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Exhibit 16

Preliminary Drainage Report
Stella and Floyd's Dog Daycare

13209 Bothell-Everett Highway
Mill Creek, WA 98012

12/12/2018

CG Project No.: 18129.20

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Section I Summary

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The purpose of this report is to provide a preliminary overview of the drainage considerations on this project for the pre-application stages of the work.

The proposed project consists of the construction of (5) 912 sf~ buildings and an 1,874 sf~ main office building, along with an associated parking lot and walkways, for the development of a dog daycare facility on a property located at 13209 Bothell-Everett Highway, Mill Creek, WA 98012. The existing site is undeveloped and contains small to large trees, other vegetation, and a Category III Wetland. The parcel has a total area of 115,082 sf (2.64 ac).

The new and replaced impervious areas proposed are as follows:

Impervious Areas	
Roofs:	6,434 sf (0.148 ac)
Walkways:	4,081 sf (0.093 ac)
Pavement:	10,441 sf (0.240 ac)
Impervious Areas Total:	20,956 sf (0.480 ac)

The project will comply with stormwater system engineering and design requirements of Chapter 15.14.180 of the Mill Creek Municipal Code (MCMC) and the 2012 (amended 2014) Stormwater Management Manual for Western Washington (herein referred to as the DOE Manual). The project is a New Development project and will comply with Minimum Requirements #1-9 of the DOE Manual (see Figure I-3 for Minimum Requirements flow chart). Minimum requirements for this project are discussed later in this section.

Stormwater Management

At this time, On-site Stormwater Management BMPs have not been considered for this project. For Flow Control, a detention pipe was selected and modeled in WWHM 2012 in a configuration of three rows of 5-ft diameter, 147 lineal feet pipes (with connectors between), totaling in 453 lineal feet of pipe. This detention pipe system will collect runoff from the new buildings, other hard surfaces made up by walkways and the parking lot pavement, and pervious areas all via catch basins and conveyance pipes.

The pervious areas to be converted from forest to lawn that were modeled in WWHM are as follows:

Pervious Areas	
C, Lawn, Flat:	30,880 sf (0.709 ac)
Total:	30,880 sf (0.709 ac)

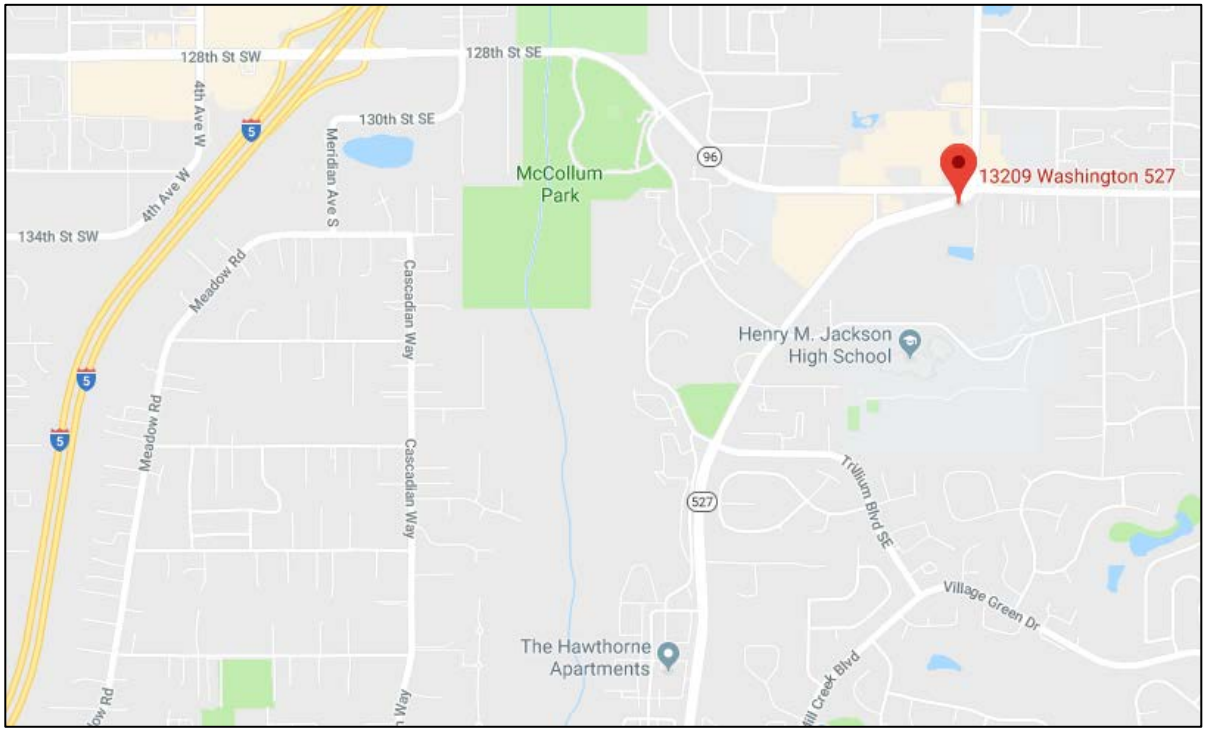

Figure I-1. Vicinity map (from Google Maps).

Figure I-2. Aerial image (from Google Maps).

Minimum Requirements

The project must comply with stormwater requirements in Chapter 15.14.180 of MCMC and the 2014 DOE Manual. The project is a new development inside the Urban Growth Area and must meet Minimum Requirements #1-9 because the amount of new plus replaced impervious surfaces total over 5,000 sf. The Minimum Requirements are discussed as follows:

Minimum Requirement #1: Preparation of Stormwater Site Plans: The stormwater site plan consists of this report and the civil drawings and is prepared in accordance with stormwater requirements in Chapter 15.14.180 of MCMC and Chapter 3 of Volume I of the DOE Manual.

Minimum Requirement #2: **Construction Stormwater Pollution Prevention Plan (SWPPP)**: The SWPPP shall include a narrative and drawings. The SWPPP narrative shall include documentation that addresses the 13 elements of Construction Stormwater Pollution Prevention. See Section V and the civil drawings.

Minimum Requirement #3: Source Control of Pollution: All known, available and reasonable source control BMPs are required for all projects approved by the City. The developed site will be a dog daycare facility, which will likely generate pollutants including (but not limited to) manure deposits, animal washing, grazing, and any other animal handling activity that could contaminate stormwater. This project will incorporate required BMPs from SWMMWW Volume IV, S402 – BMPs for Commercial Animal Handling Areas. The Operation & Maintenance Manual found in Section VII contains Applicable Operational BMPs for Commercial Animal Handling Areas.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls: Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down-gradient properties. All projects shall submit an off-site qualitative analysis.

Minimum Requirement #5: On-Site Stormwater Management: At this time, On-site Stormwater Management BMPs have not been considered for this project, but will be in future submittals.

Minimum Requirement #6: Runoff Treatment: This requirement applies to the new plus replaced hard surfaces and the converted vegetation areas. The following require construction of stormwater treatment facilities: i.) Projects in which the total of pollution-generating hard surface (PGHS) is 5,000 square feet or more in a threshold discharge area of the project, or ii.) projects in which the total of pollution-generating pervious surfaces (PGPS) – not including permeable pavements is 0.75 acres or more in a threshold discharge area, and from which there will be a surface discharge in a natural or man-made conveyance system from the site. The project's total amount of PGHS is more than 5,000 square feet. Runoff treatment is required for the new parking lot. At this time, runoff treatment facilities

have not been designed for this project, but stormfilter catch basins will likely be the mode of treatment for parking lot runoff.

Minimum Requirement #7: Flow Control: This requirement applies to projects that discharge stormwater directly, or indirectly through a conveyance system, into a fresh waterbody. Flow control is not required for projects that discharge directly or indirectly to a Flow Control-Exempt Receiving Water (Appendix I-E in the 2014 SWMMWW). The following circumstances require achievement of the standard flow control requirement for western Washington: i.) Projects in which the total of effective impervious surfaces is 10,000 square feet or more in a threshold discharge area, or ii.) projects that convert 0.75 acres or more of vegetation to lawn or landscape, or iii.) projects that through a combination of hard surfaces and converted vegetation areas cause a 0.15 cubic feet per second (cfs) increase or greater in the 100-year flow frequency between existing and developed conditions from a threshold discharge area as estimated using the Western Washington Hydrology Model or other approved model and 15-minute time steps. The project will cause greater than a 0.15 cfs increase between existing and developed 100-year flow frequencies and Flow Control is required. See Section IV for more.

Minimum Requirement #8: Wetlands Protection: This requirement applies only to projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system. Some stormwater on this site will discharge into a wetland on-site. Wetland protection will be implemented on this project.

Minimum Requirement #9: Operation and Maintenance: An operation and maintenance manual that is consistent with the provisions in Volume I and Volume V of the SWMMWW is required for proposed Stormwater Treatment and Flow Control BMPs/facilities. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. For private facilities approved by the City, a copy of the operation and maintenance manual shall be retained on-site or within reasonable access to the site and shall be transferred with the property to the new owner. For public facilities, a copy of the operation and maintenance manual shall be retained in the appropriate department. A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection. See Section VIII.

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Section II – Existing Conditions Summary

Section II Summary

Narrative

The project site is located at 13209 Bothell-Everett Highway, Mill Creek, WA 98012. The site is undeveloped and contains small to large trees, other vegetation, and a Category III Wetland.

The parcel has five sides and has a total area of 115,082 sf (2.64 ac). The northwest property line runs parallel with Bothell-Everett Highway, the northeast property line faces a PUD electric utility parcel, the east property line faces a Lowe's building and parking lot, the south property line faces a detention pond for Lowe's, and the west property line is shared by a Les Schwab building and parking lot. The parcel is fairly flat, but topography generally slopes down from north to south.

Section III – Off-site Analysis Report

Section III Summary:

Narrative

An off-site analysis shall be prepared according to Chapter 3 of Volume I of the DOE Manual. It shall assess the potential off-site water quality, erosion, slope stability, and drainage impacts associated with the project and propose appropriate mitigation of those impacts. If a receiving water is within one-quarter mile, the analysis shall extend within the receiving water to one-quarter mile from the project site.

The natural discharge location from the site is questionable because the site's topography slopes in various directions. The site slopes north towards SR 527, to the existing wetland on-site, and south towards an off-site wetland. There is a detention pond that is used by Lowe's directly south of the site. Mitigation of stormwater impacts to the wetland will be accomplished by the implementation of about 453 ft of 60" diameter detention pipe. Stormwater runoff will be gradually released into an existing catch basin in SR 527 by a control structure near the west edge of the proposed parking lot. This analysis will be more thoroughly studied and complete in future submittal phases. See Figure III-1 below for the study area map.

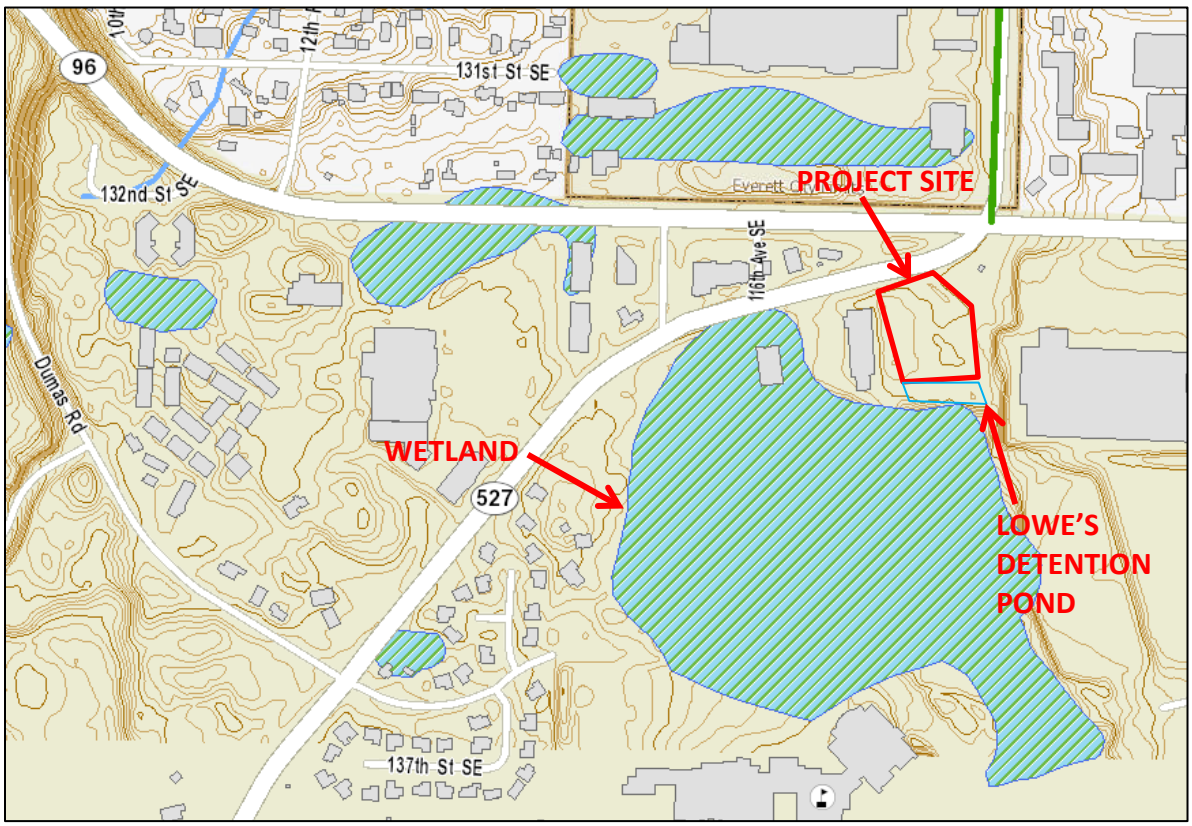

Figure III-1. Study area map.

Section IV – Permanent Stormwater Control Plan

Section IV Summary

Narrative
Flow Control
Basin Map
Tree Canopy Map
Calculations
WWHM Report

At this time, On-site Stormwater Management (per Minimum Requirement #5) and Runoff Treatment (per Minimum Requirement #6) have not been evaluated for this project. However, these Minimum Requirements will be addressed completely in future submittals of this project. Flow Control (per Minimum Requirement #7) has been addressed and will be utilized with detention pipes that were sized for flow control using WWHM 2012. The WWHM report can be found later in this section.

Flow Control

A detention pipe was selected for stormwater management and modeled in WWHM 2012 in a configuration of three rows of 60" diameter, 147 lineal feet pipes (with connectors between), totaling in 453 lineal feet of pipe. This detention pipe system will collect runoff from the new buildings, other hard surfaces made up by walkways and the parking lot pavement, and pervious areas all via catch basins and conveyance pipes. The outlet from the detention pipe will discharge from a flow control structure towards the north to an existing catch basin in SR 527. See civil plans for more.

Modeling in WWHM was done by selecting a basin that would incorporate the areas of the proposed development made up by impervious and pervious surfaces as well as some extra pervious areas (to be conservative) that are not expected to contribute to the detention system. The delineation of the areas used for design can be found on the following attached sheet.

