

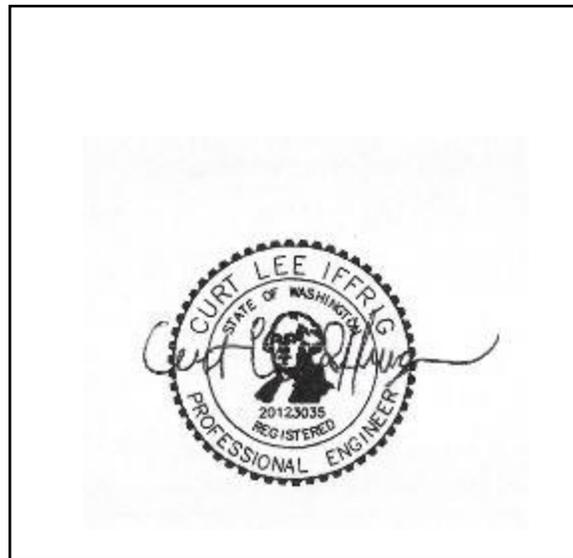
Preliminary Drainage Report

Ballinger Short Plat

Monroe, Washington

Tax Parcel: 200310065002

Group Four Job: 20-3008



Dec 15th, 2021

Prepared For:
Ballinger Commercial Properties
Fred Ballinger
PO Box 1
Monroe, WA 98272

Prepared By:
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Section I

Project Overview and Executive Summary

Name: Ballinger

File Number: TBD

Tax Parcel: 200310065002

Owner/Applicant:

Fred Ballinger
PO Box 1,
Monroe, WA 98272

Engineer:

Group Four, Inc.
P.O. Box 1059
Lake Stevens, WA 98258
425-408-1152

This drainage report was prepared as part of a Preliminary Drainage Review for the City of Monroe per the requirements found in the Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW 2014). The applicant proposes divide a 42,283 sf parcel into 3 Lots. Lot 1 will be 18,150 sf and contains an existing duplex which will remain. Lots 2 and 3 will be 6,318 sf and 6,632 sf respectively. These two lots propose approximately 2,600 sf of impervious each. The short plat will also include a 11,183 sf open space tract to remain native vegetation.

Stormwater runoff mitigation will be provided primarily by full dispersion with runoff from driveways being mitigated by sheet flow dispersion.

