

Pinnacle at Liberty Bay

Preliminary Stormwater Site Plan Report

June 20, 2025

Prepared for

Montebanc Management, LLC
400 NW Gilman Blvd. #2781
Issaquah, WA 98027



06/20/2025

"I hereby state that this Stormwater Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume liability for the sufficiency, suitability or performance of stormwater drainage facilities prepared by me."

Submitted by

ESM Consulting Engineers, LLC
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1. PROJECT OVERVIEW

The proposed Pinnacle at Liberty Bay project is a planned residential development located in the southwest quarter of Section 24, Township 26 North, Range 1 East, W.M., in the City of Poulsbo, WA. The site is located on the north side of State Hwy 305 and situated east of the Plat of Baywatch at Poulsbo and west of the Plat of Crystal View. The subject property consists of four undeveloped parcels: 232601-4-001-2009, 242601-3-003-2008, and 242601-3-018-2001, and 242601-3-005-2006 zoned RL, for a total of 1,803,847 square feet (41.41 acres). The proposed project is a phased residential subdivision containing 151 detached single-family lot, pedestrian access, domestic water, sanitary sewer, public road improvements, utility services, open space, a stormwater detention pond and two stormwater detention vaults. The project will be accessed from Baywatch Ct NE, located in the Plat of Baywatch at Poulsbo. Additional access will be provided from NE Crystallia Ct, located in the Plat of Cystal View, and Johnson Parkway, located in the Plat of Johnson Ridge. The project is requesting a Type III permit from the City of Poulsbo. The project will also require permits for water and sewer extensions through the City of Poulsbo, a Construction Stormwater General Permit from the State of Washington, Wetland Mitigation, Final Plat permits, and Building permits (retaining walls). Refer to Figure 1.1 and 1.3 for a vicinity map and proposed conditions, respectively.

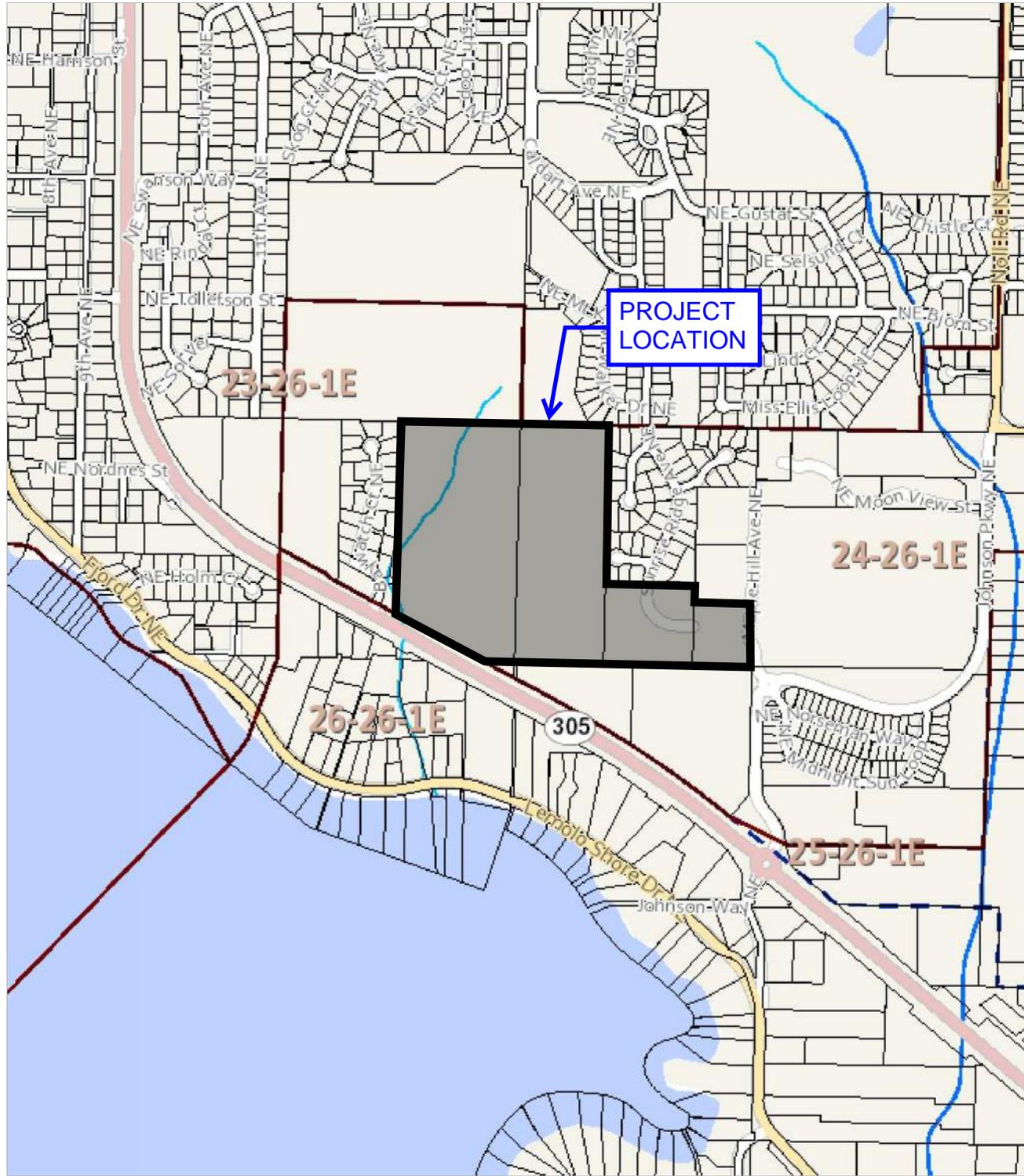
The development is required to meet flow control and enhanced water quality treatment standards. Stormwater will be conveyed and collected by a series of pipes and catch basins. A stormwater detention pond is proposed at the southwest side of the property and two underground stormwater detention vaults are proposed at the southeast side of the property to meet flow control requirements conditioned with this project. The stormwater detention facilities will mitigate runoff generated from the project's target surface areas.

Enhanced treatment will be provided with the use of modular wetland systems with a system located downstream of each of the stormwater detention facilities. Discharge from the proposed stormwater detention pond will be to the existing ditch located in the public right-of-way along the north side of State Hwy 305. The proposed stormwater detention vaults will discharge into an existing onsite stream. See section 4 of this report for further discussion of existing and proposed hydrology and design details.

FIGURE 1.1 - VICINITY MAP

Map Scale: 1 : 10,000

Printed: Wednesday, May 22, 2025



** This map is not a substitute for field survey **

1,000 ft



Comments



FIGURE 1.2 - EXISTING CONDITIONS (1 of 3)

HORIZONTAL DATUM

WASHINGTON COORDINATE SYSTEM (WCS) — NORTH ZONE
(BASED UPON NAD 83/2011) UTILIZING THE WASHINGTON
STATE REFERENCE NETWORK (WSRN) IN JANUARY OF 2025

VERTICAL DATUM

NAVD 88 BASED ON GPS UTILIZING THE WASHINGTON
STATE REFERENCE NETWORK (WSRN) IN JANUARY OF 2025

SURVEY INSTRUMENTATION

SURVEYING PERFORMED IN CONJUNCTION WITH THIS SURVEY DOCUMENT UTILIZED
ALL OR A PORTION OF THE FOLLOWING EQUIPMENT:

FIELD TRAVERSE AND/OR GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

ELECTRONIC TOTAL STATIONS, INCLUDING TOPCON PS-103A,
LEICA TCRA 1105 PLUS, TRIMBLE S5.

TRIMBLE R8, TOPCON GR-5 GNSS EQUIPMENT.

FARO FOCUS S350 LASER SCANNER.

PROCEDURE USED : FIELD TRAVERSE WORK COMPLIES WITH CURRENT STANDARDS
AS OUTLINED IN WAC-332-130-070, -080 AND -090. ALL INSTRUMENTS
MAINTAINED TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY
WAC-332-130-100.

NOTES:

1. FIELD WORK PERFORMED JANUARY 2025 - JUNE 2025.

2. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON THE FOLLOWING SOURCES:
SURVEYED LOCATIONS OF VISIBLE SURFACE INDICATIONS OBSERVED IN THE FIELD; BURIED
UTILITIES LOCATED BY MT. VIEW LOCATING SERVICES LLC, IN APRIL OF 2025. THE
LOCATIONS OF BURIED UTILITIES SHOWN HEREON SHOULD BE CONSIDERED APPROXIMATE
AND REQUIRES FIELD VERIFICATION PRIOR TO ANY DEMOLITION OR CONSTRUCTION WORK
ON OR AROUND THE SITE.

