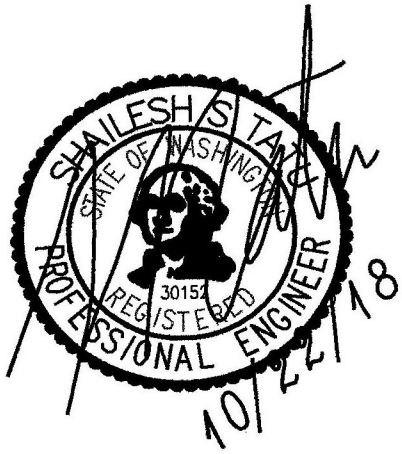
TCE

Klein Residence

King County Parcel: 362350-0226
Mercer Island, WA

Technical Information Report For Off-site Drive

October 2018



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TCE

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Section 1 – Project Narrative

The project site is the right of way for SE 38th Street, from the intersection of SE 38th Street and 73rd Avenue SE to the west property line of the subject parcel. Please see the vicinity map included on drawing C-0 and also in the appendix of the drainage report.

Currently, the street right of way only has a gravel driveway. Please see the topographic survey included in the submittal package. The gravel pavement provides access from 73rd Avenue SE to the two parcels located south of SE 38th Street right of way.

The development north of the curb line is 12,171 square feet in area. The topography of the area is flat at the gravel paved area and sloped north of the gravel pavement. The drainage pattern of the parcel is from the North to the South. The drainage characteristic is sheet flow. There are 23 significant trees varying in diameters from 60" to 8"on or about this area.

The project consists of constructing a 20' wide asphalt access drive. The access proposed is 7,746 square feet in area. The rest of area is pervious 4,425 square feet. The access elevation varies from 215.5' at the lowest to 228.7' at the highest. Retaining walls up to 8'-9' high will be employed on the north side of the access to widen the flat area to construct the 20' wide access.

Including the on-site development the project disturbs less than an acre area and converts less than ¾ of an acre to lawns or landscaped area. Off site, the project creates new and replaced impervious area of 7,746 square feet. The land disturbing activity off-site is greater than 7,000 square feet. The net increase in impervious area is greater than 500 square feet. The discharge from the project site is the same location previously reviewed by the City. Therefore, for on-site work, full drainage report is required.

Using WWHM program we calculated the peak runoff rates at 100-year event using 15-minute time step for historic condition and developed condition. We found that the increase was less than 0.15 cfs. Therefore, with that exception, the on-site development is exempt from providing a flow control facility.

Nine significant trees are directly under the proposed access, retaining wall, and the ecology block barrier along the north right of way line. Eleven trees are proposed for preservation. Two trees are close to the proposed access but are on adjacent properties to the south of the access. A 60" diameter is proposed for preservation but would require special guidance from an arborist due to its close proximity to the access.

Prior to any work Temporary Erosion and Sedimentation Control (TESC) Best Management Practices (BMP) would be employed. BMPs such as clearing limits, tree protection, construction entrance, silt fences, stabilized access route, plastic covering, dust control, and matting/mulching would be installed and maintained.

Under the historic forested conditions the parcel is located in drainage basin 20. The drainage from this parcel sheet-flows south down the slope and is received into a drainage channel

south of SE 38th Street right of way. The drainage channel flows south ending in Lake Washington within a quarter mile from the parcel.

Under the proposed conditions the surface water from undisturbed area of the parcel (forest with moderate slope) will continue to sheet flow in the same way as before the development to the bottom of the slope south of the parcel. The surface water from the impervious areas generated is directed to the entire project outfall that is discharged at the bottom of the slope south of the parcel.

Since there are no easements available to extend the drains south of the discharge location, the drainage is pointed to the east. This is the same direction the drains were extended in the previous submittals. The outfall is at the east property line of the parcel to promote sheetflow and to mimic natural drainage conditions.

The project parcel is located within infiltration infeasible areas of Mercer Island's Infeasibility Map.

Research on the soils from Web Soils Survey NRCS indicates that the project parcel is underlain with KpD-Kitsap Silty Loam and Silty Clay soils up to a depth of 5. The hydrologic group is C. The infiltration rates for such soils are very limited. Please see the soils map for the site and associated engineering properties included in the appendix.

Section 2 – Conditions and Requirements Summary

The following summary describes how this project will meet the nine "Minimum Requirements":

Minimum Requirements

#1 **Preparation of Stormwater Site Plan:** Submitted drainage plan along with this report together they form the stormwater site plan. Drawing C-2 is the plan that delineates the drainage system that services the access drive. Drawing C-2.1 shows the details associated with the drainage plan.

#2 **Construction Stormwater Pollution Prevention Plan (SWPP/TESC):** Please note that the project area is much less than 1 acre. Drawing C-1 is the plan that delineates the construction stormwater BMPs listed here. Drawing C-1.1 shows the BMP details associated with the construction stormwater BMPs.

Clearing Limits – Demarking clearly the extent of disturbed area to limit it & not exceed it.
Silt Fence – To prevent the sediment laden surface water from escaping the property.
Stabilized Construction Entrance – To prevent the loose soil from being tracked out.
Stabilized Construction Access – To access construction site with minimal soil loosening.
Dust Control – To reduce air pollution, flying dust, and removing deposits from roads.
Interceptor Swale/Dike – To divert runoff to minimize erosion and sediment transport.
Plastic Covering – To protect slopes from precipitation including stockpiled dirt.
Inlet Protection – To prevent eroded soil from entering the drainage system.

#3 **Source Control of Pollutants:** No portion of this project is at risk of generating commercial or industrial pollutants. The drive proposed is not a high use site. The number of trips generated by this residential project is much less than 85 trips per day. The total area of this residential project is much less than 1 acre.

Each of the catch basins proposed have about a foot and a half of sump depth below the drain to allow any sediments in the drainage to settle down and not be transported downstream. The detention tanks have been sunk down half a foot below the outlet elevation to settle any sediments transported to the detention system. The control structure discharge orifice is located 2' below the outlet elevation to trap floating debris and prevent oil pollutants from escaping the drainage system.

#4 **Preservation of Natural Discharge Systems and Outfalls:** This site, currently in existing undeveloped condition, drains south with sheet flow conditions down the slope and is received into SE 38th Street right of way.

Under the proposed conditions the surface water from undisturbed area (forest with moderate slope) of the parcel will continue to sheet flow in the same way as before the development to the bottom of the slope south. The surface water from the impervious areas generated is directed to the outfall for entire project that is discharged at the bottom of the slope south of the parcel.

Since there are no easements available to extend the drains south of the discharge location, the drainage is pointed to the east. This is the same direction the drains were extended in the previous submittals. The outfall is at the east property line of the parcel via energy dissipater with a level spreader to promote sheetflow and to mimic natural drainage conditions.

A Level 1 off-site analysis was completed for this project and is included in Section 3 of this Technical Information Report. No significant downstream drainage problems were found.

#5 **On-site Stormwater Management:** The off-site development of a 20' drive generates new or replaced impervious area of greater than 2,000 square feet and net increase of impervious area of greater than 500 square feet, LID BMPs are required, if feasible.

Please see section 4 for full discussion of the infeasibility of dispersion, infiltration, detention, and conveyance.

