PRELIMINARY DRAINAGE REPORT

For

LORENZINI SHORT PLAT

4719 86TH AVE SE Mercer Island, WA

07/20/2023

DRS Project No. 21071
Mercer Island Permit No. SUB22-002

Applicant

Design Built Homes
11400 SE 8th ST, Suite 415
Bellevue, WA 98004

Report Prepared by

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PRELIMINARY DRAINAGE REPORT
4719 89th AVE SE SHORT PLAT
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SECTION I: PROJECT OVERVIEW

GENERAL DESCRIPTION

The Site is located at 4719 86th Ave SE, Mercer Island Washington, also known as Tax Parcel Numbers 7598100420. Project is the subdivision one existing parcel into two single-family residential lots. Access to project will be along 89th Ave SE where it connects with the existing roadway facility; the second lot will be accessed from a proposed private drive located along the northern edge of the property line. The Project is required to meet the standards in the 2019 Department of Ecology Stormwater Management Manual for Western Washington. The existing residence will be removed.

PREDEVELOPED SITE CONDITIONS

The total area of the existing parcel is 28,644 s.f. (0.658 ac). The total project area is 29,138 s.f. (0.669 ac). The Site is currently developed with a single-family residence, driveways and landscaping. Vegetation consists of lawn and landscaping with evergreen and deciduous trees. There are no critical areas identified on the Site.

The Site is encompassed in one Threshold Discharge Area (TDA). This TDA consists of on Natural Discharge Areas (NDA) and one Natural Discharge Locations (NDL). The topography of NDA 1 slopes from a high point in the north east corn of the site at approximately 12.2% within Lot 1 to 4.4% within Lot 2; runoff travels southwest along the western property line exiting the Site through as sheet flow along the southwest property corner and continues southwest through the existing stormwater conveyance system in SE 47th PL. The system along SE 47th PL conveys runoff until it outfalls to Lake Washington.

The USDA Web Soil Survey describes the soil on Site as Arents, Alderwood material, 6 to 15 percent slopes (AmC - 6-15% slopes), Kitsap silt loam, 2 to 8 percent slopes and Kitsap silt loam, 15 to 30 percent slopes.

DEVELOPED SITE CONDITIONS

The applicant is seeking approval for development of 28,644 s.f. (0.658 ac) into two single-family residential lots through the City of Mercer Island short plat process (Project), with lot sizes of 13,670 and 14,974 s.f. (Project). Lots 1 and 2 will contain new development; Lot 1 will contain a 20ôwide shared use driveway. Lot 2 will access the lot from the shared driveway. A total of 4,002 s.f. of pavement will be provided for access to Lots 1 and 2. The existing residence will be removed. A total of 5,097 CF of volume is required for flow control; accordingly, all runoff is being routed to a 110-foot long, 8-foot diameter tank.

The Project is located in R-9.6 zoning, which has a minimum lot area of 9,600 s.f. Maximum impervious is limited to 40% per lot and the maximum lot coverage by structure is limited to 40% per lot.

- Total area of land-disturbing activities = 29,138 s.f.
- Total Lot Impervious Area Allowed = 11,457 s.f. (40% of Site area)
- Total Impervious Area Added = 11,951 s.f.

Applicable Minimum Requirements for the Project are determined by Flow chart (see Appendix A). The Project is defined as new development and therefore does not qualify for Redevelopment thresholds.

The Project will result in more than 2,000 s.f. of new, replaced, and new plus replaced impervious surfaces. Lots 1 and 2 will provide 11,457 s.f. of impervious surfaces; accordingly, all minimum requirements apply to the new and replaced hard surfaces and the land disturbed.

Minimum Requirement #1: Preparation of Stormwater Site Plans

This Stormwater Site Plan has been prepared in accordance with the 2019 Department of Ecology Stormwater Management Manual for Western Washington.

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

The Project will comply with the Construction SWPP thirteen elements. An erosion control plan will be provided with each building permit.

Minimum Requirement #3: Source Control of Pollution

All known, available, and reasonable source control BMPs will be applied to this Project.

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

The natural drainage patterns will be maintained for this Project. Surface runoff will be collected for flow control and discharged to the existing system in SE 47th PL.

Minimum Requirement #5: On-site Stormwater Management

The project will apply On-site Stormwater Management BMPs in accordance with the project thresholds, standards, and lists found in Table 1-3-2 of the 2019 Department of Ecology Stormwater Management Manual for Western Washington. For the process of selecting on-site BMPs see Appendix A.

Since all nine minimum requirements are triggered by this project, On-site Stormwater Management BMPs from List #2 will be applied according to feasibility to each type of surface. The result of the selection process for Lot 1 is outlined below.

Lawn and Landscaped Areas:

- Post-Construction Soil Quality and Depth BMP T5.13 will be applied to all feasible areas in accordance with the 2019 Department of Ecology Stormwater Management Manual for Western Washington. See soil management plan, below.

Roofs:

- Full Dispersion: Not feasible as there is not enough available area that is in the native or forested condition.
- Full Infiltration: Not permitted per Mercer Island infiltration feasibility map.
- Bioretention: Not feasible due to the lack of a safe and available overflow pathway to the municipal storm system.
- Downspout Dispersion Systems: A downspout dispersion system consistent with DOE BMP T5.10B will be provided.

Other Hard Surfaces (Driveways/Sidewalks) ï

- Full Dispersion: Not feasible as there is not enough available area that is in the native or forested condition.
- Permeable Pavement: Not permitted per Mercer Island infiltration feasibility map.
- Bioretention: Not feasible due to the lack of a safe and available overflow pathway to the municipal storm system.
- Sheet Flow Dispersion: Basic sheet flow dispersion may be utilized to the maximum extent feasible per Figure V-3.2 of the 2019SWMMWW; location of sheet flow dispersion strips to be determined as applicable with final engineering plans.

The result of the BMP selection process for Lot 2 is outlined below.

Lawn and Landscaped Areas:

- Post-Construction Soil Quality and Depth BMP T5.13 will be applied to all feasible areas in accordance with the 2020 SWES. See soil management plan, below.

Roofs:

- Full Dispersion: Not feasible as there is not enough available area that is in the native or forested condition.
- Full Infiltration: Not permitted per Mercer Island infiltration feasibility map.
- Bioretention: Not feasible due to the lack of a safe and available overflow pathway to the municipal storm system.
- Downspout Dispersion Systems: A downspout dispersion system consistent with DOE BMP T5.10B will be provided.

Other Hard Surfaces (Driveways/Sidewalks) ï

- Full Dispersion: Not feasible as there is not enough available area that is in the native or forested condition.
- Permeable Pavement: Not permitted per Mercer Island infiltration feasibility map.
- Bioretention: Not feasible due to the lack of a safe and available overflow pathway to the municipal storm system.

- Sheet Flow Dispersion: Basic sheet flow dispersion may be utilized to the maximum extent feasible per Figure V-3.2 of the 2019SWMMWW; location of sheet flow dispersion strips to be determined as applicable with final engineering plans. There are no sidewalks to be constructed along the proposed private drive.

Soil Management Plan

Within the limits of Site disturbance, duff and topsoil will be retained in an undisturbed state and stockpiled for later use to stabilize and amend soils throughout the Site. Post-construction soil amendment will meet the requirements of BMP T5.13 Post-Construction Soil Quality and Depth. Detailed calculation for imported soil amendment compost, if necessary, will be provided during engineering review for the Project.

Minimum Requirement #6: Runoff Treatment

Not applicable for this project. The total effective PGIS for the Project is less than 5,000 s.f. (4,002 s.f.) and therefore, according per the TDA thresholds as outlined in 1-3.4.6 of the 2019 Department of Ecology Stormwater Management Manual for Western Washington, a treatment facility is not applicable.

Minimum Requirement #7: Flow Control

A continuous simulation model, WWHM 2012, was used to analyze the pre- and post-developed runoff rates. The soil type is modeled as hydrologic soil group C for the Alderwood SCS classification as shown in Figure 4. In the pre-developed condition, the entire Site is modeled as ñForestò In post-development conditions, the soil types are unchanged from the pre-developed conditions. Pursuant to the 2019 Department of Ecology Stormwater Management Manual for Western Washington, Volume III-Appendix C, all areas that meet the soil quality and depth requirement are to be entered into the model as pasture rather than lawn/landscaping; accordingly, landscaped areas are modeled as ñPastureòfor this Project. The remaining portions of the developed Site tributary to the proposed detention tank are modeled impervious as appropriate. Results of the WWHM2012 analysis are included in Appendix B.

Minimum Requirement #8: Wetlands Protection

Not applicable to this Project. There are no wetlands on the Project Site nor in the vicinity of the downstream discharge area.

Minimum Requirement #9: Operation and Maintenance

An operation and maintenance manual will be provided at final engineering.

