FINAL STORM DRAINAGE REPORT

9419 SE 54th Street
MERCER ISLAND, WASHINGTON

FOR

Vadim Scherbinin
9419 SE 54th Street
Mercer Island, WA 98040

09/27/2023

Project Manager:	**Michael A. Moody, P.E., LEED AP**
Prepared by	**Brackon Rawlinson, E.I.T.**
	Christian R. VanderHoeven, E.I.T.
Date:	**September 2023**
Approved by	**Michael A. Moody, P.E., LEED AP**
Core No.:	**23008**

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1.0 PROJECT OVERVIEW

The 9419 SE 54th Street property includes one lot located in Mercer Island, WA. See Figure 1.1 Vicinity Map on the following page. The development of the parcel includes a single-family residence with an associated driveway and patio area being constructed on the lot. The parcel is in the SE ¼ of Section 19, Township 24, Range 5 East, W.M. The King County tax parcel ID numbers for the project parcel is provided below in Table 1. 1.

Table 1. 1 Parcel Areas

King County Parcel ID & Area
(1) Parcel A: 143870-0150 (0.45 Acres)

*This value may differ from the parcel's actual surveyed area

The parcel is bordered by SE 54th Street Mercer Way to the north, large single-family lots to the east and west, and the Cayhill Open Space to the south. The existing, on-site area contains heavy vegetation, trees, and steep slope. The existing site topography generally slopes from west to east in the northern portion of the parcel, from northwest to southeast in the middle of the parcel and from north to south in the southern portion of the parcel (steep slope). The parcel also contains an open watercourse at the most southern portion of the parcel.

This project will employ permanent and temporary construction BMPs to mitigate erosion and protect downstream drainage. The project will provide a detention tank to mitigate stormwater runoff. Due to site constraints the project is unable to provide onsite BMPs.

The project is designed using the guidelines and requirements established in the following reference: 2014 Department of Ecology Stormwater Management Manual and the City of Mercer Island Construction Stormwater Codes.

The King County Parcel and Districts Reports are included in Appendix A of this report.

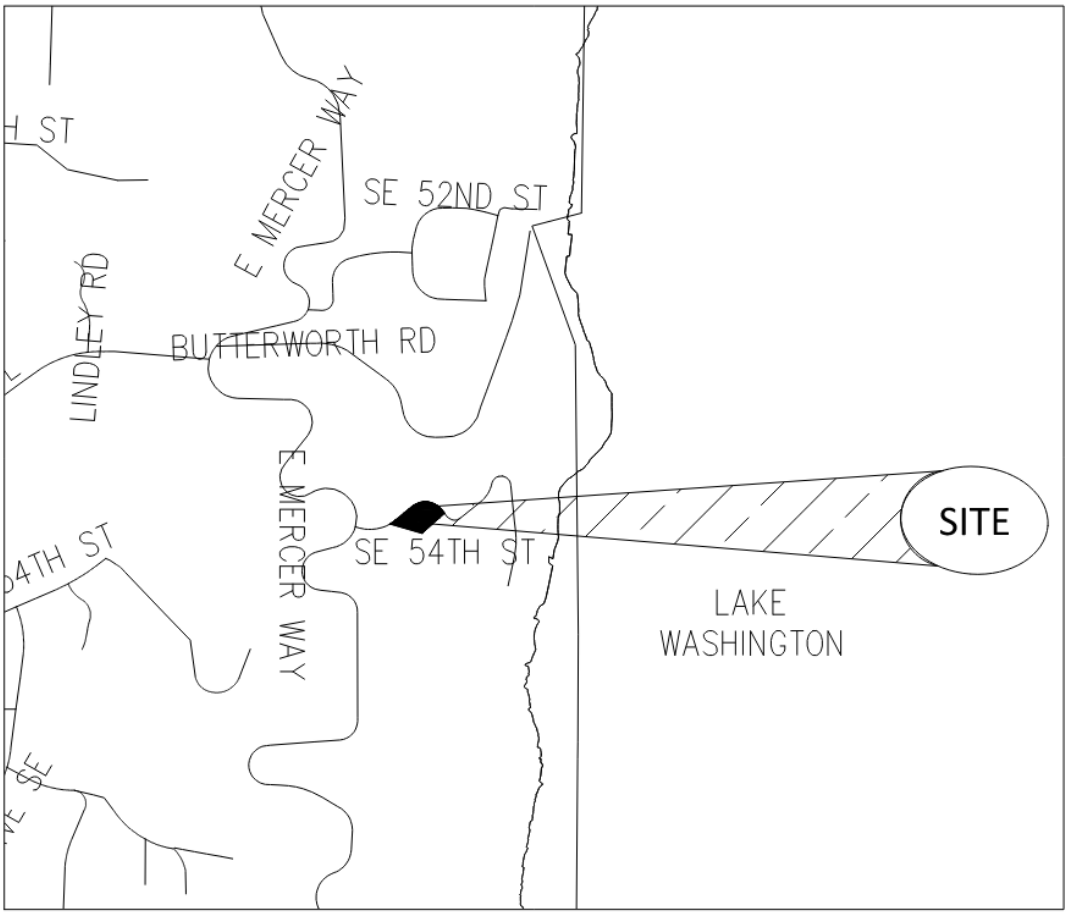


Figure 1.1 Vicinity Map

2.0 CONDITIONS AND REQUIREMENTS SUMMARY

The proposed project is classified as a development which includes less than 5,000 sq-ft of new plus replaced impervious surfaces. Therefore, Minimum Requirements 1 through 5 of the 2014 DOE Stormwater Management Manual for Western Washington (SWMMWW) apply. Applicable minimum requirements, and how the project addresses each, are listed below.

2.1 Minimum Requirements

2.1.1 Minimum Requirement #1: Preparation of Stormwater Site Plans

See Site & Stormwater Plan submitted under separate cover.

2.1.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPP/TESC)

A CSWPPP has been prepared for the project and is submitted under separate cover.

2.1.3 Minimum Requirements #3: Source Control of Pollutants

The SWMMWW requires that available and reasonable source control measures be adopted on all sites. Source controls are not anticipated for the project as the site is not a high use site.

2.1.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Natural drainage patterns shall be maintained, and discharges from the project site will occur at the natural location to the south. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down gradient properties, per SWMMWW Vol 1: 2.5.3. See Section 3 of this report for the downstream analysis and discussion of the natural discharge location.

2.1.5 Minimum Requirement #5: On-Site Stormwater Management

Projects are required to implement On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing groundwater contamination, flooding, or erosion impacts. Per Mercer Island Standards and Volume I of the 2014 SWMMWW, this project shall be required to meet the minimum standards for sites which propose less than 5,000 sf of hard surface. BMPs from List #1 were evaluated for the site. Refer to the responses below for each BMP.

List #1

Lawn and Landscaped Areas

- Post Construction Soil Quality and Depth in accordance with BMP T5.13 in Chapter 5 of Volume V (2014 SWMMWW).

- Response: Amended soils will be applied to approximately 4,138 sf of disturbed pervious areas within the clearing limits of the project in accordance with BMP T5.13 of the 2014 SWMMWW.

Roofs

- Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V of the DOE Manual, or Downspout Full Infiltration Systems in accordance with BMP T5.10A in Section 3.1.1 in Chapter 3 of Volume III (2014 SWMMWW).

    - Response: Per page 941 of the 2014 SWMMWW, the slope of the flowpath must be no steeper than 15% for any 20-foot reach of the flowpath. Slopes up to 33% area allowed where level spreaders are located upstream of the dispersion area and at sites where vegetation can be established. Due to onsite slopes and associated buffers, the required 100-foot flowpath cannot be attained. Thus, full dispersion systems are infeasible for the project.

      The project is located in an infiltration infeasibility area per the Mercer Island GIS Map; thus, infiltration BMPs are infeasible for the project.

- Bioretention BMPs that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.

    - Response: Per the bioretention infeasibility criteria on page 967 of the 2014 SWMMWW, bioretention cannot be placed within 50 feet from the top of slopes that are greater than 20% and over 10 feet of vertical relief. The project has multiple areas of severe slope and cannot reasonably locate bioretention outside of required setbacks; furthermore, the project is located in an infiltration infeasibility area. Thus, bioretention is infeasible.

- Downspout Dispersion Systems in accordance with BMP T5.10B in Section 3.1.2 in Chapter 3 of Volume III (2014 SWMMWW).

    - Response: Due to onsite slopes which are greater than 15%, the required vegetated flowpath of at least 50 feet in length cannot be maintained between the outlet of the trench and any slope steeper than 15%; thus, downspout dispersion is considered infeasible.

- Perforated Stub-out Connections in accordance with BMP T5.10C: Perforated Stub-out Connections in Section 3.1.3 in Chapter 3 of Volume III (2014 SWMMWW).

- Response: Due to onsite slopes greater than 20%, landslide hazard areas, and required setbacks from buildings, Perforated Stub-out Connections are not proposed for the project.

