Appendix F

Tesoro Savage Vancouver Energy Distribution Terminal
Vancouver, Washington

Preliminary Stormwater Report

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TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
PRELIMINARY STORMWATER REPORT

TABLE OF CONTENTS

SECTION **PAGE**

1.0 PROJECT OVERVIEW 1
- 1.1 REGULATORY APPLICABILITY 1
- 1.2 SITE DESCRIPTIONS/PROPOSED IMPROVEMENTS 1
- 1.3 EXISTING CONDITIONS 6

2.0 MINIMUM REQUIREMENTS 7
- 2.1 Minimum Requirement No. 1: Preparation of Stormwater Site Plans 7
- 2.2 Minimum Requirement No. 2: Construction Stormwater Pollution Prevention 8
- 2.3 Minimum Requirement No. 3: Source Control of Pollution 11
- 2.4 Minimum Requirement No. 4: Preservation of Natural Drainage Systems and Outfalls 11
- 2.5 Minimum Requirement No. 5: On-site Stormwater Management 11
- 2.6 Minimum Requirement No. 6: Runoff Treatment 12
- 2.7 Minimum Requirement No. 7: Flow Control 12
- 2.8 Minimum Requirement No. 8: Wetlands Protection 13
- 2.9 Minimum Requirement No. 9: Operation and Maintenance 13

3.0 PRELIMINARY SOILS EVALUATION 13

4.0 FLOODPLAINS 14

5.0 SOURCE CONTROL 14
- 5.1 Construction Source Control BMPs 14
- 5.2 Structural Source Control BMPs 16
- 5.3 Operational Source Control BMPs 17

6.0 WATER QUALITY TREATMENT ANALYSIS AND DESIGN 17

7.0 FLOW CONTROL ANALYSIS AND DESIGN 19

8.0 WETLANDS PROTECTION 20

LIST OF TABLES

Table 1. Office/Change Room Areas 2
Table 2. Rail Unloading Area 3
Table 3. Containment Berm Area 3
Table 4. Support Building & Parking Areas 4
Table 5. Marine Terminal Areas 4
Table 6. Transfer Pipeline Areas 5
Table 7. West Boiler Areas 5
Table 8. Drainage Basin Areas 7
Table 9. NRCS Site Soils 14
Table 10. Construction Source Control BMPs 15
Table 11. Applicable Structural Source Control & Operational BMPs 17

Table 12. Summary of Water Quality Model Results..... 18
Table 13. Summary of 100-Year Storm Event Model Results..... 19

LIST OF ATTACHMENTS

Attachment A Vicinity Map
Attachment B Water Quality Basins Map
Attachment C Soils Maps
Attachment D Flood Insurance Rate Maps
Attachment E WWHM Model Results
Attachment F Wellhead Protection
Attachment G Shoreline Management Area
Attachment H Terminal 5 Expansion Final Hydrologic and Hydraulic Analysis Report
Attachment I Stormwater Site Plans
Attachment J Port of Vancouver, West Vancouver Freight Access Project, Parcel 1A Drainage Study
Attachment K Port of Vancouver Municipal Phase II General Stormwater Permit
Attachment L Port of Vancouver Industrial General Stormwater Permit

TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
PRELIMINARY STORMWATER REPORT
VANCOUVER, WASHINGTON

1.0 PROJECT OVERVIEW

The Tesoro Savage Vancouver Energy Distribution Terminal Project (Facility) is located within the Port of Vancouver (Port), Washington. Development activities include five individual sites located near the northwest end of the port. One site is located adjacent to State Route (SR) 501 and just east of Farwest Steel and north of the Port's Terminal 4 pond. Three of the sites are located within or adjacent to the Port's Terminal 5, west of the Clark Public Utilities (CPU) power plant off NW Gateway Avenue. The fifth site is the reuse of an existing shipping berth. The total area of all five sites equals 41.5 acres. The general project location is shown on the vicinity map in Attachment A.

The development consists of a rail offloading area and administrative and support buildings with associated parking; a crude oil product storage area within a containment berm and the support buildings, access, and parking associated with it, and the west boiler building with associated parking; and an existing marine terminal. Sites were limited to contiguous acreage because of existing development and facilities within the port.

1.1 REGULATORY APPLICABILITY

The facility will be permitted through the Washington State Energy Facility Site Evaluation Council (EFSEC). EFSEC will render the final determination of regulatory applicability and confirm that the project design meets or exceeds the necessary stormwater and runoff requirements. The project design is based upon achieving compliance with the following standards and regulations.

- Washington State Department of Ecology *Stormwater Management Manual for Western Washington* (dated August 2012) (the stormwater manual)
- City of Vancouver Municipal Code (VMC) 14.24, 14.25 and 14.26
- City of Vancouver Surface Water General Requirements (revised September 2009)
- Port of Vancouver Industrial General Stormwater Permit
- Port of Vancouver Municipal Phase II General Stormwater Permit
- 40 CFR 112

The project requires compliance with all nine of the minimum requirements set forth in the stormwater manual.

1.2 SITE DESCRIPTIONS/PROPOSED IMPROVEMENTS

Area 200 – Rail Unloading and Office Area

The rail unloading and office area consists of two separate drainage basin areas. These areas are separated from one another by the existing rail loop located on Terminal 5 that

was constructed as part of the Port's West Vancouver Freight Access project. The area north of the rail loop is designated as the administrative and support building area, and the area south of the rail loop is designated as the rail offloading area. The sections that follow discuss these areas in more detail.

The administrative and support building area consists of three modular office and change room facilities. Associated parking for staff and visitors is provided at this site. A designated covered area is provided for two dumpsters. A series of proposed containment tanks is located on this site. The site encompasses 1.6 acres and is located parallel and adjacent to NW Old Lower River Road between the CPU power plant and the intersection of NW Old Lower River Road and Hickey Marine. Runoff from the parking area and landscape located above the Vanexco cap will be directed to on-site sump catch basins), and flow to a combination oil-water separator and cartridge media filter vault located south of the rail unloading building. A detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designation is provided in Table 1 below.

Table 1. Administrative and Support Building Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Untreated Impervious	C, Lawn, Flat	0.37
Office/Change Room Buildings	Untreated Impervious	Roof Top/Flat	0.23
Sidewalk	Untreated Impervious	Sidewalks/Flat	0.07
Parking	Untreated Impervious	Parking/Flat	0.93

The northern portion of the decommissioned Alcoa property will be redeveloped to serve as the rail offloading area. The facility encompasses 7.05 acres and is located on the northern portion of the Terminal 5 rail loop and bounded by NW Old Lower River Road to the north, NW Gateway Avenue to the east, the Columbia River to the south, and Hickey Marine to the west. Stormwater runoff from the roof area of the rail offloading building will be collected through a gutter system and discharged directly to the stormwater conveyance system just downstream of the proposed water quality vault. A combination oil-water separator and cartridge media filter vault will be installed to treat runoff collected from the yard and rail improvement area east of the rail offloading area. A small berm will be constructed to isolate the rail track that is currently proposed to serve as a unit train loop designated for a future tenant on Terminal 5.

The areas identified as "port general use" in Table 2 are yard and rail areas that are topographically unable to sheet flow to the proposed on-site stormwater system installed by the project. These areas although located within the applicant's lease boundary are part of a general use area designated by the Port and drainage from these areas will continue to be collected and treated by the Port's stormwater systems. Drainage from them will be directed to existing on-site stormwater inlets and conveyances that discharge to the downstream water quality ponds for treatment. A

portion of the existing industrial yard outside of the proposed site area will be directed to the on-site drainage system. Table 2 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 2. Rail Unloading Area

Surface Description	Existing Condition	WWHM Type	Area (acres)
Rail Unloading Area	Untreated Impervious	Roof Top/Flat	3.98
Treated Yard Area	Untreated Impervious	Parking/Flat	1.28
Treated Walkways	Untreated Impervious	Sidewalks/Flat	0.02
Port General Use Area	Untreated Impervious	Parking/Flat	1.77
Port General Use Area - Walkways	Untreated Impervious	Sidewalks/Flat	0.06

Areas 300 – Storage Area and Boiler Building

The storage area consists of two separate drainage basins totaling 21.02 acres located east of Farwest Steel and adjacent to SR 501 and approximately 0.4 mile east of the intersection of SR 501 and NW Gateway Avenue. The first basin consists of everything within the limits of the containment berm. The second basin includes the support buildings, parking area, access roads, and landscaping areas around the containment berm. A discussion of the basins follows.

The area inside the containment berm consists of 18.35 acres with 6.23 acres of roof area at buildout. Each tank will be constructed with a roof that floats on top of the crude oil to prevent vapors from escaping and a fixed roof on top of the tank to prevent stormwater from mixing with the stored product. Gutters will be installed on the tanks and roof runoff will be discharged directly to the storm drain downstream of the water quality vault. The gravel yard area used for occasional maintenance, monitoring, and sampling of crude oil in the product storage tanks will be sloped to 12 sumps within the site. Each tank will be separated from the other tanks with intermediate 4-foot-tall berms. Each tank area will have two sumps. Stormwater from the sumps will be pumped to hydrodynamic separator, oil/water separator, and a water quality vault on the site. Pumps will be positive displacement type to reduce the likelihood of re-emulsifying oil into solution with the stormwater. Stormwater from the gravel yard will be pumped out of the containment area only when the facility staff confirms visually that no oil sheen is visible in the sumps. Table 3 provides a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 3. Containment Berm Area

Surface Description	Existing Condition	WWHM Type	Area (acres)
Storage Tank Roofs	Treated Impervious	Roof Top/Flat	6.23
Treated Yard Area	Treated Impervious	Parking/Flat	12.12

The area outside the containment berm consists of 2.67 acres and is the location of support buildings, parking areas, landscape areas, and miscellaneous maintenances yard. Runoff from the support buildings and sidewalks will be directed onto the parking areas, and will be treated along with the parking runoff. Runoff from these pollution-generating surfaces will be treated with a combination oil-water separator and cartridge filter media vault. Table 4 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 4. Support Building & Parking Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Treated Impervious	C, Lawn, Flat	1.62
Boiler, Pump Pit, Fire Skid, Control Room Building	Treated Impervious	Roof Top/Flat	0.16
Sidewalk	Treated Impervious	Sidewalks/Flat	0.05
Parking	Untreated Impervious	Parking/Flat	0.28
Port General Use Area	Treated Impervious	Parking/Flat	0.39
Untreated Off site	Treated Impervious	Driveways/Flat	0.17

Area 400 – Marine Terminal and MVCU Area

The marine terminal consists of a single upland drainage basin. Currently, the 1.08-acre basin sheet flows upland into a series of water quality swales. Piping hydraulically connects the northern treatment swales to the southern infiltration swales. The basin consists of existing pavement and gravel surfacing. In a few spotted areas, sparse herbaceous grasses have begun to establish within the graveled areas. Because of the historical general industrial use of the area and the nature of fill soils placed in it over time, its soils function as impervious despite minimal grass establishment.

The marine vapor combustion unit (MVCU) is currently located in a portion of the northeastern swale. Mitigation for this reduction in treatment capacity is completed by restoring 0.07 acre of existing impervious to landscaping along the top of the riverbank and adding an additional filter strip designed to treat the equivalent loss of land treated by the portion of impacted swale. The remaining areas will be hard-surfaced with asphalt for employee parking and support buildings for vessel loading activities. Table 5 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 5. Marine Terminal Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Treated Impervious	C, Lawn, Flat	0.07
Support Buildings	Treated Impervious	Roof Top/Flat	0.03
Parking Lot & Drive Aisle	Treated Impervious	Parking/Flat	0.98

No stormwater improvements are proposed on the waterward portion of the dock facility. Modifications to the dock include limited overwater construction of mooring dolphins connected by grated open bottom walkways. Modifications to the primary berth will not result in additional impervious area. Additional impervious area created by the new mooring dolphins will be mitigated by removing the existing dolphins and portions of the downriver Berth 14. The open-air containment area located underneath the crane will catch all oil drips from the hoses, and this will be collected and pumped through the oil return line to the product storage tanks.

Area 500 – Transfer Pipeline Area

The transfer pipeline area is defined as a relatively narrow lease area in which the transfer pipelines are constructed in either above or below grade conveyances. Above-grade pipelines are fully welded steel located on pipeline trestles with supports spaced approximately every 30 feet. Underground sections of pipeline occur at key rail and roadway crossings. Where the pipeline is underground, the pipeline will be constructed inside of sealed casings with leak detection. The pipeline area is designated as part of the Port's General Use Area. Stormwater from the pipeline alignment will not be modified and will continue to discharge to existing inlets and conveyance systems for treatment and discharge to the Columbia River. Table 5 shows a detailed breakdown of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations.

Table 6. Transfer Pipeline Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Port General Use Area	Untreated Impervious	Parking/Flat	4.47

Area 600 - West Boiler Building

This site is necessary for full buildout of the facility and will not be constructed initially. The site is 0.5 acre, consists of a boiler building and associated parking, and is located to the north of the Terminal 5 rail loop at the intersection of NW Old Lower River Road and Hickey Marine. Stormwater from the facility will be discharged to a combination oil-water separator and cartridge media filter vault located on the south side of the rail unloading building. Details of the existing and proposed surfacing descriptions, areas and the applicable Western Washington Hydrology Model (WWHM) designations are provided in Table 7 below.

Table 7. West Boiler Areas

Surface Description	Existing Condition	WWHM Type	Area (acres)
Landscaping	Untreated Impervious	C, Lawn, Flat	0.15
Boiler Building	Untreated Impervious	Roof Top/Flat	0.15
Sidewalk	Untreated Impervious	Sidewalks/Flat	0.01

Surface Description	Existing Condition	WWHM Type	Area (acres)
Parking	Untreated Impervious	Parking/Flat	0.15
Off-site Pavement	Untreated Impervious	Parking/Flat	0.04

1.3 EXISTING CONDITIONS

Existing conditions are generally impervious, and consist of existing facilities within the port. The rail offloading area and administrative and support buildings (Area 200) is the former Alcoa site; it contains existing rail tracks and gravel laydown areas. The storage area (Area 300) and adjacent access and parking are currently used as staging and storage areas for other port construction. Existing gravel and excavated soil piles are located on this site. The west boiler building (Area 600) located at the southeast corner of the intersection of NW Old Lower River Road and Hickey Marine is currently unimproved area that was a miscellaneous industrial area used as borrow for fill activities on site.

An existing stormwater system on the site was installed in preparation for future development of Terminal 5. A hydrologic and hydraulic analysis report, dated May 3, 2012 was prepared by HDR Engineering Inc. and submitted to the City and is included as Attachment H. On-site conveyance and water quality treatment systems were designed for the area of the proposed development and assumed the site would be fully impervious. In accordance with the Port's National Pollutant Discharge Elimination System (NPDES) permit for Terminal 5, basic treatment is performed on site for the on-site tenant areas (Area 200 and Area 600) and the Port's downstream water quality ponds provide final polishing prior to discharge to the Columbia River through manmade conveyance systems and outfall.

The surrounding topography is flat and existing surface structures and improvements prohibit off-site stormwater from entering the project area. Outside the Terminal 5 rail loop, a new loop road, currently under construction, will be owned by the Port; this new loop road has its own separate stormwater system that further isolates the project area from off-site stormwater impacts.

The storage area located on Terminal 4 will discharge stormwater to an existing conveyance system designed when Farwest Steel completed its improvements. The stormwater system was sized and designed for tenant stormwater; the system keeps tenant stormwater separate from the Port's general stormwater basins and combines the two downstream of the Port's Terminal 4 water quality pond. Stormwater from the storage area will be treated to enhanced levels of treatment in accordance with the Port's NPDES General Stormwater Permit.

Farwest Steel's improvements were designed to manage stormwater on the site; to the east, the wetland depression collects water from SR 501 and the surrounding areas.

SR 501 restricts stormwater from the north from entering the tank farm area, while the rail loops and constructed stormwater systems to the south prohibit stormwater from entering the project site.

2.0 MINIMUM REQUIREMENTS

The facility's new development and redevelopment will comply with VMC Section 14.25 and will be regulated by the City's January 17, 2007 NPDES Western Washington Phase II Municipal Stormwater Permit and the mandatory provisions it incorporates from the 2012 edition of the stormwater manual.

The project is located entirely on previously disturbed soils that are generally considered impervious gravel. In some instances, the existing soil is heavily compacted fill material used for decades as an industrial area. While some sparse, short grasses have established themselves, years of industrial activity, fill, compaction, and environmental caps have resulted in the soils on the site being considered impervious.

The following table summarizes changes to land coverage resulting from this project.

Table 8. Drainage Basin Areas

	On-site Drainage Areas				Off-site Drainage Areas	
	Existing Impervious Surface	Replaced or Maintained Impervious Surface	Separated Impervious Roof Runoff	Impervious Surface Converted to Landscaping	Impervious Surface Contributing to Project Drainage System	Replaced Impervious Surface
Area 200 Unloading and Office	8.65 ac	4.07 ac	4.21 ac	0.37 ac	0.06 ac	-
Area 300 Storage	20.85 ac	12.84 ac	6.39 ac	1.62 ac	-	0.17 ac
Area 400 Marine Terinal	1.00 ac	0.90 ac	0.03 ac	0.07 ac	0.08	-
Area 500 Transfer Pipelines	4.47 ac	4.47 ac	-	-	-	-
Area 600 West Boiler	0.46 ac	0.16 ac	0.15 ac	0.15 ac	0.04 ac	-
Rail Infrastructure	4.63 ac	4.63 ac				
Total	**2.21 ac**	**27.07 ac**	**10.78 ac**	**2.21 ac**	**0.18 ac**	**0.17 ac**

The land-disturbing activity that will be carried out by the project will trigger water quality improvements required by the City's NPDES Phase II permit. Therefore, minimum requirements 1 through 9 of the stormwater manual apply to the project. The minimum requirements are listed below.

2.1 Minimum Requirement No. 1: Preparation of Stormwater Site Plans

Stormwater site plans have been prepared and are attached as Attachment I. Stormwater site plans are required by Section 2.5.1 of the stormwater manual and must be prepared according to Chapter 3 of the manual and VMC 14.24, 14.25, and 14.26.

2.2 Minimum Requirement No. 2: Construction Stormwater Pollution Prevention

The facility will result in more than 2,000 square feet of replaced hard surface and will disturb more than 7,000 square feet of land; stormwater pollution prevention therefore must be considered. To comply with this minimum requirement, a preliminary stormwater pollution prevention plan (SWPPP) has been prepared; it is attached to the EFSEC Application for Site Certification as Appendix C.

The SWPPP includes narratives and drawings that clearly refer to each of the best management practices (BMPs) that will be used to prevent erosion and control sediment. The SWPPP addresses the 13 elements that are briefly described in the following paragraphs. Seasonal limits are listed and erosion and sediment controls are designed to prevent silt-laden water from leaving the site during the wet and rainy season.

- **Element 1: Preserve Vegetation/Mark Clearing Limits –** Existing vegetation on site is very minimal and consists of herbaceous groundcover not exceeding 6 inches in height. Clearing limits are defined in the stormwater site plans and will be marked in the field by construction of either silt fencing or high visibility fencing. Existing landscape buffers and nearby wetland will be protected from construction activities. The contractor will restore any accidental disturbance.

- **Element 2: Establish Construction Access –** Construction access will be limited to stabilized construction entrances and construction routes assigned for the project. Rock-stabilized construction accesses will be installed at the storage area, rail unloading and office area, and the west boiler. Access to the transfer pipeline and marine terminal is from existing impervious areas, and land-disturbing activities at these sites will be isolated from general truck traffic.

  Wheel wash units are not anticipated to be necessary. If sediment is transported onto nearby roadways, the tracked sediment will be cleaned during dry weather by shoveling, sweeping, or other pickup means. Street washing will be used only after the previously mentioned methods of sediment removal have been completed. If these currently proposed BMPs are not sufficient to control sediment transport, wheel washes will be implemented.

- **Element 3: Control Flow Rates –** Turbid waters will be controlled from downstream properties through installed erosion and sediment control BMPs. All of the sites consist of existing impervious coverage, and runoff rates therefore will not be increased to downstream properties or conveyances. Sediment ponds will be installed to detain stormwater runoff from the rail offloading area and the storage area. Erosion and sediment control BMPs, including sediment ponds and conveyances, will be sized for the Type 1A 10-year 24-hour storm event.

  Construction BMPS will manage stormwater until the site has been stabilized and permanent operational BMPs have been installed; the supplier will perform start-up.

- **Element 4: Install Sediment Controls –** Elimination of soil erosion is the primary goal of the SWPPP as prepared. Sediment controls are added as an extra layer of security against off-site sediment transport if erosion occurs. Sediment controls such as sediment ponds, filters, and cutoff ditches will be installed before land-disturbing activities take place. Stormwater will be directed to installed sediment removal BMPs.

  Construction of erosion or sediment controls will be located above the ordinary high water line and therefore no interference is anticipated with juvenile salmonids. Additionally, the project will construct no new outfalls.

- **Element 5: Stabilize Soils –** Soil stabilizing will be performed on site for all soils exposed more than 7 days during the dry season (May 1–September 30) and for all soils exposed more than 2 days during the wet season (October 1–April 30). Soils will be stabilized by applying BMPs that prevent erosion; as appropriate, these BMPS include temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, and early application of gravel base on areas to be paved.

  Depending upon the weather forecast, soils will be stabilized at the end of the workday prior to a holiday or weekend. Stockpiles will be protected by plastic covering and silt fencing. To the extent possible, soil disturbance will be limited to areas being worked on, without carrying out clearing and grubbing activities ahead of construction activities.

- **Element 6: Protect Slopes –** The site is generally flat without any slopes requiring protection. Silt fencing will be installed along the edge of the riverbank to protect the river from runoff during construction. Stormwater discharges at the marine terminal will be maintained and directed to existing swale areas just north of the marine terminal. Slope construction necessary during construction of the storage area containment berm will be protected using applicable BMPs. The site will be surrounded by silt fencing and, once constructed, the soils will be tracked and seeded.

- **Element 7: Protect Drain Inlets –** All drain inlets, existing and proposed, will be protected with BMPs to maintain operation and prevent sediment transport. BMPs include insertable filter devices or above-grade filter media. Drain inlet BMPs will be inspected after each storm event to check capacity and the filter media will be cleaned or removed and replaced when sediment has filled one-third of the device's available storage capacity.

- **Element 8: Stabilize Channels and Outlets –** On-site conveyance channels (cutoff ditches) are designed to convey the Type 1A, 10-year, 24-hour storm without causing

erosion under the 10-minute peak velocity. No modifications are proposed to existing outfalls or outlets.