Tree retention credits were taken into account for the design of the detention system. Credits can be applied to reduce impervious or other hard surface area requiring flow control up to 25% of impervious/hard surfaces requiring mitigation (BMP T5.16 of V5 of the DOE Manual). Per Table 5.3.1 of V5 of the DOE Manual, tree credits are made up by 20% of canopy area for Evergreen trees and 10% of canopy area for Deciduous trees.

Tree canopy areas were determined using the site survey provided by Pacific Coast Surveys, which includes tree driplines on-site. The driplines were separated into Evergreen and Deciduous and the areas were summed up using AutoCAD's "area" command. See the following attached sheet for the delineation of the trees that were used for the tree retention credits.

Calculations

Impervious/Hard Surface Area Mitigated = [Σ(Evergreen canopies * 0.2) + Σ(Deciduous canopies * 0.1)]

Impervious/Hard Surface Area Mitigated = (18,133 sf * 0.2) + (16,287 sf * 0.1) = 5,255 sf

25% of new impervious/hard surface area mitigated = 20,956 sf * 0.25 = 5,239 sf

Therefore, the total of impervious surfaces were modeled as (20,956 sf – 5,239 sf) = 15,717 sf (0.361 ac).

WWHM Report

WWHM2012
PROJECT REPORT

Project Name: Stella & Floyd's DD Detention System
Site Name: Stella & Floyd's Dog Daycare
Site Address: 13209 Bothell-Everett Highway
City : Mill Creek
Report Date: 12/3/2018
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.00
Version Date: 2017/04/14
Version : 4.2.13

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

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	1.07
Pervious Total	1.07

Impervious Land Use	acre
Impervious Total	0
Basin Total	1.07

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE
Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Flat	.709
Pervious Total	**0.709**

Impervious Land Use	acre
ROOF TOPS FLAT	0.148
DRIVEWAYS FLAT	0.119
SIDEWALKS FLAT	0.094
Impervious Total	**0.361**

Basin Total	1.07

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Name : Tank 1
Tank Name: Tank 1

Dimensions
Depth: 5 ft.
Tank Type : Circular
Diameter : 5 ft.
Length : 453 ft.
Discharge Structure
Riser Height: 4.9 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.5 in. **Elevation:** 0.5 ft.

Element Flows To:

Outlet 1	Outlet 2

Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000	0.000	0.000	0.000
0.0556	0.010	0.000	0.000	0.000
0.1111	0.015	0.001	0.000	0.000
0.1667	0.018	0.002	0.000	0.000
0.2222	0.021	0.003	0.000	0.000
0.2778	0.023	0.004	0.000	0.000
0.3333	0.025	0.005	0.000	0.000
0.3889	0.027	0.007	0.000	0.000
0.4444	0.029	0.008	0.000	0.000
0.5000	0.031	0.010	0.000	0.000
0.5556	0.032	0.012	0.001	0.000

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0.6111	0.034	0.014	0.002	0.000
0.6667	0.035	0.016	0.002	0.000
0.7222	0.036	0.018	0.003	0.000
0.7778	0.037	0.020	0.003	0.000
0.8333	0.038	0.022	0.003	0.000
0.8889	0.039	0.024	0.004	0.000
0.9444	0.040	0.026	0.004	0.000
1.0000	0.041	0.029	0.004	0.000
1.0556	0.042	0.031	0.005	0.000
1.1111	0.043	0.033	0.005	0.000
1.1667	0.044	0.036	0.005	0.000
1.2222	0.044	0.038	0.005	0.000
1.2778	0.045	0.041	0.006	0.000
1.3333	0.046	0.043	0.006	0.000
1.3889	0.046	0.046	0.006	0.000
1.4444	0.047	0.048	0.006	0.000
1.5000	0.047	0.051	0.006	0.000
1.5556	0.048	0.054	0.007	0.000
1.6111	0.048	0.056	0.007	0.000
1.6667	0.049	0.059	0.007	0.000
1.7222	0.049	0.062	0.007	0.000
1.7778	0.049	0.065	0.007	0.000
1.8333	0.050	0.067	0.007	0.000
1.8889	0.050	0.070	0.008	0.000
1.9444	0.050	0.073	0.008	0.000
2.0000	0.050	0.076	0.008	0.000
2.0556	0.051	0.079	0.008	0.000
2.1111	0.051	0.082	0.008	0.000
2.1667	0.051	0.084	0.008	0.000
2.2222	0.051	0.087	0.008	0.000
2.2778	0.051	0.090	0.009	0.000
2.3333	0.051	0.093	0.009	0.000
2.3889	0.051	0.096	0.009	0.000
2.4444	0.052	0.099	0.009	0.000
2.5000	0.052	0.102	0.009	0.000
2.5556	0.052	0.105	0.009	0.000
2.6111	0.051	0.107	0.009	0.000
2.6667	0.051	0.110	0.010	0.000
2.7222	0.051	0.113	0.010	0.000
2.7778	0.051	0.116	0.010	0.000
2.8333	0.051	0.119	0.010	0.000
2.8889	0.051	0.122	0.010	0.000
2.9444	0.051	0.125	0.010	0.000
3.0000	0.050	0.127	0.010	0.000
3.0556	0.050	0.130	0.010	0.000
3.1111	0.050	0.133	0.011	0.000
3.1667	0.050	0.136	0.011	0.000
3.2222	0.049	0.139	0.011	0.000
3.2778	0.049	0.141	0.011	0.000
3.3333	0.049	0.144	0.011	0.000
3.3889	0.048	0.147	0.011	0.000
3.4444	0.048	0.150	0.011	0.000
3.5000	0.047	0.152	0.011	0.000
3.5556	0.047	0.155	0.011	0.000
3.6111	0.046	0.157	0.012	0.000
3.6667	0.046	0.160	0.012	0.000

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3.7222	0.045	0.163	0.012	0.000
3.7778	0.044	0.165	0.012	0.000
3.8333	0.044	0.168	0.012	0.000
3.8889	0.043	0.170	0.012	0.000
3.9444	0.042	0.172	0.012	0.000
4.0000	0.041	0.175	0.012	0.000
4.0556	0.040	0.177	0.012	0.000
4.1111	0.039	0.179	0.012	0.000
4.1667	0.038	0.181	0.013	0.000
4.2222	0.037	0.183	0.013	0.000
4.2778	0.036	0.186	0.013	0.000
4.3333	0.035	0.188	0.013	0.000
4.3889	0.034	0.189	0.013	0.000
4.4444	0.032	0.191	0.013	0.000
4.5000	0.031	0.193	0.013	0.000
4.5556	0.029	0.195	0.013	0.000
4.6111	0.027	0.196	0.013	0.000
4.6667	0.025	0.198	0.013	0.000
4.7222	0.023	0.199	0.013	0.000
4.7778	0.021	0.201	0.014	0.000
4.8333	0.018	0.202	0.014	0.000
4.8889	0.015	0.203	0.014	0.000
4.9444	0.010	0.203	0.163	0.000
5.0000	0.000	0.204	0.516	0.000
5.0556	0.000	0.000	0.984	0.000

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:1.07
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.709
Total Impervious Area:0.361

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.022937
5 year	0.033949
10 year	0.041489
25 year	0.051214
50 year	0.058571
100 year	0.066008

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.013654
5 year	0.029936

10 year	0.048335
25 year	0.085073
50 year	0.126393
100 year	0.184285

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.013	0.010
1950	0.025	0.012
1951	0.021	0.010
1952	0.016	0.010
1953	0.013	0.009
1954	0.051	0.011
1955	0.034	0.068
1956	0.030	0.089
1957	0.034	0.013
1958	0.023	0.011
1959	0.025	0.012
1960	0.022	0.012
1961	0.023	0.014
1962	0.020	0.009
1963	0.024	0.010
1964	0.020	0.008
1965	0.023	0.012
1966	0.012	0.010
1967	0.028	0.010
1968	0.033	0.012
1969	0.025	0.011
1970	0.018	0.010
1971	0.025	0.048
1972	0.022	0.010
1973	0.018	0.012
1974	0.031	0.011
1975	0.018	0.009
1976	0.017	0.011
1977	0.014	0.009
1978	0.018	0.010
1979	0.032	0.010
1980	0.020	0.010
1981	0.017	0.009
1982	0.022	0.013
1983	0.031	0.011
1984	0.023	0.066
1985	0.030	0.022
1986	0.073	0.186
1987	0.033	0.077
1988	0.018	0.012
1989	0.015	0.009
1990	0.024	0.012
1991	0.025	0.012
1992	0.019	0.012
1993	0.013	0.008
1994	0.012	0.012
1995	0.024	0.013

1996	0.042	0.013
1997	0.080	0.352
1998	0.015	0.010
1999	0.022	0.012
2000	0.012	0.013
2001	0.004	0.007
2002	0.023	0.013
2003	0.017	0.011
2004	0.027	0.013
2005	0.020	0.011
2006	0.045	0.177
2007	0.039	0.013
2008	0.061	0.099
2009	0.019	0.011

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0802	0.3523
2	0.0734	0.1864
3	0.0614	0.1768
4	0.0508	0.0990
5	0.0453	0.0893
6	0.0420	0.0773
7	0.0386	0.0678
8	0.0344	0.0655
9	0.0338	0.0485
10	0.0328	0.0222
11	0.0326	0.0136
12	0.0323	0.0133
13	0.0314	0.0133
14	0.0307	0.0133
15	0.0304	0.0131
16	0.0297	0.0129
17	0.0280	0.0129
18	0.0265	0.0128
19	0.0254	0.0128
20	0.0253	0.0123
21	0.0252	0.0122
22	0.0246	0.0122
23	0.0245	0.0122
24	0.0242	0.0121
25	0.0239	0.0121
26	0.0237	0.0119
27	0.0232	0.0119
28	0.0228	0.0116
29	0.0228	0.0116
30	0.0227	0.0116
31	0.0225	0.0115
32	0.0224	0.0115
33	0.0220	0.0113
34	0.0218	0.0110
35	0.0217	0.0110
36	0.0205	0.0110
37	0.0202	0.0109

38	0.0202	0.0107
39	0.0198	0.0107
40	0.0195	0.0105
41	0.0193	0.0104
42	0.0192	0.0104
43	0.0181	0.0104
44	0.0180	0.0101
45	0.0179	0.0100
46	0.0179	0.0100
47	0.0179	0.0098
48	0.0172	0.0098
49	0.0169	0.0097
50	0.0165	0.0097
51	0.0163	0.0097
52	0.0153	0.0096
53	0.0152	0.0092
54	0.0144	0.0091
55	0.0135	0.0091
56	0.0130	0.0091
57	0.0126	0.0088
58	0.0124	0.0088
59	0.0121	0.0083
60	0.0117	0.0077
61	0.0040	0.0069

Stream Protection Duration
POC #1
The Facility PASSED
The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0115	22672	21410	94	Pass
0.0119	20552	15210	74	Pass
0.0124	18574	10128	54	Pass
0.0129	16814	6949	41	Pass
0.0134	15150	4588	30	Pass
0.0138	13727	2902	21	Pass
0.0143	12459	1634	13	Pass
0.0148	11315	1588	14	Pass
0.0153	10247	1536	14	Pass
0.0158	9300	1481	15	Pass
0.0162	8461	1434	16	Pass
0.0167	7683	1379	17	Pass
0.0172	6947	1325	19	Pass
0.0177	6314	1276	20	Pass
0.0181	5781	1221	21	Pass
0.0186	5285	1181	22	Pass
0.0191	4851	1131	23	Pass
0.0196	4445	1092	24	Pass
0.0200	4092	1057	25	Pass
0.0205	3707	1034	27	Pass
0.0210	3375	1004	29	Pass
0.0215	3056	977	31	Pass
0.0219	2751	946	34	Pass
0.0224	2505	912	36	Pass

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0.0229	2304	885	38	Pass
0.0234	2108	865	41	Pass
0.0238	1952	844	43	Pass
0.0243	1823	819	44	Pass
0.0248	1698	803	47	Pass
0.0253	1581	785	49	Pass
0.0257	1479	769	51	Pass
0.0262	1398	752	53	Pass
0.0267	1329	737	55	Pass
0.0272	1261	722	57	Pass
0.0276	1197	709	59	Pass
0.0281	1138	695	61	Pass
0.0286	1081	673	62	Pass
0.0291	1025	659	64	Pass
0.0295	956	646	67	Pass
0.0300	915	630	68	Pass
0.0305	879	619	70	Pass
0.0310	845	597	70	Pass
0.0315	807	585	72	Pass
0.0319	767	573	74	Pass
0.0324	731	563	77	Pass
0.0329	700	555	79	Pass
0.0334	676	544	80	Pass
0.0338	655	535	81	Pass
0.0343	639	525	82	Pass
0.0348	620	517	83	Pass
0.0353	604	509	84	Pass
0.0357	588	498	84	Pass
0.0362	573	485	84	Pass
0.0367	560	473	84	Pass
0.0372	551	462	83	Pass
0.0376	539	447	82	Pass
0.0381	523	432	82	Pass
0.0386	511	425	83	Pass
0.0391	496	412	83	Pass
0.0395	473	403	85	Pass
0.0400	458	394	86	Pass
0.0405	448	379	84	Pass
0.0410	438	368	84	Pass
0.0414	426	361	84	Pass
0.0419	417	350	83	Pass
0.0424	402	344	85	Pass
0.0429	396	339	85	Pass
0.0433	385	330	85	Pass
0.0438	374	324	86	Pass
0.0443	362	319	88	Pass
0.0448	355	314	88	Pass
0.0452	349	307	87	Pass
0.0457	338	301	89	Pass
0.0462	329	294	89	Pass
0.0467	320	289	90	Pass
0.0472	310	282	90	Pass
0.0476	306	276	90	Pass
0.0481	300	269	89	Pass
0.0486	296	262	88	Pass
0.0491	288	258	89	Pass

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0.0495	283	251	88	Pass
0.0500	276	245	88	Pass
0.0505	270	238	88	Pass
0.0510	260	236	90	Pass
0.0514	252	229	90	Pass
0.0519	245	222	90	Pass
0.0524	239	216	90	Pass
0.0529	234	212	90	Pass
0.0533	227	209	92	Pass
0.0538	215	204	94	Pass
0.0543	205	198	96	Pass
0.0548	200	194	97	Pass
0.0552	194	190	97	Pass
0.0557	188	187	99	Pass
0.0562	184	181	98	Pass
0.0567	176	174	98	Pass
0.0571	170	171	100	Pass
0.0576	165	170	103	Pass
0.0581	158	169	106	Pass
0.0586	152	165	108	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Water Quality	Total Volumn Percent Treatment?	Comment	Volumn Needs Treatment (ac-ft)	Through Facility (ac-ft)	Infiltration Volumn (ac-ft.)	Cumulative Infiltration Credit	Percent Volumn Infiltrated	Water Quality Treated
Tank 1 POC	N	100.00					N	0.00	
Total Volume Infiltrated		100.00		0.00	0.00	0.00	0.00	0.00	0%

No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Failed

Perlnd and Implnd Changes

No changes have been made.