Other Hard Surfaces

- Full Dispersion in accordance with BMP T5.30 in Chapter 5 Volume V (2014 SWMMWW).
    - Response: Per page 941 of the 2014 SWMMWW, the slope of the flowpath must be no steeper than 15% for any 20-foot reach of the flowpath. Slopes up to 33% area allowed where level spreaders are located upstream of the dispersion area and at sites where vegetation can be established. Due to onsite slopes and associated buffers, the required 100-foot flowpath cannot be attained. Thus, full dispersion systems are infeasible for the project.
- Permeable pavement in accordance with BMP T5.15 in Chapter 5 of Volume V of the DOE Manual, or Rain Gardens in accordance with Chapter 7 of Volume V of the DOE Manual. The rain garden or bioretention facility must have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.
    - Response: Per the infeasibility criteria on page 923 of the 2014 SWMMWW, permeable pavement cannot be located within an area designated as an erosion hazard, or landslide hazard. The project is also located in an infiltration infeasibility area.
- Bioretention BMPs that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.
    - Response: Per the bioretention infeasibility criteria on page 967 of the 2014 SWMMWW, bioretention cannot be placed within 50 feet from the top of slopes that are greater than 20% and over 10 feet of vertical relief. The project has multiple areas of severe slope and cannot reasonably locate bioretention outside of required setbacks; furthermore, the project is located in an infiltration infeasibility area. Thus, bioretention is infeasible.
- Sheet Flow Dispersion in accordance with BMP T5.12, or Concentrated Flow Dispersion in accordance with BMP T5.11 in Chapter 5 of Volume V (2014 SWMMWW).
    - Response: Due to existing onsite slopes and landslide areas, Sheet Flow and Concentrated Flow Dispersion BMPs are infeasible for the site.

Due to the severe slopes throughout the site, limited space for dispersion, and the project being within an infiltration infeasibility area as well as an erosion and landslide hazard area none of the listed BMPs are feasible for the project.

City of Mercer Island Code 15.09 includes an additional alternative method to comply with Minimum Requirement #5. This requires supplemental detention onsite when no LID options are considered viable. The site will provide a detention tank sized in compliance with the City of Mercer Island Onsite Detention Requirements. See Section 4 for detention tank sizing.

3.0 OFFSITE ANALYSIS

Existing Conditions

The northern portion of the site generally slopes from west to east. The central portion of the site generally slopes from northwest to southeast, and the southern portion of the site steeply slopes north to south towards an open watercourse. The site is currently developed with a single-family residence, driveway, walkways, and patio. The site has grass areas near the existing residence with forest areas covering the north and south portions of the site. An unnamed, private, watercourse runs along the southernmost edge of the site.

Upstream Drainage

Due to the neighboring/uphill parcel's northern portion slope, runoff has the potential to flow onto the subject project property; however, due to existing vegetated buffers and the uphill parcel's drainage, runoff onto the project parcel from the uphill parcel is negligible.

Downstream Drainage

Onsite flows for the northern and central portions of the site drain to the east passing through vegetated areas which effectively mitigate runoff via dispersion, plant uptake, infiltration into soils, or evaporation. Onsite flows from the southern portion of the site sheet flow through forested areas and are effectively mitigated by a combination of dispersion, infiltration, plant uptake, evaporation, or combine with the open watercourse located at the southeastern portion of the site. Flows which combine with the watercourse flow east for approximately 210 feet until entering a 12" concrete pipe which conveys the watercourse east for approximately 208 feet at which point the runoff and watercourse discharge into Lake Washington.

Additional Notes

No drainage complaints were identified around the subject property. According to the City of Mercer Island GIS map, the project is within an erosion and landslide hazard area. The project is also contained within an infiltration infeasibility area. Lastly, the project has slope protection areas which coincide with the location of steep slope along the eastern property line and throughout the southern portion of the site. Onsite soils are classified as Kitsap Silt Loam per the NRCS Soil Survey Map (refer to Appendix B of this report for soils map).

4.0 FLOW CONTROL AND WATER QUALITY DESIGN

4.1. Basin Modeling

4.1.1 Existing Conditions

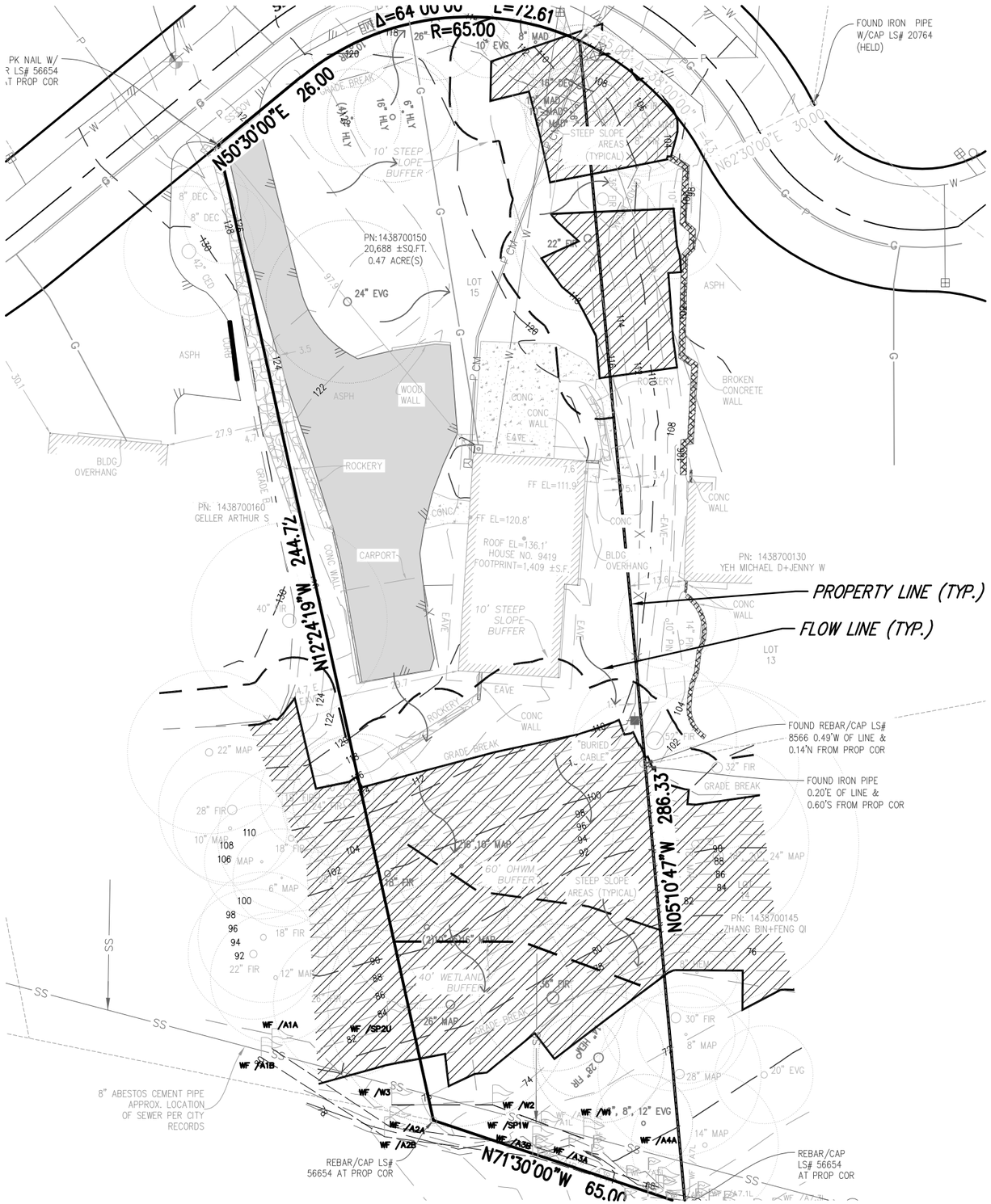
The site consists of one parcel for a total of 0.45 acres. The project parcel is currently developed with an access driveway, walkways, rockeries, and single-family residence. The project proposes to remove the existing single-family residence and construct a single-family home on the property with associated utilities. The existing driveway will be retained and used for access to the new single-family home. Steep slope covers portions of the northwest and southern areas of the parcel. A small stream also passes through the southern portion of the site. The disturbance limits for the project are approximately 7,898 sf (0.181 ac).

4.1.2 Existing Soils

The onsite soil type is mapped by NRCS as Kitsap Silt Loam. Based on the King County Soil types of the soil is considered hydraulic soil group C. The NRCS Site Soils Map is included in Appendix B of this report.

4.1.3 Existing Site Summary

The pre-developed conditions were modeled in WWHM as fully forested area with hydrologic soil group C.



SCALE: 1" = 30'

