DRAINAGE REPORT

Brindley Residence
XXXX 79th Ave SE, Mercer Island, 98040

City of Mercer Island Permit No. _____

Prepared by:

HL ENGINEERING

March 2, 2022

Contents

1. INTRODUCTION:

These calculations and report document the storm drainage design for the single-family residential development project located at an un-addressed parcel on 79th Avenue SE in the City of Mercer Island.

The calculations and report have been prepared by HL Engineering for submittal of the building permit application, and in compliance with the City of Mercer Island's Stormwater Requirements (based on the Department of Ecology's 2014 Stormwater Management Manual for Western Washington).

The project is located on the east side of 79th Ave SE (see Figure 1). The site is surrounded on the north, south, and east by single family developments. The site is currently vacant as consists of a well-maintained lawn and several trees.

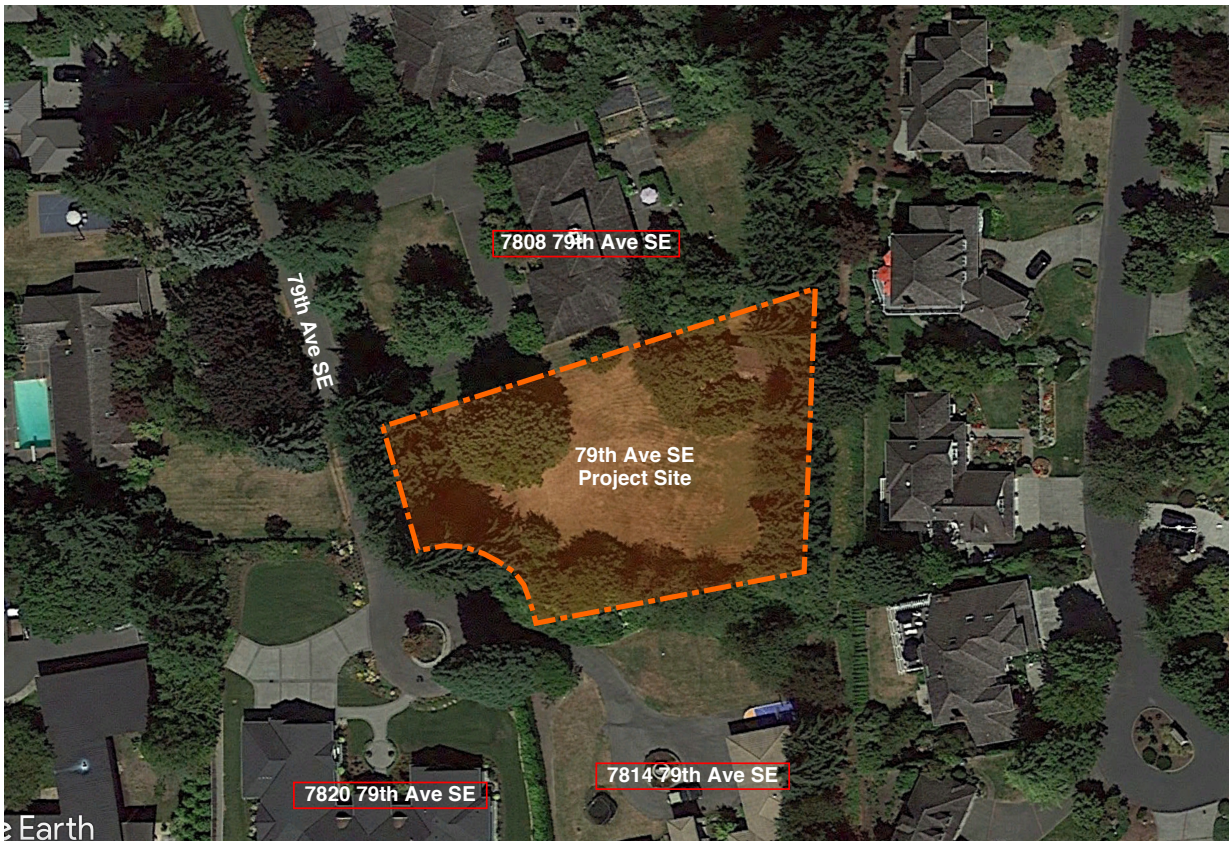


Figure 1: Location Map

The project improvements include the following:

- Removal of non-exceptional trees and fencing. The project proposes to re-use a stubbed sanitary side sewer.
- Construction of a new residential structure, along with walkways and driveway, along with Installation of service utilities, including non-infiltrating bioretention planters, a dispersion swale, and an underground detention vault for roof stormwater runoff as a Best Management Practice (BMP).

See Appendix C for the Stormwater Plan, highlighted to show BMPs and proposed compliance.

2. MINIMUM REQUIREMENTS:

The project proposes one residential dwelling unit, with a total New + Replaced Hard Surface Footprint of 11,850 sf in a vacant / undeveloped parcel. As such, the minimum requirements for the project are summarized in Table 1.

Table 1. Minimum Stormwater Requirements for Parcel-Based Projects:

Description	Code Section	Applicability
Preparation of Stormwater Site Plan	1-3.4.1 MR1	Applies
Construction Stormwater Pollution Prev Plan	1-3.4.2 MR2	Applies
Source Control of Pollution	1-3.4.3 MR3	Applies
Preservation of Natural Drainage Systems	1-3.4.4 MR4	Applies
On-Site Stormwater Management	1-3.4.5 MR5	Applies
Runoff Treatment	1-3.4.6 MR6	Applies
Flow Control	1-3.4.7 MR7	Applies

Description	Code Section	Applicability
Wetlands Protection	1-3.4.8 MR8	Applies
Operations and Maintenance	1-3.4.9 MR9	Applies

This report will discuss the requirements that impact the strategy, selection, and sizing of proposed stormwater BMPs.

3. ON-SITE STORMWATER MANAGEMENT:

On-site Stormwater Management is required for this project, and the specific requirement is to comply with LID Performance Standard (only applied to the New + Replaced Hard Surface areas):

> *"Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2- year peak flow. Refer to the Flow Control Performance Standard section in I-3.4.7 MR7: Flow Control for information about the assignment of the pre-developed condition. Project sites that must also meet I-3.4.7 MR7: Flow Control must match flow durations between 8% of the 2-year flow through the full 50-year flow."*

Ideally a project could use infiltration techniques to comply with this Requirement, as the City of Mercer Island Infiltration Feasibility Map (Appendix B) indicates moderate infiltration potential at the site. However, the project geotechnical engineer (Geotech Consultants, Inc) concluded in their September 2, 2021 Geotechnical Engineering Study:

> *Often, the impermeable nature of the glacial till causes a shallow seasonal perched water table to form where the ground surface is not covered by an impervious layer. This is a common problem in the wet season throughout the Pacific Northwest. Considering this, and because the upper soil at the site is generally fill soil that cannot be used to infiltrate into, it is our professional opinion that onsite infiltration of stormwater is not feasible for the subject site.*

The selected On-Site Stormwater management mitigation for the project is a combination of dispersion systems and non-infiltrating bioretention planters as shown in Appendix D.

4. FLOW CONTROL:

The project is required to achieve the Flow Control Performance Standard for the New + Replaced Hard Surfaces, for which the following must be met:

> *Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.*

Given the inability to infiltrate stormwater, the project is providing detention to the maximum extent feasible to comply with the Flow Control Performance Standard.

5. BMP SIZING:

The project applied the Western Washington Hydrology Model (WWHM) iteratively to prove compliance using increasing bioretention and detention vault sizing. The WWHM output is included as Appendix D. Using a Predeveloped Forested Condition for a footprint equal to the area of proposed New + Replaced Hard Surfaces along with the proposed stormwater BMPs, the results of WWHM are:

Return Period	Predeveloped Flow (cfs)	Mitigated Flow (cfs)	Compliant?
2-Year	0.0076	0.0038	Y
5-Year	0.0120	0.0050	Y
10-Year	0.0145	0.0059	Y
25-Year	0.0171	0.0072	Y
50-Year	0.0187	0.0083	Y
100-Year	0.0201	0.0095	Y

6. CONVEYANCE SYSTEM ANALYSIS:

In accordance with the City of Mercer Island's Pre-Application meeting guidance, the project is required to convey stormwater to the existing shallow 8" storm drain main located in 79th Avenue SE. The project has no ability to install storm drainage onsite in a manner to gravity flow to the existing main, so a pump system is proposed to elevate discharge just before entering the public right of way through a service drain connection to the public main.

Proposed storm drainage piping is designed with a minimum slope of 1.00% but due to site topography and available locations for bioretention, cannot be sloped at the standard 2.00% and accommodate the topography by gravity flow.

From the Rational Method:

$$Q_{25\text{-Year}} = (C)(i)(A)$$

Where:

- Rainfall intensity (i) can be derived from King County's Surface Water Design Manual isopluvial maps, Section 3.2. for a 25-year, 24-hour occurrence storm event to be a maximum of **3.40 in/hr**.