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Section V – Construction Stormwater Pollution Prevention Plan Narrative

Section V Summary:

Narrative

The proposed project consists of the construction of (5) 912 sf~ buildings and an 1,874 sf~ main office building, along with an associated parking lot and walkways, for the development of a dog daycare on a parcel located at 13209 Bothell-Everett Highway, Mill Creek, WA 98012. The existing site is undeveloped and contains small to large trees, other vegetation, and a Category III Wetland. The parcel has a total area of 115,082 sf (2.64 ac).

Erosion control details will be provided consistent with the City of Mill Creek guidelines. Erosion control plan sheets are provided in full size as a part of the civil drawing set. As shown on the plan, disturbance is expected to affect most of the lot area outside of the wetland buffer and proposed native vegetation fence. Sediment and erosion control Best Management Practices (BMPs) are addressed as follows:

Element 1: Mark Clearing Limits

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Clearing limits will be to the extents of necessary land disturbance for the new buildings and associated parking area and walkways. High visibility fence should also be placed around all trees that are to be retained outside of the proposed native vegetation fence. The BMPs relevant to marking the clearing limits that will be applied for this project include:

High Visibility Plastic or Metal Fence (BMP C103)

Element 2: Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads. A 50'x20' stabilized construction entrance should be implemented near the NW corner of the lot. The BMPs relevant to establishing construction access that will be applied for this project include:

Stabilized Construction Entrance (BMP C105)

Element 3: Control Flow Rates

The site is flat enough that flow rates are not expected to be an issue.

Element 4: Install Sediment Controls

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged. Silt fence will be installed around the perimeter of the property, while staying outside of the proposed wetland protection fence. Pollution prevention facilities on the erosion control plan must be constructed prior to or in conjunction with all clearing and grading to ensure that the transport of sediment to surface waters and adjacent properties is minimized. The specific BMPs to be used for controlling sediment on this project include:

Silt Fence (BMP C233)

Element 5: Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

Temporary and Permanent Seeding (BMP C120)
Mulching (BMP C121)
Nets and Blankets (BMP C122)
Plastic Covering (BMP C123)
Sodding (BMP C124)
Topsoiling/Composting (BMP C125)
Surface Roughening (BMP C130)
Dust Control (BMP C140)

Element 6: Protect Slopes

Slopes are not expected to be an issue on this site. However, slopes created by piling of material shall be stabilized with BMPs found in Element 5.

Element 7: Protect Drain Inlets

Drain inlets within 100' of the site and those made operable on-site will be protected from sedimentation. Stormwater shall not enter the conveyance system without first being filtered or treated to remove sediment. Inlet protection devices shall be cleaned or removed and replaced when sediment has filled one-third of the available storage (or as specified by the manufacturer). The specific BMPs to be used for protecting drain inlets are:

Storm Drain Inlet Protection (BMP C220)

Element 8: Stabilize Channels and Outlets

Conveyance channels are not located on or in the immediate vicinity of the site. However, interceptor swales have been designed for a sediment trap during construction and they must be stabilized during construction.

Element 9: Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The suggested BMPs are:

Concrete Handling (BMP C151)
Sawcutting and Surfacing Pollution Prevention (BMP C152)
Material Delivery, Storage and Containment (BMP C153)

Element 10: Control Dewatering

Groundwater was not encountered during the geotechnical explorations of the site.

Element 11: Maintain BMPs

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Element 12: Manage the Project

- Phase development projects to the maximum degree practicable and consider seasonal work limits.
- Inspection and monitoring – Inspect, maintain, and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with the Construction Stormwater General Permit or local plan approval authority.
- Maintain an Updated Construction SWPPP
  - This SWPPP shall be retained on-site or within reasonable access to the site.
  - The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.
  - The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

Element 13: Protect Low Impact Development BMPs

There are no Low Impact Development BMPs proposed at this time.

Section VI – Special Reports and Studies

Section VI Summary:

Narrative

Included in this section are the following reports:

1. *Geotechnical Engineering Evaluation* by Nelson Geotechnical Associates dated June 20, 2018.
2. *Critical Areas Study and Mitigation Plan* by Wetland Resources Environmental Consultants dated August 15, 2018.
3. *NRCS Soil Resource Report dated December 12, 2018.*

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June 20, 2018

Ms. Julie Nealey
9402 – 224th Street SW
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stellanfloyds@gmail.com

Geotechnical Engineering Evaluation
Stella and Floyds Commercial Development
13209 Bothell-Everett Highway
Mill Creek, Washington
NGA Job No. 10362B18

Dear Ms. Nealey:

We are pleased to submit the attached report titled "Geotechnical Engineering Evaluation – Stella and Floyds Commercial Development – 13209 Bothell-Everett Highway – Bothell, Washington." This report summarizes our observations of the existing surface and subsurface conditions within the site, and provides general recommendations for the proposed site development. Our services were completed in general accordance with the proposals signed by you on April 13, 2018 and May 31, 2018.

The property is currently undeveloped and heavily vegetated with underbrush and a dense canopy of young to mature trees. The ground surface is generally level to gently sloping. A large wetlands area occupies the majority of the site within the central, eastern, and southeastern portions of the property. Specific grading plans were not available at the time this report was prepared, however, we understand that the proposed development plan will likely include the construction of an office building, five dog house structures, and a parking area, along with associated access roadways and underground utilities.

We monitored the excavation of six test pit explorations throughout the property. Within one of our test pits we conducted a small-scale pilot infiltration test (PIT). Our explorations indicated that the site was underlain by surficial undocumented fill with competent, native glacial soils at depth.

It is our opinion that the proposed site development is feasible from a geotechnical engineering standpoint, provided that our recommendations for site development are incorporated into project plans. In general, the native soils underlying the site should adequately support the planned structures. Foundations should be advanced through any loose soils down to the competent glacial material interpreted to underlie the site, for bearing capacity and settlement considerations. These soils should generally be encountered approximately one to three feet below the existing ground surface, based on our explorations. If loose soils or undocumented fill are encountered in unexplored areas of the site, they should be removed and replaced with structural fill for foundation and pavement support. Final stormwater plans have also not been developed, but we understand that on-site infiltration is being considered for this site. Based on our onsite testing it our opinion that stormwater infiltration is marginally feasible within the site. The subsurface soils generally consisted of surficial undocumented fill soils underlain by dense silty fine to medium sand with varying amounts of gravel and iron-oxide

weathering that we interpreted as native glacial soils at relatively shallow depths. We did not encounter groundwater within our explorations throughout the site. We recommend that any stormwater infiltration systems within the site be designed with an incorporated overflow system and maintain the minimum groundwater separation as specified in the 2014 Department of Ecology Stormwater Management Manual for Western Washington.

In the attached report, we have also provided general recommendations for site grading, slabs-on-grade, structural fill placement, retaining walls, erosion control, and 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 construction differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications.

It has been a pleasure 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 Engineer

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Geotechnical Engineering Evaluation
Stella and Floyds Commercial Development
13209 Bothell-Everett Highway
Mill Creek, Washington

INTRODUCTION

This report presents the results of our geotechnical engineering investigation and evaluation of the planned Stella and Floyds Commercial Development project in the Mill Creek area of Snohomish County, Washington. The project site is located at 13209 Bothell-Everett Highway, 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 the planned site development. For our use in preparing this report, we have been provided with a preliminary site plan showing the proposed development, titled "Stella and Floyds," dated May 1, 2017, prepared by Capitol Architects Group.

The property is currently undeveloped and heavily forested with dense underbrush and young to mature trees. A wetlands area occupies the majority of the central, eastern, and southeastern portions of the site. We understand the proposed developments will consist of constructing several dog houses, a parking lot, and office building along the western and northern portions of the site. Final development and grading plans have not been prepared at the time this report was issued. Final stormwater plans have also not been developed, however, we understand that stormwater may be directed to on-site infiltration systems, if feasible. The existing and proposed site layout is shown on the Site Plan in Figure 2.

SCOPE

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

1. Review available soil and geologic maps of the area.
2. Explore the subsurface soil and groundwater conditions within the site with trackhoe excavated test pits. Trackhoe to be provided/subcontracted by NGA.
3. Provide long-term design infiltration rates based on on-site Pilot Infiltration Testing (PIT) per the 2014 DOE SWMMWW.
4. Perform laboratory grain-size sieve analysis on soil samples, as necessary.
5. Provide recommendations for earthwork, foundation support, and slabs-on-grade.
6. Provide recommendations for temporary and permanent slopes.
7. Provide recommendations for pavement subgrade.
8. Provide recommendations for infiltration system installation.
9. Provide recommendations for site drainage and erosion control.
10. Document the results of our findings, conclusions, and recommendations in a written geotechnical report.

SITE CONDITIONS

Surface Conditions

The site consists of a roughly rectangular-shaped parcel covering approximately 2.68 acres. The site is undeveloped and heavily forested with young to mature trees and dense underbrush. A wetlands area and associated buffer encompass the central, eastern, and southeastern portions of the site. The ground surface within the site is relatively level to gently sloping. The site is bounded to the north by Bothell-Everett Highway, to the east by Lowe's, to the south by Lowe's detention pond, and to the west by Les Schwab Tire. We did not observe surface water throughout the site during our site visits on April 26 and June 6, 2018.

Subsurface Conditions

Geology: The site is mapped on the Geologic map of the Everett 7.5 minute quadrangle, Snohomish County, Washington, by James P. Minard (US Geological Survey, 1985). The site is mapped as glacial till (Qvt). Till is generally described as a nonsorted mixture or mud, sand, pebbles, cobbles, and diamicton boulders. Our explorations typically encountered undocumented fill underlain by compact silty fine to medium sand with gravel consistent with the description of native glacial till deposits at depth.

Explorations: The subsurface conditions within the site were explored on April 26 and June 6, 2018 by monitoring the excavation of six total track hoe excavated test pits that ranged in depth from 3.0 to 7.0 feet below the existing ground surface. The approximate locations of our explorations are shown on the 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 test pits.

The soils were visually classified in general accordance with the Unified Soil Classification System, presented in Figure 3. The logs of our test pits are attached to this report and are presented as Figures 4 and 5. We present a brief summary of the subsurface conditions in the following paragraphs. For a detailed description of the subsurface conditions, the logs of the test pits should be reviewed.

At the surface of each exploration we generally encountered 1.5 to 2.0 feet of dark brown to reddish brown, organic-rich silty sand with varying amounts of gravel, and roots, which we interpreted as topsoil and/or undocumented fill soils. Underlying the topsoil and undocumented fill we encountered medium dense or better orange-brown to gray, silty fine to medium sand with gravel, iron-oxide staining, and trace roots, which we interpreted as weathered and unweathered glacial till soils. Test Pit 1 through 5 and Infiltration Pit 1 terminated at respective depths of 7.0, 7.0, 4.5, 7.0, 3.0, and 4.5 feet below the existing ground surface, respectively.

Hydrogeologic Conditions

We did not encounter groundwater within our explorations throughout the site. If groundwater is encountered during construction we would interpret this as perched groundwater. Perched water occurs when surface water infiltrates through less dense, more permeable soils and accumulates on top of relatively low permeability materials. The more permeable soils consist of the topsoil/weathered soils and undocumented fill. The low permeability soil consists of relatively silty native glacial deposits. 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 perched groundwater to decrease during drier times of the year and increase during wetter periods.

SENSITIVE AREA EVALUATION

Seismic Hazard

We reviewed the 2018 International Building Code (IBC) for seismic site classification for this project. Since competent glacial till soils are inferred to underlie the site at depth, the site conditions best fit the IBC description for Site Class D.

Table 1 below provides seismic design parameters for the site that are in conformance with the 2018 IBC, which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years), and the 2008 USGS seismic hazard maps.

Table 1 – 2018 IBC Seismic Design Parameters

Site Class	Spectral Acceleration at 0.2 sec. (g) S_s	Spectral Acceleration at 1.0 sec. (g) S_1	Site Coefficients		Design Spectral Response Parameters	
			F_a	F_v	S_{DS}	S_{D1}
D	1.36	0.531	1.000	1.500	0.907	0.531

The spectral response accelerations were obtained from the USGS Earthquake Hazards Program Interpolated Probabilistic Ground Motion website (2008 data) for the project latitude and longitude.

The site is located within the South Whidbey Island Fault Zone (SWIFZ): an active, shallow region of seismicity within central Puget Sound stretching from the Strait of Juan de Fuca to North Bend. Information published in 2013 by the Washington State Department of Natural Resources suggests the SWIFZ last ruptured less than 2,700 years ago, and that the fault zone can produce a M7.5 earthquake. In our opinion, the possibility of faulting ground rupture caused by this fault zone is considered low.

Hazards associated with seismic activity include liquefaction potential and amplification of ground motion. Liquefaction is caused by a rise in pore pressures in a loose, fine sand deposit beneath the groundwater table. It is our opinion that the medium dense or better glacial deposits interpreted to underlie the site have a low potential for liquefaction or amplification of ground motion.

Erosion Hazard

The criteria used for determination of the erosion hazard for affected areas include 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 King County Area, Washington, by the Soil Conservation Service (SCS) was reviewed to determine the erosion hazard of the on-site soils. The surface soils for this site were mapped as Alderwood-Urban land complex, 2 to 8 percent slopes. The erosion hazard for this material is listed as slight. This site is relatively level to gently sloping and there are no steep slopes on the property. It is our opinion that the erosion hazard for site soils should be low in areas where the site is not disturbed.

CONCLUSIONS AND RECOMMENDATIONS

General

It is our opinion that the site is generally compatible with the planned development from a geotechnical standpoint. Our explorations indicated that the site is generally underlain by competent native soils at depth. The native soils encountered at depth should provide adequate support for foundation, slab, and pavement loads. We recommend that the planned structure be designed utilizing shallow foundations. Footings should extend through any loose soil or undocumented fill soils and be founded on the underlying medium dense or better native soil, or structural fill extending to these soils. The medium dense or better native glacial soils should typically be encountered approximately one to three feet below the existing surface, based on our explorations. We should note that localized areas of deeper unsuitable soils and/or undocumented fill could be encountered at this site. This condition would require additional excavations in foundation, slab, and pavement areas to remove the unsuitable soils.

Based on the results of our infiltration testing and soil explorations throughout the site, it is our opinion that traditional stormwater infiltration systems within this site are not feasible, however low-impact design infiltration systems, such as pervious pavements, rain gardens, and bio-swales may be feasible. We recommend any low-impact systems within the site be designed with an incorporated overflow system directed towards an approved point of discharge. This is further discussed in the **Site Drainage** section of this report.

The surficial soils encountered on this site are considered moisture-sensitive and will disturb easily 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 native on-site soils may be suitable for use as structural fill depending on the moisture content of the soil during construction. 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 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.

Site Preparation and Grading

After erosion control measures are implemented, site preparation should consist of stripping the topsoil, undocumented fill and loose soils from foundation, slab, pavement areas, and other structural areas, to expose medium dense or better native soils. The stripped soil should be removed from the site or stockpiled for later use as a landscaping fill. Based on our observations, we anticipate stripping depths of one to three feet, depending on the specific locations. However, additional stripping may be required if areas of deeper undocumented fill and/or loose soil are encountered in unexplored areas of the site.

