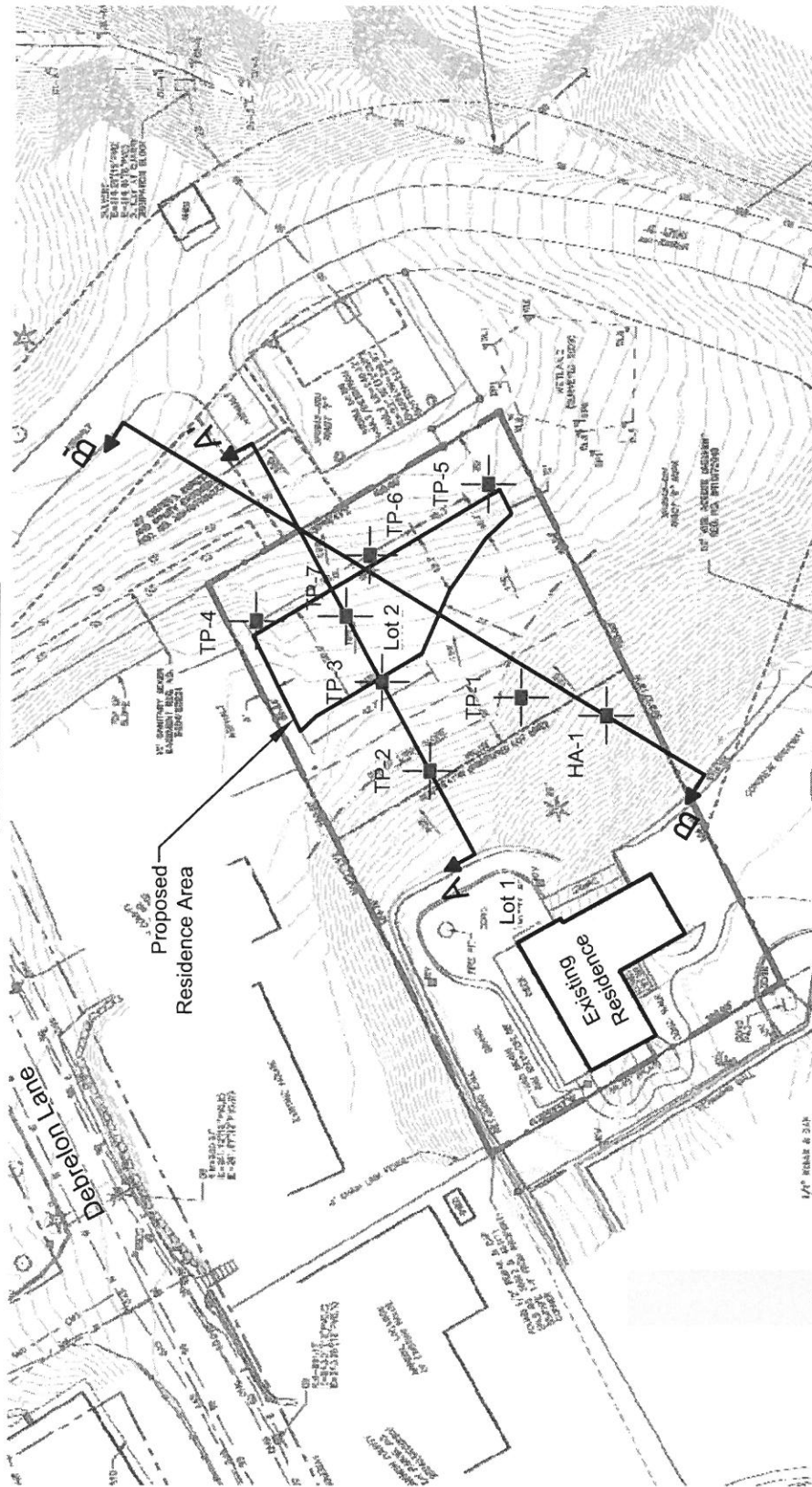
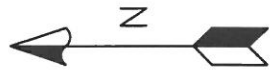
17311-135th Ave. NE, A-500  
Woodinville, WA 98072  
(425) 486-1669 / Fax 481-2510

Snohomish County (425) 339-1669  
Wenatchee/Chelan (509) 665-7696  
www.nelsongeotech.com

No.	Date	Revision	By	CK
1	10/7/16	Original	DPN	ABR



# Site Plan



## LEGEND

- Property line
- TP-1
- Number and approximate location of test pit
- HA-1
- Number and approximate location of hand auger
- A' A'
- Approximate location of cross-section



