

LITCHFIELD ENGINEERING

Civil Engineering & Development Services

TECHNICAL INFORMATION REPORT for the BCH 93rd AVENUE PROJECT

Prepared for:

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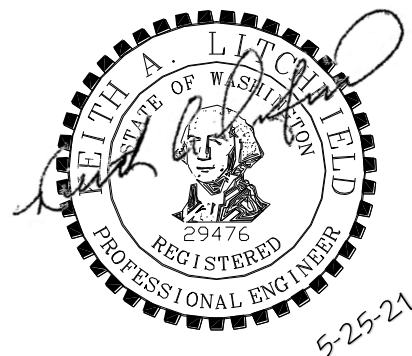


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1. PROJECT OVERVIEW

Project: BCH 93rd Short Plat
City of Mercer Island Permit Number:
Tax Parcel No. 258190-0210

Site Area: The parcel area is 0.90 acres.

Site Location:

The site is located in the City of Mercer Island at 7216 93rd Avenue SE within the SE ¼ of Section 30, Township 24 North, Range 5 East, W.M. See the vicinity map on page 2.

Existing Adjacent Development:

Existing development adjacent to the subject site includes the following:
North – Single-Family Residence
East – Single-Family Residence
South – Single-Family Residence
West – 93rd Avenue SE

Pre-developed Site Conditions:

The property is presently developed with a single-family residence with detached garage and a paved driveway that provides access to 93rd Avenue SE. Except for the structures and driveway, the site is vegetated with shrubs and trees. The site generally slopes down from the west to the east at an average grade of approximately 16%. There are steep slopes (>40%) located in the eastern portion of the site. Refer to Figure 4 for a depiction of the existing conditions.

Post-developed Site Conditions:

The development proposal incorporates the construction of on-site and off-site infrastructure to support the future construction of three new single-family residences. The existing structures will be demolished. The lots will be accessed via new driveways extending from 93rd Avenue SE. The project site is located within the Mercer Island Drainage Basin. The site is defined by a single drainage basin that discharges to the west. Developed runoff will be collected, detained, and conveyed to the existing conveyance system within 93rd Avenue SE. The discharge from the proposed detention tank will be pumped to an onsite catch basin. In order to get gravity flow from the site to the public conveyance system with 93rd Avenue SE, approximately 314 feet of the existing conveyance system will need to be replaced. Water quality is not required since the new pollution generating impervious surface is less than 5,000 SF. The pervious landscape areas will be allowed to infiltrate naturally into the native soil.

2. MINIMUM REQUIREMENTS

Flow Chart #1: Flow Chart for Determining Requirements for New Development was utilized to determine which requirements apply to the project. Per Flow Chart #1 all Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas. Please refer to page #4 for Flow Chart #1.

Minimum Requirements #1-9:

Minimum Requirement No. 1 – Preparation of Stormwater Site Plans

A Stormwater Site Plan has been prepared for review by the City.

Minimum Requirement No. 2 – Construction Stormwater Pollution Prevention (SWPP)

A SWPP (i.e. TESC) plan is included in the project submittal.

Minimum Requirement No. 3 – Source Control of Pollution

Proposed construction source control measures include silt fence and temporary and permanent seeding. Operational and structural BMPs are not proposed. Please refer to Section 3: Construction Stormwater Pollution Prevention Plan for additional BMPs.

Minimum Requirement No. 4 – Preservation of Natural Drainage Systems and Outfalls

The natural drainage pattern and discharges from the site will be maintained to the maximum extent practicable. No significant adverse impacts to the downstream system are expected or anticipated.

Minimum Requirement No. 5 – On-site Stormwater Management

Flow Chart #2 Flow Chart for Determining LID MR #5 Requirements was utilized to determine the requirements to meet On-site Stormwater Management. Per Flow Chart #2, List #2 was used to determine the On-site Stormwater Management BMPs feasible for the project. Please refer to Flow Chart #2 on page 5.

List #2 Analysis:

Per Section 2.5.5 of the Stormwater Management Manual for Western Washington, the BMPs must be considered in the order listed in List #2 for each surface. The first BMP considered feasible must be implemented to the maximum extent feasible. Below is the feasibility evaluation of the BMPs in the order listed.

Lawn and Landscaped areas:

1. **Post Construction Soil Quality and Depth** – This BMP is feasible and will be implemented per BMP T5.13 for all disturbed and converted vegetated areas that are sloped at less than 33%.

Roofs:

1. Full Dispersion – Infeasible due to steep slopes and lack of vegetated flow paths.
2. Rain Gardens or Bioretention – Infeasible; per city mapping the site is labeled as “non-infiltrating”.

3. Downspout Dispersion Systems – Infeasible due to steep slopes and lack of vegetated flow paths.
4. Perforated Stub-out Connection – Infeasible; per city mapping the site is labeled as “non-infiltrating”.

Other Hard Surfaces:

1. Full Dispersion – Infeasible due to steep slopes and lack of vegetated flow paths.
2. Permeable Pavement – Infeasible; per city mapping the site is labeled as “non-infiltrating”.

Minimum Requirement No. 6 – Runoff Treatment

The pollution-generating impervious surfaces (4,584 SF) are less than 5,000 SF therefore water quality treatment is not required.