PROPOSED SITE DOWNSTREAM DRAINAGE SYSTEM

Upstream Analysis

In evaluating the upstream area, we reviewed the USGS topographic survey mapping of the area, and field topographic survey, performed by D.R. STRONG. Consulting Engineers Inc. The majority of upstream runoff appears to be drained away from the Site. Runoff from the parcel to the north drains toward the west and is either collected

along SE 47th ST or sheet flows across neighboring parcels to the west until it is collected along 84th AVE SE. A negligible amount of stormwater may enter the Project Site over the northern property line before draining to the west, away from the Site. Runoff from parcels to the south drains southwest and away from the Site. In summary, the amount of upstream stormwater the Site is expected to receive is negligible.

Downstream Analysis

The downstream area is located within the Mercer Island Drainage Basin. The downstream area was evaluated by reviewing available resources, and by conducting a field reconnaissance. The field reconnaissance was performed on June 18, 2021 under sunny conditions and no precipitation.

The Site is encompassed in one Threshold Discharge Area (TDA). This TDA consists of on Natural Discharge Areas (NDA) and one Natural Discharge Locations (NDL). The topography of NDA 1 slopes from a high point in the north east corn of the site at approximately 12.2% within Lot 1 to 4.4% within Lot 2; runoff travels southwest along the western property line exiting the Site through as sheet flow along the southwest property corner and continues southwest through the existing stormwater conveyance system in SE 47th PL. The system along SE 47th PL conveys runoff until it outfalls to Lake Washington.

Downstream Path of the NDA 1

Point ñA1ò is the natural discharge location where runoff sheet flows over the southwestern property corner of the Site. (0ô)

From ñA1ò to Point ñA2ò, runoff travels south as surface flow over vegetation. (0ô±200ô) No flow was observed.

Point ñA2ò, runoff enters an existing catch basin located in the loop of SE 47TH PL (±200ô)

From Point ñA2ò to Point ñA3ò, Runoff continues southwest as pipe flow through a 12-inch diameter concrete pipe. (±260) No flow was observed.

Point ñA3ò, runoff from the 12-inch PVC converges with an open water course. (±260ô)

From Point ñA3ò to Point ñA4ò, Runoff continues west as channelized flow through. (±420) No flow was observed.

Point ñA4ò, runoff from the channelized flow enters a 12ò concrete pipe. (±420ô)

From Point ñA4ò to Point ñA5ò, Runoff continues southwest as pipe flow through a stormwater conveyance system. (±515) No flow was observed.

Point ñA5ò, runoff enters a Type 2 manhole just north of Mercer Way. (±515ô)

From Point ñA5ò to Point ñA6ò, Runoff continues southwest as pipe flow through a 12-inch concrete pipe. (±620) No flow was observed.

From Point ñA6,ò stormwater outfalls from a 12-inch concrete pipe into an open watercourse (±620)

From Point ñA6ò to Point ñA7ò, Runoff continues south as channel flow. (±705) No flow was observed.

From Point ñA7,ò stormwater enters an 18-inch corrugated metal pipe (±705)

From Point ñA7ò to Point ñA8ò, Runoff continues south as pipe flow through an 18-inch corrugated metal pipe. (±725) No flow was observed.

From Point ñA8,ò stormwater enters a type 1 CB east of 84th Ave SE. (±725)

From Point ñA8ò to Point ñA9ò, Runoff continues west as pipe flow through a 12-inch concrete pipe. (±740) No flow was observed.

From Point ñA9,ò stormwater outfalls from a 12-inch concrete pipe to an open water course (±740)

From Point ñA9ò to Point ñA10ò, Runoff continues west as channelized flow through an open water course. (±1320) No flow was observed.

From Point ñA10,ò stormwater enters an 18-inch corrugated metal pipe where it travels through a series of catch basins, and open water courses until it ultimately outfalls to Lake Washington (±1320)

SECTION II: SITE MAPS

FIGURE 1
VICINITY MAP

4719 86TH AVE SE, MERCER ISLAND, WA

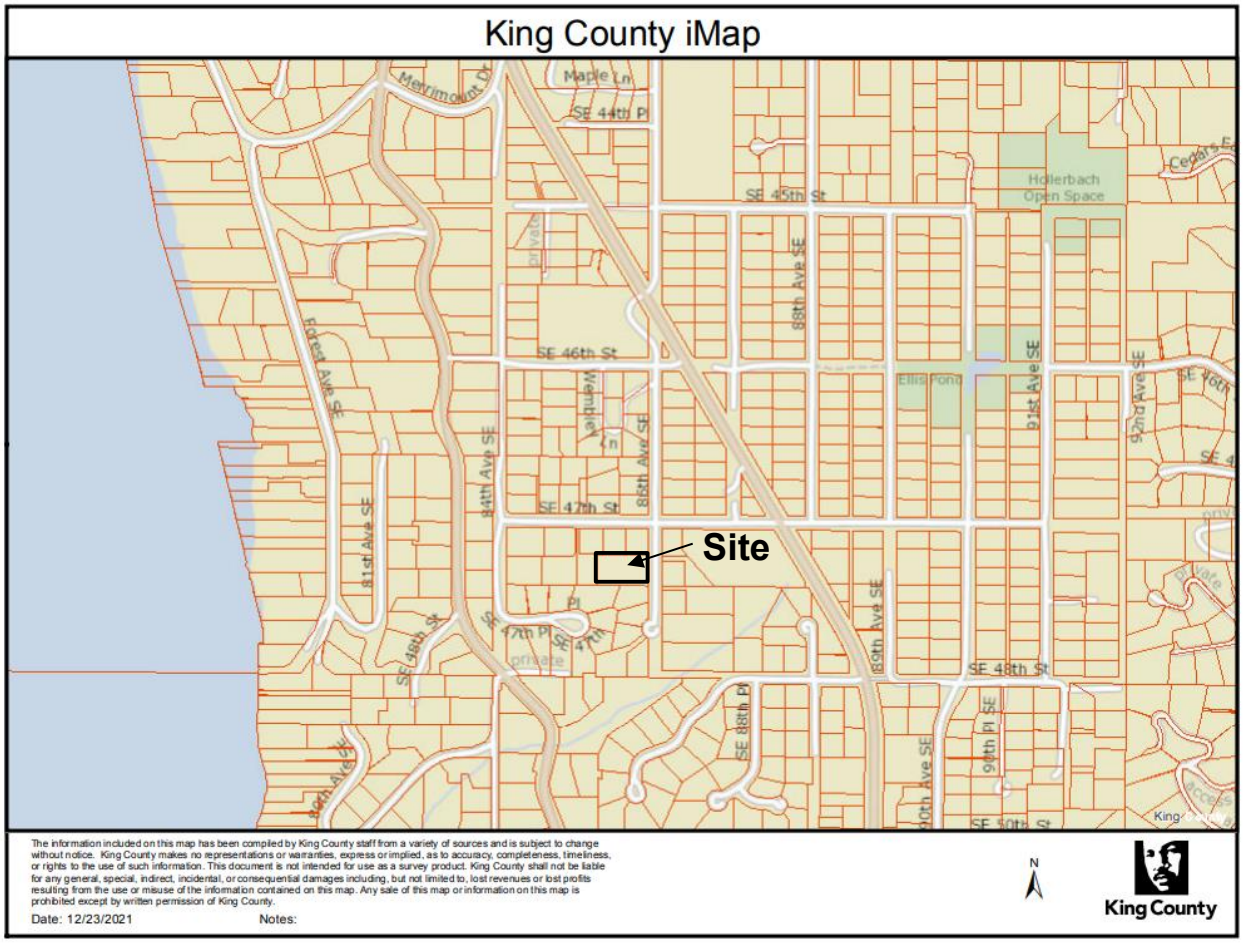
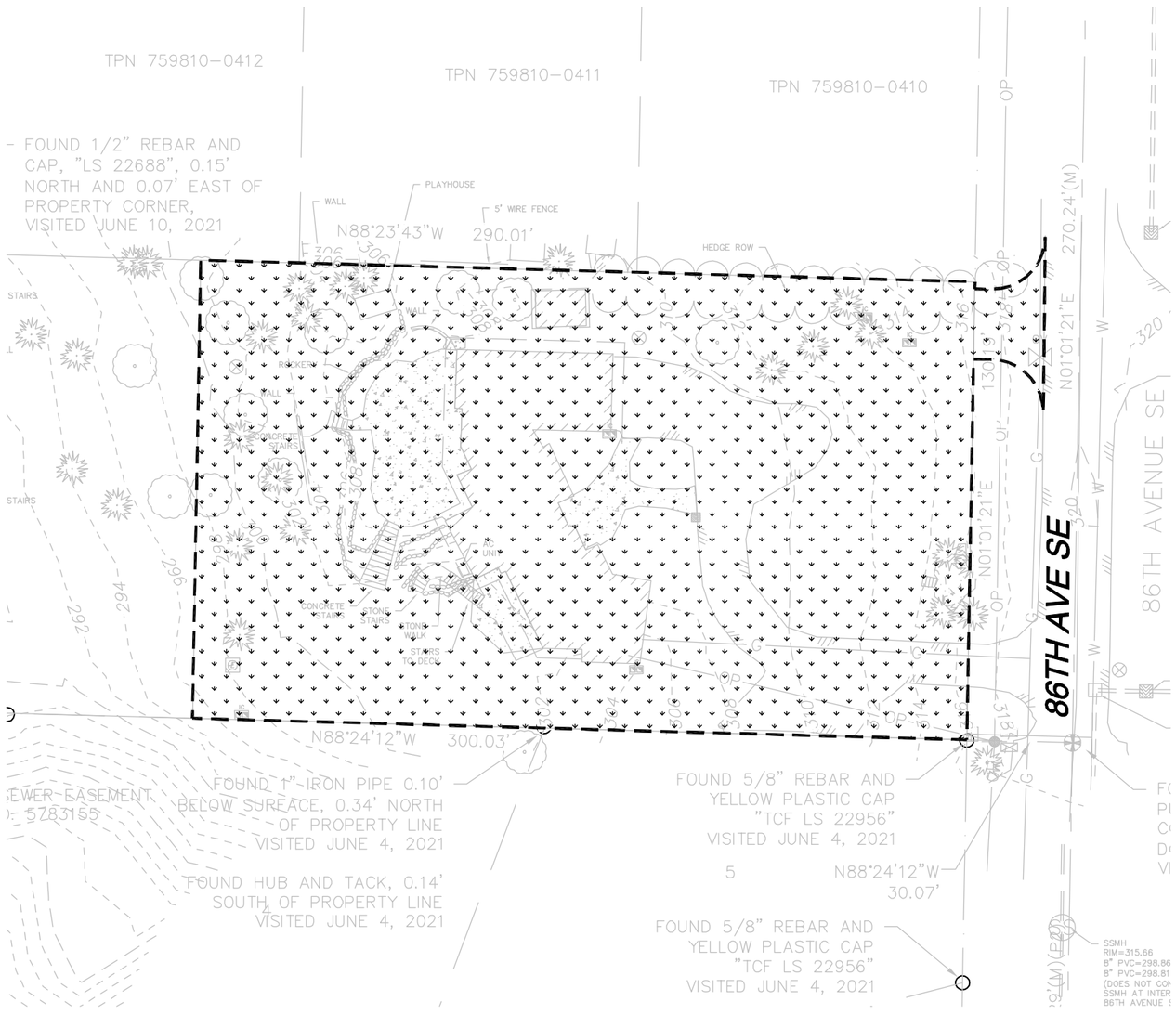