0 7.5 15 30

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9419 SE 54TH STREET

4.2 EXISTING CONDITIONS EXHIBIT

DATE FEBRUARY 2023	SHEET	OF
DESIGNED BCR	1	1
DRAWN BCR	PROJECT NUMBER 23008	

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4.1.4 Developed Conditions

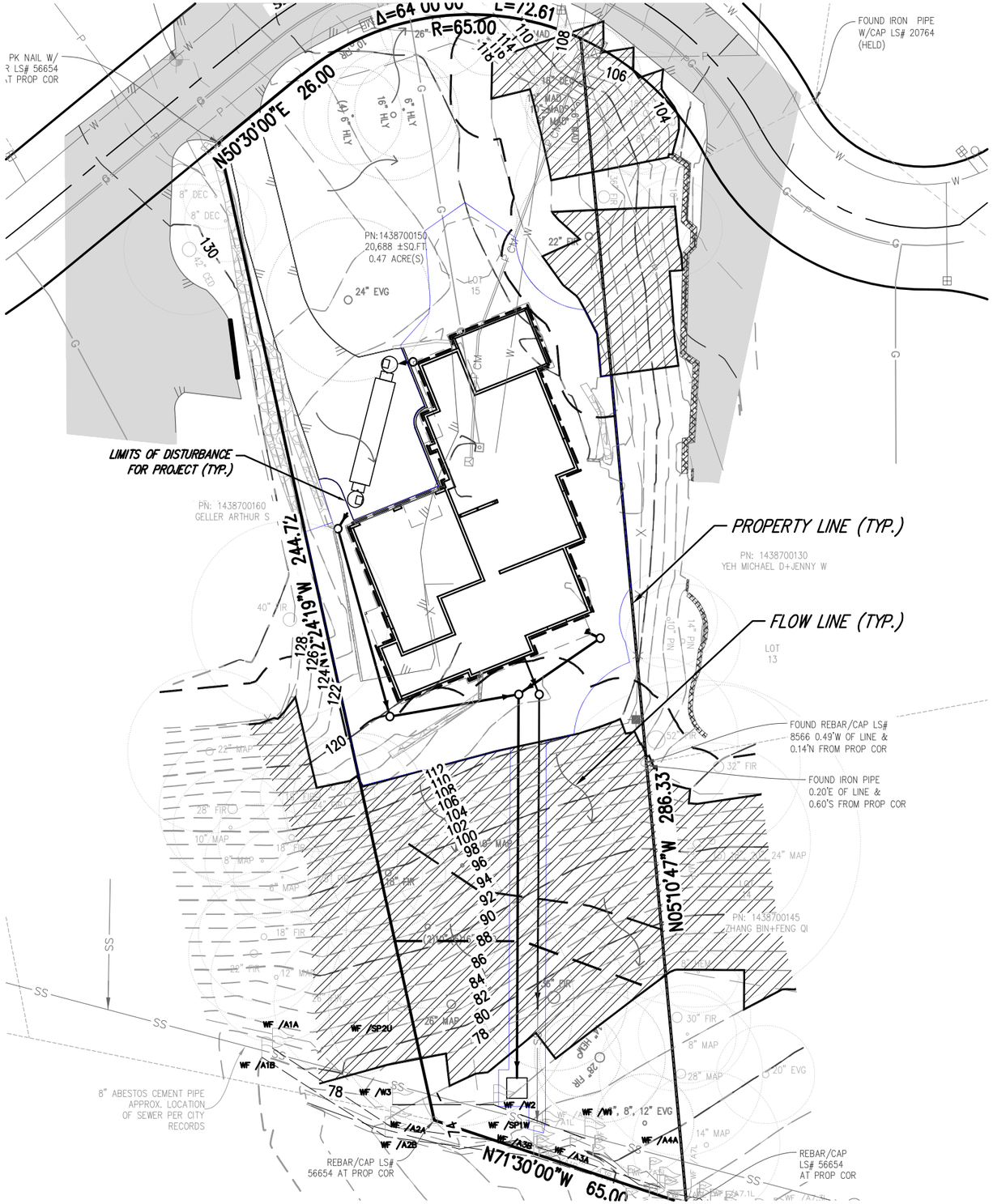
The developed condition proposes to construct of a single-family residence with associated utilities. The existing driveway will be retained and used for access to the new single-family home. Refer to Table 4.1 and 4.2 below for a breakdown of the actual developed areas. The disturbed area for the project is approximately 7,989 sf (0.181 ac). Refer to the developed conditions exhibit on the following page for an area breakdown.

Table 4.1 Developed Site Disturbed Area Breakdown

Total Area (sf)	***7,898***
Roofs (with eaves)	3,536
Driveway	37
Detached Structure	187
Impervious Subtotal	***3,760***
Lawn/Landscaping	4,138
Pervious Subtotal	***4,138***

Table 4.2 Developed Area Summary

DEVELOPED CONDITIONS	Total Area = 0.181 acres
GROUND COVER	AREA (acres)
Impervious	0.086
Grass/Lawn	0.095



SCALE: 1" = 30'

0 7.5 15 30

AREA SUMMARY

ONSITE AREA	
HARD SURFACE AREA	0.086 AC
PERVIOUS SURFACE AREA	0.095 AC
TOTAL ONSITE AREA	0.181 AC
TOTAL PROJECT AREA	0.181 AC

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9419 SE 54TH STREET

4.2 DEVELOPED CONDITIONS EXHIBIT

DATE FEBRUARY 2023	SHEET	OF
DESIGNED BCR	1	1
DRAWN BCR	PROJECT NUMBER 23008	

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4.1.5 WWHM Modeling Results

The predeveloped condition area was assumed to be fully forested with Group C soils. The developed condition area is represented in Tables 4.1 and 4.2. Both conditions, predeveloped and developed, were input into WWHM and a model using 15-minute timesteps was executed. The project causes a 0.084 cfs change to the 100-year peak flow which is less than the maximum 0.15 cfs change. Refer to the WWHM Flow Frequency Analysis on the following page. The full WWHM Report Printout has been included in Appendix B of this report.

Flow Frequency			
Flow(cfs)		Predeveloped	Mitigated
2 Year	=	0.0054	0.0405
5 Year	=	0.0088	0.0547
10 Year	=	0.0110	0.0648
25 Year	=	0.0137	0.0785
50 Year	=	0.0155	0.0894
100 Year	=	0.0172	0.1009

4.2. Flow Control BMPs

Per the City of Mercer Island regulation, the project follows the Mercer Island City Code in addendum to the 2014 DOE Manual. As such, the Minimum Requirements 1 through 5 determine whether or not various stormwater BMP measures are required and to what degree. The project proposes less than 5,000 ft^2 of new plus replaced impervious surfaces and therefore is not subject to standard Flow Control BMPs. LID BMPs are typically used to meet minimum requirement 5; however, all LID options are not feasible onsite due to site constraints.

The City of Mercer Island requires supplemental detention in place of any LID requirements and has provided a pre-sized detention tank table for sites which do not have feasible LID options. Per the table provided by the City of Mercer Island the site will provide a detention tank.

Table 4.3: Detention Pipe Sizing	
Diameter (inches)	60
Length (feet)	26
Lowest Orifice Diameter	0.5
Distance from outlet invert to second orifice (ft)	3.5
Second Orifice Diameter (in)	1.3

4.3 Outfall System Design

The project is proposing to discharge stormwater runoff from impervious surfaces to a 5' x 5' rock pad which will act as an outfall dispersion device to adequately dissipate conveyed runoff flow velocities.

The areas tributary to the dispersion outfall rock pad were modeled in WWHM to determine the 100-year flow rate. The existing driveway and proposed roof areas will be routed to the outfall rock pad. Runoff from pervious areas on the site will be sufficiently mitigated via sheet flow over/through vegetated areas. Refer to Tables 4.3 and 4.4 below for the area tributary to the outfall rock pad.

Table 4.3 Areas Tributary to Dispersion Outfall Trench Breakdown

Total Area (sf)	***5,393***
Roofs (with eaves)	3,536
Driveway	1,670
Detached Structure	187
Impervious Subtotal	***5,393***

Table 4.4 Areas Tributary to Dispersion Outfall Trench

DEVELOPED CONDITIONS	Total Area = 0.123 acres
GROUND COVER	AREA (acres)
Impervious	0.123

WWHM Model Results

The areas from Table 4.3 were input into the latest version of WWHM and a model using 15-minute timesteps was executed. The following Flow Frequency Analysis (included below) shows the flows for the model run. Refer to Appendix B of this report for the full WWHM model report.

Flow Frequency			
Flow(cfs)		Predeveloped	Mitigated
2 Year	=	0.0037	0.0490
5 Year	=	0.0060	0.0620
10 Year	=	0.0075	0.0708
25 Year	=	0.0093	0.0823
50 Year	=	0.0105	0.0911
100 Year	=	0.0117	0.1001

5.0 FINANCIAL LIABILITY

A site improvement Bond Quantities Worksheet will be provided prior to permit approval.

APPENDIX A

King County Parcel Report

Department of Assessments

201 South Jackson Street, Room 708
Seattle, WA 98104

Office Hours: Mon - Fri 8:30 a.m. to 4:30 p.m.

TEL: 206-296-7300
FAX: 206-296-5107
TTY: 206-296-7888

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- New Search
- Property Tax Bill
- Map This Property
- Glossary of Terms
- Area Report
- Property Detail

PARCEL

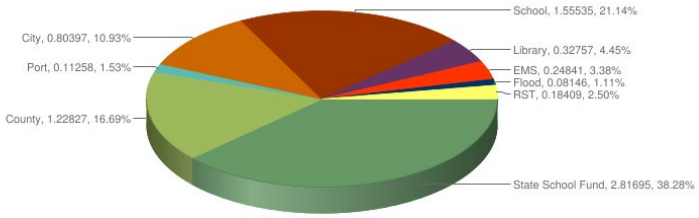
Parcel Number	143870-0150
Name	HONORLAND LLC
Site Address	9419 SE 54TH ST 98040
Legal	CAY HILLS ADD & UND INT IN PRIVATE RD

BUILDING 1

Year Built	1963
Total Square Footage	2820
Number Of Bedrooms	3
Number Of Baths	3.50
Grade	9 Better
Condition	Average
Lot Size	19817
Views	Yes
Waterfront	

TOTAL LEVY RATE DISTRIBUTION

Tax Year: 2022 **Levy Code:** 1031 **Total Levy Rate:** $7.35865 **Total Senior Rate:** $4.31001



49.66% Voter Approved

Click here to see levy distribution comparison by year.