After site stripping, if the exposed subgrade is deemed loose, it should be compacted to a non-yielding condition and then proof-rolled with a heavy rubber-tired piece of equipment. Areas observed to pump or weave during the proof-roll test should be reworked to structural fill specifications or over-excavated and replaced with properly compacted structural fill or rock spalls. If loose soils are encountered in the pavement areas, the loose soils should be removed and replaced with rock spalls or granular structural fill. If significant surface water flow is encountered during construction, this flow should be diverted around areas to be developed, and the exposed subgrades should be maintained in a semi-dry condition.

If wet conditions are encountered, alternative site stripping and grading techniques might be necessary. These could include using large excavators equipped with wide tracks and a smooth bucket to complete site grading and covering exposed subgrade with a layer of crushed rock for protection. If wet conditions are encountered or construction is attempted in wet weather, the subgrade should not be compacted as this could cause further subgrade disturbance. In wet conditions it may be necessary to cover the exposed subgrade with a layer of crushed rock as soon as it is exposed to protect the moisture sensitive soils from disturbance by machine or foot traffic during construction. The prepared subgrade should be protected from construction traffic and surface water should be diverted around areas of prepared subgrade.

The site soils are considered to be moisture-sensitive and will disturb easily when wet. We recommend that construction take place during the drier summer months if possible. However, if construction takes place during the wet season, additional expenses and delays should be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls on exposed subgrades, construction traffic areas, and paved areas prior to placing structural fill. Wet weather grading will also require additional erosion control and site drainage measures. Some of the on-site soils may be suitable for use as structural fill, depending on the moisture content of the soil at the time of construction. NGA should be retained to evaluate the suitability of all on-site and imported structural fill material during construction.

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 at all times as indicated in OSHA guidelines for cut slopes.

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 upper undocumented fill soils be no steeper than 2 Horizontal to 1 Vertical (2H:1V). Temporary cuts in the competent native glacial soils at depth should be no steeper than 1.5H:1V. If significant groundwater seepage or surface water flow were encountered, we would expect that flatter inclinations would be necessary. We recommend that cut slopes be protected from erosion. The slope protection measures may include covering cut slopes with plastic sheeting and diverting surface 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 should be no steeper than 2H:1V. However, flatter inclinations may be required in areas where loose soils are encountered. Permanent slopes should be vegetated and the vegetative cover maintained until established.

Foundations

Conventional shallow spread foundations should be placed on medium dense or better native soils, or be supported on structural fill or rock spalls extending to those soils. Medium dense soils should be encountered approximately one to three feet below ground surface based on our explorations. Where undocumented fill or less dense soils are encountered at footing bearing elevation, the subgrade should be over-excavated to expose suitable bearing soil. The over-excavation may be filled with structural fill, or the footing may be extended down to the competent native soils. If footings are supported on structural fill, the fill zone should extend outside the edges of the footing a distance equal to one half of the depth of the over-excavation below the bottom of the footing.

Footings should extend at least 18 inches below the lowest adjacent finished ground surface for frost protection and bearing capacity considerations. Foundations should be designed in accordance with the 2018 IBC. Footing widths should be based on the anticipated loads and allowable soil bearing pressure. Water should not be allowed to accumulate in footing trenches. All loose or disturbed soil should be removed from the foundation excavation prior to placing concrete.

For foundations constructed as outlined above, we recommend an allowable design bearing pressure of not more than 2,500 pounds per square foot (psf) be used for the design of footings founded on the medium dense or better native soils or structural fill extending to the competent native material. The foundation bearing soil should be evaluated by a representative of NGA. We should be consulted if higher bearing pressures are needed. Current IBC guidelines should be used when considering increased allowable bearing pressure for short-term transitory wind or seismic loads. Potential foundation settlement using the recommended allowable bearing pressure is estimated to be less than 1-inch total and ½-inch differential between adjacent footings or across a distance of about 20 feet, based on our experience with similar projects.

Lateral loads may be resisted by friction on the base of the footing and passive resistance against the subsurface portions of the foundation. A coefficient of friction of 0.35 may be used to calculate the base friction and should be applied to the vertical dead load only. Passive resistance may be calculated as a triangular equivalent fluid pressure distribution. An equivalent fluid density of 200 pounds per cubic foot (pcf) should be used for passive resistance design for a level ground surface adjacent to the footing. This

level surface should extend a distance equal to at least three times the footing depth. These recommended values incorporate safety factors of 1.5 and 2.0 applied to the estimated ultimate values for frictional and passive resistance, respectively. To achieve this value of passive resistance, the foundations should be poured "neat" against the native medium dense soils or compacted fill should be used as backfill against the front of the footing. We recommend that the upper one foot of soil be neglected when calculating the passive resistance.

Retaining Walls

Specific grading plans for this project were not available at the time this report was prepared, but retaining walls may be incorporated into project plans. In general, 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, and the inclination of the backfill. 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. A seismic design loading of 8H should also be included in the wall design. It represents the total height of the wall.

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 loads, slopes, or other surface loads. We could consult with the structural engineer regarding additional loads on retaining walls during final design, if needed.

The lateral pressures on walls may be resisted by friction between the foundation and subgrade soil, and by passive resistance acting on the below-grade portion of the foundation. Recommendations for frictional and passive resistance to lateral loads are presented in the **Foundations** subsection of this report.

All wall backfill should be well compacted as outlined in the **Structural Fill** subsection of this report. 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 8-inch loose lifts and compacting the backfill 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. The recommended level of compaction should still be maintained.

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 observe installation of the drainage systems.

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, but this will be highly dependent on the moisture content of these soils at the time of 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.

Slab-on-Grade

Slabs-on-grade should be supported on subgrade soils prepared as described in the **Site Preparation and Grading** subsection of this report. We recommend that all floor slabs be underlain by at least six inches of free-draining gravel with less than three percent by weight of the material passing 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.

Pavements

Pavement subgrade preparation and structural filling where required, should be completed as recommended in the **Site Preparation and Grading** and **Structural Fill** subsections of this report. The pavement subgrade should be proof-rolled with a heavy, rubber-tired piece of equipment, to identify soft or yielding areas that require repair. The pavement section should be underlain by a minimum of six inches of clean granular pit run. We should be retained to observe the proof-rolling and recommend repairs prior to placement of the asphalt or hard surfaces.

Utilities

We recommend that underground utilities be bedded with a minimum six inches of pea gravel prior to backfilling the trench with on-site or imported material. Trenches within settlement sensitive areas should be compacted to 95% of the modified proctor as described in the **Structural Fill** subsection of this report. Trenches located in non-structural areas should be compacted to a minimum 90% of the maximum dry density.

Site Drainage

Infiltration: We conducted a Small PIT within Infiltration Pit 1, located as shown on the attached Schematic Site Plan in Figure 2. The test was conducted within a pit that measured 4.5-feet long by 3.0-feet wide by 4.5-feet deep. The pit was filled with 12-inches of water at the beginning of the day and we began the soaking period of the PIT for approximately 6 hours. At this time, the water flow rate into the hole was monitored with a Great Plains Industries (GPI) TM 075 water flow meter for the pre-soak period.

After the 6-hour soaking period was completed, the water level was maintained at approximately 12-inches for one hour for the steady-state period. The flow rate for Infiltration Pit 1 stabilized at 0.0235 gallons per minute (1.41 gallons per hour). This equated to an approximate infiltration rate of 0.168 inches per hour. The water was shut off after the steady-state period and monitored at least every 15

minutes for one hour. After 60 minutes, the water level within the pit dropped approximately 0.125 inches, resulting in a measured infiltration rate of 0.125 inch per hour.

In accordance with the Table 3.5 of the Department of Ecology 2014 SWMMWW, correction factors of 1.0, 0.5, and 0.9 for CFv, CFt, CFm, respectively were applied to the field measured infiltration rate of 0.125 inches per hour, obtained from the falling-head portion of the testing in Infiltration Pit 1. A total correction factor of 0.45 was applied to the measured field infiltration rate obtained from the falling head portion of the test to determine the long-term design infiltration rate.

Using the above correction factor, we calculated a long-term design infiltration rate of approximately 0.056 inches per hour. In our opinion, a long-term design infiltration rate of 0.056 inches per hour could be utilized to design the on-site low-impact infiltration systems within the native, silty fine to medium sand with gravel found on this site at depth.

It is our opinion that the subsurface soils within the site are not suitable for traditional stormwater infiltration systems, however low-impact design systems may be feasible within the site. The subsurface soils generally consisted of surficial undocumented fill soils underlain by silty fine to medium sand with gravel that we interpreted as native glacial till deposits. We did not encounter groundwater within our explorations to a maximum depth of 7.0 feet below the ground surface. We recommend that low-impact infiltration facilities, such as permeable pavements have an incorporated overflow component directed towards an approved point of discharge. We recommend these systems be sized and designed in accordance with the 2014 Department of Ecology Stormwater Management Manual for Western Washington in conjunction with the provided long-term design infiltration rate of 0.056 inches per hour.

We recommend that any proposed infiltration systems be placed as to not negatively impact any proposed or existing nearby structures and also meet all required setbacks from existing property lines, structures, and sensitive areas as discussed in the drainage manual. In general, infiltration systems should not be located within proposed fill areas within the site associated with site grading or retaining wall backfill as such condition could lead to failures of the placed fills and/or retaining structures. We should be retained to evaluate the infiltration system design and installation during construction.

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 residences. 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 residences. Surface water should be collected by permanent catch basins and drain lines, and be discharged into an appropriate discharge system.

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 should be retained to provide construction monitoring services during the earthwork phase of the project to evaluate subgrade conditions, temporary cut conditions, fill compaction, and drainage system installation.

USE OF THIS REPORT

NGA has prepared this report for Ms. Julie Nealey and her agents, for use in the planning and design of the development 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.

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.

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.

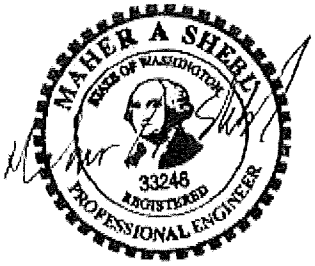
o-o-o

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.

Alex B. Rinaldi, GIT
Staff Geologist II



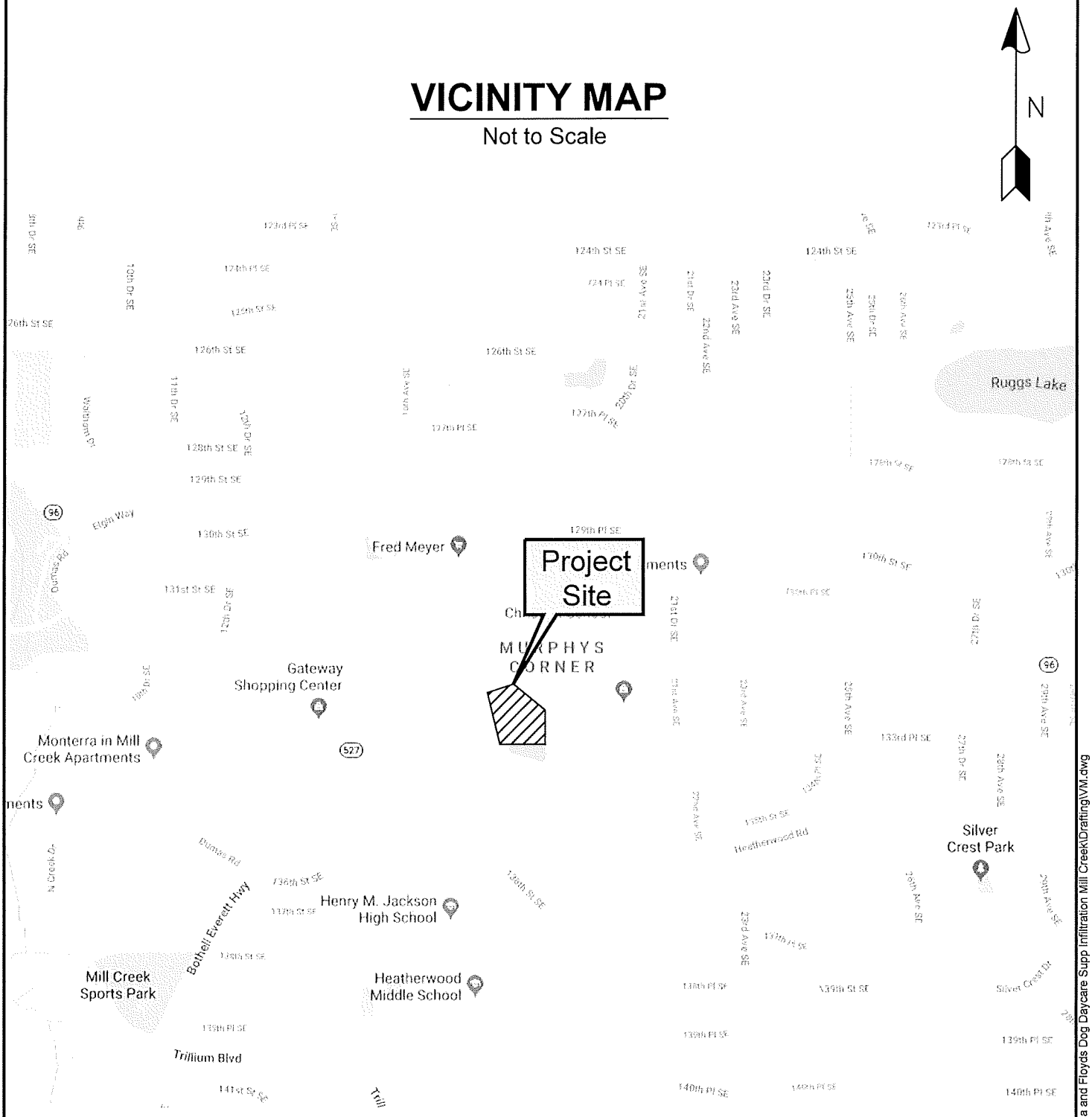
Maher A. Shebl, PE
Senior Engineer

ABR:MAS:dy

Five Figures Attached

VICINITY MAP

Not to Scale



Mill Creek, WA

Project Number 10362B18	Stella and Floyds Supplemental Infiltration Vicinity Map	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS Woodinville Office: 17311-135th Ave. NE, A-500, Woodinville, WA 98072, (425) 486-1669 / Fax: 481-2510 East Wenatchee Office: 5526 Industry Lane, #2, East Wenatchee, WA 98802, (509) 665-7696 / Fax: 665-7692 www.nelsongeotech.com
Figure 1		