FIGURE 2
PREDEVELOPED FIGURE



AREA BREAKDOWN

TOTAL SITE/PROJECT AREA:	29,138 S.F. (0.669 ACRES)

LEGEND

- - - -	SITE/PROJECT BOUNDARY	
	C, PASTURE, MODERATE	29,138 S.F. (0.669 ACRES)

NORTH

GRAPHIC SCALE

0 20 40 80

1 INCH = 40 FT.

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D.R. STRONG
CONSULTING ENGINEERS
ENGINEERS PLANNERS SURVEYORS
620 - 7th AVENUE KIRKLAND, WA 98033
O 425.827.3063 F 425.827.2423

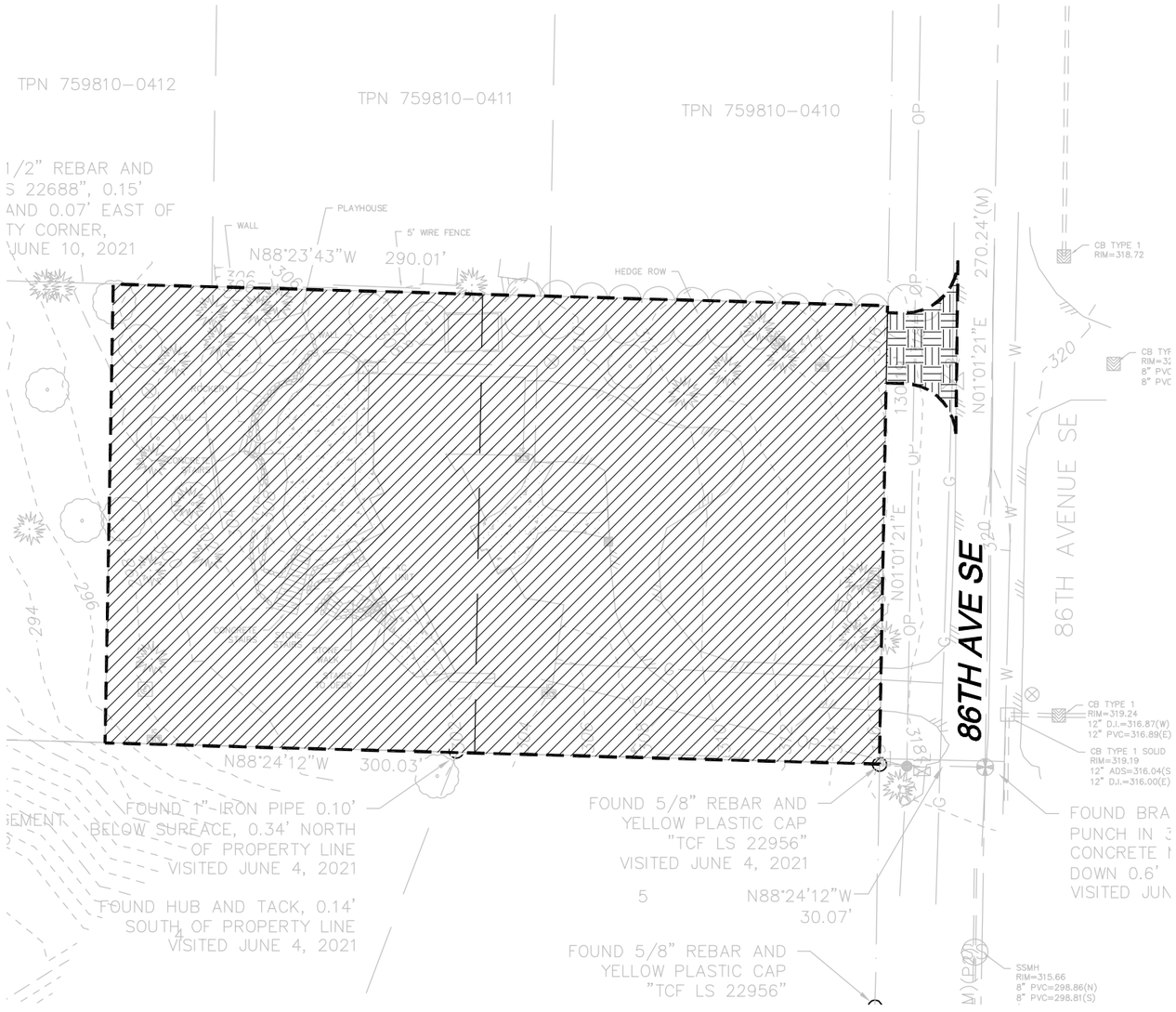
PREDEVELOPED FIGURE

SHORT PLAT
LORENZINI SP
MERCER ISLAND, WA

DRAFTED BY: JSK
DESIGNED BY: JSK
PROJECT ENGINEER: MAJ
DATE: 12.23.21
PROJECT NO.: 21071

FIGURE: 02

FIGURE 3
DEVELOPED FIGURE



AREA BREAKDOWN

TOTAL SITE/PROJECT AREA:	29,138 S.F. (0.669 ACRES)

LEGEND

SITE/PROJECT BOUNDARY

LOT 1 & 2 AREA (PROPOSED):	28,644 S.F. (0.658 ACRES)
PERVIOUS:	17,187 S.F. (0.395 ACRES)
IMPERVIOUS:	11,457 S.F. (0.263 ACRES)
ROW:	494 S.F. (0.011 ACRES)
PERVIOUS:	0 S.F. (0.000 ACRES)
IMPERVIOUS:	494 S.F. (0.011 ACRES)

NORTH

GRAPHIC SCALE

0 20 40 80

1 INCH = 40 FT.

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DEVELOPED FIGURE

SHORT PLAT
LORENZINI SP
MERCER ISLAND, WA

DRAFTED BY: JSK
DESIGNED BY: JSK
PROJECT ENGINEER: MAJ
DATE: 12.23.21
PROJECT NO.: 21071

FIGURE: 03

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FIGURE 4
SOILS MAP

King County Area, Washington

AmC—Arents, Alderwood material, 6 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1hmsq
Elevation: 50 to 660 feet
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Arents, alderwood material, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents, Alderwood Material