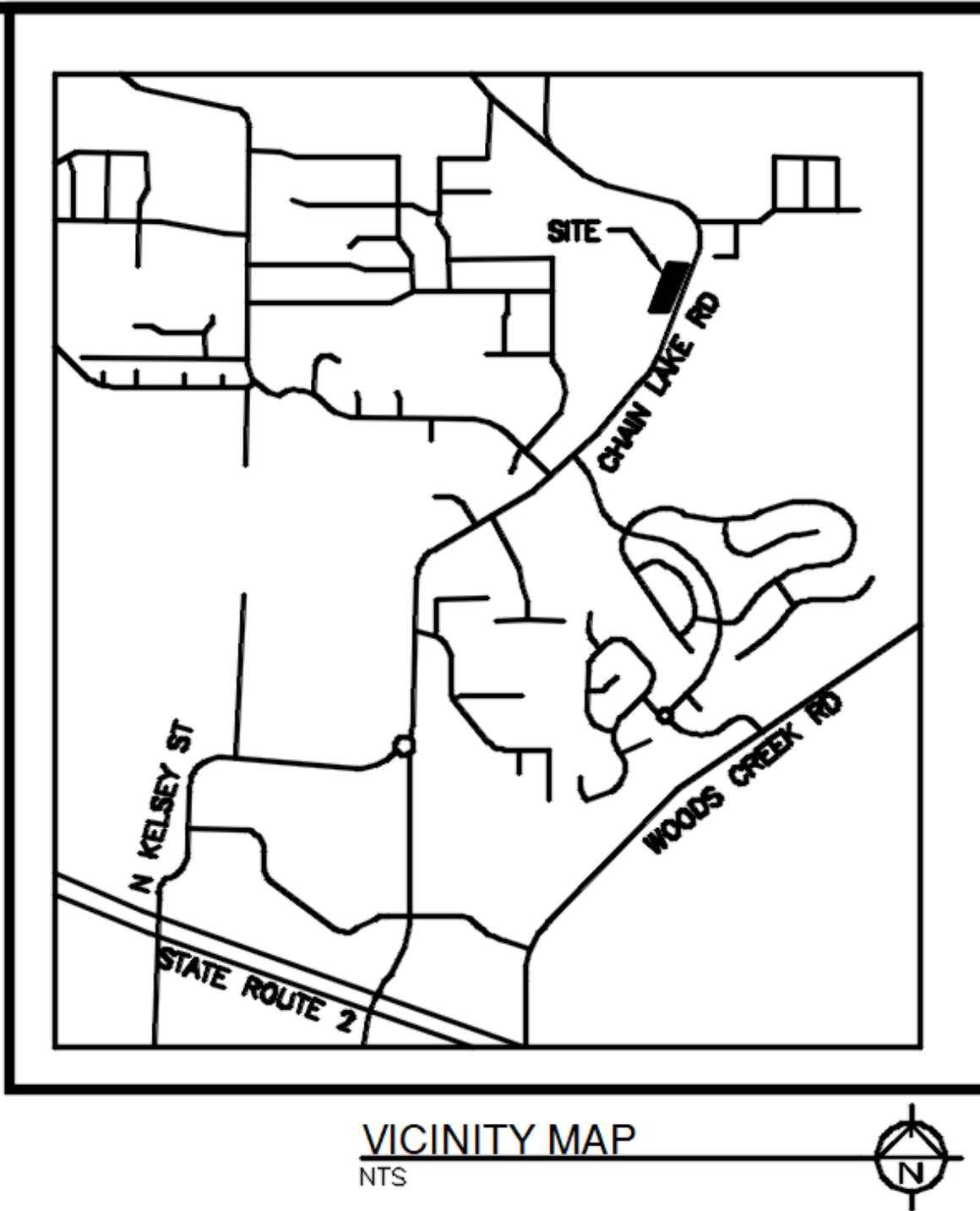


Figure 1: Vicinity Map

Existing Conditions Summary

The existing site is 0.97 acres in an area zoned residential. The site is currently undeveloped forest. The topography generally slopes to the southeast with an average slope of 4%. The soils on-site are mapped as Tokul gravely medial loam, 0%-8% slopes per Natural Resources Conservation Service (NRCS) Web Soil Survey.

A geotechnical assessment has not been obtained at this time. If one is to be required it will be submitted for the final design review.

Targeted Drainage Area

The targeted drainage area for this project includes all the proposed impervious surfaces for the two new lots including the roofs and driveways. The break down of targeted surfaces and the runoff mitigation for each is outlined in the table below. See Figure 3: Proposed Site Plan

TDA	Area, SF	BMP	Note
Proposed Roof	4,200 SF	Dispersion	
Proposed Driveways & Parking	3,112 sf	Sheet Flow Dispersion	

Off-Site Analysis

Upstream Analysis

The upstream area includes approximately 8.83 acres that is tributary to the site. This area includes mostly pasture with a small amount of impervious. Based on site topography, runoff from these surfaces sheet flows onto part of the project site. However, there is no visible evidence of concentrated surface water flowing onto project site.

Downstream Analysis

The downstream was walked by Curt Iffrig, PE on December 14, 2021. The weather was 40 degrees F and cloudy. The walking route began on the site and continued to follow the natural drainage path for ¼ mile.

Drainage Basin

The entire site is one drainage basin. Runoff from site sheet flows to east into a drainage ditch in Chain Lake Road.

Downstream Walkthrough

From the project site the stormwater runoff sheet flows into a drainage ditch on the west side of Chain Lake Road. This ditch flows south for ¼ mile. The ditch eventually drains into an unnamed stream which outfalls to the Skykomish River.

No drainage problems were observed. At the time of the site visit the downstream channel had erosion and sediment controls in place. It is anticipated that the drainage channel will be stabilized prior to project completion.

Section II: Minimum Requirements

Per the SWMMWW, Figure I-3.1, this project must comply with Minimum Requirements 1 through 9. See Appendix A.

MR-1 Targeted Stormwater Site Plan

A preliminary Stormwater Site Plan has been prepared for a City of Monroe drainage review. A full set of design plans will be prepared as the project approaches final design.

MR 2-SWPPP Narrative

A Surface Water Pollution Prevention Plan (SWPPP) will be prepared as the project approaches final design.