Minimum Requirement No. 7 – Flow Control

Per Section 2.5.7 of the SWMMWW a formal flow control facility is required if the following thresholds are exceeded;

- the total effective impervious surface is 10,000 square feet or more
- ¾ acres or more of native vegetation converted to lawn or landscape, or 2.5 acres or more of native vegetation converted to pasture
- A 0.15 cubic feet per second increase in the 100-year flow frequency

Since the project is proposing greater than 10,000 square feet of effective impervious surface a formal flow control facility is required. The site was analyzed using the Western Washington Hydrology Model (WVHM) provided by the Department of Ecology (DOE). The project site is located in a Level 2 Flow Control Area, therefore forested conditions have been used for the pre-developed modeling analysis. The hydrologic analysis of the site was completed in order to determine the on-site detention necessary to account for the increase in the peak storm release rate for the developed site. Please note for the purpose of this analysis only the developable area of the site was used, as the steep slope areas and associated buffers will not be disturbed. As discussed, given the topography of the existing project site, a single drainage basin was analyzed for the project. Per Appendix III – C: Washington State Department of Ecology Low Impact Development Flow Modeling Guidance, C-9 Soil Quality and Depth, pervious areas that meet the requirements for BMP T5.13 may be modeled as pasture. Therefore, the pervious areas to be amended per BMP T5.13 have been modeled as pasture. The site basin criterion is summarized below. Refer to Appendix A for a detailed depiction of the project’s WVHM modeling areas.

WVHM Area Summary:

Existing Conditions:

Area Forest	=	0.64 acre
Total Site	=	0.64 acre

Developed Conditions:

Impervious	=	0.33 acre
Pervious (Lawn/Pasture)	=	0.31 acre
Total Site	=	0.64 acre

The detention tank system was designed for the drainage basin using WWHM. The proposed detention tank is 67 LF and 10' diameter. Please see Appendix A for the complete WWHM tank analysis. The discharge from the proposed detention tank will be pumped to an onsite catch basin located in the northwest corner of the site. The catch basin will convey runoff via gravity to the existing public conveyance system within 93rd Ave SE. In order to provide gravity flow, approximately 314 feet of the existing conveyance system will need to be replaced.

Minimum Requirement No. 8 – Wetlands Protection

N/A – The project does not discharge to a wetland.

Minimum Requirement No. 9 – Operations and Maintenance

A draft Operations and Maintenance Manual is included in Appendix B.

Flow Chart #1:

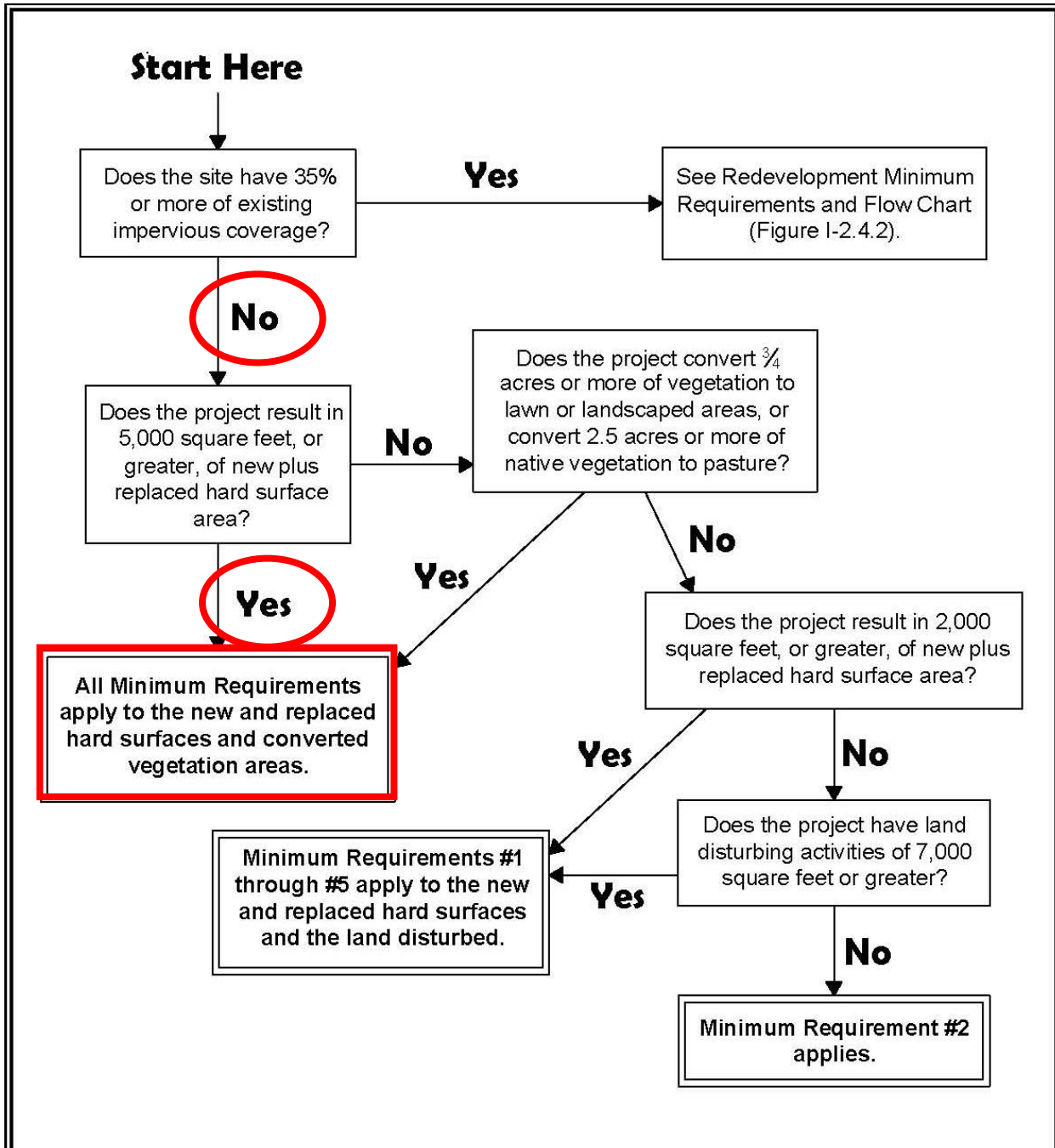


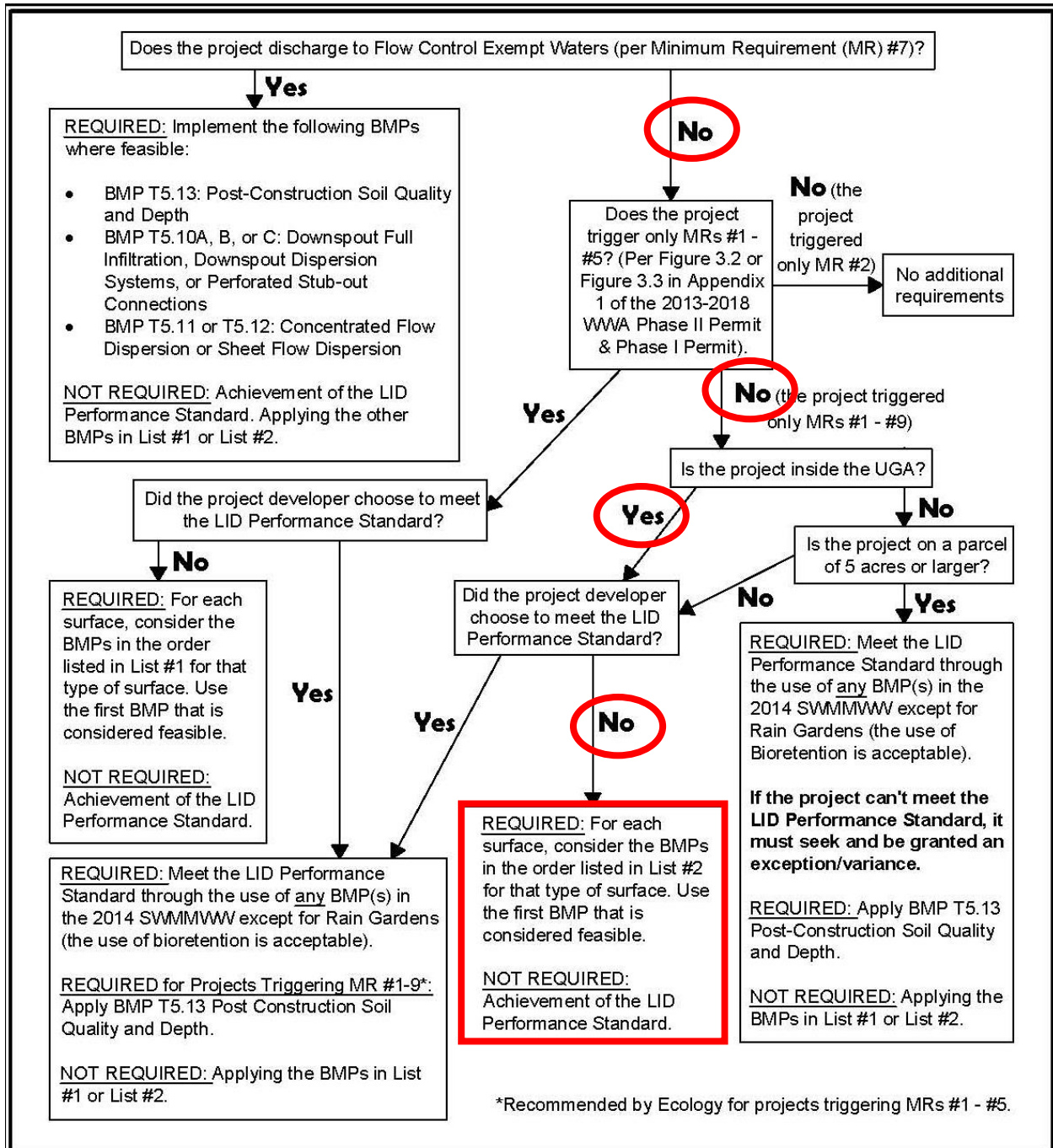
Figure I-2.4.1
Flow Chart for Determining Requirements for New Development



Revised June 2015

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Flow Chart #2:



*Recommended by Ecology for projects triggering MRs #1 - #5.



**Figure I-2.5.1
Flow Chart for Determining LID MR #5
Requirements**

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3. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

The project SWPPP addresses the 13 required elements as follows:

Element 1 – Preserve Vegetation/Mark Clearing Limits – Clearing limits will be delineated with silt fence and orange construction fencing.

Element 2 – Establish Construction Access - A quarry spall construction entrance and a wheel wash will be provided if warranted.

Element 3 – Control Flow Rates – The proposed detention tank will be used during construction as a sediment and flow control device. Upon completion of the project, the tank and associated catch basins to be flushed and cleaned of debris.

Element 4 – Install Sediment Controls – Silt fencing will be constructed and is expected to provide construction stormwater sediment control during construction.

Element 5 – Stabilize Soils – Stockpiled or unworked soils will be protected during construction by covering with plastic or temporary or permanent seeding. All exposed soils will be landscaped or seeded and BMP T5.13- Post Construction Soil Amendment will be implemented at the conclusion of the project.

Element 6 – Protect Slopes – Areas of cut slopes to be covered with plastic per BMP C123 until permanently stabilized.

Element 7 – Protect Drain Inlets – The existing and newly constructed conveyance system inlets in the vicinity of the project site will be protected with catch basin filters during construction.

Element 8 – Stabilize Channels and Outlets – There are no existing or proposed surface channels or outfalls. Therefore the use of typical energy dissipation devices and channel lining such as riprap are not anticipated.

Element 9 – Control Pollutants – The small size of this project will limit the opportunity for discharge of pollutants. Waste/demolition debris will not be stockpiled, fueling will be done off-site and concrete trucks will be washed out off-site.

Element 10 – Control De-watering – De-watering is not anticipated.