- Area (A) represents the largest tributary basin to any pipe. The largest collection system is the pipe network carrying flow along the southeast and south downspouts, which deliver the flow into the south bioretention planter and further downstream into the large underground detention vault. That pipe system conveys a total roof area = **3,250 sf (0.075 ac)**

- Runoff coefficient (C) for the scenario is based on the tributary areas, and since the roof flow is the only contributing area the coefficient of **0.90** is appropriate.

The maximum site runoff within any pipe is calculated from Rational Method to be:

$$Q_{25\text{-}Year} = (C)(i)(A)$$

$$Q_{25\text{-}Year} = (0.90)(3.40)(0.075)$$

$$Q_{25\text{-}Year} = 0.23 \text{ cfs}$$

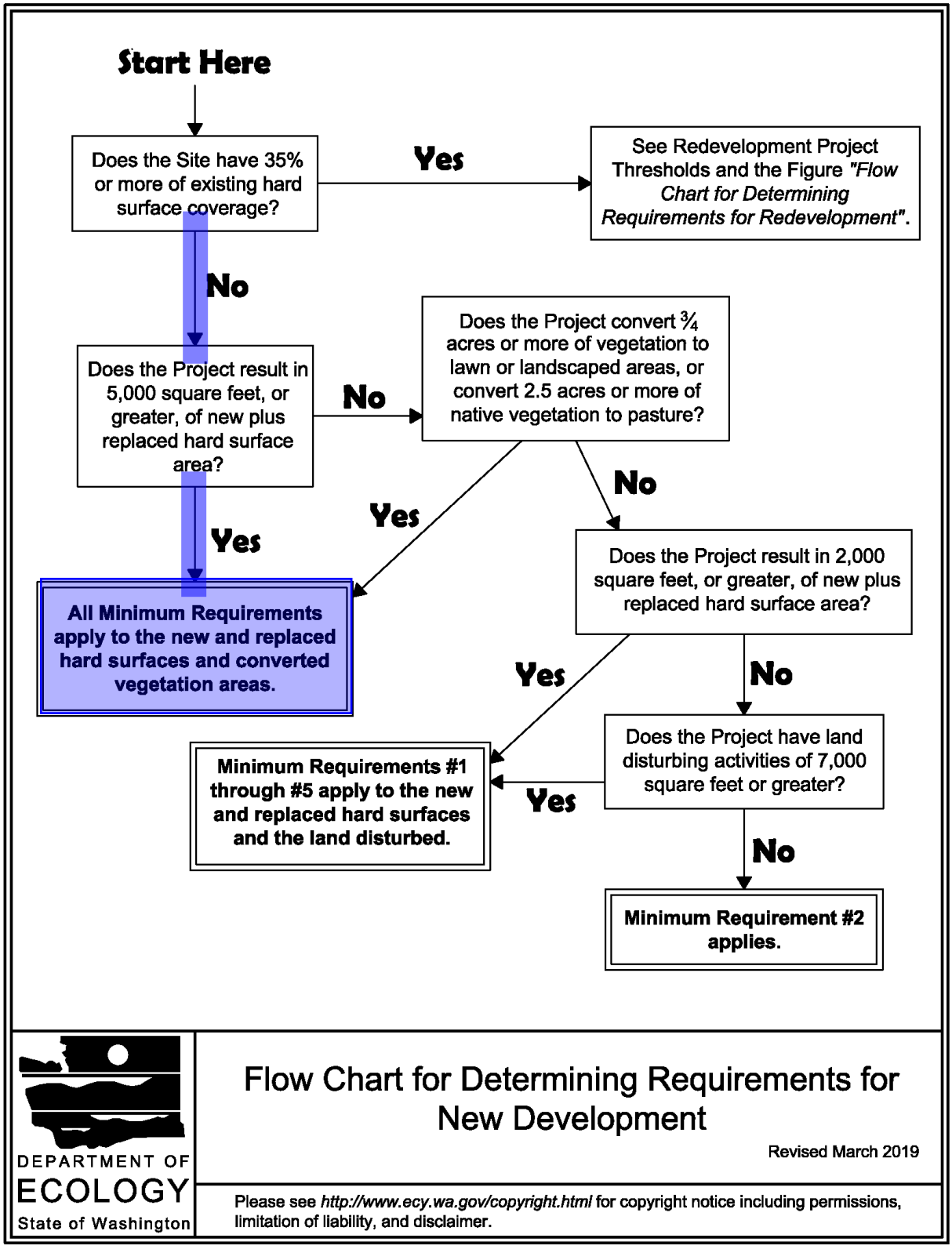
Using Manning's Equation:

- A 4" diameter plastic solid-wall pipe, sloped at 1.00% and flowing 75% ful (25% clogged) has capacity to convey **0.23 cfs.**

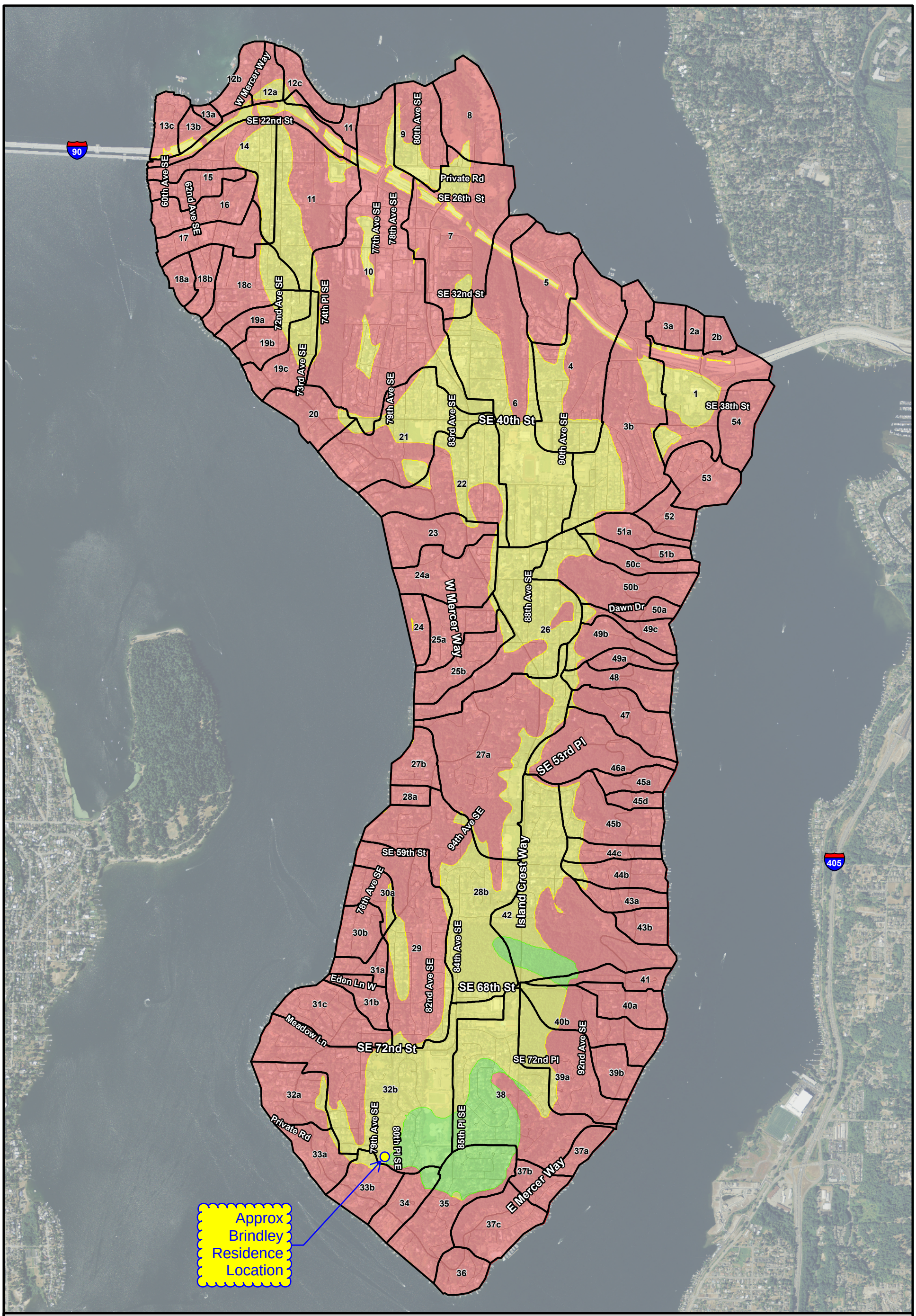
Therefore, the proposed drainage system pipe sizing is considered to be feasible and appropriate.

APPENDIX A: DOE Flowchart; Requirements for New Dev

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



APPENDIX B: Infiltration Feasibility Map



Legend

- Infiltrating LID facilities may be feasible, and soil has high infiltration potential
- Infiltrating LID facilities may be feasible, and soil has moderate infiltration potential
- Infiltrating LID facilities are not permitted
- 36 Storm drainage basin

* Map is intended to be used for planning purposes only. Site-specific analysis is required prior to design and construction of LID facilities.