#6 **Runoff Treatment:** The runoff from the asphalt drive and the undisturbed project area (forest with moderate slope) are received into strategically located catch basin inlets, The underground drains from these catch basins are directed east at a minimum slope of 0.5% to the east end of the drive to the detention tank. The catch basins upstream from the detention tank would be storm filters with media cartridges. After receiving the water quality treatment at the storm filters, the runoff will enter the detention tank to receive the flow control treatment.

#7 **Flow Control:** Using WWHM program we calculated the peak runoff rates at 100-year event using 15-minute time step for historic condition and developed condition. We found that the increase was less than 0.15 cfs. Therefore, with that exception, the off-site development should be exempt from providing a flow control facility.

Currently, the drawings show a detention facility at the east end of the drive. We have used the detention sizing table to size the tank. Please see section 4 of this report for full discussion.

#8 **Wetlands Protection:** There are no wetlands mapped at the access drive location or the project site. The project outfall is at the bottom of the slope within the SE 38th Street right of way, approximately at the west property line of the project parcel. The discharge from the outfall sheet flows east overland through the undeveloped vegetated right of way.

Approximately about 300 feet from the outfall is wetland mapped in the survey. The discharge from the outfall sheet flows east overland through the undeveloped vegetated right of way to the wetland. The drainage flow will follow the same drainage pattern that exists in the existing conditions there.

The peak rate of discharge is insignificant, about 0.17 cfs at 100 year 24 hour storm event. The increase in the discharge rate due to the project is less than 0.15 cfs. We do not anticipate any adverse impact on the wetland due to the project.

#9 **Operation & Maintenance Manual:** An Operation & Maintenance Manual has been prepared and included in this report in the appendix.

Section 3 – Off-site Analysis

This Level 1 Downstream Analysis requires a qualitative analysis of upstream and downstream drainage conditions with an initial project submittal.

Task 1: Study Area Definition and Maps:

The study area includes upstream area draining towards the north property line of the development parcel.

The downstream extent is along the SE 38th Street right of way.

Task 2: Resource Review:

Resources reviewed include the site survey and iMap,

A sensitive areas review shows that there are no critical areas on the project site, except the erosion hazard. The parcel has no sensitive area notice on the title. About 300' downstream of the project outfall there is a wetland area. The discharge drains to the wetland as overland sheet flow following the existing drainage pattern.

There are no drainage complaints mapped in the vicinity of the parcel.

Task 3: Field Inspection:

A field observation of the site and downstream analysis were performed on October 16, 2018. The weather was clear during the visit.

Task 4: Drainage System Description and Problem Descriptions:

Upstream:

Upstream area flowing through the site is very limited consisting of a portion of an undeveloped parcel of moderate slope with a number of trees.

Downstream:

The extent of downstream drainage system is east along SE 38th Street right of way. The downstream drainage area consists of alternating areas of flat and moderately sloped area. Before reaching 76th Avenue SE the right of way of SE 38th Street becomes flat and drains into a large wetland located north of the right of way. The wetland overflows into a drainage system starting at the intersection of 76th Avenue SE and SE 37th Place and extends to the quarter mile point located at the intersection of SE 37th Place and 77th Avenue SE. From the pipe outfall at the east property line of the project parcel the drainage is overland to the wetland.

After the wetland the drainage is via the series of catch basins and the 12” underground drains to the quarter mile point.

The slopes and sizes of the drains appear adequate to adequately convey the drainage.

Task 5 – Mitigation of Existing or Potential Problems:

There do not appear to be any existing or potential problems with the downstream drainage system.

Section 4 – Proposed Site Conditions and Design Parameters

Flow Control Analysis and Design

Following is the manner in which the drainage analysis of the project site was conducted.

Please see the proposed drainage basin map included in the Appendix.

In the existing conditions the parcel is undeveloped. To calculate the hydrology of the parcel in the existing condition we have modelled it as a forest with moderate average slope. The type of soil the parcel is located in is Kitsap Silty Loam KpD belong to a hydrologic soil group C.

In the proposed conditions, the site is divided into components such as driveway and undisturbed area (forest with moderate slope). Please see the areas summary included in the appendix. The WWHM2012 printout also shows these components of the site in pre-development and mitigated land use report. The development area off-site is 12,171 square feet. The new or replaced area impervious surface created is 7,746 square feet, leaving the undisturbed area (forest with moderate slope) of 4,425 square feet.

WWHM2012 program was used to conduct the drainage analysis. The program was used to calculate only the peak rates of runoff under pre and post development conditions.

The printout of the program output is included in the appendix to show that the pre-development peak rate of runoff at a 100 year storm event with 15-minutes time step is 0.027 CFS and that for the post development is 0.166. The difference between the two is the increase of rate of runoff at a 100 year event of 0.14 CFS. Since this increase is less than 0.15 CFS, this meets the requirement of the exception from providing a flow control facility. No flow control facility needs to be provided for off-site development.

Please see the Areas Summary on C-2 of the drawings and the one included within this report in the Appendix.

The following flow control BMPs are infeasible at the project drive.

The full dispersion BMPs are infeasible because the existing slope along the flow path is high.

The project parcel is located within infiltration infeasible areas of Mercer Island's Infeasibility Map.

Research on the soils from Web Soils Survey NRCS indicates that the project parcel is underlain with KpD-Kitsap Silty Loam and Silty Clay soils up to a depth of 5. The hydrologic group is C. The infiltration rates for such soils are very limited. Please see the soils map for the site and associated engineering properties included in the appendix.

We feel basic dispersion BMPs are also infeasible due to the slope of the site.

Due to the silty loam and silty clay soils overlying the hardpan, introduction of surface water underground (perforated disconnect drain) ought to be avoided to avoid sliding issue,

Therefore, the discharge is released via grade mounted drainage pipe at the bottom of the slope to surface discharge with energy dissipater.

Water Quality Analysis and Design

The area of the pollution generating impervious surface is 7,746 square feet. We are proposing water quality treatment of the street runoff using storm-filters with media cartridge. Two storm-filter catch basins are proposed to capture the water quality runoff from the street before it flows into the detention tank.

Section 5 – Conveyance System Analysis and Design

The roof runoff would be conveyed to the surface discharge by means of roof gutter, downspouts, and 4" roof drains at a minimum slope of 2%. The drive runoff will be conveyed by 8" pipes at minimum 0.5% slope.

The peak rate of flow expected at the 100 year storm event is less than 0.166 cfs. The capacity of the 4" pipe at 2 % and the 8" pipe at 0.5% can be calculated using the program Civil Tools to be much greater.

Pipe Dia. (In.)	Pipe Slope (%)	Roughness (n)	Velocity (F/Sec.)	Flow (CFS)
4	2.0	0.012	3.33	0.29
8	0.5	0.012	2.65	0.93

Therefore in our opinion the conveyance system is adequate to service the proposed development.

Section 6 – Special Reports and Studies

The web soils survey information from NRCS is attached in the Appendix. The project parcel is located within infiltration infeasible areas of Mercer Island's Infeasibility Map.

Section 7 – Other Permits

City of Mercer Island Building Permit including clearing & grading and drainage.
City of Mercer Island water, sewer, fire, and irrigation services approval.

8 CSWPPP ANALYSIS AND DESIGN

Standard erosion and sedimentation control BMPs are proposed. Drawing sheet C-1 is dedicated to show clearing limits, construction entrance, dust control, inlet protection, matting & mulching, and silt fence. Prior to beginning any work these BMPs will be installed and operational. Upon completion of earthwork and stabilization of worked areas, these BMPs will be removed.