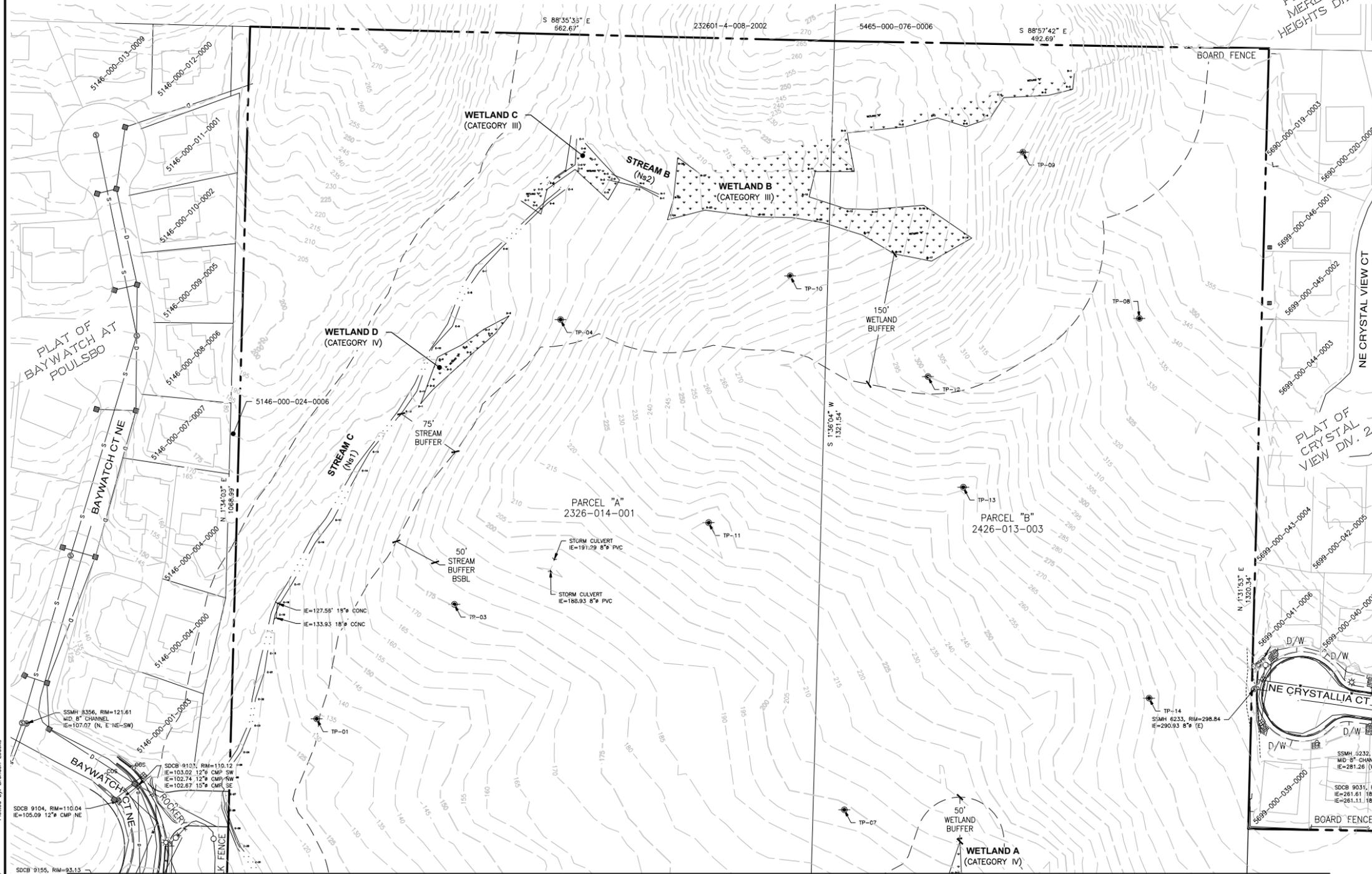
3. LEGAL DESCRIPTION, EASEMENTS, COVENANTS, CONDITIONS AND RESTRICTIONS ARE
FROM FIRST AMERICAN TITLE INSURANCE COMPANY SUBDIVISION GUARANTEE NO.
5003353-4276436 DATED MAY 27, 2025. IN PREPARING THIS PLAT, ESM HAS NOT
CONDUCTED AN INDEPENDENT TITLE SEARCH NOR IS ESM AWARE OF ANY TITLE ISSUES
AFFECTING THE PROPERTY OTHER THAN THOSE SHOWN ON THIS PLAT. ESM HAS WHOLLY
RELIED ON THE ABOVE REFERENCED SUBDIVISION GUARANTEE TO PREPARE THIS PLAT AND
THEREFORE QUALIFIES THE PLATS ACCURACY AND COMPLETENESS TO THAT EXTENT.



SCALE: 1" = 60'
CONTOUR INTERVAL = 5'

LEGEND

- ⊙ CABLE TEL RISER
- ⊗ WETLAND FLAG
- ⊗ FENCE GATE END
- ⊙ LIGHT POST WITH ARM
- ⊙ LIGHT POST
- ⊙ GUARD POST/BOLLARD
- ⊙ HANDICAP RAMP
- ⊙ MAIL BOX
- ⊙ SOIL LOG/PERC TEST
- ⊙ SIGN
- ⊙ STREET SIGN
- ⊙ GAS MARKER POST
- ⊙ POWER GUY ANCHOR
- ⊙ POWER JUNCTION BOX
- ⊙ POWER MARKER POST
- ⊙ POWER POLE
- ⊙ POWER POLE WITH DROP
- ⊙ POWER VAULT
- ⊙ STORM CATCH BASIN
- ⊙ STORM CULVERT
- ⊙ STORM MANHOLE
- ⊙ STORM YARD DRAIN
- ⊙ SIGNAL CONTROL BOX
- ⊙ SANITARY SEWER MANHOLE
- ⊙ SANITARY SEWER CLEANOUT
- ⊙ LEFT TURN ARROW
- ⊙ RIGHT TURN ARROW
- ⊙ FOUND MONUMENT IN CASE
- ⊙ FOUND REBAR AND CAP
- ⊙ TELEPHONE RISER
- ⊙ WATER BLOWOFF
- ⊙ WATER FIRE HYDRANT
- ⊙ WATER IRRIG CONTROL VALVE
- ⊙ WATER METER
- ⊙ WATER VALVE
- ⊙ GEOTECHNICAL TEST PIT
- ASPHALT CENTERLINE
- BUILDING OUTLINE
- CURB LINE
- EDGE OF CONCRETE/ASPHALT
- EDGE OF GRAVEL
- BOARD FENCE
- CHAIN LINK FENCE
- SPLIT RAIL FENCE
- GRADE BREAK
- FEATURE LINE
- RETAINING WALL
- ROAD STRIPING
- STREAM CENTERLINE
- EDGE WATER
- COMMUNICATIONS UNDERGROUND
- GAS UNDERGROUND
- POWER UNDERGROUND
- POWER OVERHEAD
- SANITARY SEWER
- STORM DRAINAGE
- STORM CULVERT CONNCTION
- STORM DRAINAGE DITCH
- TELEPHONE UNDERGROUND
- WATER
- RIGHT-OF-WAY
- BOUNDARY LINE
- EASEMENT LINE
- CONTOUR
- WETLAND BUFFER



SEE SHEET PP-03 FOR CONTINUATION

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Montebanc Management, LLC
Pinnacle at Liberty Bay Subdivision
Washington
City of Poulsbo
EXISTING CONDITIONS

Land Surveying
Project Management
Landscape Architecture

JOB NO.:	2090-004-022
DWG. NAME:	PP-02
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
DATE OF PRINT:	6/20/2025
PP-02	
2 OF 26 SHEETS	

FIGURE 1.2 - EXISTING CONDITIONS (2 of 3)

LEGAL DESCRIPTIONS

PARCEL A (TAX PARCEL NO. 232601-4-001):

THE EAST HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER IN SECTION 23, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., KITSAP COUNTY, WASHINGTON;
EXCEPT 1.43 ACRES TO HIGHWAY 21A.

PARCEL B (TAX PARCEL 242601-3-003):

THE WEST 15 ACRES OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., KITSAP COUNTY, WASHINGTON.

PARCEL C (TAX PARCEL 252601-2-047):

THE WEST 15 FEET OF GOVERNMENT LOT 7, SECTION 25, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M. LYING NORTHEASTERLY OF STATE HIGHWAY NO. 21A;
SITUATED IN KITSAP COUNTY, WASHINGTON.

PARCEL D (TAX PARCEL NO. 252601-2-048):

THE WEST 15 FEET OF GOVERNMENT LOT 7, SECTION 25, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M. LYING SOUTHEASTERLY OF STATE HIGHWAY NO. 21A;
SITUATED IN KITSAP COUNTY, WASHINGTON.

PARCEL E (PORTION OF TAX PARCEL 242601-3-005 LYING NORTH OF SECTION LINE):

THAT PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 24, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., IN KITSAP COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID QUARTER:

THENCE WEST ALONG THE SOUTH LINE OF SAID SECTION 24 A DISTANCE OF 330 FEET; THENCE NORTH PARALLEL WITH THE EAST LINE OF SAID QUARTER A DISTANCE OF 345.7 FOOT; THENCE EAST PARALLEL WITH THE SOUTH LINE OF SAID QUARTER A DISTANCE OF 330 FEET TO THE EAST LINE OF SAID QUARTER; THENCE SOUTH ALONG SAID EAST LINE A DISTANCE OF 345.7 FEET TO THE POINT OF BEGINNING;

EXCEPT THE EAST 15 FEET THEREOF.

PARCEL E1 (PORTION OF TAX PARCEL 242601-3-005 LYING SOUTH OF SECTION LINE):

THAT PORTION OF GOVERNMENT LOT 7, SECTION 25, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., IN KITSAP COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID GOVERNMENT LOT 7; THENCE SOUTH 15 FEET; THENCE NORTHWESTERLY IN A STRAIGHT LINE TO A POINT ON THE NORTH LINE OF SAID GOVERNMENT LOT 7; THENCE EAST ALONG SAID NORTH LINE 200 FEET TO THE NORTHEAST CORNER THEREOF AND THE POINT OF BEGINNING, AS DISCLOSED IN DECREE FILED IN KITSAP COUNTY SUPERIOR COURT CAUSE NO. 57080.

SITUATE IN THE COUNTY OF KITSAP, STATE OF WASHINGTON.

PARCEL F (TAX PARCEL NO. 242601-3-018):

THE SOUTH 1/3, EXCEPT COUNTY ROAD NO. 141, OF THE FOLLOWING DESCRIBED PROPERTY: THAT PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER, SECTION 24, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., IN KITSAP COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT 330 FEET WEST OF THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF SAID SECTION 24; THENCE WEST 495 FEET; THENCE SOUTH 1320 FEET; THENCE EAST 495 FEET; THENCE NORTH 1320 FEET TO THE POINT OF BEGINNING.

SITUATE IN THE COUNTY OF KITSAP, STATE OF WASHINGTON.