Figure 3. Low impact development infiltration feasibility on Mercer Island.

N

0 950 1,900 3,800 Feet

HERRERA

Aerial photography: USDA (2009)

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APPENDIX C: WWHM Output

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	79th Ave SW, Mercer Island
Site Name:	79th Ave SW
Site Address:	79th Ave SW
City:	Mercer Island
Report Date:	3/2/2022
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

Existing Condition

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.26
Pervious Total	0.26
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.26

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Roof and Dwy

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.18
DRIVEWAYS FLAT	0.07
Impervious Total	0.25
Basin Total	0.25

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 1	Surface retention 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Bioretention 1

Bottom Length:	40.00 ft.
Bottom Width:	2.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	SMMWW 12 in/hr
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	5.9
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	38.627
Total Outflow (ac-ft.):	39.304
Percent Through Underdrain:	98.28
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	8 in.
Element Flows To:	
Outlet 1	Outlet 2
Detention Vault	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0018	0.0000	0.0000	0.0000
0.0495	0.0018	0.0000	0.0000	0.0000
0.0989	0.0018	0.0001	0.0000	0.0000
0.1484	0.0018	0.0001	0.0000	0.0000
0.1978	0.0018	0.0002	0.0001	0.0000
0.2473	0.0018	0.0002	0.0002	0.0000
0.2967	0.0018	0.0002	0.0003	0.0000
0.3462	0.0018	0.0003	0.0005	0.0000
0.3956	0.0018	0.0003	0.0007	0.0000
0.4451	0.0018	0.0004	0.0009	0.0000
0.4945	0.0018	0.0004	0.0010	0.0000
0.5440	0.0018	0.0005	0.0012	0.0000
0.5934	0.0018	0.0005	0.0015	0.0000
0.6429	0.0018	0.0005	0.0019	0.0000
0.6923	0.0018	0.0006	0.0024	0.0000
0.7418	0.0018	0.0006	0.0029	0.0000
0.7912	0.0018	0.0007	0.0034	0.0000
0.8407	0.0018	0.0007	0.0040	0.0000
0.8901	0.0018	0.0007	0.0040	0.0000
0.9396	0.0018	0.0008	0.0047	0.0000
0.9890	0.0018	0.0008	0.0055	0.0000
1.0385	0.0018	0.0009	0.0063	0.0000
1.0879	0.0018	0.0009	0.0071	0.0000
1.1374	0.0018	0.0010	0.0081	0.0000
1.1868	0.0018	0.0010	0.0091	0.0000
1.2363	0.0018	0.0010	0.0099	0.0000
1.2857	0.0018	0.0011	0.0102	0.0000
1.3352	0.0018	0.0011	0.0114	0.0000
1.3846	0.0018	0.0012	0.0126	0.0000

1.4341	0.0018	0.0012	0.0140	0.0000
1.4835	0.0018	0.0012	0.0154	0.0000
1.5330	0.0018	0.0013	0.0168	0.0000
1.5824	0.0018	0.0013	0.0184	0.0000
1.6319	0.0018	0.0014	0.0191	0.0000
1.6813	0.0018	0.0014	0.0200	0.0000
1.7308	0.0018	0.0014	0.0217	0.0000
1.7802	0.0018	0.0015	0.0370	0.0000
1.8297	0.0018	0.0015	0.0370	0.0000
1.8791	0.0018	0.0015	0.0370	0.0000
1.9286	0.0018	0.0016	0.0370	0.0000
1.9780	0.0018	0.0016	0.0370	0.0000
2.0275	0.0018	0.0017	0.0370	0.0000
2.0769	0.0018	0.0017	0.0370	0.0000
2.1264	0.0018	0.0017	0.0370	0.0000
2.1758	0.0018	0.0018	0.0370	0.0000
2.2253	0.0018	0.0018	0.0370	0.0000
2.2747	0.0018	0.0018	0.0370	0.0000
2.3242	0.0018	0.0019	0.0370	0.0000
2.3736	0.0018	0.0019	0.0370	0.0000
2.4231	0.0018	0.0020	0.0370	0.0000
2.4725	0.0018	0.0020	0.0370	0.0000
2.5000	0.0018	0.0020	0.0370	0.0000

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.001837	0.002021	0.0000	0.0222	0.0000
2.5495	0.001837	0.002111	0.0000	0.0222	0.0000
2.5989	0.001837	0.002202	0.0000	0.0237	0.0000
2.6484	0.001837	0.002293	0.0000	0.0244	0.0000
2.6978	0.001837	0.002384	0.0000	0.0252	0.0000
2.7473	0.001837	0.002475	0.0000	0.0259	0.0000
2.7967	0.001837	0.002566	0.0000	0.0266	0.0000
2.8462	0.001837	0.002656	0.0000	0.0274	0.0000
2.8956	0.001837	0.002747	0.0000	0.0281	0.0000
2.9451	0.001837	0.002838	0.0000	0.0288	0.0000
2.9945	0.001837	0.002929	0.0000	0.0295	0.0000
3.0440	0.001837	0.003020	0.0000	0.0303	0.0000
3.0934	0.001837	0.003110	0.0000	0.0310	0.0000
3.1429	0.001837	0.003201	0.0000	0.0317	0.0000
3.1923	0.001837	0.003292	0.0000	0.0325	0.0000
3.2418	0.001837	0.003383	0.0000	0.0332	0.0000
3.2912	0.001837	0.003474	0.0000	0.0339	0.0000
3.3407	0.001837	0.003565	0.0000	0.0347	0.0000
3.3901	0.001837	0.003655	0.0000	0.0354	0.0000
3.4396	0.001837	0.003746	0.0000	0.0361	0.0000
3.4890	0.001837	0.003837	0.0000	0.0369	0.0000
3.5385	0.001837	0.003928	0.0533	0.0376	0.0000
3.5879	0.001837	0.004019	0.1820	0.0383	0.0000
3.6374	0.001837	0.004109	0.3430	0.0391	0.0000
3.6868	0.001837	0.004200	0.5072	0.0398	0.0000
3.7363	0.001837	0.004291	0.6466	0.0405	0.0000
3.7857	0.001837	0.004382	0.7429	0.0413	0.0000
3.8352	0.001837	0.004473	0.8104	0.0420	0.0000
3.8846	0.001837	0.004564	0.8681	0.0427	0.0000
3.9341	0.001837	0.004654	0.9223	0.0435	0.0000
3.9835	0.001837	0.004745	0.9734	0.0442	0.0000
4.0330	0.001837	0.004836	1.0219	0.0449	0.0000

4.0824	0.001837	0.004927	1.0683	0.0457	0.0000
4.1319	0.001837	0.005018	1.1127	0.0464	0.0000
4.1813	0.001837	0.005108	1.1555	0.0471	0.0000
4.2308	0.001837	0.005199	1.1967	0.0479	0.0000
4.2802	0.001837	0.005290	1.2365	0.0486	0.0000
4.3297	0.001837	0.005381	1.2751	0.0493	0.0000
4.3791	0.001837	0.005472	1.3125	0.0501	0.0000
4.4286	0.001837	0.005563	1.3489	0.0508	0.0000
4.4780	0.001837	0.005653	1.3844	0.0515	0.0000
4.5000	0.001837	0.005694	1.4189	0.0519	0.0000

Surface retention 1

Element Flows To:

Outlet 1	Outlet 2
Detention Vault	Bioretention 1

Detention Vault

Width: 6.75 ft.
Length: 114 ft.
Depth: 7 ft.
Discharge Structure
Riser Height: 7 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.014 ft.
Notch Height: 0.560 ft.
Orifice 1 Diameter: 0.26654645322i4in2.11589482033333E-02 ft.
Element Flows To:
Outlet 1 Outlet 2