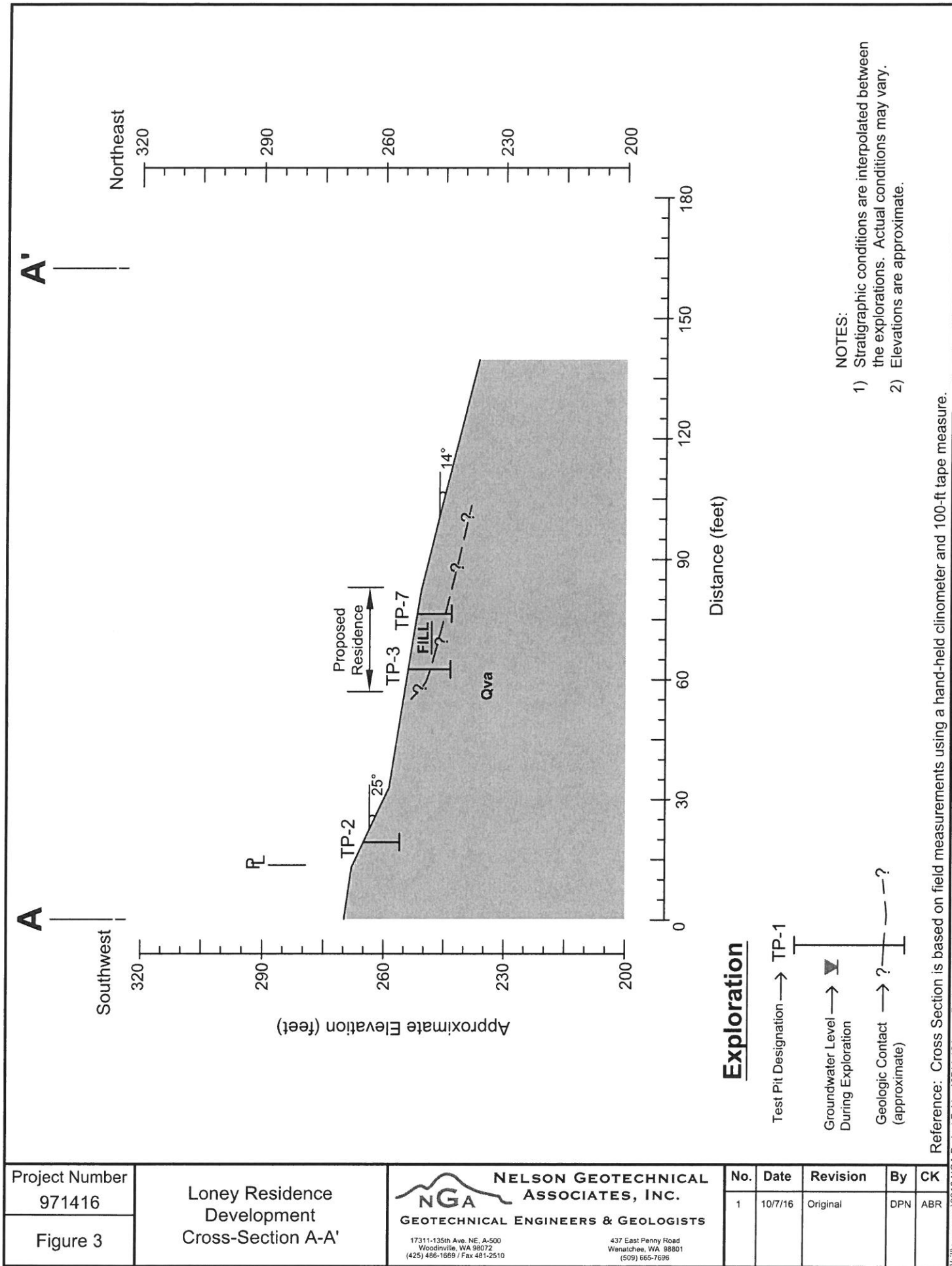
Scale: 1 inch = 50 feet

Reference: Site plan based on a plan dated June 7, 2016 titled "Preliminary Short Plat," prepared by Pacific Geomatic Services, Inc.

Project Number 971416	Loney Residence Development Site Plan	<b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> GEOTECHNICAL ENGINEERS & GEOLOGISTS 17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510 Snohomish County (425) 337-1669 Wenatchee/Chelan (509) 665-7696 www.nelsongeotech.com	No.	Date	Revision	By	CK
Figure 2			1	10/7/16	Original	DPN	ABR

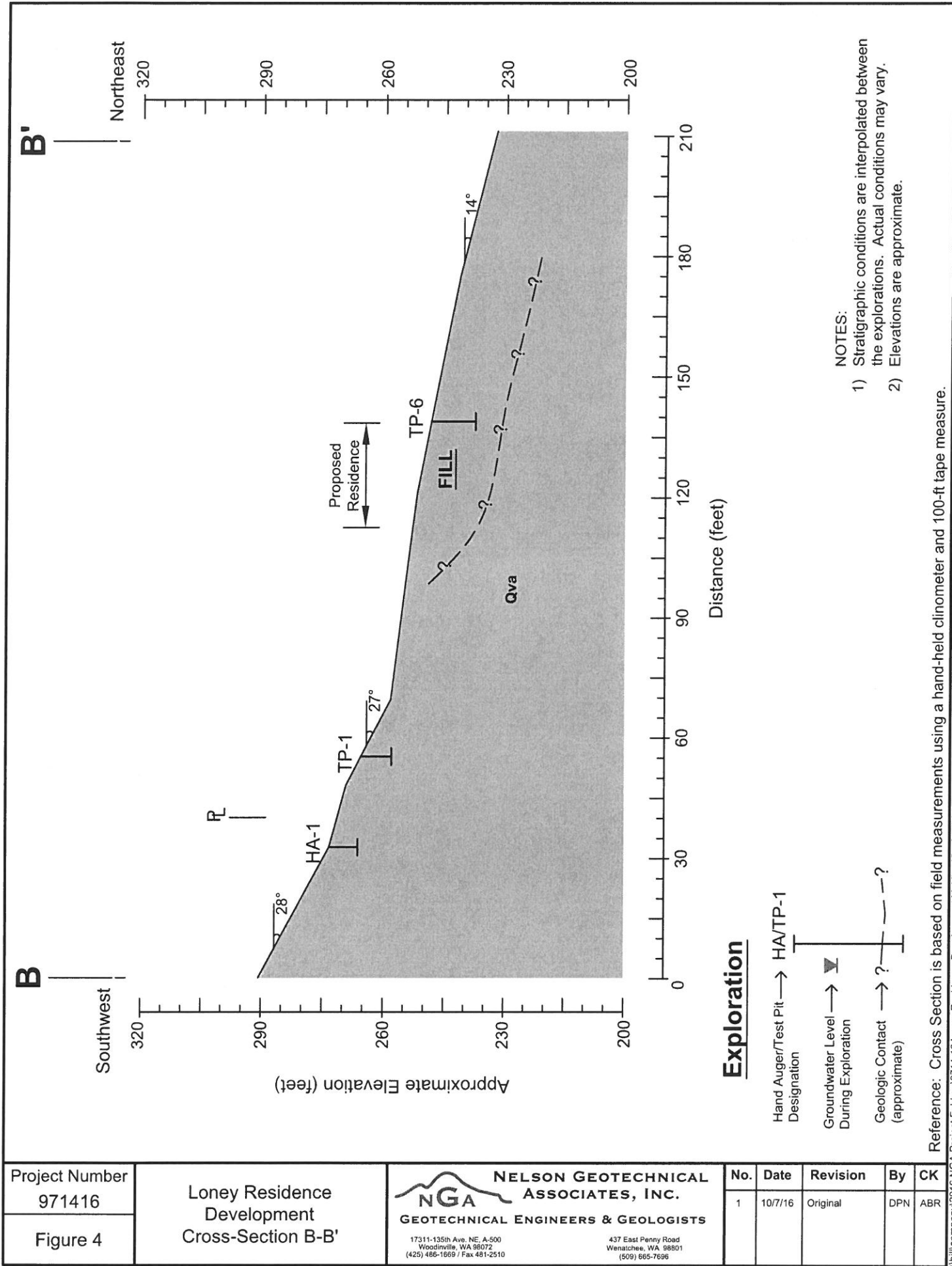
N:\2016 NGA Project Folders\9714-16 Loney Residence Development Mukilteo\Drafting\SP.dwg





Project Number 971416	Loney Residence Development Cross-Section A-A'	 <b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> GEOTECHNICAL ENGINEERS & GEOLOGISTS <small>17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510</small> <small>437 East Penny Road Wenatchee, WA 98801 (509) 665-7696</small>	No.	Date	Revision	By	CK
Figure 3			1	10/7/16	Original	DPN	ABR





Project Number 971416	Loney Residence Development Cross-Section B-B'	<b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> <b>GEOTECHNICAL ENGINEERS &amp; GEOLOGISTS</b> <small>17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 466-1669 / Fax 481-2510</small> <small>437 East Penny Road Venatchee, WA 98801 (509) 665-7696</small>	No.	Date	Revision	By	CK
Figure 4			1	10/7/16	Original	DPN	ABR



# UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS  MORE THAN 50 % RETAINED ON NO. 200 SIEVE	GRAVEL  MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND  MORE THAN 50 % OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS  MORE THAN 50 % PASSES NO. 200 SIEVE	SILT AND CLAY  LIQUID LIMIT LESS THAN 50 %	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY  LIQUID LIMIT 50 % OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FLAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

**NOTES:**

- 1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
- 2) Soil classification using laboratory tests is based on ASTM D 2488-93.
- 3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

**SOIL MOISTURE MODIFIERS:**

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

Moist - Damp, but no visible water.