PARCEL G (TAX PARCEL 242601-3-019):

THAT PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER, SECTION 24, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M., IN KITSAP COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

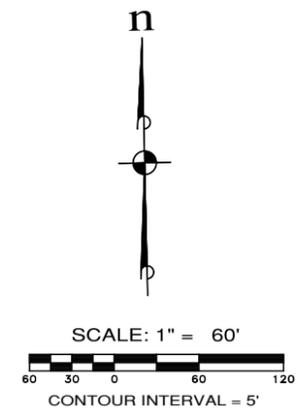
BEGINNING AT THE SOUTHEAST CORNER OF SAID SUBDIVISION:

THENCE NORTH 89°02'10" WEST ALONG SOUTH LINE, 15 FEET:

THENCE NORTH 01°30'56" EAST PARALLEL WITH THE EAST LINE OF SAID SUBDIVISION, 345.7 FEET:

THENCE SOUTH 29°02'10" EAST, 15 FEET TO THE EAST LINE OF SAID SUBDIVISION; THENCE SOUTH 01°30'56" WEST ALONG SAID EAST LINE, 345.7 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

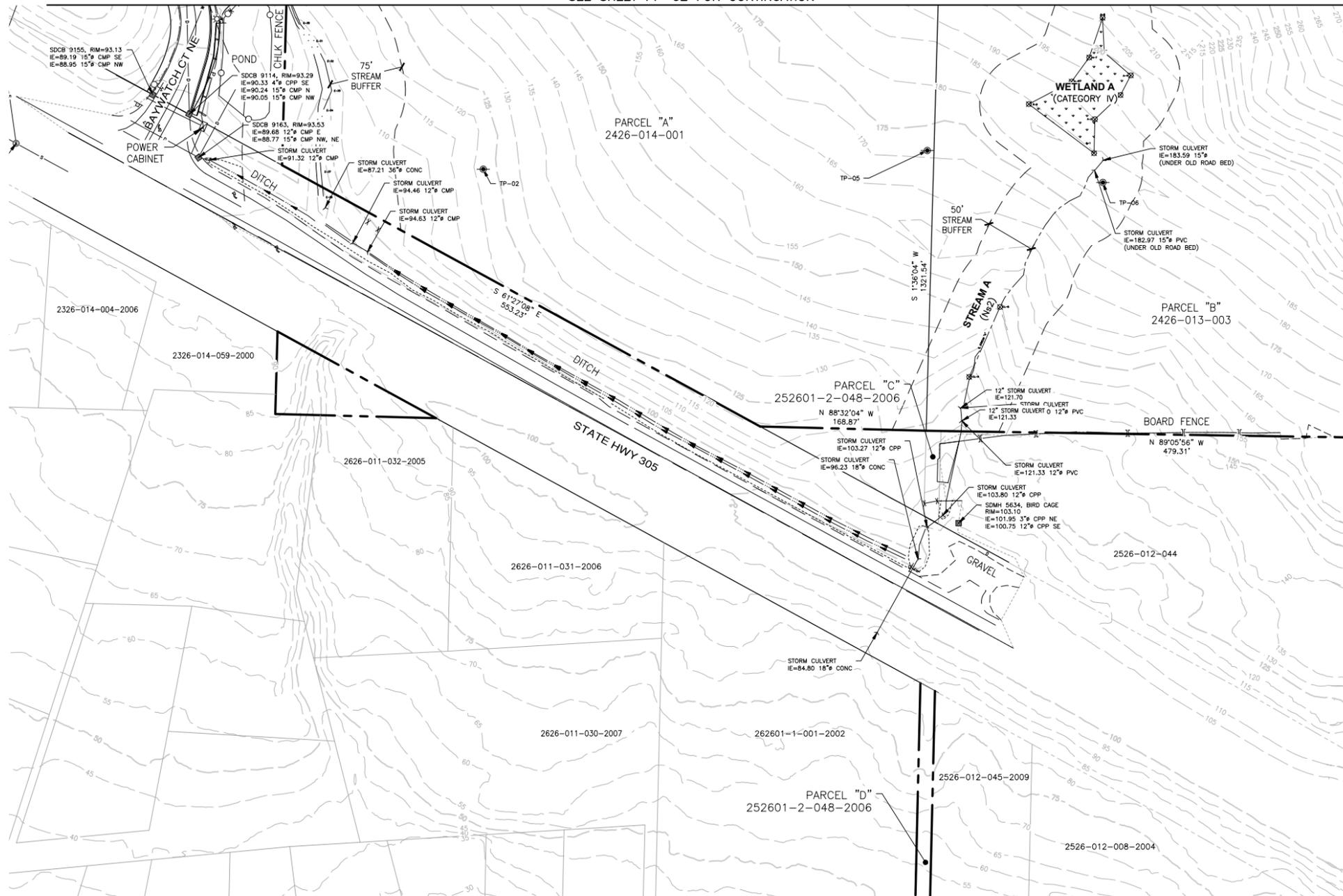
SITUATE IN THE COUNTY OF KITSAP, STATE OF WASHINGTON.



SEE LEGEND ON SHEET PP-02

SEE SHEET PP-02 FOR CONTINUATION

SEE SHEET PP-04 FOR CONTINUATION



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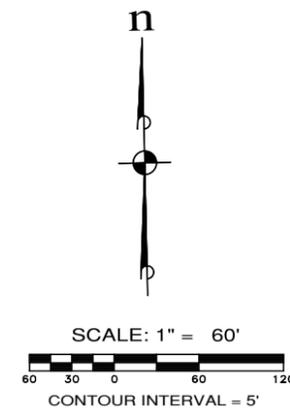
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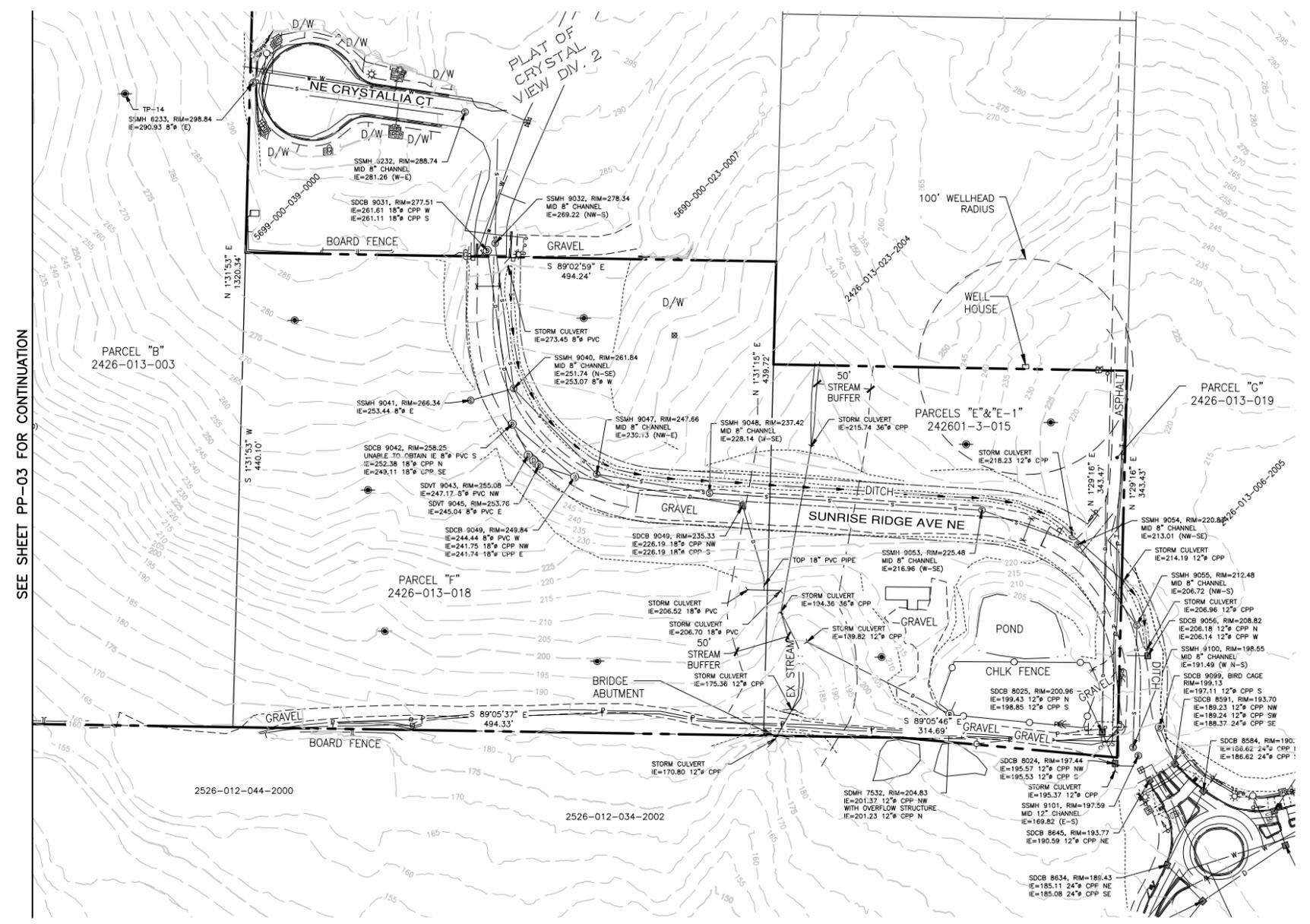
MONTEBANC MANAGEMENT, LLC
Pinnacle at Liberty Bay Subdivision
EXISTING CONDITIONS
WASHINGTON
CITY OF POULSBORO

JOB NO.:	2090-004-022
DWG. NAME:	PP-03
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DATE:	6/20/2025
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PP-03	
3 OF 26 SHEETS	

FIGURE 1.2 - EXISTING CONDITIONS (3 of 3)