- **Element 9: Control Pollutants –** All liquid pollutants, including chemicals, gasoline, paints, thinners, solvents, grease, etc., will be stored in covered areas to prevent pollution. Fueling will be conducted off site and, when necessary, at a designated location on site. Detailed spill prevention and control measures are described in the spill prevention control and countermeasures (SPCC) plan included in the EFSEC Application for Site Certification Appendix B.2. Secondary containment will be provided for all chemical, liquid, and petroleum tanks and mechanical piping.

  Wheel wash and tire baths are not anticipated to be required. If necessary, wastewater will be contained in a closed loop system or disposed of to the sanitary sewer system after receiving permission from the City for the discharge.

  BMPs will be used to prevent contaminating stormwater runoff by sources of differing pH. A designated location will be provided for washing concrete trucks, and curing water, or discharge water from concrete sawing etc. Construction stormwater from these processes will be checked for pH prior to its discharge and, when necessary, will be treated to adjust its pH. The pH adjustment will be completed using CO_2 or dry ice only.

- **Element 10: Control Dewatering –** Construction dewatering is anticipated in portions of the site during excavation for underground utilities and building footings. Dewatering discharges will be directed to the on-site cutoff ditches and to on-site sediment ponds.

  If dewatering water cannot be discharged cleanly, additional treatment methods, including off-site disposal and/or settling tanks and flocculating chemical injection, may be completed prior to discharge to on-site systems.

- **Element 11: Maintain BMPs –** All BMPs will be inspected after each storm event to ensure that sediment buildup is less than 30 percent of the storage volume and that all BMPs are operating as designed. BMPs will be removed within 30-days of site stabilization and startup of the permanent operational stormwater system and BMPs.

- **Element 12: Manage the Project –** Initially, construction of the project will be phased to install all the stormwater BMPs necessary to manage stormwater on site in accordance with the stormwater manual. A Certified Erosion and Sediment Control Lead (CESCL) must inspect the site; the CESCL will be identified in the final SWPPP. Inspection and monitoring will be completed in accordance with Special Condition S4 of the Construction Stormwater General Permit.

To the maximum extent possible, construction phasing will avoid exposing disturbed soils for long periods. Soil stabilization will be completed according to Element 8 as frequently as possible to prevent erosion. Permanent facilities and site stabilization will be timed to maximize the effectiveness of stormwater erosion and sediment control BMPs to maintain downstream water quality.

- **Element 13: Protect Low Impact Development BMPs –** Any adjacent low impact development (LID) BMPs will be protected using necessary construction BMPs to prevent damage, including compaction, sedimentation, and other disruptions. Due to the industrial nature of the proposed site, suitable BMPs are designed for construction and operations on site.

2.3 Minimum Requirement No. 3: Source Control of Pollution

Identified sources of pollution are addressed with designed source control BMPs in accordance with the stormwater manual. Possible sources are identified and, where possible, eliminated during design. Remaining sources are protected with BMPs as identified in the erosion control and sedimentation plans.

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

The site is an existing industrial site with no natural drainage channels. Discharges from the site will be maintained and directed to existing conveyance systems using existing outfalls. Discharge rates will not be increased due to the condition of the existing site as fully impervious. The site will discharge to three existing outfall systems, one located downstream of the Terminal 4 pond, one located at Terminal 5, and an infiltration swale located immediately north of the marine terminal.

Stormwater control and treatment structures are not located within the 25-year water elevation of the Columbia River, the only salmonid-bearing water adjacent to the project location. Existing outfalls were sized and designed to account for the construction of the project area as fully impervious surfaces.

2.5 Minimum Requirement No. 5: On-site Stormwater Management

Stormwater will be managed on site in accordance with Section 2.5.5 of Volume I Minimum Technical Requirements and Site Planning of the stormwater manual. In addition, in accordance with Section 2.5.7 of Appendix I-E, the project is flow control-exempt and therefore is not required to achieve the LID performance standard, or to consider bioretention, rain gardens, permeable pavement, and full dispersion. Stormwater monitoring manholes will be installed upstream of the connection point to monitor and confirm that on-site stormwater management techniques meet all discharge requirements.

Site grading will be conducted and stormwater improvements installed to minimize the discharge of stormwater run-off from the site. Structural components of design,

including manmade conveyances, inlets, and berms, will be used to contain stormwater on site. The project design accounts for the safe conveyance of the 100-year storm event in accordance with the stormwater manual.

2.6 Minimum Requirement No. 6: Runoff Treatment

Because the total project adds more than 5,000 square feet of pollution-generating hard surface, the project is required to address runoff treatment. Treatment units are sized for the contributing area and expected water quality flow as determined by the Western Washington Hydrology Model. Treatment facilities were selected in accordance with the process identified in Chapter 4 of Volume I and Chapter 2 of Volume V of the stormwater manual. An operations and maintenance (O&M) manual will be developed adhering to the maintenance schedule required in Volume V.

Discharge water quality monitoring manholes will be provided at all connection points to the existing stormwater conveyances. Stormwater discharges from pollution-generating surfaces in the storage area and marine terminal will be discharged to existing stormwater systems located in Terminal 4. Stormwater will be treated on site to the discharge limits identified in the state General Industrial Stormwater Permit. Terminal 4 discharges are currently permitted through state General Industrial Stormwater Permit No. WAR000424.

Stormwater discharges from pollution-generating surfaces in the west boiler building area, rail unloading and office area, and rail infrastructure improvements will be discharged to existing systems located in Terminal 5. Stormwater will be treated on site to the discharge limits identified in the State Phase II Municipal Stormwater Permit. Terminal 5 stormwater is then routed to an existing water quality pond that was designed with sufficient capacity for the built-out project areas, assuming fully impervious coverage. Terminal 5 discharges are currently permitted through a State Phase II Municipal Stormwater Permit No. WAR045201.

2.7 Minimum Requirement No. 7: Flow Control

Flow control is not required for this project. This project discharges indirectly to the Columbia River, which is listed in Appendix I-E of the stormwater manual. The areas proposed for redevelopment are located within the existing drainage basins of developed storm drain systems that discharge through manmade conveyances directly to the Columbia River.

Additionally, the existing brownfield nature of the project site is such that the project stormwater does not result in the diversion of drainage from any perennial stream listed in the water typing system or from any category of wetland. Additionally, construction flow splitting devices or drainage BMPs that route stormwater to any wetlands are not required.

On-site stormwater will be collected from buildings roofs through gutter and rain drain systems that will bypass stormwater treatment, as these surfaces are classified as non-pollution generating. Stormwater from surface improvements will be collected through a series of inlets and storm drain systems, routed through on-site treatment, and discharged to existing on-site manmade pipelines. These pipelines continue through manmade conveyance pipes to manmade water quality facilities before discharging through piped outfalls to the Columbia River. From collection to discharge into the river, the stormwater is never conveyed through natural channels.

The design of the downstream conveyance and water quality ponds that are not part of this project assumed that the project sites would be developed as fully impervious. Copies of the design reports for the downstream conveyance systems are attached in Attachments H and J.

2.8 Minimum Requirement No. 8: Wetlands Protection

Wetland protection does not apply to this project. This project does not discharge stormwater directly or indirectly into a wetland.

2.9 Minimum Requirement No. 9: Operation and Maintenance

An O&M manual consistent with the provisions of Volume V of the stormwater manual will be developed for the facilities and BMPs that are included in the project. A copy of the O&M manual will be retained on the site and available for review. Updated logs and copies of all required monitoring will be retained and included in the O&M manual for reference.

3.0 PRELIMINARY SOILS EVALUATION

According to the Natural Resource Conservation Service (NRCS) and the Soil Survey of Clark County, there are four predominant soil types on the project site: Newberg silt loam, Pilchuck fine sand, Sauvie silt loam, and Sauvie silty clay loam. In the vicinity of the storage tank farm (Subbasin 1 and Subbasin 2), all four soil types are found as well as areas of fill. Around the rail unloading facility (Subbasin 3), the soil is classified as fill land. At the intersection of NW Old Lower River Road and Hickey Marine (Subbasin 4), and at the existing truck loading station and office building along NW Old Lower River Road (Subbasin 5), the soil is classified as Sauvie silty clay loam.

A comprehensive study on existing geological conditions, including soil study is being completed by Geotechnical Resources, Inc. (GRI). The development of design criteria and recommendations is proceeding concurrently with design. A description of on-site soils and descriptive narratives are included in Part 3 of the EFSEC Application.

The physical and engineering properties of the soils are summarized in Table 9.

Table 9. NRCS Site Soils

Soil	Hydrological Group	Slope	Erosion Potential
Newberg silt loam (NbA)	B	0 to 3%	Slight
Pilchuck fine sand (PhB)	A	0 to 8%	Slight
Sauvie silt loam (SmA, SmB)	C	0 to 8%	Slight to Moderate
Sauvie silty clay loam (SpB)	C	0 to 8%	Moderate
Fill Land*	NA	NA	NA

* For the purpose of hydrologic capacity of soils to infiltrate, fill land was considered to be hydrological group C.

A soil survey map is provided in Attachment C.

4.0 FLOODPLAINS

According to Panel 0363D and Panel 0364D of the Flood Insurance Rate Map (FIRM) for Clark County, the storage area; the office area located at the southeast corner of the intersection of NW Old Lower River Road and Hickey Marine ; and the existing truck loading station and office building along NW Old Lower River Road are within Zone AE. See Attachment D for Panel 0363D and Panel 0364D.

5.0 SOURCE CONTROL

Pollution source control is the primary method used on site for preserving the quality of drainage leaving the site. All construction and operational activities on the site were evaluated for potential sources of stormwater pollution. To the maximum extent possible, industrial activities on the site are designed to occur within covered facilities isolated from the effects of stormwater. Descriptions of the construction and operational source control measures that will be used on the site follow.

5.1 Construction Source Control BMPs

Construction source control BMPs are designed and included to exceed the requirements prescribed in Chapter 4, Volume III, of the stormwater manual. Construction source control BMPs are identified in detail in the construction SWPPP that is attached in the EFSEC Application for Site Certification as Appendix C. Table 10 lists construction-related source control BMPs.

Table 10. Construction Source Control BMPs

Sub-basin No.	BMP: #C103 High Visibility Fence	BMP: #C105 Stabilized Construction Entrance	BMP: #C107 Construction Road/Parking Area Stabilization	BMP: #C120 Temporary & Permanent Seeding	BMP: #C121 Mulching	BMP: #C123 Plastic Covering	BMP: #C130 Surface Roughening	BMP: # C140 Dust Control	BMP: #C151 Concrete Handling	BMP: #C153 Material Delivery, Storage and Containment	BMP: #C154 Concrete Washout Area	BMP: #C160 Certified Erosion and Sediment Control Lead	BMP: #C162 Scheduling	BMP: #C200 Interceptor Dike and Swale	BMP: #C201 Grass-Lined Channels	BMP: #C220 Storm Drain Inlet Protection	BMP #C233 Silt Fence	BMP: #C235 Wattles	BMP: #C241 Temporary Sediment Pond
Area 200 Administrative & Support Buildings	X	X		X		X		X	X	X	X	X				X	X		
Area 200 Rail Offloading Area	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X		X
Area 300 Containment Berm		X		X		X	X	X	X	X	X	X	X			X	X		
Area 300 Support Buildings & Parking	X	X		X		X		X	X	X	X	X	X	X	X	X	X		X
Area 400 Marine Terminal	X			X		X		X	X	X	X	X	X			X	X	X	
Area 500 Transfer Pipeline	X				X	X		X	X	X	X	X	X			X	X	X	
Area 600 West Boiler	X	X		X		X		X	X	X	X	X	X			X	X		
Rail Improvements	X		X		X			X		X		X	X			X	X		

5.2 Structural Source Control BMPs

Operational and structural source control BMPs are designed to exceed the requirements of Chapter 2, Volume IV of the stormwater manual. On-site operations, including unloading, pumping, transfer, and storage of crude oil and miscellaneous materials, are conducted in covered facilities designed to keep stormwater from entering the structures and mixing with industrial activities. Transfer of crude oil at the dock facility is completed with a closed piping system where oil transfer will not be exposed to stormwater. To the maximum extent possible, all industrial activities are protected from stormwater.

Secondary structural containment measures are in place; they consist of containment pans along the rail offloading area, double bottom tanks with in situ monitoring for the storage area, and an impervious lined berm that surrounds the tank farm and is sized to exceed the storage requirements of 110 percent of the largest tank plus a 100-year rainfall event. Secondary containment system at the rail offloading area is collected and pumped to double-walled holding tanks located near the office building where the contents will be hauled off site. Secondary containment systems at the storage area include a series of manually controlled pumps that discharge to a hydrodynamic separator, oil-water separator, and a water quality filter vault to evacuate the stormwater contained within the storage containment berm. During storm events, the pumps are manual on, automatic off. Each time, the pumps must be turned on manually, with the manual on switch located where visual inspection for oil sheen is required.

Parking and access areas are designed with a combination of sumped catch basins and media cartridge filter vaults to treat stormwater runoff. Filter vaults are designed to include an oil-water separating baffle for added protection from miscellaneous oil drips.

Maintenance, including equipment and parts wash, will be conducted in a covered portion of the rail offloading area. All wastewater produced will be pumped to the holding tanks located at the administrative and support buildings.

Table 11. Applicable Structural Source Control & Operational BMPs

Subbasin No.	S411 Landscaping and Lawn/Vegetation Management	S412 – Loading & Unloading Areas	S415 – Maintenance of Public & Private Utility Corridors & Facilities	S417 – Maintenance of Stormwater Drainage & Treatment Systems	S421 – Parking & Storage of Vehicles and Equipment	S422 – Railroad Yards	S425 – Soil Erosion & Sediment Control at Industrial Sites	S426 – Spills of Oil & Hazardous Substances	S427 Storage of Liquids in Permanent Aboveground Tanks	S431 Washing & Steam Cleaning of Vehicles/Equipment/Building Structures
Area 200 Administrative and Support Buildings	X	X	X	X	X			X	X	
Area 200 Rail Offloading Area		X	X	X		X	X	X		X
Area 300 Containment Berm	X			X			X	X	X	
Area 300 & 700 Support Buildings & Parking	X	X	X	X	X		X	X		
Area 400 Marine Terminal	X	X	X	X	X		X	X		
Area 500 Transfer Pipeline				X				X		
Area 600 West Boiler	X	X		X	X		X			
Rail Improvements				X		X	X	X		

5.3 Operational Source Control BMPs

In addition, containment drip pans and other containment measures will supplement the structural source control BMPs. A comprehensive site-specific spill prevention control and countermeasures (SPCC) plan will be developed in accordance with 40 CFR 112; a preliminary outline of the SPCC plan is attached in the EFSEC Application for Site Certification as Appendix B2.

6.0 WATER QUALITY TREATMENT ANALYSIS AND DESIGN

In accordance with the City's General Requirements, the Western Washington Hydrology Model (WWHM) with a continuous storm event was used to size the stormwater treatment system. Per the General Requirements, the water quality storm is the 6-month, 24-hour event, as estimated using the WWHM. A simplified model for each subbasin was developed in the WWHM 3.0 software. Water quality model results are included in Attachment E and summarized in Table 12. This estimated peak flow was used to size the stormwater treatment system.

Table 12. Summary of Water Quality Model Results

Subbasin No.	Total Area (acres)	Pollution-Generating Surfaces (acres)	Water Quality Flow Rate (cfs)[1]	Rated Treatment Capacity (cfs)
Area 200 Administrative and Support Buildings	1.60	1.23	0.1511 0.0849[2]	>0.2456[2]
Area 200 Rail Offloading Area	6.02	1.20	0.1496 0.0842	>0.0842
Area 300 Containment Berm	18.35	12.12	1.5108[3] 0.8507	-
Area 300 Support Buildings & Parking	2.50	0.49	0.0671[3] 0.0374	>1.5779[3]
Area 400 Marine Terminal	1.18	1.05	0.1299 0.0731	>0.1299
Area 500 Transfer Pipeline	2.29	N/A	N/A	N/A
Area 600 West Boiler	0.46	0.35	0.2854 0.1607[2]	-
Rail Infrastructure		N/A	N/A	N/A

Note: Water quality volume and flow rates calculated with WWHM3.

1. Values listed are on-line water quality flow rate and an off-line water quality flow rate calculated with WWHM3. Both rates provided as each site uses different treatment methods.
2. Offline flow rate for Area 200 Office/Change Room and Area 600 West Boiler Building combined into a single treatment facility located south of the rail unloading building.
3. Online flow rate for Area 300 Containment Berm and Area 300 & 700 Buildings and Parking combined into a single treatment facility located south of the tank farm pump pit.

Water quality treatment for each site will be provided by passing runoff flows at or below to the water quality design flow through a proprietary filtration facilities.

Stormwater for the combined contribution of the Area 200 Administrative and Support Buildings and Area 600 West Boiler will flow to a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 0.2456 cfs. The facility will be sized to hold a maximum of 11 cartridges capable of treating 0.275 cfs. A diversion structure will be designed upstream of the filtration treatment facility to direct the water quality storm to the vault and bypass the treatment vault during high flow events.

Stormwater for Area 200 Rail Offloading Area will flow to a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 0.0842 cfs. The facility will be sized to hold a maximum of 11 cartridges capable of treating 0.275 cfs. A diversion structure will be designed upstream of the filtration treatment facility to direct the water quality storm to the vault and bypass the treatment vault during high flow events.

Stormwater from Area 300 Storage Area will flow to a treatment train of proprietary units. Stormwater from within the containment berm will be pumped to a

hydrodynamic separator capable of treating 2 cfs. Stormwater will then flow directly into an oil-water separator capable of treating 1.95 cfs. Stormwater from the parking and yard areas will enter the stormwater system through inlets and be combined with containment area stormwater for treatment in a proprietary filtration facility that includes an oil-water separation baffle and cartridge media filter units. The required water quality flow rate is 1.5779 cfs. The facility will be sized to hold a minimum of 63 cartridges capable of treating 1.579 cfs. This facility is designed as an on-line facility with no diversion structures required.

Stormwater from Area 400 Marine Terminal will sheet flow through an engineering filter strip approximately 16 feet in length prior to entering a bio-filtration and infiltration swale. Filter strip is designed according to Volume V, Section 9.4, BMP T9.40 of the stormwater manual.

Roof drains for buildings and storage tanks will bypass the water quality treatment conveyance and connect directly into the existing conveyance system. Selection of media filter type and final filtration vault sizing will be completed during final design.

7.0 FLOW CONTROL ANALYSIS AND DESIGN

The project discharges to existing Columbia River outfalls through existing manmade conveyance pipelines. This project is categorically exempt from the flow control provisions of the stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

Conveyance pipelines and structures were sized for the 100-year storm to ensure safe conveyance. The pipeline running along the south side of the rail offloading area was additionally analyzed to convey 2,000 gpm of fire flow water with 1,000 gpm entering the system at the extreme west and east ends of the building. Conveyance pipelines were designed using Manning's equation assuming that the pipelines are flowing at 75 percent of capacity. Grade of the proposed pipelines was determined assuming 2.5 feet per second using the 2-year storm event.

Table 13. Summary of 100-Year Storm Event Model Results

Subbasin No.	Total Area (acres)	100- Year Contributing Area (acres)	100-Year Storm Flow Rate (cfs)	Conveyance System Capacity (cfs)
Area 200 Administrative and Support Buildings	1.60	1.60	0.9323	>0.9323
Area 200 Rail Offloading Area	6.02	5.10	0.8506 2.7646[1]	>3.6152
Area 300 Containment Berm	18.35	18.35	8.5914 4.4162[2]	>13.0076
Area 300 Support Buildings and Parking	2.50	2.11	0.7101	>0.7101

Subbasin No.	Total Area (acres)	100- Year Contributing Area (acres)	100-Year Storm Flow Rate (cfs)	Conveyance System Capacity (cfs)
Area 400 Marine Terminal	1.18	1.18	0.7651	>0.7651
Area 500 Transfer Pipeline	2.29	N/A	N/A	N/A
Area 600 West Boiler	0.46	0.50	0.2730	>0.2730
Rail Infrastructure		N/A	N/A	N/A

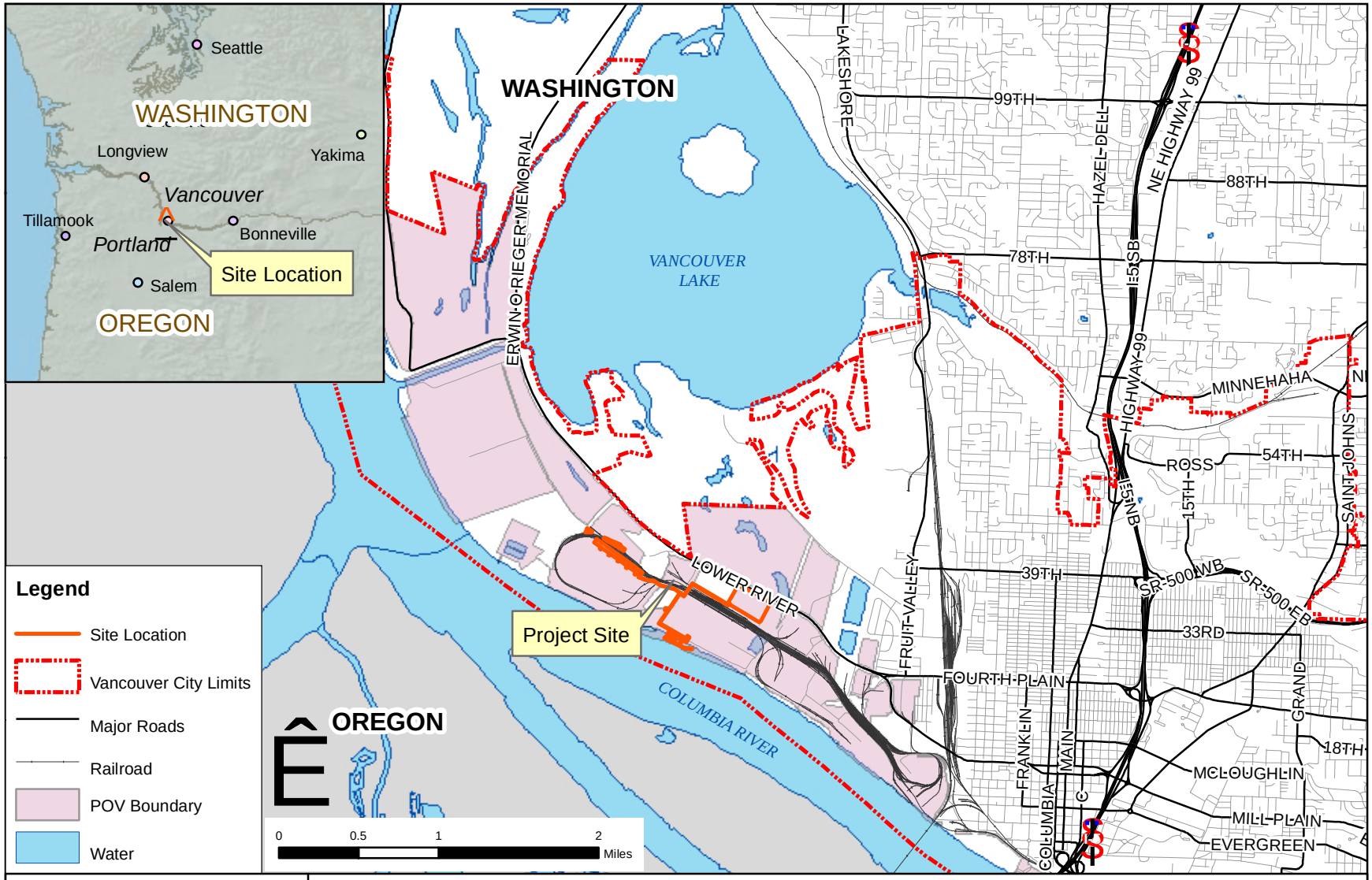
Note: 100-Year Storm flow rates calculated with WWHM3.