No.	Date	Revision	By	CK
1	5/4/18	Original	DPN	ABR
2	6/12/18	Revision	DPN	ABR

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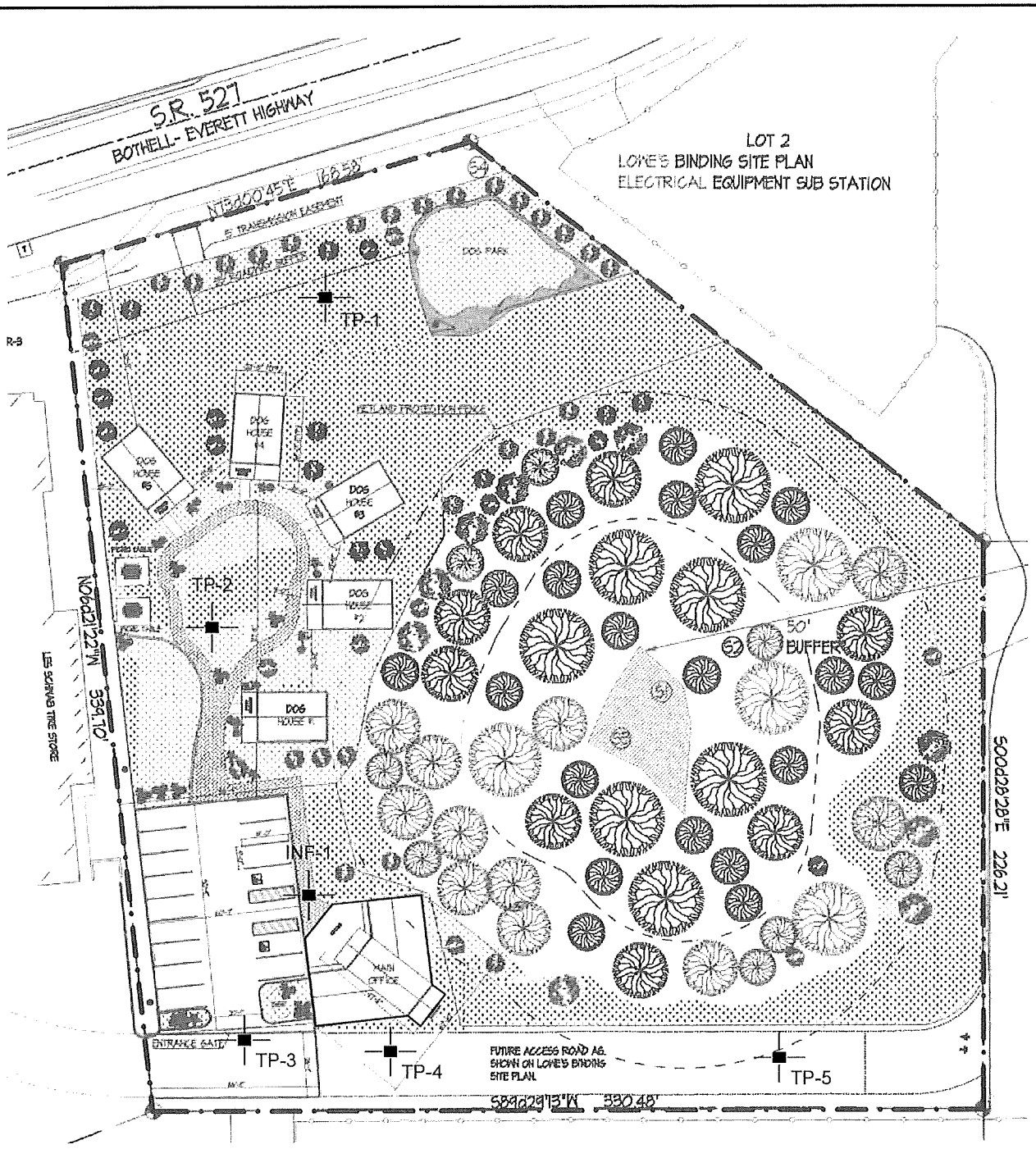

LEGEND

Property line

INF-1

Number and approximate location of infiltration test pit

TP-1

Number and approximate location of test pit

0 60 120

Scale: 1 inch = 60 feet

Reference: Site Plan based on a plan dated May 1, 2017 titled "Stella & Floyds," prepared by Capital Group.

Project Number 10362B18	Stella and Floyds Supplemental Infiltration Site Plan	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS
Figure 2		Woodinville Office: 17311-135th Ave, NE, A-500, Woodinville, WA 98072, (425) 486-1669 / Fax: 481-2510
		East Wenatchee Office: 5526 Industry Lane, #2, East Wenatchee, WA 98802, (509) 665-7696 / Fax: 665-7692
		www.nelsongeotech.com

No.	Date	Revision	By	CK
1	5/4/18	Original	DPN	ABR
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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, FAT 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 10362B18	Stella and Floyds Supplemental Infiltration Soil Classification Chart	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS Woodinville Office: 17311-135th Ave. NE, A-500, Woodinville, WA 98072, (425) 486-1669 / Fax: 481-2510 www.nelsongeotech.com East Wenatchee Office: 5526 Industry Lane, #2, East Wenatchee, WA 98802, (509) 665-7696 / Fax: 665-7692
Figure 3		

No.	Date	Revision	By	CK
1	5/4/18	Original	DPN	ABR
2	6/12/18	Revision	DPN	ABR

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LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
TEST PIT ONE		
0.0 – 1.5		DARK BROWN, ORGANIC-RICH SILTY FINE TO MEDIUM SAND WITH ROOTS (LOOSE TO MEDIUM DENSE, MOIST) (**TOPSOIL**)
1.5 – 3.6	SM	ORANGE-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND TRACE ROOTS (MEDIUM DENSE TO DENSE, MOIST)
3.6 – 7.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND TRACE IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 2.3 AND 4.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 7.0 FEET ON 4/26/2018
TEST PIT TWO		
0.0 – 2.0		DARK BROWN, ORGANIC-RICH SILTY FINE TO MEDIUM SAND WITH ROOTS AND TRACE GARBAGE (LOOSE TO MEDIUM DENSE, MOIST) (**UNDOCUMENTED FILL**)
2.0 – 3.5	SM	ORANGE-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND TRACE ROOTS (MEDIUM DENSE, MOIST)
3.5 – 7.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 3.0 AND 7.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 7.0 FEET ON 4/26/2018
TEST PIT THREE		
0.0 – 2.0		DARK BROWN, ORGANIC-RICH SILTY FINE TO MEDIUM SAND WITH ROOTS AND TRACE GARBAGE (LOOSE TO MEDIUM DENSE, MOIST) (**UNDOCUMENTED FILL**)
2.0 – 3.3	SM	ORANGE-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND SCATTERED ROOTS (MEDIUM DENSE, MOIST)
3.3 – 4.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 4.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 4.5 FEET ON 4/26/2018
TEST PIT FOUR		
0.0 – 2.0		DARK BROWN, ORGANIC-RICH SILTY FINE TO MEDIUM SAND WITH ROOTS GARBAGE (LOOSE TO MEDIUM DENSE, MOIST) (**TOPSOIL**)
2.0 – 4.0	SM	ORANGE-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND TRACE ROOTS (MEDIUM DENSE, MOIST)
4.0 – 7.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 7.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 7.0 FEET ON 4/26/2018

LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
TEST PIT FIVE		
0.0 – 1.5		DARK BROWN TO REDDISH, ORGANIC-RICH SILTY FINE TO MEDIUM SAND WITH ROOTS AND WOOD DEBRIS (LOOSE TO MEDIUM DENSE, MOIST) (**TOPSOIL**)
1.5 – 2.5	SM	ORANGE-BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, IRON-OXIDE STAINING, AND TRACE ROOTS (MEDIUM DENSE, MOIST)
2.5 – 3.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLE WAS NOT COLLECTED GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 3.0 FEET ON 4/26/2018
INFILTRATION PIT ONE		
0.0 – 2.8		UNDERBRUSH UNDERLAIN BY BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, ROOTS, ORGANICS, AND WOOD DEBRIS (LOOSE TO MEDIUM DENSE, MOIST) (**TOPSOIL/FILL**)
2.8 – 4.5	SM	GRAY, WELL-CEMENTED SILTY FINE TO MEDIUM SAND WITH GRAVEL AND IRON-OXIDE STAINING (MEDIUM DENSE TO DENSE, MOIST)
		SAMPLE WAS NOT COLLECTED GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 4.5 FEET ON 4/26/2018

CRITICAL AREAS STUDY
AND
MITIGATION PLAN

FOR

13209 BOTHELL EVERETT HWY
MUTTLEY SQUARE
SEATTLE, WA

Wetland Resources, Inc. Project #16263

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

Prepared For
Capital Architects Group
Attn: Sandra Martin
2813 Rockefeller Avenue
Everett, WA 98201

Original:
August 15, 2018

Revision:
November 28, 2018

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TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

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1.0 INTRODUCTION

The subject site is a 2.68-acre parcel located at 13209 Bothell Everett Highway in the City of Mill Creek, Washington, (parcel #: 28053100100400) within a portion of Section 31, Township 28N, Range 5E, W.M. Access to the subject site is from the northeast via 132nd Street SE. Surrounding land use consists primarily of large commercial centers and dense suburban residences within a heavily developed area. A PUD power substation lies immediately northeast of the site, a Lowes shopping center to the east, a detention pond to the south, and an automotive business to the west. On-site topography varies, sloping down to the southwest overall. However, a small depressional area is present near the center of the site, and a low swale is in the northwestern corner.

Currently the property is undeveloped scrub-shrub and forest. Some refuse is present near the property boundaries. The on-site vegetation is dominated by western red cedar (*Thuja plicata*), Douglas fir (*Pseudotsuga menziesii*), Himalayan blackberry (*Rubus armeniacus*), salmonberry (*Rubus spectabilis*), bracken fern (*Pteridium aquilinum*), and false lily of the valley (*Maianthemum dilatatum*).

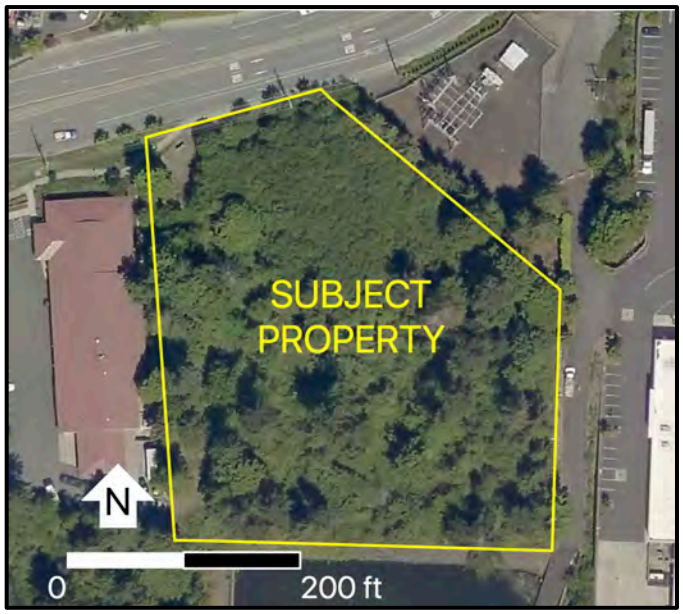

Figure 1: Aerial view of the subject property

Wetland Resources, Inc. (WRI) visited the subject property on September 28, 2016 to determine the presence of any jurisdictional critical areas that exist on or adjacent to the subject site. There is one Category III wetland (A) near the center of the subject property. A large off-site wetland is present to the south. Existing development is present between the site and the off-site wetland.

Wetland A receives an overall score of 16 points under the Department of Ecology's *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014). In the City of Mill Creek, Category III wetlands typically require 100-foot standard buffers on sites with high-intensity land use, and 50-foot buffers for sites with low-intensity land uses [per Mill Creek Municipal Code (MCMC) 18.06.930(B)].

1.1 CRITICAL AREAS CLASSIFICATIONS

1.1.1 Cowardin System Classifications

According to the Cowardin System, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin 1979), the classification for the on-site critical area is as follows:

Wetland A: Palustrine, Forested Wetland, Nontidal, Seasonally Flooded (PFOC).

Off-site Wetland: Palustrine, Scrub-shrub, Nontidal, Permanently Flooded (PSSH).

1.1.2 City of Mill Creek Classifications

Under Chapter 18.06 of the MCMC, the on-site critical area is classified as follows:

Wetland A

Category III wetland: This wetland scores a total of 16 points on the Wetland Rating Form (2014) for Western Washington, which equates to a Category III rating. Wetland A has two vegetation classes throughout its matrix, two hydroperiods, and has disturbed habitat connections. This wetland scores 4 points (low) for habitat functions. In the City of Mill Creek, Category III wetlands typically receive a standard buffer of 100 feet for high-intensity land uses and 50-foot buffers for low-intensity.

Off-site Wetland

Given the lack of off-site property access, we were not able to rate the wetland in question. From aerial photography it appears that the wetland is permanently flooded and is primarily vegetated with scrub-shrub vegetation. The buffer width for this wetland has not been determined, but does not extend onto the subject property due to intervening development that functionally and effectively disconnects the wetland from the subject site. This determination is consistent with the definition of "buffer" in MCMC 18.06.210. See *section 3.3.3* for more details,

1.2 PROJECT INFORMATION

Julie Nealey, hereafter referred to as the applicant, proposes to construct a canine boarding facility on the subject site. The development will consist of multiple dog lodging buildings, a main office, parking, pathways, and associated utilities and infrastructure. The overall footprint of the facility slightly extends into the standard buffer associated with Wetland A. In order to avoid potential buffer impacts related to project activities, the applicant further proposes to implement buffer averaging as stipulated in Mill Creek Municipal Code (MCMC) 18.06.930(C). The standard buffer will be modified to exclude a 2,117 square-foot area near and overlaying the proposed development. As compensation, an equal amount of buffer will be provided between two areas, one on either side of the buffer exclusion. This additional buffer area is of at least equal quality as that being reduced. As verified in a conversation with city staff, buffer averaging is being used to avoid impacts and no buffer mitigation (such as enhancement with native vegetation) is required. Per MCMC 18.06.80, the modified buffer edge will be demarcated by fencing and critical area signage.

2.0 STATEMENT OF QUALIFICATIONS

The work for this Report was conducted by Jim Rothwell and Scott Walters.

Jim Rothwell holds a Bachelor of Science degree in Environmental Science. Additional training includes a post-Baccalaureate certificate in Wetland Science and Management from the University of Washington as well as numerous continuing education classes. Jim has been a wetland ecologist for over 15 years and became a certified Professional Wetland Scientist (PWS) in 2009.

Scott Walters holds a Bachelor of Science degree in Wildlife Conservation Biology and Applied Vertebrate Ecology. Additional training includes an advanced certificate in Aquarium and Aquatic Sciences, and a post-Baccalaureate certificate in Wetland Science and Management from the University of Washington. Scott has worked as an ecologist on projects across the country for over 10 years, including scientific study of wetlands, environmental restoration monitoring, endangered species monitoring, and shorebird population research.

3.0 CRITICAL AREAS DETERMINATION REPORT

3.1 PUBLICLY AVAILABLE DATA

Prior to conducting the site investigation, 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 included *USDA/NRCS Web Soil Survey*, *DNR FPAMT Mapping Application*, *WDFW SalmonScape Interactive Mapping System*, *WDFW Priority Habitat and Species (PHS) Interactive Map*, *USFWS National Wetlands Inventory (NWI)*, *and Snohomish County SnoScape mapping application.*

USDA/NRCS Web Soil Survey
Soils on-site are mapped as Alderwood-Urban Land Complex, 2 to 8 percent slopes. A more detailed soil map unit description is provided in the *3.2.2 Soils Criteria* section below.

USFWS National Wetlands Inventory (NWI)
A relatively large scrub-shrub and forested wetland system is identified adjacent to the subject site to the southwest. No wetlands are shown on the subject property.