SEE LEGEND ON SHEET PP-02



SEE SHEET PP-03 FOR CONTINUATION

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 Public Works | Land Planning

MONTEBANC MANAGEMENT, LLC

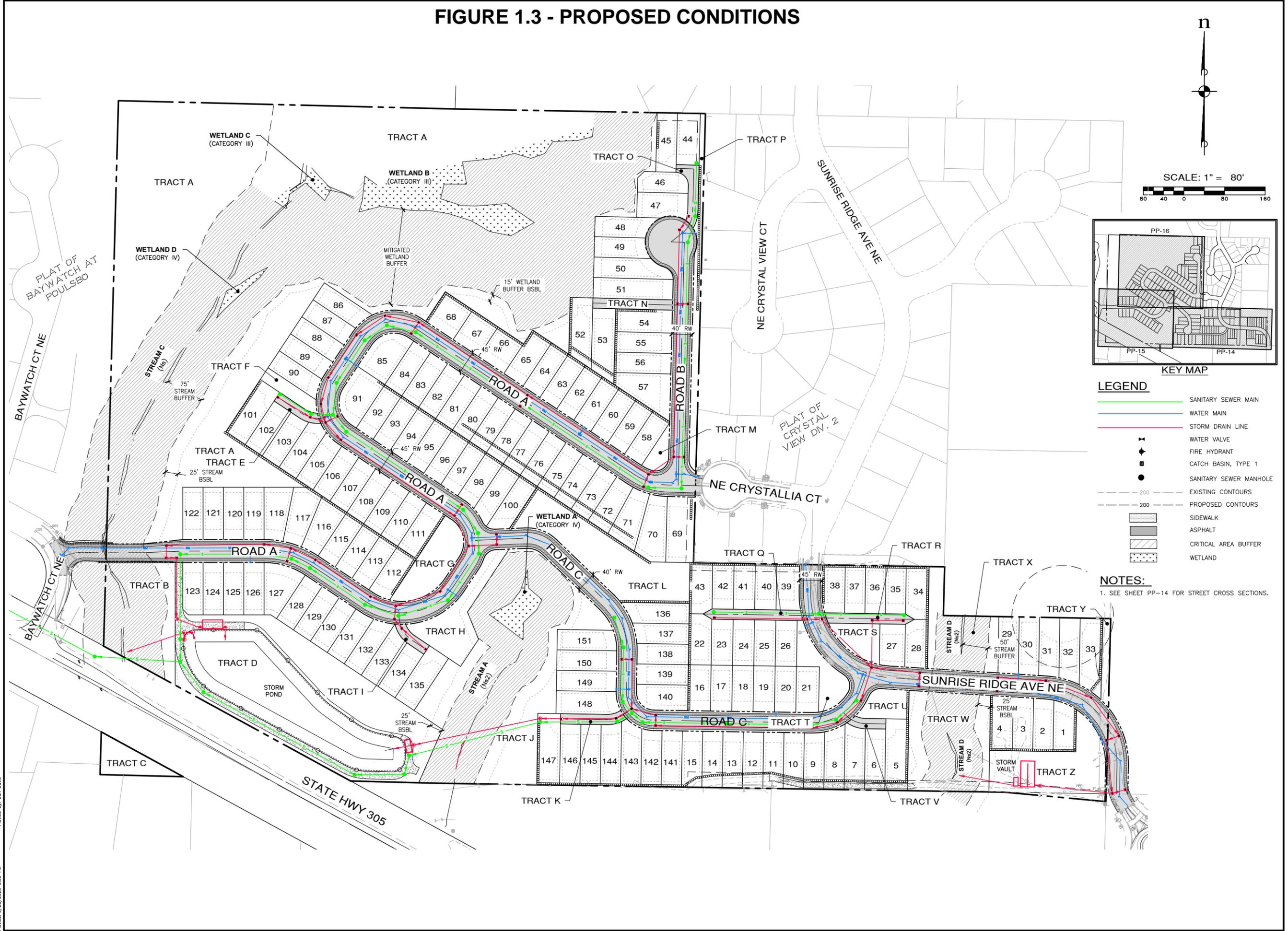
PINNACLE AT LIBERTY BAY SUBDIVISION

EXISTING CONDITIONS

CITY OF POULLSBO WASHINGTON

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FIGURE 1.3 - PROPOSED CONDITIONS

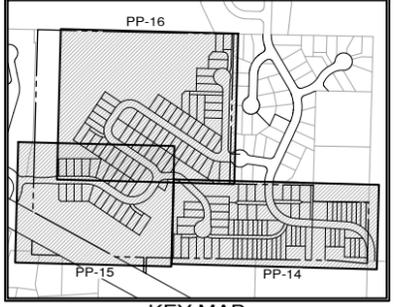


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Land Planning
Project Management
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LEGEND

- SANITARY SEWER MAIN
- WATER MAIN
- STORM DRAIN LINE
- WATER VALVE
- FIRE HYDRANT
- CATCH BASIN, TYPE 1
- SANITARY SEWER MANHOLE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SIDEWALK
- ASPHALT
- CRITICAL AREA BUFFER
- WETLAND

NOTES:
1. SEE SHEET PP-14 FOR STREET CROSS SECTIONS.

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MONTEBANC MANAGEMENT, LLC
Pinnacle at Liberty Bay Subdivision
OVERALL ROAD & UTILITY PLAN
WASHINGTON
CITY OF POULSBORO

JOB NO.: 2090-004-022
DWG. NAME: PP-13
DESIGNED BY:
DRAWN BY:
CHECKED BY:
DATE: 6/20/2025
DATE OF PRINT:
PP-13
13 OF 26 SHEETS

Figure 1.4 - Web Soil Survey (1 of 3)
Custom Soil Resource Report
Soil Map



Soil Map may not be valid at this scale.

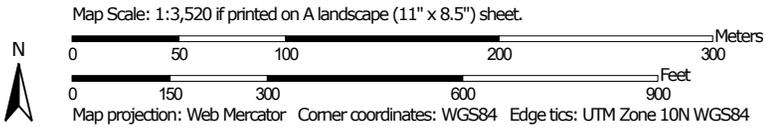


Figure 1.4 - Web Soil Survey (2 of 3)

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

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

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

-  Streams and Canals

Transportation

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

Background

-  Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Kitsap County Area, Washington
 Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: Jul 31, 2022—Aug 8, 2022

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

Figure 1.4 - Web Soil Survey (3 of 3)

Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
39	Poulsbo gravelly sandy loam, 0 to 6 percent slopes	7.8	18.8%
40	Poulsbo gravelly sandy loam, 6 to 15 percent slopes	25.0	60.3%
41	Poulsbo gravelly sandy loam, 15 to 30 percent slopes	8.7	20.9%
Totals for Area of Interest		41.5	100.0%

2. EXISTING CONDITIONS

The project site is located on the north side of State Hwy 305 and situated east of the Plat of Baywatch at Poulsbo and west of the Plat of Crystal View. The subject property consists of four undeveloped parcels: 232601-4-001-2009, 242601-3-003-2008, and 242601-3-018-2001, and 242601-3-005-2006 zoned RL, for a total of 1,797,164 square feet (41.26 acres). The site generally slopes toward the south, southwest, and west with elevations across the site ranging between approximately 120-feet to 376-feet. Presently, existing site improvements include a paved/gravel access road, stormwater detention pond, storm conveyance pipes & ditches, and a sanitary sewer main located on the east side of the project site. The existing access road (Sunrise Ridge Road) provides access to existing onsite utilities and existing detention pond. There is also an existing single-family residence with gravel access located on parcel 242601-3-005-2006. The remaining site area is undeveloped and generally covered with dense forest coverage and brush. Refer to Figure 1.2 for existing conditions.

A site investigation has been conducted by Sewall Wetland Consulting, Inc., which identified Four (4) different onsite wetlands as well as three (3) streams on the site. Wetlands A & D are classified as Category IV wetlands with a standard buffer of 50 feet. Wetlands B & C are classified as Category III wetlands with a standard buffer of 150 feet. Streams A & B are classified as Type Ns2 streams with a standard buffer of 50 feet. Stream C is classified as a Type Np stream with a standard buffer of 100 feet. See Appendix D for wetland delineation and mitigation plan information. There are no other sensitive or critical areas on or adjacent to the site nor are there any known historical drainage problems. The project site is not located within a 100-year flood hazard zone or aquifer recharge area.

According to NRCS's Web Soil Survey, the onsite soils consist of Poulsbo Gravelly Sandy Loam. Refer to Figure 1.4 for the Web Soil Survey. Additionally, a subsurface investigation has been conducted by Aspect Consulting. In summary, 14 test pits were excavated to maximum depth of 13 feet below existing surface grades. In general, soil conditions generally consist of a 6" to 18" layer of topsoil overlying native soils. Native soils encountered on the site consist primarily of Vashon Recessional Outwash which consisted of medium dense, moist, gray-brown, sand with silt, gravel and cobbles, silty sand with gravel and cobbles, and gravel with sand and cobbles. In some test pits, soils consisting of Pre-Vashon Silt were found underlying the Vashon recessional outwash. The Pre-Vashon Silt consisted of medium dense to dense, sand with silt and silt with sand with varied degrees of weathering. Groundwater seepage was observed at 5 of the test pit locations at approximately 2 to 7 feet below ground surface and interpreted to be perched groundwater. A copy of the report from Aspect Consulting is provided in Appendix D.

Stormwater from the project site generally flows toward existing onsite streams, onsite conveyance ditch or pipe systems, or to an offsite public conveyance ditch located along the north side of State Hwy 305 NE. The onsite streams and conveyance systems ultimately discharge into the public conveyance ditch located on the north side of State Hwy 305 NE. Stormwater collected by the public conveyance ditch is conveyed south to Liberty Bay through various conveyance pipes and swales. Upstream of the project site, an existing stormwater conveyance system discharges to the site. The existing stormwater conveyance was constructed as part of the Crystal View Plat and discharges to an onsite stream located on the

eastern side of the project site. There is also a paved street (Maple Height Ave NE) and two single-family residences on predominately wooded lots which also to drain by sheet flow to the project site. Runoff from other upstream areas is generally conveyed through the project site by onsite streams that meander through the property.