1. Value for 100-year runoff rate from rail facility's separated roof.
2. Value for 100-year runoff rate from aboveground storage tanks' separated roof.

8.0 WETLANDS PROTECTION

The storage area borders an existing wetland area. Site construction and disturbance will be limited to areas within the existing gravel access perimeter road. High visibility silt fencing installed along the property boundary will flag the sensitive area. On-site activities within the storage area will be contained within an imperviously lined containment berm with sufficient capacity for 110 percent of the volume of a single tank and the 100-year storm event. Runoff to the wetland will not be altered by the project and no modifications are proposed to the existing inlet or outlet of the wetland.

Attachment A
Vicinity Map



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General Vicinity Map

Attachment B
Water Quality Basins Map

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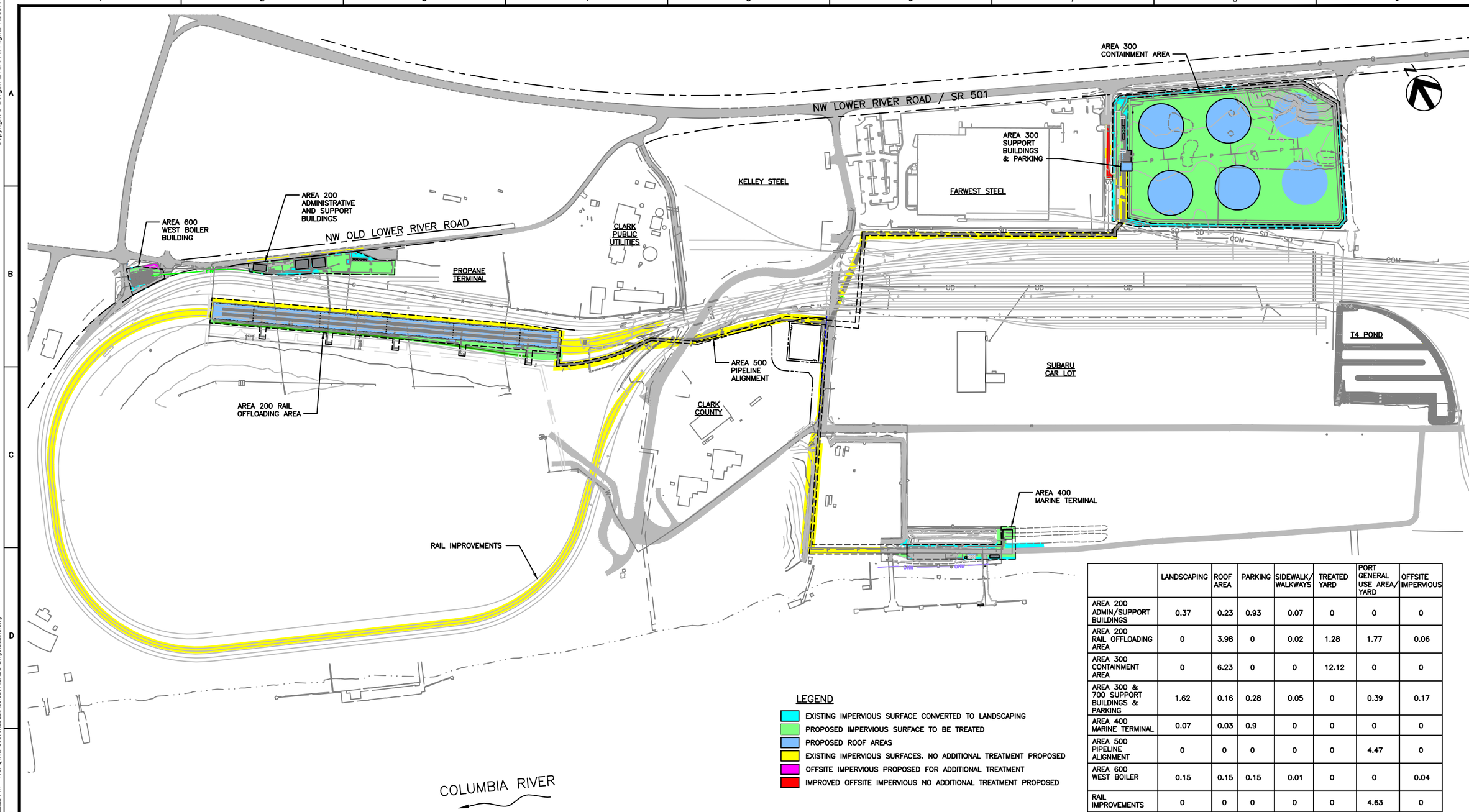

	LANDSCAPING	ROOF AREA	PARKING	SIDEWALK/ WALKWAYS	TREATED YARD	PORT GENERAL USE AREA/ YARD	OFFSITE IMPERVIOUS
AREA 200 ADMIN/SUPPORT BUILDINGS	0.37	0.23	0.93	0.07	0	0	0
AREA 200 RAIL OFFLOADING AREA	0	3.98	0	0.02	1.28	1.77	0.06
AREA 300 CONTAINMENT AREA	0	6.23	0	0	12.12	0	0
AREA 300 & 700 SUPPORT BUILDINGS & PARKING	1.62	0.16	0.28	0.05	0	0.39	0.17
AREA 400 MARINE TERMINAL	0.07	0.03	0.9	0	0	0	0
AREA 500 PIPELINE ALIGNMENT	0	0	0	0	0	4.47	0
AREA 600 WEST BOILER	0.15	0.15	0.15	0.01	0	0	0.04
RAIL IMPROVEMENTS	0	0	0	0	0	4.63	0

LEGEND

- EXISTING IMPERVIOUS SURFACE CONVERTED TO LANDSCAPING
- PROPOSED IMPERVIOUS SURFACE TO BE TREATED
- PROPOSED ROOF AREAS
- EXISTING IMPERVIOUS SURFACES. NO ADDITIONAL TREATMENT PROPOSED
- OFFSITE IMPERVIOUS PROPOSED FOR ADDITIONAL TREATMENT
- IMPROVED OFFSITE IMPERVIOUS NO ADDITIONAL TREATMENT PROPOSED

NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
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CUSTOMER: TESORO SAVAGE PETROLEUM TERMINAL LLC

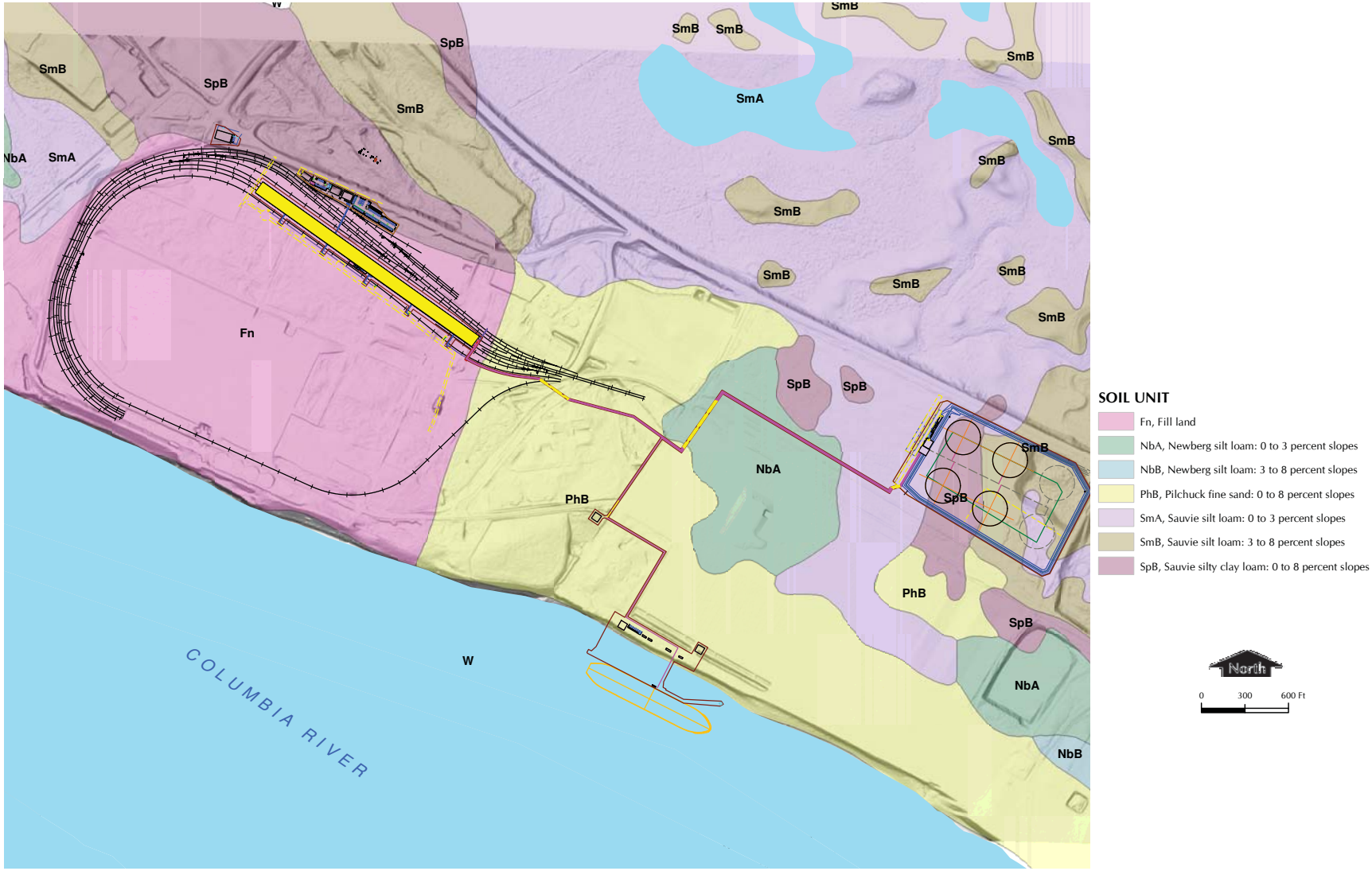
PROJECT: TESORO SAVAGE PETROLEUM TERMINAL LLC
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: WATER QUALITY BASIN MAP

DESIGN:	DES	START DATE:	6/26/2013	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	8/22/2013	PROJECT MANAGER:	PM
CHECKED:		APPROVED:	APPR	SIZE:	24X36
DRAWING NUMBER				SHEET	REV.
0X00-BASINS-001				1/1	

Last Saved by: Tony.pritchett on: Aug 22, 2013 12:23 PM File: Q:\Vancouver\2013\A13.0267\CADD\Dwgs\Basins.dwg

Attachment C
Soils Map



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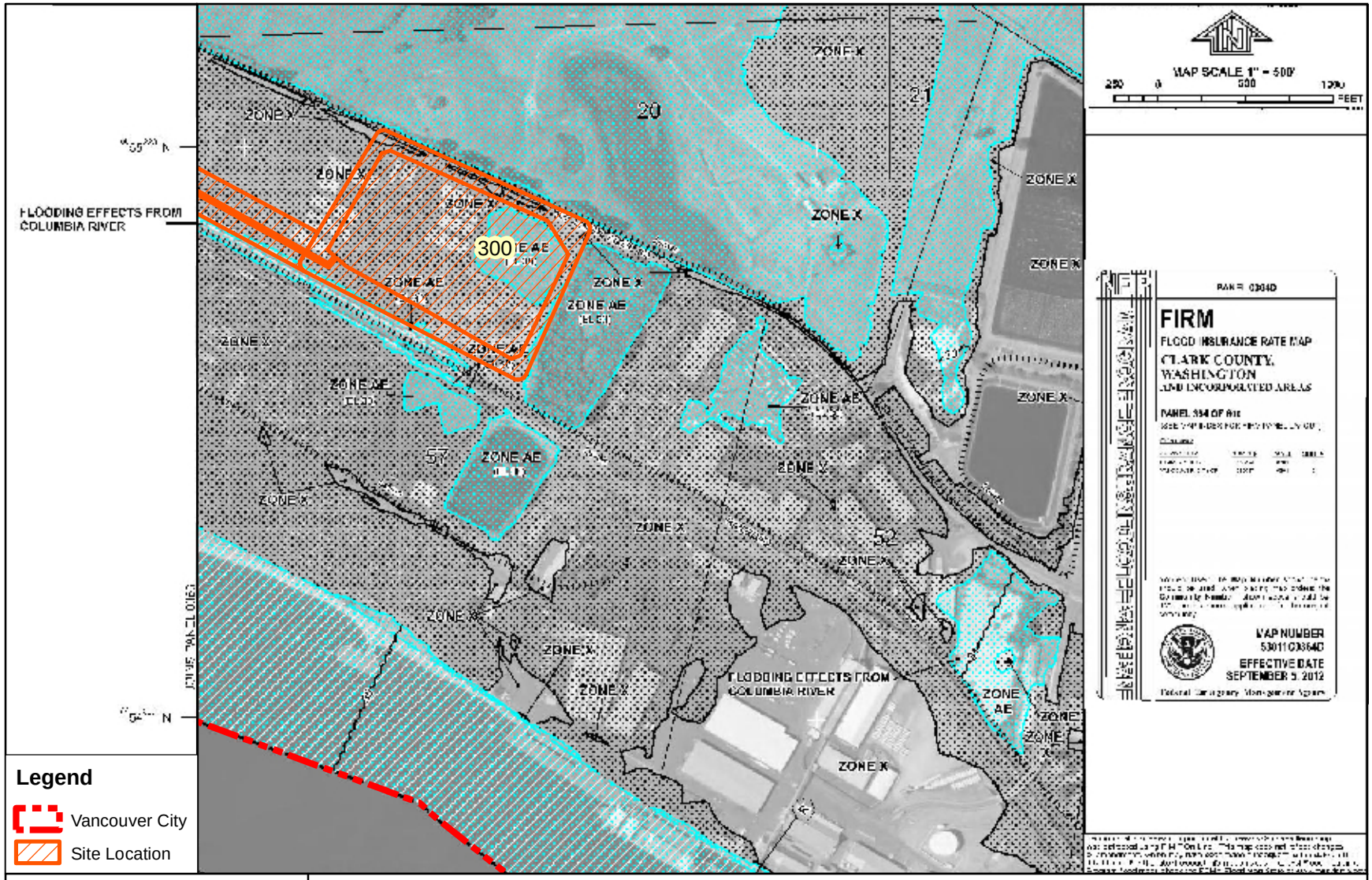
Soils Map

Attachment D
Flood Insurance Rate Maps



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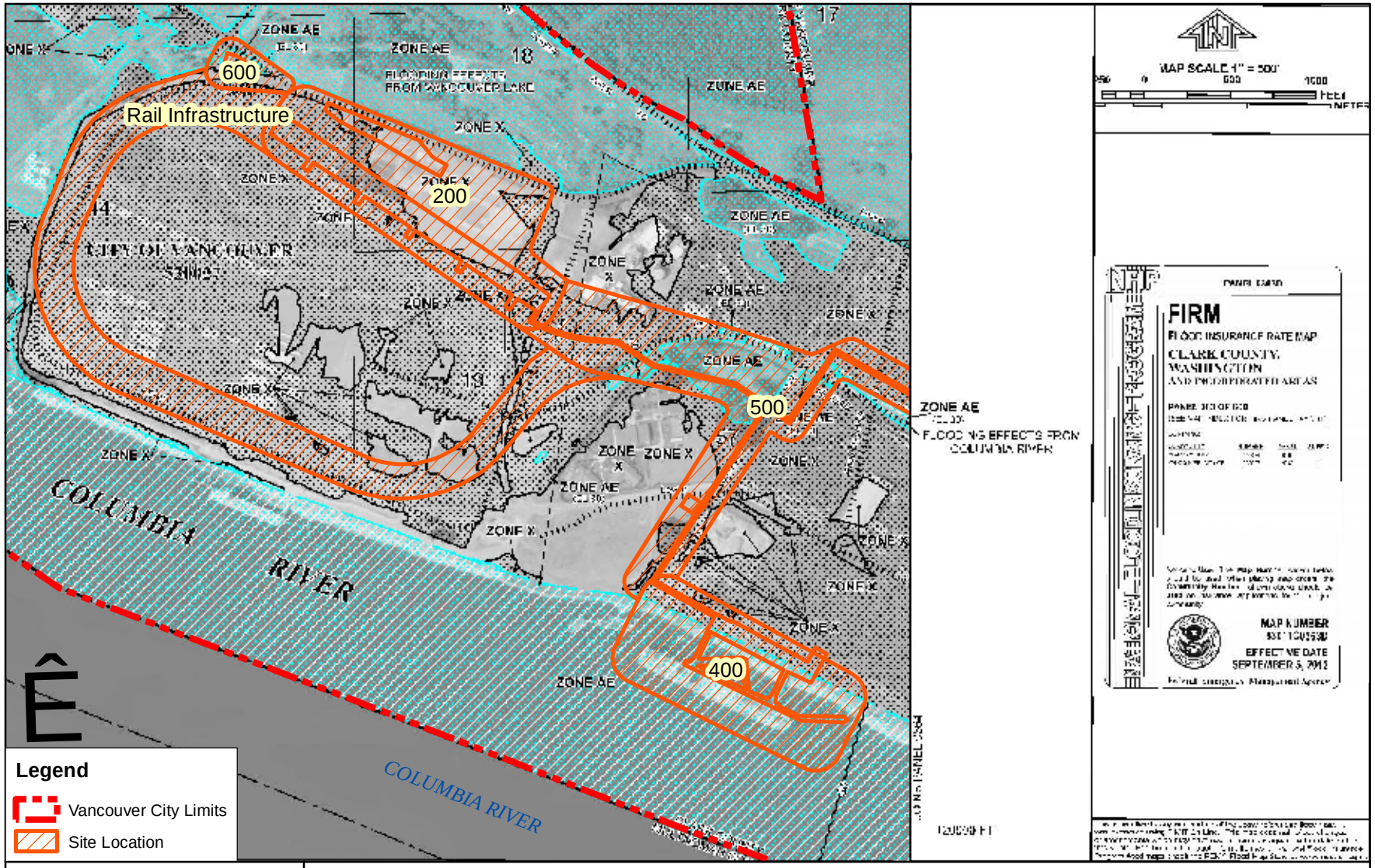
Mapped Floodplains East



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Mapped Floodplains West

Attachment E
WWHM Model Results

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Savage
Site Name:	Tesoro Savage Petroleum Terminal
Site Address:	5501 Old Lower River Road
City:	Vancouver
Report Date:	8/7/2013
Gage:	Portland
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.80
Version:	2013/05/17

POC Thresholds

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Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year
Low Flow Threshold for POC5:	50 Percent of the 2 Year
High Flow Threshold for POC5:	50 Year
Low Flow Threshold for POC6:	50 Percent of the 2 Year
High Flow Threshold for POC6:	50 Year
Low Flow Threshold for POC7:	50 Percent of the 2 Year
High Flow Threshold for POC7:	50 Year
Low Flow Threshold for POC8:	50 Percent of the 2 Year
High Flow Threshold for POC8:	50 Year
Low Flow Threshold for POC9:	50 Percent of the 2 Year
High Flow Threshold for POC9:	50 Year

Landuse Basin Data

Predeveloped Land Use

Area 200 - Office Change Room

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	1.6
Impervious Total	1.6
Basin Total	1.6

Element Flows To:

Surface	Interflow	Groundwater

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Area 200 Rail Unloading

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	6.02
Impervious Total	6.02
Basin Total	6.02

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 300 Containment Berm

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	18.35
Impervious Total	18.35
Basin Total	18.35

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 300 & 700 Buidlings & Parking

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.5
Impervious Total	2.5
Basin Total	2.5

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 400 Dock

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	1.18
Impervious Total	1.18
Basin Total	1.18

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 500 Pipeline Alignment

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.29
Impervious Total	2.29
Basin Total	2.29

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 600 - West Boiler Building

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	0.46
Impervious Total	0.46
Basin Total	0.46

Element Flows To:

Surface	Interflow	Groundwater

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Mitigated Land Use

Area 20O - Office Change Room

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	0.37
Pervious Total	0.37
Impervious Land Use	Acres
ROOF TOPS FLAT	0.23
SIDEWALKS FLAT	0.07
PARKING FLAT	0.93
Impervious Total	1.23
Basin Total	1.6

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 200 Rail Unloading

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
SIDEWALKS FLAT	0.02
PARKING FLAT	1.18
Impervious Total	1.2
Basin Total	1.2

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 300 Containment Berm

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	12.12
Impervious Total	12.12
Basin Total	12.12

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 300 & 700 Buidlings & Parking

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	1.62
Pervious Total	1.62
Impervious Land Use	Acres
ROOF TOPS FLAT	0.16
SIDEWALKS FLAT	0.05
PARKING FLAT	0.28
Impervious Total	0.49
Basin Total	2.11

Element Flows To:

Surface	Interflow	Groundwater

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Area 400 Dock

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	0.13
Pervious Total	0.13
Impervious Land Use	Acres
PARKING FLAT	1.05
Impervious Total	1.05
Basin Total	1.18

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 500 Pipeline Alignment

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
PARKING FLAT	2.29
Impervious Total	2.29
Basin Total	2.29

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 600 - West Boiler Building

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	0.15
Pervious Total	0.15
Impervious Land Use	Acres
ROOF TOPS FLAT	0.15
SIDEWALKS FLAT	0.01
PARKING FLAT	0.19
Impervious Total	0.35
Basin Total	0.5

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 300 - Tank Roofs

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROOF TOPS FLAT	6.23
Impervious Total	6.23
Basin Total	6.23

Element Flows To:

Surface	Interflow	Groundwater

DRAFT

Area 200 - Rail Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROOF TOPS FLAT	3.9
Impervious Total	3.9
Basin Total	3.9

Element Flows To:

Surface	Interflow	Groundwater

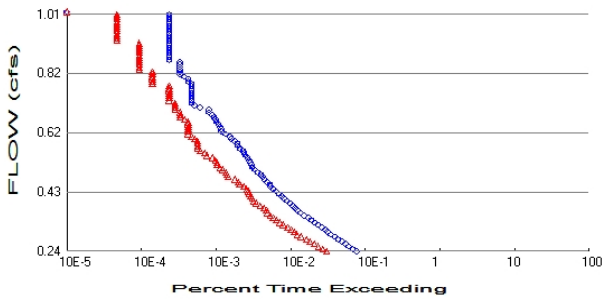
DRAFT

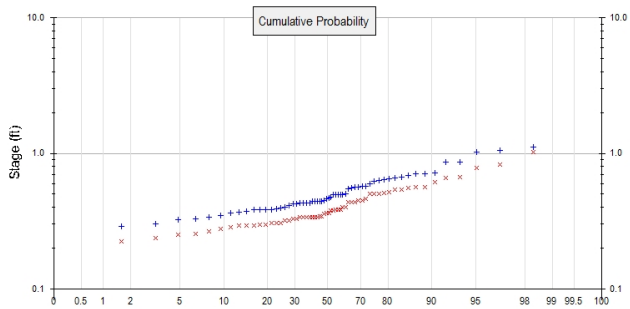
Routing Elements
Predeveloped Routing

DRAFT

DRAFT

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 1.6

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.37
Total Impervious Area: 1.23

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.479642
5 year	0.632761
10 year	0.742566
25 year	0.891239
50 year	1.00943
100 year	1.134182

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.378635
5 year	0.506049
10 year	0.598343
25 year	0.72432
50 year	0.825185
100 year	0.932254

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.672	0.517
1950	0.383	0.294
1951	0.430	0.343
1952	0.478	0.377
1953	0.399	0.307
1954	0.501	0.385
1955	0.323	0.252
1956	0.660	0.563
1957	0.448	0.356
1958	0.703	0.566

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1959	0.382	0.294
1960	0.443	0.343
1961	0.621	0.511
1962	0.338	0.266
1963	0.426	0.337
1964	0.376	0.296
1965	0.546	0.452
1966	0.422	0.336
1967	0.492	0.386
1968	0.705	0.542
1969	0.858	0.661
1970	1.117	1.018
1971	0.441	0.339
1972	0.442	0.340
1973	0.430	0.330
1974	0.493	0.400
1975	0.300	0.236
1976	0.394	0.318
1977	0.280	0.216
1978	0.494	0.403
1979	0.684	0.553
1980	0.382	0.296
1981	0.564	0.464
1982	0.572	0.447
1983	0.599	0.505
1984	0.366	0.286
1985	0.413	0.319
1986	0.497	0.383
1987	0.465	0.365
1988	0.567	0.436
1989	0.427	0.329
1990	0.441	0.339
1991	0.433	0.340
1992	0.386	0.307
1993	0.555	0.438
1994	0.363	0.291
1995	0.653	0.502
1996	0.857	0.672
1997	0.713	0.612
1998	0.626	0.506
1999	0.347	0.275
2000	0.330	0.254
2001	0.291	0.225
2002	0.640	0.540
2003	0.387	0.308
2004	0.494	0.380
2005	0.440	0.339
2006	0.564	0.434
2007	0.461	0.362
2008	1.050	0.825
2009	1.016	0.782

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.1170	1.0179
2	1.0505	0.8253
3	1.0163	0.7815

4	0.8584	0.6716
5	0.8566	0.6607
6	0.7134	0.6121
7	0.7046	0.5662
8	0.7029	0.5627
9	0.6844	0.5532
10	0.6718	0.5424
11	0.6602	0.5401
12	0.6528	0.5168
13	0.6404	0.5115
14	0.6264	0.5057
15	0.6211	0.5046
16	0.5994	0.5022
17	0.5724	0.4643
18	0.5674	0.4516
19	0.5644	0.4467
20	0.5643	0.4376
21	0.5547	0.4363
22	0.5459	0.4340
23	0.5008	0.4030
24	0.4969	0.3995
25	0.4944	0.3855
26	0.4938	0.3853
27	0.4931	0.3827
28	0.4923	0.3798
29	0.4779	0.3773
30	0.4653	0.3646
31	0.4605	0.3619
32	0.4478	0.3556
33	0.4433	0.3430
34	0.4419	0.3426
35	0.4407	0.3403
36	0.4406	0.3400
37	0.4402	0.3390
38	0.4331	0.3389
39	0.4297	0.3387
40	0.4296	0.3373
41	0.4271	0.3362
42	0.4260	0.3304
43	0.4219	0.3292
44	0.4129	0.3189
45	0.3988	0.3180
46	0.3944	0.3082
47	0.3867	0.3069
48	0.3864	0.3069
49	0.3830	0.2959
50	0.3823	0.2956
51	0.3823	0.2945
52	0.3756	0.2943
53	0.3664	0.2915
54	0.3627	0.2863
55	0.3472	0.2753
56	0.3381	0.2658
57	0.3298	0.2536
58	0.3234	0.2519
59	0.3000	0.2355
60	0.2908	0.2253
61	0.2804	0.2162

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2398	1620	647	39	Pass
0.2476	1441	574	39	Pass
0.2554	1283	503	39	Pass
0.2631	1144	444	38	Pass
0.2709	1042	386	37	Pass
0.2787	924	346	37	Pass
0.2865	829	295	35	Pass
0.2942	733	260	35	Pass
0.3020	665	236	35	Pass
0.3098	614	217	35	Pass
0.3176	557	195	35	Pass
0.3253	497	169	34	Pass
0.3331	446	154	34	Pass
0.3409	401	136	33	Pass
0.3487	366	125	34	Pass
0.3564	323	113	34	Pass
0.3642	287	105	36	Pass
0.3720	262	101	38	Pass
0.3797	244	93	38	Pass
0.3875	227	83	36	Pass
0.3953	209	73	34	Pass
0.4031	190	68	35	Pass
0.4108	172	65	37	Pass
0.4186	161	62	38	Pass
0.4264	148	59	39	Pass
0.4342	137	58	42	Pass
0.4419	124	55	44	Pass
0.4497	115	50	43	Pass
0.4575	112	44	39	Pass
0.4653	104	42	40	Pass
0.4730	94	38	40	Pass
0.4808	89	31	34	Pass
0.4886	85	30	35	Pass
0.4964	77	29	37	Pass
0.5041	71	26	36	Pass
0.5119	66	24	36	Pass
0.5197	63	22	34	Pass
0.5275	62	22	35	Pass
0.5352	59	21	35	Pass
0.5430	56	19	33	Pass
0.5508	54	16	29	Pass
0.5585	51	15	29	Pass
0.5663	49	13	26	Pass
0.5741	44	12	27	Pass
0.5819	42	12	28	Pass
0.5896	41	12	29	Pass
0.5974	38	12	31	Pass
0.6052	34	11	32	Pass
0.6130	33	10	30	Pass
0.6207	29	9	31	Pass
0.6285	25	9	36	Pass
0.6363	25	9	36	Pass
0.6441	24	9	37	Pass

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0.6518	23	9	39	Pass
0.6596	22	9	40	Pass
0.6674	21	8	38	Pass
0.6752	20	7	35	Pass
0.6829	19	7	36	Pass
0.6907	17	7	41	Pass
0.6985	17	6	35	Pass
0.7063	13	6	46	Pass
0.7140	11	6	54	Pass
0.7218	10	6	60	Pass
0.7296	10	5	50	Pass
0.7373	10	5	50	Pass
0.7451	10	5	50	Pass
0.7529	10	5	50	Pass
0.7607	10	5	50	Pass
0.7684	10	5	50	Pass
0.7762	10	5	50	Pass
0.7840	10	3	30	Pass
0.7918	9	3	33	Pass
0.7995	9	3	33	Pass
0.8073	8	3	37	Pass
0.8151	7	3	42	Pass
0.8229	7	3	42	Pass
0.8306	7	2	28	Pass
0.8384	7	2	28	Pass
0.8462	7	2	28	Pass
0.8540	7	2	28	Pass
0.8617	5	2	40	Pass
0.8695	5	2	40	Pass
0.8773	5	2	40	Pass
0.8850	5	2	40	Pass
0.8928	5	2	40	Pass
0.9006	5	2	40	Pass
0.9084	5	2	40	Pass
0.9161	5	2	40	Pass
0.9239	5	1	20	Pass
0.9317	5	1	20	Pass
0.9395	5	1	20	Pass
0.9472	5	1	20	Pass
0.9550	5	1	20	Pass
0.9628	5	1	20	Pass
0.9706	5	1	20	Pass
0.9783	5	1	20	Pass
0.9861	5	1	20	Pass
0.9939	5	1	20	Pass
1.0017	5	1	20	Pass
1.0094	5	1	20	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.1175 acre-feet
On-line facility target flow:	0.1511 cfs.
Adjusted for 15 min:	0.1511 cfs.
Off-line facility target flow:	0.0849 cfs.
Adjusted for 15 min:	0.0849 cfs.

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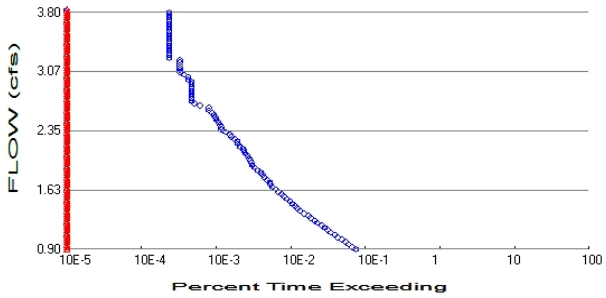
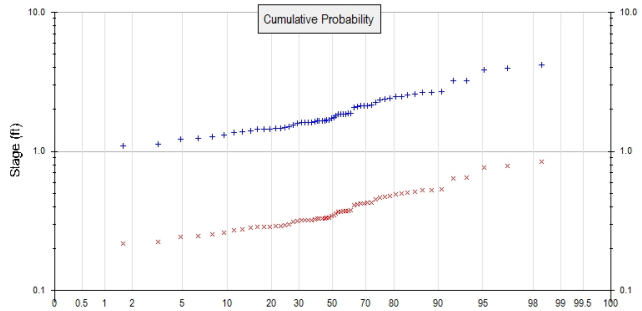
POC 2





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 6.02

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 1.2

Flow Frequency Method: Log Pearson Type III 17B

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Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	1.804655
5 year	2.380765
10 year	2.793906
25 year	3.353291
50 year	3.797982
100 year	4.267365

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.359732
5 year	0.474571
10 year	0.556925
25 year	0.66843
50 year	0.757073
100 year	0.850638

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	2.528	0.504
1950	1.441	0.287
1951	1.616	0.322
1952	1.798	0.358
1953	1.501	0.299
1954	1.884	0.376
1955	1.217	0.243
1956	2.484	0.495
1957	1.685	0.336
1958	2.645	0.527
1959	1.438	0.287

1960	1.668	0.332
1961	2.337	0.466
1962	1.272	0.254
1963	1.603	0.320
1964	1.413	0.282
1965	2.054	0.409
1966	1.587	0.316
1967	1.852	0.369
1968	2.651	0.528
1969	3.230	0.644
1970	4.203	0.838
1971	1.658	0.331
1972	1.663	0.331
1973	1.617	0.322
1974	1.855	0.370
1975	1.129	0.225
1976	1.484	0.296
1977	1.055	0.210
1978	1.860	0.371
1979	2.575	0.513
1980	1.439	0.287
1981	2.124	0.423
1982	2.154	0.429
1983	2.255	0.450
1984	1.379	0.275
1985	1.554	0.310
1986	1.870	0.373
1987	1.751	0.349
1988	2.135	0.426
1989	1.607	0.320
1990	1.658	0.330
1991	1.630	0.325
1992	1.454	0.290
1993	2.087	0.416
1994	1.365	0.272
1995	2.456	0.490
1996	3.223	0.642
1997	2.684	0.535
1998	2.357	0.470
1999	1.306	0.260
2000	1.241	0.247
2001	1.094	0.218
2002	2.409	0.480
2003	1.455	0.290
2004	1.858	0.370
2005	1.656	0.330
2006	2.123	0.423
2007	1.733	0.345
2008	3.952	0.788
2009	3.824	0.762

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	4.2028	0.8378
2	3.9523	0.7878
3	3.8237	0.7622
4	3.2298	0.6438

5	3.2231	0.6425
6	2.6842	0.5351
7	2.6510	0.5284
8	2.6447	0.5272
9	2.5752	0.5133
10	2.5275	0.5038
11	2.4840	0.4951
12	2.4561	0.4896
13	2.4094	0.4803
14	2.3569	0.4698
15	2.3371	0.4659
16	2.2553	0.4496
17	2.1535	0.4293
18	2.1347	0.4255
19	2.1235	0.4233
20	2.1232	0.4232
21	2.0871	0.4160
22	2.0539	0.4094
23	1.8841	0.3756
24	1.8695	0.3727
25	1.8602	0.3708
26	1.8579	0.3703
27	1.8553	0.3698
28	1.8522	0.3692
29	1.7982	0.3584
30	1.7506	0.3490
31	1.7328	0.3454
32	1.6850	0.3359
33	1.6680	0.3325
34	1.6627	0.3314
35	1.6580	0.3305
36	1.6579	0.3305
37	1.6561	0.3301
38	1.6297	0.3249
39	1.6169	0.3223
40	1.6164	0.3222
41	1.6068	0.3203
42	1.6029	0.3195
43	1.5875	0.3164
44	1.5537	0.3097
45	1.5007	0.2991
46	1.4840	0.2958
47	1.4550	0.2900
48	1.4539	0.2898
49	1.4410	0.2872
50	1.4386	0.2868
51	1.4384	0.2867
52	1.4131	0.2817
53	1.3788	0.2748
54	1.3646	0.2720
55	1.3063	0.2604
56	1.2722	0.2536
57	1.2408	0.2473
58	1.2168	0.2425
59	1.1289	0.2250
60	1.0943	0.2181
61	1.0549	0.2103

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.9023	1608	0	0	Pass
0.9316	1432	0	0	Pass
0.9608	1281	0	0	Pass
0.9901	1143	0	0	Pass
1.0193	1031	0	0	Pass
1.0486	915	0	0	Pass
1.0778	828	0	0	Pass
1.1071	729	0	0	Pass
1.1363	666	0	0	Pass
1.1656	611	0	0	Pass
1.1948	556	0	0	Pass
1.2241	492	0	0	Pass
1.2533	446	0	0	Pass
1.2826	399	0	0	Pass
1.3118	366	0	0	Pass
1.3411	321	0	0	Pass
1.3703	286	0	0	Pass
1.3996	260	0	0	Pass
1.4288	244	0	0	Pass
1.4581	225	0	0	Pass
1.4873	209	0	0	Pass
1.5166	190	0	0	Pass
1.5458	171	0	0	Pass
1.5751	161	0	0	Pass
1.6043	147	0	0	Pass
1.6336	137	0	0	Pass
1.6628	123	0	0	Pass
1.6921	115	0	0	Pass
1.7213	112	0	0	Pass
1.7505	103	0	0	Pass
1.7798	94	0	0	Pass
1.8090	89	0	0	Pass
1.8383	85	0	0	Pass
1.8675	77	0	0	Pass
1.8968	71	0	0	Pass
1.9260	65	0	0	Pass
1.9553	63	0	0	Pass
1.9845	62	0	0	Pass
2.0138	59	0	0	Pass
2.0430	56	0	0	Pass
2.0723	53	0	0	Pass
2.1015	51	0	0	Pass
2.1308	49	0	0	Pass
2.1600	44	0	0	Pass
2.1893	42	0	0	Pass
2.2185	41	0	0	Pass
2.2478	38	0	0	Pass
2.2770	34	0	0	Pass
2.3063	33	0	0	Pass
2.3355	29	0	0	Pass
2.3648	25	0	0	Pass
2.3940	25	0	0	Pass
2.4233	24	0	0	Pass

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2.4525	23	0	0	Pass
2.4818	22	0	0	Pass
2.5110	21	0	0	Pass
2.5403	20	0	0	Pass
2.5695	19	0	0	Pass
2.5988	17	0	0	Pass
2.6280	17	0	0	Pass
2.6573	13	0	0	Pass
2.6865	11	0	0	Pass
2.7158	10	0	0	Pass
2.7450	10	0	0	Pass
2.7743	10	0	0	Pass
2.8035	10	0	0	Pass
2.8328	10	0	0	Pass
2.8620	10	0	0	Pass
2.8913	10	0	0	Pass
2.9205	10	0	0	Pass
2.9498	10	0	0	Pass
2.9790	9	0	0	Pass
3.0083	9	0	0	Pass
3.0375	8	0	0	Pass
3.0668	7	0	0	Pass
3.0960	7	0	0	Pass
3.1253	7	0	0	Pass
3.1545	7	0	0	Pass
3.1838	7	0	0	Pass
3.2130	7	0	0	Pass
3.2423	5	0	0	Pass
3.2715	5	0	0	Pass
3.3007	5	0	0	Pass
3.3300	5	0	0	Pass
3.3592	5	0	0	Pass
3.3885	5	0	0	Pass
3.4177	5	0	0	Pass
3.4470	5	0	0	Pass
3.4762	5	0	0	Pass
3.5055	5	0	0	Pass
3.5347	5	0	0	Pass
3.5640	5	0	0	Pass
3.5932	5	0	0	Pass
3.6225	5	0	0	Pass
3.6517	5	0	0	Pass
3.6810	5	0	0	Pass
3.7102	5	0	0	Pass
3.7395	5	0	0	Pass
3.7687	5	0	0	Pass
3.7980	5	0	0	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume:	0.1067 acre-feet
On-line facility target flow:	0.1496 cfs.
Adjusted for 15 min:	0.1496 cfs.
Off-line facility target flow:	0.0842 cfs.
Adjusted for 15 min:	0.0842 cfs.

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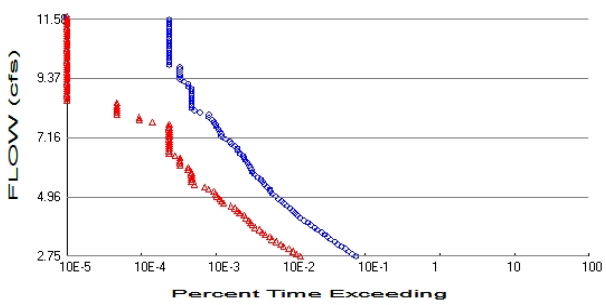
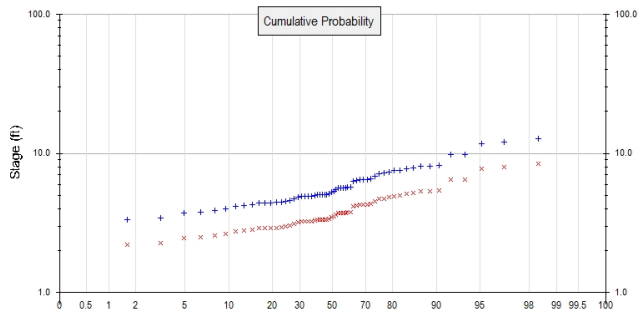
POC 3





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 0
Total Impervious Area: 18.35

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0
Total Impervious Area: 12.12

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	5.500899
5 year	7.256983
10 year	8.516311
25 year	10.221418
50 year	11.576914
100 year	13.007677

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Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	3.63329
5 year	4.793165
10 year	5.624938
25 year	6.751142
50 year	7.646433
100 year	8.591436

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	7.704	5.089
1950	4.393	2.901
1951	4.927	3.254
1952	5.481	3.620
1953	4.574	3.021
1954	5.743	3.793
1955	3.709	2.450
1956	7.572	5.001
1957	5.136	3.392
1958	8.061	5.324
1959	4.384	2.896

1960	5.084	3.358
1961	7.124	4.705
1962	3.878	2.561
1963	4.886	3.227
1964	4.307	2.845
1965	6.261	4.135
1966	4.839	3.196
1967	5.646	3.729
1968	8.081	5.337
1969	9.845	6.502
1970	12.811	8.461
1971	5.054	3.338
1972	5.068	3.347
1973	4.928	3.255
1974	5.655	3.735
1975	3.441	2.273
1976	4.523	2.988
1977	3.216	2.124
1978	5.670	3.745
1979	7.850	5.185
1980	4.385	2.896
1981	6.473	4.275
1982	6.564	4.336
1983	6.874	4.540
1984	4.203	2.776
1985	4.736	3.128
1986	5.699	3.764
1987	5.336	3.524
1988	6.507	4.298
1989	4.898	3.235
1990	5.054	3.338
1991	4.968	3.281
1992	4.432	2.927
1993	6.362	4.202
1994	4.160	2.747
1995	7.487	4.945
1996	9.825	6.489
1997	8.182	5.404
1998	7.184	4.745
1999	3.982	2.630
2000	3.782	2.498
2001	3.336	2.203
2002	7.344	4.851
2003	4.435	2.929
2004	5.663	3.740
2005	5.048	3.334
2006	6.472	4.275
2007	5.282	3.489
2008	12.047	7.957
2009	11.655	7.698

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	12.8109	8.4615
2	12.0474	7.9572
3	11.6554	7.6983
4	9.8449	6.5025

5	9.8246	6.4890
6	8.1819	5.4040
7	8.0807	5.3372
8	8.0614	5.3245
9	7.8496	5.1846
10	7.7043	5.0886
11	7.5716	5.0010
12	7.4866	4.9448
13	7.3442	4.8507
14	7.1843	4.7452
15	7.1238	4.7052
16	6.8744	4.5405
17	6.5643	4.3356
18	6.5069	4.2977
19	6.4728	4.2752
20	6.4719	4.2746
21	6.3620	4.2020
22	6.2606	4.1351
23	5.7432	3.7933
24	5.6986	3.7639
25	5.6703	3.7452
26	5.6631	3.7404
27	5.6552	3.7352
28	5.6459	3.7291
29	5.4812	3.6203
30	5.3361	3.5244
31	5.2819	3.4886
32	5.1362	3.3924
33	5.0843	3.3581
34	5.0681	3.3475
35	5.0539	3.3381
36	5.0537	3.3379
37	5.0481	3.3342
38	4.9675	3.2810
39	4.9285	3.2552
40	4.9270	3.2542
41	4.8978	3.2350
42	4.8858	3.2270
43	4.8389	3.1961
44	4.7358	3.1280
45	4.5743	3.0213
46	4.5233	2.9876
47	4.4350	2.9293
48	4.4317	2.9271
49	4.3925	2.9012
50	4.3850	2.8962
51	4.3845	2.8959
52	4.3072	2.8449
53	4.2027	2.7758
54	4.1596	2.7474
55	3.9818	2.6299
56	3.8779	2.5613
57	3.7823	2.4982
58	3.7089	2.4497
59	3.4410	2.2727
60	3.3356	2.2031
61	3.2156	2.1239