WDFW Priority Habitat and Species (PHS) Interactive Map
Depicts the same wetland system as identified on the NWI maps. Additionally, the site and the surrounding landscape are identified as potential little brown bat (*Myotis lucifugus*) habitat areas.

WDFW SalmonScape Interactive Mapping System
North Creek is located approximately 0.8 miles west of the subject site, and Penny Creek

approximately 1 mile to the southeast. Both of these stream systems support multiple runs of salmon species. However, there is no direct connection between these streams and the subject property.

DNR FPAMT Mapping Application
This public resource verifies the approximate location of the streams identified by S*almonScape.*

Snohomish County PDS Map Portal
Sitka Creek is located approximately a half-mile west of the subject site, and is designated as fish-bearing. This stream is a tributary of North Creek.

3.2 WETLAND DETERMINATION AND DELINEATION METHODOLOGY

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

The following criteria must be met in order to make a positive wetland determination:

3.2.1 Vegetation Criteria

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

3.2.2 Soils Criteria

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

Alderwood-Urban land complex, 2-8 percent slopes, is about 60 percent Alderwood gravelly sandy loam and about 25 percent urban land. Included in this unit are small areas of McKenna

and Norma soils and Terric Medisaprists in depressional areas and drainage-ways on plains. Also included are small areas of soils that are very shallow over a hardpan; small areas of Everett, Indianola, and Ragnar soils on terraces and outwash plains; and soils that have a stony and bouldery surface layer. Included areas make up about 15 percent of the total acreage.

The Alderwood soil is moderately deep over a hardpan and is moderately well drained. It formed in glacial till. Typically the surface layer is very dark grayish brown gravelly sandy loam about 7 inches thick. The upper part of the subsoil is dark yellowish brown and dark brown very gravelly sandy loam about 23 inches thick. A weakly cemented hardpan is at a depth of about 35 inches. Permeability of this soil is moderately rapid above the hardpan and very slow through it. Available water capacity is low.

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 WETLAND BOUNDARY DETERMINATION FINDINGS

3.3.1 Wetland A

Dominant vegetation in this wetland is represented by Scouler's willow (*Salix scouleriana*; FAC), Pacific willow (*Salix lasiandra*; FACW), red alder (*Alnus rubra*; FAC), salmonberry (FAC), and hardhack (*Spiraea douglasii*; FACW). These observed species all rate as facultative or wetter, indicating a hydrophytic vegetation community.

Soils in Wetland A from 0 to 7 inches below the surface have a Munsell color of black (10YR 2/1) with distinct brown (7.5YR 3/3) redoximorphic features, and have a loam texture. From 7 to 10 inches below the surface, soils are very dark grayish brown (10YR 3/2) with distinct yellowish brown (10YR 5/4) and prominent yellowish red (5YR 4/6) redoximorphic features, and have a clay loam texture. From 10 to 18 inches below the surface, soils are light olive brown (2.5Y 5/3) with prominent dark reddish brown (2.5YR 2.5/3) and prominent dark yellowish brown (10YR 4/6) redoximorphic features, and have a silty clay loam texture.

The topographic depression has multiple hydrology indicators present, including Geomorphic Position (D2). Additionally, administration of a FAC-neutral test (where "facultative" vegetation species are not considered) leaves only Pacific willow (FACW) and hard hack (FACW), thus meeting the FAC-Neutral Test (D5) secondary wetland hydrology indicator.Soils were dry at the time of our September 2016 site visit.

Field observations indicate that the area mapped as Wetland A is flooded, ponded, or saturated long enough during the growing season to develop anaerobic conditions in the upper part of the

soils. The approximate location of Wetland A is depicted on the map associated with this report (*Appendix C*).

3.3.2 Non-wetland Areas Adjacent to Wetland A

The subject site is relatively undisturbed and is vegetated with an assemblage commonly associated with upland areas. The dominant on-site vegetation adjacent to Wetland A (Data Site S2) consists of western red cedar (FAC), black cottonwood (*Populus balsamifera*; FAC), salmonberry (FAC), salal (*Gaultheria shallon*; FAC), and bracken fern (FACU). The majority of the on-site vegetation is facultative or wetter, indicating a hydrophytic vegetation community.

Typical soils on the subject site, which is mapped as non-wetland, have a Munsell color of very dark brown (7.5YR 2.5/3), with a loam texture, extending at least 17 inches below the surface. These soil characteristics do not meet any hydric soil indicators. Soils were dry at the time of our July 2016 site investigation.

Although hydrophytic vegetation is technically present, hydric soils show no indication of sustained inundation, and direct hydrologic indicators are lacking. Therefore, field observations indicate that the on-site area mapped as non-wetland is not flooded, ponded, or saturated long enough during the growing season to develop anaerobic conditions in the upper part of the soils.

3.3.3 Off-site Wetland

The off-site wetland located southwest of the subject site is a large forested and scrub-shrub system that appears to be permanently flooded. Lack of access prevented us from delineating or rating this critical area. An existing automotive repair facility and large stormwater detention pond (fenced) bisect the area between the subject parcel and the off-site wetland. Only a very small (<50 foot) gap is between these intervening structures. However, even the gap area is highly disturbed with a dirt roadway between the wetland and the proposed development area. Given these existing conditions, the subject site is not contiguous with the off-site critical area and is unable to provide functions or protections. As such, it has been determined that any buffer associate with the off-site wetland does not extend into the project area. This is consistent with the definition of buffer in MCMC 18.06.210, which is provided below. Therefore, the wetland category is not germane to this project.

> *MCMC 18.06.210*
> *"Buffer" or "buffer area" means the area or zone contiguous to a critical area that protects the integrity or functions and values of a critical area from potential adverse impacts. Buffers shall not include areas that are functionally and effectively disconnected from the wetland by a road or other substantial developed surface.*

Figure 2: Photo taken from stormwater pond, facing the automotive facility

3.3.4 Wildlife

The on-site critical areas are of poor habitat quality, and are only suitable to support wildlife species commonly present in heavily developed urban areas. Nevertheless, Wetland A and its buffer do provide important habitat elements in the form of resources such as food, water, perches, thermal cover, and hiding cover.

Burrows created by small burrowing animals, such as mountain beaver (*Aplodontia rufa*) and cottontail rabbit (*Sylvilagus floridanus*) are present throughout much of the site. Other mammalian species expected to occur on the subject site include gray squirrels (*Sciurus* spp.), Douglas squirrels (*Tamiasciurus douglasii*), and raccoon (*Procyon lotor*). Given the habitat available, it is expected that the following avian species use the area: American Crow (*Corvus brachyrhynchos),* American Robin (*Turdus migratorius*), Steller's Jay (*Cyanocitta stelleri*), Black-capped Chickadee (*Poecile atricapilla)*, Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Regulus calendula*), Dark-eyed Junco (*Junco hyemalis*), and Song Sparrow (*Melospiza melodia*).

Although the WDFW PHS map identifies the site and the surrounding landscape as potential little brown bat (*Myotis lucifugus*) habitat areas, this priority habitat is applied broadly (over a quarter section) and appropriate habitat features are not present on the subject site. Little brown bats generally use mature forest areas with copious tree cavities available for roosting. The on-site forest age is too young to provide such habitat. Therefore, use by this species is unlikely.

4.0 COMPLIANCE WITH MCMC 18.06.930(C) [BUFFER AVERAGING]

Pursuant to MCMC 18.06.930(C), development of the proposed project follows buffer averaging guidelines as detailed below. Portions of the MCMC are provided in *italics*, with responses provided in normal text underneath:

C. The director shall have the authority to "average" buffer widths on a case-by-case basis where a qualified professional demonstrates to the director's satisfaction that all the following criteria are met:

1. The total area contained in the buffer area after averaging is no less than that which would be contained within the standard buffer;

The total area of proposed buffer reduction (2,117 square feet) is equal to that proposed as additional buffer. The compensatory area of buffer being provided is divided into two areas (1,418 and 699 square feet), one on either side of the buffer reduction area.

2. The buffer averaging does not reduce the functions or values of the wetland;

Areas provided as additional buffer are of higher quality compared to that being removed. The area of buffer proposed for reduction through averaging is degraded by human refuse, low habitat heterogeneity, and invasive vegetation such as Himalayan blackberry (see figure 3). In contrast, the portion of the buffer being provided through averaging is a complex, multi-story forest community with little to no invasive plant cover (see figure 4). Overall vegetation structure and habitat complexity within the wetland buffer will be increased through the proposed buffer averaging, and buffer functionality is expected to be improve. Photographs of these areas are provided below.

3. The portion of the buffer reduced through buffer averaging is less than 25 percent of the total buffer length on a project site;

A length of 175 linear feet of the standard buffer perimeter being is proposed for reduction through buffer averaging. Given that the total length of the perimeter is 797 linear feet, the portion of the buffer being reduced is less than 25 percent of the total buffer length.

4. The wetland contains variations in sensitivity due to existing physical characteristics or the character of the buffer varies in slope, soils, or vegetation; and

The on-site wetland varies in sensitivity due to the proximity of multiple surrounding disturbances beyond the buffer. Additionally, vegetation within the standard buffer is not consistent in its composition or structure throughout the entire buffer. However, the area being averaged do not differ significantly. These conditions meet the requirements of this stipulation.

5. The buffer width is not reduced to less than 50 percent of the standard width, except that no buffer dimension shall be less than 25 feet.

The averaged buffer will be 77 feet wide at its narrowest point, leaving a width of over 50-percent throughout the 100-foot standard buffer.

Figure 3: Degraded conditions in the proposed buffer averaging reduction area.

Figure 4: Healthy, multi-story forest conditions in the proposed buffer averaging addition area.

5.0 USE OF THIS REPORT

This Critical Area Study and Mitigation Plan is supplied to Capital Architects Group as a means of determining on-site critical area conditions as required by the City of Mill Creek during the permitting process. This report is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

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

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

Wetland Resources, Inc.

Scott Walters
Associate Ecologist

Jim Rothwell
Senior Ecologist

6.0 REFERENCES

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APPENDIX A

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: Sept 29, 2016

Rated by S. Walters & J. Rothwell Trained by Ecology? ✔ Yes ___No Date of training March 2015

HGM Class used for rating DEPRESSIONAL 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 III (based on functions___ or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

_____**Category II** – Total score = 20 - 22

✔ **Category III** – Total score = 16 - 19

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H [M] L	H [M] L	H M [L]	
Landscape Potential	H [M] L	H [M] L	H M [L]	
Value	H [M] L	H [M] L	H [M] L	TOTAL
Score Based on Ratings	**6**	**6**	**4**	**16**

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	✔

Wetland name or number **A**

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	A1
Hydroperiods	D 1.4, H 1.2	A1
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	A1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	A1
Map of the contributing basin	D 4.3, D 5.3	A2
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)	D 3.1, D 3.2	A3
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	A4

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

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

Slope Wetlands

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

Wetland name or number **A**

HGM Classification of Wetlands in Western Washington

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

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

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

   NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

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

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

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

   NO – go to 3 **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   The wetland is on a slope (*slope can be very gradual*),
   The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   The water leaves the wetland **without being impounded**.

   NO – go to 5 **YES –** The wetland class is **Slope**

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

5. Does the entire wetland unit **meet all** of the following criteria?
   The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   The overbank flooding occurs at least once every 2 years.

Wetland name or number **A**

NO – go to 6 **YES** – The wetland class is **Riverine**

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

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

NO – go to 7 **YES** – The wetland class is **Depressional**

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

NO – go to 8 **YES** – The wetland class is **Depressional**

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

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

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

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

Wetland name or number **A**

DEPRESSIONAL AND FLATS WETLANDS

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

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: ☑ Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 ☐ Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 ☐ Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 ☐ Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	**3**
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions).* Yes = 4 [No = 0]	**0**
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): ☑ Wetland has persistent, ungrazed, plants > 95% of area points = 5 ☐ Wetland has persistent, ungrazed, plants > ½ of area points = 3 ☐ Wetland has persistent, ungrazed plants > $^{1}/_{10}$ of area points = 1 ☐ Wetland has persistent, ungrazed plants < $^{1}/_{10}$ of area points = 0	**5**
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* ☐ Area seasonally ponded is > ½ total area of wetland points = 4 ☐ Area seasonally ponded is > ¼ total area of wetland points = 2 ☑ Area seasonally ponded is < ¼ total area of wetland points = 0	**0**
Total for D 1 Add the points in the boxes above	**8**

Rating of Site Potential If score is: ___ **12-16 = H** ✔ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? [Yes = 1] No = 0	**1**
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 [No = 0]	**0**
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 [No = 0]	**0**
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 [No = 0]	**0**
Total for D 2 Add the points in the boxes above	**1**

Rating of Landscape Potential If score is: ___ **3 or 4 = H** ✔ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 [No = 0]	**0**
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? [Yes = 1] No = 0	**1**
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 [No = 0]	**0**
Total for D 3 Add the points in the boxes above	**1**

Rating of Value If score is: ___ **2-4 = H** ✔ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number **A**

DEPRESSIONAL AND FLATS WETLANDS

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

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

D 4.1. Characteristics of surface water outflows from the wetland:

- [✔] Wetland is a depression or flat depression with no surface water leaving it (no outlet) — points = 4
- [ ] Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet — points = 2
- [ ] Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch — points = 1
- [ ] Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing — points = 0

4

D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.*

- [ ] Marks of ponding are 3 ft or more above the surface or bottom of outlet — points = 7
- [ ] Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet — points = 5
- [ ] Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet — points = 3
- [ ] The wetland is a "headwater" wetland — points = 3
- [ ] Wetland is flat but has small depressions on the surface that trap water — points = 1
- [✔] Marks of ponding less than 0.5 ft (6 in) — points = 0

0

D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.*

- [ ] The area of the basin is less than 10 times the area of the unit — points = 5
- [✔] The area of the basin is 10 to 100 times the area of the unit — points = 3
- [ ] The area of the basin is more than 100 times the area of the unit — points = 0
- [ ] Entire wetland is in the Flats class — points = 5

3

Total for D 4 — Add the points in the boxes above — **7**

Rating of Site Potential If score is: ___ **12-16 = H** ✔ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

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

D 5.1. Does the wetland receive stormwater discharges? [Yes = 1] No = 0 — **1**

D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 [No = 0] — **0**

D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 [No = 0] — **0**

Total for D 5 — Add the points in the boxes above — **1**

Rating of Landscape Potential If score is: ___ **3 = H** ✔ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

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

D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.*
The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds):

- [ ] • Flooding occurs in a sub-basin that is immediately down-gradient of unit. — points = 2
- [✔] • Surface flooding problems are in a sub-basin farther down-gradient. — points = 1
- [ ] Flooding from groundwater is an issue in the sub-basin. — points = 1
- [ ] The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ — points = 0
- [ ] There are no problems with flooding downstream of the wetland. — points = 0

1

D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 [No = 0] — **0**

Total for D 6 — Add the points in the boxes above — **1**

Rating of Value If score is: ___ **2-4 = H** ✔ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number **A**

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

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

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

____Aquatic bed — 4 structures or more: points = 4
____Emergent — 3 structures: points = 2
__✔__Scrub-shrub (areas where shrubs have > 30% cover) — [2 structures: points = 1]
__✔__Forested (areas where trees have > 30% cover) — 1 structure: points = 0