Setting

Landform: Till plains
Parent material: Basal till

Typical profile

H1 - 0 to 26 inches: gravelly sandy loam
H2 - 26 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 16 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B/D
Hydric soil rating: No

Data Source Information

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 17, Aug 23, 2021

King County Area, Washington

KpB—Kitsap silt loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1hmt9
Elevation: 0 to 590 feet
Mean annual precipitation: 37 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 160 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kitsap and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kitsap

Setting

Landform: Terraces
Parent material: Lacustrine deposits with a minor amount of volcanic ash

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 24 inches: silt loam
H3 - 24 to 60 inches: stratified silt to silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: F002XA004WA - Puget Lowlands Forest
Forage suitability group: Soils with Few Limitations (G002XN502WA)
Other vegetative classification: Soils with Few Limitations (G002XN502WA)
Hydric soil rating: No

Minor Components

Alderwood
Percent of map unit: 10 percent
Hydric soil rating: No

Bellingham
Percent of map unit: 3 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Seattle
Percent of map unit: 1 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Tukwila
Percent of map unit: 1 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 17, Aug 23, 2021

King County Area, Washington

KpD—Kitsap silt loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1hmtc
Elevation: 0 to 590 feet
Mean annual precipitation: 37 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kitsap and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kitsap

Setting

Landform: Terraces
Parent material: Lacustrine deposits with a minor amount of volcanic ash

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 40 inches: silt loam
H3 - 40 to 60 inches: stratified silt to silty clay loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F002XA004WA - Puget Lowlands Forest
Forage suitability group: Sloping to Steep Soils (G002XN702WA)
Other vegetative classification: Sloping to Steep Soils (G002XN702WA)
Hydric soil rating: No

Minor Components

Bellingham

Percent of map unit: 1 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Seattle

Percent of map unit: 1 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

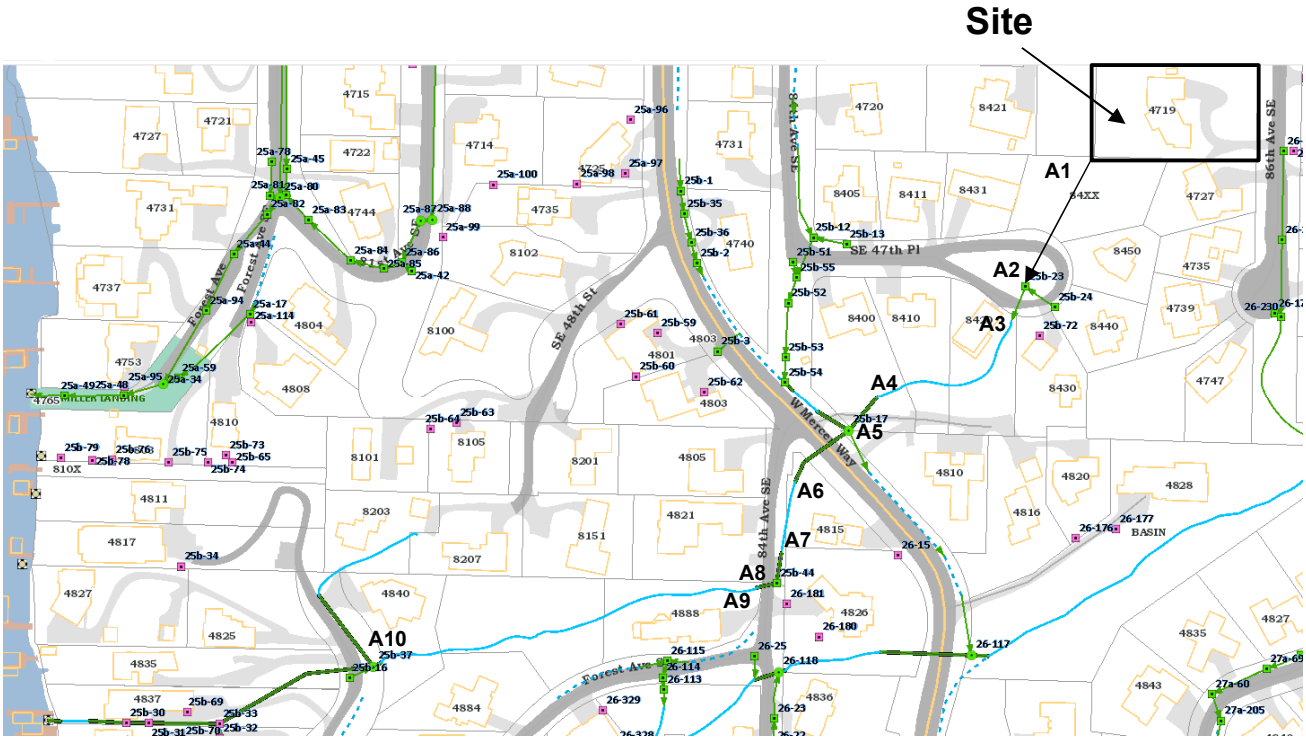
Tukwila

Percent of map unit: 1 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 17, Aug 23, 2021