Section 9 – Financial Guarantees

The project proposes to construct an off-site drive to access the new on-site residence. Minimal paving, grading, drainage system, water, fire, irrigation, & sewer services will be installed to service the residence.

The work in the right of way consists of installing a driveway. It also includes a water/fire service.

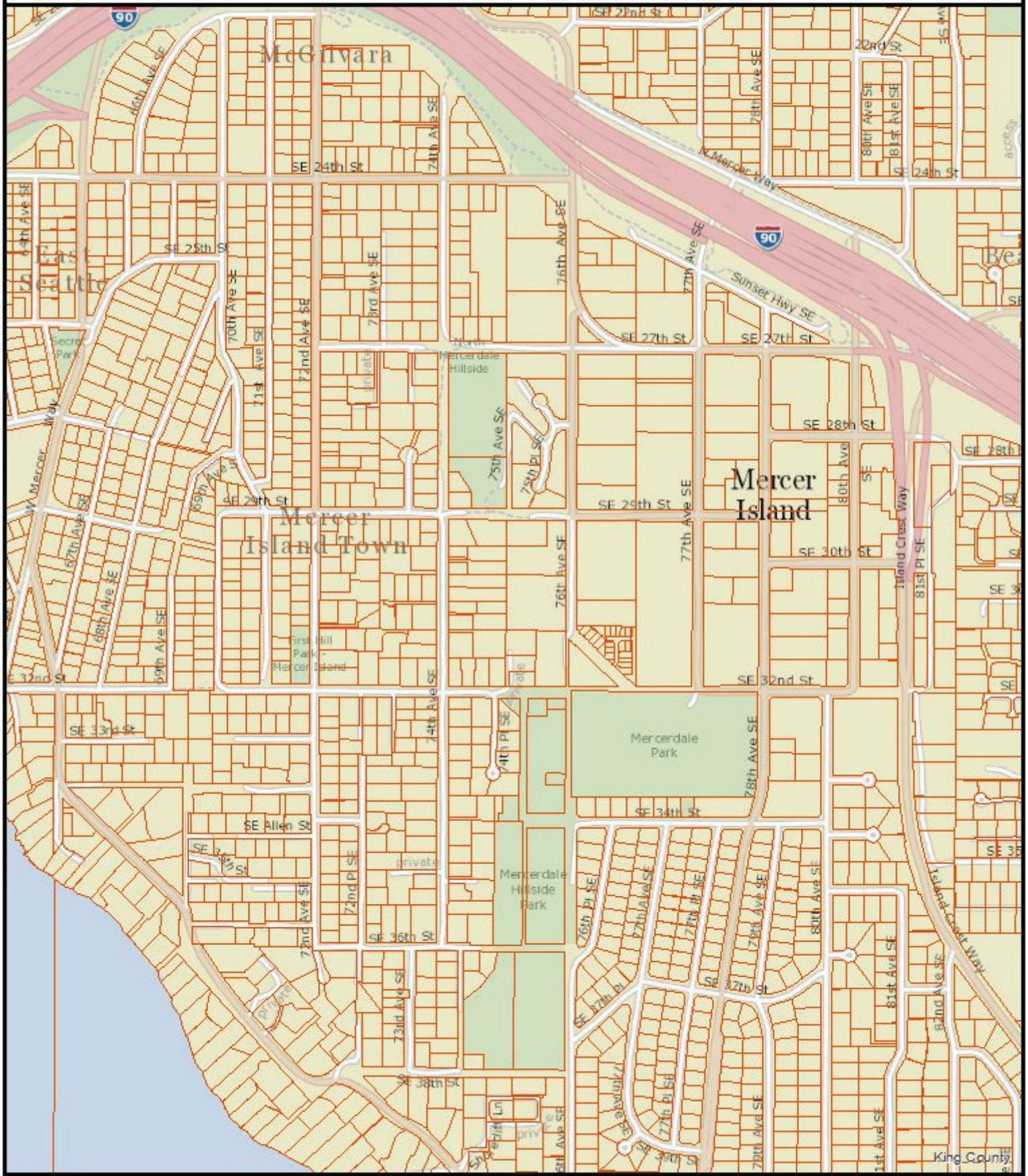
The bond quantities consisting of pavements and drainage system are being submitted for your review with this off-site development report.

Section 10 – Operations and Maintenance Manual

The operation and maintenance manual consisting of the detention tank, catch basin, energy dissipater, and catch basin insert media filter drain is being submitted.

APPENDICES

VICINITY MAP (1:24,000)



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King County GIS Center

Date: 9/21/2017 Notes:

Soil Map—King County Area, Washington
(Klien Property)

17

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.

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 13, Sep 7, 2017

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

Date(s) aerial images were photographed: Aug 31, 2013—Oct 6, 2013

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	0.2	100.0%
Totals for Area of Interest		**0.2**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

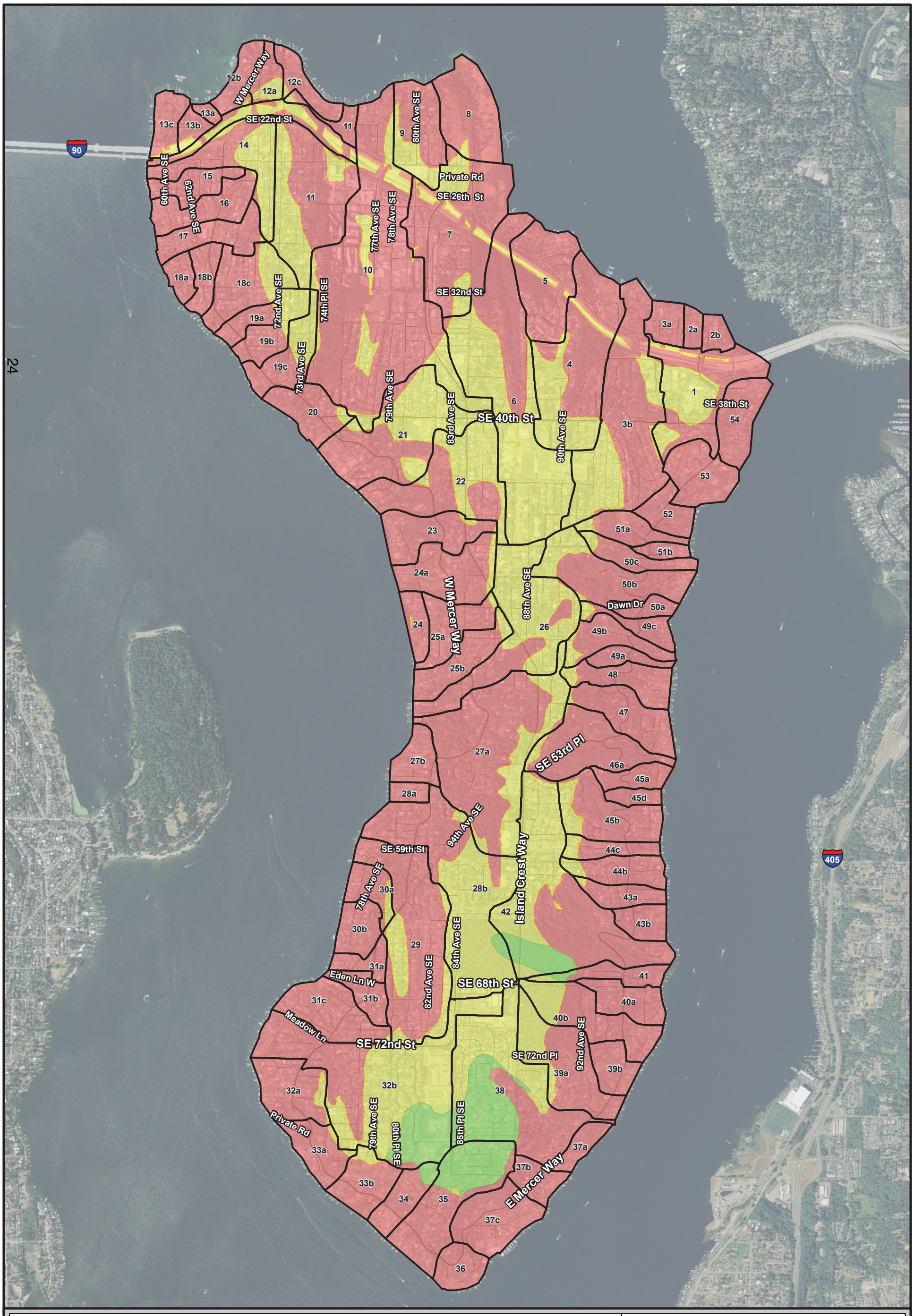
Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–King County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
KpD—Kitsap silt loam, 15 to 30 percent slopes														
Kitsap	97	C	0-5	Silt loam	ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	80-85-90	25-33-40	NP-5-10
			5-40	Silt loam, silty clay loam	MH, ML	A-4, A-5, A-7	0- 0- 0	0- 0- 0	95-98-100	90-95-100	90-95-100	85-93-100	35-45-55	5-13-20
			40-60	Stratified silt to silty clay loam	MH, ML	A-4, A-5, A-7	0- 0- 0	0- 0- 0	95-98-100	90-95-100	90-95-100	85-93-100	35-45-55	5-13-20