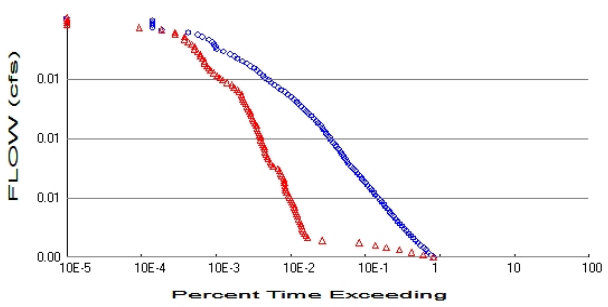
Vault Hydraulic Table

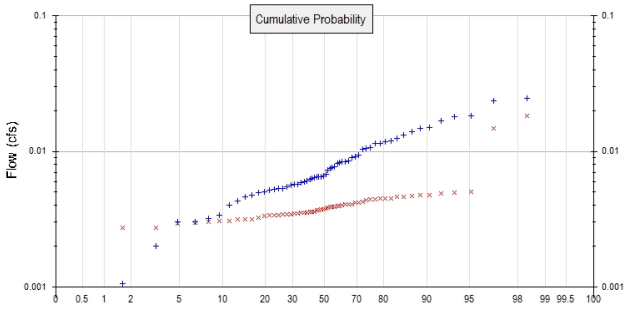
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.017	0.000	0.000	0.000
0.0778	0.017	0.001	0.000	0.000
0.1556	0.017	0.002	0.000	0.000
0.2333	0.017	0.004	0.001	0.000
0.3111	0.017	0.005	0.001	0.000
0.3889	0.017	0.006	0.001	0.000
0.4667	0.017	0.008	0.001	0.000
0.5444	0.017	0.009	0.001	0.000
0.6222	0.017	0.011	0.001	0.000
0.7000	0.017	0.012	0.001	0.000
0.7778	0.017	0.013	0.001	0.000
0.8556	0.017	0.015	0.001	0.000
0.9333	0.017	0.016	0.001	0.000
1.0111	0.017	0.017	0.002	0.000
1.0889	0.017	0.019	0.002	0.000
1.1667	0.017	0.020	0.002	0.000
1.2444	0.017	0.022	0.002	0.000
1.3222	0.017	0.023	0.002	0.000
1.4000	0.017	0.024	0.002	0.000
1.4778	0.017	0.026	0.002	0.000
1.5556	0.017	0.027	0.002	0.000
1.6333	0.017	0.028	0.002	0.000
1.7111	0.017	0.030	0.002	0.000
1.7889	0.017	0.031	0.002	0.000
1.8667	0.017	0.033	0.002	0.000
1.9444	0.017	0.034	0.002	0.000
2.0222	0.017	0.035	0.002	0.000
2.1000	0.017	0.037	0.002	0.000
2.1778	0.017	0.038	0.002	0.000
2.2556	0.017	0.039	0.002	0.000
2.3333	0.017	0.041	0.003	0.000
2.4111	0.017	0.042	0.003	0.000
2.4889	0.017	0.044	0.003	0.000
2.5667	0.017	0.045	0.003	0.000
2.6444	0.017	0.046	0.003	0.000
2.7222	0.017	0.048	0.003	0.000
2.8000	0.017	0.049	0.003	0.000
2.8778	0.017	0.050	0.003	0.000
2.9556	0.017	0.052	0.003	0.000

3.0333	0.017	0.053	0.003	0.000
3.1111	0.017	0.055	0.003	0.000
3.1889	0.017	0.056	0.003	0.000
3.2667	0.017	0.057	0.003	0.000
3.3444	0.017	0.059	0.003	0.000
3.4222	0.017	0.060	0.003	0.000
3.5000	0.017	0.061	0.003	0.000
3.5778	0.017	0.063	0.003	0.000
3.6556	0.017	0.064	0.003	0.000
3.7333	0.017	0.066	0.003	0.000
3.8111	0.017	0.067	0.003	0.000
3.8889	0.017	0.068	0.003	0.000
3.9667	0.017	0.070	0.003	0.000
4.0444	0.017	0.071	0.003	0.000
4.1222	0.017	0.072	0.003	0.000
4.2000	0.017	0.074	0.004	0.000
4.2778	0.017	0.075	0.004	0.000
4.3556	0.017	0.076	0.004	0.000
4.4333	0.017	0.078	0.004	0.000
4.5111	0.017	0.079	0.004	0.000
4.5889	0.017	0.081	0.004	0.000
4.6667	0.017	0.082	0.004	0.000
4.7444	0.017	0.083	0.004	0.000
4.8222	0.017	0.085	0.004	0.000
4.9000	0.017	0.086	0.004	0.000
4.9778	0.017	0.087	0.004	0.000
5.0556	0.017	0.089	0.004	0.000
5.1333	0.017	0.090	0.004	0.000
5.2111	0.017	0.092	0.004	0.000
5.2889	0.017	0.093	0.004	0.000
5.3667	0.017	0.094	0.004	0.000
5.4444	0.017	0.096	0.004	0.000
5.5222	0.017	0.097	0.004	0.000
5.6000	0.017	0.098	0.004	0.000
5.6778	0.017	0.100	0.004	0.000
5.7556	0.017	0.101	0.004	0.000
5.8333	0.017	0.103	0.004	0.000
5.9111	0.017	0.104	0.004	0.000
5.9889	0.017	0.105	0.004	0.000
6.0667	0.017	0.107	0.004	0.000
6.1444	0.017	0.108	0.004	0.000
6.2222	0.017	0.109	0.004	0.000
6.3000	0.017	0.111	0.004	0.000
6.3778	0.017	0.112	0.004	0.000
6.4556	0.017	0.114	0.005	0.000
6.5333	0.017	0.115	0.006	0.000
6.6111	0.017	0.116	0.008	0.000
6.6889	0.017	0.118	0.010	0.000
6.7667	0.017	0.119	0.012	0.000
6.8444	0.017	0.120	0.015	0.000
6.9222	0.017	0.122	0.018	0.000
7.0000	0.017	0.123	0.022	0.000
7.0778	0.017	0.125	0.366	0.000
7.1556	0.000	0.000	0.992	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.26
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.25

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.007644
5 year	0.012006
10 year	0.014477
25 year	0.017096
50 year	0.018716
100 year	0.020094

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.003788
5 year	0.00502
10 year	0.005944
25 year	0.007239
50 year	0.008301
100 year	0.009451

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.008	0.003
1950	0.009	0.004
1951	0.017	0.005
1952	0.005	0.003
1953	0.004	0.004
1954	0.007	0.003
1955	0.011	0.003
1956	0.008	0.004
1957	0.007	0.003
1958	0.008	0.004

1959	0.007	0.003
1960	0.011	0.005
1961	0.006	0.004
1962	0.004	0.003
1963	0.005	0.004
1964	0.007	0.004
1965	0.005	0.004
1966	0.005	0.004
1967	0.010	0.004
1968	0.006	0.004
1969	0.006	0.003
1970	0.005	0.004
1971	0.006	0.004
1972	0.013	0.005
1973	0.006	0.004
1974	0.006	0.004
1975	0.008	0.003
1976	0.006	0.004
1977	0.001	0.003
1978	0.005	0.004
1979	0.003	0.003
1980	0.012	0.005
1981	0.005	0.004
1982	0.009	0.004
1983	0.008	0.004
1984	0.005	0.003
1985	0.003	0.003
1986	0.013	0.004
1987	0.012	0.004
1988	0.005	0.003
1989	0.003	0.003
1990	0.025	0.004
1991	0.015	0.005
1992	0.006	0.004
1993	0.006	0.003
1994	0.002	0.003
1995	0.008	0.004
1996	0.018	0.005
1997	0.015	0.015
1998	0.003	0.003
1999	0.014	0.005
2000	0.006	0.004
2001	0.001	0.003
2002	0.006	0.004
2003	0.008	0.003
2004	0.011	0.005
2005	0.008	0.003
2006	0.009	0.004
2007	0.018	0.018
2008	0.023	0.005
2009	0.012	0.004

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0245	0.0183
2	0.0235	0.0148
3	0.0182	0.0050

4	0.0179	0.0050
5	0.0168	0.0049
6	0.0150	0.0048
7	0.0148	0.0048
8	0.0140	0.0047
9	0.0132	0.0046
10	0.0125	0.0046
11	0.0119	0.0045
12	0.0117	0.0045
13	0.0115	0.0045
14	0.0114	0.0044
15	0.0107	0.0044
16	0.0105	0.0044
17	0.0104	0.0042
18	0.0094	0.0042
19	0.0091	0.0042
20	0.0091	0.0041
21	0.0085	0.0041
22	0.0084	0.0040
23	0.0084	0.0040
24	0.0083	0.0039
25	0.0082	0.0039
26	0.0077	0.0039
27	0.0076	0.0039
28	0.0075	0.0039
29	0.0072	0.0038
30	0.0067	0.0038
31	0.0066	0.0037
32	0.0065	0.0037
33	0.0065	0.0037
34	0.0065	0.0037
35	0.0064	0.0036
36	0.0063	0.0036
37	0.0062	0.0036
38	0.0061	0.0035
39	0.0059	0.0035
40	0.0059	0.0035
41	0.0057	0.0035
42	0.0057	0.0035
43	0.0056	0.0034
44	0.0055	0.0034
45	0.0053	0.0034
46	0.0053	0.0034
47	0.0052	0.0034
48	0.0052	0.0034
49	0.0051	0.0033
50	0.0050	0.0032
51	0.0047	0.0032
52	0.0046	0.0032
53	0.0043	0.0032
54	0.0040	0.0031
55	0.0034	0.0030
56	0.0032	0.0030
57	0.0030	0.0030
58	0.0030	0.0029
59	0.0020	0.0027
60	0.0011	0.0027
61	0.0007	0.0026