Wet - Visible free water or saturated, usually soil is obtained from below water table

Project Number 971416	Loney Residence Development Soil Classification Chart	 <b>NELSON GEOTECHNICAL ASSOCIATES, INC.</b> GEOTECHNICAL ENGINEERS & GEOLOGISTS <small>17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510</small> <small>Snohomish County (425) 337-1669 Wenatchee/Chelan (509) 665-7696 www.nelsongeotech.com</small>	No.	Date	Revision	By	CK
Figure 5			1	10/7/16	Original	DPN	ABR

\\hillcompany\2016 NGA Project Folders\9714-16 Loney Residence Development Mukilteo\Drafting\SC.dwg



## LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
<b>TEST PIT ONE</b>		
0.0 – 0.3		GRASS AND ROOTS
0.3 – 3.3		ORANGE-BROWN, SILTY FINE SAND WITH ROOTS, ORGANICS, GRAVEL, AND IRON-OXIDE WEATHERING (LOOSE TO MEDIUM DENSE, MOIST)
3.3 – 7.5	SM	GRAY-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, COBBLES, AND TRACE IRON-OXIDE WEATHERING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 3.0, 5.5, 7.0, AND 7.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED SLIGHT TEST PIT CAVING WAS ENCOUNTERED TEST PIT WAS COMPLETED AT 7.5 FEET ON 10/6/16
<b>TEST PIT TWO</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 1.2		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, ROOTS/ORGANICS, AND IRON-OXIDE WEATHERING (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
1.2 – 6.0	SP-SM	BROWN TO ORANGE-BROWN, FINE SAND WITH SILT, IRON-OXIDE WEATHERING, TRACE ROOTS AND GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
6.0 – 9.0	SP-SM	GRAY-BROWN, FINE SAND WITH SILT, COARSE SAND POCKETS, SILT LENSES, AND TRACE IRON-OXIDE WEATHERING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 3.0, 5.5, 7.5, AND 9.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 9.0 FEET ON 10/6/16
<b>TEST PIT THREE</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 1.8		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
1.8 – 5.5		BROWN TO ORANGE-BROWN, FINE TO MEDIUM SAND WITH SILT, IRON-OXIDE WEATHERING, ROOTS, ORGANICS, AND DRAIN PIPE AT APPROXIMATELY 2.0 FEET (LOOSE TO MEDIUM DENSE, MOIST) ( <u>FILL</u> )
5.5 – 8.0	ML	GRAY-BROWN SILT WITH FINE SAND IRON-OXIDE WEATHERING, ORGANICS, AND TRACE GRAVEL (VERY STIFF, MOIST)
8.0 – 10.5	SP-SM	GRAY-BROWN, FINE TO MEDIUM SAND WITH SILT, TRACE GRAVEL, AND IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 3.0, 5.0, 7.5, AND 10.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 10.5 FEET ON 10/6/16



## LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
<b>TEST PIT FOUR</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 0.5		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <b>TOPSOIL</b> )
0.5 – 9.0		BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE WEATHERING, METAL SCRAPS, PLASTIC GARBAGE, AND IRON-OXIDE WEATHERING (LOOSE TO MEDIUM DENSE, MOIST) ( <b>FILL</b> )
9.0 – 10.0		GRAY, SILT WITH FINE SAND INTERMIXED WITH BROWN, FINE TO MEDIUM SAND WITH SILT, WOOD DEBRIS (BURIED LOG) AND TRACE GRAVEL (LOOSE TO MEDIUM DENSE, MOIST) ( <b>FILL</b> )
		SAMPLES WERE COLLECTED AT 2.5, 5.5, 8.3, AND 10.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 10.0 FEET ON 10/6/16
<b>TEST PIT FIVE</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 1.0		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH IRON-OXIDE STAINING, ROOTS, AND TRACE GRAVEL (LOOSE TO MEDIUM DENSE, MOIST) ( <b>TOPSOIL</b> )
1.0 – 9.5		BROWN TO ORANGE-BROWN, FINE TO MEDIUM SAND WITH SILT, GRAVEL, WOOD DEBRIS, ORGANICS, AND INTERMIXED SILT WITH FINE SAND LAYERS (LOOSE TO MEDIUM DENSE, MOIST) ( <b>FILL</b> )
9.5 – 10.5		GRAY-BROWN TO ORANGE BROWN, FINE TO MEDIUM SAND WITH SILT, GRAVEL, COARSE SAND POCKETS, AND IRON-OXIDE WEATHERING (MEDIUM DENSE TO DENSE) ( <b>FILL</b> )
		SAMPLES WERE COLLECTED AT 4.0, 8.5, 9.4, AND 10.5 GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 10.5 FEET ON 10/6/16
<b>TEST PIT SIX</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 0.8		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <b>TOPSOIL</b> )
0.8 – 11.0		ORANGE-BROWN TO GRAY-BROWN, FINE TO MEDIUM SAND WITH SILT, INTERMIXED GRAVELLY FINE TO COARSE SAND POCKETS AND SILT WITH FINE SAND LENSES, ASPHALT GRINDINGS AT APPROXIMATELY 1.0 FEET, ORGANIC DEBRIS, BURIED LOG AT APPROXIMATELY 6.0 FEET, AND IRON-OXIDE STAINING (LOOSE TO MEDIUM DENSE, MOIST) ( <b>FILL</b> )
		SAMPLES WERE COLLECTED AT 4.0, 6.0, 10.5, AND 11.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 11.0 FEET ON 10/6/16



## LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
<b>TEST PIT SEVEN</b>		
0.0 – 0.2		GRASS AND ROOTS
0.2 – 1.0		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
1.0 – 7.0		ORANGE-BROWN TO GRAY-BROWN, SILTY FINE SAND WITH ORGANICS, WOOD DEBRIS, AND IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST) ( <u>FILL</u> )
7.0 – 8.5	ML	GRAY-BROWN SILT WITH FINE SAND, IRON-OXIDE STAINING, GRAVEL AND TRACE ORGANICS (VERY STIFF, MOIST) ( <u>FILL</u> )  SAMPLES WERE COLLECTED AT 3.5, 5.5, AND 8.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT COMPLETED AT 8.5 FEET ON 10/6/16
<b>HAND AUGER ONE</b>		
0.0 – 0.2		GRASS AND UNDERBRUSH
0.2 – 0.6		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND ROOTS (LOOSE TO MEDIUM DENSE, MOIST) ( <u>TOPSOIL</u> )
0.6 – 5.0	SP-SM	DARK BROWN TO BROWN, FINE TO MEDIUM SAND WITH IRON-OXIDE STAINING, TRACE ROOTS AND ORGANICS (LOOSE TO MEDIUM DENSE, MOIST)
5.0 – 5.5	SM	GRAY-BROWN SILTY FINE SAND, IRON-OXIDE STAINING, TRACE ORGANICS AND GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
5.5 – 7.0	SP-SM	GRAY-BROWN, FINE TO MEDIUM SAND WITH SILT AND TRACE GRAVEL (MEDIUM DENSE TO DENSE, MOIST)  SAMPLES WERE COLLECTED AT 2.0, 3.0, 5.0, 6.0, AND 7.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER COMPLETED AT 7.0 FEET ON 10/6/16