Data Source Information

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 13, Sep 7, 2017



Legend

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

36 Storm drainage basin

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

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

N

0 950 1,900 3,800 Feet

HERRERA

Aerial photography: USDA (2009)

K:\Projects\10-04816-000\Project\lid_feasibility-report-11x17.mxd

EXISTING BASIN MAP

N

20 0 20 40

SCALE IN FEET

SDCB
RIM=228.82
8" DI (SE)=226.82
BOTTOM=224.82

SDCB
RIM=227.89
IE 12" DI (N)=226.39
IE 12" DI (S)=226.39
IE 8" DI (NW)=226.34
BOTTOM=224.19

SDCB
RIM=227.31
DI (NE)=224.41
CPP (W)=224.11
BOTTOM=222.51

SSMH
RIM=227.06
HAN.=218.36
" PVC N/W)

SDCB
RIM=226.79
IE 12" DI (N)=225.34
IE 12" DI (SW)=225.09
IE 4" PVC (E)=225.69
BOTTOM=223.29

TAX PARCEL
283770-0035

TAX PARCEL
283770-0045

TAX PARCEL
283770-0040

CONCRETE DRIVEWAY

ASPHALT

EXISTING
ROADWAY

INTERCEPTOR DIKE

FORRESTED BASIN
12,171 SF

EXISTING
GRAVEL
DRIVE

WOOD STEPS

WEST PROP. LINE
N01°41'24"E 80.00'

N88°18'36"W 280.32' (M)

FOUND CONCRETE
MONUMENT WITH
BRASS PIN

FOUND REBAR & CAP
LS #42676

FOUND 1" I.P.

FOUND 5/8" REBAR
NO CAP

TAX PARCEL
283770-0160

TAX PARCEL
362350-0037

TAX PARCEL
362350-0035

TAX PARCEL
362350-0036

PROPOSED BASINS MAP

N

SCALE IN FEET
20 0 20 40

SDCB
RIM=228.82
IE 8" DI (SE)=226.82
BOTTOM=224.82

SDCB
RIM=227.89
IE 12" DI (N)=226.39
IE 12" DI (S)=226.39
IE 8" DI (NW)=226.34
BOTTOM=224.19

SDCB
RIM=227.31
DI (NE)=224.41
CPP (W)=224.11
BOTTOM=222.51

SSMH
RIM=227.06
CHAN.=218.36
8" PVC N/W)

SDCB
RIM=226.79
IE 12" DI (N)=225.34
IE 12" DI (SW)=225.09
IE 4" PVC (E)=225.69
BOTTOM=223.29

TAX PARCEL
283770-0035

TAX PARCEL
283770-0045

TAX PARCEL
283770-0040

TAX PARCEL
283770-0160

TAX PARCEL
362350-0037

TAX PARCEL
362350-0035

TAX PARCEL
362350-0036

CONCRETE DRIVEWAY

ASPHALT

EXISTING ROADWAY

INTERCEPTOR DIKE

PERVIOUS BASIN
4,425 SF

ASPHALT DRIVE
7,746 SF

GRAVEL

WOOD STEPS

WEST PROP. LINE

50 LF DETN. TANK, 5' DIA.

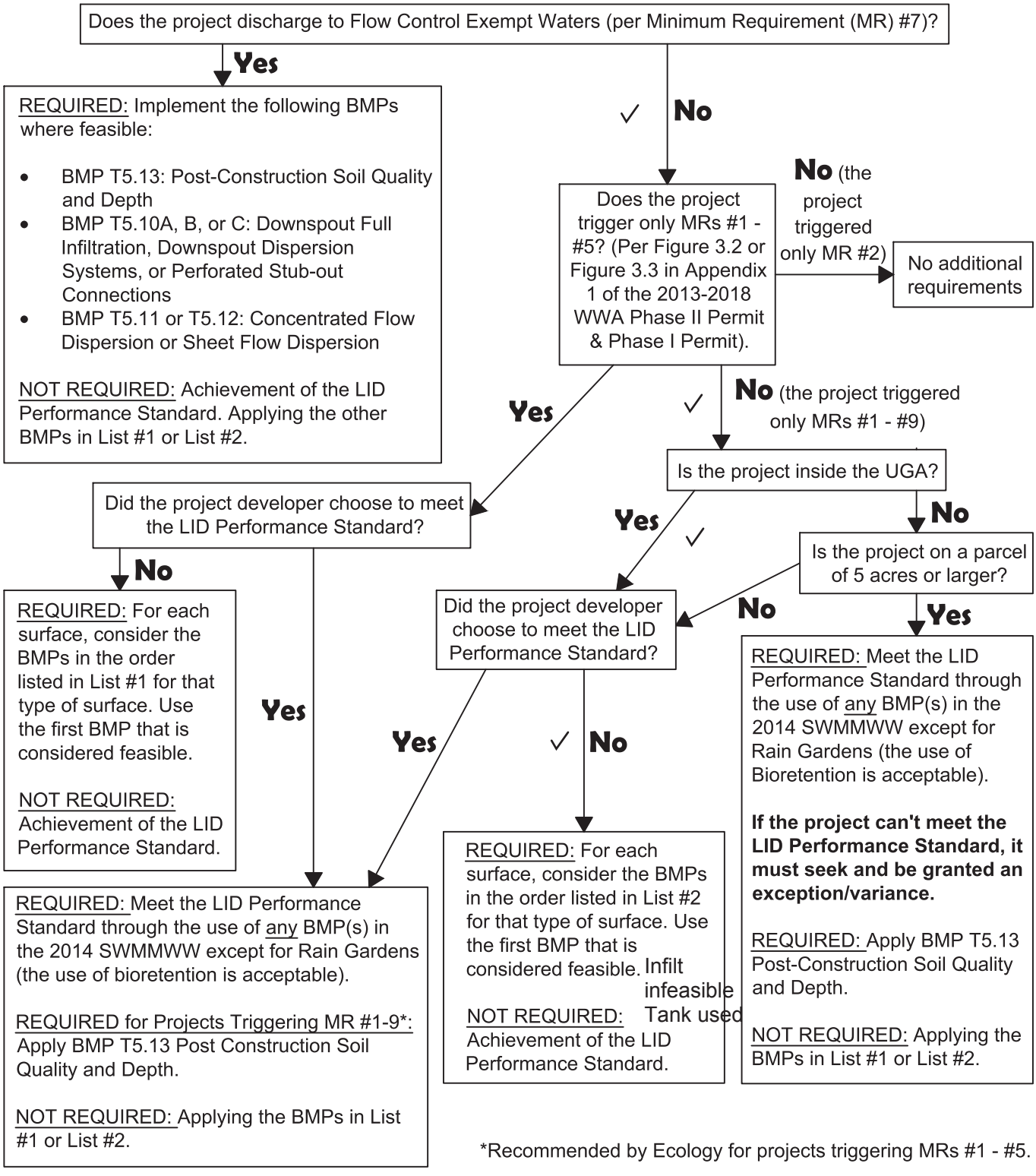
N88°18'36"W 280.32' (M)