MR 3-Water Pollution Source Control for New Development

Source Control is not required for this residential project. The property owners shall practice good house-keeping measures for the use and disposal of pollutants.

MR 4-Preservation of Natural Drainage Systems and Outfalls, and Provisions of Off-site Mitigation

The proposed stormwater discharge maintains the site's natural drainage system. Off-site work includes two proposed driveways for access to Chain Lake Road.

MR 5-On-site Stormwater Management

Per the SWMMWW 2014, on-site stormwater management is to be met by choosing BMP's from List #2 and this section documents those BMP's used. Full dispersion is feasible because the Tract 901 has 11,183 SF that will be left vegetated. Runoff from the proposed roofs will be dispersed over this area. Since full dispersion is not feasible for the driveway surfaces. Runoff from them will be handled by sheet flow dispersion over an amended filter strip.

New pervious surfaces including lawn and landscape areas will be treated with BMP T5.13, Post Construction Amended Soils. See the soil worksheet in Appendix D.

MR 6-Runoff Treatment

Stormwater runoff from pollution generating pervious surface will be treated by sheet flow dispersion over an amended filter strip. Design of the amended filter strip will be completed as project approaches final design.

MR 7- Flow Control

Per Surface Water Management Manual for Western Washington (SWMMWW) 2014, a project is exempt from a flow control facility if a continuous runoff model can demonstrate that the 100-year peak runoff from the developed condition is not more than 0.15 cfs greater than the 100-year peak runoff for the historic condition.

WWHM 2012 was used to show how this project meets this requirement. The targeted area includes the proposed impervious surface including roof and driveways for the new lots totaling 0.168 acres. Since Lot 1 and Tract 901 will remain undisturbed, they are not included in this total. Since full dispersion will be used an area of 1,720 sf (0.04 acres) will be counted as ineffective and removed from the model. The new targeted area is 0.128 acres. In the historic condition this area is modeled as Forest.

For the developed condition, impervious surfaces were modeled as impervious road. A 50% credit was taken for the driveway surfaces that will be mitigated by sheet flow dispersion. This area is approximately 0.023 acres. The modeling parameters are outlined in the table below.

SURFACE	SLOPE	COVER	AREA (ac)
PRE-DEVELOPED (Historic)			
Existing Site-Historic Condition	3-10%	Forest	0.128
DEVELOPED			
Proposed Impervious surface (not dispersed)	3-10%	Road	0.105
Proposed Impervious surface (sheet flow)	3-10%	Pasture	0.023

Per WWHM 2012 output the 100-year peak runoff for the developed condition is 0.17 cfs while the 100-year peak runoff for the predeveloped condition is 0.02 cfs. The difference is 0.15 cfs so dispersion is adequate for flow control. See WWHM 2012 outputs in Appendix C.

MR 8- Wetland Protection

There are no wetland areas on this property. Wetland protection is not required.

MR 9- Operation and Maintenance

Stormwater BMP's are to be owned, operated and maintained by the property owner according to the standards contained in the Snohomish County Drainage Manual 2016, Volume V Chapter 4.