**APPENDICES:**

1. SITE MAPS
2. WWHM 2012 NO MITIGATION DESIGN CALCULATIONS
3. DRAINAGE REPORT FOR KARI SHORT PLAT
4. MAINTENTANCE MANUAL



**APPENDICES:**

1. SITE MAPS
2. WWHM 2012 NO MITIGATION DESIGN CALCULATIONS
3. DRAINAGE REPORT FOR KARI SHORT PLAT
4. MAINTENTANCE MANUAL
5. PIPE CAPACITY



**Appendix 1:**

- VICINITY MAP
- DRAINAGE BASIN MAP
- AERIAL PHOTO



VICINITY MAP

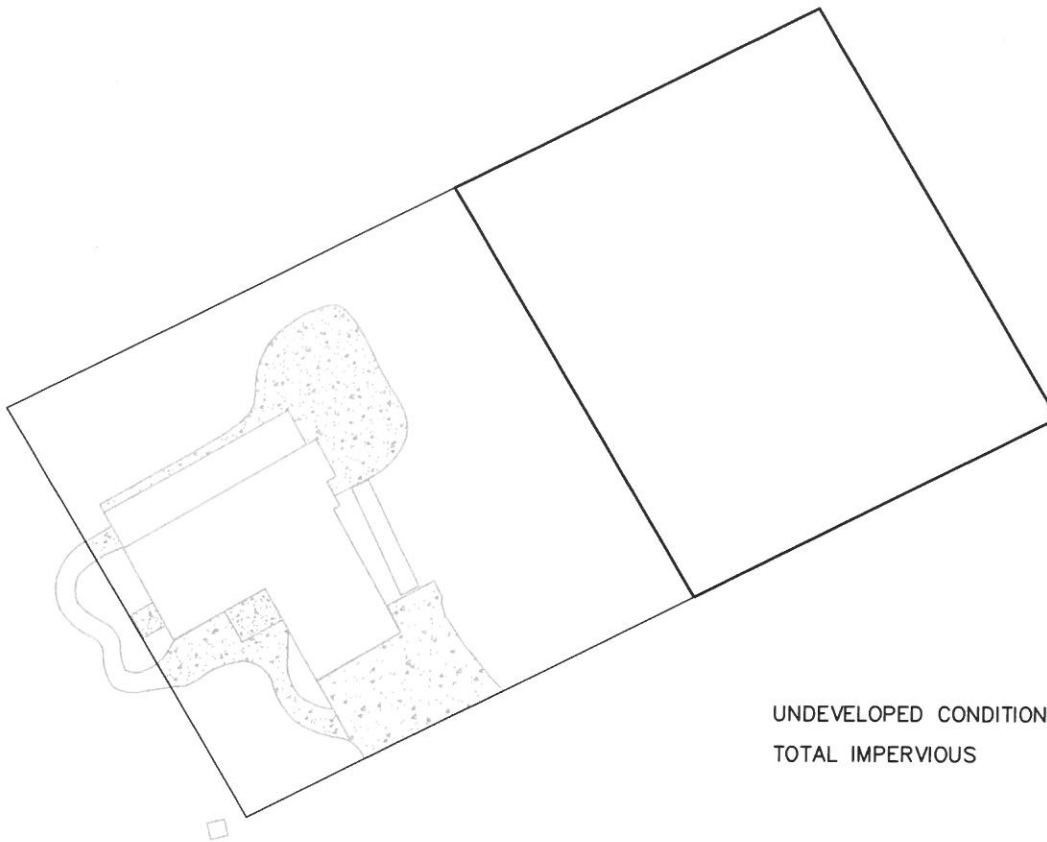




#05999  
Loney Short Plat  
5/02/2019

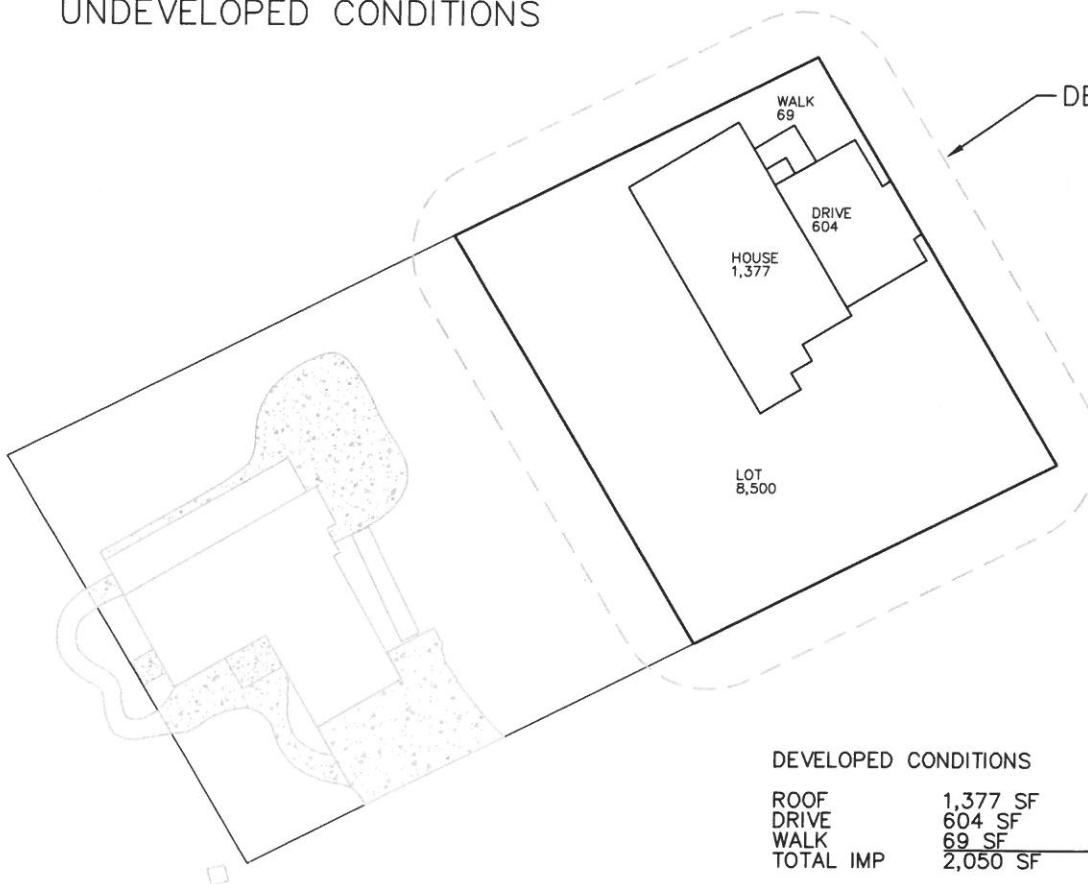
- DRAINAGE BASIN MAP





UNDEVELOPED CONDITIONS  
TOTAL IMPERVIOUS 0

UNDEVELOPED CONDITIONS



DEVELOPED CONDITIONS

ROOF	1,377 SF	0.032 AC
DRIVE	604 SF	0.014 AC
WALK	69 SF	0.001 AC
TOTAL IMP	2,050 SF	0.047 AC

DEVELOPED CONDITIONS



#05999  
Loney Short Plat  
5/02/2019

• AERIAL PHOTO





## **Appendix 2**

### WWHM 2012 NO MITIGATION DESIGN CALCULATIONS

RESULT: LESS THAN 0.15 CFS OF RUNOFF IS CREATED IN THE  
TRANSITION FROM THE CURRENT SITE CONDITION TO THE  
NEW IMPERVIOUS SURFACE.



