OLIVER TERRACE SUBDIVISION

PRELIMINARY
TECHNICAL INFORMATION REPORT

Prepared for:
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01/14/2026

This project complies with Camas Municipal Code (CMC) 14.02 Stormwater Control and the July 2024 Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).

DATE: 01/14/26

JOB #: 2452

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Tables

Technical Appendix

SECTION A - Project Overview

The Oliver Terrace project proposes to develop parcel 178221-000, approximately 18.15 acres total, into 11 proposed single-family detached residential lots. The site is located at 1004 SE Everett Road, Camas, WA 98607. There is one existing home, one barn and other outbuildings on the site. The existing home will remain in a remainder lot and the barn will remain in a separate tract.

The existing vegetation on site consists of mostly dense tree cover on the north end of the site with slopes typical between 0-25%. The majority of existing runoff from the developable site area flows northeast from a highpoint in the middle of the site. This project will consist of site grading, constructing roads, and utilities necessary to develop the site. Stormwater control will conform to the requirements of the City of Camas Design Standards Manual and the 2024 Stormwater Management Manual for Western Washington. Stormwater will be managed on the site using Contech Stormfilters for treatment and a detention pond for flow control. There are currently no stormwater facilities on site.

SECTION B – Minimum Requirements

According to Table A below and Figure 1.2 from Chapter 1 of the Camas Stormwater Design Standards Manual, all Minimum Requirements (1-9) apply.

Table A. – Surface Area Breakdown Onsite

Existing Impervious Surface	**0.00 Acres**
New Impervious Surface	**1.76 Acres**
Replaced Impervious Surface	**0.00 Acres**
Native Vegetation Converted to Lawn or Landscaping	**1.46 Acres**
Native Vegetation Converted to Pasture	**0.00 Acres**
Total Land-disturbing Activity	**3.22 Acres**

1. All TDAs do not increase the 100-year flood frequency from predeveloped to developed conditions.
2. All TDAs must meet *Minimum Requirement #6: Runoff Treatment*.
3. All TDAs must meet *Minimum Requirement #7: Flow Control*.
4. All TDAs must meet *Minimum Requirement #8: Wetland Protection.*

Minimum Requirement 1. – Preparation of Stormwater Site Plans*:*
The final stormwater plan and final engineering plans with layouts and construction details will be prepared after the project receives preliminary approval.

Minimum Requirement 2. – Construction Stormwater Pollution Prevention*:*
A Construction Stormwater Pollution Prevention Plan (SWPPP) is required and will be prepared. The contractor will comply with construction SWPPP requirements including elements 1-13.

Minimum Requirement 3. – Source Control of Pollution*:*
All development activities shall consult Camas Design Standard Manual. The BMPs that may apply to land disturbance could be **BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots, BMPs for Landscaping and Lawn/Vegetation Management, BMPs for Maintenance of Stormwater Drainage and Treatment Systems, BMPs for Urban Streets.** Refer to Section D of this report.

Minimum Requirement 4. – Preservation of Natural Drainage Systems and Outfalls*:*
The proposed improvements associated with this parcel will preserve the existing conveyance. Existing drainage patterns shall be maintained, and discharges from the project site shall occur as is, to the maximum extent practicable. The manner by which runoff is discharged from the project site will not cause a significant adverse impact to downstream receiving waters and downgradient properties. Refer to Section L of this report.

Minimum Requirement 5. – Onsite Stormwater Management*:*
1. General

After evaluation of the geotechnical report from Soil and Water Technologies, Inc, the following BMPs were selected based on suitability of the site:

T5.13 – Post-Construction Soil Quality and Depth

Since the majority of the site has been or will be stripped of topsoil and/or organic material for grading purposes, the remaining open spaces, yards and landscaping areas shall be restored with the appropriate soil quality and depths. See Clark County Stormwater Manual 2015: Book 2 Chapter 2 On-Site Stormwater Management BMPs for design criteria. These pervious areas are modeled as 'Field' in the WWHM program.

D6.10 - Detention Pond

The detention pond is placed at the current low point and stormwater runoff release point onsite. The pond is sized to detain and release stormwater below predeveloped rates. See Clark County Stormwater Manual 2015: Book 2 Chapter 2 On-Site Stormwater Management BMPs for design criteria.

Contech Stormfilter

Contech Stormfilter Systems were chosen as a treatment BMP for the pollution generating basins. Stormfilter systems have been approved by the Washington State Department of Ecology and can provide basic, phosphorus, oil, and enhanced treatment. Stormfilter catch basins from Contech will be utilized to treat pollution generating improvements. The main benefits of the Stormfilter

catch basins are the small footprint and minimal vertical drop within the system. The small vertical drop allows for maximum separation from the storm system to groundwater.

2. Low Impact Development (LID)

This preliminary stormwater plan will meet the LID Performance Standard, however, the List #2 Criteria may be used during final engineering due to site constraints. The proposed storm system has been modeled in the WWHM to pass the LID duration and stream protection duration for the developed condition. Design details for each BMP can be found in the following sections of the Clark County Stormwater Manual 2015:

- **T5.13 - Post-Construction Soil Quality and Depth: Book 2 Chapter 2 On-Site Stormwater Management BMPs**
- **D6.10 - Detention Pond: Book 2 Chapter 2 On-Site Stormwater Management BMPs**

A WWHM design and design report printout can be found in Appendix C of this report for the detention pond.

Minimum Requirement #6. – Runoff Treatment:
Since the thresholds for impervious area added exceeds the limits, runoff treatment is required. Basic treatment and phosphorus treatment is proposed in the form of Contech stormfilter catch basins that will meet or exceed the required treatment parameters. Other approved LID or traditional BMP's may be used to treat stormwater for this development. Refer to Section F of this report.

Table B. – Stormfilter Breakdown

RUNOFF TREATMENT -CONTECH STORMFILTER			
PG BASIN	FILTER	REQ'D WQ FLOW	TREATMENT CAPACITY
A	3 – 27" PSORB	0.0903 CFS	0.1260 CFS
B	1 – 18" PSORB	0.0236 CFS	0.0280 CFS

Minimum Requirement #7. – Runoff Flow Control:
This project's storm plan consists of a storm detention pond for the main source of flow control. The pond will detain and release water below predeveloped rates through a metered release in an outlet control structure. Roof runoff will be routed directly to the detention pond by means of a clean storm line. Pollution generated runoff will be treated and conveyed to the detention pond via the clean storm line as well. See Appendix B of this report for additional soil information. The site was evaluated using continuous modeling in the WWHM 2012 software. Refer to Section F below for more detailed flow control modeling calculations.

Minimum Requirement #8. – Wetlands Protection:
Multiple wetlands exist on site or immediately adjacent to the site, triggering Minimum Requirement #8. A Critical Areas Report and Mitigation plan have been prepared by ELS Refer to Section H below for a summary of how this requirement is satisfied.

Minimum Requirement #9. – Operation and Maintenance:
The storm systems will be privately owned and maintained by a Homeowners Association. See latest version of City of Camas *Storm Sewer Systems Operation & Maintenance Manual*.

SECTION C – Soils Evaluation

The Soil Survey of Clark County, Washington, November 1972 identifies the onsite soils as, Lauren Gravel Loam (LIB), Vader Silt Loam (VaB, VaC), Hesson Clay Loam (HcB, HcE), Hillsboro Silt Loam (HoB), McBee Silty Clay Loam (MeA), Olympic Clay Loam (OmE), and Tisch Medial Silt (ThA).

A geotechnical analysis was performed by Soil and Water Technologies, Inc. and based on their lab analysis and underlying bedrock on site, they reclassified all soils on site as Soil Group 4. Thus, Soil Group 4 was used to complete stormwater design calculations. The geotechnical investigation also found negligible infiltration rates (see Geotech Report in Appendix D) in the native soil which indicates that the site is suitable for the above ground detention pond as recommended by Soil and Water Technologies, Inc.

SECTION D – Source Control

All development activities shall consult the City of Camas Design Standard Manual and Camas Stormwater Design Standards Manual. The BMPs that may apply to land disturbance could be 'BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots', 'BMPs for Landscaping and Lawn/Vegetation Management', 'BMPs for Maintenance of Stormwater Drainage and Treatment Systems' and 'BMPs for Urban Streets'.

SECTION E - Onsite Stormwater Management BMPs

1. The following is a list of onsite stormwater management BMPs:

T5.13 – Post-Construction Soil Quality and Depth

2. Refer to Section C above for geotechnical information

3./4. **T5.13 – Post-Construction Soil Quality and Depth (Volume V, SMMWW)**

Since the majority of the site has been or will be stripped of topsoil and/or organic material for grading purposes, the remaining open spaces, yards and landscaping areas shall be restored with the appropriate soil quality and depths.

T5.21 – Better Site Design (Volume V, SMMWW)

An attempt to provide better site design has been considered to the extent practical. Sensitive areas with wetlands and significant trees have been left out of the development.

5./6./7. Contech Stormfilter cartridges and detention pond are proposed on this project. They are shown on the Stormwater plan.

8. N/A; no pervious pavement is proposed.

9. N/A; no reversed slope sidewalks are proposed.

SECTION F - Runoff Treatment Analysis and Design

1. Based on the proposed site conditions and use, phosphorous treatment is proposed.

2. Since the threshold for impervious areas added exceeds the limits, runoff treatment is required. The PSORB Contech Stormfilter Catch Basins will meet or exceed the required treatment parameters as described in the Washington State Department of Ecology Stormwater Management Manual for Western Washington (SWMM), Appendix III-C.

3. See Section C for Geotechnical information.

4. The following are the BMPs used in the design.

   Contech Stormfilter Treatment System

5. In accordance with the Camas Stormwater Design Standards Manual and Volume V of the SMMWW, the water quality treatment system designs comply with these sections and provide basic treatment and phosphorus (see plans and details).

6. The Pollution Generating Areas are listed in Table C below.

Table C. – Pollution generating areas Summary

Basin ID	PGIS(Acres)	PGPS (Acres)
Basin A WQ	0.55	0.69
Basin B WQ	0.12	0.24

Refer to Table B in Section B Minimum Requirement #6 above for a detailed stormfilter cartridge breakdown.

SECTION G - Flow Control Analysis and Design

As previously mentioned in Sections A and B of this report, the proposed detention pond is designed to detain and release flows below predeveloped conditions. The detention pond was designed in accordance with Volume III-3.2.1 of the SWMMWW. The detention pond will detain and release water below predeveloped rates through a metered release in an outlet control structure. WWHM calculations are included in Appendix C.

The site was analyzed as one Threshold Discharge Area (TDA) within the developable site area. The developed stormwater plan will release runoff at the northwestern portion of the site, similar to the current flow patterns of the existing topography of the developable site area. Portions of the site that will not be developed or disturbed, flow to a separate TDA in the southwest corner of the site. The southwest TDA, which contains the existing wetland on site, will remain undisturbed.

The Detention Pond Storm Elevations are listed in Table D below. The Outlet Control Design is listed in Table E below. Refer to Section C of this report for soils information.

Table D. – Detention Pond Elevations

Storm Event	Elevation
Bottom	**0 feet**
2-Year	**3.99 feet**
10-Year	**4.46 feet**
100-Year	**4.70 feet**
Freeboard	**5.70 feet**

Table E. – Detention Pond Orifice Control Design

Orifice	Elevation	Size (dia.)
1	**0 feet**	**1.2 inch**
2 (notch)	**3.75 feet**	**2.2 inch**
3 (standpipe)	**4 feet**	**12 inch**

The site was evaluated using the continuous model using the WWHM2012 software. Electronic copies of the WWHM files will be submitted upon request.

SECTION H – Wetlands Protection

There is one wetland onsite and two adjacent offsite wetlands, which trigger the evaluation of Minimum Requirement #8. A critical areas report and bank use plan has been prepared for any impacts to the wetlands. The three wetlands in consideration are Onsite Wetland A (Category I, Habitat Score of 8), Offsite Wetland 1 (Category III, Habitat Score of 7) and Offsite Wetland 2 (Category III, Habitat Score of 7).

Onsite Wetland A contributes to the Southwest TDA onsite, which will remain undisturbed from the development due to existing topography and existing, functional isolation. Offsite Wetland 1is located in the Northeast corner of the site and will remain undisturbed due to its distance from the developed area and existing topography. Offsite Wetland 2 is part of the Northwest TDA that the developable area contributes to in the predeveloped and developed conditions. Reference the Wetland Flow Chart in Appendix C.

The Following Wetland Protection Levels Apply:

2024 SWMMWW Appendix I-C.2 General Protection

All wetlands (Categories I, II, III, and IV) must receive the following general protection:

1. Consult regulations issued under federal and state laws that regulate the discharge of pollutants to surface waters, including the Construction Stormwater General NPDES Permit.

The site stormwater system has been appropriately designed and complies with federal and state laws and discharging onsite, outside of the wetland buffer in the proposed manner is allowed. Refer to Section B of this report for compliance with Minimum Requirements 1-9. An NPDES permit has been completed for the project improvements and included in the SWPPP.

2. Maintain the wetland buffer required by county and/or state and federal regulations.

The Critical Areas Report (CAR) and Mitigation Plan (MIT) produced by Ecological Land Services (ELS) identifies the Reduced Wetland Buffer which is 83' from the wetland. The dispersion trench is outside of this buffer.

3. Retain areas of native vegetation connecting the wetland and its buffer with nearby wetlands and other contiguous areas of native vegetation.

The area between the storm pond and the wetland will be preserved in a "Protected Vegetated Corridor" per the MIT.

4. Avoid compaction of soil and introduction of invasive plant or animal species in the wetland and its buffer.

Compaction and introduction of invasive species within the buffer will be avoided to the maximum extent feasible. The only impact to the buffer will be to install the storm dispersion trench. 0.24 acres of Invasive Species Removal within the protected vegetated corridor is proposed on the mitigation and planting plan.