Appendices

A - Soil Logs

B - Figure 1.1

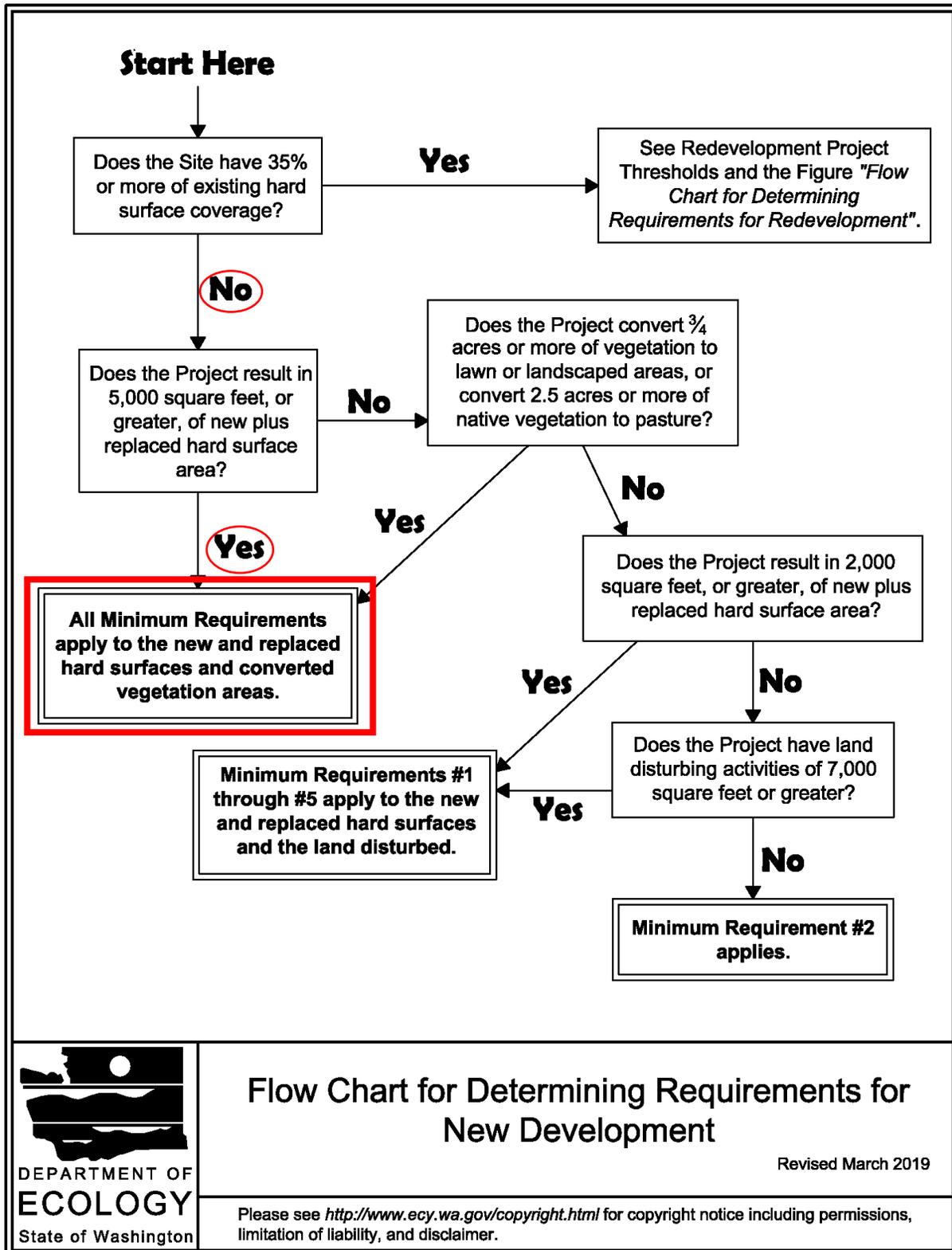
C - WWHM 2012 Output

D - Post-construction Soil Standard

Appendix A

Figure I-1.3 Minimum Requirements
Stormwater Management Manual for Western Washington
2014

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



Flow Chart for Determining Requirements for New Development

Revised March 2019

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Appendix B

WWHM Modeling Report

WWHM 2012

**WWHM2012
PROJECT REPORT**

Project Name: Ballinger Dispersion
Site Name:
Site Address:
City :
Report Date: 12/20/2021
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2019/09/13
Version : 4.2.17

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

<u>Pervious Land Use</u>	<u>acre</u>
C, Forest, Mod	.128
Pervious Total	0.128
<u>Impervious Land Use</u>	<u>acre</u>
Impervious Total	0
Basin Total	0.128

Element Flows To:

Surface	Interflow	Groundwater
----------------	------------------	--------------------

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

<u>Pervious Land Use</u>	<u>acre</u>
C, Pasture, Mod	.023
Pervious Total	0.023
<u>Impervious Land Use</u>	<u>acre</u>
ROADS MOD	0.105
Impervious Total	0.105
Basin Total	0.128

Element Flows To:		
Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
 Total Pervious Area:0.128
 Total Impervious Area:0

Mitigated Landuse Totals for POC #1
 Total Pervious Area:0.023
 Total Impervious Area:0.105

Flow Frequency Return Periods for Predeveloped. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.004732
5 year	0.007567
10 year	0.009823
25 year	0.01313
50 year	0.015944
100 year	0.019072

Flow Frequency Return Periods for Mitigated. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.068347
5 year	0.092134
10 year	0.109479
25 year	0.133281
50 year	0.152428
100 year	0.172828