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
2.7504	1608	289	17	Pass
2.8396	1430	253	17	Pass
2.9288	1281	228	17	Pass
3.0179	1144	201	17	Pass
3.1071	1029	172	16	Pass
3.1962	914	156	17	Pass
3.2854	828	137	16	Pass
3.3745	729	120	16	Pass
3.4637	666	112	16	Pass
3.5529	610	97	15	Pass
3.6420	555	89	16	Pass
3.7312	492	82	16	Pass
3.8203	446	71	15	Pass
3.9095	398	65	16	Pass
3.9986	364	62	17	Pass
4.0878	322	59	18	Pass
4.1769	286	53	18	Pass
4.2661	260	51	19	Pass
4.3553	243	44	18	Pass
4.4444	226	41	18	Pass
4.5336	208	38	18	Pass
4.6227	190	34	17	Pass
4.7119	171	27	15	Pass
4.8010	161	25	15	Pass
4.8902	147	24	16	Pass
4.9794	137	22	16	Pass
5.0685	123	21	17	Pass
5.1577	115	20	17	Pass
5.2468	112	17	15	Pass
5.3360	103	15	14	Pass
5.4251	94	11	11	Pass
5.5143	89	10	11	Pass
5.6034	85	10	11	Pass
5.6926	77	10	12	Pass
5.7818	71	10	14	Pass
5.8709	65	10	15	Pass
5.9601	63	9	14	Pass
6.0492	62	9	14	Pass
6.1384	59	7	11	Pass
6.2275	56	7	12	Pass
6.3167	53	7	13	Pass
6.4059	51	7	13	Pass
6.4950	49	6	12	Pass
6.5842	44	5	11	Pass
6.6733	42	5	11	Pass
6.7625	41	5	12	Pass
6.8516	38	5	13	Pass
6.9408	34	5	14	Pass
7.0299	33	5	15	Pass
7.1191	29	5	17	Pass
7.2083	25	5	20	Pass
7.2974	25	5	20	Pass
7.3866	24	5	20	Pass

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7.4757	23	5	21	Pass
7.5649	22	5	22	Pass
7.6540	21	5	23	Pass
7.7432	20	3	15	Pass
7.8324	19	2	10	Pass
7.9215	17	2	11	Pass
8.0107	17	1	5	Pass
8.0998	13	1	7	Pass
8.1890	11	1	9	Pass
8.2781	10	1	10	Pass
8.3673	10	1	10	Pass
8.4564	10	1	10	Pass
8.5456	10	0	0	Pass
8.6348	10	0	0	Pass
8.7239	10	0	0	Pass
8.8131	10	0	0	Pass
8.9022	10	0	0	Pass
8.9914	10	0	0	Pass
9.0805	9	0	0	Pass
9.1697	9	0	0	Pass
9.2589	8	0	0	Pass
9.3480	7	0	0	Pass
9.4372	7	0	0	Pass
9.5263	7	0	0	Pass
9.6155	7	0	0	Pass
9.7046	7	0	0	Pass
9.7938	7	0	0	Pass
9.8829	5	0	0	Pass
9.9721	5	0	0	Pass
10.0613	5	0	0	Pass
10.1504	5	0	0	Pass
10.2396	5	0	0	Pass
10.3287	5	0	0	Pass
10.4179	5	0	0	Pass
10.5070	5	0	0	Pass
10.5962	5	0	0	Pass
10.6854	5	0	0	Pass
10.7745	5	0	0	Pass
10.8637	5	0	0	Pass
10.9528	5	0	0	Pass
11.0420	5	0	0	Pass
11.1311	5	0	0	Pass
11.2203	5	0	0	Pass
11.3094	5	0	0	Pass
11.3986	5	0	0	Pass
11.4878	5	0	0	Pass
11.5769	5	0	0	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	1.0785 acre-feet
On-line facility target flow:	1.5108 cfs.
Adjusted for 15 min:	1.5108 cfs.
Off-line facility target flow:	0.8507 cfs.
Adjusted for 15 min:	0.8507 cfs.

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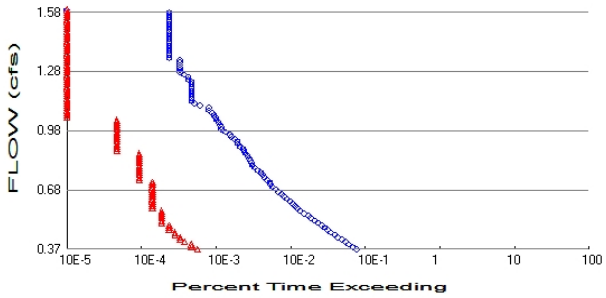
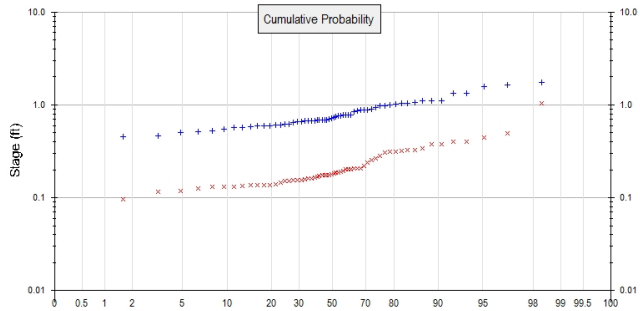
POC 4





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4
Total Pervious Area: 0
Total Impervious Area: 2.5

Mitigated Landuse Totals for POC #4
Total Pervious Area: 1.62
Total Impervious Area: 0.49

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	0.749441
5 year	0.988689
10 year	1.16026
25 year	1.392563
50 year	1.577235
100 year	1.772161

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Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	0.190564
5 year	0.285817
10 year	0.364424
25 year	0.483906
50 year	0.589246
100 year	0.710103

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	1.050	0.207
1950	0.598	0.139
1951	0.671	0.207
1952	0.747	0.189
1953	0.623	0.150
1954	0.782	0.155
1955	0.505	0.130
1956	1.032	0.444
1957	0.700	0.187
1958	1.098	0.328
1959	0.597	0.119

1960	0.693	0.145
1961	0.971	0.339
1962	0.528	0.138
1963	0.666	0.174
1964	0.587	0.169
1965	0.853	0.307
1966	0.659	0.181
1967	0.769	0.204
1968	1.101	0.241
1969	1.341	0.267
1970	1.745	1.039
1971	0.689	0.137
1972	0.690	0.160
1973	0.671	0.170
1974	0.770	0.286
1975	0.469	0.125
1976	0.616	0.186
1977	0.438	0.089
1978	0.773	0.252
1979	1.069	0.328
1980	0.597	0.132
1981	0.882	0.311
1982	0.894	0.204
1983	0.937	0.375
1984	0.573	0.132
1985	0.645	0.159
1986	0.776	0.155
1987	0.727	0.178
1988	0.886	0.174
1989	0.667	0.135
1990	0.689	0.136
1991	0.677	0.165
1992	0.604	0.162
1993	0.867	0.219
1994	0.567	0.177
1995	1.020	0.206
1996	1.339	0.320
1997	1.115	0.497
1998	0.979	0.378
1999	0.542	0.154
2000	0.515	0.115
2001	0.454	0.096
2002	1.001	0.405
2003	0.604	0.195
2004	0.772	0.152
2005	0.688	0.136
2006	0.882	0.204
2007	0.720	0.175
2008	1.641	0.400
2009	1.588	0.313

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	1.7454	1.0389
2	1.6413	0.4974
3	1.5879	0.4438
4	1.3413	0.4053

5	1.3385	0.3995
6	1.1147	0.3781
7	1.1009	0.3752
8	1.0983	0.3390
9	1.0694	0.3285
10	1.0496	0.3281
11	1.0316	0.3196
12	1.0200	0.3133
13	1.0006	0.3106
14	0.9788	0.3072
15	0.9705	0.2855
16	0.9366	0.2665
17	0.8943	0.2519
18	0.8865	0.2412
19	0.8819	0.2188
20	0.8817	0.2072
21	0.8668	0.2072
22	0.8529	0.2063
23	0.7825	0.2045
24	0.7764	0.2041
25	0.7725	0.2036
26	0.7715	0.1950
27	0.7705	0.1895
28	0.7692	0.1869
29	0.7468	0.1857
30	0.7270	0.1809
31	0.7196	0.1781
32	0.6998	0.1768
33	0.6927	0.1752
34	0.6905	0.1745
35	0.6885	0.1736
36	0.6885	0.1699
37	0.6877	0.1689
38	0.6768	0.1649
39	0.6715	0.1616
40	0.6713	0.1602
41	0.6673	0.1594
42	0.6656	0.1552
43	0.6593	0.1548
44	0.6452	0.1543
45	0.6232	0.1523
46	0.6163	0.1502
47	0.6042	0.1451
48	0.6038	0.1389
49	0.5984	0.1378
50	0.5974	0.1366
51	0.5973	0.1361
52	0.5868	0.1360
53	0.5726	0.1347
54	0.5667	0.1325
55	0.5425	0.1324
56	0.5283	0.1302
57	0.5153	0.1250
58	0.5053	0.1187
59	0.4688	0.1149
60	0.4544	0.0965
61	0.4381	0.0894

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3747	1617	12	0	Pass
0.3869	1441	10	0	Pass
0.3990	1280	10	0	Pass
0.4112	1144	8	0	Pass
0.4233	1031	7	0	Pass
0.4355	915	7	0	Pass
0.4476	829	6	0	Pass
0.4597	737	6	0	Pass
0.4719	669	5	0	Pass
0.4840	610	5	0	Pass
0.4962	555	5	0	Pass
0.5083	494	4	0	Pass
0.5205	448	4	0	Pass
0.5326	400	4	1	Pass
0.5448	366	4	1	Pass
0.5569	323	4	1	Pass
0.5691	286	4	1	Pass
0.5812	260	3	1	Pass
0.5934	244	3	1	Pass
0.6055	227	3	1	Pass
0.6177	209	3	1	Pass
0.6298	190	3	1	Pass
0.6419	172	3	1	Pass
0.6541	161	3	1	Pass
0.6662	147	3	2	Pass
0.6784	137	3	2	Pass
0.6905	123	3	2	Pass
0.7027	115	3	2	Pass
0.7148	112	3	2	Pass
0.7270	104	2	1	Pass
0.7391	94	2	2	Pass
0.7513	89	2	2	Pass
0.7634	85	2	2	Pass
0.7756	77	2	2	Pass
0.7877	71	2	2	Pass
0.7999	66	2	3	Pass
0.8120	63	2	3	Pass
0.8241	62	2	3	Pass
0.8363	59	2	3	Pass
0.8484	56	2	3	Pass
0.8606	54	2	3	Pass
0.8727	51	1	1	Pass
0.8849	49	1	2	Pass
0.8970	44	1	2	Pass
0.9092	42	1	2	Pass
0.9213	41	1	2	Pass
0.9335	38	1	2	Pass
0.9456	34	1	2	Pass
0.9578	33	1	3	Pass
0.9699	29	1	3	Pass
0.9821	25	1	4	Pass
0.9942	25	1	4	Pass
1.0063	24	1	4	Pass

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1.0185	23	1	4	Pass
1.0306	22	1	4	Pass
1.0428	21	0	0	Pass
1.0549	20	0	0	Pass
1.0671	19	0	0	Pass
1.0792	17	0	0	Pass
1.0914	17	0	0	Pass
1.1035	13	0	0	Pass
1.1157	11	0	0	Pass
1.1278	10	0	0	Pass
1.1400	10	0	0	Pass
1.1521	10	0	0	Pass
1.1643	10	0	0	Pass
1.1764	10	0	0	Pass
1.1885	10	0	0	Pass
1.2007	10	0	0	Pass
1.2128	10	0	0	Pass
1.2250	10	0	0	Pass
1.2371	9	0	0	Pass
1.2493	9	0	0	Pass
1.2614	8	0	0	Pass
1.2736	7	0	0	Pass
1.2857	7	0	0	Pass
1.2979	7	0	0	Pass
1.3100	7	0	0	Pass
1.3222	7	0	0	Pass
1.3343	7	0	0	Pass
1.3464	5	0	0	Pass
1.3586	5	0	0	Pass
1.3707	5	0	0	Pass
1.3829	5	0	0	Pass
1.3950	5	0	0	Pass
1.4072	5	0	0	Pass
1.4193	5	0	0	Pass
1.4315	5	0	0	Pass
1.4436	5	0	0	Pass
1.4558	5	0	0	Pass
1.4679	5	0	0	Pass
1.4801	5	0	0	Pass
1.4922	5	0	0	Pass
1.5044	5	0	0	Pass
1.5165	5	0	0	Pass
1.5286	5	0	0	Pass
1.5408	5	0	0	Pass
1.5529	5	0	0	Pass
1.5651	5	0	0	Pass
1.5772	5	0	0	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #4

On-line facility volume:	0.087 acre-feet
On-line facility target flow:	0.0671 cfs.
Adjusted for 15 min:	0.0671 cfs.
Off-line facility target flow:	0.0374 cfs.
Adjusted for 15 min:	0.0374 cfs.

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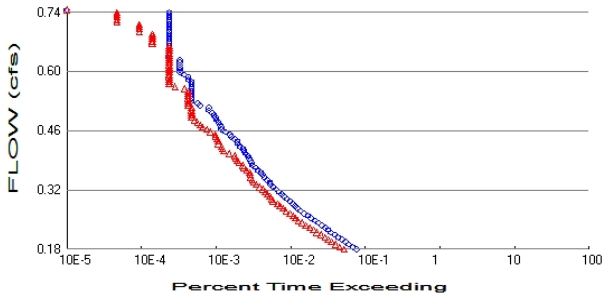
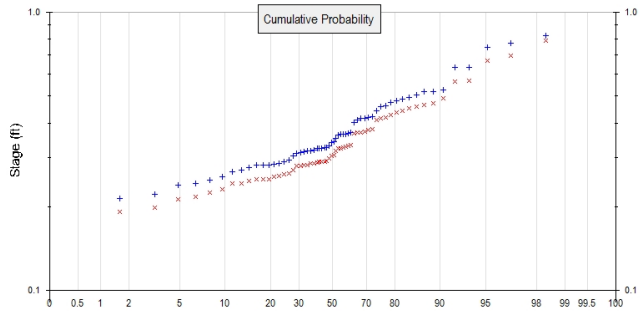
POC 5





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #5
Total Pervious Area: 0
Total Impervious Area: 1.18

Mitigated Landuse Totals for POC #5
Total Pervious Area: 0.13
Total Impervious Area: 1.05

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	**Flow(cfs)**
2 year	0.353736
5 year	0.466661
10 year	0.547642
25 year	0.657289
50 year	0.744455
100 year	0.83646

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Flow Frequency Return Periods for Mitigated. POC #5

Return Period	**Flow(cfs)**
2 year	0.318141
5 year	0.421986
10 year	0.496768
25 year	0.598363
50 year	0.679368
100 year	0.765073

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #5

Year	**Predeveloped**	**Mitigated**
1949	0.495	0.441
1950	0.282	0.251
1951	0.317	0.286
1952	0.352	0.317
1953	0.294	0.262
1954	0.369	0.329
1955	0.239	0.212
1956	0.487	0.453
1957	0.330	0.298
1958	0.518	0.470
1959	0.282	0.251

1960	0.327	0.292
1961	0.458	0.420
1962	0.249	0.224
1963	0.314	0.283
1964	0.277	0.248
1965	0.403	0.369
1966	0.311	0.281
1967	0.363	0.325
1968	0.520	0.463
1969	0.633	0.564
1970	0.824	0.789
1971	0.325	0.289
1972	0.326	0.290
1973	0.317	0.282
1974	0.364	0.331
1975	0.221	0.198
1976	0.291	0.264
1977	0.207	0.184
1978	0.365	0.333
1979	0.505	0.459
1980	0.282	0.252
1981	0.416	0.381
1982	0.422	0.378
1983	0.442	0.409
1984	0.270	0.242
1985	0.305	0.271
1986	0.366	0.326
1987	0.343	0.308
1988	0.418	0.372
1989	0.315	0.281
1990	0.325	0.289
1991	0.319	0.287
1992	0.285	0.257
1993	0.409	0.368
1994	0.267	0.242
1995	0.481	0.429
1996	0.632	0.567
1997	0.526	0.491
1998	0.462	0.415
1999	0.256	0.231
2000	0.243	0.216
2001	0.214	0.191
2002	0.472	0.437
2003	0.285	0.258
2004	0.364	0.324
2005	0.325	0.289
2006	0.416	0.370
2007	0.340	0.305
2008	0.775	0.696
2009	0.749	0.667

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	0.8238	0.7890
2	0.7747	0.6956
3	0.7495	0.6670
4	0.6331	0.5668

5	0.6318	0.5636
6	0.5261	0.4906
7	0.5196	0.4704
8	0.5184	0.4626
9	0.5048	0.4587
10	0.4954	0.4526
11	0.4869	0.4410
12	0.4814	0.4370
13	0.4723	0.4285
14	0.4620	0.4196
15	0.4581	0.4151
16	0.4421	0.4087
17	0.4221	0.3811
18	0.4184	0.3780
19	0.4162	0.3724
20	0.4162	0.3704
21	0.4091	0.3695
22	0.4026	0.3680
23	0.3693	0.3325
24	0.3664	0.3308
25	0.3646	0.3287
26	0.3642	0.3263
27	0.3637	0.3249
28	0.3631	0.3241
29	0.3525	0.3171
30	0.3431	0.3078
31	0.3397	0.3050
32	0.3303	0.2979
33	0.3269	0.2916
34	0.3259	0.2901
35	0.3250	0.2893
36	0.3250	0.2892
37	0.3246	0.2890
38	0.3194	0.2868
39	0.3169	0.2864
40	0.3168	0.2830
41	0.3150	0.2820
42	0.3142	0.2810
43	0.3112	0.2806
44	0.3045	0.2712
45	0.2941	0.2640
46	0.2909	0.2619
47	0.2852	0.2576
48	0.2850	0.2571
49	0.2825	0.2515
50	0.2820	0.2514
51	0.2819	0.2510
52	0.2770	0.2476
53	0.2703	0.2425
54	0.2675	0.2421
55	0.2561	0.2308
56	0.2494	0.2240
57	0.2432	0.2164
58	0.2385	0.2122
59	0.2213	0.1979
60	0.2145	0.1915
61	0.2068	0.1842

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1769	1625	1104	67	Pass
0.1826	1447	972	67	Pass
0.1883	1283	852	66	Pass
0.1941	1144	750	65	Pass
0.1998	1045	674	64	Pass
0.2055	924	615	66	Pass
0.2113	828	545	65	Pass
0.2170	729	478	65	Pass
0.2227	674	434	64	Pass
0.2285	614	384	62	Pass
0.2342	556	340	61	Pass
0.2399	503	305	60	Pass
0.2457	452	270	59	Pass
0.2514	400	246	61	Pass
0.2571	365	229	62	Pass
0.2629	324	208	64	Pass
0.2686	288	185	64	Pass
0.2743	260	167	64	Pass
0.2801	244	154	63	Pass
0.2858	228	143	62	Pass
0.2915	209	124	59	Pass
0.2973	190	118	62	Pass
0.3030	172	112	65	Pass
0.3087	162	104	64	Pass
0.3145	148	98	66	Pass
0.3202	137	90	65	Pass
0.3259	124	82	66	Pass
0.3317	115	73	63	Pass
0.3374	112	68	60	Pass
0.3431	104	65	62	Pass
0.3489	94	62	65	Pass
0.3546	89	61	68	Pass
0.3603	85	60	70	Pass
0.3661	77	55	71	Pass
0.3718	73	51	69	Pass
0.3775	66	49	74	Pass
0.3833	63	43	68	Pass
0.3890	62	41	66	Pass
0.3947	59	39	66	Pass
0.4005	57	38	66	Pass
0.4062	54	32	59	Pass
0.4119	51	27	52	Pass
0.4177	49	26	53	Pass
0.4234	44	25	56	Pass
0.4291	42	23	54	Pass
0.4349	41	23	56	Pass
0.4406	38	22	57	Pass
0.4463	34	21	61	Pass
0.4521	33	21	63	Pass
0.4578	29	18	62	Pass
0.4635	25	16	64	Pass
0.4693	25	14	56	Pass
0.4750	24	13	54	Pass

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0.4807	23	12	52	Pass
0.4865	22	11	50	Pass
0.4922	21	10	47	Pass
0.4979	20	10	50	Pass
0.5037	19	10	52	Pass
0.5094	17	10	58	Pass
0.5151	17	10	58	Pass
0.5209	13	9	69	Pass
0.5266	12	9	75	Pass
0.5323	10	9	90	Pass
0.5381	10	9	90	Pass
0.5438	10	9	90	Pass
0.5495	10	9	90	Pass
0.5553	10	9	90	Pass
0.5610	10	8	80	Pass
0.5667	10	6	60	Pass
0.5725	10	5	50	Pass
0.5782	10	5	50	Pass
0.5839	9	5	55	Pass
0.5897	9	5	55	Pass
0.5954	8	5	62	Pass
0.6011	7	5	71	Pass
0.6069	7	5	71	Pass
0.6126	7	5	71	Pass
0.6183	7	5	71	Pass
0.6241	7	5	71	Pass
0.6298	7	5	71	Pass
0.6355	5	5	100	Pass
0.6413	5	5	100	Pass
0.6470	5	5	100	Pass
0.6527	5	5	100	Pass
0.6585	5	5	100	Pass
0.6642	5	5	100	Pass
0.6699	5	3	60	Pass
0.6757	5	3	60	Pass
0.6814	5	3	60	Pass
0.6871	5	3	60	Pass
0.6929	5	3	60	Pass
0.6986	5	2	40	Pass
0.7043	5	2	40	Pass
0.7101	5	2	40	Pass
0.7158	5	2	40	Pass
0.7215	5	1	20	Pass
0.7273	5	1	20	Pass
0.7330	5	1	20	Pass
0.7387	5	1	20	Pass
0.7445	5	1	20	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #5

On-line facility volume:	0.0959 acre-feet
On-line facility target flow:	0.1299 cfs.
Adjusted for 15 min:	0.1299 cfs.
Off-line facility target flow:	0.0731 cfs.
Adjusted for 15 min:	0.0731 cfs.