Element 11 – Maintain BMPs – BMPs will be maintained as necessary to assure continued functioning.

Element 12 – Manage the Project – An inspector (sites less than 1 acre) will be present or on call to ensure BMPs are maintained and assess effectiveness of ESC measures. Rainy season requirements will be implemented if necessary.

Element 13 – Protect LID BMPs – N/A. No LID BMPs are proposed.

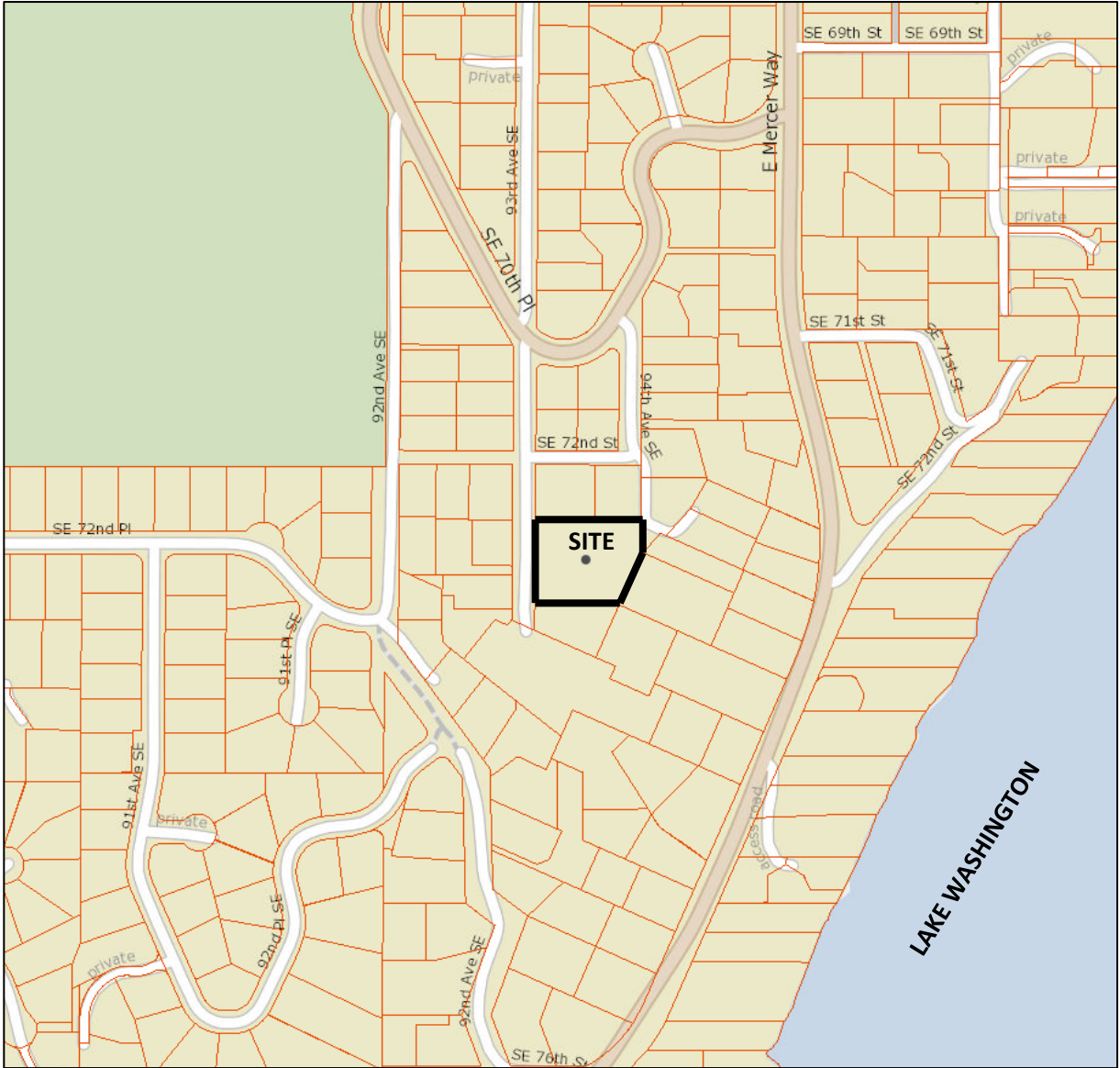


Figure 1 – Vicinity Map

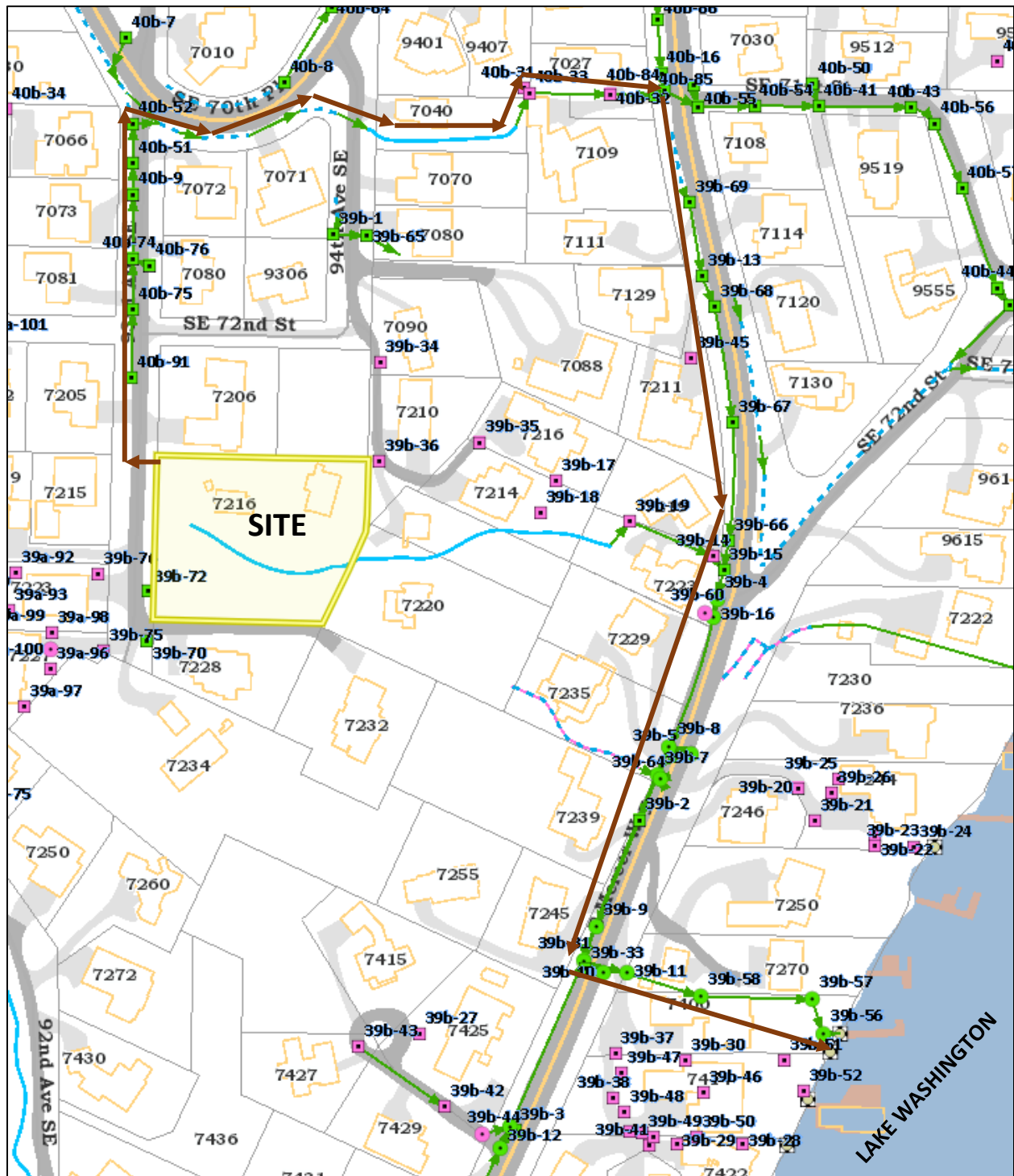


Figure 2 – Downstream Map

Appendix A
WWHM OUTPUT

WWHM2012
PROJECT REPORT

General Model Information

Project Name: BCH 93rd Short Plat Tank 5-17-21
Site Name: BCH 93rd Short Plat
Site Address: 7216 93rd Ave SE
City: Mercer Island
Report Date: 5/18/2021
Gage: Seatac
Data Start: 1948/10/01
Data End: 2009/09/30
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2019/09/13
Version: 4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 0.64
Pervious Total	0.64
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.64

Element Flows To:		
Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Lawn, Steep	0.02
C, Pasture, Flat	0.05
C, Pasture, Mod	0.07
C, Pasture, Steep	0.17

Pervious Total 0.31

Impervious Land Use	acre
ROADS FLAT	0.27
ROADS MOD	0.06

Impervious Total 0.33

Basin Total 0.64

Element Flows To:

Surface
Tank 1

Interflow
Tank 1

Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

Dimensions
 Depth: 10 ft.
 Tank Type: Circular
 Diameter: 10 ft.
 Length: 67 ft.
 Discharge Structure
 Riser Height: 9.5 ft.
 Riser Diameter: 12 in.
 Orifice 1 Diameter: 0.5 in. Elevation:0 ft.