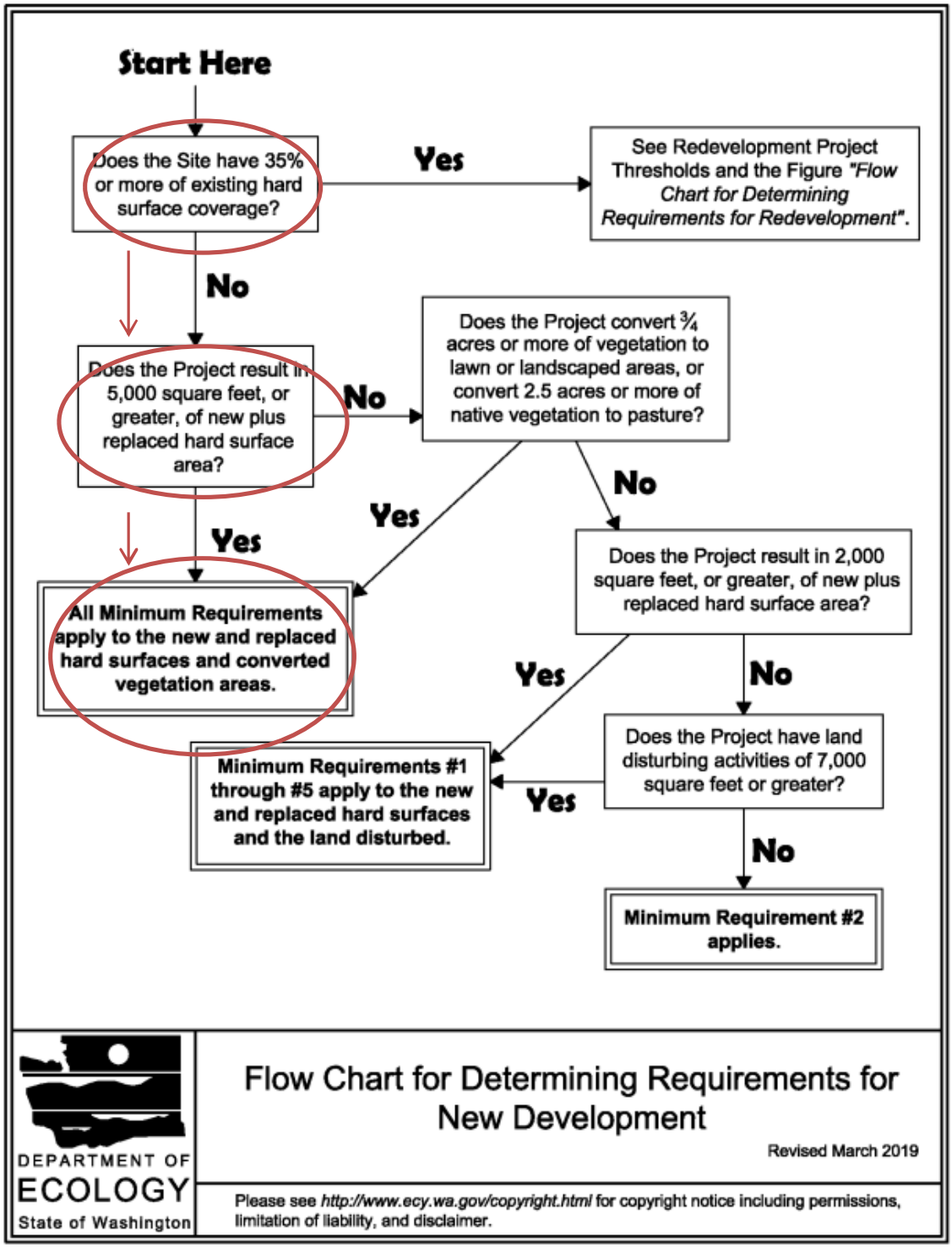
FIGURE 5
DOWNSTREAM MAP

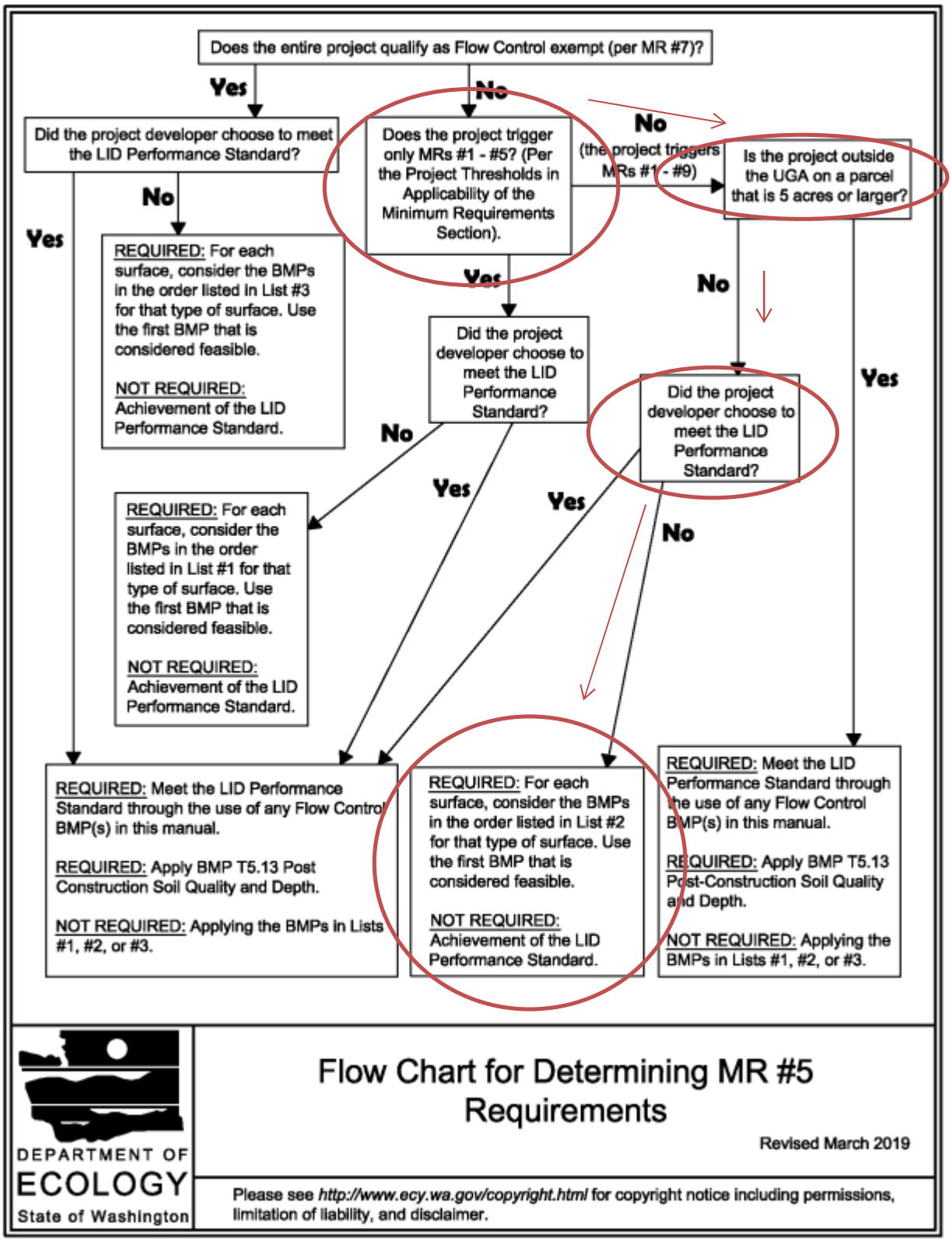


APPENDICES

APPENDIX A

FLOW CHART




Does the entire project qualify as Flow Control exempt (per MR #7)?
Yes
No
Did the project developer choose to meet the LID Performance Standard?
Does the project trigger only MRs #1 - #5? (Per the Project Thresholds in Applicability of the Minimum Requirements Section).
No
(the project triggers MRs #1 - #9)
Is the project outside the UGA on a parcel that is 5 acres or larger?
Yes
No
REQUIRED: For each surface, consider the BMPs in the order listed in List #3 for that type of surface. Use the first BMP that is considered feasible.
NOT REQUIRED: Achievement of the LID Performance Standard.
Yes
Did the project developer choose to meet the LID Performance Standard?
No
Yes
Did the project developer choose to meet the LID Performance Standard?
Yes
No
REQUIRED: For each surface, consider the BMPs in the order listed in List #1 for that type of surface. Use the first BMP that is considered feasible.
NOT REQUIRED: Achievement of the LID Performance Standard.
REQUIRED: Meet the LID Performance Standard through the use of any Flow Control BMP(s) in this manual.
REQUIRED: Apply BMP T5.13 Post Construction Soil Quality and Depth.
NOT REQUIRED: Applying the BMPs in Lists #1, #2, or #3.
REQUIRED: For each surface, consider the BMPs in the order listed in List #2 for that type of surface. Use the first BMP that is considered feasible.
NOT REQUIRED: Achievement of the LID Performance Standard.
REQUIRED: Meet the LID Performance Standard through the use of any Flow Control BMP(s) in this manual.
REQUIRED: Apply BMP T5.13 Post-Construction Soil Quality and Depth.
NOT REQUIRED: Applying the BMPs in Lists #1, #2, or #3.
DEPARTMENT OF ECOLOGY
State of Washington
Flow Chart for Determining MR #5 Requirements
Revised March 2019
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APPENDIX B

WWHM Report

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	pipe
Site Name:	Lorenzini
Site Address:	
City:	
Report Date:	3/10/2022
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/19
Version:	4.2.18

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.638
Pervious Total	0.638
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.638

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.364
Pervious Total	0.364

Impervious Land Use	acre
ROOF TOPS FLAT	0.178
DRIVEWAYS MOD	0.09
SIDEWALKS FLAT	0.006
Impervious Total	0.274
Basin Total	0.638

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

Dimensions
Depth: 8 ft.
Tank Type: Circular
Diameter: 8 ft.
Length: 109 ft.
Discharge Structure
Riser Height: 7 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.410 in. Elevation:0 ft.
Orifice 2 Diameter: 0.670 in. Elevation:4.7 ft.
Orifice 3 Diameter: 0.430 in. Elevation:6 ft.
Element Flows To:
Outlet 1 Outlet 2

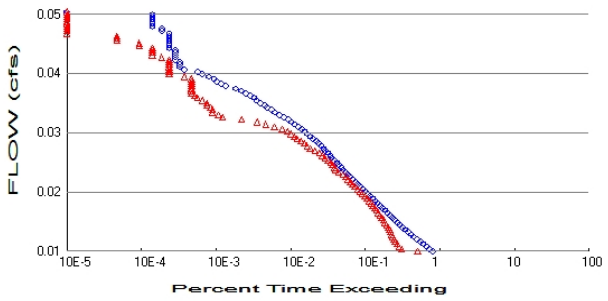
Tank Hydraulic Table

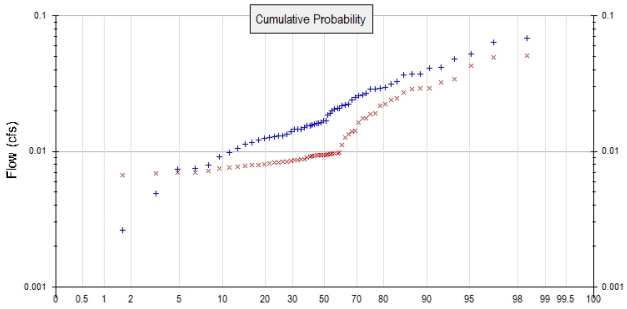
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000000	0.000000	0.000	0.000
0.0889	0.004197	0.000249	0.001	0.000
0.1778	0.005902	0.000703	0.001	0.000
0.2667	0.007187	0.001286	0.002	0.000
0.3556	0.008251	0.001974	0.002	0.000
0.4444	0.009171	0.002749	0.003	0.000
0.5333	0.009987	0.003601	0.003	0.000
0.6222	0.010723	0.004522	0.003	0.000
0.7111	0.011394	0.005505	0.003	0.000
0.8000	0.012011	0.006546	0.004	0.000
0.8889	0.012582	0.007639	0.004	0.000
0.9778	0.013114	0.008782	0.004	0.000
1.0667	0.013610	0.009970	0.004	0.000
1.1556	0.014075	0.011200	0.004	0.000
1.2444	0.014511	0.012471	0.005	0.000
1.3333	0.014921	0.013779	0.005	0.000
1.4222	0.015307	0.015123	0.005	0.000
1.5111	0.015671	0.016500	0.005	0.000
1.6000	0.016015	0.017908	0.005	0.000
1.6889	0.016339	0.019346	0.005	0.000
1.7778	0.016645	0.020812	0.006	0.000
1.8667	0.016934	0.022305	0.006	0.000
1.9556	0.017206	0.023822	0.006	0.000
2.0444	0.017463	0.025363	0.006	0.000
2.1333	0.017705	0.026926	0.006	0.000
2.2222	0.017933	0.028510	0.006	0.000
2.3111	0.018146	0.030114	0.006	0.000
2.4000	0.018347	0.031736	0.007	0.000
2.4889	0.018535	0.033375	0.007	0.000
2.5778	0.018710	0.035031	0.007	0.000
2.6667	0.018873	0.036701	0.007	0.000
2.7556	0.019025	0.038386	0.007	0.000
2.8444	0.019165	0.040083	0.007	0.000
2.9333	0.019293	0.041792	0.007	0.000
3.0222	0.019411	0.043513	0.007	0.000
3.1111	0.019518	0.045243	0.008	0.000