5. Take measures to avoid general physical impacts (e.g., littering and vegetation destruction). Examples are protecting existing buffer zones; discouraging access, especially by vehicles, by planting outside the wetland, and encouragement of stewardship and signage by landowners.

Physical impacts to the buffer will be avoided to the maximum extent feasible. Silt fencing will be installed along the project grading limits to discourage access to the wetland. Signage is also proposed. Disturbances to the buffer have been accounted for in the CAR/MIT produced by ELS.

6. Any stormwater management practices, such as Runoff Treatment or Flow Control BMP implementation, must be done outside of the wetland buffer boundary, except limited circumstances where the wetland and/or buffer may be used for additional Runoff Treatment and/or Flow Control of stormwater (See 1-H.6 Compensatory Mitigation of Wetlands)

Stormwater Management Practices are not proposed within the wetland buffer. The wetland itself is not proposed to be used for treatment or flow control.

7. Discharge from a BMP or project site should be dispersed using a method to diffuse the flow before entering the wetland buffer.

A dispersion trench is proposed to diffuse the flow from the storm facility. Impacts to the buffer have been accounted for in the CAR/BUP produced by ELS.

8. Consider fences to restrict human access, but make sure it doesn't interfere with wildlife movement. They should be used when wildlife passage is not a major issue and the potential for intrusive impacts is high. When wildlife movement and intrusion are both issues, the circumstances will have to be weighed to make a decision about fencing. Check with the local and/or state agencies to determine if fencing would be allowed.

The storm tract is located between the proposed lots and mitigated buff and will be fenced which will obstruct the human impact to the habitat buffer. The other wetlands are functionally isolated from the development due to the steep slope.

2024 SWMMWW Appendix I-C.3 Protection from Pollutants

All wetlands (Categories I, II, III, and IV) must receive the following protection from pollutants:

1. Provide Construction Stormwater BMPs as directed in Book 1, Section 1.5.2 MR #2 Construction Stormwater Pollution Prevention Plan (SWPPP) to prevent sediment and other pollutants from entering the wetland.

A Construction Stormwater Pollution Prevention Plan (SWPPP) will be prepared and submitted with the final engineering review. Refer to the SWPPP for proposed BMPs.

2. Provide Source Control BMPs as directed in Book 1, Section 1.5.3 MR #3 Source Control of Pollution.

Refer to Minimum Requirement #3 in Section B of this report for the proposed Source Control BMPs.

3. Provide On-Site Stormwater Management and use LID principles as much as practicable for the site, as directed in Book 1, Section 1.5.5 MR #5 On-Site Stormwater Management. LID principles and practices will help meet other wetland hydroperiod protection criteria and provide additional habitat.

Refer to Minimum Requirement #5 in Section B of this report for the proposed stormwater management BMPs. LID principles were incorporated into the design to the extent feasible.

4. Provide Runoff Treatment BMPs as directed in Book 1, Section 1.5.6 MR #6: Runoff

Treatment to treat runoff prior to entering the wetland and its buffer.
Note: If the thresholds for MR #6 Runoff Treatment are not met for a TDA, then it is not required to provide Runoff Treatment BMPs for that TDA to comply with MR #8 Wetlands Protection.

The stormwater from pollution generating surfaces being released to the wetland buffer has been fully treated with phosphorus treatment by Contech PSORB stormfilters, per MR #6.

2024 SWMMWW Appendix I-C.4 Wetland Hydroperiod Protection

Protection of many wetland functions and values depends on maintaining the existing wetland's hydroperiod. This means maintaining the annual fluctuations in water depth and its timing as closely as possible. The developed site contributes to the TDA of an existing Category III Wetland with a habitat score greater than 5. These characteristics require Method 2 Wetland Hydroperiod Protection. This analysis will be performed in the WWHM Modeling software and included in Appendix E of the final TIR.

References

United States Department of Agriculture, Soil Conservation Service. "Soil Survey of Clark County Washington," Washington, D.C., 1972.

United States Department of Agriculture, Soil Conservation Service, Engineering Division, "Technical Release 55: Urban Hydrology for Small Watersheds, 2nd Ed.," Washington, D.C., 1986.

United States Department of Transportation, Federal Highway Administration, "Hydraulic Engineering Circular No. 12: Drainage of Highway Pavements," Springfield, VA, 1984.

United States Department of Transportation, Federal Highway Administration, "Hydraulic Engineering Circular No. 15: Design of Roadside Channels with Flexible Linings," Springfield, VA, 1984.

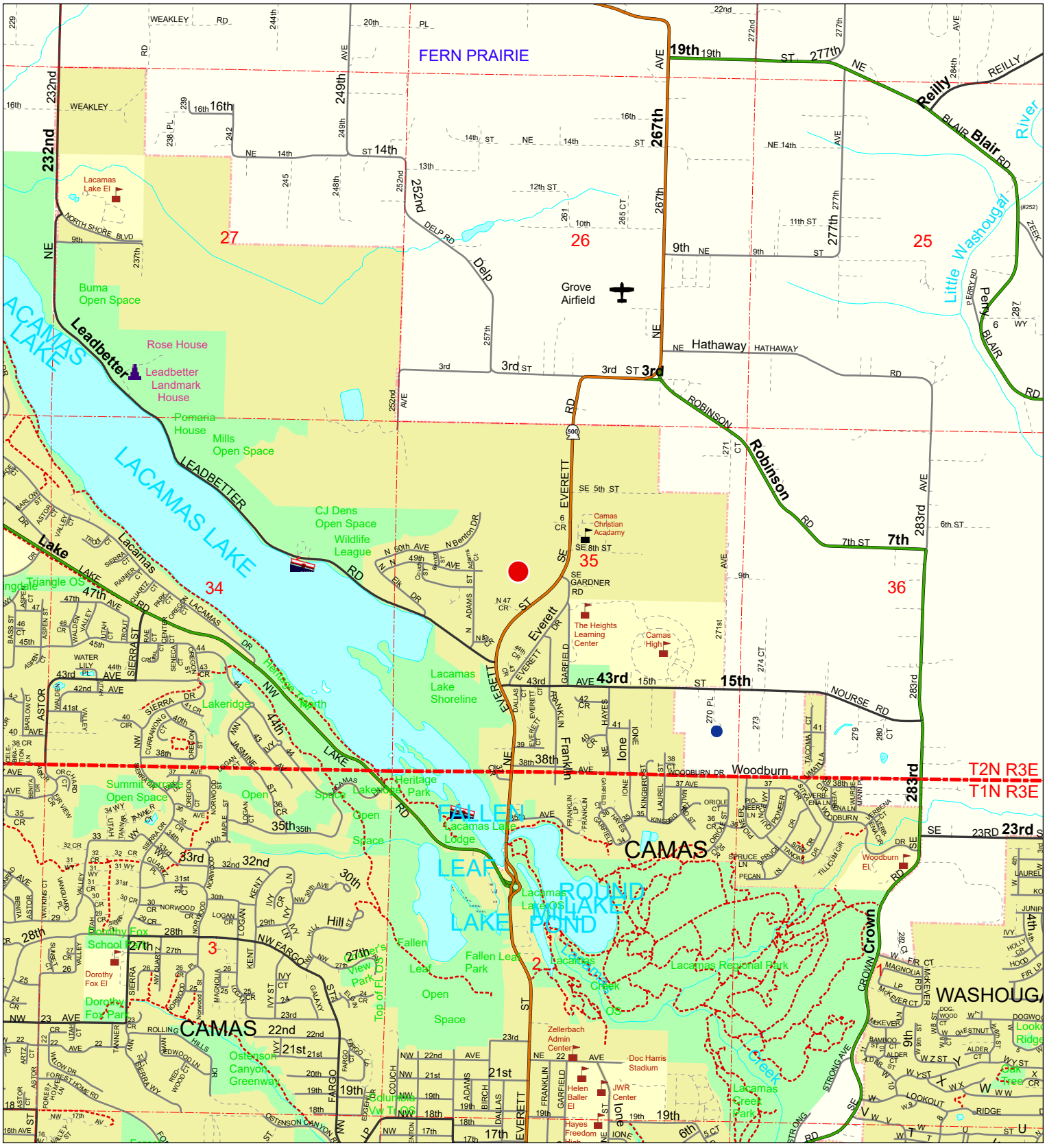
Washington State Department of Ecology, "Stormwater Management Manual for Western Washington, Volume I-V," Olympia, WA, February 2005.

Washington State Department of Transportation, "Hydraulic Manual," Olympia, WA, 1989.

City of Camas, "Camas Stormwater Design Standards Manual," Camas, WA, 2016

Clark County Department of Assessment and GIS, "2000 Clark County Road Atlas," Vancouver, WA, 2000.

A p p e n d i x A

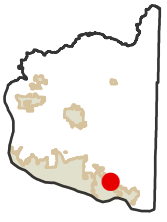


General Location

Account: 178221000
Owner: OLIVER THOMAS R
Address: 40304 NE 44TH ST
C/S/Z: WASHOUGAL, WA 98671

Printed on: October 29, 2024

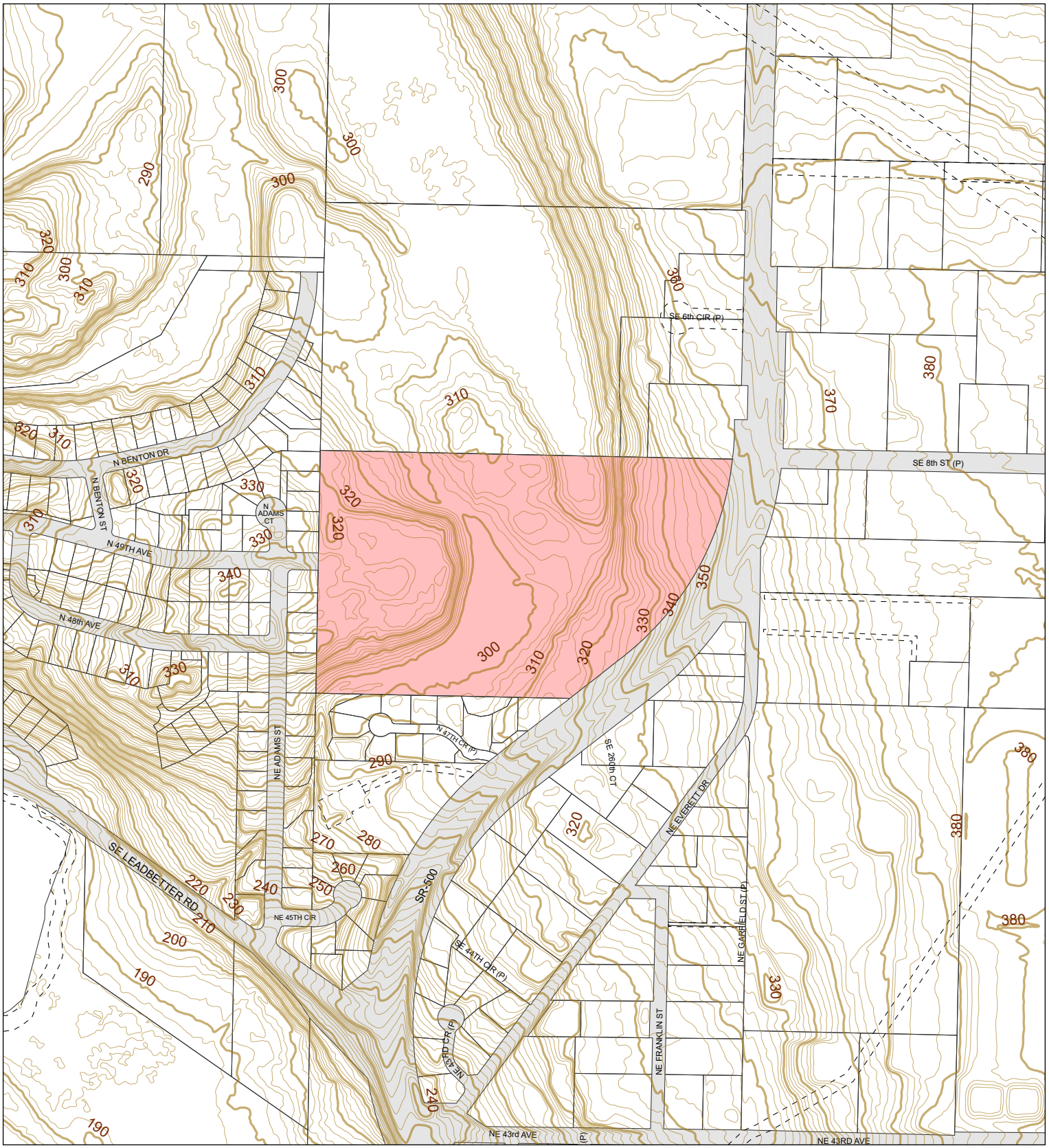
Location of Subject Property(s)



Geographic Information System

0 1,000 2,000 Feet

Information shown on this map was collected from several sources. Clark County accepts no responsibility for any inaccuracies that may be present.