#05999  
Loney Short Plat  
5/02/2019

WWM2012  
PROJECT REPORT

---

Project Name: NO MITIGATION CONDITION  
Site Name: Loney  
Timesteps = 15-minutes  
Site Address: Debrelon Ave  
City : Mukilteo  
Report Date: 5/3/2019  
Gage : Everett  
Data Start : 1948/10/01  
Data End : 2009/09/30  
Precip Scale: 0.80  
Version Date: 2018/10/10  
Version : 4.2.16

---

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

---

High Flow Threshold for POC 1: 50 year

---

PREDEVELOPED LAND USE

Name : Basin 1  
Bypass: No

Ground Water: No

<u>Pervious Land Use</u>	<u>acre</u>
C, Forest, Mod	0.1951

Pervious Total	0.1951
----------------	--------

<u>Impervious Land Use</u>	<u>acre</u>
Impervious Total	0

Basin Total	0.1951
-------------	--------

---

Element Flows To:

Surface

Interflow

Groundwater

---

MITIGATED LAND USE

Name : Basin 1  
Bypass: No



#05999  
 Loney Short Plat  
 5/02/2019

Ground Water: No

<u>Pervious Land Use</u>	<u>acre</u>
C, Lawn, Mod	.1481
Pervious Total	0.1481
<u>Impervious Land Use</u>	<u>acre</u>
ROOF TOPS FLAT	0.0316
DRIVEWAYS FLAT	0.0154
Impervious Total	0.047
Basin Total	0.1951

---

Element Flows To:		
Surface	Interflow	Groundwater

---

#### ANALYSIS RESULTS

##### Stream Protection Duration

---

Predeveloped Landuse Totals for POC #1  
 Total Pervious Area:0.1951  
 Total Impervious Area:0

---

Mitigated Landuse Totals for POC #1  
 Total Pervious Area:0.1481  
 Total Impervious Area:0.047

---

Flow Frequency Return Periods for Predeveloped. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.002402
5 year	0.003757
10 year	0.004601
25 year	0.005583
50 year	0.006253
100 year	0.006873

Flow Frequency Return Periods for Mitigated. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.019882
5 year	0.030528
10 year	0.039108
25 year	0.051875
50 year	0.062902
100 year	0.075335

Delta Q100 = 0.075 - 0.0068 = 0.068 <<< 0.150 CFS



#05999  
 Loney Short Plat  
 5/02/2019

Stream Protection Duration			POC #1
Annual Peaks for Predeveloped and Mitigated.			
Year	Predeveloped	Mitigated	
1949	0.000	0.022	
1950	0.003	0.029	
1951	0.002	0.016	
1952	0.002	0.019	
1953	0.001	0.021	
1954	0.004	0.051	
1955	0.004	0.029	
1956	0.003	0.011	
1957	0.004	0.026	
1958	0.003	0.052	
1959	0.003	0.017	
1960	0.002	0.018	
1961	0.003	0.091	
1962	0.002	0.018	
1963	0.002	0.037	
1964	0.002	0.016	
1965	0.002	0.011	
1966	0.001	0.011	
1967	0.003	0.032	
1968	0.003	0.021	
1969	0.002	0.071	
1970	0.002	0.014	
1971	0.003	0.024	
1972	0.003	0.033	
1973	0.001	0.024	
1974	0.003	0.029	
1975	0.002	0.026	
1976	0.002	0.015	
1977	0.001	0.012	
1978	0.002	0.012	
1979	0.004	0.039	
1980	0.002	0.017	
1981	0.002	0.014	
1982	0.003	0.014	
1983	0.003	0.024	
1984	0.002	0.015	
1985	0.004	0.023	
1986	0.009	0.036	
1987	0.003	0.023	
1988	0.002	0.015	
1989	0.001	0.023	
1990	0.003	0.012	
1991	0.003	0.014	
1992	0.002	0.020	
1993	0.001	0.013	
1994	0.001	0.011	
1995	0.002	0.012	
1996	0.005	0.024	
1997	0.010	0.041	
1998	0.001	0.023	



#05999

Loney Short Plat

5/02/2019

1999	0.003	0.012
2000	0.001	0.029
2001	0.000	0.011
2002	0.002	0.011
2003	0.002	0.014
2004	0.002	0.033
2005	0.002	0.014
2006	0.005	0.030
2007	0.004	0.027
2008	0.005	0.018
2009	0.002	0.016

---

**Stream Protection Duration**

**Ranked Annual Peaks for Predeveloped and Mitigated. POC #1**

Rank	Predeveloped	Mitigated
1	0.0099	0.0906
2	0.0091	0.0711
3	0.0055	0.0518
4	0.0054	0.0510
5	0.0053	0.0408
6	0.0042	0.0390
7	0.0041	0.0366
8	0.0041	0.0363
9	0.0038	0.0331
10	0.0035	0.0328
11	0.0035	0.0317
12	0.0034	0.0298
13	0.0033	0.0295
14	0.0033	0.0292
15	0.0030	0.0291
16	0.0030	0.0289
17	0.0028	0.0270
18	0.0028	0.0260
19	0.0027	0.0259
20	0.0027	0.0242
21	0.0026	0.0242
22	0.0026	0.0236
23	0.0026	0.0236
24	0.0025	0.0233
25	0.0025	0.0228
26	0.0025	0.0226
27	0.0025	0.0225
28	0.0024	0.0223
29	0.0024	0.0207
30	0.0024	0.0207
31	0.0023	0.0197
32	0.0023	0.0188
33	0.0023	0.0185
34	0.0023	0.0182
35	0.0023	0.0177
36	0.0021	0.0173
37	0.0020	0.0167
38	0.0020	0.0161
39	0.0020	0.0161
40	0.0020	0.0156



#05999  
Loney Short Plat  
5/02/2019

41	0.0020	0.0154
42	0.0019	0.0150
43	0.0019	0.0148
44	0.0019	0.0143
45	0.0018	0.0143
46	0.0018	0.0142
47	0.0017	0.0142
48	0.0017	0.0141
49	0.0016	0.0136
50	0.0015	0.0129
51	0.0015	0.0125
52	0.0014	0.0121
53	0.0014	0.0121
54	0.0014	0.0120
55	0.0014	0.0118
56	0.0013	0.0115
57	0.0013	0.0114
58	0.0009	0.0113
59	0.0009	0.0111
60	0.0003	0.0108
61	0.0003	0.0106