 Orifice 2 Diameter: 0.7812 in Elevation:6 ft.
 Orifice 3 Diameter: 0.4844 in Elevation:7 ft.
 Element Flows To:
 Outlet 1 Outlet 2

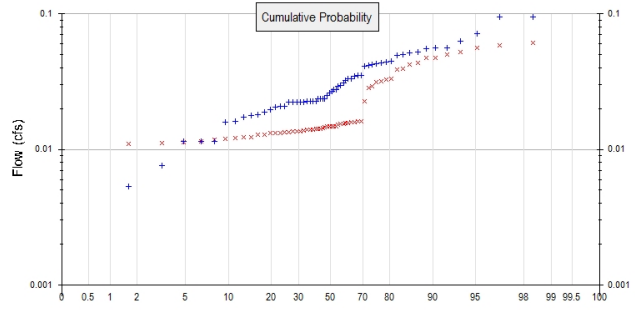
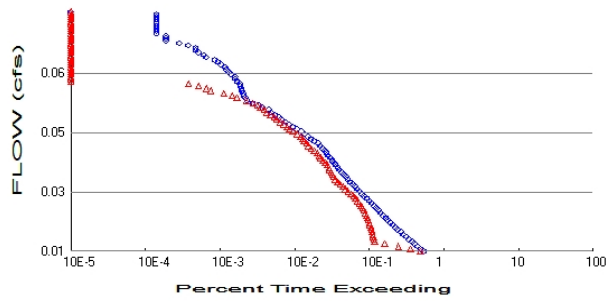
Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000000	0.000000	0.000	0.000
0.1111	0.003225	0.000239	0.002	0.000
0.2222	0.004535	0.000675	0.003	0.000
0.3333	0.005522	0.001236	0.003	0.000
0.4444	0.006339	0.001896	0.004	0.000
0.5556	0.007046	0.002640	0.005	0.000
0.6667	0.007673	0.003459	0.005	0.000
0.7778	0.008239	0.004343	0.006	0.000
0.8889	0.008754	0.005288	0.006	0.000
1.0000	0.009229	0.006287	0.006	0.000
1.1111	0.009668	0.007337	0.007	0.000
1.2222	0.010076	0.008434	0.007	0.000
1.3333	0.010457	0.009575	0.007	0.000
1.4444	0.010814	0.010757	0.008	0.000
1.5556	0.011149	0.011978	0.008	0.000
1.6667	0.011464	0.013234	0.008	0.000
1.7778	0.011761	0.014525	0.009	0.000
1.8889	0.012041	0.015847	0.009	0.000
2.0000	0.012305	0.017200	0.009	0.000
2.1111	0.012554	0.018581	0.009	0.000
2.2222	0.012789	0.019989	0.010	0.000
2.3333	0.013011	0.021422	0.010	0.000
2.4444	0.013220	0.022880	0.010	0.000
2.5556	0.013418	0.024360	0.010	0.000
2.6667	0.013604	0.025861	0.011	0.000
2.7778	0.013778	0.027382	0.011	0.000
2.8889	0.013943	0.028923	0.011	0.000
3.0000	0.014097	0.030480	0.011	0.000
3.1111	0.014241	0.032055	0.012	0.000
3.2222	0.014376	0.033645	0.012	0.000
3.3333	0.014501	0.035249	0.012	0.000
3.4444	0.014618	0.036867	0.012	0.000
3.5556	0.014725	0.038497	0.012	0.000
3.6667	0.014824	0.040139	0.013	0.000
3.7778	0.014914	0.041791	0.013	0.000
3.8889	0.014996	0.043453	0.013	0.000