Elevation Contours

Account: 178221000
Owner: OLIVER THOMAS R
Address: 40304 NE 44TH ST
C/S/Z: WASHOUGAL, WA 98671

Printed on: October 29, 2024

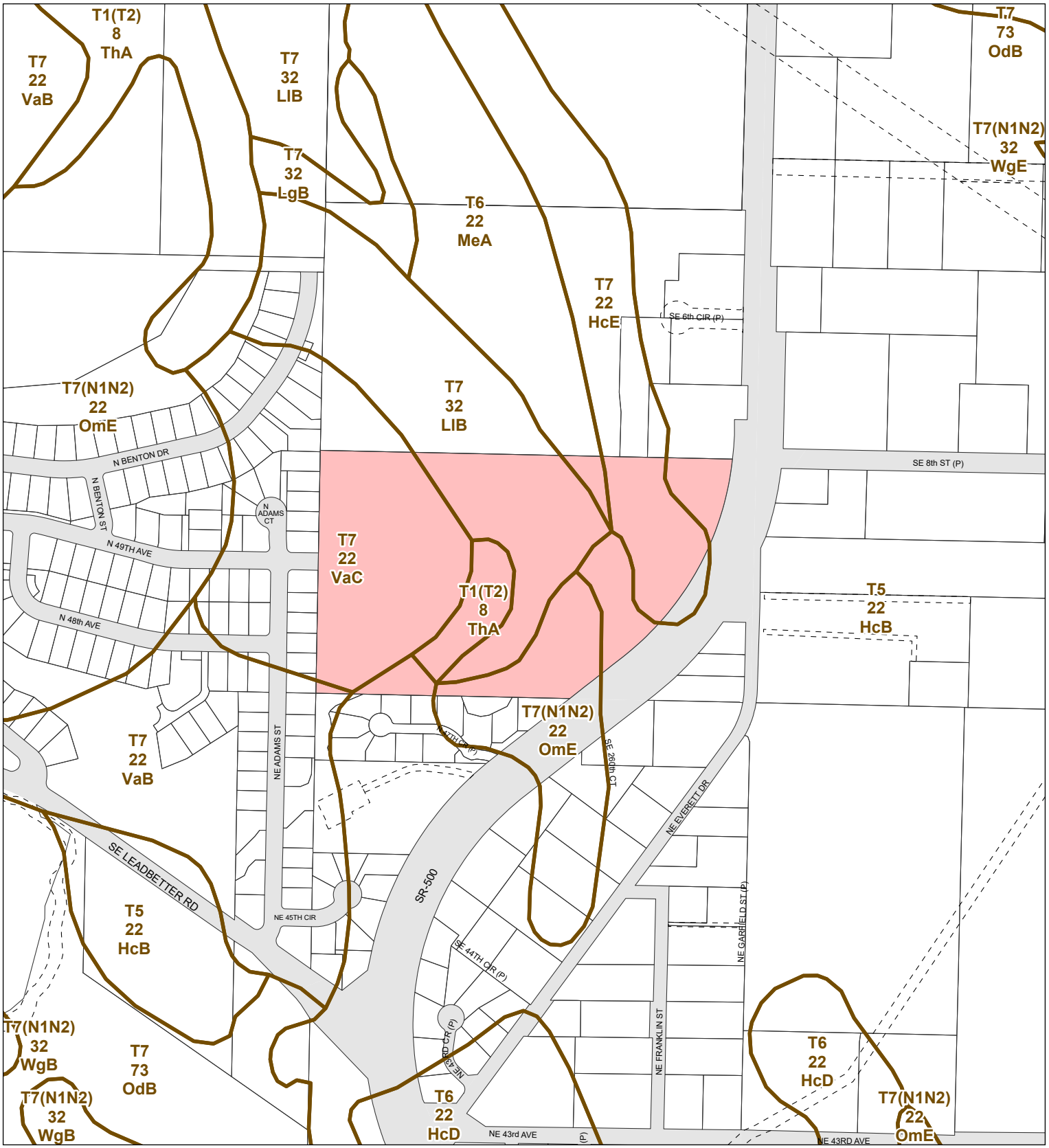
Subject Property(s)
Public Road
Transportation or Major Utility Easement
10' Elevation Contours
2' Elevation Contours

23127	23126	23125
23134	23135	23136
13103	13102	13101

CLARK COUNTY, WASHINGTON
Geographic Information System

0 200 400 Feet

Information shown on this map was collected from several sources. Clark County accepts no responsibility for any inaccuracies that may be present.



Soil Types

Printed on: October 29, 2024

Account: 178221000
Owner: OLIVER THOMAS R
Address: 40304 NE 44TH ST
C/S/Z: WASHOUGAL, WA 98671

Subject Property(s)
Public Road
Transportation or Major Utility Easement
Soil Type Boundary

23127	23126	23125
23134	23135	23136
13103	13102	13101

CLARK COUNTY, WASHINGTON
Geographic Information System

0 200 400 Feet

Information shown on this map was collected from several sources. Clark County accepts no responsibility for any inaccuracies that may be present.

LOT 2
(SP3-118)

EX. HOUSE
1,947 SF
WOOD STRUCTURE

EX. SHED
64 SF
WOOD STRUCTURE

EX. SHED
175 SF
WOOD STRUCTURE

EX. SHED
380 SF
WOOD STRUCTURE

-N-

0 30 60 90
Scale: 1" = 30'

PRE-SITE

STM MH
RIM 324.27
IE 318.32

CB
RIM 323.59

CB
RIM 323.57

SAN MH
RIM 323.98

SA

"CAMAS HILLS"
(312-291)

TAX LOT 129
PIN: 178221-000

PREDEVELOPED BASIN		
	SF	Acres
EXISTING FORESTED	140283	3.22

128
127
126
125
124
112
111
110
109

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PREDEVELOPED BASIN

OLIVER TERRACE

CITY OF CAMAS WASHINGTON

PRELIMINARY

REVISIONS

DESIGNED BY:	NDM
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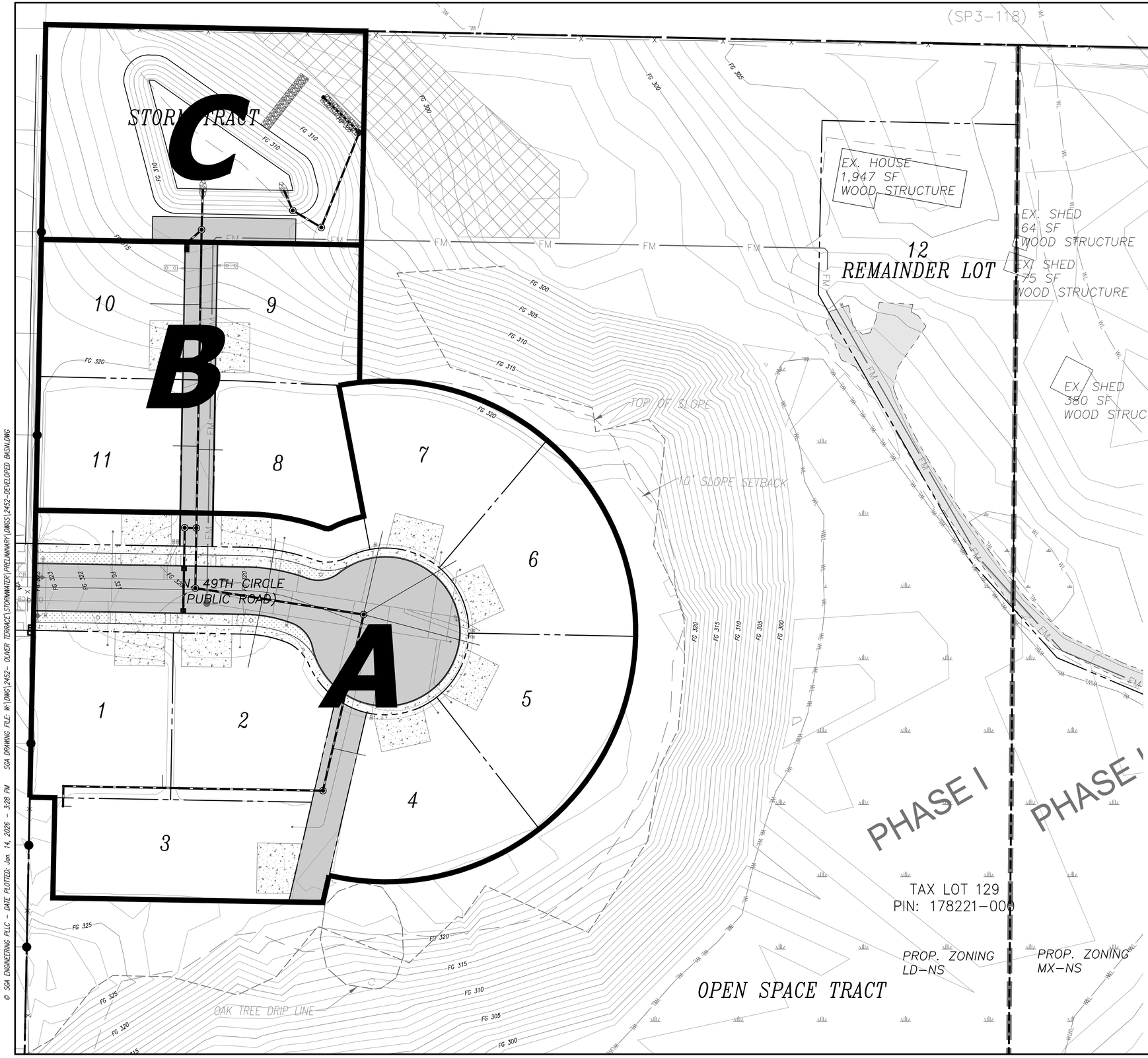
CHECKED BY:	JAI
SCALE:	1" = 30'

JOB NUMBER	SHEET
2452	PREDEV



DEVELOPED A		
	SF	Acres
EX AC		
AC	13725	0.32
SW	2960	0.07
DW	4485	0.10
ROOF	30781	0.71
Total Imperv	51951	1.19
Total Perv	32613	0.75
Total	84563	1.94

DEVELOPED B		
	SF	Acres
EX AC		
AC	3460	0.08
SW		
DW	1600	0.04
ROOF	15721	0.36
Total Imperv	20781	0.48
Total Perv	10290	0.24
Total	31070	0.71

DEVELOPED C		
	SF	ACRES
EX AC		
AC	1290	0.03
SW		
DW		
ROOF		
Total Imperv	1290	0.03
Total Perv	23360	0.54
Total	24650	0.57

N

0 30 60 90

Scale: 1" = 30'

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DEVELOPED BASIN

CITY OF CAMAS WASHINGTON

PRELIMINARY

REVISIONS

DESIGNED BY:	NDM
DRAWN BY:	NDM
CHECKED BY:	JAI
SCALE:	1" = 30'

JOB NUMBER	SHEET
2452	DEV

Design Criteria Appendix B

WWHM Soil Groups

Memorandum

otak

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Vancouver, WA 98660
Phone (360) 737-9613
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To: Rod Swanson, Clark County Environmental Services

From: Tim Kraft

Copies: File

Date: December 21, 2010

Subject: Clark County WWHM Soil Groupings

The Clark County version of the Western Washington Hydrology Model (WWHM) includes five soils groups to represent the many soil types found within the county limits. Although there are over 110 different soil types throughout Clark County, similarities between the soils allows them to be grouped into categories for modeling purposes.

Clark County soils are grouped into five categories largely based on their permeability and runoff potential. These categories include:

- Soil Group (SG) 1 – Excessively drained soils (hydrologic soil groups A & B)
- Soil Group (SG) 2 – Well drained soils (mostly hydrologic soil group B)
- Soil Group (SG) 3 – Moderately drained soils (hydrologic soil groups B & C)
- Soil Group (SG) 4 – Poorly drained soils (slowly infiltrating C soils, as well as D soils)
- Soil Group (SG) 5 – Wetland soils (mucks).

Soil Groups 1 and 2 are those most suitable for traditional infiltration facilities such as trenches and drywells, while Soil Group 3 may only be suitable for slower infiltrating facilities such as rain gardens and other Low Impact Development (LID) measures. Soil Groups 4 and 5 are those which are typically not suitable for infiltration.

For additional information on the classification of soils for use in the Clark County WWHM model, please see the report titled "Development of the Clark County Version of the Western Washington Hydrology Model", which can be found on the county's community development web site.

The following table lists the WWHM soil group for each NCRS soil type in Clark County.

Map Symbol	Soil Name	HSG
Soils Group (SG) 1		
LeB	LAUREN	B
LgB	LAUREN	B
LgD	LAUREN	B
LgF	LAUREN	B
LIB	LAUREN	B
Ro	ROUGH BROKEN LAND	A
SvA	SIFTON	B
WnB	WIND RIVER VARIANT	B
WnD	WIND RIVER VARIANT	B
WnG	WIND RIVER VARIANT	B
WrB	WIND RIVER VARIANT	B
WrF	WIND RIVER VARIANT	B
	PITS	A
	BONNEVILLE STONY SAND LOAM	A
Soils Group (SG) 2		
BpB	BEAR PRARIE	B
BpC	BEAR PRARIE	B
CnB	CINEBAR	B
CnD	CINEBAR	B
CnE	CINEBAR	B
CnG	CINEBAR	B
CrE	CINEBAR	B
CrG	CINEBAR	B
CsF	CISPUS	B
CtA	CLOQUATO	B
HlA	HILLSBORO	B
HlB	HILLSBORO	B
HlC	HILLSBORO	B
HlD	HILLSBORO	B
HlE	HILLSBORO	B

Map Symbol	Soil Name	HSG
HlF	HILLSBORO	B
Soils Group (SG) 2 (continued)		
KeC	KINNEY	B
KeE	KINNEY	B
KeF	KINNEY	B
KnF	KINNEY	B
LaE	LARCHMOUNT	B
LaG	LARCHMOUNT	B
LcG	LARCHMOUNT	B
MsB	MOSSYROCK	B
NbA	NEWBERG	B
NbB	NEWBERG	B
PhB	PILCHUCK	C
PuA	PUYALLUP	B
SaC	SALKUM	B
VaB	VADER	B
VaC	VADER	B
WaA	WASHOUGAL	B
WgB	WASHOUGAL	B
WgE	WASHOUGAL	B
WhF	WASHOUGAL	B
YaA	YACOLT	B
YaC	YACOLT	B
YcB	YACOLT	B