---



#05999  
Loney Short Plat  
5/02/2019

**Appendix 3**  
DRAINAGE REPORT REFERENCE  
FOR  
KARI SHORT PLAT



# AMENDED DRAINAGE REPORT FOR KARI SHORT PLAT

AMENDED ANALYSIS, FORMALLY KAILASH HEIGHTS PLAT, CITY OF MUKILTEO, WA  
CITY FILE # SD2008-04/SEP A 2008-23

RECEIVED

NOV 20 2012

CITY OF MUKILTEO



DATE: 11/19/12

FILE COPY

APPROVED

City of Mukilteo

Phone: 425-652-5820  
Prepared by: James A. Kresge PE  
Date: NOVEMBER 13, 2012  
MAC #: 20096

**MAC ENGINEERING, LLC**

PO Box 177  
Silvana, WA 98287  
Tel/Fax 360-652-5820  
E-Mail: [macengineering@frontier.net](mailto:macengineering@frontier.net)



## **TABLE OF CONTENTS**

SECTION 1: EXECUTIVE SUMMARY

SECTION 2: EXISTING SITE CONDITIONS

SECTION 3: DEVELOPED CONDITIONS

SECTION 4: OFF SITE ANALYSIS

SECTION 5: MINIMUM REQUIREMENTS

SECTION 6: STORMWATER CONTROL PLAN

SECTION 7: SWPPP

SECTION 8: PROJECT OVERVIEW

### **APPENDIX A**

CALCULATIONS

### **APPENDIX B**

OPERATION & MAINTENANCE MANUAL

### **APPENDIX C**

SOIL MAP

EXISTING CONDITIONS BASIN MAP

DEVELOPED CONDITIONS BASIN MAP

PHOTOS



## **SECTION 1: EXECUTIVE SUMMARY:**

The KARI – SP (Short Plat, Formally Kailash Heights plat) project proposes to construct a 4 lot short plat within the City of Mukilteo, Washington. The project site area is 7.86 ac and is located near the intersection of Lamar Road and Debreton Lane with a site address of 15XX Debreton Lane in the City of Mukilteo. The earlier 8 lot plat Kailash Heights plat project was not completed on this site. This short plat project will utilize the existing detention vault, outfall and private road access that was constructed earlier on this site. The project will include needed corrections on the site including but not limited to retaining wall removal and replacement walls, revised utilities, drainage improvements and new tract and easements as required. The detention vault and control structure will be reviewed and sized based on a revised analysis sized to the 2005 DOE Stormwater Management Manual for Western Washington.

## **SECTION 2: EXISTING SITE CONDITIONS:**

The proposed development area is vegetated with grass with some underbrush and sparse trees. Tracts A, F and H will preserve native growth and steep slope areas. Earlier block retaining walls and road construction (curbs, sidewalks, ATB pavement and utilities) will be revised or relocated prior to construction. The topography of the development area of the site is steep with grades ranging from 15 to 30%. The ravine within the eastern portion of the site has slopes that exceed 30% and is covered with 2nd growth forest with thick underbrush and will become a native growth protection area (NGPA).

A small wetland (Category IV) and its buffer are believed to exist within Proposed Tract F designated as a Native Growth Protection Area. Buffer mitigation is proposed in conjunction with this small wetland to allow for roadway construction.

There are several steep slope areas identified on site and each includes a 25 foot setback and corrective action to stabilize slopes.

As identified in the Soil survey of the Snohomish County Area, Washington, soils on site are Alderwood-Everett gravelly sandy loam, which is classified by the NRCS as a type "CIA" soil (Table 2.1, Volume III of the DOE Manual). A geotechnical investigation of the site was performed by GEOTEST, dated November 2012 and the report has been submitted to the City.



### **SECTION 3: DEVELOPED SITE CONDITIONS:**

The 4 lot short plat development proposes to construct 4 new single family residences. Access to the site will be provided from the construction of a private road system with access off Debreton Lane. Runoff from the new development will be conveyed to an existing detention vault. The 4 lots will provide a maximum 35% building foot print area per lot. New retaining walls have been designed to stabilize some steep slope areas adjacent to the existing private road system (removal and replacement of existing wall and use of existing and new blocks) and a block wall will be set adjacent to the north side of Lot 1. Walls will be constructed of Redi-Rock and will be geo designed walls with geo fabric and footing drains.

An identified wetland of approximately 1,150 sf will be provided with vegetation and a mitigated buffer area as well. The steep slope area in Tract F will be dispersed to maintain runoff to the wetland area.

### **SECTION 4: OFF SITE ANALYSIS:**

The project is located in a relatively hilly area of the City of Mukilteo. Soils onsite and within the surrounding areas are Alderwood/Everett type soils. Approximately 1.21 acres of partially cleared land adjacent the south boundary contributes runoff to the development area of this site. The detention facility control structure will be sized to allow for the additional offsite up-stream runoff. The Boeing air field and plant site south of the site contribute runoff to the Ravine that flows north through the undeveloped portion of the site. The Ravine discharges to the Puget Sound at an oval culvert (24" wide by 28" high) crossing the existing rail road right-of-way lines approximately 1800 ft downstream of the site. The culvert has an 8 ft potential headwater depth. The Ravine banks are vegetated with native 2nd and 3rd growth forest with thick underbrush. Natural dead fall litters the stream throughout the majority of the downstream system. Sloughing of the ravine banks was noted along the drainage course, however no sloughing was observed within the stream bed itself. Numerous above ground culvert discharge to the ravine from public and private offsite drainage systems that contribute runoff to this stream. No adverse impacts to the upstream or downstream drainage courses are anticipated with the development of the Kari Short Plat.

### **SECTION 5: MINIMUM REQUIREMENTS**

Per Volume I, Figure 2.2 of the 2005 DOE manual, All Minimum Requirements #1 through #10 apply. To meet these requirements, a Construction Storm Water Pollution Prevention Plan (SWPPP) will be provided with the construction plan set. The following address the Minimum Requirements:



### **Requirement # 1: Preparation of Stormwater Site Plans**

A Stormwater Site Plan will be prepared and included with the construction plan set.

### **Requirement #2: Construction Stormwater Pollution Prevention (SWPP)**

The 12 elements of the Construction SWPPP have been addressed in Section 7 of this report.

### **Requirement #3: Source Control of Pollution**

The development site is in a residential area. Contamination of the soils on site is not anticipated. This project is not expected to require additional source control of pollutants.

### **Requirement #4: Preservation of Natural Drainage and Outfalls**

This project will use the existing detention vault and the ravine outfall to preserve the natural drainage course per the 2005 DOE manual to maintain the natural drainage patterns into the groundwater table.

### **Requirement #5: On-Site Stormwater Management**

Runoff from the new buildings, driveways, public and private road system will be conveyed to the existing detention facility and control structure to maintain the pre-developed runoff rates. A WET VAULT (Existing Detention Vault) provides water quality. Temporary erosion control will be provided to minimize impacts that are anticipated with this project.