3.2000	0.019614	0.046982	0.008	0.000
3.2889	0.019699	0.048730	0.008	0.000
3.3778	0.019775	0.050484	0.008	0.000
3.4667	0.019840	0.052245	0.008	0.000
3.5556	0.019894	0.054011	0.008	0.000
3.6444	0.019939	0.055781	0.008	0.000
3.7333	0.019974	0.057555	0.008	0.000
3.8222	0.019999	0.059332	0.008	0.000
3.9111	0.020013	0.061110	0.009	0.000
4.0000	0.020018	0.062890	0.009	0.000
4.0889	0.020013	0.064669	0.009	0.000
4.1778	0.019999	0.066447	0.009	0.000
4.2667	0.019974	0.068224	0.009	0.000
4.3556	0.019939	0.069998	0.009	0.000
4.4444	0.019894	0.071768	0.009	0.000
4.5333	0.019840	0.073534	0.009	0.000
4.6222	0.019775	0.075295	0.009	0.000
4.7111	0.019699	0.077049	0.011	0.000
4.8000	0.019614	0.078797	0.013	0.000
4.8889	0.019518	0.080536	0.015	0.000
4.9778	0.019411	0.082266	0.016	0.000
5.0667	0.019293	0.083987	0.017	0.000
5.1556	0.019165	0.085696	0.018	0.000
5.2444	0.019025	0.087393	0.019	0.000
5.3333	0.018873	0.089078	0.020	0.000
5.4222	0.018710	0.090748	0.021	0.000
5.5111	0.018535	0.092404	0.021	0.000
5.6000	0.018347	0.094043	0.022	0.000
5.6889	0.018146	0.095665	0.023	0.000
5.7778	0.017933	0.097269	0.023	0.000
5.8667	0.017705	0.098853	0.024	0.000
5.9556	0.017463	0.100416	0.024	0.000
6.0444	0.017206	0.101957	0.026	0.000
6.1333	0.016934	0.103474	0.027	0.000
6.2222	0.016645	0.104967	0.028	0.000
6.3111	0.016339	0.106433	0.029	0.000
6.4000	0.016015	0.107871	0.030	0.000
6.4889	0.015671	0.109279	0.031	0.000
6.5778	0.015307	0.110656	0.032	0.000
6.6667	0.014921	0.112000	0.033	0.000
6.7556	0.014511	0.113308	0.033	0.000
6.8444	0.014075	0.114579	0.034	0.000
6.9333	0.013610	0.115809	0.035	0.000
7.0222	0.013114	0.116997	0.106	0.000
7.1111	0.012582	0.118140	0.821	0.000
7.2000	0.012011	0.119233	1.923	0.000
7.2889	0.011394	0.120274	3.277	0.000
7.3778	0.010723	0.121257	4.783	0.000
7.4667	0.009987	0.122178	6.346	0.000
7.5556	0.009171	0.123030	7.865	0.000
7.6444	0.008251	0.123805	9.248	0.000
7.7333	0.007187	0.124493	10.41	0.000
7.8222	0.005902	0.125076	11.33	0.000
7.9111	0.004197	0.125530	12.00	0.000
8.0000	0.000000	0.125779	12.50	0.000
8.0889	0.000000	0.000000	13.18	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.638
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.364
Total Impervious Area: 0.274

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.018997
5 year	0.031128
10 year	0.038928
25 year	0.048206
50 year	0.054633
100 year	0.060636

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.011462
5 year	0.01902
10 year	0.025767
25 year	0.036723
50 year	0.046969
100 year	0.059298

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.022	0.008
1950	0.026	0.014
1951	0.042	0.051
1952	0.013	0.007
1953	0.011	0.008
1954	0.016	0.009
1955	0.026	0.009
1956	0.021	0.019
1957	0.017	0.009
1958	0.019	0.009

1959	0.016	0.008
1960	0.029	0.027
1961	0.016	0.009
1962	0.010	0.007
1963	0.013	0.009
1964	0.019	0.009
1965	0.013	0.013
1966	0.012	0.008
1967	0.029	0.009
1968	0.016	0.009
1969	0.016	0.008
1970	0.013	0.009
1971	0.014	0.010
1972	0.032	0.024
1973	0.014	0.014
1974	0.015	0.010
1975	0.022	0.009
1976	0.015	0.009
1977	0.002	0.007
1978	0.013	0.010
1979	0.008	0.007
1980	0.037	0.025
1981	0.012	0.009
1982	0.024	0.019
1983	0.021	0.010
1984	0.012	0.008
1985	0.007	0.008
1986	0.033	0.018
1987	0.029	0.022
1988	0.011	0.008
1989	0.008	0.007
1990	0.069	0.029
1991	0.036	0.029
1992	0.015	0.010
1993	0.015	0.008
1994	0.005	0.007
1995	0.021	0.011
1996	0.048	0.050
1997	0.037	0.032
1998	0.009	0.008
1999	0.041	0.022
2000	0.014	0.009
2001	0.003	0.007
2002	0.017	0.016
2003	0.025	0.008
2004	0.027	0.029
2005	0.020	0.010
2006	0.022	0.013
2007	0.052	0.043
2008	0.063	0.034
2009	0.030	0.017

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0688	0.0507
2	0.0634	0.0495
3	0.0520	0.0428

4	0.0482	0.0342
5	0.0415	0.0324
6	0.0408	0.0293
7	0.0372	0.0290
8	0.0371	0.0290
9	0.0365	0.0274
10	0.0326	0.0248
11	0.0315	0.0239
12	0.0295	0.0224
13	0.0292	0.0218
14	0.0287	0.0192
15	0.0286	0.0189
16	0.0268	0.0175
17	0.0260	0.0175
18	0.0258	0.0164
19	0.0251	0.0142
20	0.0241	0.0141
21	0.0224	0.0134
22	0.0219	0.0126
23	0.0215	0.0111
24	0.0208	0.0098
25	0.0208	0.0097
26	0.0206	0.0097
27	0.0199	0.0096
28	0.0191	0.0095
29	0.0186	0.0095
30	0.0168	0.0094
31	0.0168	0.0094
32	0.0164	0.0094
33	0.0162	0.0094
34	0.0160	0.0094
35	0.0160	0.0093
36	0.0157	0.0092
37	0.0155	0.0091
38	0.0154	0.0090
39	0.0149	0.0087
40	0.0145	0.0087
41	0.0145	0.0086
42	0.0145	0.0086
43	0.0140	0.0085
44	0.0135	0.0084
45	0.0130	0.0084
46	0.0130	0.0083
47	0.0128	0.0083
48	0.0127	0.0081
49	0.0124	0.0080
50	0.0122	0.0079
51	0.0116	0.0079
52	0.0113	0.0078
53	0.0105	0.0077
54	0.0098	0.0075
55	0.0091	0.0075
56	0.0079	0.0071
57	0.0075	0.0069
58	0.0074	0.0069
59	0.0049	0.0069
60	0.0026	0.0067
61	0.0023	0.0065