FOUND CONCRETE MONUMENT WITH BRASS PIN

FOUND REBAR & CAP LS #42676

FOUND 1" I.P.

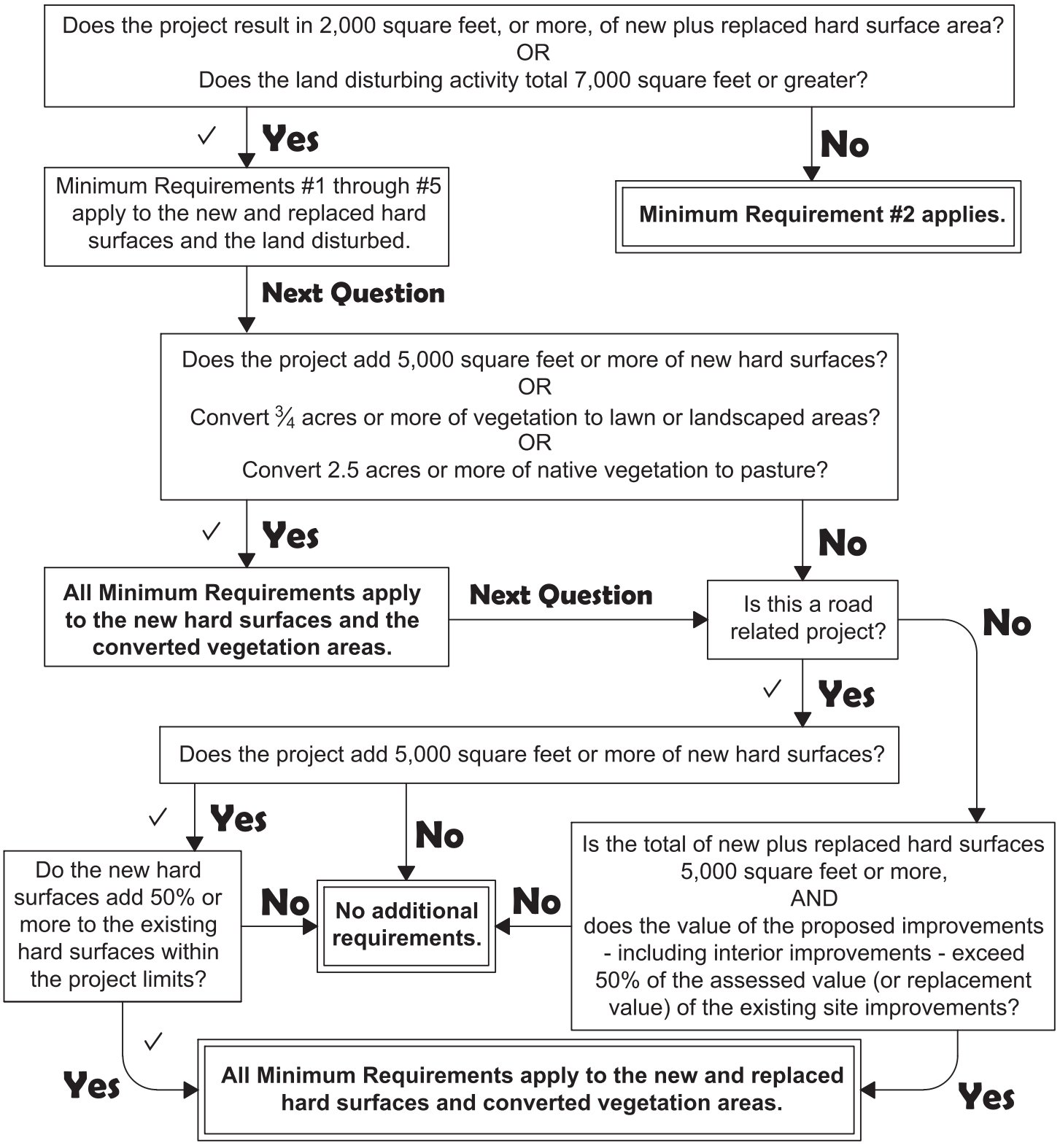
FOUND 5/8" REBAR NO CAP



DEPARTMENT OF ECOLOGY
State of Washington

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

Revised June 2015



DEPARTMENT OF ECOLOGY
State of Washington

Figure I-2.4.2
Flow Chart for Determining Requirements for Redevelopment

Revised June 2015

Offsite Drainage Areas Summary (Square Feet)	
Site area	12171
Total Development Area	12171
Existing Conditions	
Bldg Roof	
Asphalt Pavement Remove	87
Gravel Paving Remove/Replace	3204
Total impervious area	3291
Total pervious area	8880
Proposed Conditions	
Building Roof	
Concrete Pavement	
Asphalt Pavement	7746
Landscape	4425
Total Hardscape area	7746
Total pervious area	4425
New/Replaced Impervious area	7746
New/Replaced water Quality area	7746

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default[24]
Site Name:	Klien Drive
Site Address:	SE 38th St & 73rd Ave SE
City:	Mercer Island
Report Date:	10/12/2018
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2018/07/12
Version:	4.2.15

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	0.28
Pervious Total	0.28
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.28