TAX ROLL HISTORY

Valued Year	Tax Year	Appraised Land Value ($)	Appraised Imps Value ($)	Appraised Total ($)	Appraised Imps Increase ($)	Taxable Land Value ($)	Taxable Imps Value ($)	Taxable Total ($)
2022	2023	1,760,000	467,000	2,227,000	0	1,760,000	467,000	2,227,000
2021	2022	1,449,000	216,000	1,665,000	0	1,449,000	216,000	1,665,000
2020	2021	1,380,000	90,000	1,470,000	0	1,380,000	90,000	1,470,000
2019	2020	1,192,000	10,000	1,202,000	0	1,192,000	10,000	1,202,000
2018	2019	1,169,000	10,000	1,179,000	0	1,169,000	10,000	1,179,000
2017	2018	1,057,000	59,000	1,116,000	0	1,057,000	59,000	1,116,000
2016	2017	967,000	72,000	1,039,000	0	967,000	72,000	1,039,000
2015	2016	876,000	65,000	941,000	0	876,000	65,000	941,000
2014	2015	810,000	57,000	867,000	0	810,000	57,000	867,000
2013	2014	691,000	137,000	828,000	0	691,000	137,000	828,000
2012	2013	637,000	127,000	764,000	0	637,000	127,000	764,000
2011	2012	670,000	85,000	755,000	0	670,000	85,000	755,000
2010	2011	702,000	89,000	791,000	0	702,000	89,000	791,000
2009	2010	723,000	92,000	815,000	0	723,000	92,000	815,000
2008	2009	897,000	113,000	1,010,000	0	897,000	113,000	1,010,000
2007	2008	603,000	224,000	827,000	0	603,000	224,000	827,000
2006	2007	539,000	173,000	712,000	0	539,000	173,000	712,000
2005	2006	490,000	170,000	660,000	0	490,000	170,000	660,000
2004	2005	450,000	151,000	601,000	0	450,000	151,000	601,000

Reference Links:

- King County Taxing Districts Codes and Levies (.PDF)
- King County Tax Links
- Property Tax Advisor
- Washington State Department of Revenue (External link)
- Washington State Board of Tax Appeals (External link)
- Board of Appeals/Equalization
- Districts Report
- iMap
- Recorder's Office
- Scanned images of surveys and other map documents
- Scanned images of plats

Notice mailing date: 08/11/2022

2003	2004	450,000	151,000	601,000	0	450,000	151,000	601,000
2002	2003	450,000	151,000	601,000	0	450,000	151,000	601,000
2001	2002	351,000	225,000	576,000	0	351,000	225,000	576,000
2000	2001	306,000	197,000	503,000	0	306,000	197,000	503,000
1999	2000	245,000	182,000	427,000	0	245,000	182,000	427,000
1998	1999	234,000	158,000	392,000	0	234,000	158,000	392,000
1997	1998	0	0	0	0	188,000	134,000	322,000
1996	1997	0	0	0	0	185,000	101,400	286,400
1994	1995	0	0	0	0	185,000	101,400	286,400
1992	1993	0	0	0	0	184,600	121,800	306,400
1990	1991	0	0	0	0	202,900	133,800	336,700
1988	1989	0	0	0	0	103,500	74,900	178,400
1986	1987	0	0	0	0	103,500	70,200	173,700
1984	1985	0	0	0	0	71,700	83,500	155,200
1982	1983	0	0	0	0	62,900	80,300	143,200

Updated: July 25, 2022

Information for... **Do more online**
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King County

King County Districts and Development Conditions for parcel 1438700150

print

Parcel number	**1438700150**	Drainage Basin	**Mercer Island**
Address	**9419 SE 54TH ST**	Watershed	**Cedar River / Lake Washington**
Jurisdiction	**Mercer Island**	WRIA	**Cedar-Sammamish (8)**
Zipcode	**98040**	PLSS	**NE - 19 - 24 - 5**
Kroll Map page	**91**	Latitude	**47.55432**
Thomas Guide page	**596**	Longitude	**-122.21156**

King County Electoral districts

Voting district	**M-I 41-0777**
King County Council district	**District 6, Claudia Balducci (206) 477-1006**
Congressional district	**9**
Legislative district	**41**
School district	**Mercer Island #400**
Seattle school board district	**does not apply (not in Seattle)**
District Court electoral district	**Northeast**
Regional fire authority district	**does not apply**

Fire district	**does not apply**
Water district	**does not apply**
Sewer district	**does not apply**
Water & Sewer district	**does not apply**
Parks & Recreation district	**does not apply**
Hospital district	**does not apply**
Rural library district	**Rural King County Library System**
Tribal Lands?	**No**

King County planning and critical areas designations*

King County zoning	**NA, check with jurisdiction**
Development conditions	**None**
Comprehensive Plan Land Use Designation	**does not apply**
Urban Growth Area	**Urban**
Community Service Area	**does not apply**
Community Planning Area	**Eastside**
Coal mine hazards?	**Check with jurisdiction**
Erosion hazards?	**Yes**
Landslide hazards?	**Check with jurisdiction**
Seismic hazards?	**Check with jurisdiction**
100-year flood plain?	**None mapped**

Urban Unincorporated Status	**does not apply**
Rural town?	**No**
Water service planning area	**City of Mercer Island**
Transportation Concurrency Management	**does not apply**
Forest Production district?	**No**
Agricultural Production district?	**No**
Snoqualmie Valley watershed improvement district?	**No**
Critical aquifer recharge area?	**None mapped**
Wetlands at this parcel?	**Check with jurisdiction**
Within the Tacoma Smelter Plume?	**20 ppm to 40 ppm** Estimated Arsenic Concentration in Soil
Shoreline management designation (% of parcel)	**None mapped**

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Contact us at giscenter@kingcounty.gov.

APPENDIX B

WWHM Model Reports

Flow Control Check Model

Outfall Model

NRCS Soil Survey

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 23008 Flow Control Check

Site Name:	9419 SE 54th St
Site Address:	
City:	Mercer Island
Report Date:	2/10/2023
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

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

Predev Conditions

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.181
Pervious Total	0.181
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.181

Mitigated Land Use

Dev Conditions

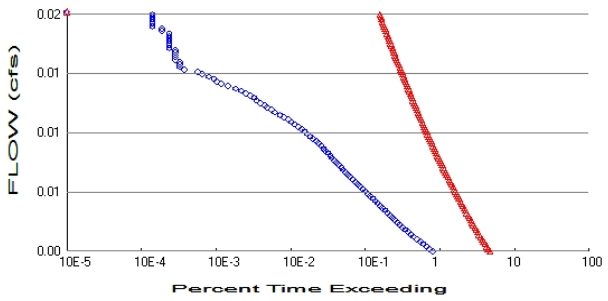
Bypass:	No
GroundWater:	No

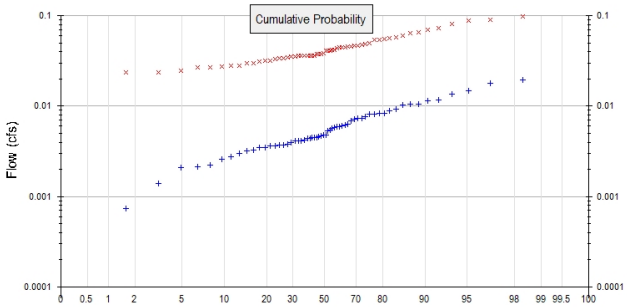
Pervious Land Use	acre
C, Lawn, Mod	0.095
Pervious Total	0.095

Impervious Land Use	acre
ROADS MOD	0.001
ROOF TOPS FLAT	0.085
Impervious Total	0.086
Basin Total	0.181

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.181
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.095
Total Impervious Area: 0.086

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.005389
5 year	0.008831
10 year	0.011044
25 year	0.013676
50 year	0.015499
100 year	0.017202

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.040484
5 year	0.054677
10 year	0.06483
25 year	0.078543
50 year	0.089418
100 year	0.100872

DIFFERENCE BETWEEN PREDEVELOPED AND DEVELOPED CONDITION 100-YEAR PEAK FLOW IS LESS THAN 0.15 CFS.

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.006	0.060
1950	0.007	0.055
1951	0.012	0.036
1952	0.004	0.025
1953	0.003	0.027
1954	0.005	0.033
1955	0.007	0.036
1956	0.006	0.035
1957	0.005	0.045
1958	0.005	0.031

1959	0.005	0.028
1960	0.008	0.038
1961	0.004	0.036
1962	0.003	0.028
1963	0.004	0.036
1964	0.005	0.032
1965	0.004	0.047
1966	0.003	0.027
1967	0.008	0.055
1968	0.005	0.057
1969	0.005	0.042
1970	0.004	0.038
1971	0.004	0.046
1972	0.009	0.055
1973	0.004	0.024
1974	0.004	0.044
1975	0.006	0.046
1976	0.004	0.034
1977	0.001	0.032
1978	0.004	0.038
1979	0.002	0.049
1980	0.011	0.064
1981	0.003	0.041
1982	0.007	0.065
1983	0.006	0.044
1984	0.004	0.030
1985	0.002	0.041
1986	0.009	0.036
1987	0.008	0.049
1988	0.003	0.028
1989	0.002	0.035
1990	0.020	0.098
1991	0.010	0.072
1992	0.004	0.030
1993	0.004	0.024
1994	0.001	0.023
1995	0.006	0.036
1996	0.014	0.047
1997	0.011	0.042
1998	0.003	0.036
1999	0.012	0.090
2000	0.004	0.041
2001	0.001	0.038
2002	0.005	0.057
2003	0.007	0.047
2004	0.008	0.082
2005	0.006	0.037
2006	0.006	0.034
2007	0.015	0.088
2008	0.018	0.070
2009	0.008	0.045

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0195	0.0978
2	0.0180	0.0895
3	0.0148	0.0885