4.0000	0.015070	0.045123	0.013	0.000
4.1111	0.015136	0.046802	0.013	0.000
4.2222	0.015194	0.048487	0.013	0.000
4.3333	0.015244	0.050178	0.014	0.000
4.4444	0.015286	0.051874	0.014	0.000
4.5556	0.015320	0.053574	0.014	0.000
4.6667	0.015347	0.055278	0.014	0.000
4.7778	0.015366	0.056984	0.014	0.000
4.8889	0.015377	0.058693	0.015	0.000
5.0000	0.015381	0.060401	0.015	0.000
5.1111	0.015377	0.062110	0.015	0.000
5.2222	0.015366	0.063818	0.015	0.000
5.3333	0.015347	0.065525	0.015	0.000
5.4444	0.015320	0.067228	0.015	0.000
5.5556	0.015286	0.068929	0.016	0.000
5.6667	0.015244	0.070625	0.016	0.000
5.7778	0.015194	0.072316	0.016	0.000
5.8889	0.015136	0.074001	0.016	0.000
6.0000	0.015070	0.075679	0.016	0.000
6.1111	0.014996	0.077350	0.022	0.000
6.2222	0.014914	0.079012	0.024	0.000
6.3333	0.014824	0.080664	0.026	0.000
6.4444	0.014725	0.082305	0.028	0.000
6.5556	0.014618	0.083936	0.029	0.000
6.6667	0.014501	0.085554	0.031	0.000
6.7778	0.014376	0.087158	0.032	0.000
6.8889	0.014241	0.088748	0.033	0.000
7.0000	0.014097	0.090322	0.034	0.000
7.1111	0.013943	0.091880	0.037	0.000
7.2222	0.013778	0.093420	0.039	0.000
7.3333	0.013604	0.094942	0.041	0.000
7.4444	0.013418	0.096443	0.042	0.000
7.5556	0.013220	0.097923	0.044	0.000
7.6667	0.013011	0.099380	0.045	0.000
7.7778	0.012789	0.100814	0.046	0.000
7.8889	0.012554	0.102222	0.047	0.000
8.0000	0.012305	0.103603	0.049	0.000
8.1111	0.012041	0.104956	0.050	0.000
8.2222	0.011761	0.106278	0.051	0.000
8.3333	0.011464	0.107569	0.052	0.000
8.4444	0.011149	0.108825	0.053	0.000
8.5556	0.010814	0.110046	0.054	0.000
8.6667	0.010457	0.111228	0.055	0.000
8.7778	0.010076	0.112368	0.056	0.000
8.8889	0.009668	0.113466	0.057	0.000
9.0000	0.009229	0.114516	0.058	0.000
9.1111	0.008754	0.115515	0.058	0.000
9.2222	0.008239	0.116460	0.059	0.000
9.3333	0.007673	0.117344	0.060	0.000
9.4444	0.007046	0.118163	0.061	0.000
9.5556	0.006339	0.118907	0.201	0.000
9.6667	0.005522	0.119567	0.766	0.000
9.7778	0.004535	0.120128	1.447	0.000
9.8889	0.003225	0.120563	1.985	0.000
10.000	0.000000	0.120803	2.268	0.000
10.111	0.000000	0.000000	2.528	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0.64
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.31
 Total Impervious Area: 0.33

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.028639
5 year	0.045619
10 year	0.056644
25 year	0.069977
50 year	0.079394
100 year	0.088348

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.017631
5 year	0.028354
10 year	0.037696
25 year	0.052559
50 year	0.066207
100 year	0.082389

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.032	0.013
1950	0.035	0.016
1951	0.056	0.052
1952	0.021	0.012
1953	0.016	0.012
1954	0.022	0.015
1955	0.041	0.016
1956	0.031	0.023
1957	0.029	0.014
1958	0.028	0.015