If the unit has a Forested class, check if:

____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

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

____Permanently flooded or inundated — 4 or more types present: points = 3
__✔__Seasonally flooded or inundated — 3 types present: points = 2
____Occasionally flooded or inundated — [2 types present: points = 1]
__✔__Saturated only — 1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland
____Seasonally flowing stream in, or adjacent to, the wetland
____**Lake Fringe wetland** — **2 points**
____**Freshwater tidal wetland** — **2 points**

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

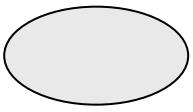
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species — points = 2
[5 - 19 species] — [points = 1]
< 5 species — points = 0

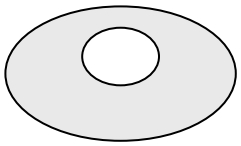
1

H 1.4. Interspersion of habitats

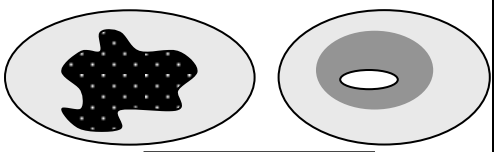
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always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



None = 0 points

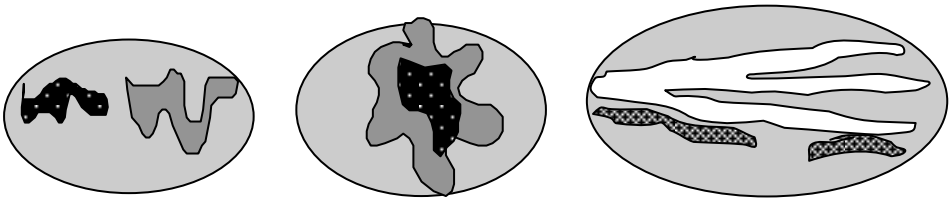


Low = 1 point



[**Moderate** = 2 points]

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



2

Wetland name or number **A**

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

Rating of Site Potential If score is:___**15-18 = H** ___**7-14 = M** __✔__**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 4 **+** [(% moderate and low intensity land uses)/2] 0 **=** 4 % If total accessible habitat is: ☐ > 1/3 (33.3%) of 1 km Polygon points = 3 ☐ 20-33% of 1 km Polygon points = 2 ☐ 10-19% of 1 km Polygon points = 1 ☑ < 10% of 1 km Polygon points = 0	**0**
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 15 **+** [(% moderate and low intensity land uses)/2] 3 **=** 18 % ☐ Undisturbed habitat > 50% of Polygon points = 3 ☐ Undisturbed habitat 10-50% and in 1-3 patches points = 2 ☑ Undisturbed habitat 10-50% and > 3 patches points = 1 ☐ Undisturbed habitat < 10% of 1 km Polygon points = 0	**1**
H 2.3. Land use intensity in 1 km Polygon: If ☑ > 50% of 1 km Polygon is high intensity land use points = (- 2) ☐ ≤ 50% of 1 km Polygon is high intensity points = 0	**-2**
Total for H 2 Add the points in the boxes above	**-1**

Rating of Landscape Potential If score is**:**___**4-6 = H** ___**1-3 = M** __✔__**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan ☑ Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 ☐ Site does not meet any of the criteria above points = 0	**1**

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 *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes **–** Go to **SC 2.2** No **–** Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes **= Category I** No **= Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 2.4** No **= Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes **= Category I** No **= Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No **= Is not a bog**	**Cat. I**

Wetland name or number **A**

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** No = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** No = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** No = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	**N/A**

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16263 CAPITAL ARCHITECTS - NEALEY SITE
WETLAND RATING FIGURE A1 - WETLAND A

LEGEND

- FORESTED VEGETATION
- SCRUB-SHRUB
- SATURATED ONLY
- SEASONALLY FLOODED
- 150' FROM WL BOUNDARY

Scale 1" = 100'

0 100 200

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
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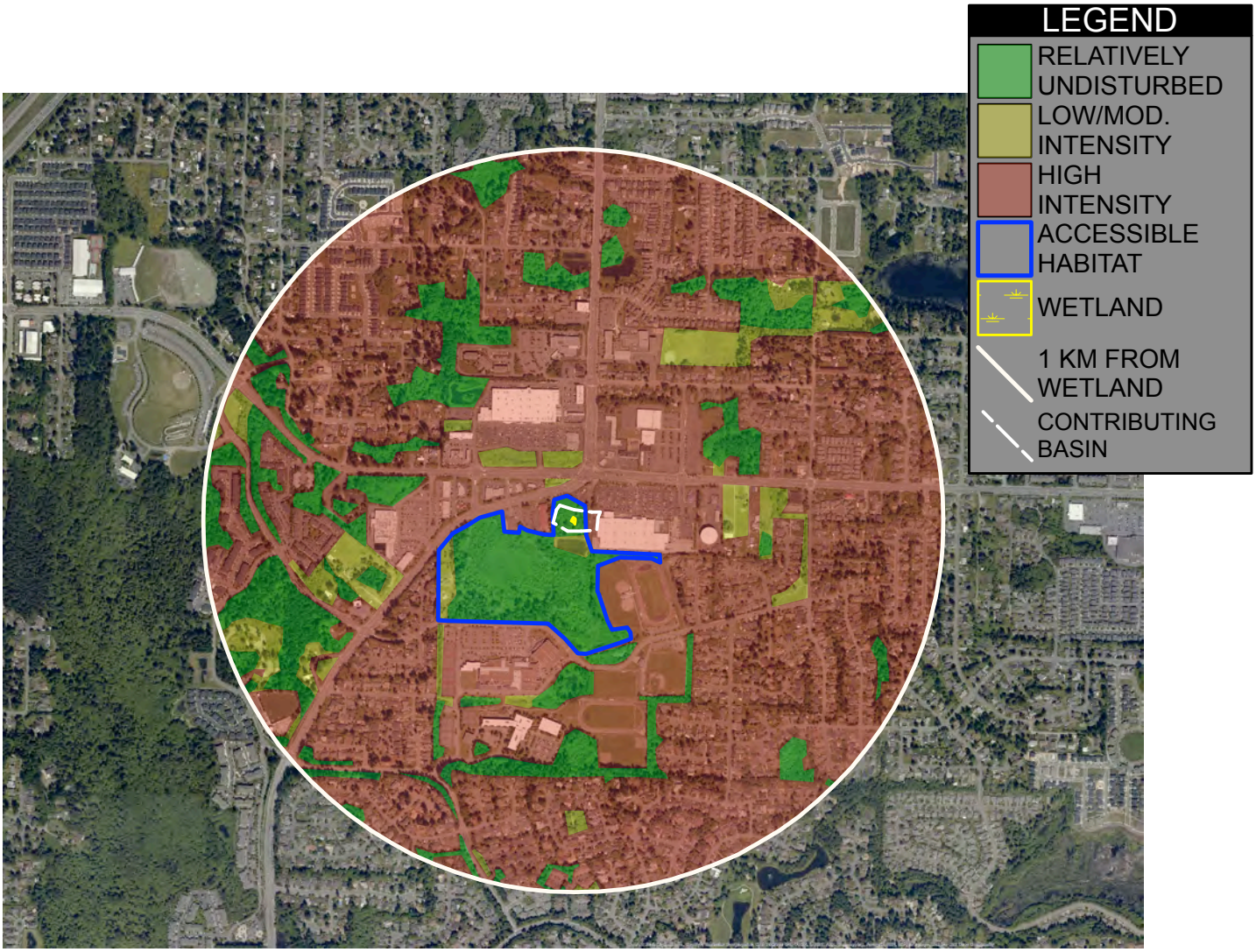
Email: mailbox@wetlandresources .com

WETLAND RATING
Wetland A

Capital Architects Group
Attn: Sandra Martin
2813 Rockefeller Ave
Everett, WA 98201

Figure A1
WRI Job # 16263
Drawn by: SW

16263 CAPITAL ARCHITECTS - NEALEY SITE
WETLAND RATING FIGURE A2 - WETLAND A



CONTRIBUTING BASIN AREA RELATIVE TO WETLAND UNIT IS 47:1

Scale 1" = 1,500'

0 1,500 3,000

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WETLAND RATING
Wetland A

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Figure A2
WRI Job # 16263
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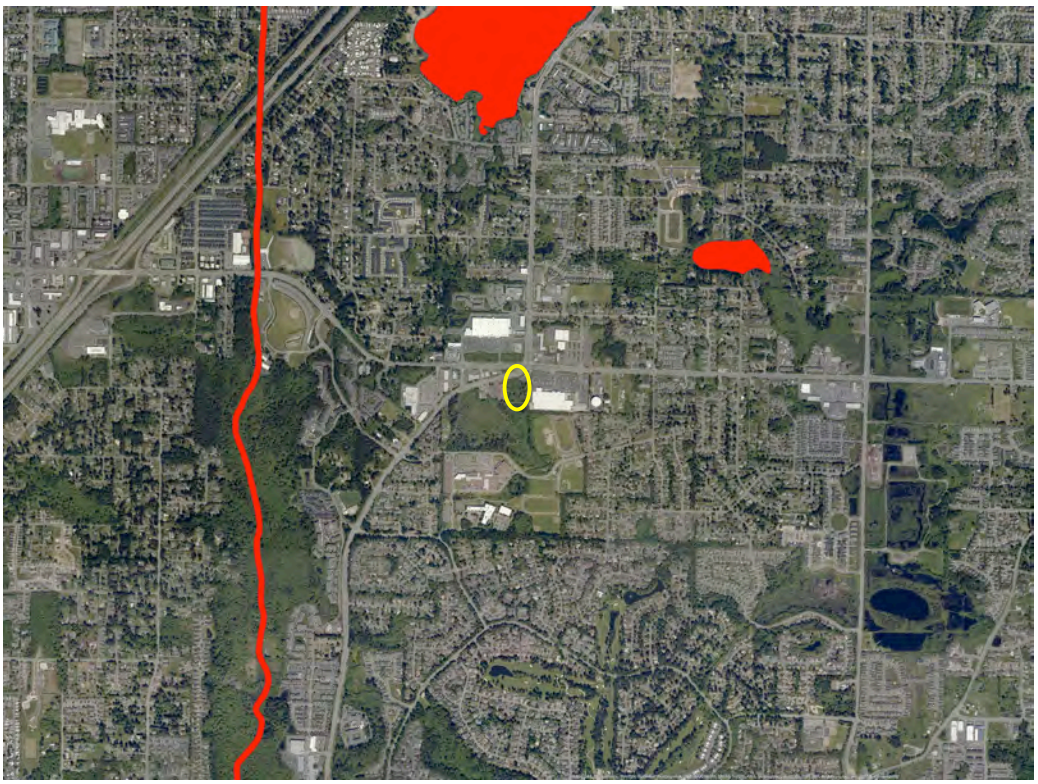
16263 CAPITAL ARCHITECTS - NEALEY SITE
WETLAND RATING FIGURE A3 - WETLAND A



Scale 1" = 3,000'

0 3,000 6,000

LEGEND

WETLAND LOCATION

AQUATIC RESOURCES ON THE 303(d) LIST

Wetland Resources, Inc.
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9505 19th Avenue S.E. Suite 106 Everett, Washington 98208
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WETLAND RATING
Wetland A

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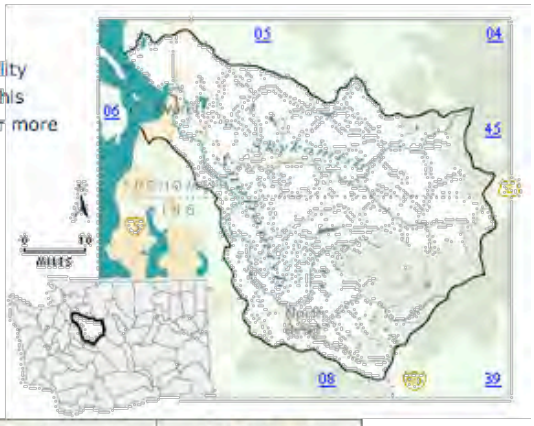
Figure A3
WRI Job # 16263
Drawn by: SW

16263 CAPITAL ARCHITECTS - NEALEY SITE
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
Lake Loma	Total Phosphorus	Straight to implementation project under development	Tricia Shoblom 425-649-7288
Snohomish River	French Creek / Pilchuck River • Dissolved Oxygen • Temperature	Under development	Ralph Svrjcek 425-649-7165
	Dioxin	EPA approved	Ralph Svrjcek 425-649-7165
	Estuary • Ammonia • BOD	EPA approved	Ralph Svrjcek 425-649-7165
	Tributaries • Fecal Coliform Tributaries: • Allen Creek • Quilceda Creek • French Creek • Woods Creek • Pilchuck River • Marshlands (Wood Creek) {2}	EPA approved	Ralph Svrjcek 425-649-7165
	Snoqualmie River • Ammonia-N • BOD (5-day) • Fecal Coliform Temperature	EPA approved EPA approved Has an implementation plan	Ralph Svrjcek 425-649-7165

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

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WETLAND RATING
Wetland A

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Figure A4
WRI Job # 16263
Drawn by: SW

APPENDIX B

CORPS OF ENGINEERS WETLAND
DETERMINATION DATA FORMS

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

Project/Site: Nealey Site - 13209 Bothell Everett Hwy City/County: Mill Creek Sampling Date: Sept 28, 2016

Applicant/Owner: Capital Architects Group State: WA Sampling Point: S1

Investigator(s): J. Rothwell & S. Walters Section, Township, Range: S31, T28N, R05E

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <5%

Subregion (LRR): LRR A Lat: 47.877354 Long: -122.207437 Datum: WSG 84

Soil Map Unit Name: Alderwood Urban Land Complex, 2 to 8 percent slopes 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 ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑ No ☐	
Wetland Hydrology Present?	Yes ☑ No ☐	

Remarks:

Soil indicator not present; hydric condition determination based on surrounding environmental conditions.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10 meter radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix scouleriana	12	Y	FAC
2. Alnus rubra	10	Y	FAC
3. Salix lasiandra	9	Y	FACW
4. Populus balsamifera	3	N	FAC
	24	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 meter radius)			
1. Spiraea douglasii	80	Y	FACW
2. Rubus spectabilis	20	Y	FAC
3.			
4.			
5.			
	100	= Total Cover	
Herb Stratum (Plot size: 1 meter radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

SOIL

Sampling Point: S1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 2/2	99	2.5YR 2.5/4	1	C	M	Loam	
7-9	10YR 5/6	70	2.5YR 2.5/3	30	C	M	Si Cl Lo	
9-18	2.5Y 4/3	100	-	-	-	-	Cl Lo	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

Nearly meets F6 indicator, but abundance of redoximorphic features in the upper horizon was below the threshold. Despite direct presence of a specific indicator, this data site is located within an area determined to most likely be wetland due to strong signs of hydrology and hydrophytic vegetation. The soil is presumed hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☑ No ☐

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

Remarks:

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

Project/Site: Nealey Site - 13209 Bothell Everett Hwy City/County: Mill Creek Sampling Date: Sept 28, 2016