Soils Group (SG) 3

DoB	DOLLAR	C
HcB	HESSON	C
HcD	HESSON	C
HcE	HESSON	C
HcF	HESSON	C
HgB	HESSON	C
HgD	HESSON	C
HhE	HESSON	C
HoA	HILLSBORO	B

Map Symbol	Soil Name	HSG
HoB	HILLSBORO	B
Soils Group (SG) 3 (continued)		
HoC	HILLSBORO	B
HoD	HILLSBORO	B
HoE	HILLSBORO	B
HoG	HILLSBORO	B
HsB	HILLSBORO	B
McB	McBEE	C
MeA	McBEE	C
MIA	McBEE	C
OeD	OLEQUA	B
OeE	OLEQUA	B
OeF	OLEQUA	B
OlB	OLYMPIC	B
OID	OLYMPIC	B
OlE	OLYMPIC	B
OIF	OLYMPIC	B
OmE	OLYMPIC	B
OmF	OLYMPIC	B
OpC	OLYMPIC VARIANT	C
OpE	OLYMPIC VARIANT	C
OpG	OLYMPIC VARIANT	C
OrC	OLYMPIC VARIANT	C
PoB	POWELL	C
PoD	POWELL	C
PoE	POWELL	C
SmA	SAUVIE	B
SmB	SAUVIE	B
SnA	SAUVIE	D
SpB	SAUVIE	B

Soils Group (SG) 4

CvA	COVE	D
CwA	COVE	D
GeB	GEE	C

Map Symbol	Soil Name	HSG
GeD	GEE	C
Soils Group (SG) 4 (continued)		
GeE	GEE	C
GeF	GEE	C
GuB	GUMBOOT	D
HtA	HOCKINSON	D
HuB	HOCKINSON	D
HvA	HOCKINSON	D
LrC	LAUREN	C
LrF	LAUREN	C
MnA	MINNIECE	D
MnD	MINNIECE	D
MoA	MINNIECE VARIANT	D
OdB	ODNE	D
OhD	OLEQUA VARIANT	C
OhF	OLEQUA VARIANT	C
SlB	SARA	D
SlD	SARA	D
SlF	SARA	D
Soils Group (SG) 5		
Sr	SEMIAHMOO	C
Su	SEMIAHMOO VARIANT	D
ThA	TISCH	D

Hydraulic Calculations Appendix C

WWHM Schematic

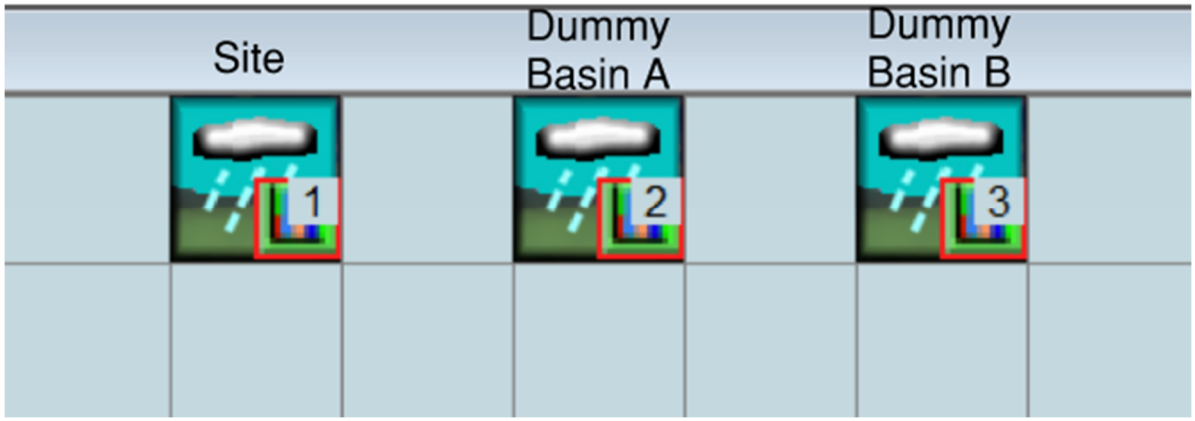
Water Quality Design

Developed Hydrologic Calculations

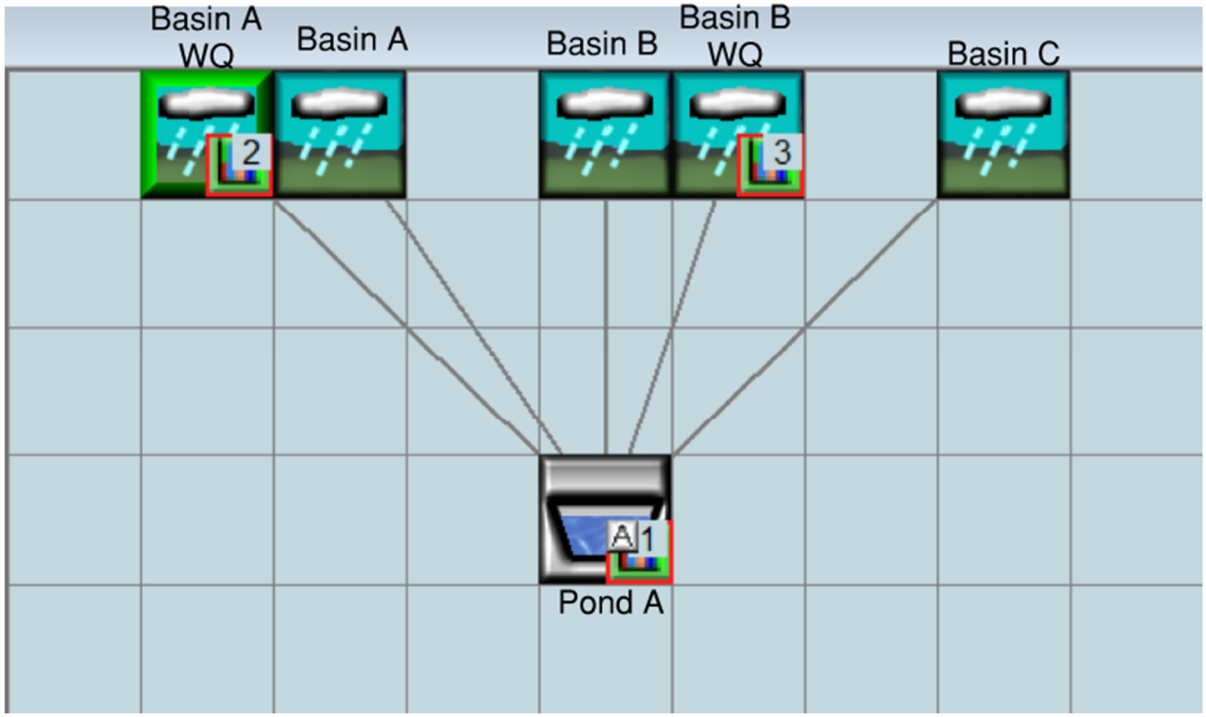
Western Washington Hydrology Model (WWHM) Project Report

WWHM SCHEMATIC

Predeveloped:



Mitigated:

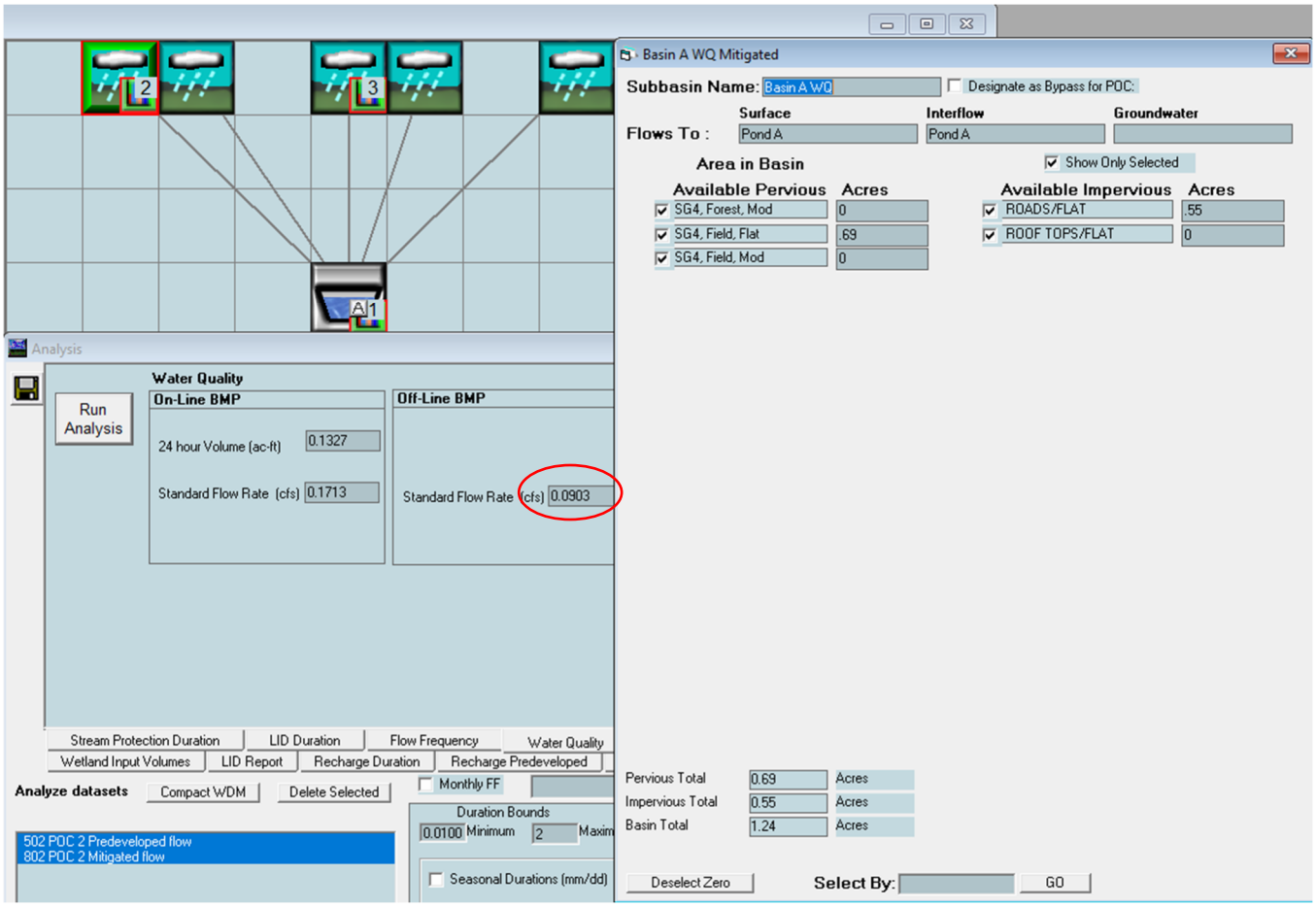


Water Quality

BASIN A:

WQ = 0.0903 CFS ~ (3) 27” PHOSPHOSORB CARTRIDGE

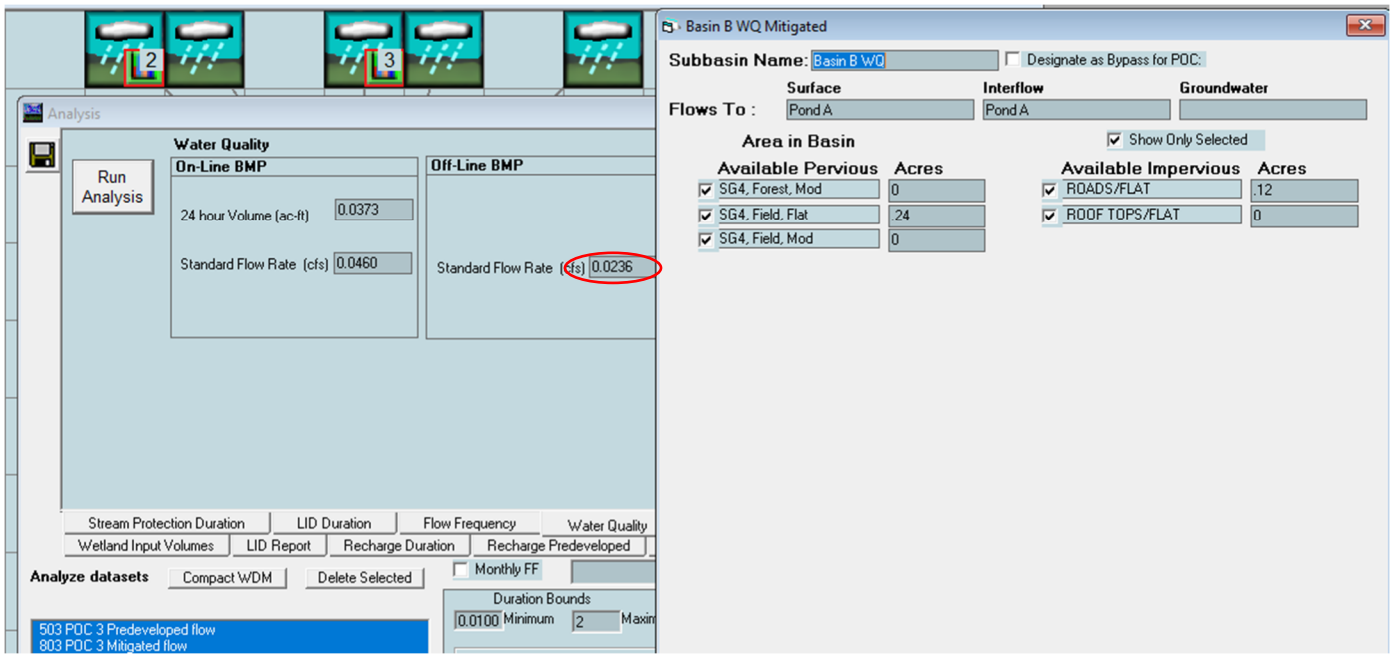
(3*0.0420 = 0.1260 CFS CAPACITY)



BASIN B:

WQ = 0.0236 CFS ~ (1) 18" PSORB CARTRIDGE

(1*0.0280 = 0.0280 CFS CAPACITY)



WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 2452-Prelim WQ WWHM

Site Name:	Oliver Terrace
Site Address:	1004 SE Everett Road
City:	Camas
Report Date:	1/13/2026
Gage:	Lacamas
Data Start:	1948/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	1.300
Version Date:	2024/06/28
Version:	4.3.1

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

Landuse Basin Data

Predeveloped Land Use

PREDEVELOPED

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SG4, Forest, Mod	3.22
Pervious Total	3.22

Impervious Land Use	acre
Impervious Total	0
Basin Total	3.22

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

Dummy WQ Basin A

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SG4, Field, Flat	0.69
Pervious Total	0.69

Impervious Land Use	acre
ROADS FLAT	0.55
Impervious Total	0.55
Basin Total	1.24

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 2	POC 2

Dummy Basin B WQ

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SG4, Field, Flat	0.24
Pervious Total	0.24

Impervious Land Use	acre
ROADS FLAT	0.12
Impervious Total	0.12
Basin Total	0.36

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 3	POC 3

Mitigated Land Use

Basin A WQ

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SG4, Field, Flat	0.69
Pervious Total	0.69

Impervious Land Use	acre
ROADS FLAT	0.55
Impervious Total	0.55
Basin Total	1.24

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Pond A	POC 2	POC 2

Basin B WQ

Bypass: No

GroundWater: No

Pervious Land Use	acre
SG4, Field, Flat	0.24
Pervious Total	0.24

Impervious Land Use	acre
ROADS FLAT	0.12
Impervious Total	0.12
Basin Total	0.36

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Pond A	POC 3	POC 3

C (Excluding Pond)

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SG4, Field, Mod	0.33
Pervious Total	0.33

Impervious Land Use	acre
ROADS FLAT	0.03
Impervious Total	0.03
Basin Total	0.36

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Pond A	Pond A

Basin A Non Pollution

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.71
Impervious Total	0.71
Basin Total	0.71

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Pond A	Pond A

Basin B Non Pollution

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS FLAT	0.36
Impervious Total	0.36
Basin Total	0.36

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Pond A	Pond A

Routing Elements

Predeveloped Routing

Mitigated Routing

Pond A

Bottom Length: 53.00 ft.
Bottom Width: 49.00 ft.
Depth: 6 ft.
Volume at riser head: 0.3685 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 1.200 in. Elevation:0 ft.
Orifice 2 Diameter: 2.200 in. Elevation:3.75 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

Pond Hydraulic Table

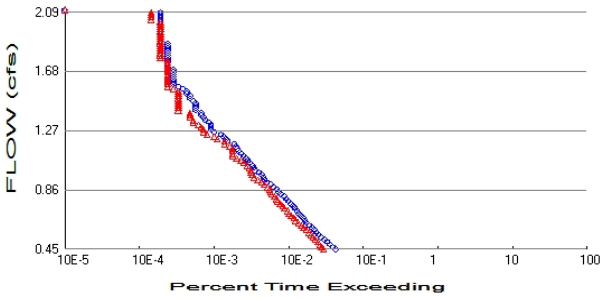
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.059	0.000	0.000	0.000
0.0667	0.060	0.004	0.010	0.000
0.1333	0.061	0.008	0.014	0.000
0.2000	0.062	0.012	0.017	0.000
0.2667	0.063	0.016	0.020	0.000
0.3333	0.064	0.020	0.022	0.000
0.4000	0.065	0.025	0.024	0.000
0.4667	0.066	0.029	0.026	0.000
0.5333	0.067	0.033	0.028	0.000
0.6000	0.068	0.038	0.030	0.000
0.6667	0.069	0.043	0.031	0.000
0.7333	0.070	0.047	0.033	0.000
0.8000	0.071	0.052	0.035	0.000
0.8667	0.072	0.057	0.036	0.000
0.9333	0.073	0.062	0.037	0.000
1.0000	0.074	0.066	0.039	0.000
1.0667	0.075	0.071	0.040	0.000
1.1333	0.076	0.077	0.041	0.000
1.2000	0.077	0.082	0.042	0.000
1.2667	0.078	0.087	0.044	0.000
1.3333	0.079	0.092	0.045	0.000
1.4000	0.080	0.098	0.046	0.000
1.4667	0.082	0.103	0.047	0.000
1.5333	0.083	0.108	0.048	0.000
1.6000	0.084	0.114	0.049	0.000
1.6667	0.085	0.120	0.050	0.000
1.7333	0.086	0.125	0.051	0.000
1.8000	0.087	0.131	0.052	0.000
1.8667	0.088	0.137	0.053	0.000
1.9333	0.089	0.143	0.054	0.000
2.0000	0.091	0.149	0.055	0.000
2.0667	0.092	0.155	0.056	0.000
2.1333	0.093	0.161	0.057	0.000

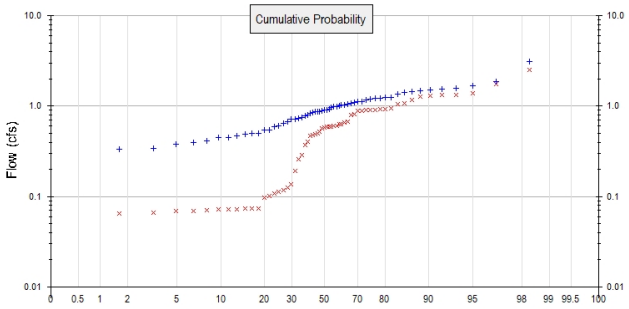
2.2000	0.094	0.168	0.058	0.000
2.2667	0.095	0.174	0.058	0.000
2.3333	0.096	0.180	0.059	0.000
2.4000	0.098	0.187	0.060	0.000
2.4667	0.099	0.193	0.061	0.000
2.5333	0.100	0.200	0.062	0.000
2.6000	0.101	0.207	0.063	0.000
2.6667	0.103	0.214	0.063	0.000
2.7333	0.104	0.221	0.064	0.000
2.8000	0.105	0.228	0.065	0.000
2.8667	0.106	0.235	0.066	0.000
2.9333	0.107	0.242	0.066	0.000
3.0000	0.109	0.249	0.067	0.000
3.0667	0.110	0.256	0.068	0.000
3.1333	0.111	0.264	0.069	0.000
3.2000	0.113	0.271	0.069	0.000
3.2667	0.114	0.279	0.070	0.000
3.3333	0.115	0.287	0.071	0.000
3.4000	0.116	0.294	0.072	0.000
3.4667	0.118	0.302	0.072	0.000
3.5333	0.119	0.310	0.073	0.000
3.6000	0.120	0.318	0.074	0.000
3.6667	0.122	0.326	0.074	0.000
3.7333	0.123	0.334	0.075	0.000
3.8000	0.124	0.343	0.105	0.000
3.8667	0.126	0.351	0.121	0.000
3.9333	0.127	0.359	0.133	0.000
4.0000	0.129	0.368	0.143	0.000
4.0667	0.130	0.377	0.334	0.000
4.1333	0.131	0.385	0.670	0.000
4.2000	0.133	0.394	1.075	0.000
4.2667	0.134	0.403	1.493	0.000
4.3333	0.136	0.412	1.865	0.000
4.4000	0.137	0.421	2.147	0.000
4.4667	0.138	0.431	2.332	0.000
4.5333	0.140	0.440	2.499	0.000
4.6000	0.141	0.449	2.644	0.000
4.6667	0.143	0.459	2.781	0.000
4.7333	0.144	0.468	2.912	0.000
4.8000	0.146	0.478	3.037	0.000
4.8667	0.147	0.488	3.157	0.000
4.9333	0.149	0.498	3.272	0.000
5.0000	0.150	0.508	3.383	0.000
5.0667	0.152	0.518	3.491	0.000
5.1333	0.153	0.528	3.596	0.000
5.2000	0.155	0.538	3.697	0.000
5.2667	0.156	0.549	3.796	0.000
5.3333	0.158	0.559	3.892	0.000
5.4000	0.159	0.570	3.986	0.000
5.4667	0.161	0.580	4.077	0.000
5.5333	0.162	0.591	4.167	0.000
5.6000	0.164	0.602	4.255	0.000
5.6667	0.165	0.613	4.341	0.000
5.7333	0.167	0.624	4.425	0.000
5.8000	0.168	0.635	4.507	0.000
5.8667	0.170	0.647	4.588	0.000
5.9333	0.172	0.658	4.668	0.000
6.0000	0.173	0.670	4.747	0.000

6.0667	0.175	0.681	4.824	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.22
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.26
Total Impervious Area: 1.77

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.905769
5 year	1.394922
10 year	1.65891
25 year	1.926593
50 year	2.085275
100 year	2.215546

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.387829
5 year	0.945342
10 year	1.46101
25 year	2.272597
50 year	2.986901
100 year	3.788975

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.681	0.633
1950	0.878	0.596
1951	1.190	0.638
1952	0.715	0.655
1953	0.974	0.890
1954	1.490	0.592
1955	0.748	0.071
1956	1.373	1.315
1957	1.214	0.481
1958	0.901	0.118

1959	0.545	0.138
1960	0.500	0.072
1961	1.252	1.160
1962	0.876	0.193
1963	0.980	0.288
1964	0.909	0.680
1965	0.780	0.903
1966	1.091	0.573
1967	0.986	0.101
1968	1.179	0.607
1969	1.129	0.369
1970	3.123	2.545
1971	0.499	0.097
1972	0.796	0.496
1973	0.828	0.943
1974	1.254	1.345
1975	0.713	0.519
1976	1.077	0.491
1977	0.032	0.071
1978	1.568	1.403
1979	1.023	0.074
1980	0.592	0.612
1981	1.404	1.318
1982	0.929	0.909
1983	1.699	0.805
1984	0.548	0.107
1985	0.395	0.408
1986	0.489	0.069
1987	0.864	0.819
1988	0.413	0.471
1989	0.446	0.065
1990	0.380	0.256
1991	1.003	0.070
1992	1.037	0.074
1993	1.231	0.113
1994	0.889	0.915
1995	0.734	1.053
1996	1.544	1.760
1997	1.882	1.280
1998	1.521	0.074
1999	1.061	0.882
2000	0.607	0.067
2001	0.335	0.062
2002	1.463	0.929
2003	1.114	1.079
2004	0.340	0.073
2005	0.453	0.126
2006	0.858	0.576
2007	0.468	0.930
2008	0.646	0.589

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	3.1232	2.5454
2	1.8817	1.7598
3	1.6986	1.4035
4	1.5681	1.3452

5	1.5439	1.3181
6	1.5206	1.3150
7	1.4897	1.2795
8	1.4630	1.1602
9	1.4044	1.0787
10	1.3730	1.0532
11	1.2541	0.9430
12	1.2524	0.9298
13	1.2314	0.9290
14	1.2139	0.9148
15	1.1904	0.9087
16	1.1794	0.9032
17	1.1289	0.8902
18	1.1140	0.8817
19	1.0908	0.8189
20	1.0767	0.8054
21	1.0605	0.6801
22	1.0374	0.6551
23	1.0228	0.6379
24	1.0030	0.6329
25	0.9857	0.6122
26	0.9800	0.6069
27	0.9737	0.5962
28	0.9290	0.5923
29	0.9094	0.5892
30	0.9009	0.5763
31	0.8888	0.5734
32	0.8782	0.5189
33	0.8757	0.4956
34	0.8638	0.4911
35	0.8584	0.4812
36	0.8284	0.4709
37	0.7963	0.4078
38	0.7798	0.3687
39	0.7482	0.2879
40	0.7339	0.2562
41	0.7147	0.1934
42	0.7132	0.1379
43	0.6809	0.1256
44	0.6463	0.1180
45	0.6067	0.1127
46	0.5923	0.1072
47	0.5482	0.1007
48	0.5448	0.0973
49	0.5005	0.0741
50	0.4985	0.0738
51	0.4893	0.0736
52	0.4677	0.0728
53	0.4529	0.0723
54	0.4461	0.0714
55	0.4126	0.0710
56	0.3950	0.0695
57	0.3798	0.0695
58	0.3402	0.0667
59	0.3348	0.0651
60	0.0321	0.0622

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.4529	898	615	68	Pass
0.4694	823	580	70	Pass
0.4859	758	548	72	Pass
0.5024	688	515	74	Pass
0.5188	628	475	75	Pass
0.5353	576	446	77	Pass
0.5518	537	423	78	Pass
0.5683	494	392	79	Pass
0.5848	458	360	78	Pass
0.6013	431	330	76	Pass
0.6178	396	308	77	Pass
0.6343	364	283	77	Pass
0.6508	347	259	74	Pass
0.6672	324	248	76	Pass
0.6837	306	225	73	Pass
0.7002	287	211	73	Pass
0.7167	271	204	75	Pass
0.7332	253	184	72	Pass
0.7497	238	174	73	Pass
0.7662	226	161	71	Pass
0.7827	211	151	71	Pass
0.7991	193	144	74	Pass
0.8156	182	134	73	Pass
0.8321	165	124	75	Pass
0.8486	152	119	78	Pass
0.8651	145	117	80	Pass
0.8816	131	110	83	Pass
0.8981	120	98	81	Pass
0.9146	107	91	85	Pass
0.9311	100	81	81	Pass
0.9475	96	72	75	Pass
0.9640	91	68	74	Pass
0.9805	84	65	77	Pass
0.9970	75	65	86	Pass
1.0135	71	62	87	Pass
1.0300	69	59	85	Pass
1.0465	62	52	83	Pass
1.0630	59	48	81	Pass
1.0795	56	42	75	Pass
1.0959	52	38	73	Pass
1.1124	49	37	75	Pass
1.1289	44	37	84	Pass
1.1454	43	37	86	Pass
1.1619	41	34	82	Pass
1.1784	39	29	74	Pass
1.1949	32	29	90	Pass
1.2114	30	23	76	Pass
1.2279	28	21	75	Pass
1.2443	26	17	65	Pass
1.2608	21	15	71	Pass
1.2773	19	15	78	Pass
1.2938	19	14	73	Pass
1.3103	19	13	68	Pass