1959	0.023	0.014
1960	0.041	0.043
1961	0.022	0.014
1962	0.016	0.012
1963	0.021	0.015
1964	0.026	0.014
1965	0.020	0.015
1966	0.018	0.013
1967	0.042	0.015
1968	0.024	0.013
1969	0.025	0.014
1970	0.022	0.014
1971	0.023	0.016
1972	0.045	0.032
1973	0.022	0.014
1974	0.022	0.015
1975	0.035	0.016
1976	0.024	0.015
1977	0.004	0.011
1978	0.023	0.014
1979	0.011	0.011
1980	0.053	0.033
1981	0.017	0.013
1982	0.043	0.040
1983	0.030	0.015
1984	0.021	0.012
1985	0.011	0.013
1986	0.050	0.032
1987	0.044	0.039
1988	0.019	0.013
1989	0.011	0.011
1990	0.094	0.042
1991	0.055	0.048
1992	0.024	0.014
1993	0.022	0.014
1994	0.008	0.010
1995	0.028	0.016
1996	0.063	0.050
1997	0.056	0.047
1998	0.018	0.013
1999	0.050	0.029
2000	0.024	0.014
2001	0.005	0.011
2002	0.027	0.031
2003	0.035	0.012
2004	0.052	0.056
2005	0.033	0.016
2006	0.033	0.015
2007	0.072	0.058
2008	0.095	0.061
2009	0.044	0.028

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0947	0.0608
2	0.0945	0.0582
3	0.0715	0.0564

4	0.0629	0.0521
5	0.0560	0.0499
6	0.0559	0.0475
7	0.0549	0.0475
8	0.0526	0.0433
9	0.0517	0.0423
10	0.0503	0.0396
11	0.0495	0.0386
12	0.0448	0.0330
13	0.0441	0.0325
14	0.0436	0.0316
15	0.0429	0.0314
16	0.0422	0.0294
17	0.0413	0.0284
18	0.0410	0.0226
19	0.0353	0.0162
20	0.0352	0.0160
21	0.0346	0.0160
22	0.0332	0.0158
23	0.0331	0.0156
24	0.0321	0.0155
25	0.0311	0.0155
26	0.0296	0.0155
27	0.0293	0.0153
28	0.0277	0.0149
29	0.0275	0.0148
30	0.0270	0.0148
31	0.0260	0.0148
32	0.0250	0.0147
33	0.0237	0.0146
34	0.0237	0.0143
35	0.0237	0.0142
36	0.0236	0.0142
37	0.0228	0.0141
38	0.0227	0.0140
39	0.0226	0.0140
40	0.0225	0.0140
41	0.0223	0.0137
42	0.0223	0.0137
43	0.0222	0.0136
44	0.0222	0.0136
45	0.0222	0.0134
46	0.0209	0.0134
47	0.0208	0.0133
48	0.0205	0.0132
49	0.0197	0.0132
50	0.0189	0.0129
51	0.0180	0.0129
52	0.0178	0.0123
53	0.0172	0.0122
54	0.0162	0.0121
55	0.0158	0.0120
56	0.0115	0.0118
57	0.0115	0.0114
58	0.0114	0.0114
59	0.0076	0.0112
60	0.0053	0.0109
61	0.0041	0.0100

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0143	11424	10307	90	Pass
0.0150	10371	7602	73	Pass
0.0156	9441	5227	55	Pass
0.0163	8630	3418	39	Pass
0.0169	7948	2513	31	Pass
0.0176	7279	2464	33	Pass
0.0183	6671	2417	36	Pass
0.0189	6098	2372	38	Pass
0.0196	5612	2331	41	Pass
0.0202	5153	2291	44	Pass
0.0209	4770	2239	46	Pass
0.0216	4408	2192	49	Pass
0.0222	4072	2147	52	Pass
0.0229	3767	2072	55	Pass
0.0235	3542	2013	56	Pass
0.0242	3292	1943	59	Pass
0.0248	3071	1881	61	Pass
0.0255	2862	1809	63	Pass
0.0262	2667	1735	65	Pass
0.0268	2479	1661	67	Pass
0.0275	2306	1572	68	Pass
0.0281	2158	1489	68	Pass
0.0288	1970	1403	71	Pass
0.0294	1828	1315	71	Pass
0.0301	1684	1218	72	Pass
0.0308	1572	1111	70	Pass
0.0314	1461	1027	70	Pass
0.0321	1362	947	69	Pass
0.0327	1268	867	68	Pass
0.0334	1173	808	68	Pass
0.0340	1102	753	68	Pass
0.0347	1030	711	69	Pass
0.0354	962	688	71	Pass
0.0360	905	659	72	Pass
0.0367	849	634	74	Pass
0.0373	802	614	76	Pass
0.0380	750	585	78	Pass
0.0386	715	548	76	Pass
0.0393	679	508	74	Pass
0.0400	638	477	74	Pass
0.0406	605	454	75	Pass
0.0413	572	429	75	Pass
0.0419	542	389	71	Pass
0.0426	503	355	70	Pass
0.0432	469	327	69	Pass
0.0439	435	310	71	Pass
0.0446	391	286	73	Pass
0.0452	351	272	77	Pass
0.0459	321	253	78	Pass
0.0465	293	232	79	Pass
0.0472	264	203	76	Pass
0.0478	230	180	78	Pass
0.0485	203	167	82	Pass