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0038	17547	17477	99	Pass
0.0040	16164	12707	78	Pass
0.0041	14970	8960	59	Pass
0.0043	13851	6132	44	Pass
0.0044	12816	4070	31	Pass
0.0046	11809	2909	24	Pass
0.0047	10900	1774	16	Pass
0.0049	10119	568	5	Pass
0.0050	9383	361	3	Pass
0.0052	8729	343	3	Pass
0.0053	8145	324	3	Pass
0.0055	7593	315	4	Pass
0.0056	7060	306	4	Pass
0.0058	6590	297	4	Pass
0.0059	6145	291	4	Pass
0.0061	5777	283	4	Pass
0.0062	5431	271	4	Pass
0.0064	5097	262	5	Pass
0.0065	4808	256	5	Pass
0.0067	4524	251	5	Pass
0.0068	4254	243	5	Pass
0.0070	4017	239	5	Pass
0.0071	3784	231	6	Pass
0.0073	3546	225	6	Pass
0.0074	3337	215	6	Pass
0.0076	3138	208	6	Pass
0.0077	2952	200	6	Pass
0.0079	2785	186	6	Pass
0.0080	2599	183	7	Pass
0.0082	2447	180	7	Pass
0.0083	2304	178	7	Pass
0.0085	2160	175	8	Pass
0.0086	2024	173	8	Pass
0.0088	1898	171	9	Pass
0.0089	1790	164	9	Pass
0.0091	1687	157	9	Pass
0.0092	1583	151	9	Pass
0.0094	1483	145	9	Pass
0.0095	1380	125	9	Pass
0.0097	1292	118	9	Pass
0.0098	1219	114	9	Pass
0.0100	1154	106	9	Pass
0.0101	1098	103	9	Pass
0.0103	1048	99	9	Pass
0.0104	997	97	9	Pass
0.0106	930	95	10	Pass
0.0107	884	94	10	Pass
0.0109	838	91	10	Pass
0.0110	789	87	11	Pass
0.0112	743	85	11	Pass
0.0113	713	84	11	Pass
0.0115	670	82	12	Pass
0.0116	633	80	12	Pass

0.0118	596	78	13	Pass
0.0119	567	75	13	Pass
0.0121	540	74	13	Pass
0.0122	497	71	14	Pass
0.0124	474	68	14	Pass
0.0125	437	65	14	Pass
0.0127	401	63	15	Pass
0.0128	370	62	16	Pass
0.0130	348	60	17	Pass
0.0131	324	57	17	Pass
0.0133	296	55	18	Pass
0.0135	272	53	19	Pass
0.0136	256	51	19	Pass
0.0138	235	49	20	Pass
0.0139	217	48	22	Pass
0.0141	195	47	24	Pass
0.0142	180	43	23	Pass
0.0144	158	41	25	Pass
0.0145	145	37	25	Pass
0.0147	129	35	27	Pass
0.0148	119	30	25	Pass
0.0150	109	26	23	Pass
0.0151	97	24	24	Pass
0.0153	91	22	24	Pass
0.0154	82	20	24	Pass
0.0156	76	18	23	Pass
0.0157	69	17	24	Pass
0.0159	61	16	26	Pass
0.0160	55	15	27	Pass
0.0162	48	15	31	Pass
0.0163	41	14	34	Pass
0.0165	38	13	34	Pass
0.0166	33	13	39	Pass
0.0168	27	12	44	Pass
0.0169	22	11	50	Pass
0.0171	21	11	52	Pass
0.0172	20	10	50	Pass
0.0174	19	9	47	Pass
0.0175	17	8	47	Pass
0.0177	14	8	57	Pass
0.0178	12	6	50	Pass
0.0180	9	6	66	Pass
0.0181	4	4	100	Pass
0.0183	3	2	66	Pass
0.0184	3	0	0	Pass
0.0186	3	0	0	Pass
0.0187	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
Detention Vault POC	☐	35.78			☐	0.00			
retention 1	☐	35.77			☐	0.00			
Total Volume Infiltrated		71.54	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

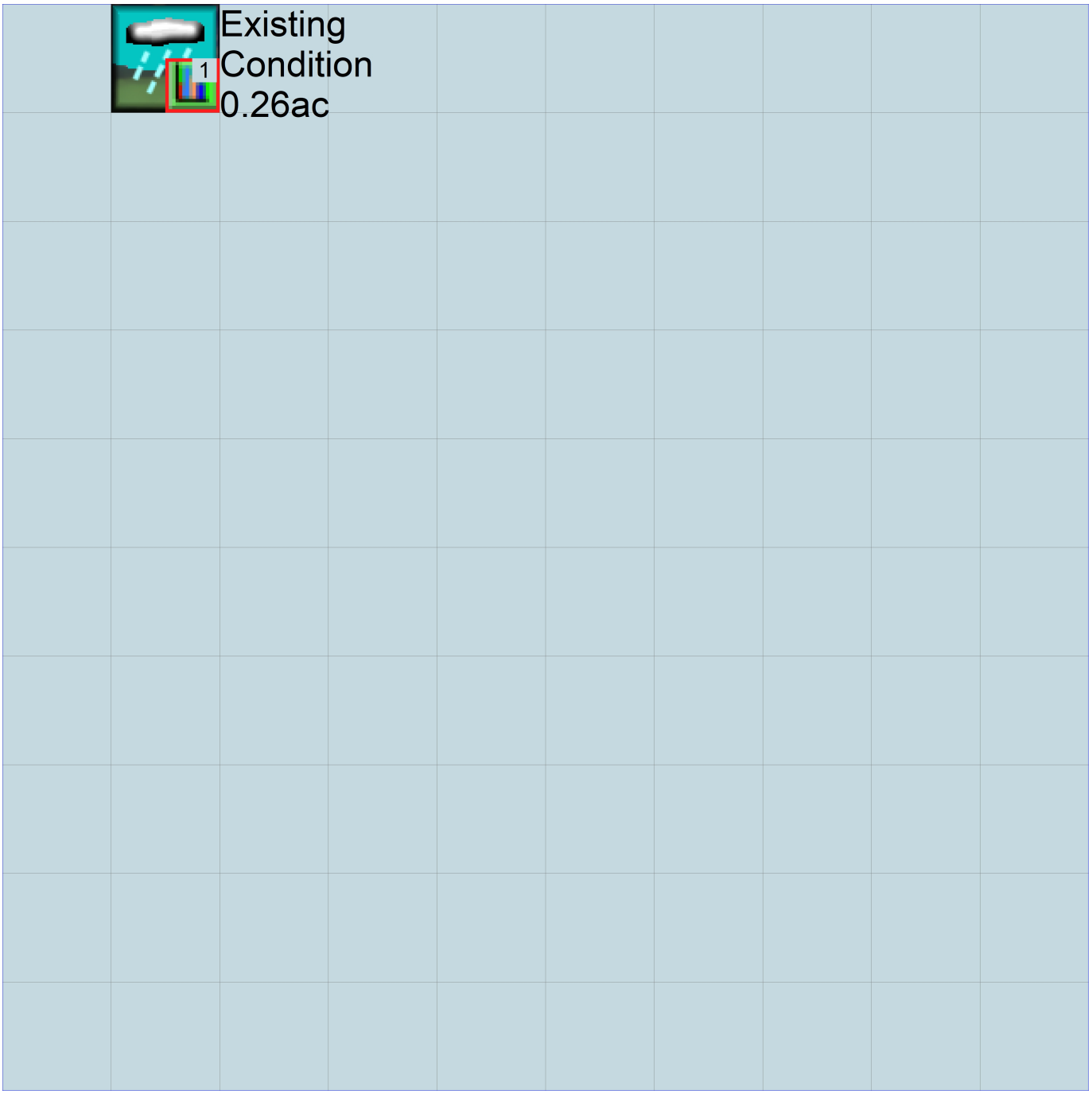
No PERLND changes have been made.