1.3268	18	11	61	Pass
1.3433	16	11	68	Pass
1.3598	15	10	66	Pass
1.3763	14	10	71	Pass
1.3927	14	10	71	Pass
1.4092	12	7	58	Pass
1.4257	12	7	58	Pass
1.4422	12	7	58	Pass
1.4587	12	7	58	Pass
1.4752	11	7	63	Pass
1.4917	10	7	70	Pass
1.5082	10	7	70	Pass
1.5247	9	7	77	Pass
1.5411	9	7	77	Pass
1.5576	8	6	75	Pass
1.5741	7	5	71	Pass
1.5906	6	5	83	Pass
1.6071	6	5	83	Pass
1.6236	6	5	83	Pass
1.6401	6	5	83	Pass
1.6566	6	5	83	Pass
1.6731	6	5	83	Pass
1.6895	6	5	83	Pass
1.7060	5	5	100	Pass
1.7225	5	5	100	Pass
1.7390	5	5	100	Pass
1.7555	5	5	100	Pass
1.7720	5	4	80	Pass
1.7885	5	4	80	Pass
1.8050	5	4	80	Pass
1.8215	5	4	80	Pass
1.8379	5	4	80	Pass
1.8544	5	4	80	Pass
1.8709	5	4	80	Pass
1.8874	4	4	100	Pass
1.9039	4	4	100	Pass
1.9204	4	4	100	Pass
1.9369	4	4	100	Pass
1.9534	4	4	100	Pass
1.9699	4	4	100	Pass
1.9863	4	4	100	Pass
2.0028	4	4	100	Pass
2.0193	4	4	100	Pass
2.0358	4	3	75	Pass
2.0523	4	3	75	Pass
2.0688	4	3	75	Pass
2.0853	4	3	75	Pass

Water Quality

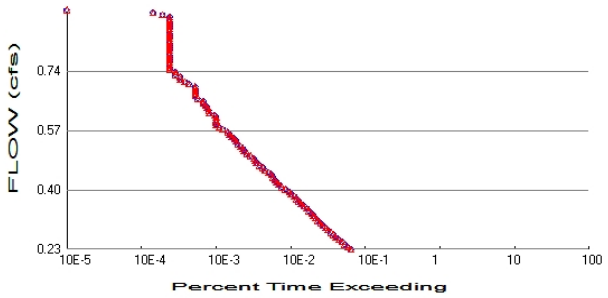
Water Quality BMP Flow and Volume for POC #1

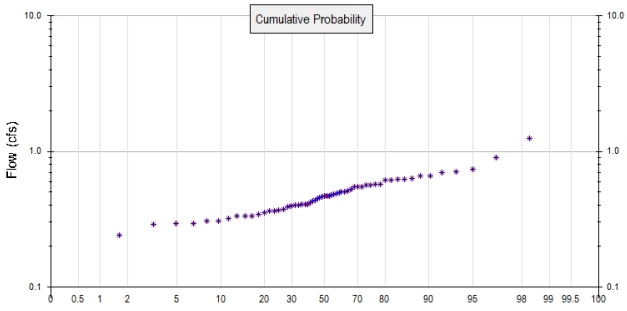
On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Pond A POC	☐	431.19			☐	0.00			
Total Volume Infiltrated		431.19	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.69
Total Impervious Area: 0.55

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.69
Total Impervious Area: 0.55

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.453534
5 year	0.59897
10 year	0.694853
25 year	0.815989
50 year	0.906427
100 year	0.99718

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.453534
5 year	0.59897
10 year	0.694853
25 year	0.815989
50 year	0.906427
100 year	0.99718

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	0.470	0.470
1950	0.407	0.407
1951	0.499	0.499
1952	0.472	0.472
1953	0.465	0.465
1954	0.659	0.659
1955	0.354	0.354
1956	0.572	0.572
1957	0.563	0.563
1958	0.563	0.563
1959	0.306	0.306

1960	0.295	0.295
1961	0.548	0.548
1962	0.453	0.453
1963	0.494	0.494
1964	0.400	0.400
1965	0.409	0.409
1966	0.512	0.512
1967	0.480	0.480
1968	0.551	0.551
1969	0.572	0.572
1970	1.250	1.250
1971	0.288	0.288
1972	0.391	0.391
1973	0.434	0.434
1974	0.545	0.545
1975	0.342	0.342
1976	0.451	0.451
1977	0.178	0.178
1978	0.656	0.656
1979	0.634	0.634
1980	0.335	0.335
1981	0.616	0.616
1982	0.471	0.471
1983	0.697	0.697
1984	0.305	0.305
1985	0.362	0.362
1986	0.369	0.369
1987	0.397	0.397
1988	0.335	0.335
1989	0.374	0.374
1990	0.334	0.334
1991	0.522	0.522
1992	0.502	0.502
1993	0.618	0.618
1994	0.401	0.401
1995	0.416	0.416
1996	0.739	0.739
1997	0.901	0.901
1998	0.706	0.706
1999	0.460	0.460
2000	0.294	0.294
2001	0.241	0.241
2002	0.617	0.617
2003	0.486	0.486
2004	0.321	0.321
2005	0.365	0.365
2006	0.433	0.433
2007	0.406	0.406
2008	0.624	0.624

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	**Predeveloped**	**Mitigated**
1	1.2504	1.2504
2	0.9009	0.9009
3	0.7386	0.7386
4	0.7061	0.7061
5	0.6974	0.6974

6	0.6592	0.6592
7	0.6564	0.6564
8	0.6338	0.6338
9	0.6240	0.6240
10	0.6177	0.6177
11	0.6166	0.6166
12	0.6158	0.6158
13	0.5722	0.5722
14	0.5716	0.5716
15	0.5633	0.5633
16	0.5626	0.5626
17	0.5506	0.5506
18	0.5478	0.5478
19	0.5450	0.5450
20	0.5217	0.5217
21	0.5124	0.5124
22	0.5020	0.5020
23	0.4992	0.4992
24	0.4939	0.4939
25	0.4860	0.4860
26	0.4795	0.4795
27	0.4720	0.4720
28	0.4714	0.4714
29	0.4701	0.4701
30	0.4651	0.4651
31	0.4604	0.4604
32	0.4529	0.4529
33	0.4512	0.4512
34	0.4336	0.4336
35	0.4331	0.4331
36	0.4164	0.4164
37	0.4089	0.4089
38	0.4067	0.4067
39	0.4064	0.4064
40	0.4010	0.4010
41	0.3999	0.3999
42	0.3967	0.3967
43	0.3915	0.3915
44	0.3743	0.3743
45	0.3691	0.3691
46	0.3647	0.3647
47	0.3624	0.3624
48	0.3538	0.3538
49	0.3421	0.3421
50	0.3350	0.3350
51	0.3347	0.3347
52	0.3338	0.3338
53	0.3210	0.3210
54	0.3057	0.3057
55	0.3049	0.3049
56	0.2947	0.2947
57	0.2939	0.2939
58	0.2881	0.2881
59	0.2409	0.2409
60	0.1781	0.1781

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2268	1339	1339	100	Pass
0.2336	1228	1228	100	Pass
0.2405	1118	1118	100	Pass
0.2474	1015	1015	100	Pass
0.2542	925	925	100	Pass
0.2611	849	849	100	Pass
0.2680	791	791	100	Pass
0.2748	726	726	100	Pass
0.2817	661	661	100	Pass
0.2886	613	613	100	Pass
0.2954	565	565	100	Pass
0.3023	528	528	100	Pass
0.3092	486	486	100	Pass
0.3160	451	451	100	Pass
0.3229	423	423	100	Pass
0.3297	401	401	100	Pass
0.3366	368	368	100	Pass
0.3435	346	346	100	Pass
0.3503	313	313	100	Pass
0.3572	291	291	100	Pass
0.3641	271	271	100	Pass
0.3709	253	253	100	Pass
0.3778	236	236	100	Pass
0.3847	214	214	100	Pass
0.3915	200	200	100	Pass
0.3984	179	179	100	Pass
0.4053	159	159	100	Pass
0.4121	145	145	100	Pass
0.4190	136	136	100	Pass
0.4259	128	128	100	Pass
0.4327	123	123	100	Pass
0.4396	116	116	100	Pass
0.4465	107	107	100	Pass
0.4533	94	94	100	Pass
0.4602	90	90	100	Pass
0.4671	81	81	100	Pass
0.4739	73	73	100	Pass
0.4808	70	70	100	Pass
0.4876	67	67	100	Pass
0.4945	61	61	100	Pass
0.5014	55	55	100	Pass
0.5082	50	50	100	Pass
0.5151	48	48	100	Pass
0.5220	45	45	100	Pass
0.5288	41	41	100	Pass
0.5357	39	39	100	Pass
0.5426	37	37	100	Pass
0.5494	34	34	100	Pass
0.5563	32	32	100	Pass
0.5632	30	30	100	Pass
0.5700	26	26	100	Pass
0.5769	23	23	100	Pass
0.5838	21	21	100	Pass

0.5906	21	21	100	Pass
0.5975	21	21	100	Pass
0.6044	21	21	100	Pass
0.6112	20	20	100	Pass
0.6181	17	17	100	Pass
0.6250	17	17	100	Pass
0.6318	16	16	100	Pass
0.6387	15	15	100	Pass
0.6455	14	14	100	Pass
0.6524	14	14	100	Pass
0.6593	12	12	100	Pass
0.6661	11	11	100	Pass
0.6730	11	11	100	Pass
0.6799	11	11	100	Pass
0.6867	11	11	100	Pass
0.6936	11	11	100	Pass
0.7005	9	9	100	Pass
0.7073	8	8	100	Pass
0.7142	7	7	100	Pass
0.7211	7	7	100	Pass
0.7279	6	6	100	Pass
0.7348	6	6	100	Pass
0.7417	5	5	100	Pass
0.7485	5	5	100	Pass
0.7554	5	5	100	Pass
0.7623	5	5	100	Pass
0.7691	5	5	100	Pass
0.7760	5	5	100	Pass
0.7829	5	5	100	Pass
0.7897	5	5	100	Pass
0.7966	5	5	100	Pass
0.8034	5	5	100	Pass
0.8103	5	5	100	Pass
0.8172	5	5	100	Pass
0.8240	5	5	100	Pass
0.8309	5	5	100	Pass
0.8378	5	5	100	Pass
0.8446	5	5	100	Pass
0.8515	5	5	100	Pass
0.8584	5	5	100	Pass
0.8652	5	5	100	Pass
0.8721	5	5	100	Pass
0.8790	5	5	100	Pass
0.8858	5	5	100	Pass
0.8927	5	5	100	Pass
0.8996	4	4	100	Pass
0.9064	3	3	100	Pass

Water Quality

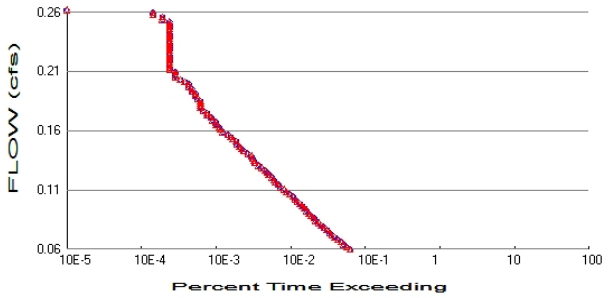
Water Quality BMP Flow and Volume for POC #2

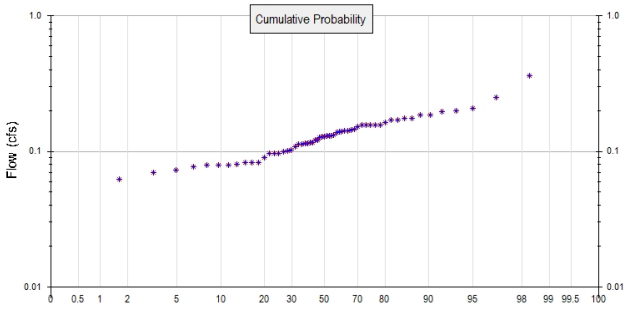
On-line facility volume:	0.1327 acre-feet
On-line facility target flow:	0.1713 cfs.
Adjusted for 15 min:	0.1713 cfs.
Off-line facility target flow:	0.0903 cfs.
Adjusted for 15 min:	0.0903 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 0.24
Total Impervious Area: 0.12

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0.24
Total Impervious Area: 0.12

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.12356
5 year	0.167751
10 year	0.196147
25 year	0.231147
50 year	0.25665
100 year	0.28172

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.12356
5 year	0.167751
10 year	0.196147
25 year	0.231147
50 year	0.25665
100 year	0.28172

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	0.103	0.103
1950	0.115	0.115
1951	0.142	0.142
1952	0.128	0.128
1953	0.130	0.130
1954	0.184	0.184
1955	0.099	0.099
1956	0.163	0.163
1957	0.157	0.157
1958	0.153	0.153
1959	0.082	0.082

1960	0.080	0.080
1961	0.156	0.156
1962	0.127	0.127
1963	0.139	0.139
1964	0.114	0.114
1965	0.115	0.115
1966	0.145	0.145
1967	0.132	0.132
1968	0.147	0.147
1969	0.156	0.156
1970	0.359	0.359
1971	0.077	0.077
1972	0.101	0.101
1973	0.122	0.122
1974	0.156	0.156
1975	0.096	0.096
1976	0.128	0.128
1977	0.039	0.039
1978	0.186	0.186
1979	0.170	0.170
1980	0.089	0.089
1981	0.174	0.174
1982	0.130	0.130
1983	0.198	0.198
1984	0.083	0.083
1985	0.096	0.096
1986	0.083	0.083
1987	0.112	0.112
1988	0.079	0.079
1989	0.096	0.096
1990	0.073	0.073
1991	0.142	0.142
1992	0.139	0.139
1993	0.171	0.171
1994	0.114	0.114
1995	0.116	0.116
1996	0.209	0.209
1997	0.249	0.249
1998	0.195	0.195
1999	0.131	0.131
2000	0.080	0.080
2001	0.062	0.062
2002	0.176	0.176
2003	0.139	0.139
2004	0.070	0.070
2005	0.080	0.080
2006	0.122	0.122
2007	0.109	0.109
2008	0.157	0.157