4	0.0137	0.0818
5	0.0118	0.0724
6	0.0116	0.0704
7	0.0105	0.0653
8	0.0105	0.0637
9	0.0104	0.0601
10	0.0092	0.0575
11	0.0089	0.0566
12	0.0084	0.0551
13	0.0083	0.0547
14	0.0082	0.0545
15	0.0081	0.0494
16	0.0076	0.0491
17	0.0074	0.0473
18	0.0073	0.0468
19	0.0071	0.0467
20	0.0068	0.0458
21	0.0063	0.0458
22	0.0062	0.0448
23	0.0061	0.0447
24	0.0059	0.0444
25	0.0059	0.0436
26	0.0058	0.0424
27	0.0056	0.0422
28	0.0054	0.0413
29	0.0053	0.0411
30	0.0048	0.0410
31	0.0048	0.0384
32	0.0047	0.0381
33	0.0046	0.0380
34	0.0045	0.0377
35	0.0045	0.0365
36	0.0045	0.0363
37	0.0044	0.0362
38	0.0044	0.0362
39	0.0042	0.0361
40	0.0041	0.0361
41	0.0041	0.0358
42	0.0041	0.0356
43	0.0040	0.0353
44	0.0038	0.0349
45	0.0037	0.0339
46	0.0037	0.0336
47	0.0036	0.0331
48	0.0036	0.0320
49	0.0035	0.0316
50	0.0035	0.0315
51	0.0033	0.0299
52	0.0032	0.0297
53	0.0030	0.0279
54	0.0028	0.0278
55	0.0026	0.0276
56	0.0022	0.0270
57	0.0021	0.0269
58	0.0021	0.0247
59	0.0014	0.0237
60	0.0007	0.0237
61	0.0006	0.0232

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0027	17085	99672	583	Fail
0.0028	15494	94881	612	Fail
0.0030	14070	90304	641	Fail
0.0031	12801	86154	673	Fail
0.0032	11569	82154	710	Fail
0.0033	10515	78433	745	Fail
0.0035	9565	74989	783	Fail
0.0036	8752	71717	819	Fail
0.0037	8031	68658	854	Fail
0.0039	7347	65685	894	Fail
0.0040	6737	63011	935	Fail
0.0041	6190	60338	974	Fail
0.0042	5730	57793	1008	Fail
0.0044	5309	55333	1042	Fail
0.0045	4924	53151	1079	Fail
0.0046	4569	51034	1116	Fail
0.0048	4237	49002	1156	Fail
0.0049	3951	46991	1189	Fail
0.0050	3645	45173	1239	Fail
0.0052	3390	43398	1280	Fail
0.0053	3133	41665	1329	Fail
0.0054	2915	40061	1374	Fail
0.0055	2706	38543	1424	Fail
0.0057	2490	37088	1489	Fail
0.0058	2314	35634	1539	Fail
0.0059	2136	34372	1609	Fail
0.0061	1972	33131	1680	Fail
0.0062	1824	31869	1747	Fail
0.0063	1702	30672	1802	Fail
0.0064	1577	29581	1875	Fail
0.0066	1443	28511	1975	Fail
0.0067	1325	27506	2075	Fail
0.0068	1232	26458	2147	Fail
0.0070	1147	25517	2224	Fail
0.0071	1083	24619	2273	Fail
0.0072	1020	23720	2325	Fail
0.0074	947	22907	2418	Fail
0.0075	885	22116	2498	Fail
0.0076	824	21320	2587	Fail
0.0077	760	20563	2705	Fail
0.0079	725	19827	2734	Fail
0.0080	674	19147	2840	Fail
0.0081	623	18503	2969	Fail
0.0083	589	17917	3041	Fail
0.0084	549	17274	3146	Fail
0.0085	506	16683	3297	Fail
0.0086	469	16172	3448	Fail
0.0088	427	15625	3659	Fail
0.0089	388	15143	3902	Fail
0.0090	356	14660	4117	Fail
0.0092	328	14176	4321	Fail
0.0093	298	13706	4599	Fail
0.0094	270	13250	4907	Fail
0.0095	241	12838	5326	Fail

0.0097	218	12427	5700	Fail
0.0098	197	12001	6091	Fail
0.0099	173	11636	6726	Fail
0.0101	153	11289	7378	Fail
0.0102	130	10921	8400	Fail
0.0103	119	10605	8911	Fail
0.0105	104	10275	9879	Fail
0.0106	95	9961	10485	Fail
0.0107	84	9657	11496	Fail
0.0108	74	9368	12659	Fail
0.0110	69	9080	13159	Fail
0.0111	61	8789	14408	Fail
0.0112	53	8575	16179	Fail
0.0114	46	8322	18091	Fail
0.0115	39	8098	20764	Fail
0.0116	31	7888	25445	Fail
0.0117	25	7657	30628	Fail
0.0119	22	7430	33772	Fail
0.0120	20	7240	36200	Fail
0.0121	17	7009	41229	Fail
0.0123	14	6795	48535	Fail
0.0124	12	6592	54933	Fail
0.0125	8	6391	79887	Fail
0.0127	7	6205	88642	Fail
0.0128	7	6010	85857	Fail
0.0129	7	5846	83514	Fail
0.0130	6	5649	94150	Fail
0.0132	6	5467	91116	Fail
0.0133	6	5324	88733	Fail
0.0134	6	5185	86416	Fail
0.0136	6	5067	84450	Fail
0.0137	5	4939	98780	Fail
0.0138	5	4789	95780	Fail
0.0139	5	4663	93260	Fail
0.0141	5	4539	90780	Fail
0.0142	5	4417	88340	Fail
0.0143	5	4293	85860	Fail
0.0145	5	4158	83160	Fail
0.0146	4	4034	100850	Fail
0.0147	4	3925	98125	Fail
0.0149	3	3814	127133	Fail
0.0150	3	3709	123633	Fail
0.0151	3	3604	120133	Fail
0.0152	3	3529	117633	Fail
0.0154	3	3450	115000	Fail
0.0155	3	3358	111933	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

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
Total Volume Infiltrated		0.00	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 = Failed

Model Default Modifications

Total of 0 changes have been made.

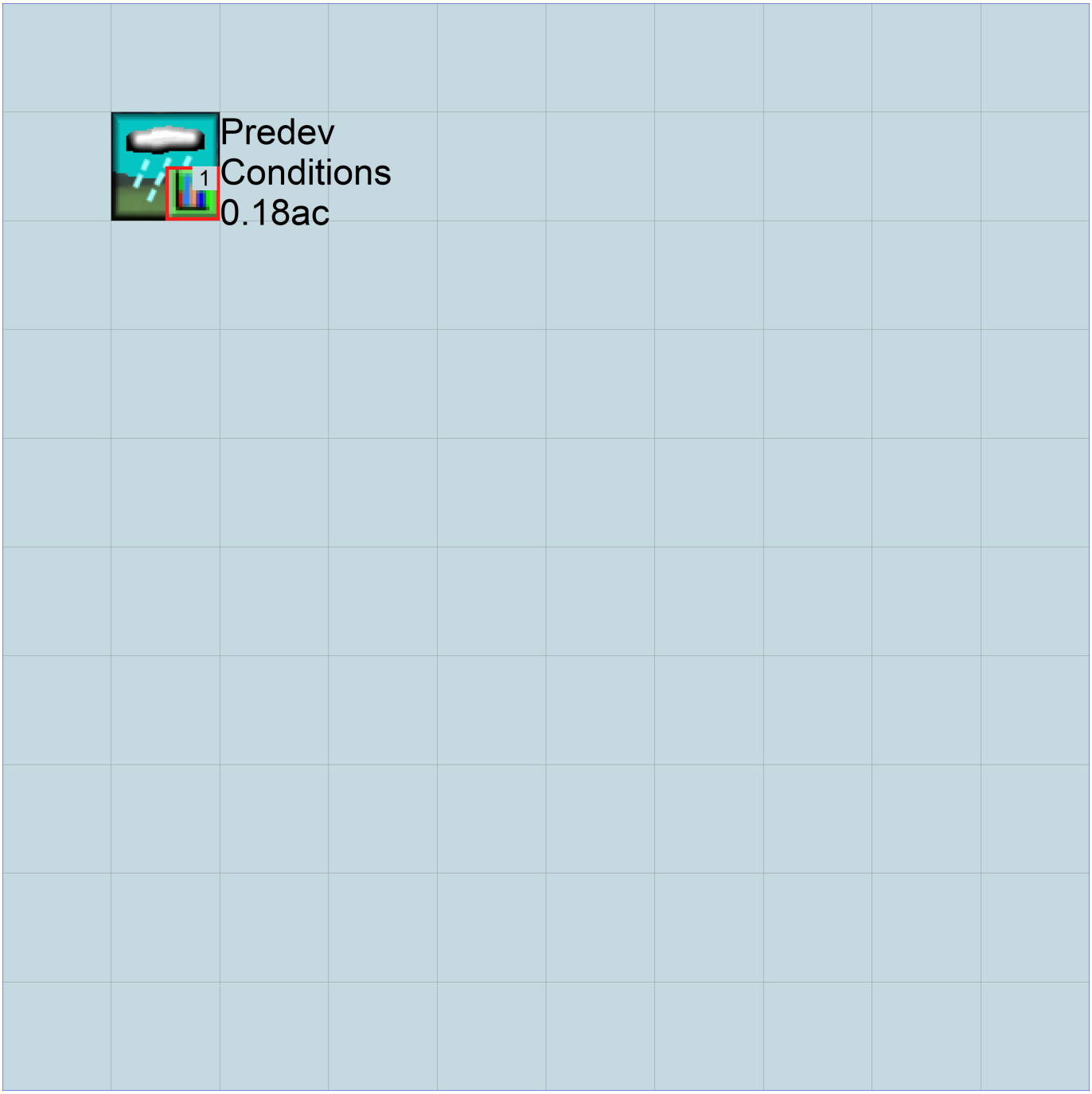
PERLND Changes

No PERLND changes have been made.