IMPLND Changes

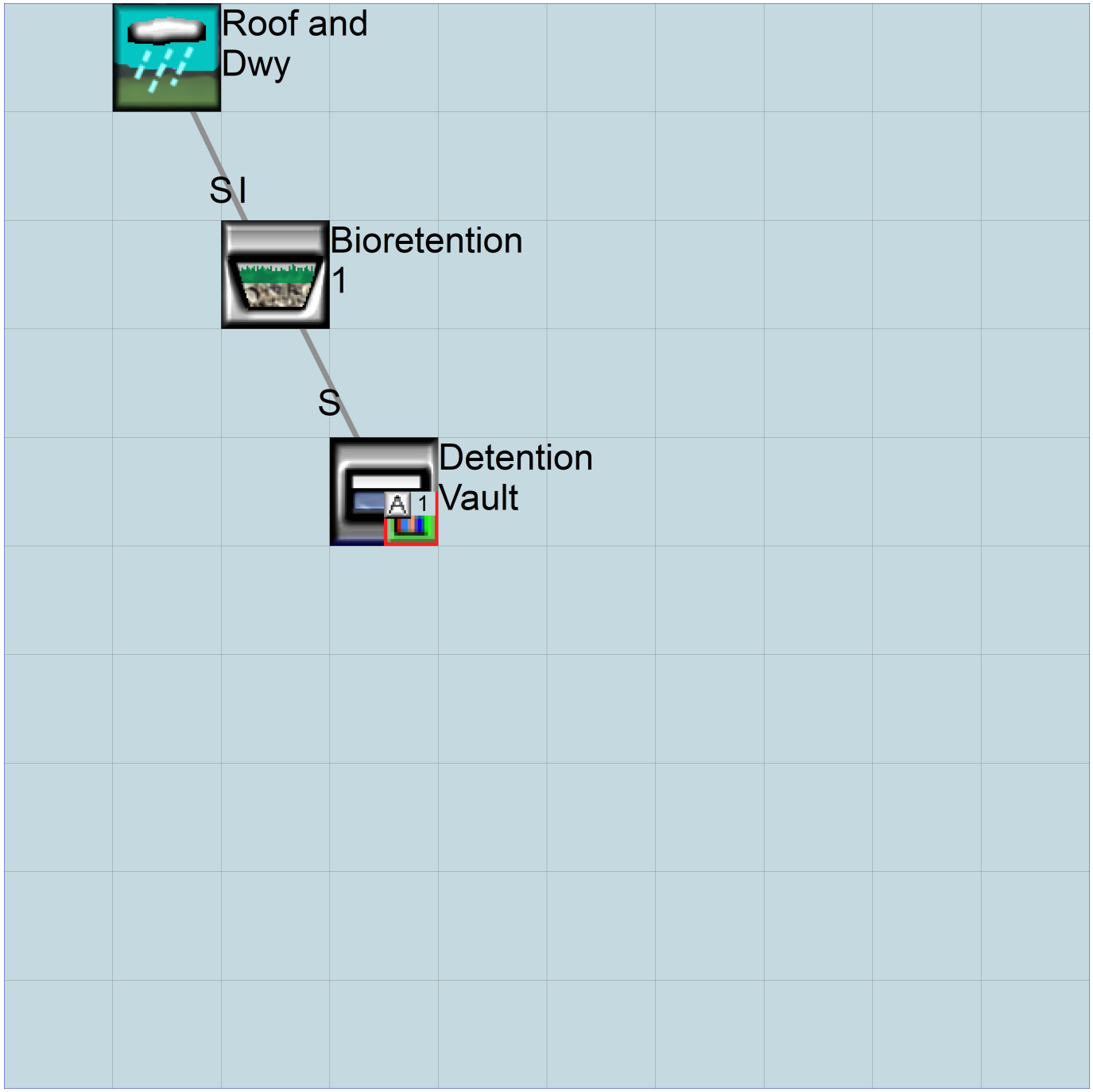
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   79th Ave SW, Mercer Island.wdm
MESSU       25   Pre79th Ave SW, Mercer Island.MES
            27   Pre79th Ave SW, Mercer Island.L61
            28   Pre79th Ave SW, Mercer Island.L62
            30   POC79th Ave SW, Mercer Island1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Existing Condition          MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                        User  t-series Engl Metr ***
                                    in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

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

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

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name-------> Unit-systems   Printer ***
    # -  #                    User  t-series Engl Metr ***
                                    in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Existing Condition***
PERLND  10                        0.26     COPY   501     12
PERLND  10                        0.26     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