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	**Predeveloped**	**Mitigated**
1	0.3590	0.3590
2	0.2488	0.2488
3	0.2089	0.2089
4	0.1979	0.1979
5	0.1952	0.1952

6	0.1862	0.1862
7	0.1844	0.1844
8	0.1761	0.1761
9	0.1742	0.1742
10	0.1711	0.1711
11	0.1699	0.1699
12	0.1626	0.1626
13	0.1574	0.1574
14	0.1568	0.1568
15	0.1562	0.1562
16	0.1559	0.1559
17	0.1558	0.1558
18	0.1527	0.1527
19	0.1468	0.1468
20	0.1446	0.1446
21	0.1425	0.1425
22	0.1419	0.1419
23	0.1388	0.1388
24	0.1387	0.1387
25	0.1386	0.1386
26	0.1321	0.1321
27	0.1306	0.1306
28	0.1303	0.1303
29	0.1301	0.1301
30	0.1284	0.1284
31	0.1281	0.1281
32	0.1268	0.1268
33	0.1218	0.1218
34	0.1215	0.1215
35	0.1156	0.1156
36	0.1154	0.1154
37	0.1146	0.1146
38	0.1138	0.1138
39	0.1136	0.1136
40	0.1122	0.1122
41	0.1086	0.1086
42	0.1026	0.1026
43	0.1006	0.1006
44	0.0992	0.0992
45	0.0963	0.0963
46	0.0962	0.0962
47	0.0961	0.0961
48	0.0894	0.0894
49	0.0829	0.0829
50	0.0826	0.0826
51	0.0823	0.0823
52	0.0803	0.0803
53	0.0796	0.0796
54	0.0795	0.0795
55	0.0792	0.0792
56	0.0771	0.0771
57	0.0729	0.0729
58	0.0701	0.0701
59	0.0624	0.0624
60	0.0389	0.0389

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0618	1310	1310	100	Pass
0.0637	1178	1178	100	Pass
0.0657	1082	1082	100	Pass
0.0677	992	992	100	Pass
0.0697	902	902	100	Pass
0.0716	821	821	100	Pass
0.0736	750	750	100	Pass
0.0756	696	696	100	Pass
0.0775	640	640	100	Pass
0.0795	589	589	100	Pass
0.0815	541	541	100	Pass
0.0834	501	501	100	Pass
0.0854	457	457	100	Pass
0.0874	428	428	100	Pass
0.0893	393	393	100	Pass
0.0913	367	367	100	Pass
0.0933	345	345	100	Pass
0.0952	323	323	100	Pass
0.0972	301	301	100	Pass
0.0992	280	280	100	Pass
0.1011	255	255	100	Pass
0.1031	240	240	100	Pass
0.1051	225	225	100	Pass
0.1071	204	204	100	Pass
0.1090	183	183	100	Pass
0.1110	171	171	100	Pass
0.1130	153	153	100	Pass
0.1149	142	142	100	Pass
0.1169	130	130	100	Pass
0.1189	126	126	100	Pass
0.1208	118	118	100	Pass
0.1228	107	107	100	Pass
0.1248	101	101	100	Pass
0.1267	95	95	100	Pass
0.1287	86	86	100	Pass
0.1307	78	78	100	Pass
0.1326	69	69	100	Pass
0.1346	67	67	100	Pass
0.1366	64	64	100	Pass
0.1385	63	63	100	Pass
0.1405	56	56	100	Pass
0.1425	49	49	100	Pass
0.1445	46	46	100	Pass
0.1464	43	43	100	Pass
0.1484	40	40	100	Pass
0.1504	39	39	100	Pass
0.1523	35	35	100	Pass
0.1543	33	33	100	Pass
0.1563	30	30	100	Pass
0.1582	26	26	100	Pass
0.1602	24	24	100	Pass
0.1622	23	23	100	Pass
0.1641	21	21	100	Pass

0.1661	21	21	100	Pass
0.1681	19	19	100	Pass
0.1700	18	18	100	Pass
0.1720	16	16	100	Pass
0.1740	16	16	100	Pass
0.1759	14	14	100	Pass
0.1779	13	13	100	Pass
0.1799	13	13	100	Pass
0.1819	13	13	100	Pass
0.1838	13	13	100	Pass
0.1858	12	12	100	Pass
0.1878	11	11	100	Pass
0.1897	11	11	100	Pass
0.1917	10	10	100	Pass
0.1937	10	10	100	Pass
0.1956	9	9	100	Pass
0.1976	9	9	100	Pass
0.1996	8	8	100	Pass
0.2015	7	7	100	Pass
0.2035	6	6	100	Pass
0.2055	6	6	100	Pass
0.2074	6	6	100	Pass
0.2094	5	5	100	Pass
0.2114	5	5	100	Pass
0.2133	5	5	100	Pass
0.2153	5	5	100	Pass
0.2173	5	5	100	Pass
0.2193	5	5	100	Pass
0.2212	5	5	100	Pass
0.2232	5	5	100	Pass
0.2252	5	5	100	Pass
0.2271	5	5	100	Pass
0.2291	5	5	100	Pass
0.2311	5	5	100	Pass
0.2330	5	5	100	Pass
0.2350	5	5	100	Pass
0.2370	5	5	100	Pass
0.2389	5	5	100	Pass
0.2409	5	5	100	Pass
0.2429	5	5	100	Pass
0.2448	5	5	100	Pass
0.2468	5	5	100	Pass
0.2488	5	5	100	Pass
0.2507	4	4	100	Pass
0.2527	4	4	100	Pass
0.2547	3	3	100	Pass
0.2567	3	3	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	0.0373 acre-feet
On-line facility target flow:	0.046 cfs.
Adjusted for 15 min:	0.046 cfs.
Off-line facility target flow:	0.0236 cfs.
Adjusted for 15 min:	0.0236 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

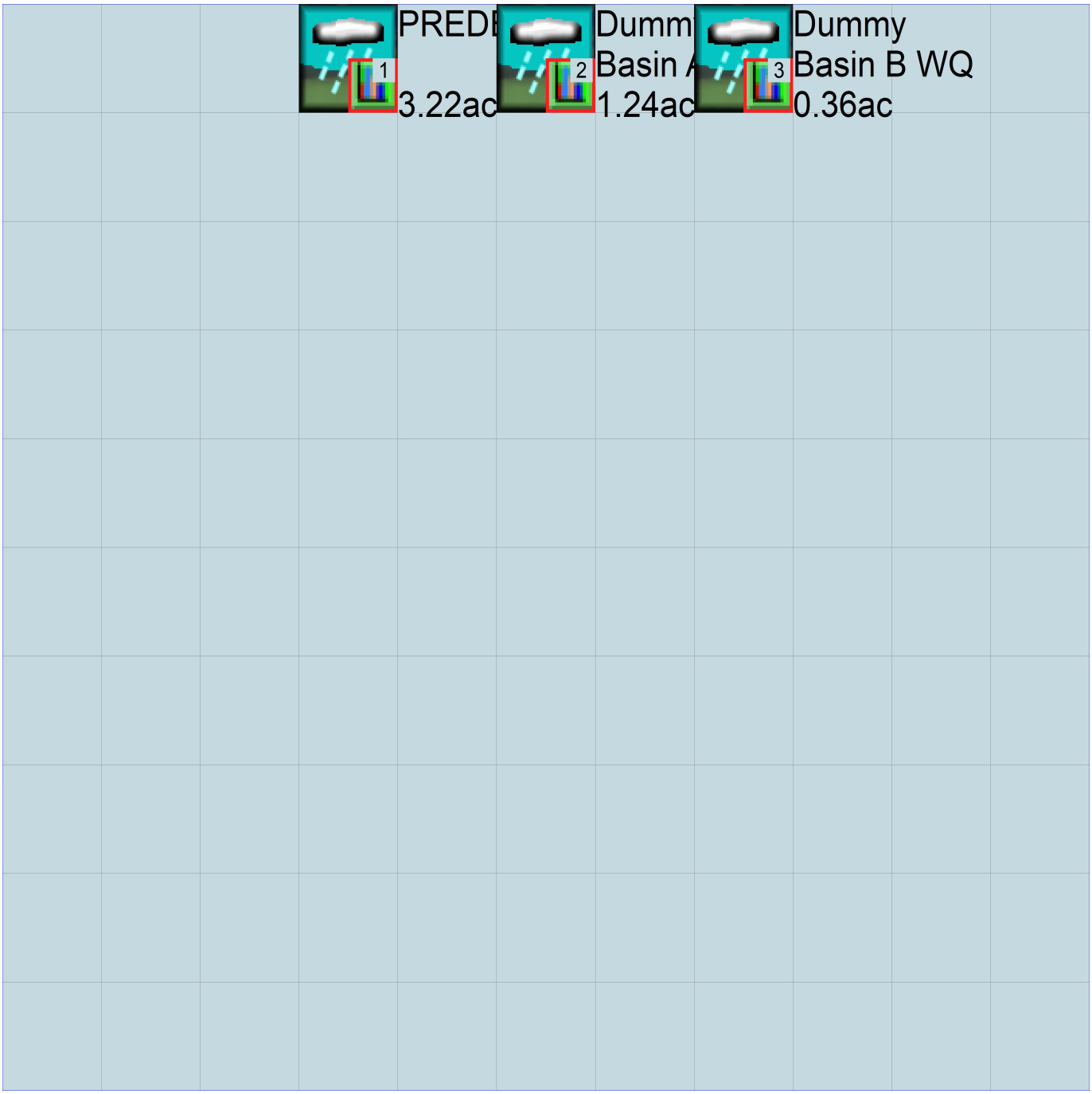
No PERLND changes have been made.

IMPLND Changes

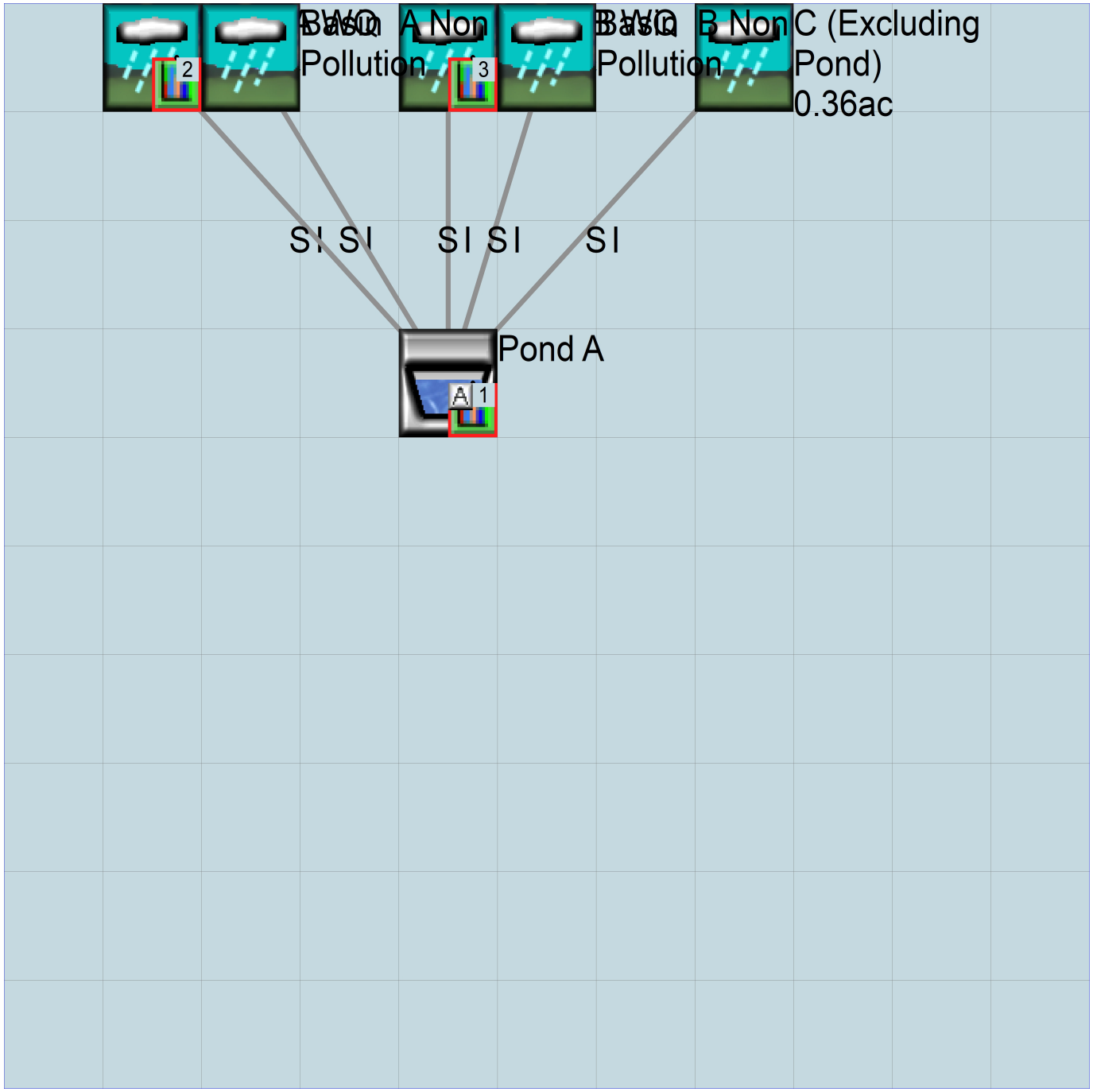
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 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   2452-Prelim WQ WWHM.wdm
MESSU       25   Pre2452-Prelim WQ WWHM.MES
            27   Pre2452-Prelim WQ WWHM.L61
            28   Pre2452-Prelim WQ WWHM.L62
            30   POC2452-Prelim WQ WWHM1.dat
            31   POC2452-Prelim WQ WWHM2.dat
            32   POC2452-Prelim WQ WWHM3.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      29
      PERLND      31
      IMPLND       1
      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        PREDEVELOPED               MAX                    1    2   30    9
    2        Dummy WQ Basin A           MAX                    1    2   31    9
    3        Dummy Basin B WQ           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           ***
   29     SG4, Forest, Mod        1    1    1    1   27    0
   31     SG4, Field, 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 ***
   29         0    0    1    0    0    0    0    0    0    0    0    0
   31         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  *********
   29         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   31         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 ***
   29         0    0    0    0    0    0    0    0    0    0    0
   31         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
   29              0         6      0.04       400       0.1         0      0.96
   31              0         6      0.03       400      0.05         0      0.96
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   29              0         0         3         2         0         0         0
   31              0         0         3         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   29            0.2       0.4      0.35         2       0.4       0.7
   31           0.15       0.4       0.3         2       0.4       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
   29              0         0         0         0       2.5          1         0
   31              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           ***
    1      ROADS/FLAT              1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

```
    1         0    0    4    0    0    4    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
PREDEVELOPED***
PERLND  29                        3.22     COPY   501     12
PERLND  29                        3.22     COPY   501     13
Dummy WQ Basin A***
PERLND  31                        0.69     COPY   502     12
PERLND  31                        0.69     COPY   502     13
IMPLND   1                        0.55     COPY   502     15
Dummy Basin B WQ***
PERLND  31                        0.24     COPY   503     12
PERLND  31                        0.24     COPY   503     13
IMPLND   1                        0.12     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->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

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

  ACTIVITY
    <PLS > ************ Active Sections ****************************
```

```
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.3            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.3            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 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   2452-Prelim WQ WWHM.wdm
MESSU       25   Mit2452-Prelim WQ WWHM.MES
            27   Mit2452-Prelim WQ WWHM.L61
            28   Mit2452-Prelim WQ WWHM.L62
            31   POC2452-Prelim WQ WWHM2.dat
            32   POC2452-Prelim WQ WWHM3.dat
            30   POC2452-Prelim WQ WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      31
      IMPLND       1
      PERLND      32
      IMPLND       4
      RCHRES       1
      COPY       502
      COPY       503
      COPY         1
      COPY       501
      DISPLY       2
      DISPLY       3
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    2        Basin A WQ                 MAX                    1    2   31    9
    3        Basin B WQ                 MAX                    1    2   32    9
    1        Pond A                     MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  502         1    1
  503         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   31     SG4, Field, Flat        1    1    1    1   27    0
```

```
   32     SG4, Field, Mod         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   31         0    0    1    0    0    0    0    0    0    0    0    0
   32         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  *********
   31         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   32         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 ***
   31         0    0    0    0    0    0    0    0    0    0    0
   32         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
   31              0         6      0.03       400      0.05         0      0.96
   32              0         6      0.03       400       0.1         0      0.96
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   31              0         0         3         2         0         0         0
   32              0         0         3         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   31          0.15       0.4       0.3         2       0.4       0.4
   32          0.15       0.4       0.3         2       0.4       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
   31              0         0         0         0       2.5          1         0
   32              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           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