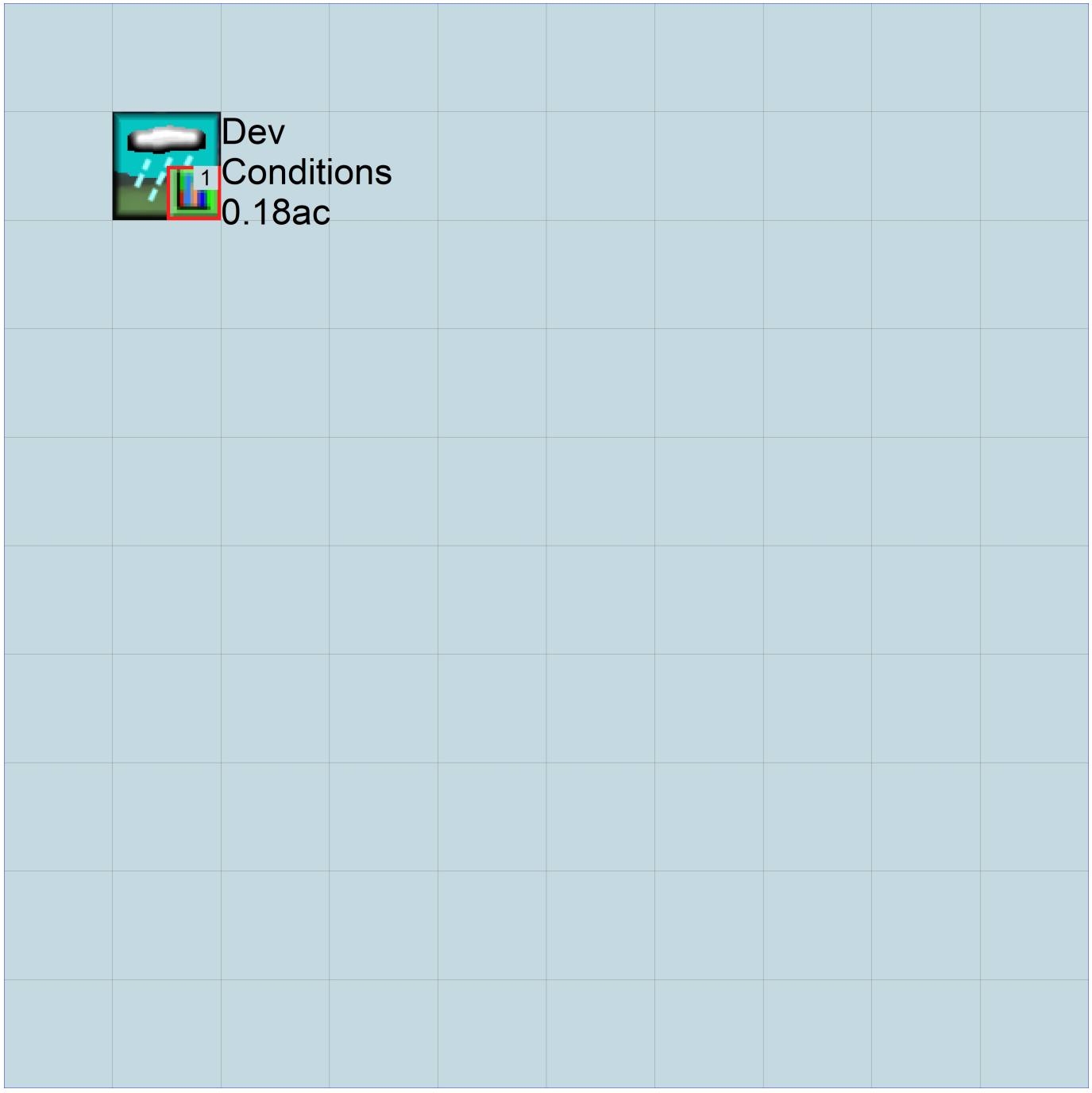
IMPLND Changes

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   23008 Flow Control Check.wdm
MESSU       25   Pre23008 Flow Control Check.MES
            27   Pre23008 Flow Control Check.L61
            28   Pre23008 Flow Control Check.L62
            30   POC23008 Flow Control Check1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Predev Conditions           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           ***
   11     C, Forest, Mod          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 ***
   11         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  *********
   11         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 ***
   11         0    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
   11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11           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
   11             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#   ***
Predev Conditions***
PERLND  11                       0.181     COPY   501     12
PERLND  11                       0.181     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   23008 Flow Control Check.wdm
MESSU       25   Mit23008 Flow Control Check.MES
            27   Mit23008 Flow Control Check.L61
            28   Mit23008 Flow Control Check.L62
            30   POC23008 Flow Control Check1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      17
      IMPLND       2
      IMPLND       4
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Dev Conditions              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           ***
   17     C, Lawn, Mod            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 ***
   17         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  *********
   17         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 ***
   17         0    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
   17             0       4.5      0.03       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   17             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   17           0.1      0.25      0.25         6       0.5      0.25
  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
   17             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           ***
    2      ROADS/MOD              1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    4    1    9
    4         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     ***
    2         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            400      0.05       0.1      0.08
    4            400      0.01       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Dev Conditions***
PERLND  17                      0.095     COPY   501     12
PERLND  17                      0.095     COPY   501     13
IMPLND   2                      0.001     COPY   501     15
IMPLND   4                      0.085     COPY   501     15

******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     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       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

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Disclaimer

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WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 23008 Outfall Trench Model

Site Name:	9419 SE 54th St
Site Address:	
City:	Mercer Island
Report Date:	2/9/2023
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2023/01/27
Version:	4.2.19

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

Predev Conditions

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.123
Pervious Total	0.123
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.123

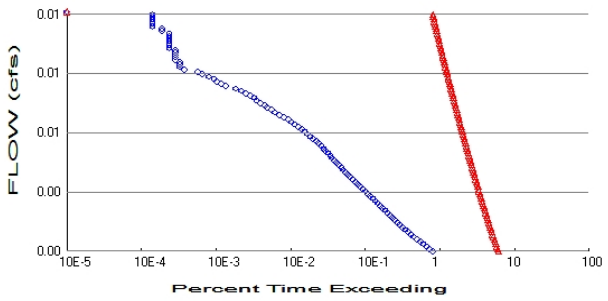
Mitigated Land Use

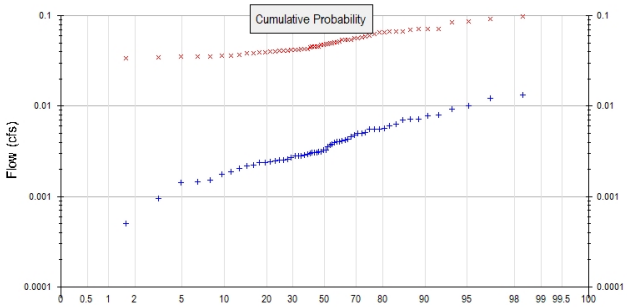
Dev Conditions

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS MOD	0.038
ROOF TOPS FLAT	0.085
Impervious Total	0.123
Basin Total	0.123

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.123
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.123

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.003662
5 year	0.006001
10 year	0.007505
25 year	0.009294
50 year	0.010533
100 year	0.01169

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.049013
5 year	0.062008
10 year	0.070848
25 year	0.082326
50 year	0.091118
100 year	0.10013

PEAK FLOW USED TO SIZE THE DISPERSION OUTFALL TRENCH

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.004	0.063
1950	0.005	0.068
1951	0.008	0.039
1952	0.003	0.034
1953	0.002	0.038
1954	0.003	0.040
1955	0.005	0.046
1956	0.004	0.043
1957	0.003	0.049
1958	0.004	0.041

1959	0.003	0.043
1960	0.006	0.041
1961	0.003	0.041
1962	0.002	0.037
1963	0.003	0.042
1964	0.004	0.042
1965	0.002	0.050
1966	0.002	0.034
1967	0.006	0.059
1968	0.003	0.071
1969	0.003	0.046
1970	0.002	0.046
1971	0.003	0.055
1972	0.006	0.054
1973	0.003	0.035
1974	0.003	0.050
1975	0.004	0.056
1976	0.003	0.039
1977	0.000	0.042
1978	0.003	0.054
1979	0.002	0.071
1980	0.007	0.065
1981	0.002	0.050
1982	0.005	0.071
1983	0.004	0.058
1984	0.002	0.036
1985	0.001	0.049
1986	0.006	0.043
1987	0.006	0.067
1988	0.002	0.041
1989	0.001	0.057
1990	0.013	0.084
1991	0.007	0.070
1992	0.003	0.036
1993	0.003	0.036
1994	0.001	0.036
1995	0.004	0.045
1996	0.009	0.051
1997	0.007	0.046
1998	0.002	0.047
1999	0.008	0.098
2000	0.003	0.048
2001	0.001	0.055
2002	0.003	0.060
2003	0.005	0.052
2004	0.005	0.093
2005	0.004	0.040
2006	0.004	0.036
2007	0.010	0.087
2008	0.012	0.067
2009	0.006	0.065

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0133	0.0981
2	0.0122	0.0930
3	0.0100	0.0871