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

```
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   79th Ave SW, Mercer Island.wdm
MESSU       25   Mit79th Ave SW, Mercer Island.MES
            27   Mit79th Ave SW, Mercer Island.L61
            28   Mit79th Ave SW, Mercer Island.L62
            30   POC79th Ave SW, Mercer Island1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      IMPLND       4
      IMPLND       5
      GENER        2
      RCHRES       1
      RCHRES       2
      RCHRES       3
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Detention Vault            MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4

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

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name-------->  Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT          1    1    1   27    0
    5      DRIVEWAYS/FLAT          1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    5         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    5         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    5              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    5              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Roof and Dwy***
IMPLND   4                       0.18     RCHRES   1      5
IMPLND   5                       0.07     RCHRES   1      5

******Routing******
RCHRES   2                          1     RCHRES   3      6
RCHRES   2                                COPY     1     16
RCHRES   1                          1     RCHRES   3      7
RCHRES   1                                COPY     1     17
RCHRES   1                          1     RCHRES   2      8
RCHRES   3                          1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0011111     RCHRES   1     EXTNL  OUTDGT 1



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     Surface retentio-014    2    1    1    1   28    0    1
    2     Bioretention  1         1    1    1    1   28    0    1
    3     Detention Vault         1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
    1       0  1  0  0    4  5  0  0  0      0  1  0  0  0       2  1  2  2  2
    2       0  1  0  0    4  0  0  0  0      0  0  0  0  0       2  2  2  2  2
    3       0  1  0  0    4  0  0  0  0      0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.0       0.0
    2             2      0.01       0.0       0.0       0.0       0.0
    3             3      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPECS-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  121.35
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   52    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.001837  0.000000  0.000000
  0.049451  0.001837  0.000042  0.000000
  0.098901  0.001837  0.000083  0.000000
  0.148352  0.001837  0.000125  0.000000
  0.197802  0.001837  0.000166  0.000125
```

```
0.247253  0.001837  0.000208  0.000213
0.296703  0.001837  0.000249  0.000334
0.346154  0.001837  0.000291  0.000491
0.395604  0.001837  0.000332  0.000688
0.445055  0.001837  0.000374  0.000928
0.494505  0.001837  0.000415  0.000961
0.543956  0.001837  0.000457  0.001214
0.593407  0.001837  0.000498  0.001548
0.642857  0.001837  0.000540  0.001934
0.692308  0.001837  0.000581  0.002374
0.741758  0.001837  0.000623  0.002870
0.791209  0.001837  0.000664  0.003425
0.840659  0.001837  0.000706  0.004028
0.890110  0.001837  0.000748  0.004040
0.939560  0.001837  0.000789  0.004718
0.989011  0.001837  0.000831  0.005461
1.038462  0.001837  0.000872  0.006270
1.087912  0.001837  0.000914  0.007149
1.137363  0.001837  0.000955  0.008097
1.186813  0.001837  0.000997  0.009118
1.236264  0.001837  0.001038  0.009889
1.285714  0.001837  0.001080  0.010213
1.335165  0.001837  0.001121  0.011382
1.384615  0.001837  0.001163  0.012629
1.434066  0.001837  0.001204  0.013953
1.483516  0.001837  0.001246  0.015356
1.532967  0.001837  0.001284  0.016839
1.582418  0.001837  0.001321  0.018400
1.631868  0.001837  0.001359  0.019103
1.681319  0.001837  0.001397  0.020036
1.730769  0.001837  0.001434  0.021727
1.780220  0.001837  0.001472  0.037037
1.829670  0.001837  0.001510  0.037037
1.879121  0.001837  0.001547  0.037037
1.928571  0.001837  0.001585  0.037037
1.978022  0.001837  0.001623  0.037037
2.027473  0.001837  0.001661  0.037037
2.076923  0.001837  0.001698  0.037037
2.126374  0.001837  0.001736  0.037037
2.175824  0.001837  0.001774  0.037037
2.225275  0.001837  0.001811  0.037037
2.274725  0.001837  0.001849  0.037037
2.324176  0.001837  0.001887  0.037037
2.373626  0.001837  0.001924  0.037037
2.423077  0.001837  0.001962  0.037037
2.472527  0.001837  0.002000  0.037037
2.500000  0.001837  0.002786  0.037037
END FTABLE  2
FTABLE      1
 42    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
0.000000  0.001837  0.000000  0.000000  0.000000
0.049451  0.001837  0.000091  0.000000  0.022222
0.098901  0.001837  0.000182  0.000000  0.023687
0.148352  0.001837  0.000272  0.000000  0.024420
0.197802  0.001837  0.000363  0.000000  0.025153
0.247253  0.001837  0.000454  0.000000  0.025885
0.296703  0.001837  0.000545  0.000000  0.026618
0.346154  0.001837  0.000636  0.000000  0.027350
0.395604  0.001837  0.000727  0.000000  0.028083
0.445055  0.001837  0.000817  0.000000  0.028816
0.494505  0.001837  0.000908  0.000000  0.029548
0.543956  0.001837  0.000999  0.000000  0.030281
0.593407  0.001837  0.001090  0.000000  0.031013
0.642857  0.001837  0.001181  0.000000  0.031746
0.692308  0.001837  0.001271  0.000000  0.032479
0.741758  0.001837  0.001362  0.000000  0.033211
0.791209  0.001837  0.001453  0.000000  0.033944
0.840659  0.001837  0.001544  0.000000  0.034676
```

```
0.890110  0.001837  0.001635  0.000000  0.035409
0.939560  0.001837  0.001726  0.000000  0.036142
0.989011  0.001837  0.001816  0.000000  0.036874
1.038462  0.001837  0.001907  0.053269  0.037607
1.087912  0.001837  0.001998  0.181987  0.038339
1.137363  0.001837  0.002089  0.343023  0.039072
1.186813  0.001837  0.002180  0.507224  0.039805
1.236264  0.001837  0.002270  0.646592  0.040537
1.285714  0.001837  0.002361  0.742908  0.041270
1.335165  0.001837  0.002452  0.810413  0.042002
1.384615  0.001837  0.002543  0.868141  0.042735
1.434066  0.001837  0.002634  0.922263  0.043468
1.483516  0.001837  0.002725  0.973381  0.044200
1.532967  0.001837  0.002815  1.021944  0.044933
1.582418  0.001837  0.002906  1.068303  0.045665
1.631868  0.001837  0.002997  1.112731  0.046398
1.681319  0.001837  0.003088  1.155453  0.047131
1.730769  0.001837  0.003179  1.196650  0.047863
1.780220  0.001837  0.003269  1.236475  0.048596
1.829670  0.001837  0.003360  1.275058  0.049328
1.879121  0.001837  0.003451  1.312506  0.050061
1.928571  0.001837  0.003542  1.348915  0.050794
1.978022  0.001837  0.003633  1.384367  0.051526
2.000000  0.001837  0.003673  1.418934  0.051852
END FTABLE  1
FTABLE      3
 92    4
    Depth      Area    Volume  Outflow1 Velocity  Travel Time***
     (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.017665  0.000000  0.000280
0.077778  0.017665  0.001374  0.000606
0.155556  0.017665  0.002748  0.000810
0.233333  0.017665  0.004122  0.000973
0.311111  0.017665  0.005496  0.001111
0.388889  0.017665  0.006870  0.001235
0.466667  0.017665  0.008244  0.001347
0.544444  0.017665  0.009618  0.001450
0.622222  0.017665  0.010992  0.001546
0.700000  0.017665  0.012366  0.001637
0.777778  0.017665  0.013740  0.001723
0.855556  0.017665  0.015114  0.001805
0.933333  0.017665  0.016488  0.001884
1.011111  0.017665  0.017862  0.001959
1.088889  0.017665  0.019236  0.002031
1.166667  0.017665  0.020610  0.002101
1.244444  0.017665  0.021983  0.002169
1.322222  0.017665  0.023357  0.002235
1.400000  0.017665  0.024731  0.002298
1.477778  0.017665  0.026105  0.002360
1.555556  0.017665  0.027479  0.002421
1.633333  0.017665  0.028853  0.002480
1.711111  0.017665  0.030227  0.002538
1.788889  0.017665  0.031601  0.002594
1.866667  0.017665  0.032975  0.002649
1.944444  0.017665  0.034349  0.002703
2.022222  0.017665  0.035723  0.002756
2.100000  0.017665  0.037097  0.002808
2.177778  0.017665  0.038471  0.002859
2.255556  0.017665  0.039845  0.002909
2.333333  0.017665  0.041219  0.002958
2.411111  0.017665  0.042593  0.003007
2.488889  0.017665  0.043967  0.003055
2.566667  0.017665  0.045341  0.003102
2.644444  0.017665  0.046715  0.003148
2.722222  0.017665  0.048089  0.003193
2.800000  0.017665  0.049463  0.003238
2.877778  0.017665  0.050837  0.003283
2.955556  0.017665  0.052211  0.003326
3.033333  0.017665  0.053585  0.003370
3.111111  0.017665  0.054959  0.003412
```

```
  3.188889  0.017665  0.056333  0.003454
  3.266667  0.017665  0.057707  0.003496
  3.344444  0.017665  0.059081  0.003537
  3.422222  0.017665  0.060455  0.003578
  3.500000  0.017665  0.061829  0.003618
  3.577778  0.017665  0.063202  0.003658
  3.655556  0.017665  0.064576  0.003697
  3.733333  0.017665  0.065950  0.003736
  3.811111  0.017665  0.067324  0.003774
  3.888889  0.017665  0.068698  0.003812
  3.966667  0.017665  0.070072  0.003850
  4.044444  0.017665  0.071446  0.003887
  4.122222  0.017665  0.072820  0.003924
  4.200000  0.017665  0.074194  0.003961
  4.277778  0.017665  0.075568  0.003997
  4.355556  0.017665  0.076942  0.004033
  4.433333  0.017665  0.078316  0.004069
  4.511111  0.017665  0.079690  0.004105
  4.588889  0.017665  0.081064  0.004140
  4.666667  0.017665  0.082438  0.004174
  4.744444  0.017665  0.083812  0.004209
  4.822222  0.017665  0.085186  0.004243
  4.900000  0.017665  0.086560  0.004277
  4.977778  0.017665  0.087934  0.004311
  5.055556  0.017665  0.089308  0.004344
  5.133333  0.017665  0.090682  0.004377
  5.211111  0.017665  0.092056  0.004410
  5.288889  0.017665  0.093430  0.004443
  5.366667  0.017665  0.094804  0.004475
  5.444444  0.017665  0.096178  0.004507
  5.522222  0.017665  0.097552  0.004539
  5.600000  0.017665  0.098926  0.004571
  5.677778  0.017665  0.100300  0.004603
  5.755556  0.017665  0.101674  0.004634
  5.833333  0.017665  0.103048  0.004665
  5.911111  0.017665  0.104421  0.004696
  5.988889  0.017665  0.105795  0.004727
  6.066667  0.017665  0.107169  0.004757
  6.144444  0.017665  0.108543  0.004787
  6.222222  0.017665  0.109917  0.004817
  6.300000  0.017665  0.111291  0.004847
  6.377778  0.017665  0.112665  0.004877
  6.455556  0.017665  0.114039  0.004994
  6.533333  0.017665  0.115413  0.006206
  6.611111  0.017665  0.116787  0.008067
  6.688889  0.017665  0.118161  0.010348
  6.766667  0.017665  0.119535  0.012942
  6.844444  0.017665  0.120909  0.015779
  6.922222  0.017665  0.122283  0.018810
  7.000000  0.017665  0.123657  0.021995
  7.077778  0.017665  0.125031  0.366798
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.76           RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
```

```
RCHRES    3 HYDR    RO      1 1         1       WDM    1012 FLOW     ENGL      REPL
RCHRES    3 HYDR    STAGE   1 1         1       WDM    1013 STAG     ENGL      REPL
COPY      1 OUTPUT  MEAN    1 1      48.4       WDM     701 FLOW     ENGL      REPL
COPY    501 OUTPUT  MEAN    1 1      48.4       WDM     801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     5

  MASS-LINK         6
RCHRES     ROFLOW                          RCHRES         INFLOW
  END MASS-LINK     6

  MASS-LINK         7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
  END MASS-LINK     7

  MASS-LINK         8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK     8

  MASS-LINK        16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK    16

  MASS-LINK        17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK    17


END MASS-LINK

END RUN
```

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APPENDIX D: Stormwater Site Plan