There are no fuel tanks on the subject property nor are there any septic systems on or within 100 feet from the site. At the northeastern end of the property, an existing well is located north of the site with the associated 100-foot wellhead protection zone extending into the site.

3. OFF-SITE ANALYSIS REPORT

An Off-Site Analysis Report has been prepared which discusses the potential drainage impacts associated with the project. This includes an analysis of the drainage conditions upstream and downstream of the site as well as identifying any downstream constraints. See Appendix 'C' for the complete Off-Site Analysis Report detailing the analysis and findings. No negative drainage impacts are expected to be created by the project to the downstream drainage systems and properties based on the observations during this analysis.

4. PERMANENT STORMWATER CONTROL PLAN

This project has a two Threshold Discharge Areas (TDA). A detention pond and two detention vaults are proposed to meet flow control requirements. The project also proposes three proprietary media treatment facilities to meet stormwater treatment requirements.

The Western Washington Hydrology Model (WWHM) 2012 was used to size the detention ponds. The standard flow control requirements are stormwater discharge shall match developed discharge durations to pre-developed durations from 50% of the 2-year peak flow up to the full 50-year peak flow. According to the WWHM 2012 user manual, the program automatically checks these stream protection flow duration criteria when determining if a stormwater facility passes the Ecology's standard flow control requirements.

Predeveloped Site Hydrology

In summary, the project proposes to construct a series of catch basins and pipes that will collect and convey stormwater runoff to a new onsite detention pond on the west area of the project site and two detention vaults located in the eastern area of the project site. The detention facilities will release runoff at controlled release rates to the offsite storm conveyance system located in the right-of-way of State Hwy 305 NE. The total area of the project is 25.414 acres. In the predeveloped condition, the project disturbance areas have been modeled as C, Forest, Steep. Target surface areas which could not be conveyed to the onsite flow control facilities were modeled as bypass. Refer to Table 4.1 below for the hydrology model predeveloped inputs and Figure 4.1 for Pre-Developed Basin Map.

Table 4.1: Hydrology Model - Predeveloped Land Cover Types

Threshold Discharge Area #1				
Area	C, Forest, Steep sf (ac)	C, Lawn Steep sf (ac)	Imperv., Steep sf (ac)	Total sf (ac)
West Basin	1,093,350 (25.100)	-	-	1,093,350 (25.100)
West Basin (Bypass)	11,015 (0.253)	-	-	11,015 (0.253)
Total West Basin	1,104,365 (25.353)	-	-	1,104,365 (25.353)
East Basin	90,384 (2.075)	-	-	90,384 (2.075)
East Basin (Bypass)	-	-	-	-
Total East Basin	90,384 (2.075)	-	-	90,384 (2.075)
Total Project Site	1,194,749 (27.428)	-	-	1,194,749 (27.428)

Developed Site Hydrology

In the developed condition, developed lot impervious areas (walks, driveways, and buildings) were modeled as Rooftops/Flat and developed right-of-way areas (roads and sidewalk) were modeled as Roads/Mod. Pervious areas will receive amended soils and were therefore modeled as C, Pasture, Mod. Refer to Table 4.2 below for the hydrology model developed inputs and Figure 4.2 for Developed Basin Map.

Table 4.2: Hydrology Model - Developed Land Cover Types

Area	Impervious sf (ac)	Pervious* sf (ac)	Impervious Bypass sf (ac)	Pervious* Bypass sf (ac)	Total sf (ac)
Detention Pond (West Basin)					
142 Lots	367,884 (8.445)	254,284 (5.838)	-	-	622,168 (14.283)
Roads & Sidewalk	170,938 (3.924)	-	10,098 (0.232)	-	181,036 (4.156)
Pond Access (Road/Path)	16,620 (0.382)	-	-	-	16,620 (0.382)
Lawn (R.O.W./Tracts)	-	170,938 (3.924)	-	917 (0.021)	171,855 (3.945)
Total Area to Detention Pond	555,442 (12.751)	537,908 (12.349)	-	-	1,093,350 (25.100)
Total Area to Bypass Detention Pond	-	-	10,098 (0.232)	917 (0.021)	11,015 (0.253)
Detention Vault (East Basin)					
9 Lots	24,705 (0.567)	17,505 (0.402)	-	-	42,210 (0.969)
Roads & Sidewalk	21,967 (0.504)	-	-	-	21,967 (0.504)
Vault Access Road	4,629 (0.106)	-	-	-	4,629 (0.106)
Lawn (R.O.W./Tracts)	-	21,578 (0.495)	-	-	21,578 (0.495)
Total Area to Detention Vault	51,301 (1.178)	39,083 (0.897)	-	-	90,384 (2.075)
Project Total					
Project Total	606,743 (13.929)	576,991 (13.246)	10,098 (0.232)	917 (0.021)	1,194,749 (27.428)

*BMP T5.13: Post-Construction Soil Quality and Depth allows "Lawn" to be modeled as "Pasture".

On-Site Stormwater Management System

In the developed condition, native vegetation is not preserved within the project's disturbance limits. List #2 is required for this project using Figure 2.5.1 A from the Supplemental Manual. BMP T5.13: Post-Construction Soil Quality and Depth and BMP T5.10C: Perforated Stub-out Connections may be feasible and will be considered during future building permit application. The area of lawn that will use BMP T5.13 consists of pervious lot areas, open space tracts, pond tracts, and new landscaping within the ROW. Refer to Section 5: Minimum Requirement #5 for more detail.

Water Quality System

This project proposes to create more than 5,000 square feet of Pollution Generating Hard Surface (PGHS); therefore, the construction of stormwater treatment facilities is required. This site is a residential project and does not require phosphorus control. The site's stormwater runoff is tributary to Barrantes Creek, two unnamed onsite streams, and Liberty Bay. Liberty Bay is listed as a Category 5 (303d) waterbody for Dissolved Oxygen. The project is required to provide enhanced treatment and a spill control type oil/water separator based on the City's pre-application summary letter for the development. Enhanced Treatment of site stormwater is proposed to be met with the use of two manufactured treatment devices approved for enhanced treatment. An oil/water separator will also be provided upstream of each detention facility.

Enhanced Stormwater Treatment:

The required level of water quality treatment mitigation for the project site is Enhanced Water Quality Treatment. The treatment systems will be located downstream of each of the detention facilities. The 2-year release rate for each detention facility was calculated utilizing WWHM and is based on the tributary area for each treatment system, as provided in Table 4.3 and depicted in Figure 4.2. With the use of these design flow rates, the size of each treatment system can be calculated.

Table 4.3 - Water Quality Basin Summary

Water Quality Area	Impervious sf (ac)	Pervious sf (ac)	Total sf (ac)	Peak Off- Line Flow (15-minute) cfs
West Basin (Pond) - West WQ Treatment Facility #1	362,451 (8.321)	242,738 (5.572)	605,188 (13.893)	1.222 (POC #2)
West Basin (Pond) - East WQ Treatment Facility #2	176,372 (4.049)	120,964 (2.777)	297,335 (6.826)	0.592 (POC #3)
East Basin (Vault) WQ Treatment Facility #3	51,301 (1.178)	39,083 (0.897)	90,384 (2.075)	0.358 (POC #1)

Three underground BioPod Biofilter units are proposed to achieve the enhanced treatment standard. Oldcastle Infrastructure, Inc.'s BioPod Biofilters have a General Use Level Designation by the Washington State Department of Ecology's (DOE) Emerging stormwater treatment technical program for enhanced treatment.

These media filter systems are flow-based and required to treat the full 2-year release rate if located downstream of a detention facility. For treatment installed upstream of the detention facility, the water quality design flow rate is the peak 15-minute water quality treatment design

flow rate as calculated using WWHM. The approved flow capacity listed by the DOE for BioPod Biofilters is as follows:

WQ Unit #1 Sizing (West Basin - Pond 'West Treatment Facility')
Required Treatment Flow Rate: 1.222 cfs

Proposed BioPod Biofilter Unit: 15' x 32'
Max. Treatment Flow Rate: 1.270 cfs

WQ Unit #2 Sizing (West Basin - Pond 'East Treatment Facility')
Required Treatment Flow Rate: 0.592 cfs

Proposed BioPod Biofilter Unit: 10' x 24'
Max. Treatment Flow Rate: 0.720 cfs

WQ Unit #3 Sizing (East Basin - Vault #1)
Required Treatment Flow Rate: 0.358 cfs

Proposed BioPod Biofilter Unit: 8' x 16'
Max. Treatment Flow Rate: 0.384 cfs

Flow Control System

This project proposes to create more than 10,000 square feet of total effective impervious surface in a TDA; therefore, flow control must be provided to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions. A new detention pond and detention vault are proposed to meet this requirement.

West Basin (Detention Pond):

The flow control system proposed for the western area of the site is a detention pond located at a low point on the southwest end of the project site. The proposed detention pond has been designed based on the design criteria and methods of analysis from the SWMMWW.

East Basin (Detention Vault):

The flow control system proposed for the eastern area of the site is a detention vault located at low point on the southeast end of the project site. The proposed detention vault has been designed based on the design criteria and methods of analysis from the SWMMWW.

Design Criteria

The onsite flow control facilities consist of a detention pond and a detention vault, each with a three-orifice control riser. The detention pond will discharge detained stormwater to an onsite stream (Barrantes Creek) on the western side of the project site. The detention vault in the east basin will discharge detained stormwater to an onsite stream located on the eastern side of the project site. The control riser orifices and the detention volumes have been sized to release detained stormwater at rates compliant with the performance standards discussed previously based on the pre-developed and developed land use basins.