```
  END ACTIVITY

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
C (Excluding Pond)***
PERLND  32                       0.33     RCHRES   1      2
PERLND  32                       0.33     RCHRES   1      3
IMPLND   1                       0.03     RCHRES   1      5
Basin A WQ***
PERLND  31                       0.69     RCHRES   1      2
PERLND  31                       0.69     RCHRES   1      3
IMPLND   1                       0.55     RCHRES   1      5
Basin B WQ***
PERLND  31                       0.24     RCHRES   1      2
PERLND  31                       0.24     RCHRES   1      3
IMPLND   1                       0.12     RCHRES   1      5
Basin  A Non Pollution***
IMPLND   4                       0.71     RCHRES   1      5
Basin  B Non Pollution***
IMPLND   1                       0.36     RCHRES   1      5
Basin A WQ***
PERLND  31                       0.69     COPY   502     12
PERLND  31                       0.69     COPY   502     13
IMPLND   1                       0.55     COPY   502     15
Basin B WQ***
PERLND  31                       0.24     COPY   503     12
PERLND  31                       0.24     COPY   503     13
IMPLND   1                       0.12     COPY   503     15

******Routing******
PERLND  31                       0.69     COPY     1     12
IMPLND   1                       0.55     COPY     1     15
```

```
PERLND  31                        0.69     COPY     1     13
PERLND  31                        0.24     COPY     1     12
IMPLND   1                        0.12     COPY     1     15
PERLND  31                        0.24     COPY     1     13
PERLND  32                        0.33     COPY     1     12
IMPLND   1                        0.03     COPY     1     15
PERLND  32                        0.33     COPY     1     13
IMPLND   4                        0.71     COPY     1     15
IMPLND   1                        0.36     COPY     1     15
RCHRES   1                           1     COPY   501     16
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                       in  out                               ***
    1     Pond A                  1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
```

FTABLES
FTABLE 1
91 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.059619	0.000000	0.000000		
0.066667	0.060559	0.004006	0.010090		
0.133333	0.061507	0.008075	0.014269		
0.200000	0.062462	0.012207	0.017476		
0.266667	0.063424	0.016403	0.020179		
0.333333	0.064394	0.020664	0.022561		
0.400000	0.065371	0.024989	0.024714		
0.466667	0.066355	0.029380	0.026695		
0.533333	0.067347	0.033837	0.028538		
0.600000	0.068346	0.038360	0.030269		
0.666667	0.069353	0.042950	0.031906		
0.733333	0.070366	0.047607	0.033464		
0.800000	0.071388	0.052333	0.034952		
0.866667	0.072416	0.057126	0.036379		
0.933333	0.073452	0.061988	0.037752		
1.000000	0.074495	0.066920	0.039077		
1.066667	0.075545	0.071921	0.040359		
1.133333	0.076603	0.076993	0.041601		
1.200000	0.077669	0.082135	0.042807		
1.266667	0.078741	0.087349	0.043980		
1.333333	0.079821	0.092634	0.045122		
1.400000	0.080908	0.097992	0.046237		
1.466667	0.082003	0.103422	0.047325		
1.533333	0.083105	0.108926	0.048388		
1.600000	0.084214	0.114503	0.049429		
1.666667	0.085331	0.120155	0.050448		
1.733333	0.086455	0.125881	0.051447		
1.800000	0.087586	0.131682	0.052427		
1.866667	0.088725	0.137559	0.053389		
1.933333	0.089871	0.143512	0.054334		
2.000000	0.091024	0.149542	0.055263		
2.066667	0.092185	0.155649	0.056177		
2.133333	0.093353	0.161834	0.057076		
2.200000	0.094528	0.168096	0.057961		
2.266667	0.095711	0.174438	0.058832		
2.333333	0.096901	0.180858	0.059691		
2.400000	0.098098	0.187358	0.060538		
2.466667	0.099303	0.193938	0.061373		
2.533333	0.100515	0.200599	0.062197		
2.600000	0.101735	0.207340	0.063010		
2.666667	0.102961	0.214163	0.063812		
2.733333	0.104196	0.221069	0.064605		
2.800000	0.105437	0.228056	0.065388		
2.866667	0.106686	0.235127	0.066162		
2.933333	0.107942	0.242281	0.066927		
3.000000	0.109206	0.249520	0.067683		
3.066667	0.110477	0.256842	0.068431		
3.133333	0.111755	0.264250	0.069171		
3.200000	0.113040	0.271743	0.069903		
3.266667	0.114333	0.279322	0.070627		
3.333333	0.115634	0.286988	0.071345		
3.400000	0.116941	0.294741	0.072054		
3.466667	0.118256	0.302580	0.072757		
3.533333	0.119579	0.310508	0.073454		
3.600000	0.120908	0.318525	0.074143		
3.666667	0.122245	0.326630	0.074827		
3.733333	0.123590	0.334824	0.075504		
3.800000	0.124941	0.343108	0.105544		
3.866667	0.126300	0.351483	0.121702		
3.933333	0.127667	0.359949	0.133737		
4.000000	0.129040	0.368506	0.143825		
4.066667	0.130421	0.377154	0.334947		
4.133333	0.131810	0.385895	0.670427		
4.200000	0.133206	0.394729	1.075867		
4.266667	0.134609	0.403656	1.493205		

```
  4.333333  0.136019  0.412677  1.865127
  4.400000  0.137437  0.421793  2.147895
  4.466667  0.138862  0.431003  2.332102
  4.533333  0.140295  0.440308  2.499612
  4.600000  0.141735  0.449709  2.644595
  4.666667  0.143182  0.459206  2.781829
  4.733333  0.144636  0.468800  2.912442
  4.800000  0.146098  0.478491  3.037314
  4.866667  0.147567  0.488280  3.157144
  4.933333  0.149044  0.498167  3.272502
  5.000000  0.150528  0.508153  3.383854
  5.066667  0.152019  0.518238  3.491593
  5.133333  0.153518  0.528422  3.596052
  5.200000  0.155024  0.538707  3.697513
  5.266667  0.156537  0.549092  3.796222
  5.333333  0.158058  0.559579  3.892393
  5.400000  0.159586  0.570167  3.986211
  5.466667  0.161121  0.580857  4.077844
  5.533333  0.162664  0.591650  4.167436
  5.600000  0.164214  0.602546  4.255120
  5.666667  0.165771  0.613545  4.341012
  5.733333  0.167336  0.624649  4.425218
  5.800000  0.168908  0.635857  4.507835
  5.866667  0.170488  0.647170  4.588950
  5.933333  0.172074  0.658589  4.668641
  6.000000  0.173669  0.670114  4.746981
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.3            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.3            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1.3            RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            RCHRES   1     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL       REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL       REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL       REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL       REPL
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        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

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

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

  MASS-LINK       12
```

```
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

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

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

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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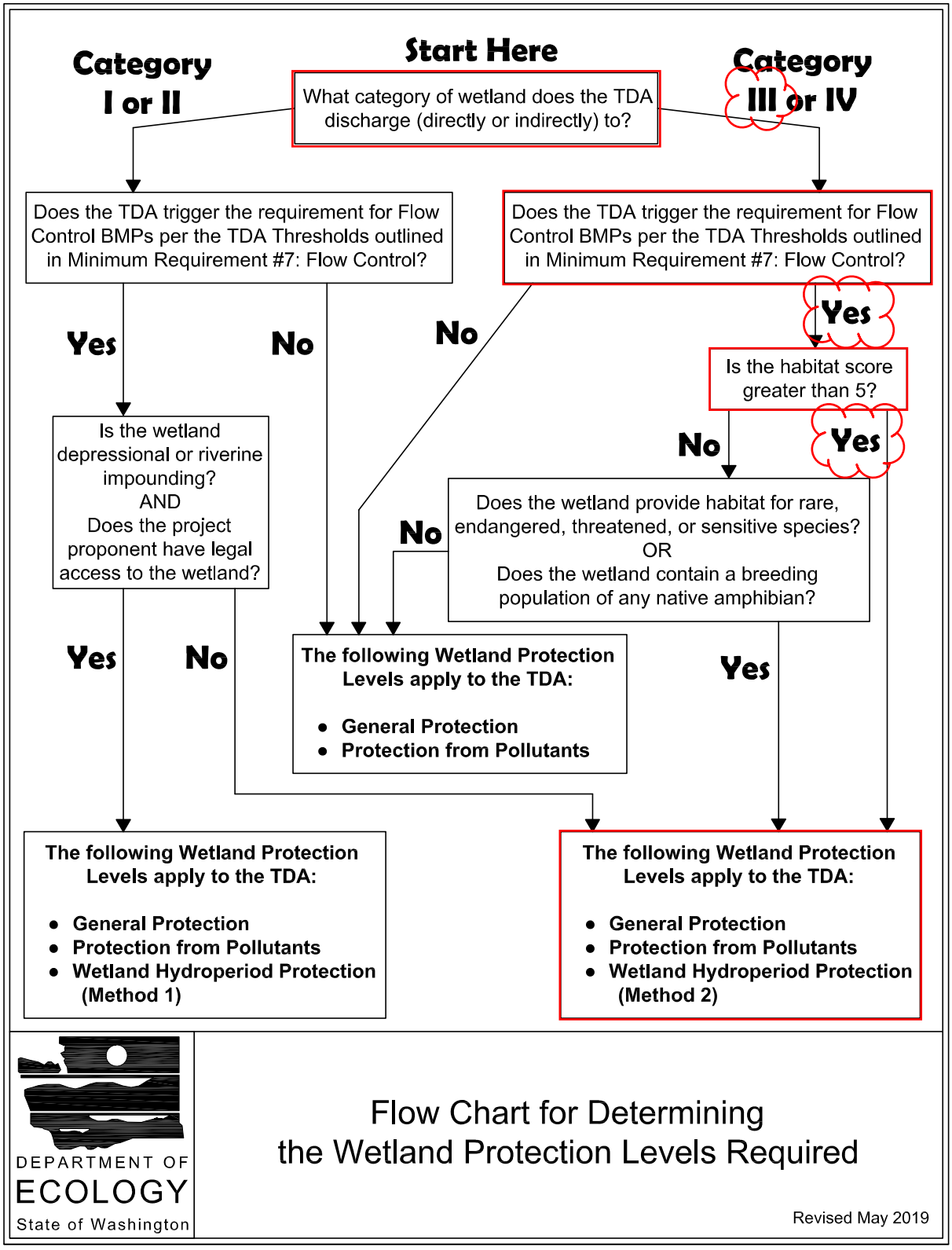
Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements



Geotechnical Report Appendix D

Refer to Section G of the preliminary application packet