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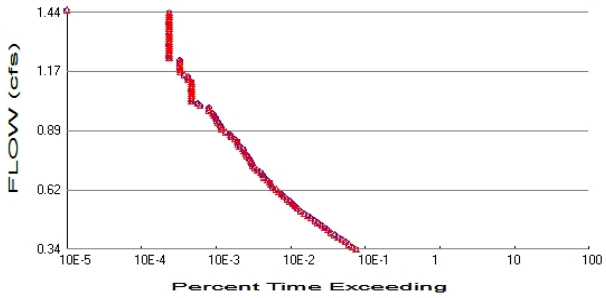
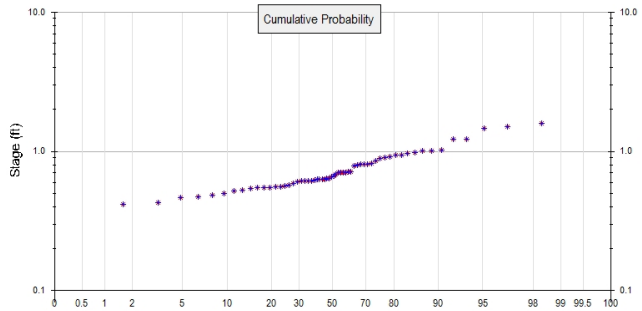
POC 6





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 2.29

Mitigated Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 2.29

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #6

Return Period	**Flow(cfs)**
2 year	0.686488
5 year	0.90564
10 year	1.062798
25 year	1.275588
50 year	1.444748
100 year	1.623301

Flow Frequency Return Periods for Mitigated. POC #6

Return Period	**Flow(cfs)**
2 year	0.686488
5 year	0.90564
10 year	1.062798
25 year	1.275588
50 year	1.444748
100 year	1.623301

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #6

Year	**Predeveloped**	**Mitigated**
1949	0.961	0.961
1950	0.548	0.548
1951	0.615	0.615
1952	0.684	0.684
1953	0.571	0.571
1954	0.717	0.717
1955	0.463	0.463
1956	0.945	0.945
1957	0.641	0.641
1958	1.006	1.006
1959	0.547	0.547

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1960	0.634	0.634
1961	0.889	0.889
1962	0.484	0.484
1963	0.610	0.610
1964	0.538	0.538
1965	0.781	0.781
1966	0.604	0.604
1967	0.705	0.705
1968	1.008	1.008
1969	1.229	1.229
1970	1.599	1.599
1971	0.631	0.631
1972	0.632	0.632
1973	0.615	0.615
1974	0.706	0.706
1975	0.429	0.429
1976	0.564	0.564
1977	0.401	0.401
1978	0.708	0.708
1979	0.980	0.980
1980	0.547	0.547
1981	0.808	0.808
1982	0.819	0.819
1983	0.858	0.858
1984	0.524	0.524
1985	0.591	0.591
1986	0.711	0.711
1987	0.666	0.666
1988	0.812	0.812
1989	0.611	0.611
1990	0.631	0.631
1991	0.620	0.620
1992	0.553	0.553
1993	0.794	0.794
1994	0.519	0.519
1995	0.934	0.934
1996	1.226	1.226
1997	1.021	1.021
1998	0.897	0.897
1999	0.497	0.497
2000	0.472	0.472
2001	0.416	0.416
2002	0.917	0.917
2003	0.553	0.553
2004	0.707	0.707
2005	0.630	0.630
2006	0.808	0.808
2007	0.659	0.659
2008	1.503	1.503
2009	1.455	1.455

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #6

Rank	Predeveloped	Mitigated
1	1.5987	1.5987
2	1.5035	1.5035
3	1.4545	1.4545
4	1.2286	1.2286

5	1.2261	1.2261
6	1.0211	1.0211
7	1.0084	1.0084
8	1.0060	1.0060
9	0.9796	0.9796
10	0.9615	0.9615
11	0.9449	0.9449
12	0.9343	0.9343
13	0.9165	0.9165
14	0.8966	0.8966
15	0.8890	0.8890
16	0.8579	0.8579
17	0.8192	0.8192
18	0.8120	0.8120
19	0.8078	0.8078
20	0.8077	0.8077
21	0.7939	0.7939
22	0.7813	0.7813
23	0.7167	0.7167
24	0.7112	0.7112
25	0.7076	0.7076
26	0.7067	0.7067
27	0.7057	0.7057
28	0.7046	0.7046
29	0.6840	0.6840
30	0.6659	0.6659
31	0.6592	0.6592
32	0.6410	0.6410
33	0.6345	0.6345
34	0.6325	0.6325
35	0.6307	0.6307
36	0.6307	0.6307
37	0.6300	0.6300
38	0.6199	0.6199
39	0.6151	0.6151
40	0.6149	0.6149
41	0.6112	0.6112
42	0.6097	0.6097
43	0.6039	0.6039
44	0.5910	0.5910
45	0.5708	0.5708
46	0.5645	0.5645
47	0.5535	0.5535
48	0.5531	0.5531
49	0.5482	0.5482
50	0.5472	0.5472
51	0.5472	0.5472
52	0.5375	0.5375
53	0.5245	0.5245
54	0.5191	0.5191
55	0.4969	0.4969
56	0.4839	0.4839
57	0.4720	0.4720
58	0.4629	0.4629
59	0.4294	0.4294
60	0.4163	0.4163
61	0.4013	0.4013

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3432	1610	1610	100	Pass
0.3544	1435	1435	100	Pass
0.3655	1282	1282	100	Pass
0.3766	1149	1149	100	Pass
0.3877	1036	1036	100	Pass
0.3989	923	923	100	Pass
0.4100	828	828	100	Pass
0.4211	731	731	100	Pass
0.4323	666	666	100	Pass
0.4434	612	612	100	Pass
0.4545	557	557	100	Pass
0.4656	497	497	100	Pass
0.4768	450	450	100	Pass
0.4879	400	400	100	Pass
0.4990	364	364	100	Pass
0.5101	322	322	100	Pass
0.5213	287	287	100	Pass
0.5324	260	260	100	Pass
0.5435	244	244	100	Pass
0.5546	227	227	100	Pass
0.5658	209	209	100	Pass
0.5769	191	191	100	Pass
0.5880	171	171	100	Pass
0.5991	161	161	100	Pass
0.6103	147	147	100	Pass
0.6214	137	137	100	Pass
0.6325	123	123	100	Pass
0.6437	115	115	100	Pass
0.6548	112	112	100	Pass
0.6659	104	104	100	Pass
0.6770	94	94	100	Pass
0.6882	89	89	100	Pass
0.6993	85	85	100	Pass
0.7104	77	77	100	Pass
0.7215	71	71	100	Pass
0.7327	66	66	100	Pass
0.7438	63	63	100	Pass
0.7549	62	62	100	Pass
0.7660	59	59	100	Pass
0.7772	56	56	100	Pass
0.7883	54	54	100	Pass
0.7994	51	51	100	Pass
0.8105	49	49	100	Pass
0.8217	44	44	100	Pass
0.8328	42	42	100	Pass
0.8439	41	41	100	Pass
0.8551	38	38	100	Pass
0.8662	34	34	100	Pass
0.8773	33	33	100	Pass
0.8884	29	29	100	Pass
0.8996	25	25	100	Pass
0.9107	25	25	100	Pass
0.9218	24	24	100	Pass

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0.9329	23	23	100	Pass
0.9441	22	22	100	Pass
0.9552	21	21	100	Pass
0.9663	20	20	100	Pass
0.9774	19	19	100	Pass
0.9886	17	17	100	Pass
0.9997	17	17	100	Pass
1.0108	13	13	100	Pass
1.0219	12	12	100	Pass
1.0331	10	10	100	Pass
1.0442	10	10	100	Pass
1.0553	10	10	100	Pass
1.0665	10	10	100	Pass
1.0776	10	10	100	Pass
1.0887	10	10	100	Pass
1.0998	10	10	100	Pass
1.1110	10	10	100	Pass
1.1221	10	10	100	Pass
1.1332	9	9	100	Pass
1.1443	9	9	100	Pass
1.1555	8	8	100	Pass
1.1666	7	7	100	Pass
1.1777	7	7	100	Pass
1.1888	7	7	100	Pass
1.2000	7	7	100	Pass
1.2111	7	7	100	Pass
1.2222	7	7	100	Pass
1.2333	5	5	100	Pass
1.2445	5	5	100	Pass
1.2556	5	5	100	Pass
1.2667	5	5	100	Pass
1.2779	5	5	100	Pass
1.2890	5	5	100	Pass
1.3001	5	5	100	Pass
1.3112	5	5	100	Pass
1.3224	5	5	100	Pass
1.3335	5	5	100	Pass
1.3446	5	5	100	Pass
1.3557	5	5	100	Pass
1.3669	5	5	100	Pass
1.3780	5	5	100	Pass
1.3891	5	5	100	Pass
1.4002	5	5	100	Pass
1.4114	5	5	100	Pass
1.4225	5	5	100	Pass
1.4336	5	5	100	Pass
1.4447	5	5	100	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #6

On-line facility volume:	0.2037 acre-feet
On-line facility target flow:	0.2854 cfs.
Adjusted for 15 min:	0.2854 cfs.
Off-line facility target flow:	0.1607 cfs.
Adjusted for 15 min:	0.1607 cfs.

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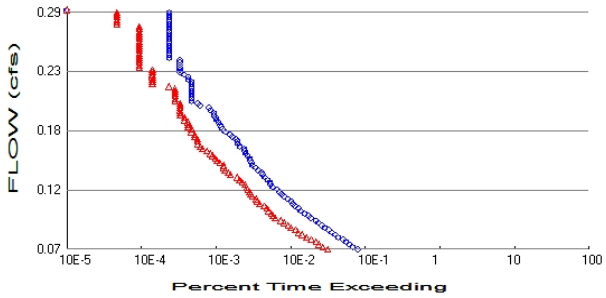
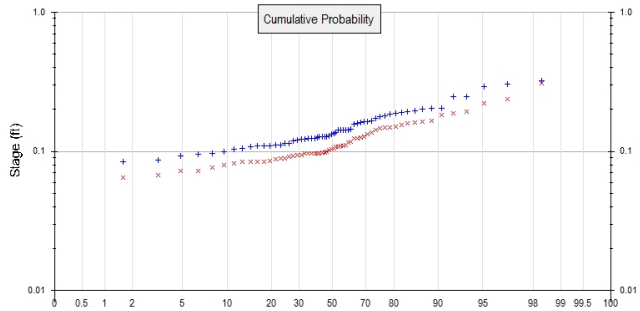
POC 7





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #7
Total Pervious Area: 0
Total Impervious Area: 0.46

Mitigated Landuse Totals for POC #7
Total Pervious Area: 0.15
Total Impervious Area: 0.35

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #7

Return Period	**Flow(cfs)**
2 year	0.137897
5 year	0.181919
10 year	0.213488
25 year	0.256232
50 year	0.290211
100 year	0.326078

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Flow Frequency Return Periods for Mitigated. POC #7

Return Period	**Flow(cfs)**
2 year	0.108994
5 year	0.14647
10 year	0.173732
25 year	0.211068
50 year	0.241052
100 year	0.272956

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #7

Year	**Predeveloped**	**Mitigated**
1949	0.193	0.147
1950	0.110	0.084
1951	0.124	0.099
1952	0.137	0.109
1953	0.115	0.087
1954	0.144	0.110
1955	0.093	0.073
1956	0.190	0.167
1957	0.129	0.103
1958	0.202	0.164
1959	0.110	0.084

1960	0.127	0.098
1961	0.179	0.150
1962	0.097	0.076
1963	0.122	0.097
1964	0.108	0.086
1965	0.157	0.132
1966	0.121	0.097
1967	0.142	0.111
1968	0.203	0.154
1969	0.247	0.188
1970	0.321	0.309
1971	0.127	0.096
1972	0.127	0.097
1973	0.124	0.094
1974	0.142	0.116
1975	0.086	0.068
1976	0.113	0.092
1977	0.081	0.062
1978	0.142	0.117
1979	0.197	0.161
1980	0.110	0.084
1981	0.162	0.136
1982	0.165	0.128
1983	0.172	0.149
1984	0.105	0.082
1985	0.119	0.092
1986	0.143	0.109
1987	0.134	0.105
1988	0.163	0.124
1989	0.123	0.094
1990	0.127	0.096
1991	0.125	0.098
1992	0.111	0.089
1993	0.159	0.126
1994	0.104	0.084
1995	0.188	0.143
1996	0.246	0.193
1997	0.205	0.182
1998	0.180	0.149
1999	0.100	0.079
2000	0.095	0.072
2001	0.084	0.064
2002	0.184	0.159
2003	0.111	0.089
2004	0.142	0.108
2005	0.127	0.096
2006	0.162	0.124
2007	0.132	0.104
2008	0.302	0.237
2009	0.292	0.222

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #7

Rank	Predeveloped	Mitigated
1	0.3211	0.3089
2	0.3020	0.2370
3	0.2922	0.2224
4	0.2468	0.1927

5	0.2463	0.1881
6	0.2051	0.1819
7	0.2026	0.1668
8	0.2021	0.1642
9	0.1968	0.1607
10	0.1931	0.1594
11	0.1898	0.1544
12	0.1877	0.1497
13	0.1841	0.1493
14	0.1801	0.1489
15	0.1786	0.1471
16	0.1723	0.1429
17	0.1646	0.1358
18	0.1631	0.1324
19	0.1623	0.1279
20	0.1622	0.1259
21	0.1595	0.1242
22	0.1569	0.1235
23	0.1440	0.1175
24	0.1429	0.1162
25	0.1421	0.1112
26	0.1420	0.1097
27	0.1418	0.1090
28	0.1415	0.1085
29	0.1374	0.1081
30	0.1338	0.1046
31	0.1324	0.1039
32	0.1288	0.1026
33	0.1275	0.0992
34	0.1270	0.0977
35	0.1267	0.0977
36	0.1267	0.0972
37	0.1265	0.0971
38	0.1245	0.0968
39	0.1235	0.0965
40	0.1235	0.0965
41	0.1228	0.0964
42	0.1225	0.0940
43	0.1213	0.0938
44	0.1187	0.0923
45	0.1147	0.0917
46	0.1134	0.0890
47	0.1112	0.0885
48	0.1111	0.0874
49	0.1101	0.0857
50	0.1099	0.0845
51	0.1099	0.0843
52	0.1080	0.0838
53	0.1054	0.0838
54	0.1043	0.0820
55	0.0998	0.0794
56	0.0972	0.0763
57	0.0948	0.0726
58	0.0930	0.0722
59	0.0863	0.0679
60	0.0836	0.0643
61	0.0806	0.0616

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0689	1675	667	39	Pass
0.0712	1441	576	39	Pass
0.0734	1304	506	38	Pass
0.0757	1174	466	39	Pass
0.0779	1074	404	37	Pass
0.0801	918	347	37	Pass
0.0824	840	304	36	Pass
0.0846	760	269	35	Pass
0.0868	688	247	35	Pass
0.0891	612	213	34	Pass
0.0913	561	198	35	Pass
0.0935	505	173	34	Pass
0.0958	461	158	34	Pass
0.0980	398	132	33	Pass
0.1002	366	123	33	Pass
0.1025	327	117	35	Pass
0.1047	293	108	36	Pass
0.1069	269	102	37	Pass
0.1092	244	94	38	Pass
0.1114	230	81	35	Pass
0.1136	217	77	35	Pass
0.1159	196	73	37	Pass
0.1181	171	65	38	Pass
0.1204	163	62	38	Pass
0.1226	152	60	39	Pass
0.1248	140	57	40	Pass
0.1271	123	55	44	Pass
0.1293	115	52	45	Pass
0.1315	112	48	42	Pass
0.1338	105	44	41	Pass
0.1360	96	41	42	Pass
0.1382	89	33	37	Pass
0.1405	86	31	36	Pass
0.1427	79	28	35	Pass
0.1449	73	27	36	Pass
0.1472	66	27	40	Pass
0.1494	64	24	37	Pass
0.1516	62	22	35	Pass
0.1539	60	21	35	Pass
0.1561	56	19	33	Pass
0.1583	54	18	33	Pass
0.1606	52	16	30	Pass
0.1628	51	14	27	Pass
0.1651	44	13	29	Pass
0.1673	42	12	28	Pass
0.1695	41	12	29	Pass
0.1718	39	12	30	Pass
0.1740	35	11	31	Pass
0.1762	33	11	33	Pass
0.1785	29	10	34	Pass
0.1807	26	10	38	Pass
0.1829	25	9	36	Pass
0.1852	24	9	37	Pass

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0.1874	23	9	39	Pass
0.1896	22	8	36	Pass
0.1919	21	8	38	Pass
0.1941	20	7	35	Pass
0.1963	20	7	35	Pass
0.1986	18	7	38	Pass
0.2008	17	7	41	Pass
0.2030	13	7	53	Pass
0.2053	12	7	58	Pass
0.2075	10	6	60	Pass
0.2098	10	6	60	Pass
0.2120	10	6	60	Pass
0.2142	10	6	60	Pass
0.2165	10	6	60	Pass
0.2187	10	6	60	Pass
0.2209	10	5	50	Pass
0.2232	10	3	30	Pass
0.2254	10	3	30	Pass
0.2276	9	3	33	Pass
0.2299	9	3	33	Pass
0.2321	8	3	37	Pass
0.2343	7	3	42	Pass
0.2366	7	3	42	Pass
0.2388	7	2	28	Pass
0.2410	7	2	28	Pass
0.2433	7	2	28	Pass
0.2455	7	2	28	Pass
0.2477	5	2	40	Pass
0.2500	5	2	40	Pass
0.2522	5	2	40	Pass
0.2545	5	2	40	Pass
0.2567	5	2	40	Pass
0.2589	5	2	40	Pass
0.2612	5	2	40	Pass
0.2634	5	2	40	Pass
0.2656	5	2	40	Pass
0.2679	5	2	40	Pass
0.2701	5	2	40	Pass
0.2723	5	2	40	Pass
0.2746	5	2	40	Pass
0.2768	5	2	40	Pass
0.2790	5	1	20	Pass
0.2813	5	1	20	Pass
0.2835	5	1	20	Pass
0.2857	5	1	20	Pass
0.2880	5	1	20	Pass
0.2902	5	1	20	Pass

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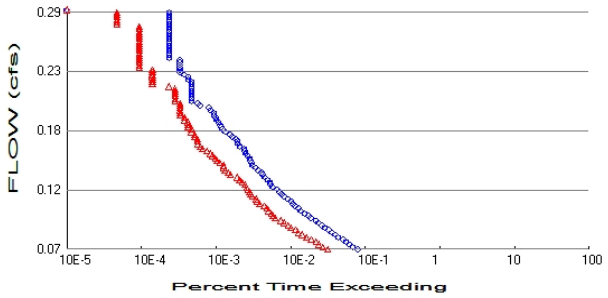
Water Quality

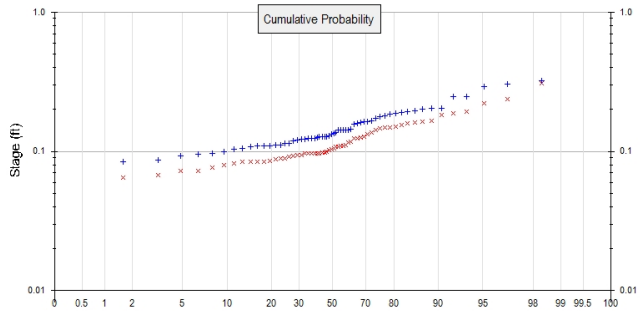
Water Quality BMP Flow and Volume for POC #7

On-line facility volume:	0.0346 acre-feet
On-line facility target flow:	0.0429 cfs.
Adjusted for 15 min:	0.0429 cfs.
Off-line facility target flow:	0.024 cfs.
Adjusted for 15 min:	0.024 cfs.

DRAFT

POC 8





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #8
Total Pervious Area: 0
Total Impervious Area: 0

Mitigated Landuse Totals for POC #8
Total Pervious Area: 0
Total Impervious Area: 6.23

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #8

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

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Flow Frequency Return Periods for Mitigated. POC #8

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #8

Year	**Predeveloped**	**Mitigated**

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #8

Rank	**Predeveloped**	**Mitigated**

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

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0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #8

On-line facility volume:	0.5544 acre-feet
On-line facility target flow:	0.7766 cfs.
Adjusted for 15 min:	0.7766 cfs.
Off-line facility target flow:	0.4372 cfs.
Adjusted for 15 min:	0.4372 cfs.

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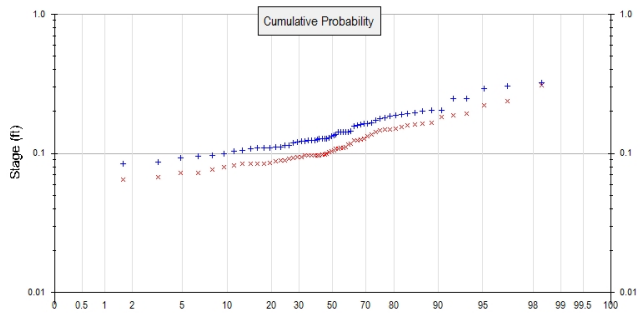
POC 9



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #9
Total Pervious Area: 0
Total Impervious Area: 0

Mitigated Landuse Totals for POC #9
Total Pervious Area: 0
Total Impervious Area: 3.9

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #9

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

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Flow Frequency Return Periods for Mitigated. POC #9

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #9

Year	**Predeveloped**	**Mitigated**

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #9

Rank	**Predeveloped**	**Mitigated**

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

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0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass
0.0000	0	0	0	Pass

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Water Quality

Water Quality BMP Flow and Volume for POC #9

On-line facility volume:	0.347 acre-feet
On-line facility target flow:	0.4862 cfs.
Adjusted for 15 min:	0.4862 cfs.
Off-line facility target flow:	0.2737 cfs.
Adjusted for 15 min:	0.2737 cfs.

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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.