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

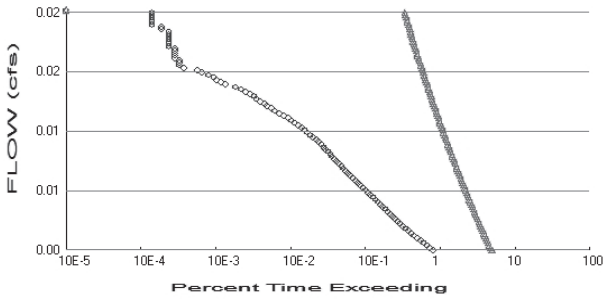
Pervious Land Use	acre
C, Forest, Mod	0.102
Pervious Total	0.102

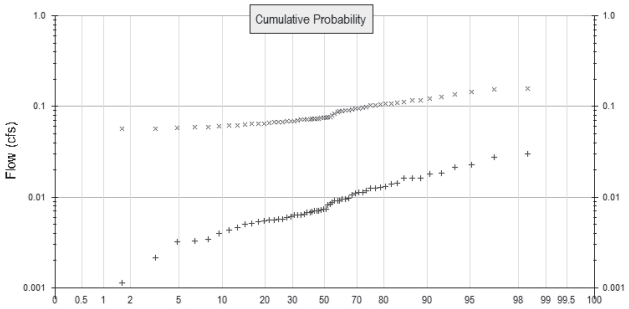
Impervious Land Use	acre
ROADS MOD	0.178
Impervious Total	0.178
Basin Total	0.28

Element Flows To:

Surface	Interflow	Groundwater

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.28
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.102
Total Impervious Area: 0.178

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.008337
5 year	0.013661
10 year	0.017084
25 year	0.021156
50 year	0.023977
100 year	0.026611

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.08052
5 year	0.102164
10 year	0.116921
25 year	0.136114
50 year	0.150838
100 year	0.165949

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.010	0.103
1950	0.011	0.104
1951	0.018	0.063
1952	0.006	0.052
1953	0.005	0.062
1954	0.007	0.065
1955	0.011	0.076
1956	0.009	0.072
1957	0.007	0.077
1958	0.008	0.065

1959	0.007	0.071
1960	0.013	0.072
1961	0.007	0.068
1962	0.004	0.057
1963	0.006	0.070
1964	0.008	0.068
1965	0.006	0.079
1966	0.005	0.058
1967	0.013	0.094
1968	0.007	0.121
1969	0.007	0.072
1970	0.006	0.074
1971	0.006	0.089
1972	0.014	0.090
1973	0.006	0.057
1974	0.007	0.083
1975	0.009	0.087
1976	0.007	0.068
1977	0.001	0.066
1978	0.006	0.097
1979	0.003	0.117
1980	0.016	0.127
1981	0.005	0.076
1982	0.011	0.109
1983	0.009	0.090
1984	0.005	0.059
1985	0.003	0.074
1986	0.014	0.067
1987	0.013	0.102
1988	0.005	0.068
1989	0.003	0.107
1990	0.030	0.136
1991	0.016	0.117
1992	0.007	0.061
1993	0.006	0.074
1994	0.002	0.064
1995	0.009	0.069
1996	0.021	0.093
1997	0.016	0.073
1998	0.004	0.074
1999	0.018	0.158
2000	0.006	0.075
2001	0.001	0.091
2002	0.007	0.094
2003	0.011	0.098
2004	0.012	0.154
2005	0.009	0.062
2006	0.010	0.059
2007	0.023	0.145
2008	0.028	0.109
2009	0.013	0.112

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0302	0.1580
2	0.0278	0.1539
3	0.0228	0.1447

4	0.0211	0.1361
5	0.0182	0.1267
6	0.0179	0.1214
7	0.0163	0.1168
8	0.0163	0.1167
9	0.0160	0.1122
10	0.0143	0.1089
11	0.0138	0.1087
12	0.0130	0.1068
13	0.0128	0.1044
14	0.0126	0.1035
15	0.0126	0.1020
16	0.0118	0.0978
17	0.0114	0.0969
18	0.0113	0.0940
19	0.0110	0.0938
20	0.0106	0.0927
21	0.0098	0.0913
22	0.0096	0.0899
23	0.0095	0.0897
24	0.0091	0.0887
25	0.0091	0.0870
26	0.0090	0.0829
27	0.0087	0.0794
28	0.0084	0.0768
29	0.0082	0.0763
30	0.0074	0.0757
31	0.0074	0.0745
32	0.0072	0.0745
33	0.0071	0.0740
34	0.0070	0.0738
35	0.0070	0.0738
36	0.0069	0.0729
37	0.0068	0.0724
38	0.0068	0.0718
39	0.0065	0.0716
40	0.0064	0.0713
41	0.0064	0.0698
42	0.0064	0.0694
43	0.0061	0.0685
44	0.0059	0.0682
45	0.0057	0.0681
46	0.0057	0.0677
47	0.0056	0.0669
48	0.0056	0.0656
49	0.0054	0.0652
50	0.0053	0.0646
51	0.0051	0.0644
52	0.0050	0.0633
53	0.0046	0.0619
54	0.0043	0.0618
55	0.0040	0.0606
56	0.0035	0.0592
57	0.0033	0.0589
58	0.0032	0.0577
59	0.0021	0.0574
60	0.0011	0.0568
61	0.0010	0.0522

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0042	17079	104206	610	Fail
0.0044	15488	100570	649	Fail
0.0046	14070	97084	690	Fail
0.0048	12799	93768	732	Fail
0.0050	11569	90667	783	Fail
0.0052	10519	87609	832	Fail
0.0054	9561	84721	886	Fail
0.0056	8750	81876	935	Fail
0.0058	8031	79267	987	Fail
0.0060	7347	76807	1045	Fail
0.0062	6733	74454	1105	Fail
0.0064	6190	72123	1165	Fail
0.0066	5726	69856	1219	Fail
0.0068	5309	67610	1273	Fail
0.0070	4924	65514	1330	Fail
0.0072	4569	63439	1388	Fail
0.0074	4235	61514	1452	Fail
0.0076	3951	59611	1508	Fail
0.0078	3643	57793	1586	Fail
0.0080	3388	56060	1654	Fail
0.0082	3133	54370	1735	Fail
0.0084	2915	52702	1807	Fail
0.0086	2704	51141	1891	Fail
0.0088	2488	49643	1995	Fail
0.0090	2314	48210	2083	Fail
0.0092	2136	46799	2190	Fail
0.0094	1972	45387	2301	Fail
0.0096	1824	44082	2416	Fail
0.0098	1702	42820	2515	Fail
0.0100	1577	41580	2636	Fail
0.0102	1442	40382	2800	Fail
0.0104	1325	39270	2963	Fail
0.0106	1232	38158	3097	Fail
0.0108	1147	37067	3231	Fail
0.0110	1085	36019	3319	Fail
0.0112	1020	35013	3432	Fail
0.0114	947	34051	3595	Fail
0.0116	886	33088	3734	Fail
0.0118	824	32190	3906	Fail
0.0120	760	31249	4111	Fail
0.0122	725	30393	4192	Fail
0.0124	674	29559	4385	Fail
0.0126	623	28725	4610	Fail
0.0128	589	27998	4753	Fail
0.0130	549	27228	4959	Fail
0.0132	506	26565	5250	Fail
0.0134	469	25859	5513	Fail
0.0136	427	25175	5895	Fail
0.0138	388	24469	6306	Fail
0.0140	356	23827	6692	Fail
0.0142	328	23250	7088	Fail
0.0144	298	22651	7601	Fail
0.0146	270	22073	8175	Fail
0.0148	241	21496	8919	Fail