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

Year	Predeveloped	Mitigated
1949	0.005	0.070
1950	0.005	0.067
1951	0.005	0.090
1952	0.004	0.065
1953	0.003	0.074
1954	0.019	0.106
1955	0.006	0.086
1956	0.005	0.037
1957	0.007	0.057
1958	0.006	0.149
1959	0.005	0.064
1960	0.005	0.065
1961	0.009	0.212
1962	0.005	0.075
1963	0.008	0.073
1964	0.006	0.050
1965	0.004	0.061
1966	0.002	0.060
1967	0.004	0.120
1968	0.005	0.059
1969	0.018	0.133
1970	0.003	0.053
1971	0.006	0.067
1972	0.004	0.088
1973	0.004	0.070
1974	0.010	0.090
1975	0.004	0.070
1976	0.004	0.052
1977	0.003	0.051
1978	0.003	0.043
1979	0.011	0.082
1980	0.005	0.083
1981	0.003	0.052
1982	0.004	0.061
1983	0.009	0.070
1984	0.004	0.066
1985	0.006	0.089
1986	0.013	0.088
1987	0.006	0.077
1988	0.003	0.070
1989	0.004	0.062
1990	0.004	0.054
1991	0.004	0.078
1992	0.003	0.065
1993	0.003	0.054
1994	0.003	0.060
1995	0.004	0.054
1996	0.008	0.091
1997	0.016	0.078
1998	0.003	0.086
1999	0.003	0.035
2000	0.003	0.155
2001	0.001	0.040

2002	0.004	0.048
2003	0.003	0.063
2004	0.005	0.118
2005	0.004	0.054
2006	0.012	0.079
2007	0.009	0.071
2008	0.011	0.063
2009	0.003	0.051

Stream Protection Duration

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0187	0.2120
2	0.0175	0.1549
3	0.0157	0.1488
4	0.0127	0.1330
5	0.0124	0.1196
6	0.0107	0.1179
7	0.0106	0.1056
8	0.0096	0.0909
9	0.0094	0.0902
10	0.0091	0.0901
11	0.0087	0.0886
12	0.0079	0.0879
13	0.0077	0.0876
14	0.0069	0.0859
15	0.0060	0.0855
16	0.0060	0.0826
17	0.0058	0.0822
18	0.0057	0.0791
19	0.0057	0.0782
20	0.0056	0.0775
21	0.0054	0.0770
22	0.0053	0.0745
23	0.0053	0.0741
24	0.0051	0.0733
25	0.0050	0.0714
26	0.0050	0.0704
27	0.0047	0.0703
28	0.0045	0.0703
29	0.0045	0.0703
30	0.0045	0.0702
31	0.0044	0.0675
32	0.0042	0.0667
33	0.0042	0.0658
34	0.0041	0.0654
35	0.0041	0.0650
36	0.0040	0.0649
37	0.0039	0.0637
38	0.0038	0.0635
39	0.0038	0.0634
40	0.0037	0.0616
41	0.0037	0.0611
42	0.0037	0.0610
43	0.0036	0.0601
44	0.0036	0.0601

45	0.0035	0.0595
46	0.0034	0.0572
47	0.0032	0.0542
48	0.0032	0.0540
49	0.0032	0.0537
50	0.0031	0.0536
51	0.0031	0.0533
52	0.0031	0.0521
53	0.0030	0.0518
54	0.0030	0.0513
55	0.0030	0.0513
56	0.0030	0.0500
57	0.0029	0.0481
58	0.0028	0.0427
59	0.0026	0.0402
60	0.0022	0.0373
61	0.0010	0.0349