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0095	17075	10671	62	Pass
0.0100	15481	6519	42	Pass
0.0104	14067	6049	43	Pass
0.0109	12810	5685	44	Pass
0.0113	11569	5364	46	Pass
0.0118	10532	5176	49	Pass
0.0122	9569	4986	52	Pass
0.0127	8765	4793	54	Pass
0.0131	8044	4633	57	Pass
0.0136	7347	4502	61	Pass
0.0141	6744	4327	64	Pass
0.0145	6192	4126	66	Pass
0.0150	5739	3927	68	Pass
0.0154	5311	3756	70	Pass
0.0159	4924	3557	72	Pass
0.0163	4571	3364	73	Pass
0.0168	4237	3200	75	Pass
0.0172	3957	3018	76	Pass
0.0177	3645	2838	77	Pass
0.0182	3388	2697	79	Pass
0.0186	3133	2565	81	Pass
0.0191	2915	2402	82	Pass
0.0195	2706	2246	83	Pass
0.0200	2490	2094	84	Pass
0.0204	2314	1936	83	Pass
0.0209	2136	1826	85	Pass
0.0214	1972	1689	85	Pass
0.0218	1826	1547	84	Pass
0.0223	1702	1434	84	Pass
0.0227	1579	1346	85	Pass
0.0232	1443	1266	87	Pass
0.0236	1325	1181	89	Pass
0.0241	1233	1067	86	Pass
0.0245	1147	932	81	Pass
0.0250	1086	856	78	Pass
0.0255	1020	820	80	Pass
0.0259	947	773	81	Pass
0.0264	887	736	82	Pass
0.0268	824	679	82	Pass
0.0273	761	615	80	Pass
0.0277	725	566	78	Pass
0.0282	674	519	77	Pass
0.0286	623	453	72	Pass
0.0291	589	391	66	Pass
0.0296	549	353	64	Pass
0.0300	506	324	64	Pass
0.0305	469	292	62	Pass
0.0309	427	260	60	Pass
0.0314	388	237	61	Pass
0.0318	356	217	60	Pass
0.0323	328	193	58	Pass
0.0327	298	164	55	Pass
0.0332	270	129	47	Pass

0.0337	241	99	41	Pass
0.0341	218	76	34	Pass
0.0346	198	47	23	Pass
0.0350	174	26	14	Pass
0.0355	152	23	15	Pass
0.0359	130	19	14	Pass
0.0364	119	19	15	Pass
0.0369	104	18	17	Pass
0.0373	95	16	16	Pass
0.0378	83	16	19	Pass
0.0382	74	14	18	Pass
0.0387	69	12	17	Pass
0.0391	61	11	18	Pass
0.0396	53	10	18	Pass
0.0400	46	10	21	Pass
0.0405	39	10	25	Pass
0.0410	29	10	34	Pass
0.0414	25	10	40	Pass
0.0419	22	10	45	Pass
0.0423	20	10	50	Pass
0.0428	17	8	47	Pass
0.0432	14	5	35	Pass
0.0437	12	5	41	Pass
0.0441	8	5	62	Pass
0.0446	7	5	71	Pass
0.0451	7	5	71	Pass
0.0455	7	5	71	Pass
0.0460	6	5	83	Pass
0.0464	6	4	66	Pass
0.0469	6	3	50	Pass
0.0473	6	3	50	Pass
0.0478	6	3	50	Pass
0.0483	5	3	60	Pass
0.0487	5	2	40	Pass
0.0492	5	2	40	Pass
0.0496	5	1	20	Pass
0.0501	5	1	20	Pass
0.0505	5	1	20	Pass
0.0510	5	0	0	Pass
0.0514	4	0	0	Pass
0.0519	4	0	0	Pass
0.0524	3	0	0	Pass
0.0528	3	0	0	Pass
0.0533	3	0	0	Pass
0.0537	3	0	0	Pass
0.0542	3	0	0	Pass
0.0546	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Tank 1 POC	☐	56.66			☐	0.00			
Total Volume Infiltrated		56.66	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.

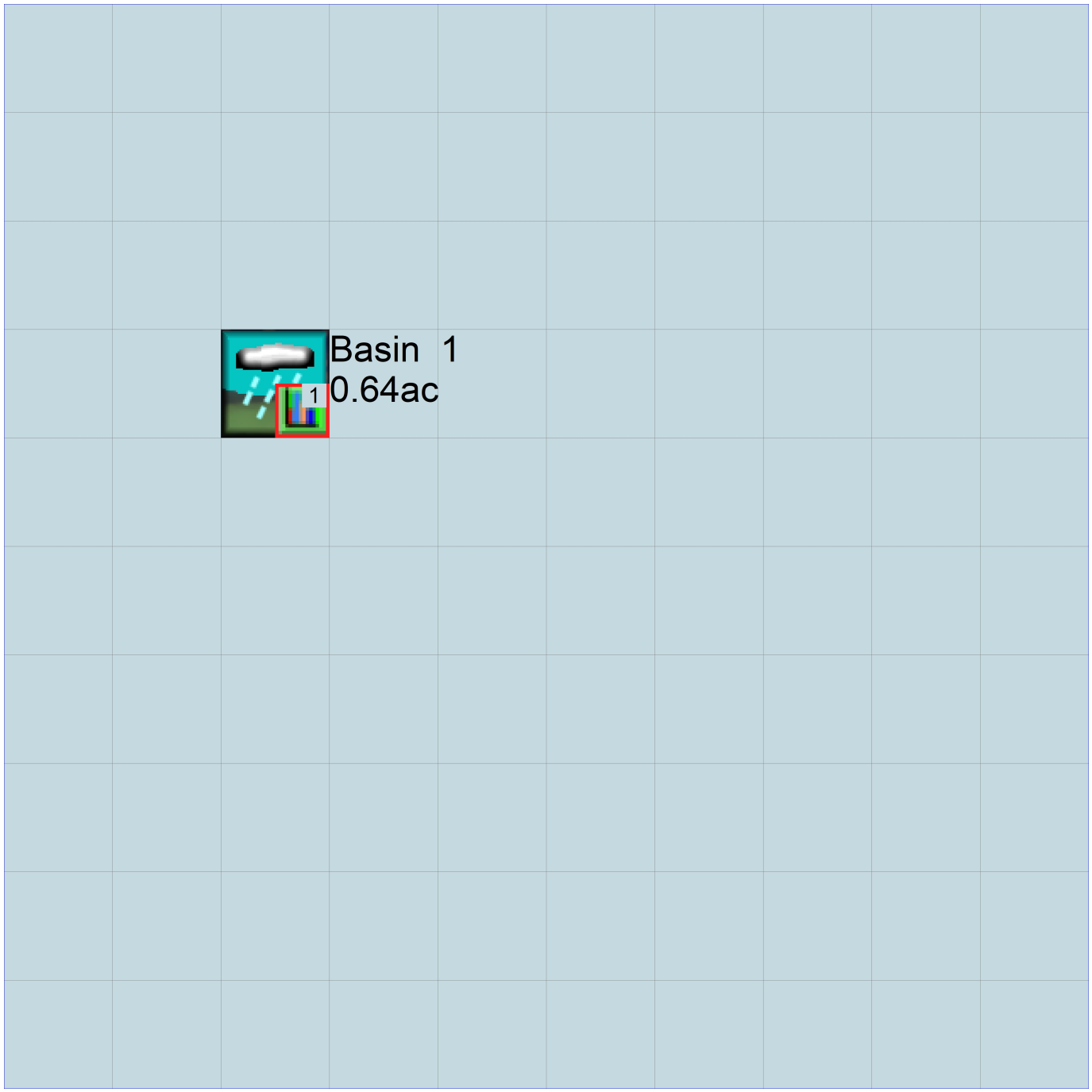
PERLND Changes

No PERLND changes have been made.