0.0150	218	20935	9603	Fail
0.0152	198	20345	10275	Fail
0.0154	174	19849	11407	Fail
0.0156	152	19353	12732	Fail
0.0158	130	18848	14498	Fail
0.0160	119	18379	15444	Fail
0.0162	104	17917	17227	Fail
0.0164	95	17464	18383	Fail
0.0166	83	17064	20559	Fail
0.0168	74	16636	22481	Fail
0.0170	69	16247	23546	Fail
0.0172	61	15830	25950	Fail
0.0174	53	15443	29137	Fail
0.0176	46	15056	32730	Fail
0.0178	39	14730	37769	Fail
0.0180	29	14384	49600	Fail
0.0182	25	14052	56208	Fail
0.0184	22	13717	62350	Fail
0.0186	20	13402	67010	Fail
0.0188	17	13064	76847	Fail
0.0190	14	12791	91364	Fail
0.0192	12	12493	104108	Fail
0.0194	8	12142	151775	Fail
0.0196	7	11856	169371	Fail
0.0198	7	11556	165085	Fail
0.0200	7	11278	161114	Fail
0.0202	6	11020	183666	Fail
0.0204	6	10763	179383	Fail
0.0206	6	10506	175100	Fail
0.0208	6	10277	171283	Fail
0.0210	6	10044	167400	Fail
0.0212	5	9817	196340	Fail
0.0214	5	9595	191900	Fail
0.0216	5	9383	187660	Fail
0.0218	5	9154	183080	Fail
0.0220	5	8947	178940	Fail
0.0222	5	8748	174960	Fail
0.0224	5	8566	171320	Fail
0.0226	4	8374	209350	Fail
0.0228	4	8203	205075	Fail
0.0230	3	8025	267500	Fail
0.0232	3	7850	261666	Fail
0.0234	3	7691	256366	Fail
0.0236	3	7516	250533	Fail
0.0238	3	7362	245400	Fail
0.0240	3	7178	239266	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.

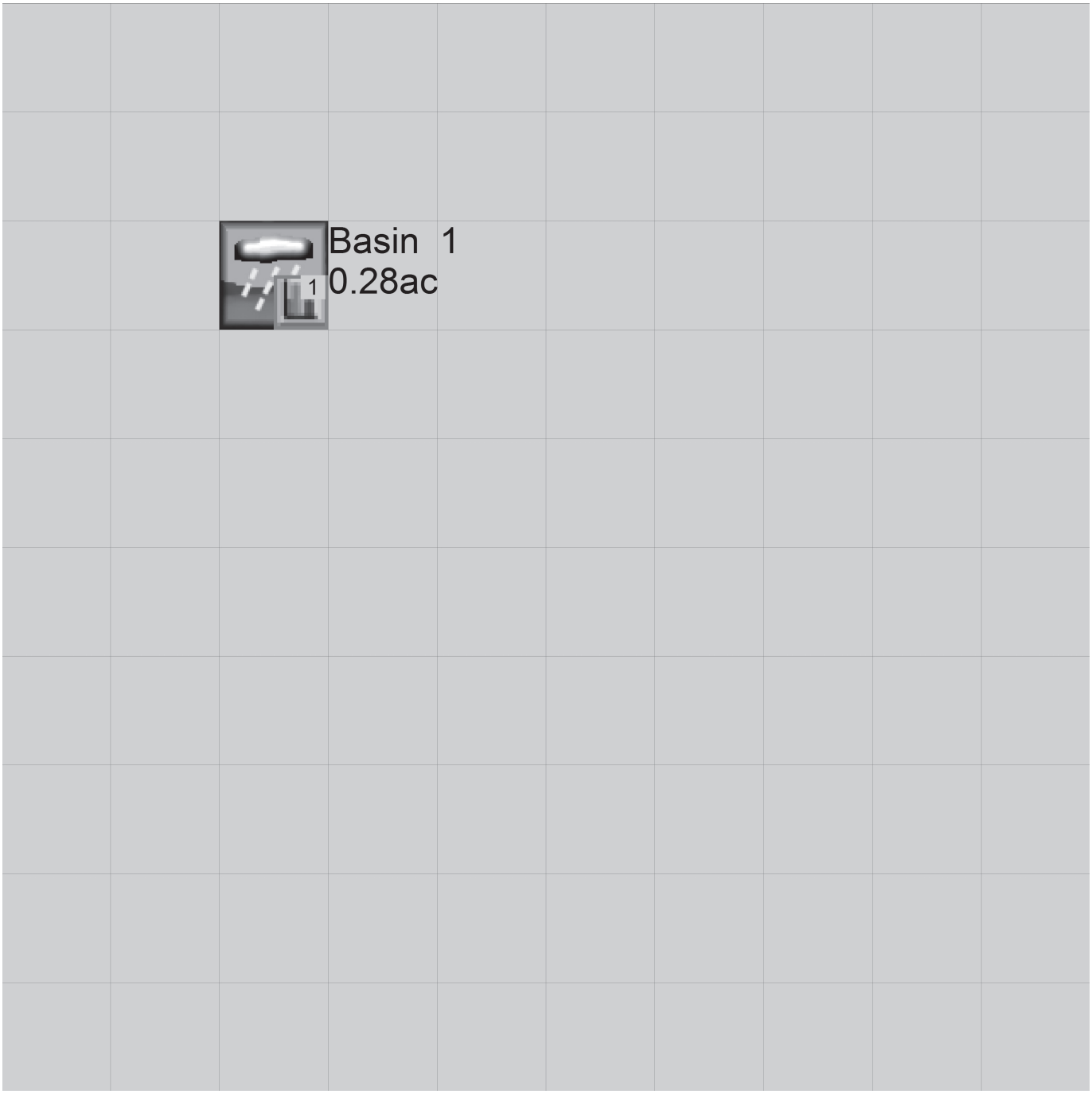
PERLND Changes

No PERLND changes have been made.