Stream Protection Duration

POC #1

The Facility FAILED

Facility FAILED duration standard for 1+ flows.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0024	14756	117703	797	Fail
0.0025	12348	112954	914	Fail
0.0026	10217	108463	1061	Fail
0.0028	8553	104121	1217	Fail
0.0029	7131	99950	1401	Fail
0.0031	5959	96078	1612	Fail
0.0032	5011	92635	1848	Fail
0.0033	4256	89320	2098	Fail
0.0035	3589	86154	2400	Fail
0.0036	3071	83245	2710	Fail
0.0037	2633	80443	3055	Fail
0.0039	2257	77941	3453	Fail
0.0040	1917	75652	3946	Fail
0.0041	1644	73278	4457	Fail
0.0043	1466	71032	4845	Fail
0.0044	1304	68979	5289	Fail
0.0046	1178	67011	5688	Fail
0.0047	1077	65065	6041	Fail
0.0048	1001	63204	6314	Fail
0.0050	921	61386	6665	Fail
0.0051	837	59696	7132	Fail
0.0052	780	58092	7447	Fail
0.0054	718	56531	7873	Fail
0.0055	672	54991	8183	Fail
0.0057	635	53579	8437	Fail
0.0058	610	52060	8534	Fail
0.0059	582	50691	8709	Fail
0.0061	551	49344	8955	Fail
0.0062	518	48039	9273	Fail
0.0063	498	46777	9392	Fail
0.0065	480	45537	9486	Fail

0.0066	455	44403	9758	Fail
0.0068	436	43248	9919	Fail
0.0069	416	42157	10133	Fail
0.0070	396	41002	10354	Fail
0.0072	382	39912	10448	Fail
0.0073	363	38928	10723	Fail
0.0074	347	37922	10928	Fail
0.0076	336	36960	11000	Fail
0.0077	323	36040	11157	Fail
0.0079	312	35099	11249	Fail
0.0080	299	34158	11424	Fail
0.0081	288	33302	11563	Fail
0.0083	276	32447	11756	Fail
0.0084	265	31570	11913	Fail
0.0085	245	30800	12571	Fail
0.0087	235	30073	12797	Fail
0.0088	221	29345	13278	Fail
0.0089	207	28640	13835	Fail
0.0091	197	27955	14190	Fail
0.0092	187	27313	14605	Fail
0.0094	174	26650	15316	Fail
0.0095	164	25966	15832	Fail
0.0096	152	25346	16675	Fail
0.0098	146	24725	16934	Fail
0.0099	135	24105	17855	Fail
0.0100	126	23592	18723	Fail
0.0102	111	22993	20714	Fail
0.0103	94	22394	23823	Fail
0.0105	80	21859	27323	Fail
0.0106	68	21295	31316	Fail
0.0107	61	20813	34119	Fail
0.0109	56	20313	36273	Fail
0.0110	46	19810	43065	Fail
0.0111	41	19342	47175	Fail
0.0113	39	18844	48317	Fail
0.0114	37	18377	49667	Fail
0.0116	32	17913	55978	Fail
0.0117	29	17470	60241	Fail
0.0118	20	17092	85460	Fail
0.0120	18	16638	92433	Fail
0.0121	14	16223	115878	Fail
0.0122	8	15798	197475	Fail
0.0124	7	15408	220114	Fail
0.0125	5	15021	300420	Fail
0.0127	5	14630	292600	Fail
0.0128	4	14318	357950	Fail
0.0129	4	13978	349450	Fail
0.0131	4	13670	341750	Fail
0.0132	4	13332	333300	Fail
0.0133	4	12994	324850	Fail
0.0135	4	12656	316400	Fail
0.0136	4	12343	308575	Fail
0.0137	3	12068	402266	Fail
0.0139	3	11770	392333	Fail
0.0140	3	11460	382000	Fail
0.0142	3	11146	371533	Fail
0.0143	3	10880	362666	Fail

0.0144	3	10592	353066	Fail
0.0146	3	10354	345133	Fail
0.0147	3	10125	337500	Fail
0.0148	3	9899	329966	Fail
0.0150	3	9657	321900	Fail
0.0151	3	9432	314400	Fail
0.0153	3	9206	306866	Fail
0.0154	3	8973	299100	Fail
0.0155	3	8780	292666	Fail
0.0157	3	8573	285766	Fail
0.0158	2	8357	417850	Fail
0.0159	2	8158	407900	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

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	Total Volume	Volume	Infiltration	Cumulative
Percent	Water Quality	Percent	Through	Volume	Volume
Volume	Water Quality	Treatment?	Facility	(ac-ft.)	Infiltration
Infiltrated	Treated	Needs	(ac-ft)	(ac-ft)	Credit
Total Volume Infiltrated			0.00	0.00	0.00
0.00	0%	No Treat.			0.00
Compliance with LID Standard 8					
Duration Analysis Result = Failed					

Perlnd and Implnd Changes

No changes have been made.

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Appendix C

Post Construction Soil Standard

Snohomish County

To be inserted for final design review