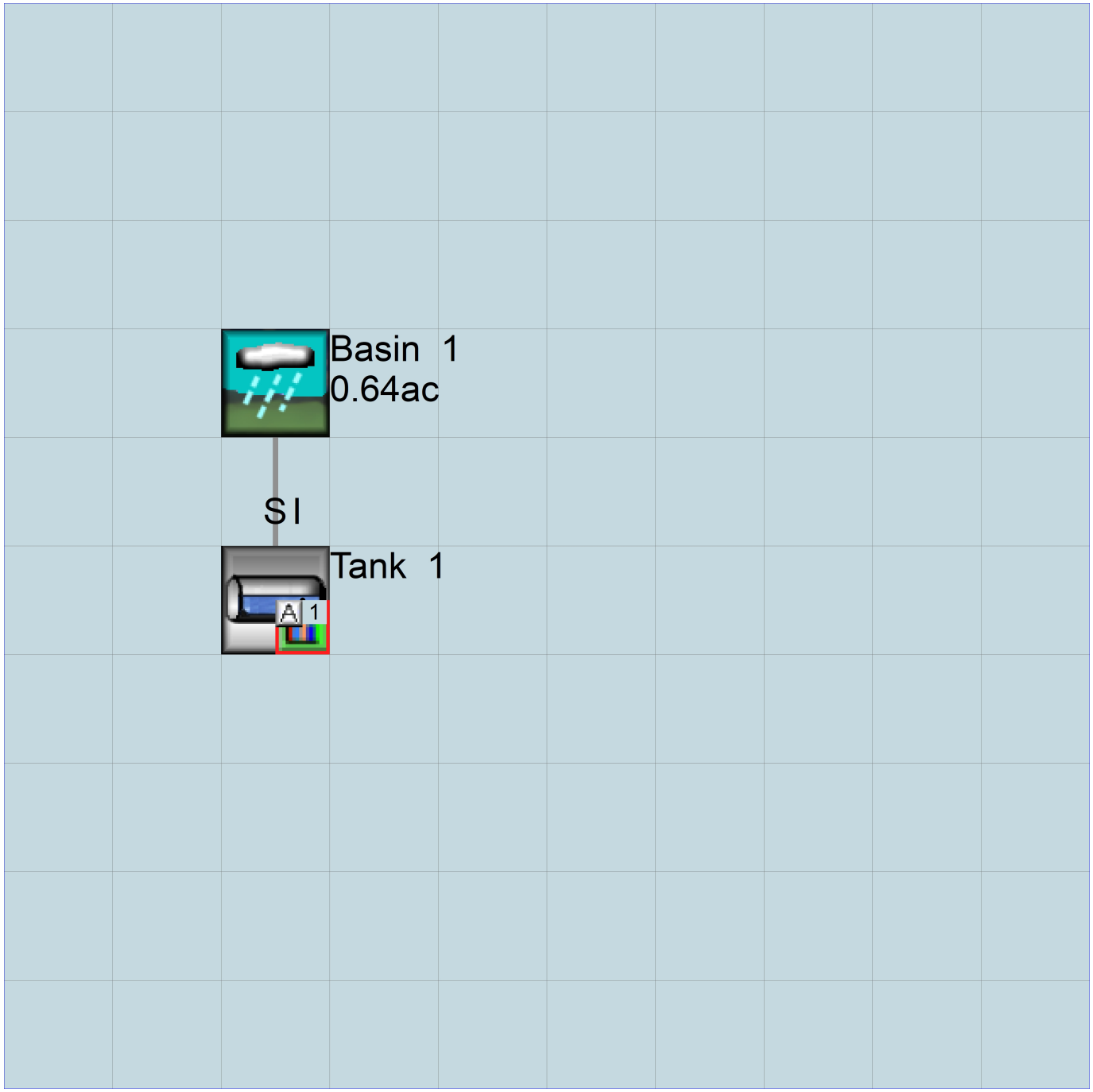
IMPLND Changes

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   pipe.wdm
MESSU       25   Prepipe.MES
            27   Prepipe.L61
            28   Prepipe.L62
            30   POCpipe1.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        Basin  1                   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#   ***
Basin  1***
PERLND  11                       0.638     COPY   501     12
PERLND  11                       0.638     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   pipe.wdm
MESSU       25   Mitpipe.MES
            27   Mitpipe.L61
            28   Mitpipe.L62
            30   POCpipe1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      13
      IMPLND       4
      IMPLND       6
      IMPLND       8
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Tank  1                    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           ***
   13     C, Pasture, 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 ***
   13         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  *********
   13         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 ***
   13         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
   13              0       4.5      0.06       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
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13          0.15       0.4       0.3         6       0.5       0.4
  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
   13              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           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
    6      DRIVEWAYS/MOD          1    1    1   27    0
    8      SIDEWALKS/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
    6         0    0    1    0    0    0
    8         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
    6         0    0    4    0    0    0    1    9
    8         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
    6         0    0    0    0    0
    8         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
    6            400      0.05       0.1      0.08
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    6              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    6              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  13                      0.364     RCHRES   1      2
PERLND  13                      0.364     RCHRES   1      3
IMPLND   4                      0.178     RCHRES   1      5
IMPLND   6                       0.09     RCHRES   1      5
IMPLND   8                      0.006     RCHRES   1      5

******Routing******
PERLND  13                      0.364     COPY     1     12
IMPLND   4                      0.178     COPY     1     15
IMPLND   6                       0.09     COPY     1     15
IMPLND   8                      0.006     COPY     1     15
PERLND  13                      0.364     COPY     1     13
RCHRES   1                          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



<-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     Tank  1                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
  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
  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  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      0.02       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  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.000000  0.000000  0.000000
  0.088889  0.004197  0.000249  0.001360
  0.177778  0.005902  0.000703  0.001923
  0.266667  0.007187  0.001286  0.002356
  0.355556  0.008251  0.001974  0.002720
  0.444444  0.009171  0.002749  0.003041
  0.533333  0.009987  0.003601  0.003331
  0.622222  0.010723  0.004522  0.003598
  0.711111  0.011394  0.005505  0.003847
  0.800000  0.012011  0.006546  0.004080
  0.888889  0.012582  0.007639  0.004301
  0.977778  0.013114  0.008782  0.004511
  1.066667  0.013610  0.009970  0.004711
  1.155556  0.014075  0.011200  0.004904
  1.244444  0.014511  0.012471  0.005089
  1.333333  0.014921  0.013779  0.005267
  1.422222  0.015307  0.015123  0.005440
  1.511111  0.015671  0.016500  0.005608
  1.600000  0.016015  0.017908  0.005770
  1.688889  0.016339  0.019346  0.005928
  1.777778  0.016645  0.020812  0.006082
  1.866667  0.016934  0.022305  0.006232
  1.955556  0.017206  0.023822  0.006379
  2.044444  0.017463  0.025363  0.006523
  2.133333  0.017705  0.026926  0.006663
  2.222222  0.017933  0.028510  0.006800
  2.311111  0.018146  0.030114  0.006935
  2.400000  0.018347  0.031736  0.007067
  2.488889  0.018535  0.033375  0.007197
  2.577778  0.018710  0.035031  0.007324
  2.666667  0.018873  0.036701  0.007449
  2.755556  0.019025  0.038386  0.007572
```

```
  2.844444  0.019165  0.040083  0.007694
  2.933333  0.019293  0.041792  0.007813
  3.022222  0.019411  0.043513  0.007930
  3.111111  0.019518  0.045243  0.008046
  3.200000  0.019614  0.046982  0.008160
  3.288889  0.019699  0.048730  0.008273
  3.377778  0.019775  0.050484  0.008384
  3.466667  0.019840  0.052245  0.008493
  3.555556  0.019894  0.054011  0.008602
  3.644444  0.019939  0.055781  0.008708
  3.733333  0.019974  0.057555  0.008814
  3.822222  0.019999  0.059332  0.008918
  3.911111  0.020013  0.061110  0.009021
  4.000000  0.020018  0.062890  0.009123
  4.088889  0.020013  0.064669  0.009224
  4.177778  0.019999  0.066447  0.009324
  4.266667  0.019974  0.068224  0.009423
  4.355556  0.019939  0.069998  0.009520
  4.444444  0.019894  0.071768  0.009617
  4.533333  0.019840  0.073534  0.009713
  4.622222  0.019775  0.075295  0.009807
  4.711111  0.019699  0.077049  0.011185
  4.800000  0.019614  0.078797  0.013846
  4.888889  0.019518  0.080536  0.015381
  4.977778  0.019411  0.082266  0.016598
  5.066667  0.019293  0.083987  0.017644
  5.155556  0.019165  0.085696  0.018580
  5.244444  0.019025  0.087393  0.019435
  5.333333  0.018873  0.089078  0.020229
  5.422222  0.018710  0.090748  0.020975
  5.511111  0.018535  0.092404  0.021680
  5.600000  0.018347  0.094043  0.022352
  5.688889  0.018146  0.095665  0.022994
  5.777778  0.017933  0.097269  0.023612
  5.866667  0.017705  0.098853  0.024207
  5.955556  0.017463  0.100416  0.024782
  6.044444  0.017206  0.101957  0.026398
  6.133333  0.016934  0.103474  0.027714
  6.222222  0.016645  0.104967  0.028774
  6.311111  0.016339  0.106433  0.029721
  6.400000  0.016015  0.107871  0.030597
  6.488889  0.015671  0.109279  0.031421
  6.577778  0.015307  0.110656  0.032206
  6.666667  0.014921  0.112000  0.032958
  6.755556  0.014511  0.113308  0.033683
  6.844444  0.014075  0.114579  0.034384
  6.933333  0.013610  0.115809  0.035064
  7.022222  0.013114  0.116997  0.106054
  7.111111  0.012582  0.118140  0.821138
  7.200000  0.012011  0.119233  1.923675
  7.288889  0.011394  0.120274  3.276970
  7.377778  0.010723  0.121257  4.783643
  7.466667  0.009987  0.122178  6.346395
  7.555556  0.009171  0.123030  7.865931
  7.644444  0.008251  0.123805  9.248484
  7.733333  0.007187  0.124493  10.41818
  7.822222  0.005902  0.125076  11.33270
  7.911111  0.004197  0.125530  12.00147
  8.000000  0.001000  0.125779  12.50607
  END FTABLE  1
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***
RCHRES   1 HYDR   RO     1 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 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        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  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

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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APPENDIX C

Geotechnical Report