4	0.0093	0.0845
5	0.0080	0.0711
6	0.0079	0.0709
7	0.0072	0.0709
8	0.0072	0.0698
9	0.0070	0.0676
10	0.0063	0.0672
11	0.0061	0.0670
12	0.0057	0.0655
13	0.0056	0.0650
14	0.0055	0.0633
15	0.0055	0.0597
16	0.0052	0.0590
17	0.0050	0.0581
18	0.0050	0.0571
19	0.0048	0.0564
20	0.0046	0.0547
21	0.0043	0.0547
22	0.0042	0.0544
23	0.0042	0.0542
24	0.0040	0.0519
25	0.0040	0.0508
26	0.0040	0.0504
27	0.0038	0.0503
28	0.0037	0.0500
29	0.0036	0.0492
30	0.0032	0.0491
31	0.0032	0.0476
32	0.0032	0.0472
33	0.0031	0.0461
34	0.0031	0.0460
35	0.0031	0.0458
36	0.0030	0.0456
37	0.0030	0.0447
38	0.0030	0.0432
39	0.0029	0.0431
40	0.0028	0.0427
41	0.0028	0.0421
42	0.0028	0.0417
43	0.0027	0.0416
44	0.0026	0.0414
45	0.0025	0.0412
46	0.0025	0.0408
47	0.0025	0.0407
48	0.0024	0.0401
49	0.0024	0.0396
50	0.0023	0.0395
51	0.0022	0.0389
52	0.0022	0.0384
53	0.0020	0.0370
54	0.0019	0.0362
55	0.0018	0.0358
56	0.0015	0.0358
57	0.0014	0.0358
58	0.0014	0.0357
59	0.0009	0.0347
60	0.0005	0.0337
61	0.0004	0.0337

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0018	17079	130600	764	Fail
0.0019	15500	127071	819	Fail
0.0020	14078	123627	878	Fail
0.0021	12808	120398	940	Fail
0.0022	11569	117339	1014	Fail
0.0023	10523	114302	1086	Fail
0.0024	9565	111350	1164	Fail
0.0024	8752	108655	1241	Fail
0.0025	8034	106046	1319	Fail
0.0026	7347	103458	1408	Fail
0.0027	6740	101083	1499	Fail
0.0028	6192	98688	1593	Fail
0.0029	5730	96442	1683	Fail
0.0030	5309	94153	1773	Fail
0.0031	4924	91993	1868	Fail
0.0031	4569	89940	1968	Fail
0.0032	4235	87929	2076	Fail
0.0033	3951	85962	2175	Fail
0.0034	3643	84037	2306	Fail
0.0035	3388	82176	2425	Fail
0.0036	3133	80358	2564	Fail
0.0037	2917	78518	2691	Fail
0.0038	2706	76829	2839	Fail
0.0039	2490	75117	3016	Fail
0.0039	2314	73492	3175	Fail
0.0040	2136	71888	3365	Fail
0.0041	1972	70369	3568	Fail
0.0042	1824	68851	3774	Fail
0.0043	1702	67332	3956	Fail
0.0044	1577	65920	4180	Fail
0.0045	1443	64487	4468	Fail
0.0046	1325	63161	4766	Fail
0.0046	1232	61814	5017	Fail
0.0047	1147	60552	5279	Fail
0.0048	1085	59290	5464	Fail
0.0049	1020	57985	5684	Fail
0.0050	947	56830	6001	Fail
0.0051	886	55718	6288	Fail
0.0052	823	54606	6634	Fail
0.0053	760	53451	7033	Fail
0.0053	725	52381	7224	Fail
0.0054	674	51290	7609	Fail
0.0055	623	50264	8068	Fail
0.0056	589	49237	8359	Fail
0.0057	549	48210	8781	Fail
0.0058	506	47226	9333	Fail
0.0059	469	46243	9859	Fail
0.0060	427	45344	10619	Fail
0.0061	388	44446	11455	Fail
0.0061	356	43548	12232	Fail
0.0062	328	42713	13022	Fail
0.0063	298	41901	14060	Fail
0.0064	270	41088	15217	Fail
0.0065	241	40275	16711	Fail

0.0066	218	39505	18121	Fail
0.0067	197	38757	19673	Fail
0.0068	173	37965	21945	Fail
0.0068	152	37238	24498	Fail
0.0069	130	36553	28117	Fail
0.0070	119	35848	30124	Fail
0.0071	104	35142	33790	Fail
0.0072	95	34415	36226	Fail
0.0073	83	33752	40665	Fail
0.0074	74	33088	44713	Fail
0.0075	69	32490	47086	Fail
0.0075	61	31869	52244	Fail
0.0076	53	31249	58960	Fail
0.0077	46	30714	66769	Fail
0.0078	39	30137	77274	Fail
0.0079	29	29602	102075	Fail
0.0080	25	29067	116268	Fail
0.0081	22	28511	129595	Fail
0.0082	20	27998	139990	Fail
0.0082	17	27420	161294	Fail
0.0083	14	26950	192500	Fail
0.0084	12	26437	220308	Fail
0.0085	8	25902	323775	Fail
0.0086	7	25410	363000	Fail
0.0087	7	24961	356585	Fail
0.0088	7	24490	349857	Fail
0.0089	6	24084	401400	Fail
0.0090	6	23613	393550	Fail
0.0090	6	23228	387133	Fail
0.0091	6	22758	379300	Fail
0.0092	6	22351	372516	Fail
0.0093	5	21924	438479	Fail
0.0094	5	21560	431200	Fail
0.0095	5	21156	423120	Fail
0.0096	5	20809	416179	Fail
0.0097	5	20426	408520	Fail
0.0097	5	20080	401600	Fail
0.0098	5	19697	393940	Fail
0.0099	4	19357	483925	Fail
0.0100	4	19030	475750	Fail
0.0101	3	18692	623066	Fail
0.0102	3	18343	611433	Fail
0.0103	3	18078	602600	Fail
0.0104	3	17742	591400	Fail
0.0104	3	17436	581200	Fail
0.0105	3	17107	570233	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

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
Total Volume Infiltrated		0.00	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 = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

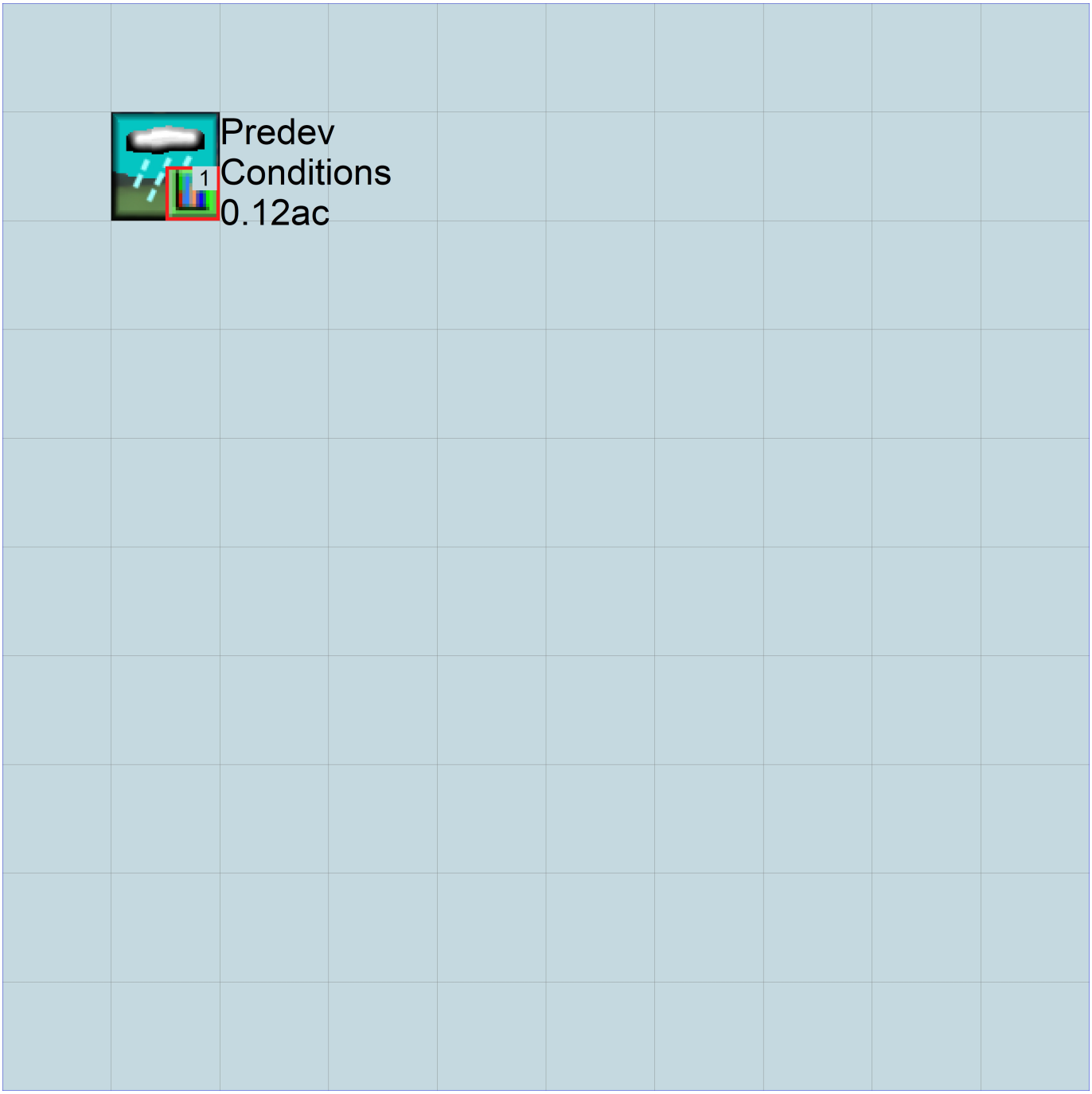
No PERLND changes have been made.