Tables 4.4A & 4.4B below summarize the input values used to evaluate each of the proposed ponds.

Flow Bypass (Sec III-2.4 Stormwater Manual)

On some sites, topography can make it difficult or costly to collect all target surface runoff for conveyance to the onsite flow control facility. Compensatory mitigation by the flow control facility must be provided so that the net effect at the point of convergence downstream is the same with or without the bypass.

A small portion of the developed site and offsite improvements will bypass the detention facilities unmitigated and are not traded for a non-target surface. As shown on the developed basin map, Figure 4.2, this includes portions of new onsite and offsite roadway. These areas have been mitigated for in the detention analysis and considered mitigated bypass.

- 1) *Runoff from both the bypass area and the Flow Control BMP converges within a quarter-mile downstream of the project site discharge location.*

Response: Project bypass and flow control facility discharge will converge within a quarter-mile.

- 2) *The Flow Control BMP is designed to compensate for the uncontrolled bypass area such that the net effect at the point of convergence downstream is the same with or without bypass.*

Response: Compensatory mitigation has been provided as a part of the proposed flow control facility so that the net effect at the point of convergence downstream is the same with or without the bypass.

- 3) *The 100-year peak discharge from the bypass area will not exceed 0.4 cfs.*

Response: The increase in the 100-year peak discharge is less than 0.4 cfs as shown in the WWHM report titled "Detention Pond (West Basin)" under POC #2. See Appendix A for WWHM report.

- 4) *Runoff from the bypass area will not create a significant adverse impact to downstream drainage systems or properties.*

Response: A significant adverse impact to the downstream drainage system is not anticipated.

- 5) *Runoff Treatment requirements applicable to the bypass area are met.*

Response: Applicable water quality requirements have been met. Less than 5,000 sf of new plus replaced PGHS (Approx 4,969 sf) will bypass untreated.

Table 4.4A Detention Pond Parameters (West Basin)

Parameter	WWHM input	Proposed
Bottom Square footage	21,200 sf	27,134 sf
Storage Depth	10 ft	10 ft
Effective Depth	11 ft	11 ft
Side Slopes	2:1	2:1
Total Live Storage	280,518 cf (6.440 ac-ft)	373,261 cf (8.569 ac-ft)

Table 4.4B Detention Vault Parameters (East Basin)

Parameter	WWHM Input	Proposed
Bottom Square footage	1,300 sf	1,300 sf
Storage Depth	5 ft	5 ft
Effective Depth	6 ft	6 ft
Total Live Storage	6,500 cf (0.149 ac-ft)	6,500 cf (0.149 ac-ft)

Tables 4.5A & 4.5B below show that the peak flows for the proposed detention facilities meet the standard flow control requirements from WWHM. Refer to Appendix A for the Hydraulic / Hydrologic Analysis and Modeling Results.

Table 4.5A: Detention Pond Hydrology Model Peak Flows (West Basin)

Return Period	Flow (cfs)	
	Predeveloped	Developed
2-year	2.200	1.171
10-year	4.941	2.139
25-year	6.815	2.752
50-year	8.449	3.267
100-year	10.304	3.836

Table 4.5B: Detention Vault Hydrology Model Peak Flows (East Basin)

Return Period	Flow (cfs)	
	Predeveloped	Developed
2-year	0.348	0.358
10-year	0.782	0.498
25-year	1.070	0.576
50-year	1.317	0.638
100-year	1.593	0.702

Conventional Conveyance System Analysis and Design

The proposed conveyance system was sized to accommodate the design event in the Supplemental Manual. All public pipe systems were designed to convey the 25-year, 24-hour peak flow rate without surcharging (the water depth in the pipe must not exceed 90% of the pipe diameter). The Conventional Conveyance System Analysis and Design will be provided with the Final Stormwater Site Plan Report.

PREDEVELOPED BASIN MAP

PARCELS 232601-4-001-2009, 242601-3-003-2008,
242601-3-018-2001, AND 242601-3-005-2006

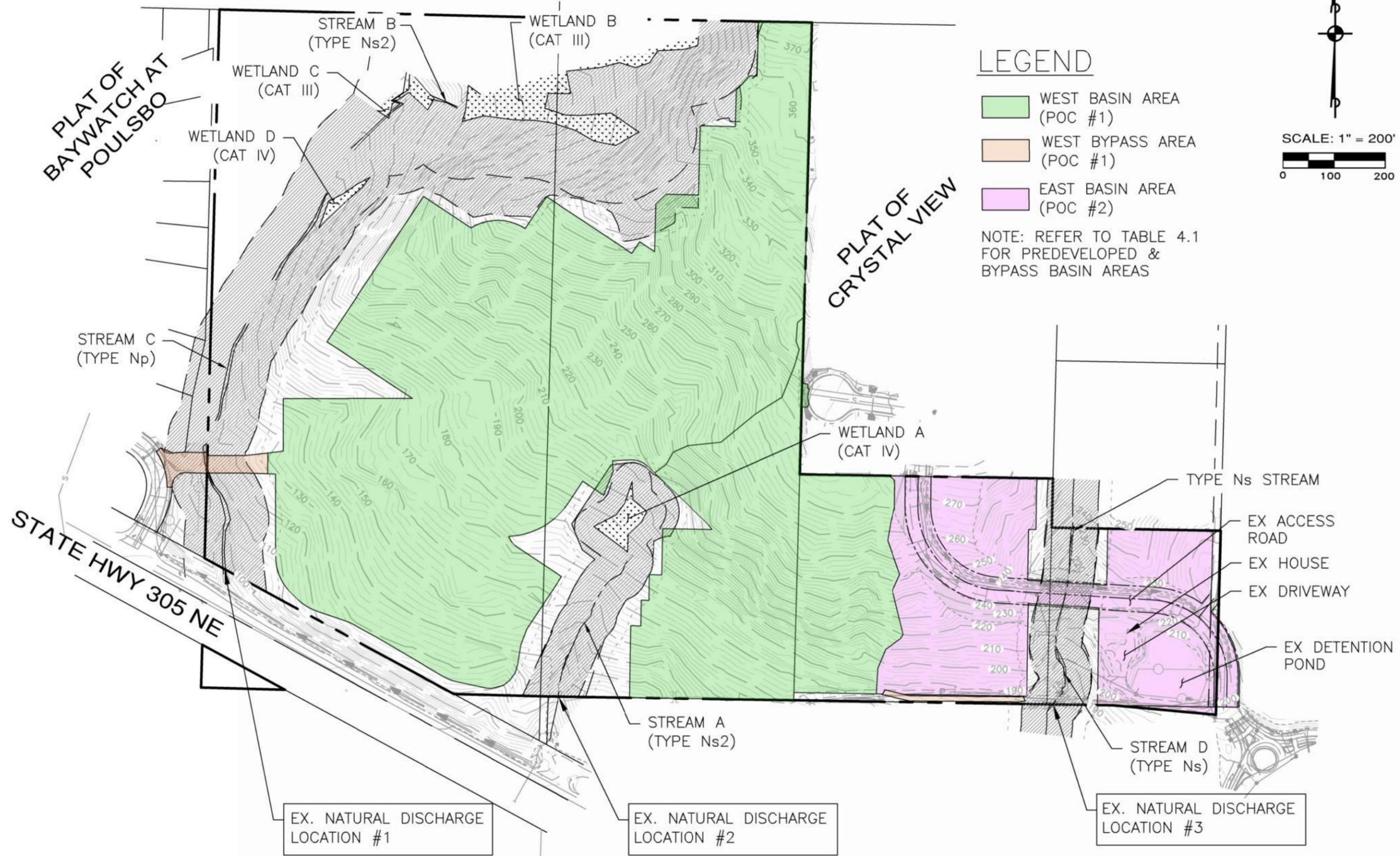


FIGURE 4.1

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DRAWING: DEVELOPED BASIN MAP