Applicant/Owner: Capital Architects Group State: WA Sampling Point: S2

Investigator(s): J. Rothwell & S. Walters Section, Township, Range: S31, T28N, R05E

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <5%

Subregion (LRR): LRR A Lat: 47.877354 Long: -122.207437 Datum: WSG 84

Soil Map Unit Name: Alderwood Urban Land Complex, 2 to 8 percent slopes 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 ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑
Hydric Soil Present?	Yes ☐ No ☑	
Wetland Hydrology Present?	Yes ☐ No ☑	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10 meter radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Thuja plicata	25	Y	FAC
2. Populus balsamifera	20	Y	FAC
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 3 meter radius)			
1. Rubus spectabilis	60	Y	FAC
2. Spiraea douglasii	15	N	FACW
3. Malus fusca	5	N	FACW
4. Vaccinium parvifolium	2	N	FACU
5.			
	82 = Total Cover		
Herb Stratum (Plot size: 1 meter radius)			
1. Gaultheria shallon	20	Y	FAC
2. Pteridium aquilinum	20	Y	FACU
3. Rubus ursinus	10	N	FACU
4. Polystichum munitum	5	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

SOIL

Sampling Point: S2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-17	7.5YR	2.5/3	-	-	-	-	Loam	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Remarks:

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

Project/Site: Nealey Site - 13209 Bothell Everett Hwy City/County: Mill Creek Sampling Date: Sept 28, 2016

Applicant/Owner: Capital Architects Group State: WA Sampling Point: S3

Investigator(s): J. Rothwell & S. Walters Section, Township, Range: S31, T28N, R05E

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <5%

Subregion (LRR): LRR A Lat: 47.877354 Long: -122.207437 Datum: WSG 84

Soil Map Unit Name: Alderwood Urban Land Complex, 2 to 8 percent slopes 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 ☑ No ☐ Hydric Soil Present? Yes ☑ No ☐ Wetland Hydrology Present? Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10 meter radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix scouleriana	16	Y	FAC
2. Salix lasiandra	9	Y	FACW
3. Alnus rubra	8	Y	FAC
4. Populus balsamifera	4	N	FAC
	37	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 meter radius)			
1. Spiraea douglasii	85	Y	FACW
2. Vaccinium parvifolium	18	N	FACU
3. Rubus spectabilis	10	N	FAC
4.			
5.			
	113	= Total Cover	
Herb Stratum (Plot size: 1 meter radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

SOIL

Sampling Point: S3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 2/1	99	7.5YR 3/3	1	C	M	Loam	
7-10	10YR 3/2	50	10YR 5/4	30	C	M	Cl Lo	
-	-	-	5YR 4/6	20	C	M	-	
10-18	2.5Y 5/3	84	2.5YR 2.5/3	1	C	M	Si Cl Lo	
-	-	-	10YR 4/6	15	C	M	-	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

Nearly meets F6 indicator, but thickness of the low chroma horizon with redoximorphic features (from 7 to 10 inches) is too thin. Despite direct presence of a specific indicator, this data site is located within an area determined to most likely be wetland due to strong signs of hydrology and hydrophytic vegetation. The soil is presumed hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☑ No ☐

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

Remarks:

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

Project/Site: Nealey Site - 13209 Bothell Everett Hwy City/County: Mill Creek Sampling Date: Sept 28, 2016

Applicant/Owner: Capital Architects Group State: WA Sampling Point: S4

Investigator(s): J. Rothwell & S. Walters Section, Township, Range: S31, T28N, R05E

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <5%

Subregion (LRR): LRR A Lat: 47.877354 Long: -122.207437 Datum: WSG 84

Soil Map Unit Name: Alderwood Urban Land Complex, 2 to 8 percent slopes 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 ☑ No ☐ Hydric Soil Present? Yes ☐ No ☑ Wetland Hydrology Present? Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10 meter radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	80	Y	FAC
2. Pseudotsuga menziesii	14	N	FACU
3. Prunus emarginata	3	N	FACU
4.			
	97	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3 meter radius)			
1. Rubus armeniacus	40	Y	FAC
2. Lonicera involucrata	7	N	FAC
3. Phalaris arundinacea	5	N	FACW
4. Spiraea douglasii	5	N	FACW
5.			
	57	= Total Cover	
Herb Stratum (Plot size: 1 meter radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

SOIL

Sampling Point: S4

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/2	100	-	-	-	-	Loam	
5-10	10YR 3/3	95	5YR 4/6	5	C	M	Sa Lo	
10-17	10YR 3/4	95	5YR 4/6	5	C	M	Sa Lo	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

Water ponds in the area surrounding this data site, but does not appear to accumulate for a sufficient duration to develop hydric soil conditions; possibly due to high sand content and irregular hydrologic inputs.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☑ No ☐

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

Remarks:

Hydrology clearly collects in this area, but does not appear to persist for significant periods of time.

APPENDIX C

CRITICAL AREAS STUDY AND
MITIGATION PLAN MAP (SHEET 1/1)

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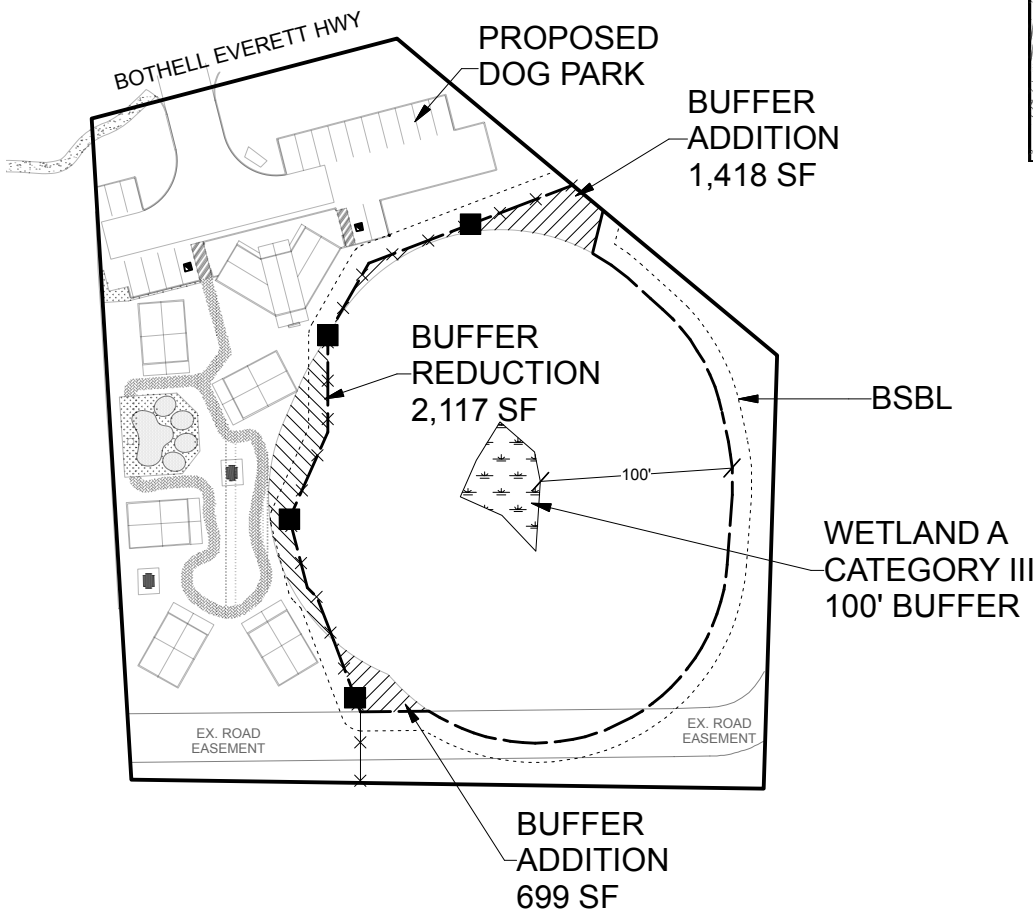
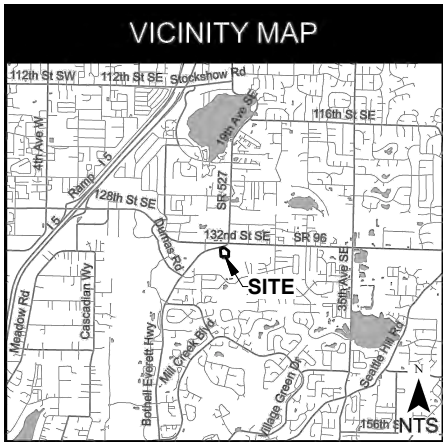
CRITICAL AREAS REPORT AND BUFFER MITIGATION PLAN MAP

13209 BOTHELL EVERETT HIGHWAY

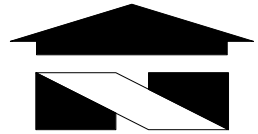
PORTION OF SECTION 31, TOWNSHIP 28N, RANGE 05E, W.M.





LEGEND

- WETLAND
- BUFFER
- 10-FOOT BSBL
- CRITICAL AREA SIGNAGE
- SPLIT-RAIL FENCING
- BUFFER REDUCTION
- BUFFER ADDITION
- PROPERTY BOUNDARY



Scale 1" = 100'

0 50 100 150 200

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 REPORT AND MITIGATION PLAN MAP
13209 Bothell Everett Highway
Mill Creek, Washington

Julie Nealey
c/o Capital Architects Group, PC
Attn: Sandra Martin
2813 Rockefeller Avenue
Mill Creek, WA 98201

Sheet 1/1
WRI Job#: 16263
Drawn by: S. Walters
Orig. Date: Aug 15, 2018
Rev. Date: Nov 28, 2018

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

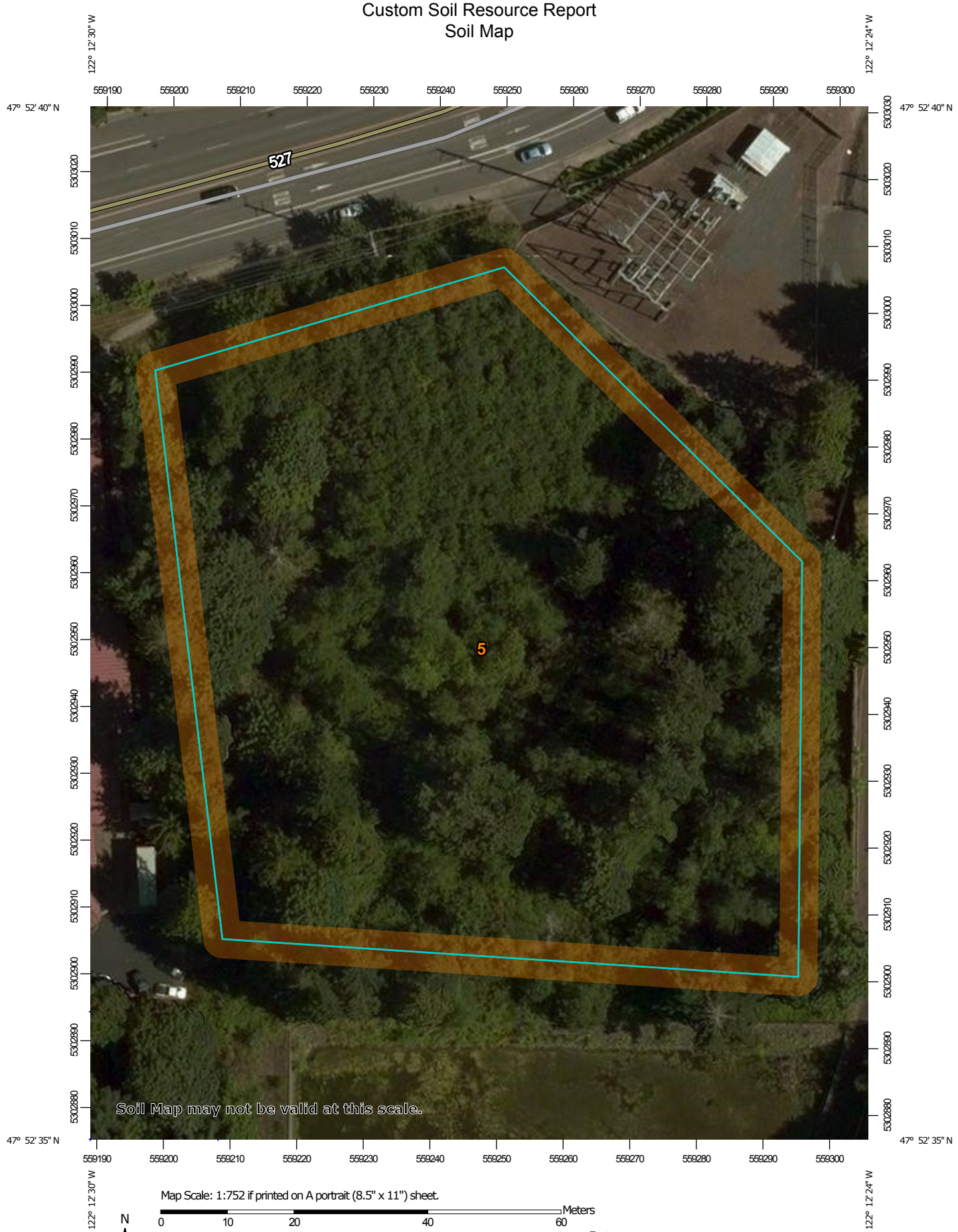
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Snohomish County Area, Washington

Stella & Floyd's Dog Daycare

December 12, 2018

Custom Soil Resource Report
Soil Map



Map Scale: 1:752 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Snohomish County Area, Washington
Survey Area Data: Version 20, Sep 10, 2018

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

Date(s) aerial images were photographed: Jul 7, 2014—Jul 8, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Alderwood-Urban land complex, 2 to 8 percent slopes	2.0	100.0%
Totals for Area of Interest		**2.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Snohomish County Area, Washington

5—Alderwood-Urban land complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2hz9
Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Alderwood and similar soils: 60 percent
Urban land: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alderwood

Setting

Landform: Till plains
Parent material: Basal till

Typical profile

H1 - 0 to 7 inches: gravelly ashy sandy loam
H2 - 7 to 35 inches: very gravelly ashy sandy loam
H3 - 35 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Forage suitability group: Limited Depth Soils (G002XN302WA)
Hydric soil rating: No

Minor Components

Mckenna

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

Norma, undrained

Percent of map unit: 5 percent

Landform: Depressions
Hydric soil rating: Yes

Terric medisaprists, undrained
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Section VII – Other Permits

Section VII Summary:

Narrative

Outside of the City of Mill Creek, the site will need to be approved for water and sewer through the Silver Lake Water and Sewer District.

250 4th Avenue South, Suite 200
Edmonds, WA 98020
ph. 425.778.8500 | f. 425.778.5536
www.cgengineering.com

Section VIII – Bond Quantities, Declaration of Covenant, & Operation and Maintenance Manual

Section VIII Summary:

Narrative

To be completed for construction drawing submittal phases of the project.

ENGINEERING

250 4th Avenue South, Suite 200
Edmonds, WA 98020
ph. 425.778.8500 | f. 425.778.5536
www.cgengineering.com