STORM DRAINAGE NOTES

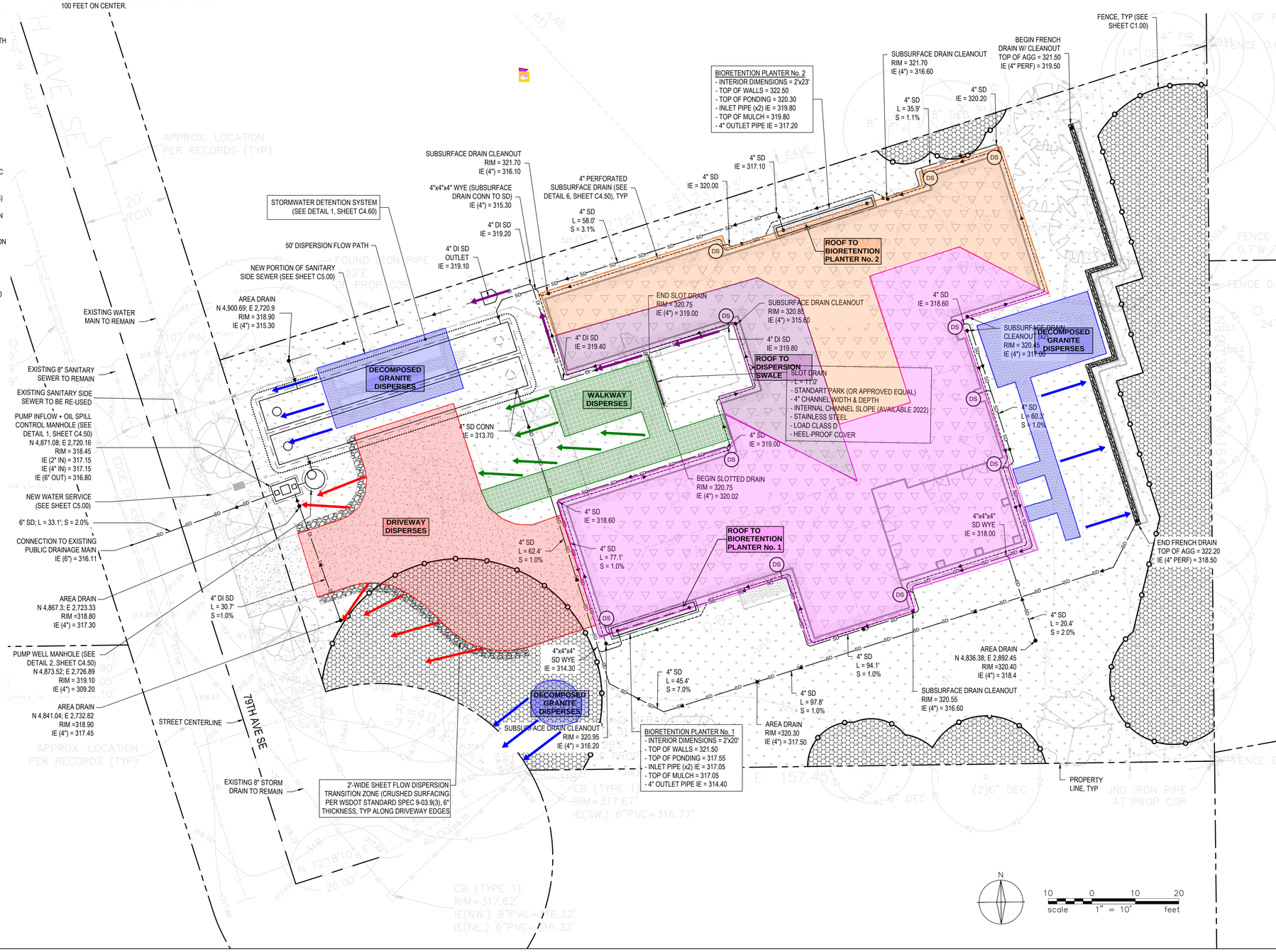
1. A COPY OF THE APPROVED DRAINAGE CONTROL PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
2. ALL REQUIRED STORM WATER FACILITIES MUST BE CONSTRUCTED AND IN OPERATION PRIOR TO ANY PAVING UNLESS OTHERWISE APPROVED BY THE DEPARTMENT OF PLANNING AND DEVELOPMENT.
3. INSTALL CATCH BASIN INSERTS UNDER ALL CATCH BASIN AND AREA DRAIN GRATES IMMEDIATELY AFTER INSTALLATION. PROTECTION SHALL BE REMOVED AFTER FINAL PAVING AND/OR LANDSCAPING HAS BEEN ESTABLISHED.
4. TOP ELEVATION FOR ALL CATCH BASINS WITH SOLID COVER SHALL MATCH FINISH GRADE.
5. UNLESS NOTED OTHERWISE, THE CONTRACTOR MAY USE ANY COMBINATION OF PREFABRICATED FITTINGS (TEES, BENDS AND WYES) AT LOCATIONS WHERE STORM CONNECTION POINTS OF INTERSECTION (PI) ARE INDICATED. PREFABRICATED FITTINGS MAY BE ADJUSTED AS REQUIRED TO MAINTAIN POSITIVE SLOPE AND DRAINAGE. WHERE SPECIFICALLY INDICATED, THE CONTRACTOR SHALL PROVIDE THE FITTINGS AS SHOWN.
6. COORDINATE POINTS AND ELEVATIONS SHOWN FOR ALL CATCH BASINS, CLEANOUTS, AREA DRAINS AND MANHOLES ARE TO THE CENTER OF THE FRAME AND GRATE OR COVER, UNLESS NOTED OTHERWISE.
7. ALL TRENCHING FOR STORM DRAINS SHALL CONFORM TO CITY OF MERCER ISLAND STANDARD DETAILS S-3 AND S-4.
8. ALL STORM DRAIN PIPING SHALL BE INSTALLED WITH A MINIMUM SLOPE OF 1.0 PERCENT.
9. ALL STORM DRAIN MANHOLES ARE 48 INCHES IN DIAMETER, UNLESS NOTED OTHERWISE.
10. VERIFY LOCATIONS OF LATERAL BUILDING CONNECTIONS WITH THE PLUMBING DRAWINGS PRIOR TO INSTALLATION.
11. TOP ELEVATION FOR ALL VAULTS SHALL MATCH FINISH GRADE. SLOPE VAULT LIDS AS REQUIRED.
12. PIPE MATERIALS SHALL BE AS FOLLOWS:
    - 12.1. SOLID WALL STORM DRAIN PIPE SHALL BE PVC SDR 35, ASTM D3034.
    - 12.2. DUCTILE IRON STORM DRAIN PIPE SHALL BE CEMENT-MORTAR LINED (DOUBLE THICKNESS) PER CITY OF SEATTLE STANDARD SPECIFICATION SECTION 9-05.3 "DUCTILE IRON PIPE".
    - 12.3. PERFORATED SUBSURFACE DRAINAGE PIPE SHALL BE PER THE "SUBSURFACE FOUNDATION DRAINAGE" DETAIL 6, SHEET C4.50.
13. CLEANOUTS SHALL BE PER DETAIL 7, SHEET C4.50 UNLESS NOTED OTHERWISE.
14. AREA DRAINS SHALL BE PER DETAIL 4, SHEET C4.50 UNLESS NOTED OTHERWISE.

FOUNDATION DRAINAGE NOTES

1. ALL FOUNDATION DRAINAGE CLEANOUTS SHALL BE AS INDICATED WITH LIDS MARKED "FD".
2. PROVIDE DUCTILE IRON SLEEVES WHERE FOUNDATION AND UNDERSLAB DRAINS PASS BELOW FOOTINGS. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS FOR PIPES PASSING BELOW FOOTINGS.
3. SEE THE STRUCTURAL DRAWINGS FOR BUILDING FOUNDATION AND FOOTING SIZES, SLAB ON GRADE DEPTH AND FOUNDATION AND SLAB ON GRADE ELEVATIONS.
4. FOUNDATION DRAINS SHALL BE SLOPED IN THE DIRECTION INDICATED WITH A MINIMUM SLOPE OF 0.50 PERCENT UNLESS NOTED OTHERWISE.
5. UNLESS NOTED OTHERWISE, THE CONTRACTOR MAY USE ANY COMBINATION OF PREFABRICATED FITTINGS (TEES, BENDS AND WYES) FOR INSTALLATION OF THE FOUNDATION AND UNDERSLAB DRAINS. PREFABRICATED FITTINGS MAY BE ADJUSTED AS REQUIRED TO MAINTAIN POSITIVE SLOPE AND DRAINAGE. WHERE SPECIFICALLY INDICATED THE CONTRACTOR SHALL PROVIDE THE FITTINGS AS SHOWN.
6. NO FOUNDATION DRAINAGE SHALL PASS THROUGH A BUILDING FOUNDATION WALL OR FOOTING WITHOUT PRIOR APPROVAL OF THE STRUCTURAL ENGINEER.
7. CLEANOUTS SHALL BE SPACED NO GREATER THAN 100 FEET ON CENTER.

LEGEND:

- NEW OR REPLACED HARD SURFACE AREA: ROOF (7,859 SF)
- NEW OR REPLACED HARD SURFACE AREA: IMPERVIOUS DRIVEWAY (2,121 SF)
- NEW OR REPLACED HARD SURFACE AREA: IMPERVIOUS WALKWAYS (630 SF)
- NEW OR REPLACED HARD SURFACE AREA: CRUSHED GRANITE WALKWAYS (1,010 SF)
- NEW OR REPLACED PERVIOUS AREA: LANDSCAPING (10,184 SF)
- NEW OR REPLACED PERVIOUS AREA: NON-INFILTRATING BIORETENTION PLANTER (86 SF)
- UNDISTURBED (5,330 SF)
- SS — 6" PVC SANITARY SIDE SEWER
- SD — 4" OR 6" STORM DRAIN (SOLID WALL PVC)
- DI — 4" OR 6" STORM DRAIN (SOLID WALL DUCTILE IRON)
- 4" STORM DRAIN (PEFORATED WALL PVC)
- DRAINAGE STRUCTURE (NOT USED)
- CLEANOUT OR AREA DRAIN AS NOTED (SEE DETAILS 4 AND 7, SHEET C4.50)
- (DS) ROOF DOWNSPOUT CONNECTION
- FLOW DIRECTION ARROW



PATRICK A. HASSELQUIST
STATE OF WASHINGTON
22550
REGISTERED
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION

DESIGN	HL
DRAWN	HL
CHECKED	HL
SHEET ISSUE DATE	03.07.2022

DRAWING SETS

PRE-APPLICATION	09/23/21
PERMIT	03/07/22
SET TITLE	DATE
SET TITLE	DATE

REVISIONS

#	DATE	DESCRIPTION

HL ENGINEERING
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MERCER ISLAND, WA 98040

PERMIT DRAWINGS

Stormwater Site Plan

C4.00