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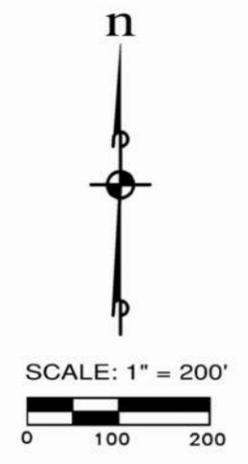
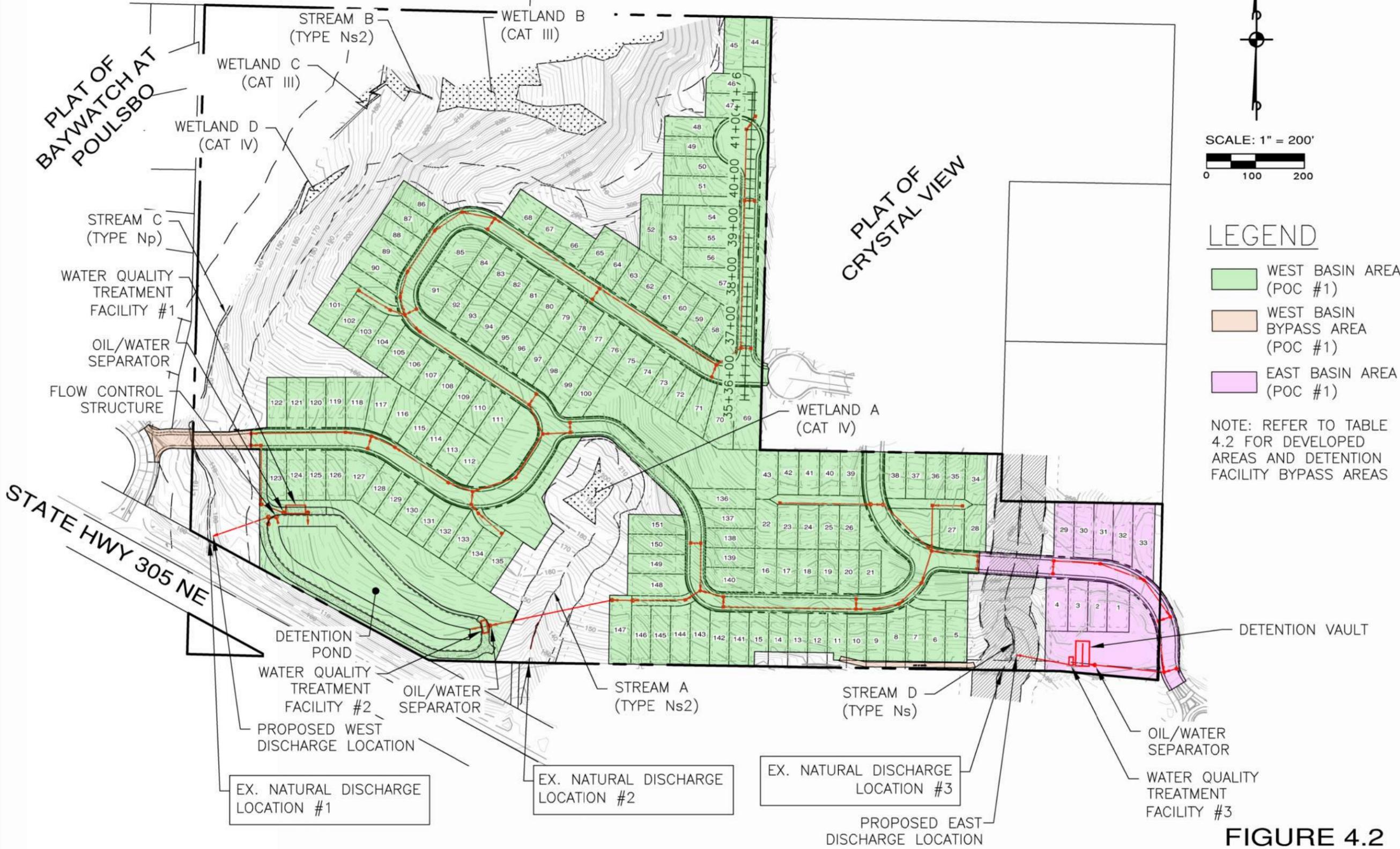
MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY

PREDEVELOPED BASIN MAP

DEVELOPED BASIN MAP

PARCELS 232601-4-001-2009, 242601-3-003-2008,
242601-3-018-2001, & 242601-3-005-2006



LEGEND

- WEST BASIN AREA (POC #1)
- WEST BASIN BYPASS AREA (POC #1)
- EAST BASIN AREA (POC #1)

NOTE: REFER TO TABLE 4.2 FOR DEVELOPED AREAS AND DETENTION FACILITY BYPASS AREAS

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 DEVELOPED BASIN MAP

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FIGURE 4.2

5. DISCUSSION OF MINIMUM REQUIREMENTS

All minimum requirements apply to the new and replaced hard surfaces and converted vegetation areas using Figure I-3.1 from the SWMMWW. Below, each minimum requirement is listed and how the project satisfies them.

Minimum Requirement #1 - Preparation of Stormwater Site Plans

This SSP report and accompanying plans satisfy this requirement.

Minimum Requirement #2 - Construction Stormwater Pollution Prevention Plan

The project site will be cleared and graded per the approved TESC plans and following the guidelines of a Construction Stormwater Pollution Prevention Plan (CSWPPP). A SWPPP and Erosion and Sedimentation Control plans will be provided during the Final Engineering review process.

Minimum Requirement #3 - Source Control of Pollution

Source Control BMPs will be identified in the SWPPP provided during the Final Engineering review process.

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

The natural discharge location for the project site's west basin is the public conveyance system located along State Hwy 305 NE. The natural discharge location for the project site's east basin is the buffer associated with an onsite stream. Stormwater discharge from the project site will be routed to these areas to maintain the natural drainage pattern.

Minimum Requirement #5 - On-site Stormwater Management

List #2 is required for this project using Figure 2.5.1 A from the Supplemental Manual. Below, each On-Site Stormwater Management BMP is considered for each surface in the order they are given in List #2. Each BMP was determined to be infeasible prior to continuing to the next BMP for that surface on the list:

Lawn and landscaped areas:

1. BMP T5.13: Post-Construction Soil Quality and Depth:

All disturbed areas which will not receive hard surfacing in the post-developed condition shall utilize amended soils.

Roofs:

1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration

The design criteria for full dispersion cannot be met; the site cannot accommodate a 100-foot native vegetation flow path. The design criteria for full infiltration also cannot be met; the geotechnical report indicates the presence of glacial till soils and perched water table which are too shallow to allow for sufficient separation from infiltration BMPs.

2. BMP T7.30: Bioretention Cells, Swales, and Planter Boxes

The design criteria for bioretention cannot be met; the geotechnical report indicates the presence of glacial till soils and perched water table which are too shallow to allow for sufficient separation from infiltration BMPs.

3. BMP T5.10B: Downspout Dispersion Systems

The design criteria for downspout dispersion cannot be met; the site cannot accommodate minimum lengths for vegetated flow path segments. Therefore, this BMP is infeasible.

4. BMP T5.10C: Perforated Stub-out Connections

Perforated stub-out connections may be feasible for the individual lots. Further evaluation will be provided once the building footprints and finished grade surfaces are known. To be provided with future building permit applications.

Other Hard Surfaces:

1. BMP T5.30: Full Dispersion

The design criteria for full dispersion cannot be met; the site cannot accommodate a 100-foot native vegetation flow path. Therefore, this BMP is infeasible.

2. BMP T5.15 Permeable Pavements

The design criteria for permeable pavement cannot be met; the geotechnical report indicates the presence of glacial till soils and perched water table which are too shallow to allow for sufficient separation from infiltration BMPs. Therefore, this BMP is infeasible.

3. BMP T7.30: Bioretention Cells, Swales, and Planter Boxes

The design criteria for bioretention cannot be met; the geotechnical report indicates the presence of glacial till soils and perched water table which are too shallow to allow for sufficient separation from infiltration BMPs.

4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion

Sheet and Concentrated Flow Dispersion were evaluated as an option to manage runoff from the plat's infrastructure improvements. There is limited space available to disperse runoff through the required 10 to 25 of vegetation within the ROW or proposed tracts. Sheet flow may be feasible for the individual lots. Further evaluation will be provided once the building footprints and finished grade surfaces are known. To be provided with future building applications.

Minimum Requirement #6 - Runoff Treatment

Refer to Section 4: Water Quality System for more information.

Minimum Requirement #7 - Flow Control

The following circumstances require achievement of the standard flow control requirement for western Washington:

1. Projects in which the total of effective impervious surfaces is 10,000 square feet or more in a threshold discharge area, or

2. Projects that convert $\frac{3}{4}$ acres or more of vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area, and from which there is a surface discharge in a natural or manmade conveyance system from the site, or
3. Projects that through a combination of effective hard surfaces and converted vegetation areas cause a 0.15 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area as estimated using the Western Washington Hydrology Model or other approved continuous simulation model and 15-minute time steps.

This project totals more than 10,000 square feet of effective impervious surfacing and is therefore subject to the standard flow control requirement for Western Washington. Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover.

To achieve this standard, a detention pond and two detention vaults are proposed with multi-orifice riser structures to provide metered release of detained stormwater to the required standard. See Sections 5 and 8 of the report for further design details.

Refer to Section 4: Flow Control System for more information on the detention facilities.

Minimum Requirement #8 - Wetlands Protection

Four delineated wetlands exist on the project site. A Wetland Mitigation Plan has been prepared by Sewall Wetland Consulting, Inc. for management actions that will be implemented to minimize or avoid deleterious changes to these wetlands. According to Figure I-3.5 of the SWMMWW, the project is required to apply the following levels of wetland protection to the TDA.

- General Protection
- Protection from Pollutants

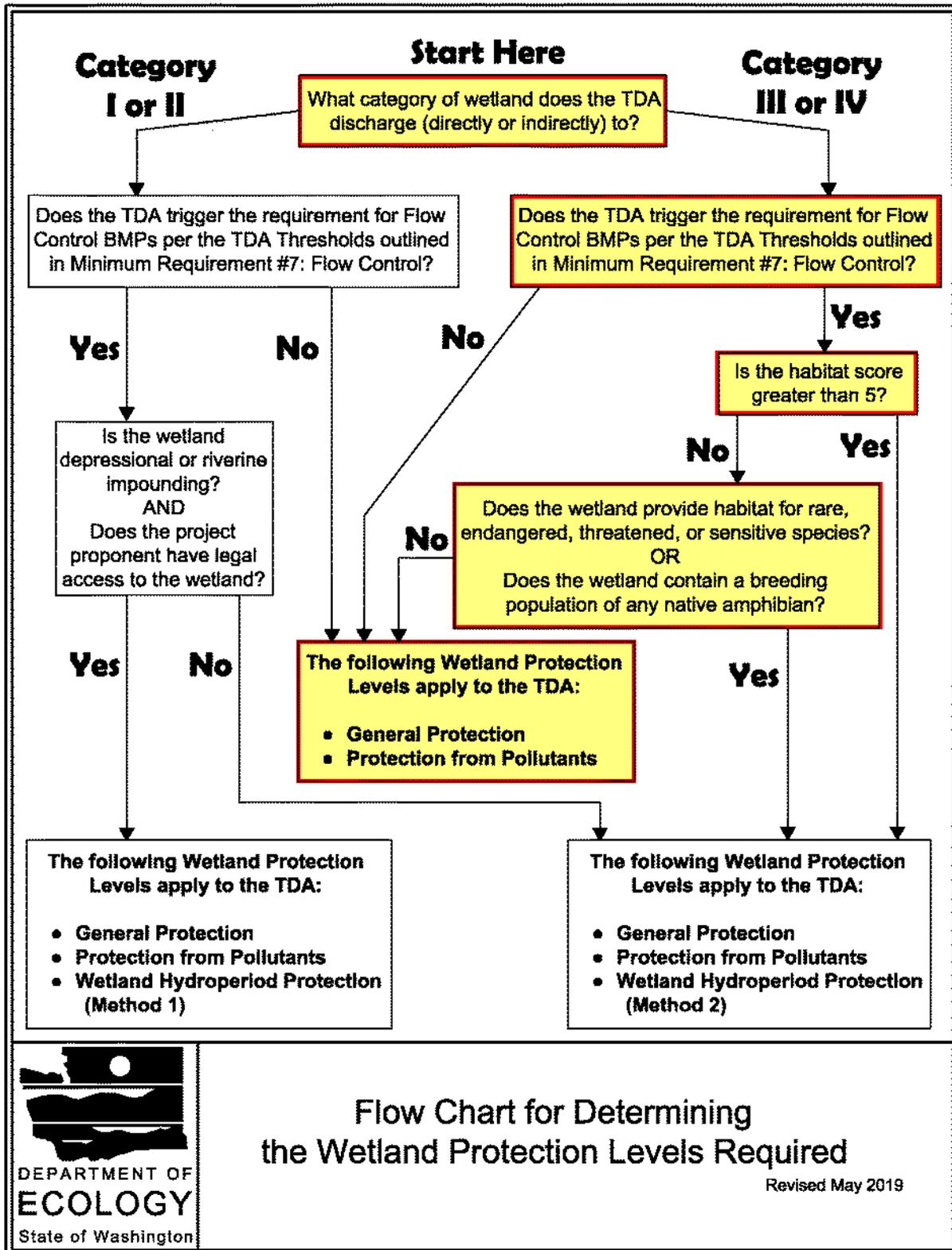
Refer to Figure I-3.5 at the end of this section for the Flow Chart for Determining Wetland Protection Level Requirements for level of protection required.