0.0492	177	153	86	Pass
0.0498	160	137	85	Pass
0.0505	141	122	86	Pass
0.0511	130	113	86	Pass
0.0518	116	101	87	Pass
0.0524	103	89	86	Pass
0.0531	95	83	87	Pass
0.0538	79	74	93	Pass
0.0544	71	68	95	Pass
0.0551	58	59	101	Pass
0.0557	49	48	97	Pass
0.0564	46	36	78	Pass
0.0570	44	31	70	Pass
0.0577	43	24	55	Pass
0.0584	42	16	38	Pass
0.0590	41	14	34	Pass
0.0597	40	11	27	Pass
0.0603	39	8	20	Pass
0.0610	36	0	0	Pass
0.0616	34	0	0	Pass
0.0623	34	0	0	Pass
0.0630	30	0	0	Pass
0.0636	28	0	0	Pass
0.0643	26	0	0	Pass
0.0649	25	0	0	Pass
0.0656	22	0	0	Pass
0.0662	20	0	0	Pass
0.0669	18	0	0	Pass
0.0676	14	0	0	Pass
0.0682	13	0	0	Pass
0.0689	11	0	0	Pass
0.0695	10	0	0	Pass
0.0702	10	0	0	Pass
0.0708	8	0	0	Pass
0.0715	6	0	0	Pass
0.0722	4	0	0	Pass
0.0728	4	0	0	Pass
0.0735	4	0	0	Pass
0.0741	3	0	0	Pass
0.0748	3	0	0	Pass
0.0755	3	0	0	Pass
0.0761	3	0	0	Pass
0.0768	3	0	0	Pass
0.0774	3	0	0	Pass
0.0781	3	0	0	Pass
0.0787	3	0	0	Pass
0.0794	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Tank 1 POC	<input type="checkbox"/>	63.13			<input type="checkbox"/>	0.00			
Total Volume Infiltrated		63.13	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Basin 1
0.64ac

Mitigated Schematic



Disclaimer

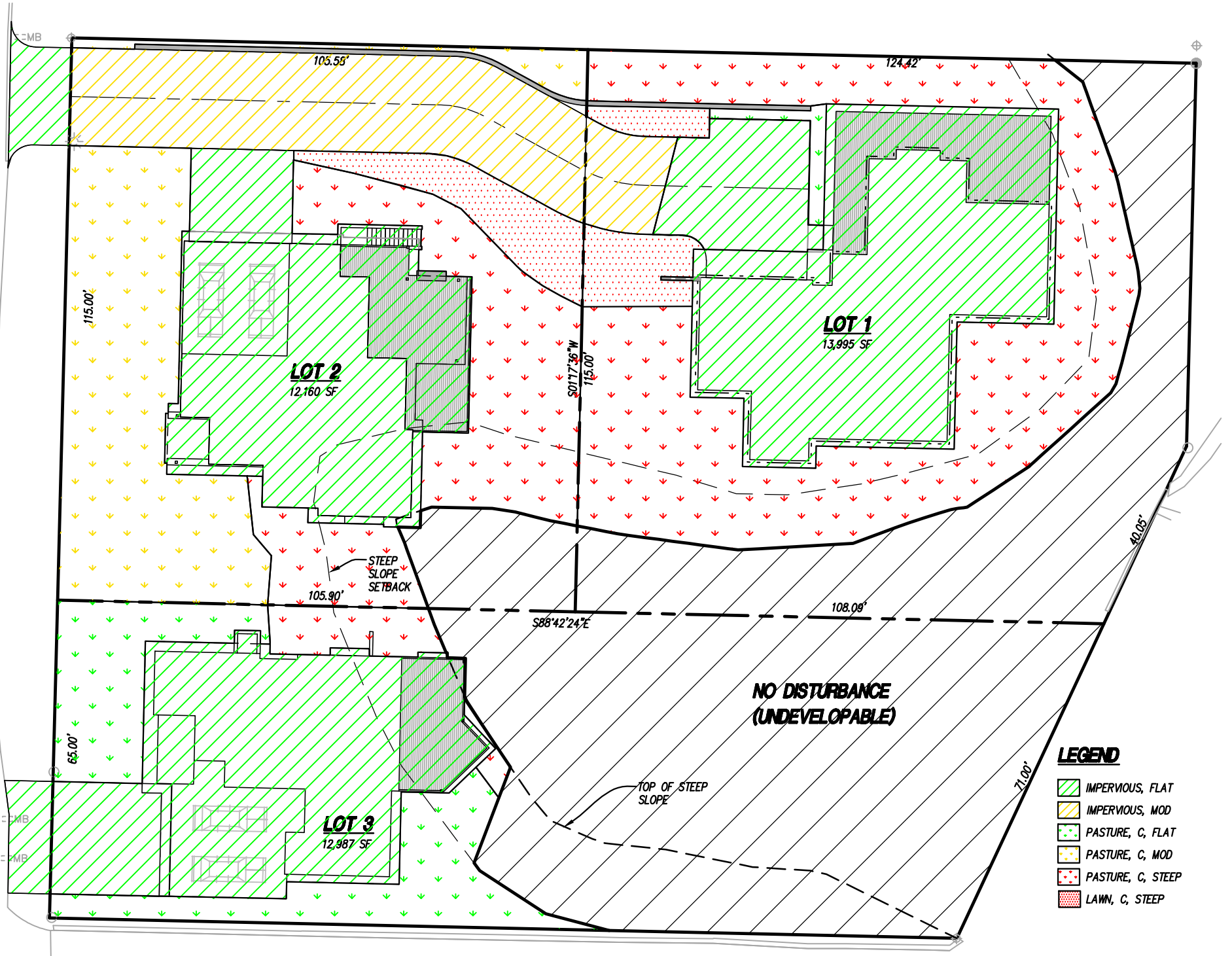
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BCH 93rd SHORT PLAT MODELING AREAS EXHIBIT



Appendix B
MAINTENANCE & OPERATIONS MANUAL

Table V-4.5.2(3) Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

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

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See "Catch Basins" (No. 5)	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(4) Maintenance Standards - Control Structure/Flow Restrictor

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

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).
Catch Basin	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(5) Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	<p>Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.</p> <p>Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.</p> <p>Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.</p> <p>Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).</p>	<p>No Trash or debris located immediately in front of catch basin or on grate opening.</p> <p>No trash or debris in the catch basin.</p> <p>Inlet and outlet pipes free of trash or debris.</p> <p>No dead animals or vegetation present within the catch basin.</p>
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	<p>Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).</p> <p>Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached</p>	<p>Top slab is free of holes and cracks.</p> <p>Frame is sitting flush on the riser rings or top slab and firmly attached.</p>

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.