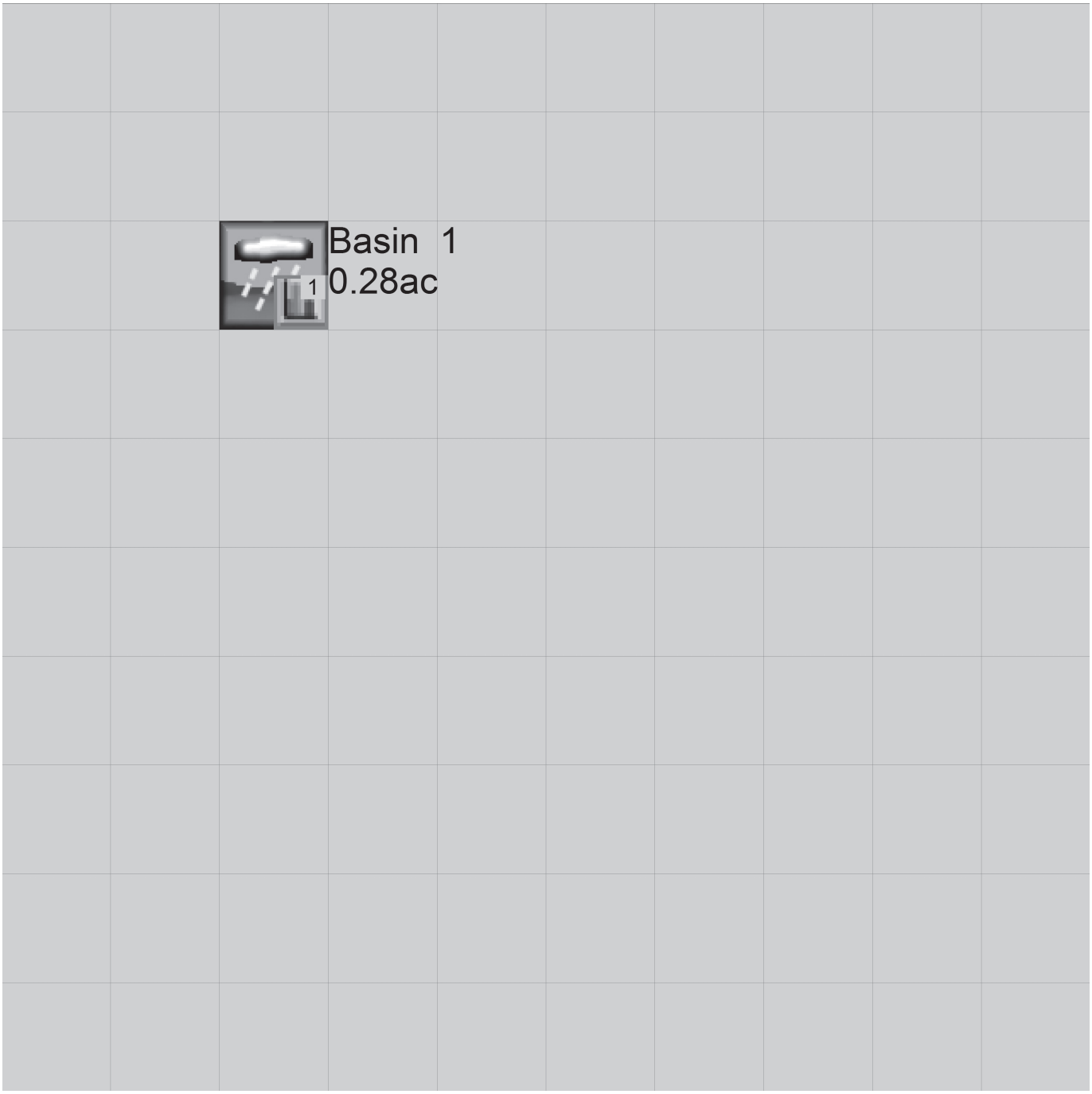
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



```
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   default[24].wdm
MESSU      25   Predefault[24].MES
           27   Predefault[24].L61
           28   Predefault[24].L62
           30   POCdefault[24]1.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
  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                       0.28     COPY   501     12
PERLND  11                       0.28     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
```

```
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   default[24].wdm
MESSU      25   Mitdefault[24].MES
           27   Mitdefault[24].L61
           28   Mitdefault[24].L62
           30   POCdefault[24]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      IMPLND       2
      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
  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           ***
    2      ROADS/MOD              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
  END ACTIVITY

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

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

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

```
  END IWAT-PARM3

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  11                       0.102     COPY   501     12
PERLND  11                       0.102     COPY   501     13
IMPLND   2                       0.178     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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Operation & Maintenance Manual

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

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

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

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

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

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as

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

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).
Catch Basin	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

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

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks. Frame is sit-

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

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	ting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into	Mechanism opens with

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

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Working	frame have less than 1/2 inch of thread.	proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

Table V-4.5.2(6) Maintenance Standards - Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4

Table V-4.5.2(6) Maintenance Standards - Debris Barriers (e.g., Trash Racks) (continued)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Bars.	Bars are missing or entire barrier missing. Bars are loose and rust is causing 50% deterioration to any part of barrier.	inch. Bars in place according to design. Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

Table V-4.5.2(7) Maintenance Standards - Energy Dissipaters

Maintenance Components	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
External:			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad replaced to design standards.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design standards.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe cleaned/-flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a "sheet flow" of water along trench). Intent is to prevent erosion damage.	Trench redesigned or rebuilt to standards.
	Perforations Plugged.	Over 1/2 of perforations in pipe are plugged with debris and sediment.	Perforated pipe cleaned or replaced.

Table V-4.5.2(7) Maintenance Standards - Energy Dissipaters (continued)

Maintenance Components	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
	Water Flows Out Top of "Distributor" Catch Basin.	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.	Facility rebuilt or redesigned to standards.
	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal:			
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.	Structure replaced to design standards.
	Other Defects	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

Table V-4.5.2(8) Maintenance Standards - Typical Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet

Table V-4.5.2(17) Maintenance Standards - Coalescing Plate Oil/Water Separators (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	inlet/outlet pipe.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.

Table V-4.5.2(18) Maintenance Standards - Catch Basin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

Table V-4.5.2(19) Maintenance Standards - Media Filter Drain (MFD)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment accumulation on grass filter strip	Sediment depth exceeds 2 inches or creates uneven grading that interferes with sheet flow.	Remove sediment deposits on grass treatment area of the embankment. When finished, embankment should be level from side to side and drain freely toward the toe of the embankment slope. There should be no areas of standing water once inflow has ceased.
	No-vegetation zone/-flow spreader	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire embankment width.	Level the spreader and clean to spread flows evenly over entire embankment width.
	Poor vegetation coverage	Grass is sparse or bare, or eroded patches are observed in more than 10% of the grass strip surface area.	Determine why grass growth is poor and correct the offending condition. Reseed into loosened, fertile soil or compost; or, replant with plugs of grass from the upper slope.
	Vegetation	Grass becomes excessively tall (greater than 10 inches); nuisance weeds and other vegetation start to take over.	Mow vegetation or remove nuisance vegetation to not impede flow. Mow grass to a height of 6 inches.
	Media filter drain mix replacement	Water is seen on the surface of the media filter drain mix long after the storms have ceased. Typically, the 6-month, 24-hour precipitation event should drain within 48 hours. More common storms should drain within 24 hours. Maintenance also needed on a 10-year cycle and during a preservation project.	Excavate and replace all of the media filter drain mix contained within the media filter drain.
	Excessive shading	Grass growth is poor because sunlight does not reach	If possible, trim back overhanging limbs and remove

Table V-4.5.2(19) Maintenance Standards - Media Filter Drain (MFD) (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
		embankment.	brushy vegetation on adjacent slopes.
	Trash and debris	Trash and debris have accumulated on embankment.	Remove trash and debris from embankment.
	Flooding of Media filter drain	When media filter drain is inundated by flood water	Evaluate media filter drain material for acceptable infiltration rate and replace if media filter drain does not meet long-term infiltration rate standards.

Table V-4.5.2(20) Maintenance Standards - Compost Amended Vegetated Filter Strip (CAVFS)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment accumulation on grass	Sediment depth exceeds 2 inches.	Remove sediment deposits. Relevel so slope is even and flows pass evenly through strip.
	Vegetation	Grass becomes excessively tall (greater than 10 inches); nuisance weeds and other vegetation start to take over.	Mow grass and control nuisance vegetation so that flow is not impeded. Grass should be mowed to a height of 6 inches.
	Trash and debris	Trash and debris have accumulated on the vegetated filter strip.	Remove trash and debris from filter.