DRAFT

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   Savage.wdm
MESSU      25   PreSavage.MES
           27   PreSavage.L61
           28   PreSavage.L62
           30   POCSavage1.dat
           31   POCSavage2.dat
           32   POCSavage3.dat
           33   POCSavage4.dat
           34   POCSavage5.dat
           35   POCSavage6.dat
           36   POCSavage7.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      COPY       507
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
      DISPLY       7
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 200 - Office Change    MAX                    1    2   30    9
    2        Area 200 Rail Unloading     MAX                    1    2   31    9
    3        Area 300 Containment Berm   MAX                    1    2   32    9
    4        Area 300 & 700 Buidlings    MAX                    1    2   33    9
    5        Area 400 Dock               MAX                    1    2   34    9
    6        Area 500 Pipeline Alignme   MAX                    1    2   35    9
    7        Area 600 - West Boiler Bu   MAX                    1    2   36    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  507         1    1
  END TIMESERIES
```

DRAFT

```
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
  END GEN-INFO
  *** Section PWATER***

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

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

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

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

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

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

END PERLND

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

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
```

DRAFT

```
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
   11         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     ***
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Area 200 - Office Change Room***
IMPLND  11                       1.6     COPY   501     15
Area 200 Rail Unloading***
IMPLND  11                      6.02     COPY   502     15
Area 300 Containment Berm***
IMPLND  11                     18.35     COPY   503     15
Area 300 & 700 Buidlings & Parking***
IMPLND  11                       2.5     COPY   504     15
Area 400 Dock***
IMPLND  11                      1.18     COPY   505     15
Area 500 Pipeline Alignment***
IMPLND  11                      2.29     COPY   506     15
Area 600 - West Boiler Building***
IMPLND  11                      0.46     COPY   507     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
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1
COPY   507 OUTPUT MEAN   1 1   48.4        DISPLY   7     INPUT  TIMSER 1



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

RCHRES
```

DRAFT

```
  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    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            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
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    502 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    503 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    504 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    505 FLOW     ENGL      REPL
COPY   506 OUTPUT MEAN   1 1     48.4      WDM    506 FLOW     ENGL      REPL
COPY   507 OUTPUT MEAN   1 1     48.4      WDM    507 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15
```

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```
END MASS-LINK

END RUN
```

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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   Savage.wdm
MESSU      25   MitSavage.MES
           27   MitSavage.L61
           28   MitSavage.L62
           30   POCSavage1.dat
           31   POCSavage2.dat
           32   POCSavage3.dat
           33   POCSavage4.dat
           34   POCSavage5.dat
           35   POCSavage6.dat
           36   POCSavage7.dat
           37   POCSavage8.dat
           38   POCSavage9.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       4
      IMPLND       8
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      COPY       507
      COPY       508
      COPY       509
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
      DISPLY       7
      DISPLY       8
      DISPLY       9
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 200 - Office Change    MAX                    1    2   30    9
    2        Area 200 Rail Unloading     MAX                    1    2   31    9
    3        Area 300 Containment Berm   MAX                    1    2   32    9
    4        Area 300 & 700 Buidlings    MAX                    1    2   33    9
    5        Area 400 Dock               MAX                    1    2   34    9
    6        Area 500 Pipeline Alignme   MAX                    1    2   35    9
    7        Area 600 - West Boiler Bu   MAX                    1    2   36    9
    8        Area 300 - Tank Roofs       MAX                    1    2   37    9
    9        Area 200 - Rail Roof        MAX                    1    2   38    9
  END DISPLY-INFO1
END DISPLY
COPY
```

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```
  TIMESERIES
    # -   #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  507         1    1
  508         1    1
  509         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            ***
   16     C, Lawn, 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 ***
   16         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  *********
   16         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 ***
   16         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
   16              0       4.5      0.03       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
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

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

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```
   16              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
    8      SIDEWALKS/FLAT         1    1    1   27    0
   11      PARKING/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
    8         0    0    1    0    0    0
   11         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
    8         0    0    4    0    0    0    1    9
   11         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
    8         0    0    0    0    0
   11         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
    8            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    8              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    8              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Area 200 - Office Change Room***
```

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```
PERLND  16                        0.37     COPY   501     12
PERLND  16                        0.37     COPY   501     13
IMPLND   4                        0.23     COPY   501     15
IMPLND   8                        0.07     COPY   501     15
IMPLND  11                        0.93     COPY   501     15
Area 200 Rail Unloading***
IMPLND   8                        0.02     COPY   502     15
IMPLND  11                        1.18     COPY   502     15
Area 300 Containment Berm***
IMPLND  11                       12.12     COPY   503     15
Area 300 & 700 Buidlings & Parking***
PERLND  16                        1.62     COPY   504     12
PERLND  16                        1.62     COPY   504     13
IMPLND   4                        0.16     COPY   504     15
IMPLND   8                        0.05     COPY   504     15
IMPLND  11                        0.28     COPY   504     15
Area 400 Dock***
PERLND  16                        0.13     COPY   505     12
PERLND  16                        0.13     COPY   505     13
IMPLND  11                        1.05     COPY   505     15
Area 500 Pipeline Alignment***
IMPLND  11                        2.29     COPY   506     15
Area 600 - West Boiler Building***
PERLND  16                        0.15     COPY   507     12
PERLND  16                        0.15     COPY   507     13
IMPLND   4                        0.15     COPY   507     15
IMPLND   8                        0.01     COPY   507     15
IMPLND  11                        0.19     COPY   507     15
Area 300 - Tank Roofs***
IMPLND   4                        6.23     COPY   508     15
Area 200 - Rail Roof***
IMPLND   4                         3.9     COPY   509     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
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1
COPY   507 OUTPUT MEAN   1 1   48.4        DISPLY   7     INPUT  TIMSER 1
COPY   508 OUTPUT MEAN   1 1   48.4        DISPLY   8     INPUT  TIMSER 1
COPY   509 OUTPUT MEAN   1 1   48.4        DISPLY   9     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
```

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```
    # -  # 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    0.8           PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8           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
COPY     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 FLOW     ENGL      REPL
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 FLOW     ENGL      REPL
COPY     4 OUTPUT MEAN   1 1     48.4      WDM    704 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    804 FLOW     ENGL      REPL
COPY     5 OUTPUT MEAN   1 1     48.4      WDM    705 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    805 FLOW     ENGL      REPL
COPY     6 OUTPUT MEAN   1 1     48.4      WDM    706 FLOW     ENGL      REPL
COPY   506 OUTPUT MEAN   1 1     48.4      WDM    806 FLOW     ENGL      REPL
COPY     7 OUTPUT MEAN   1 1     48.4      WDM    707 FLOW     ENGL      REPL
COPY   507 OUTPUT MEAN   1 1     48.4      WDM    807 FLOW     ENGL      REPL
COPY     8 OUTPUT MEAN   1 1     48.4      WDM    708 FLOW     ENGL      REPL
COPY   508 OUTPUT MEAN   1 1     48.4      WDM    808 FLOW     ENGL      REPL
COPY     9 OUTPUT MEAN   1 1     48.4      WDM    709 FLOW     ENGL      REPL
COPY   509 OUTPUT MEAN   1 1     48.4      WDM    809 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
```

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


END MASS-LINK

END RUN
```

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Savage T5
Site Name:	
Site Address:	
City:	
Report Date:	8/21/2013
Gage:	Portland
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.93
Version:	2013/05/17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year

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Landuse Basin Data
Predeveloped Land Use

Terminal 5

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Pasture, Flat	13.84
Pervious Total	13.84
Impervious Land Use	Acres
Impervious Total	0
Basin Total	13.84

Element Flows To:

Surface	Interflow	Groundwater

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Terminal 4

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Pasture, Flat	25.49
Pervious Total	25.49
Impervious Land Use	Acres
Impervious Total	0
Basin Total	25.49

Element Flows To:

Surface	Interflow	Groundwater

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Marine Terminal

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Pasture, Flat	1.08
Pervious Total	1.08
Impervious Land Use	Acres
Impervious Total	0
Basin Total	1.08

Element Flows To:

Surface	Interflow	Groundwater

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Mitigated Land Use

Terminal 5

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	0.52
Pervious Total	0.52
Impervious Land Use	Acres
ROOF TOPS FLAT	4.36
SIDEWALKS FLAT	0.1
PARKING FLAT	8.86
Impervious Total	13.32
Basin Total	13.84

Element Flows To:

Surface	Interflow	Groundwater

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Terminal 4

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	1.62
Pervious Total	1.62
Impervious Land Use	Acres
ROOF TOPS FLAT	6.39
SIDEWALKS FLAT	0.05
PARKING FLAT	17.43
Impervious Total	23.87
Basin Total	25.49

Element Flows To:

Surface	Interflow	Groundwater

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Marine Terminal

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	0.07
Pervious Total	0.07
Impervious Land Use	Acres
ROOF TOPS FLAT	0.03
PARKING FLAT	0.98
Impervious Total	1.01
Basin Total	1.08

Element Flows To:

Surface	Interflow	Groundwater

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Routing Elements
Predeveloped Routing

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Mitigated Routing

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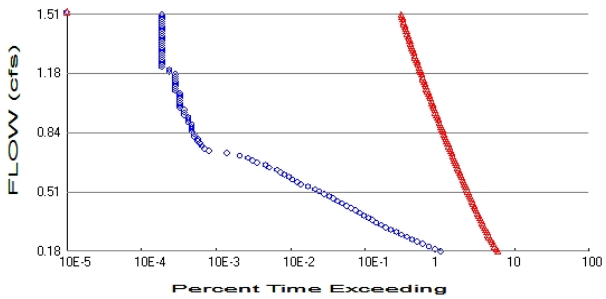
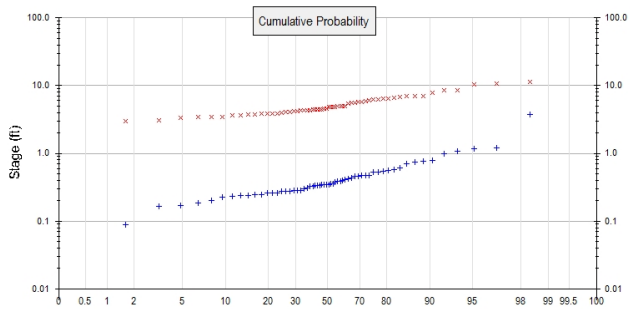
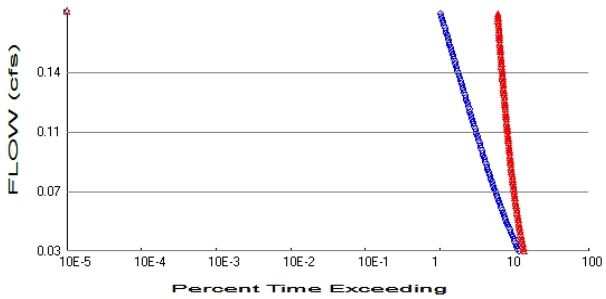
Analysis Results
POC 1







+ Predeveloped x Mitigated

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Predeveloped Landuse Totals for POC #1
Total Pervious Area: 13.84
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.52
Total Impervious Area: 13.32

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.362901
5 year	0.629251
10 year	0.854431
25 year	1.200747
50 year	1.507667
100 year	1.860032

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	4.816932
5 year	6.355366
10 year	7.458706
25 year	8.952709
50 year	10.140458
100 year	11.394218

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.467	6.742
1950	0.418	3.927
1951	0.401	4.299
1952	0.335	4.790
1953	0.351	4.039
1954	0.356	5.005
1955	0.282	3.486
1956	1.071	6.563
1957	0.324	4.421
1958	0.264	6.977
1959	0.240	3.800
1960	0.233	4.383
1961	0.706	6.221
1962	0.277	3.426
1963	0.300	4.238
1964	0.380	3.741
1965	0.562	5.514
1966	0.347	4.221
1967	0.258	4.855
1968	0.476	6.921
1969	0.340	8.541
1970	3.783	11.208
1971	0.259	4.463
1972	0.382	4.364
1973	0.323	4.386
1974	0.786	4.907
1975	0.345	3.067
1976	0.391	3.901
1977	0.050	2.777
1978	0.549	4.907
1979	0.465	6.938
1980	0.404	3.793
1981	0.750	5.601
1982	0.607	5.678
1983	1.176	6.135
1984	0.283	3.611
1985	0.332	4.077
1986	0.226	4.864
1987	0.530	4.575
1988	0.246	5.763
1989	0.165	4.919
1990	0.244	4.430
1991	0.271	4.357
1992	0.240	3.889
1993	0.273	5.471
1994	0.473	3.664
1995	0.345	6.450
1996	0.762	8.457
1997	1.205	7.785
1998	0.528	6.284
1999	0.436	3.465
2000	0.171	3.309
2001	0.089	2.951
2002	0.974	6.415
2003	0.454	3.819
2004	0.186	4.825

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2005	0.204	4.315
2006	0.345	5.819
2007	0.307	4.554
2008	0.285	10.615
2009	0.582	10.335

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	3.7827	11.2082
2	1.2047	10.6150
3	1.1759	10.3349
4	1.0707	8.5411
5	0.9743	8.4572
6	0.7857	7.7852
7	0.7618	6.9774
8	0.7502	6.9383
9	0.7062	6.9210
10	0.6071	6.7419
11	0.5819	6.5632
12	0.5618	6.4504
13	0.5486	6.4145
14	0.5295	6.2839
15	0.5277	6.2210
16	0.4761	6.1346
17	0.4728	5.8188
18	0.4667	5.7633
19	0.4645	5.6783
20	0.4536	5.6012
21	0.4364	5.5142
22	0.4185	5.4708
23	0.4040	5.0047
24	0.4012	4.9186
25	0.3908	4.9075
26	0.3824	4.9068
27	0.3800	4.8635
28	0.3555	4.8547
29	0.3511	4.8251
30	0.3474	4.7897
31	0.3452	4.5753
32	0.3451	4.5536
33	0.3451	4.4627
34	0.3397	4.4300
35	0.3354	4.4207
36	0.3322	4.3863
37	0.3241	4.3831
38	0.3230	4.3640
39	0.3073	4.3573
40	0.3003	4.3151
41	0.2851	4.2987
42	0.2830	4.2383
43	0.2819	4.2214
44	0.2770	4.0767
45	0.2735	4.0387
46	0.2713	3.9268
47	0.2635	3.9014
48	0.2593	3.8895
49	0.2582	3.8195

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50	0.2464	3.8004
51	0.2438	3.7935
52	0.2404	3.7414
53	0.2404	3.6644
54	0.2329	3.6112
55	0.2262	3.4864
56	0.2041	3.4650
57	0.1865	3.4257
58	0.1706	3.3087
59	0.1653	3.0666
60	0.0894	2.9509
61	0.0505	2.7773

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Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0290	245971	288107	117	Fail
0.0306	237630	283188	119	Fail
0.0321	229716	278268	121	Fail
0.0337	222016	273991	123	Fail
0.0352	214744	269713	125	Fail
0.0367	208027	265649	127	Fail
0.0383	201525	261799	129	Fail
0.0398	195301	258163	132	Fail
0.0413	189334	254741	134	Fail
0.0429	183623	251318	136	Fail
0.0444	178276	247896	139	Fail
0.0460	173078	244902	141	Fail
0.0475	168030	241907	143	Fail
0.0490	163090	238913	146	Fail
0.0506	158363	236132	149	Fail
0.0521	153850	233566	151	Fail
0.0537	149572	230785	154	Fail
0.0552	145422	228218	156	Fail
0.0567	141551	225866	159	Fail
0.0583	137701	223513	162	Fail
0.0598	134044	220946	164	Fail
0.0614	130514	218594	167	Fail
0.0629	127114	216455	170	Fail
0.0644	123798	214530	173	Fail
0.0660	120633	212391	176	Fail
0.0675	117553	210359	178	Fail
0.0691	114537	208284	181	Fail
0.0706	111585	206316	184	Fail
0.0721	108741	204456	188	Fail
0.0737	106003	202659	191	Fail
0.0752	103287	200862	194	Fail
0.0768	100720	199066	197	Fail
0.0783	98217	197354	200	Fail
0.0798	95779	195579	204	Fail
0.0814	93448	193868	207	Fail
0.0829	91202	192307	210	Fail
0.0845	89106	190767	214	Fail
0.0860	86988	189227	217	Fail
0.0875	84956	187708	220	Fail
0.0891	82967	186211	224	Fail
0.0906	81021	184692	227	Fail
0.0922	79139	183195	231	Fail
0.0937	77299	181783	235	Fail
0.0952	75502	180436	238	Fail
0.0968	73749	179088	242	Fail
0.0983	72080	177762	246	Fail
0.0999	70455	176415	250	Fail
0.1014	68936	175174	254	Fail
0.1029	67332	173870	258	Fail
0.1045	65920	172608	261	Fail
0.1060	64402	171260	265	Fail
0.1076	62969	170105	270	Fail
0.1091	61600	168972	274	Fail
0.1106	60209	167795	278	Fail

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0.1122	58905	166662	282	Fail
0.1137	57557	165507	287	Fail
0.1152	56402	164394	291	Fail
0.1168	55204	163261	295	Fail
0.1183	53943	162127	300	Fail
0.1199	52809	161036	304	Fail
0.1214	51654	159967	309	Fail
0.1229	50606	158919	314	Fail
0.1245	49515	157892	318	Fail
0.1260	48424	156801	323	Fail
0.1276	47440	155860	328	Fail
0.1291	46371	154812	333	Fail
0.1306	45366	153785	338	Fail
0.1322	44425	152909	344	Fail
0.1337	43419	151882	349	Fail
0.1353	42457	150941	355	Fail
0.1368	41451	149935	361	Fail
0.1383	40553	149037	367	Fail
0.1399	39655	148182	373	Fail
0.1414	38671	147262	380	Fail
0.1430	37815	146406	387	Fail
0.1445	36896	145465	394	Fail
0.1460	36083	144631	400	Fail
0.1476	35270	143733	407	Fail
0.1491	34479	142877	414	Fail
0.1507	33752	142022	420	Fail
0.1522	33067	141273	427	Fail
0.1537	32340	140460	434	Fail
0.1553	31677	139669	440	Fail
0.1568	30928	138835	448	Fail
0.1584	30265	138043	456	Fail
0.1599	29602	137295	463	Fail
0.1614	28939	136482	471	Fail
0.1630	28319	135733	479	Fail
0.1645	27698	134921	487	Fail
0.1661	27100	134151	495	Fail
0.1676	26522	133445	503	Fail
0.1691	25902	132696	512	Fail
0.1707	25389	131969	519	Fail
0.1722	24832	131178	528	Fail
0.1738	24319	130493	536	Fail
0.1753	23784	129766	545	Fail
0.1768	23228	128996	555	Fail
0.1784	22758	128333	563	Fail
0.1799	22266	127627	573	Fail
0.1815	21774	126964	583	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.

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Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	1.3867 acre-feet
On-line facility target flow:	1.9475 cfs.
Adjusted for 15 min:	1.9475 cfs.
Off-line facility target flow:	1.0963 cfs.
Adjusted for 15 min:	1.0963 cfs.

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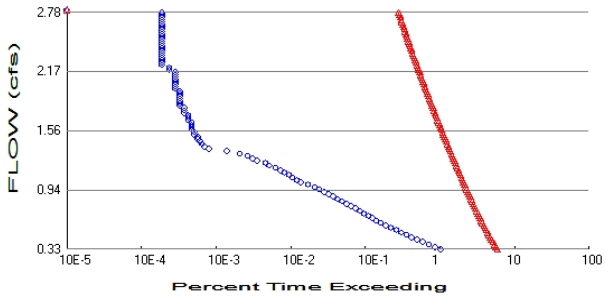
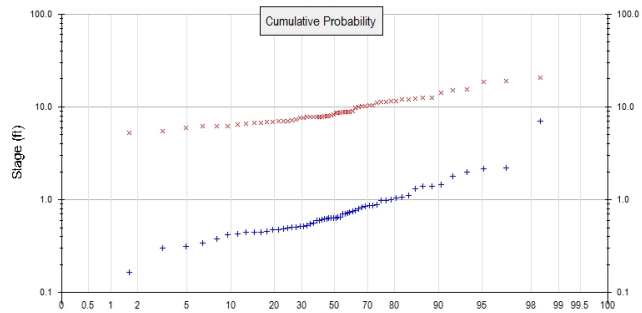
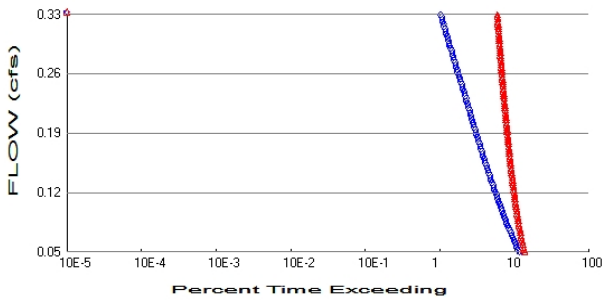
POC 2







+ Predeveloped x Mitigated

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Predeveloped Landuse Totals for POC #2
Total Pervious Area: 25.49
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 1.62
Total Impervious Area: 23.87

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.668377
5 year	1.158931
10 year	1.573658
25 year	2.21149
50 year	2.776763
100 year	3.425736

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	8.664614
5 year	11.450471
10 year	13.45095
25 year	16.162471
50 year	18.320079
100 year	20.599204

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**

1949	0.859	12.082
1950	0.771	7.037
1951	0.739	7.751
1952	0.618	8.614
1953	0.647	7.245
1954	0.655	8.971
1955	0.519	6.248
1956	1.972	11.916
1957	0.597	7.961
1958	0.485	12.608
1959	0.443	6.815
1960	0.429	7.865
1961	1.301	11.273
1962	0.510	6.163
1963	0.553	7.626
1964	0.700	6.716
1965	1.035	9.979
1966	0.640	7.602
1967	0.476	8.745
1968	0.877	12.414
1969	0.626	15.316
1970	6.967	20.473
1971	0.478	7.997
1972	0.704	7.821
1973	0.595	7.861
1974	1.447	8.857
1975	0.636	5.505
1976	0.720	7.039
1977	0.093	4.982
1978	1.010	8.869
1979	0.856	12.522
1980	0.744	6.805
1981	1.382	10.131
1982	1.118	10.215
1983	2.166	11.120
1984	0.521	6.485
1985	0.612	7.312
1986	0.417	8.722
1987	0.975	8.223
1988	0.454	10.331
1989	0.304	8.815
1990	0.449	7.942
1991	0.500	7.835
1992	0.443	7.000
1993	0.504	9.841
1994	0.871	6.605
1995	0.636	11.560
1996	1.403	15.217
1997	2.219	14.149
1998	0.972	11.307
1999	0.804	6.233
2000	0.314	5.930
2001	0.165	5.296
2002	1.795	11.640
2003	0.835	6.883
2004	0.343	8.647
2005	0.376	7.735
2006	0.636	10.430

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2007	0.566	8.188
2008	0.525	19.125
2009	1.072	18.524

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	6.9668	20.4729
2	2.2187	19.1245
3	2.1657	18.5238
4	1.9720	15.3164
5	1.7945	15.2171
6	1.4470	14.1486
7	1.4031	12.6076
8	1.3818	12.5223
9	1.3006	12.4142
10	1.1181	12.0819
11	1.0716	11.9158
12	1.0346	11.6396
13	1.0104	11.5595
14	0.9753	11.3066
15	0.9720	11.2728
16	0.8768	11.1203
17	0.8708	10.4298
18	0.8595	10.3305
19	0.8555	10.2152
20	0.8353	10.1310
21	0.8038	9.9793
22	0.7708	9.8413
23	0.7441	8.9713
24	0.7390	8.8687
25	0.7197	8.8566
26	0.7043	8.8145
27	0.7000	8.7452
28	0.6548	8.7223
29	0.6467	8.6473
30	0.6399	8.6145
31	0.6358	8.2231
32	0.6356	8.1877
33	0.6356	7.9975
34	0.6256	7.9607
35	0.6177	7.9418
36	0.6118	7.8654
37	0.5970	7.8605
38	0.5949	7.8354
39	0.5659	7.8208
40	0.5530	7.7507
41	0.5252	7.7351
42	0.5211	7.6264
43	0.5192	7.6017
44	0.5102	7.3122
45	0.5037	7.2447
46	0.4997	7.0387
47	0.4853	7.0371
48	0.4777	7.0002
49	0.4756	6.8835
50	0.4538	6.8154
51	0.4491	6.8054

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52	0.4427	6.7157
53	0.4427	6.6048
54	0.4289	6.4848
55	0.4165	6.2479
56	0.3759	6.2330
57	0.3435	6.1632
58	0.3143	5.9298
59	0.3044	5.5046
60	0.1646	5.2956
61	0.0930	4.9821

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Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0535	247468	292385	118	Fail
0.0563	238485	286610	120	Fail
0.0591	229930	281477	122	Fail
0.0620	224582	278054	123	Fail
0.0648	216882	273349	126	Fail
0.0676	209482	268643	128	Fail
0.0705	202595	264366	130	Fail
0.0733	195964	260302	132	Fail
0.0762	189590	256238	135	Fail
0.0790	185526	253885	136	Fail
0.0818	179773	250249	139	Fail
0.0847	174255	246827	141	Fail
0.0875	168886	243405	144	Fail
0.0903	163646	240196	146	Fail
0.0932	158598	237202	149	Fail
0.0960	153850	234207	152	Fail
0.0988	150834	232068	153	Fail
0.1017	146385	229288	156	Fail
0.1045	142193	226507	159	Fail
0.1073	138150	223941	162	Fail
0.1102	134257	221374	164	Fail
0.1130	130536	219021	167	Fail
0.1159	128098	217310	169	Fail
0.1187	124611	214957	172	Fail
0.1215	121210	212776	175	Fail
0.1244	117916	210487	178	Fail
0.1272	114751	208306	181	Fail
0.1300	111628	206188	184	Fail
0.1329	109596	204776	186	Fail
0.1357	106645	202809	190	Fail
0.1385	103778	200926	193	Fail
0.1414	101019	198937	196	Fail
0.1442	98410	197034	200	Fail
0.1470	95800	195109	203	Fail
0.1499	94132	193911	205	Fail
0.1527	91758	192221	209	Fail
0.1555	89491	190510	212	Fail
0.1584	87288	188927	216	Fail
0.1612	85127	187259	219	Fail
0.1641	82989	185548	223	Fail
0.1669	81641	184436	225	Fail
0.1697	79588	182896	229	Fail
0.1726	77641	181356	233	Fail
0.1754	75738	179923	237	Fail
0.1782	73877	178447	241	Fail
0.1811	72102	177014	245	Fail
0.1839	70947	176094	248	Fail
0.1867	69257	174618	252	Fail
0.1896	67610	173207	256	Fail
0.1924	66091	171880	260	Fail
0.1952	64530	170533	264	Fail
0.1981	62969	169250	268	Fail
0.2009	61985	168394	271	Fail
0.2038	60552	167218	276	Fail

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0.2066	59119	165977	280	Fail
0.2094	57750	164694	285	Fail
0.2123	56466	163475	289	Fail
0.2151	55183	162255	294	Fail
0.2179	54328	161485	297	Fail
0.2208	53087	160309	301	Fail
0.2236	51911	159111	306	Fail
0.2264	50713	157978	311	Fail
0.2293	49579	156844	316	Fail
0.2321	48446	155817	321	Fail
0.2349	47740	155090	324	Fail
0.2378	46649	154021	330	Fail
0.2406	45580	152951	335	Fail
0.2435	44510	151860	341	Fail
0.2463	43483	150812	346	Fail
0.2491	42457	149807	352	Fail
0.2520	41772	149144	357	Fail
0.2548	40810	148203	363	Fail
0.2576	39783	147219	370	Fail
0.2605	38821	146257	376	Fail
0.2633	37858	145273	383	Fail
0.2661	36938	144267	390	Fail
0.2690	36361	143669	395	Fail
0.2718	35463	142727	402	Fail
0.2746	34650	141851	409	Fail
0.2775	33858	140995	416	Fail
0.2803	33088	140118	423	Fail
0.2831	32361	139241	430	Fail
0.2860	31891	138642	434	Fail
0.2888	31121	137787	442	Fail
0.2917	30415	136952	450	Fail
0.2945	29688	136097	458	Fail
0.2973	28982	135263	466	Fail
0.3002	28319	134429	474	Fail
0.3030	27891	133894	480	Fail
0.3058	27249	133060	488	Fail
0.3087	26629	132290	496	Fail
0.3115	26009	131498	505	Fail
0.3143	25431	130728	514	Fail
0.3172	24854	129894	522	Fail
0.3200	24298	129103	531	Fail
0.3228	23913	128568	537	Fail
0.3257	23357	127841	547	Fail
0.3285	22822	127114	556	Fail
0.3314	22309	126386	566	Fail
0.3342	21795	125638	576	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.

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Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume:	2.4992 acre-feet
On-line facility target flow:	3.4808 cfs.
Adjusted for 15 min:	3.4808 cfs.
Off-line facility target flow:	1.9602 cfs.
Adjusted for 15 min:	1.9602 cfs.

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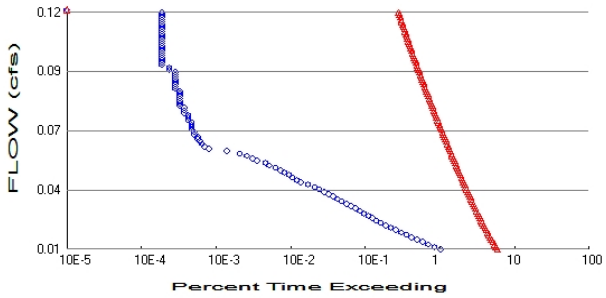
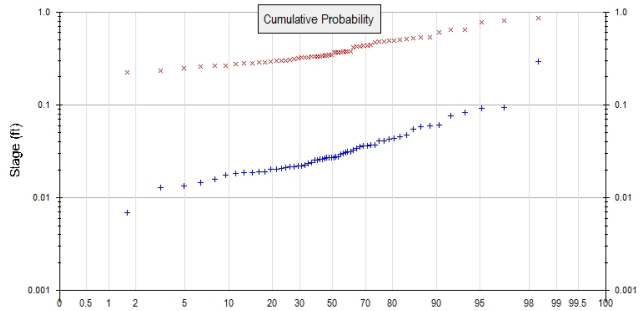
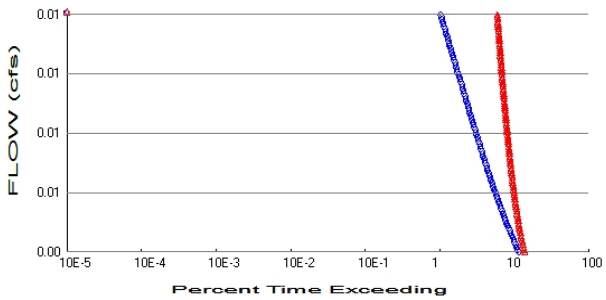
POC 3







+ Predeveloped x Mitigated

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Predeveloped Landuse Totals for POC #3
Total Pervious Area: 1.08
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0.07
Total Impervious Area: 1.01

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.028319
5 year	0.049103
10 year	0.066675
25 year	0.0937
50 year	0.11765
100 year	0.145147

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.36669
5 year	0.484628
10 year	0.569323
25 year	0.684127
50 year	0.775483
100 year	0.871987

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**

1949	0.036	0.511
1950	0.033	0.298
1951	0.031	0.328
1952	0.026	0.365
1953	0.027	0.307
1954	0.028	0.380
1955	0.022	0.264
1956	0.084	0.505
1957	0.025	0.337
1958	0.021	0.534
1959	0.019	0.288
1960	0.018	0.333
1961	0.055	0.477
1962	0.022	0.261
1963	0.023	0.323
1964	0.030	0.284
1965	0.044	0.422
1966	0.027	0.322
1967	0.020	0.370
1968	0.037	0.525
1969	0.027	0.648
1970	0.295	0.867
1971	0.020	0.338
1972	0.030	0.331
1973	0.025	0.333
1974	0.061	0.375
1975	0.027	0.233
1976	0.030	0.298
1977	0.004	0.211
1978	0.043	0.375
1979	0.036	0.530
1980	0.032	0.288
1981	0.059	0.429
1982	0.047	0.432
1983	0.092	0.471
1984	0.022	0.274
1985	0.026	0.309
1986	0.018	0.369
1987	0.041	0.348
1988	0.019	0.437
1989	0.013	0.373
1990	0.019	0.336
1991	0.021	0.332
1992	0.019	0.296
1993	0.021	0.416
1994	0.037	0.280
1995	0.027	0.489
1996	0.059	0.644
1997	0.094	0.599
1998	0.041	0.479
1999	0.034	0.264
2000	0.013	0.251
2001	0.007	0.224
2002	0.076	0.493
2003	0.035	0.291
2004	0.015	0.366
2005	0.016	0.327
2006	0.027	0.441

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2007	0.024	0.346
2008	0.022	0.809
2009	0.045	0.784

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.2952	0.8671
2	0.0940	0.8094
3	0.0918	0.7838
4	0.0836	0.6481
5	0.0760	0.6440
6	0.0613	0.5991
7	0.0594	0.5337
8	0.0585	0.5300
9	0.0551	0.5253
10	0.0474	0.5112
11	0.0454	0.5045
12	0.0438	0.4928
13	0.0428	0.4891
14	0.0413	0.4785
15	0.0412	0.4772
16	0.0372	0.4708
17	0.0369	0.4413
18	0.0364	0.4371
19	0.0362	0.4323
20	0.0354	0.4289
21	0.0341	0.4225
22	0.0327	0.4165
23	0.0315	0.3796
24	0.0313	0.3754
25	0.0305	0.3749
26	0.0298	0.3730
27	0.0297	0.3701
28	0.0277	0.3691
29	0.0274	0.3659
30	0.0271	0.3646
31	0.0269	0.3480
32	0.0269	0.3465
33	0.0269	0.3384
34	0.0265	0.3369
35	0.0262	0.3360
36	0.0259	0.3328
37	0.0253	0.3326
38	0.0252	0.3316
39	0.0240	0.3309
40	0.0234	0.3281
41	0.0223	0.3273
42	0.0221	0.3228
43	0.0220	0.3217
44	0.0216	0.3094
45	0.0213	0.3066
46	0.0212	0.2979
47	0.0206	0.2978
48	0.0202	0.2963
49	0.0202	0.2913
50	0.0192	0.2884
51	0.0190	0.2880

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52	0.0188	0.2842
53	0.0188	0.2795
54	0.0182	0.2744
55	0.0176	0.2644
56	0.0159	0.2638
57	0.0146	0.2608
58	0.0133	0.2509
59	0.0129	0.2329
60	0.0070	0.2241
61	0.0039	0.2108

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Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0023	245971	291743	118	Fail
0.0024	237630	286396	120	Fail
0.0025	229716	281477	122	Fail
0.0026	222016	276557	124	Fail
0.0027	214744	272066	126	Fail
0.0029	207985	267788	128	Fail
0.0030	201504	263724	130	Fail
0.0031	195301	259874	133	Fail
0.0032	189312	256238	135	Fail
0.0033	183623	252602	137	Fail
0.0035	178297	249180	139	Fail
0.0036	173057	245971	142	Fail
0.0037	168009	242763	144	Fail
0.0038	163090	239768	147	Fail
0.0039	158363	236988	149	Fail
0.0041	153850	234207	152	Fail
0.0042	149572	231427	154	Fail
0.0043	145444	228860	157	Fail
0.0044	141530	226080	159	Fail
0.0045	137701	223727	162	Fail
0.0047	134044	221160	164	Fail
0.0048	130536	219021	167	Fail
0.0049	127114	216669	170	Fail
0.0050	123820	214530	173	Fail
0.0051	120654	212391	176	Fail
0.0053	117553	210231	178	Fail
0.0054	114537	208134	181	Fail
0.0055	111585	206145	184	Fail
0.0056	108762	204220	187	Fail
0.0057	105982	202381	190	Fail
0.0059	103287	200563	194	Fail
0.0060	100720	198681	197	Fail
0.0061	98196	196863	200	Fail
0.0062	95758	195066	203	Fail
0.0064	93426	193419	207	Fail
0.0065	91202	191836	210	Fail
0.0066	89106	190211	213	Fail
0.0067	87010	188713	216	Fail
0.0068	84978	187109	220	Fail
0.0070	82967	185484	223	Fail
0.0071	81021	183944	227	Fail
0.0072	79139	182489	230	Fail
0.0073	77299	181056	234	Fail
0.0074	75502	179687	237	Fail
0.0076	73749	178318	241	Fail
0.0077	72080	176950	245	Fail
0.0078	70455	175602	249	Fail
0.0079	68829	174255	253	Fail
0.0080	67311	172886	256	Fail
0.0082	65856	171624	260	Fail
0.0083	64402	170362	264	Fail
0.0084	62926	169185	268	Fail
0.0085	61536	168009	273	Fail
0.0086	60188	166833	277	Fail

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0.0088	58841	165656	281	Fail
0.0089	57557	164480	285	Fail
0.0090	56359	163325	289	Fail
0.0091	55162	162170	293	Fail
0.0092	53943	161079	298	Fail
0.0094	52766	159988	303	Fail
0.0095	51675	158833	307	Fail
0.0096	50563	157742	311	Fail
0.0097	49472	156737	316	Fail
0.0098	48403	155710	321	Fail
0.0100	47398	154662	326	Fail
0.0101	46414	153743	331	Fail
0.0102	45387	152716	336	Fail
0.0103	44403	151689	341	Fail
0.0104	43441	150705	346	Fail
0.0106	42457	149743	352	Fail
0.0107	41494	148845	358	Fail
0.0108	40575	147904	364	Fail
0.0109	39633	147005	370	Fail
0.0110	38714	146086	377	Fail
0.0112	37815	145123	383	Fail
0.0113	36938	144225	390	Fail
0.0114	36104	143326	396	Fail
0.0115	35270	142471	403	Fail
0.0116	34522	141658	410	Fail
0.0118	33773	140867	417	Fail
0.0119	33067	140032	423	Fail
0.0120	32361	139177	430	Fail
0.0121	31677	138364	436	Fail
0.0122	30971	137551	444	Fail
0.0124	30287	136760	451	Fail
0.0125	29602	135947	459	Fail
0.0126	28960	135156	466	Fail
0.0127	28319	134364	474	Fail
0.0128	27720	133616	482	Fail
0.0130	27121	132846	489	Fail
0.0131	26522	132119	498	Fail
0.0132	25945	131370	506	Fail
0.0133	25410	130621	514	Fail
0.0134	24854	129830	522	Fail
0.0136	24340	129081	530	Fail
0.0137	23806	128333	539	Fail
0.0138	23250	127670	549	Fail
0.0139	22758	127007	558	Fail
0.0140	22287	126279	566	Fail
0.0142	21795	125574	576	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.

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Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	0.1057 acre-feet
On-line facility target flow:	0.1472 cfs.
Adjusted for 15 min:	0.1472 cfs.
Off-line facility target flow:	0.0829 cfs.
Adjusted for 15 min:	0.0829 cfs.

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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.

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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   Savage T5.wdm
MESSU      25   PreSavage T5.MES
           27   PreSavage T5.L61
           28   PreSavage T5.L62
           30   POCSavage T51.dat
           31   POCSavage T52.dat
           32   POCSavage T53.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      13
      COPY       501
      COPY       502
      COPY       503
      DISPLY       1
      DISPLY       2
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Terminal 5                MAX                     1    2   30    9
    2        Terminal 4                MAX                     1    2   31    9
    3        Marine Terminal           MAX                     1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         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 ****************************
```