### **Requirement #6: Runoff Treatment**

The wet vault provides basic water quality per the DOE manual.

### **Requirement #7: Flow Control**

An original multiple orifice control structure was sized to the allowable forested pre-developed runoff rates in the developed area. "Storm water discharges from the developed area in discharge durations to the pre-developed duration for the range of pre-developed rates from 50% of the 2-year peak flow up to the full 50-year peak flow." The WWHM 3 hydraulic model as provided by DOE was utilized for sizing the detention facility.



#### **Requirement #8: Wetlands Protection**

The existing detention facility outfall location within the Ravine Wetland Corridor will be maintained to avoid impacts to downstream wetlands.

#### **Requirement #9: Basin/Watershed Planning**

The detention facility will contribute to the maintenance of the basin and watershed by returning runoff to the existing downstream wetland drainage course.

#### **Requirement #10: Operation and Maintenance**

The operation and maintenance manual will be included with the construction plan submittal.

### **SECTION 6: STORMWATER CONTROL PLAN:**

#### **EXISTING SITE HYDROLOGY:**

The Snohomish County Soil Survey indicated that the soils on site are classified as AlderwooddEverett gravelly sandy loam, which is classified by the NRCS as a type "C/A" soil (Table 2.1, Volume III of the DOE Manual). The development area of the site has been cleared from the earlier incomplete project. The site is "Steep" (greater than 15% slopes) as determined by the WWHM 3 hydraulic model criteria and will be modeled as forested for the pre-developed runoff rates. In the pre-developed condition, runoff collected along and sheet flowed to the Ravine Drainage Corridor flowing north to the Puget Sound.

#### **DEVELOPED SITE HYDROLOGY:**

The KARI SHORT PLAT development proposes to construct 4 new single family residences with associated public and private accesses. The development area of the 7.86 acres site is approximately 2.02 acres.

To determine the applicable flow control and runoff treatment standards, the pollution generating impervious surfaces (PGIS), the total impervious areas, and lawn and landscape areas were calculated for the pre and post-developed site conditions.

Per minimum requirement #6, runoff treatment, any project that creates greater than 5,000 sf of PGIS is required to provide water quality for stormwater runoff. To meet this minimum requirement, runoff will be directed to a catch basin system and flow into a wet



vault detention facility. For further information, refer to the Water Quality System section below.

All calculations were performed using Western Washington Hydrology Model 3 (WWHM 3). See sizing calculations in Appendix A of this report.

For offsite upstream and downstream basin analysis see the USGS Stream Stats attached to Appendix C of this report.

#### **TREATMENT AND FLOW CONTROL SYSTEM NEEDED:**

Per the attached Treatment Facility Selection Flow Chart (Volume I, Figure 4.1), a Basic Treatment Facility consisting of a wet vault (Detention Vault) will be utilized for water quality requirements.

#### **PERFORMANCE STANDARDS AND GOALS:**

Per the 2005 DOE flow control requirements "Stormwater discharges from the developed discharge durations to the pre-developed duration for the range of pre-developed rates from 50% of the 2-year peak flow up to the full 50-year peak flow." As determined by the WWHM3 analysis this criterion has been met. For additional information see the WWHM3 hydraulic analysis attached to Appendix A of this drainage report.

Per the 2005 DOE the water quality design flow rate downstream of detention facility is the full 2-year release rate from the detention facility.

#### **FLOW CONTROL SYSTEM:**

A multiple (3) orifice control structure was sized to allow forested pre-developed runoff rates. For additional information see the WWHM3 hydraulic analysis in Appendix A of this report.

#### **WATER QUALITY SYSTEM:**

To meet City and DOE requirements, a Basic Treatment facility must be provided onsite for water quality. To meet City and DOE water quality criteria, runoff will be routed through a wet vault (Detention Vault) system.

#### **CONVEYANCE SYSTEM ANALYSIS:**

Storm water runoff from the development is conveyed to the detention vault facility via 12" HDPE storm pipe. The shallowest pipe slope leading to the detention vault is 8.31 %. Conservatively, the 12" diameter conveyance pipe was evaluated for the 100 yr storm event. The 100 yr peak flow rate for this project was calculated by WWHM 3 at 1.86 cfs. To adjust peak flows calculated by WWHM 3, the peak flow rate is multiplied by 1.6 to



approximate the 15-minute flow rate. The conveyance analysis was performed using a peak flow rate of 2.98 cfs. The pipe system was evaluated using Manning's Equation and determined to have a normal flow depth of 0.35 ft (4.2"). Calculations are attached in the Appendix A of this report. No concerns regarding the proposed conveyance system's ability to convey the developed flow rates have been observed.

## **SECTION 7: SWPPP:**

The 12 elements of the SWPPP are addressed as follows.

1. Mark Clearing Limits: The clearing limits are indicated on the plan sheet. Furthermore, clearing and grading will be limited to only areas that need to be disturbed for grading, placing or stock piling fill and to preserve as much natural vegetation and the duff layer as possible. Field marking the clearing limits shall be completed prior to any clearing and grubbing activities.

BMP's: C101 Preserve Natural Vegetation

C103 Field Marking Clearing Limits with Orange Filter Fence

2. Establish Construction Access: Access to the construction site shall be limited to the rock construction entrance. The construction entrance shall be extended to provide access to the construction vehicle/equipment staging and employee parking areas as necessary.

BMP's: C105 Stabilized Construction Entrance

C107 Parking area stabilization

3. Detain Flows: Limited stormwater is expected to leave the development area of the site due to the sloping of the site and the existing soil conditions. In the event that stormwater begins to leave the site, a temporary sediment pond may be built on site and flows will be directed there.
4. Install Sediment Controls: Sediment control will be provided through a combination of filtration through filter fence or an approved equivalent.
5. Stabilize Soils: Temporary and permanent soil stabilization will be provided. Temporary stabilization will be provided through the application of straw and/or plastic sheeting to exposed worked earth. From October 1 until April 30, no exposed soil may remain exposed and unworked for more than two days; after May 1, no exposed soil may remain exposed and unworked for more than seven days.



12. Manage the Project: The project shall be managed in a cooperative effort by the project manager, contractor, engineer, and the city inspector. During the construction process, if unforeseen issues arise that cannot be resolved on site, construction activity (other than SWPPP maintenance) shall be halted and the city inspector and project engineer are to be contacted and informed of the situation.

## **SECTION 8: PROJECT OVERVIEW:**

This project will develop a 7.86 acre site into a 4-lot single-family residential short plat development. The site will provide public road and a private road tract for access to the lots. An earlier project on this site was not completed. This project will utilize portions of the detention vault, outfall and driveway accesses of the earlier improvements that were installed that for that site. The detention vault and control structure will be sized to the 2005 DOE Stormwater Management Manual for Western Washington.

For drainage, runoff will be directed to the existing outfall to the Ravine flowing to Puget Sound.

The detention facility has been sized to maintain the pre-developed stormwater runoff conditions. A soils map has been provided in Appendix C to show the existing soil around the site.