IMPLND Changes

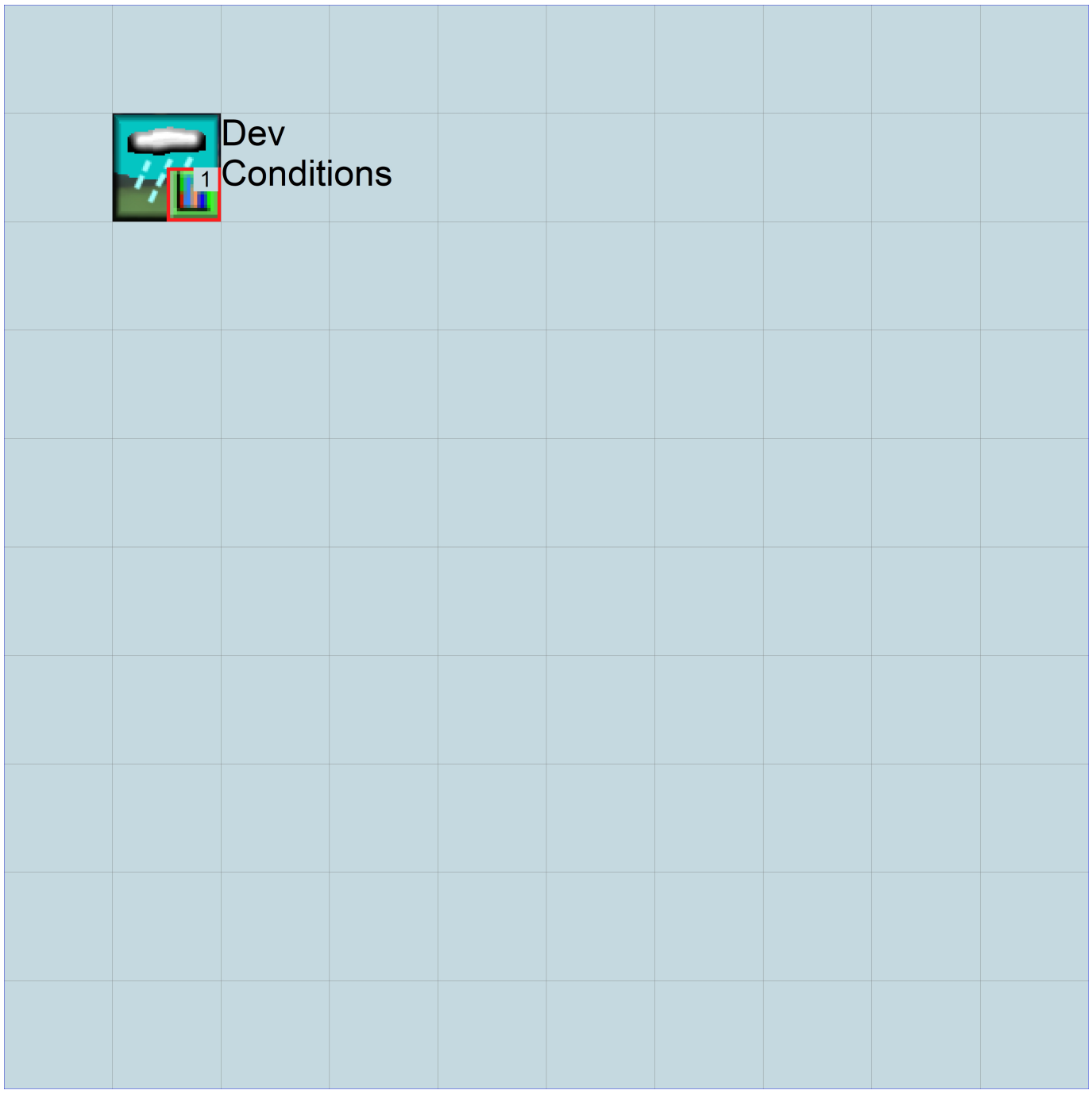
No IMPLND changes have been made.

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   23008 Outfall Trench Model.wdm
MESSU       25   Pre23008 Outfall Trench Model.MES
            27   Pre23008 Outfall Trench Model.L61
            28   Pre23008 Outfall Trench Model.L62
            30   POC23008 Outfall Trench Model1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Predev Conditions           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           ***
   11     C, Forest, Mod          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 ***
   11         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  *********
   11         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 ***
   11         0    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
   11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11           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
   11             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#   ***
Predev Conditions***
PERLND  11                       0.123     COPY   501     12
PERLND  11                       0.123     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   23008 Outfall Trench Model.wdm
MESSU       25   Mit23008 Outfall Trench Model.MES
            27   Mit23008 Outfall Trench Model.L61
            28   Mit23008 Outfall Trench Model.L62
            30   POC23008 Outfall Trench Model1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       2
      IMPLND       4
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Dev Conditions              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           ***
  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           ***
    2      ROADS/MOD              1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    4    1    9
    4         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     ***
    2         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            400      0.05       0.1      0.08
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
    4              0         0
  END IWAT-PARM3
```

```
  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Dev Conditions***
IMPLND   2                       0.038     COPY   501     15
IMPLND   4                       0.085     COPY   501     15

******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     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       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Disclaimer

Legal Notice

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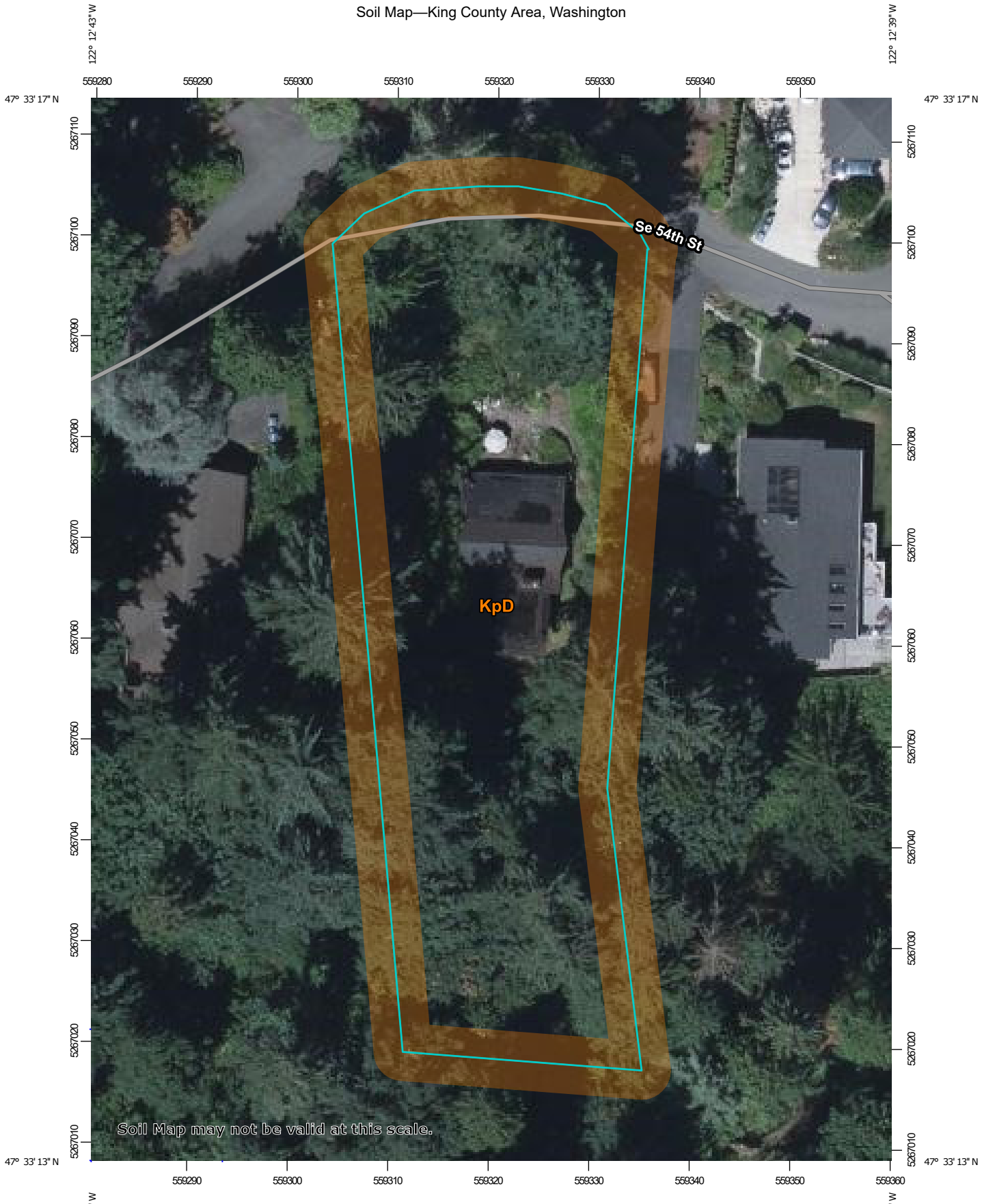

Map Scale: 1:513 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 18, Sep 8, 2022

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

Date(s) aerial images were photographed: Jul 6, 2020—Jul 20, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KpD	Kitsap silt loam, 15 to 30 percent slopes	0.6	100.0%
Totals for Area of Interest		**0.6**	**100.0%**