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```
    # -   # 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           ***
  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
```

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```
  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#   ***
Terminal 5***
PERLND  13                       13.84     COPY   501     12
PERLND  13                       13.84     COPY   501     13
Terminal 4***
PERLND  13                       25.49     COPY   502     12
PERLND  13                       25.49     COPY   502     13
Marine Terminal***
PERLND  13                        1.08     COPY   503     12
PERLND  13                        1.08     COPY   503     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
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     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
```

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```
  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    0.933          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.933          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
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    502 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    503 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
```

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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   Savage T5.wdm
MESSU      25   MitSavage T5.MES
           27   MitSavage T5.L61
           28   MitSavage T5.L62
           30   POCSavage T51.dat
           31   POCSavage T52.dat
           32   POCSavage T53.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       4
      IMPLND       8
      IMPLND      11
      COPY       501
      COPY       502
      COPY       503
      DISPLY       1
      DISPLY       2
      DISPLY       3
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Terminal 5                 MAX                    1    2   30    9
    2        Terminal 4                 MAX                    1    2   31    9
    3        Marine Terminal            MAX                    1    2   32    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         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            ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***
```

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```
  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         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  *********
   16         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 ***
   16         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
   16              0       4.5      0.03       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
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   16              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
    8      SIDEWALKS/FLAT         1    1    1   27    0
   11      PARKING/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
    8         0    0    1    0    0    0
   11         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
    8         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
```

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```
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    8         0    0    0    0    0
   11         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
    8            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    8              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    8              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                <--Area-->     <-Target->   MBLK   ***
<Name>   #                <-factor->     <Name>   #   Tbl#   ***
Terminal 5***
PERLND  16                      0.52     COPY   501     12
PERLND  16                      0.52     COPY   501     13
IMPLND   4                      4.36     COPY   501     15
IMPLND   8                       0.1     COPY   501     15
IMPLND  11                      8.86     COPY   501     15
Terminal 4***
PERLND  16                      1.62     COPY   502     12
PERLND  16                      1.62     COPY   502     13
IMPLND   4                      6.39     COPY   502     15
IMPLND   8                      0.05     COPY   502     15
IMPLND  11                     17.43     COPY   502     15
Marine Terminal***
PERLND  16                      0.07     COPY   503     12
PERLND  16                      0.07     COPY   503     13
IMPLND   4                      0.03     COPY   503     15
IMPLND  11                      0.98     COPY   503     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
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
```

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```
<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    0.933          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.933          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
COPY     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 FLOW     ENGL      REPL
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
```

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```
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
```

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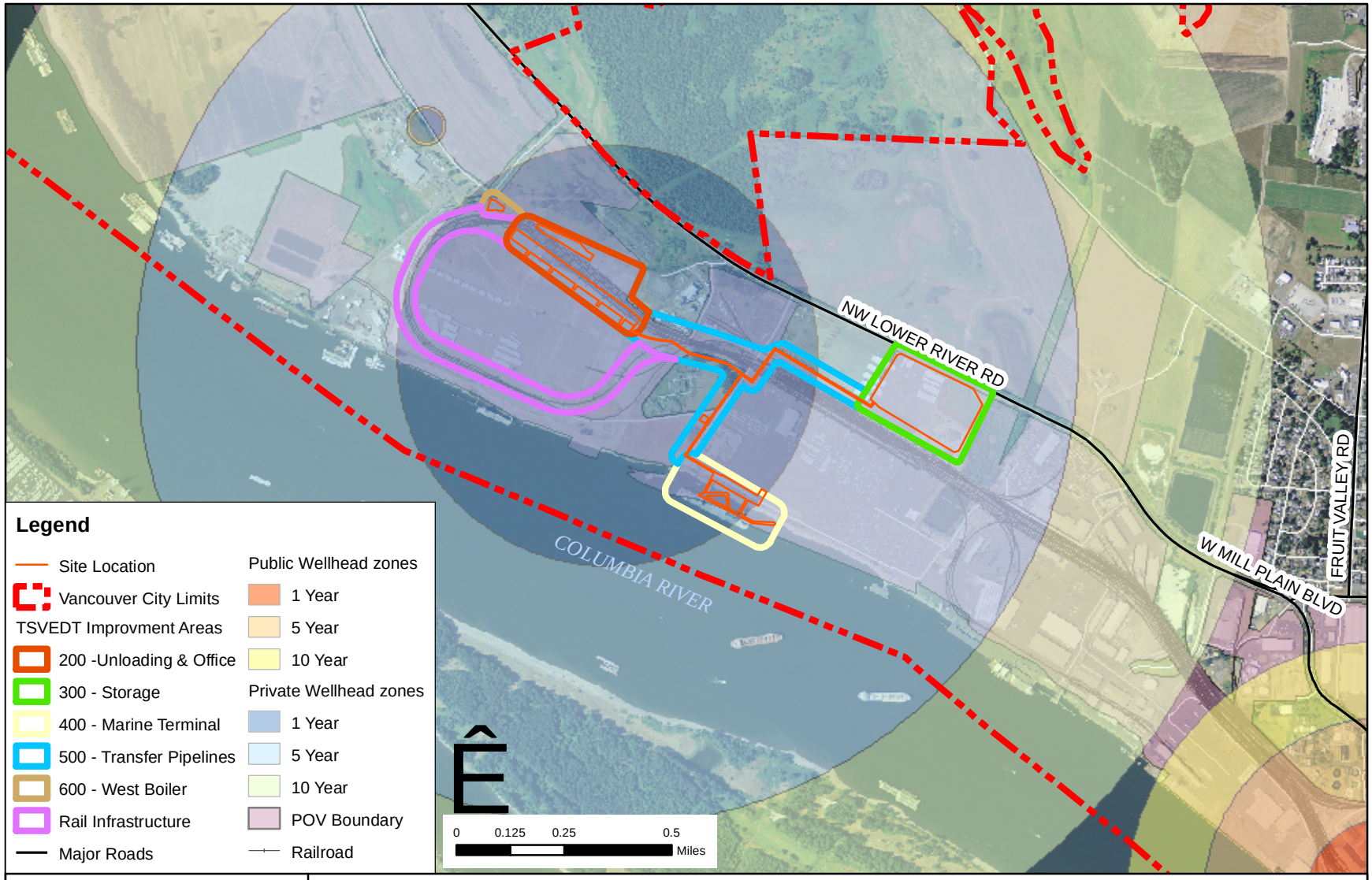
Attachment F
Wellhead Protection



BergerABAM

Wellhead Protection Map