## **APPENDIX A**



BASIN BREAKDOWN - KARI SHORT PLAT					
Basin I and Basin 6 have existing and developed areas.					
Existing areas treated vas forested condition.					
Basin 2, 3, 4, & 5 have the same condition for					
existing and developed conditions.					
These basins flow through the existing vault					
but do not change in the developed condition					
and are not a part of the proposed development.					
<b>BASINS PREDEVELOPED</b>					
<b>BASIN - 1 - DEVELOPED</b>					
TOTAL AREA	88,074	SF	2.02	AC	
MOD SLOPES	24,332	SF	0.56	AC	
STEEP SLOPES	63,598	SF	1.46	AC	
<b>BASIN - 2 - OFFSITE UPSTREAM BASIN AREA</b>					
TOTAL AREA	52,653	SF	1.21	AC	
FLAT PERVIOUS AREA	52,653	SF	1.21	AC	
<b>BASIN 3- EXSTING RESDENCE AREA</b>					
TOTAL AREA	16,260	SF	0.37	AC	
EXISTING BUILDING	3,485	SF	0.08	AC	
EXISTING DRIVEWAY	2,614	SF	0.06	AC	
LANDSCAPE	10,161	SF	0.23	AC	
<b>BASIN 4- EXSTING RESDENCE AREA</b>					
TOTAL AREA	50,656	SF	1.16	AC	
EXISTING BUILDING	35,719	SF	0.82	AC	
EXISTING DRIVEWAY	6,970	SF	0.16	AC	
LANDSCAPE	7,967	SF	0.18	AC	
<b>BASIN 5- EXISTING ROADWAY</b>					
TOTAL AREA	8,225	SF	0.19	AC	
EXISTING ROADWAY	8,225	SF	0.19	AC	



<b>BASIN 6- DETENTION AREA</b>					
	TOTAL AREA	6,776	SF	0.16	AC
	PERVIOUS	6,776	SF	0.16	AC
<b>TOTAL BASIN AREA</b>		222,644	SF	5.11	AC
<b>INCLUDES ALL BASINS</b>					
	<b>BASINS DEVELOPED</b>				
<b>BASIN - 1 - DEVELOPED</b>					
	TOTAL AREA	88,074	SF	2.02	AC
	LOT 1 RESIDENCE	10,106	SF	0.23	AC
	LOT 2 RESIDENCE	4,849	SF	0.11	AC
	LOT 3 RESIDENCE	5,298	SF	0.12	AC
	LOT 4 RESIDENCE	5,114	SF	0.12	AC
	TOTAL RES AREA	25,367	SF	0.58	AC
	LOT 1 DRIVEWAY	1,550	SF	0.04	AC
	LOT 2 DRIVEWAY	800	SF	0.02	AC
	LOT 3 DRIVEWAY	2,000	SF	0.05	AC
	LOT 4 DRIVEWAY	850	SF	0.02	AC
	TOTAL DW AREA	5,200	SF	0.12	AC
	LOT 1 LANDSCAPE	12,217	SF	0.28	AC
	LOT 2 LANDSCAPE	8,206	SF	0.19	AC
	LOT 3 LANDSCAPE	7,840	SF	0.18	AC
	LOT 4 LANDSCAPE	14,612	SF	0.34	AC
	TOTAL LS AREA	42,875	SF	0.98	AC
	PRIVATE ROAD	14,632	SF	0.34	AC
		88,074			
<b>BASIN 6- DETENTION AREA</b>					
	TOTAL AREA	6,970	SF	0.16	AC
	PERVIOUS	4,792	SF	0.11	AC
	VAULT	2,178	SF	0.05	AC
<b>TOTAL BASIN AREA</b>		222,644	SF	5.11	AC
<b>INCLUDES ALL BASINS</b>					
	<b>PREDEVELOPED</b>				
	PERVIOUS MOD	24,332	SF	0.56	AC



[illegible]



#05999  
Loney Short Plat  
5/02/2019

## **Appendix 4**

### **MAINTENANCE MANUAL**



## No. 5 – 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%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		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.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	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).	Top slab is free of holes and cracks.
		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	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.	Basin replaced or repaired to design standards.
		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.	Pipe is regouted 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.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.



## No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover 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.	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 and meets design standards.

## No. 6 – Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe



## No. 18 – Catchbasin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Normal Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.



## **Appendix 5**

### **CULVERT PIPE CAPACITY**



# Free Online Manning Pipe Flow Calculator

>> Drop your fears at the door; love is spoken here. <<

## Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate, program, or host these calculators? (./contact.php) [Hide this request]

Check out our newest spreadsheet update:   Download Spreadsheet (spreadsheet/Manning-Pipe-Flow.xlsx)  
Open Google Sheets version (spreadsheet/Manning-Pipe-Flow.php)   View All Spreadsheets  
(http://www.hawstedc.com/engcalcs/SpreadsheetLibrary.php)

--CAUTION: If you have downloaded the spreadsheet prior to September 24, you may have received incorrect results!--

Point of Compliance

12"Culvert Capacity

Set units: 

m

mm

ft

in

Pipe diameter,  $d_0$

6

in

Manning roughness,  $n$  ?  
(http://www.engineeringtoolbox.com/mannings-roughness-d\_799.html)

0.012

Pressure slope (possibly ? (./pressureslope.php)  
equal to pipe slope),  $S_0$

0.9

% rise/run

Percent of (or ratio to) full depth (100% or 1 if  
flowing full)

100

%

Results

Flow, $Q$	0.5766	cfs
Velocity, $v$	2.9368	ft/sec
Velocity head, $h_v$	1.6085	in
Flow area	28.2744	sq. in.
Wetted perimeter	18.8496	in
Hydraulic radius	1.5000	in
Top width, $T$	0.0000	in
Froude number, $F$	0.00	
Shear stress (tractive force), $\tau$	0.0702	psf



# Free Online Manning Pipe Flow Calculator

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## Manning Formula Uniform Pipe Flow at Given Slope and Depth

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(http://www.hawstedc.com/engcalcs/SpreadsheetLibrary.php)

--CAUTION: If you have downloaded the spreadsheet prior to September 24, you may have received incorrect results!--

Point of Compliance

12"Culvert Capacity

Set units: 

m

mm

ft

in

Pipe diameter, $d_0$	<div>6</div> <div>in</div>
Manning roughness, $n$ ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	<div>0.012</div>
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), $S_0$	<div>41</div> <div>% rise/run</div>
Percent of (or ratio to) full depth (100% or 1 if flowing full)	<div>100</div> <div>%</div>

Results

Flow, $Q$	3.8919	<div>cfs</div>
Velocity, $v$	19.8217	<div>ft/sec</div>
Velocity head, $h_v$	73.2767	<div>in</div>
Flow area	28.2744	<div>sq. in.</div>
Wetted perimeter	18.8496	<div>in</div>
Hydraulic radius	1.5000	<div>in</div>
Top width, $T$	0.0000	<div>in</div>
Froude number, $F$	0.00	
Shear stress (tractive force), $\tau$	3.1999	<div>psf</div>