Minimum Requirement #9 - Operations and Maintenance

The Operations and Maintenance Manual will be provided during the Final Engineering review process.

Wetland A (Category IV, habitat score of 4)

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

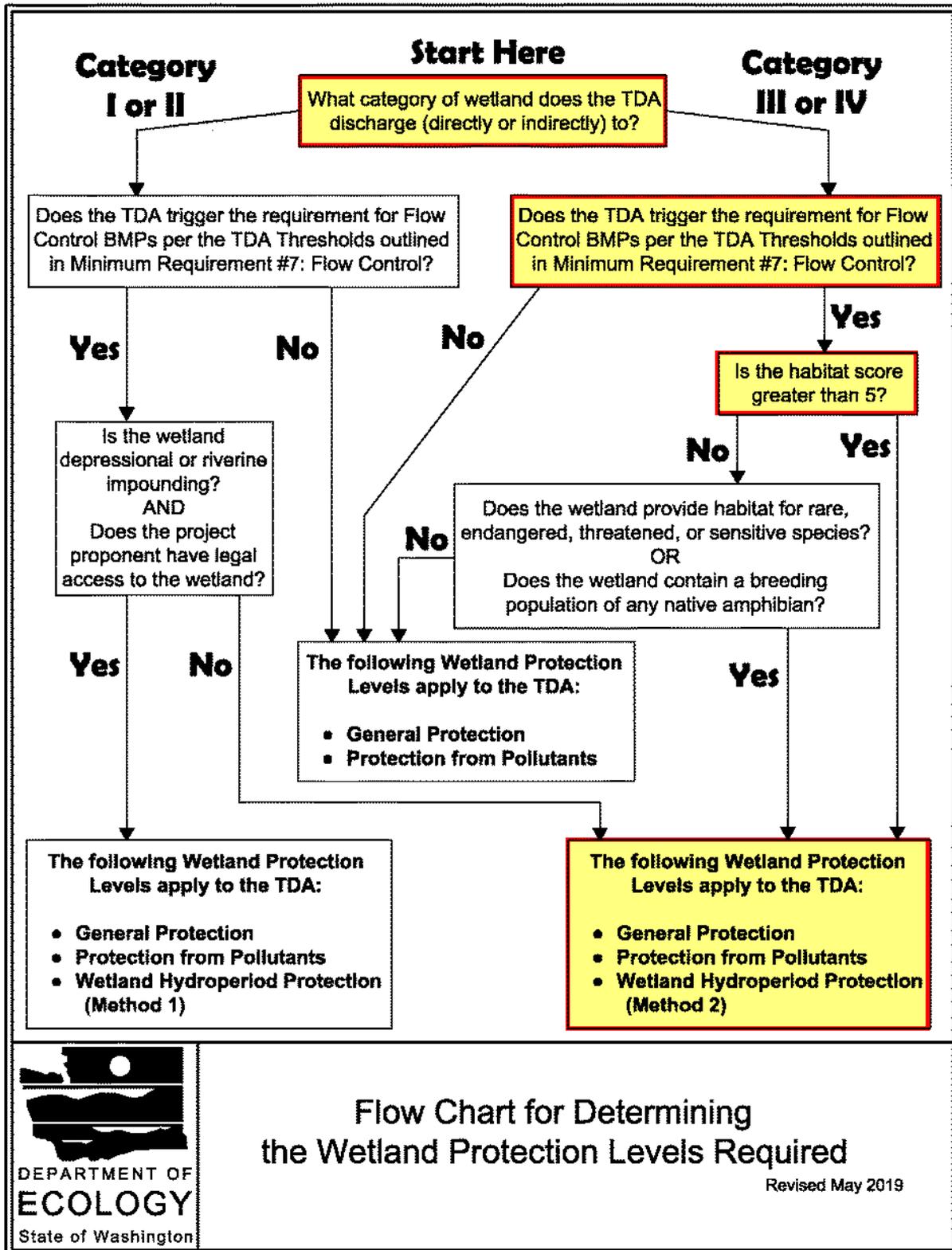


Flow Chart for Determining
the Wetland Protection Levels Required

Revised May 2019

Wetland B (Category III, habitat score of 6)

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

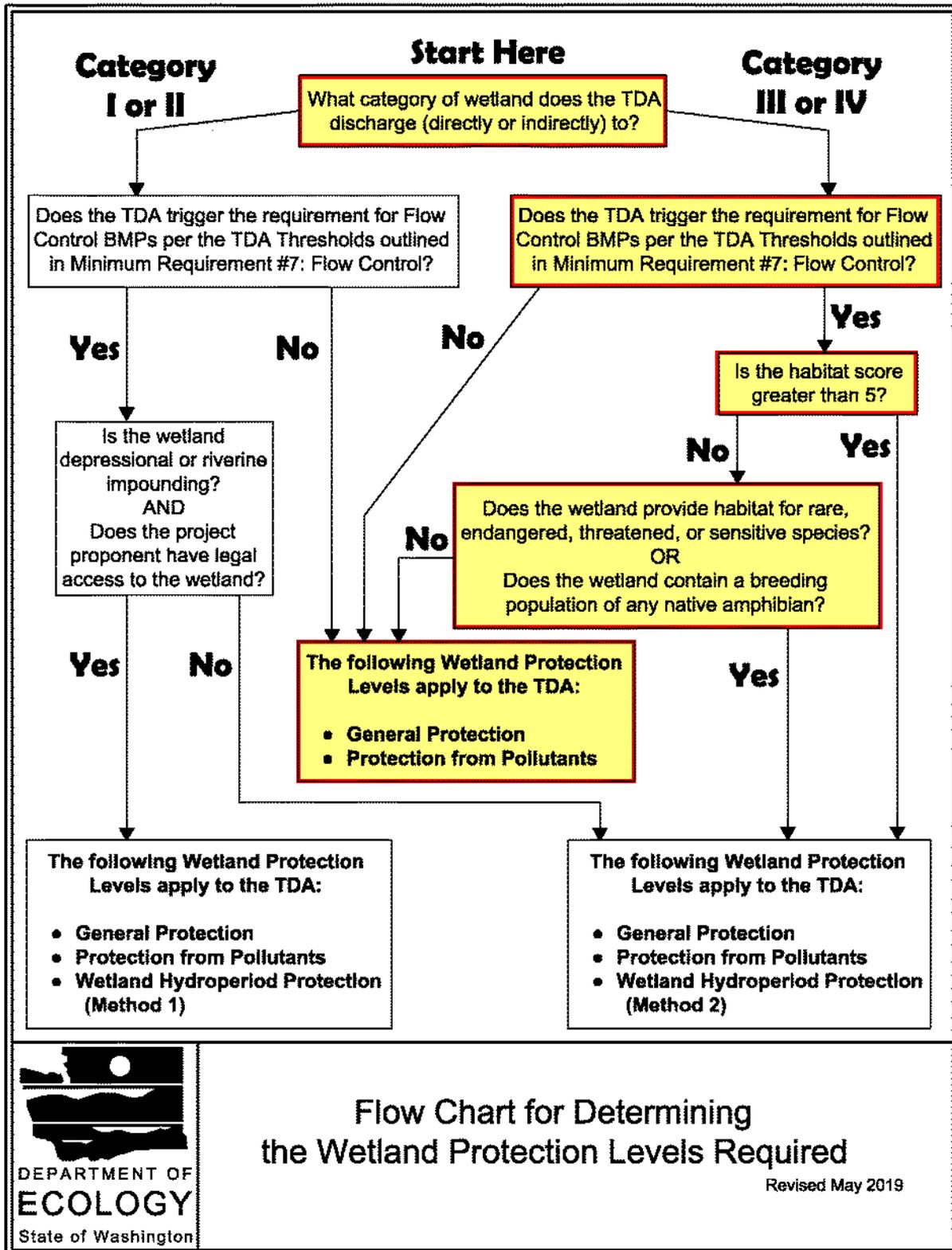


Flow Chart for Determining
the Wetland Protection Levels Required

Revised May 2019

Wetland C (Category III, habitat score of 5)

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

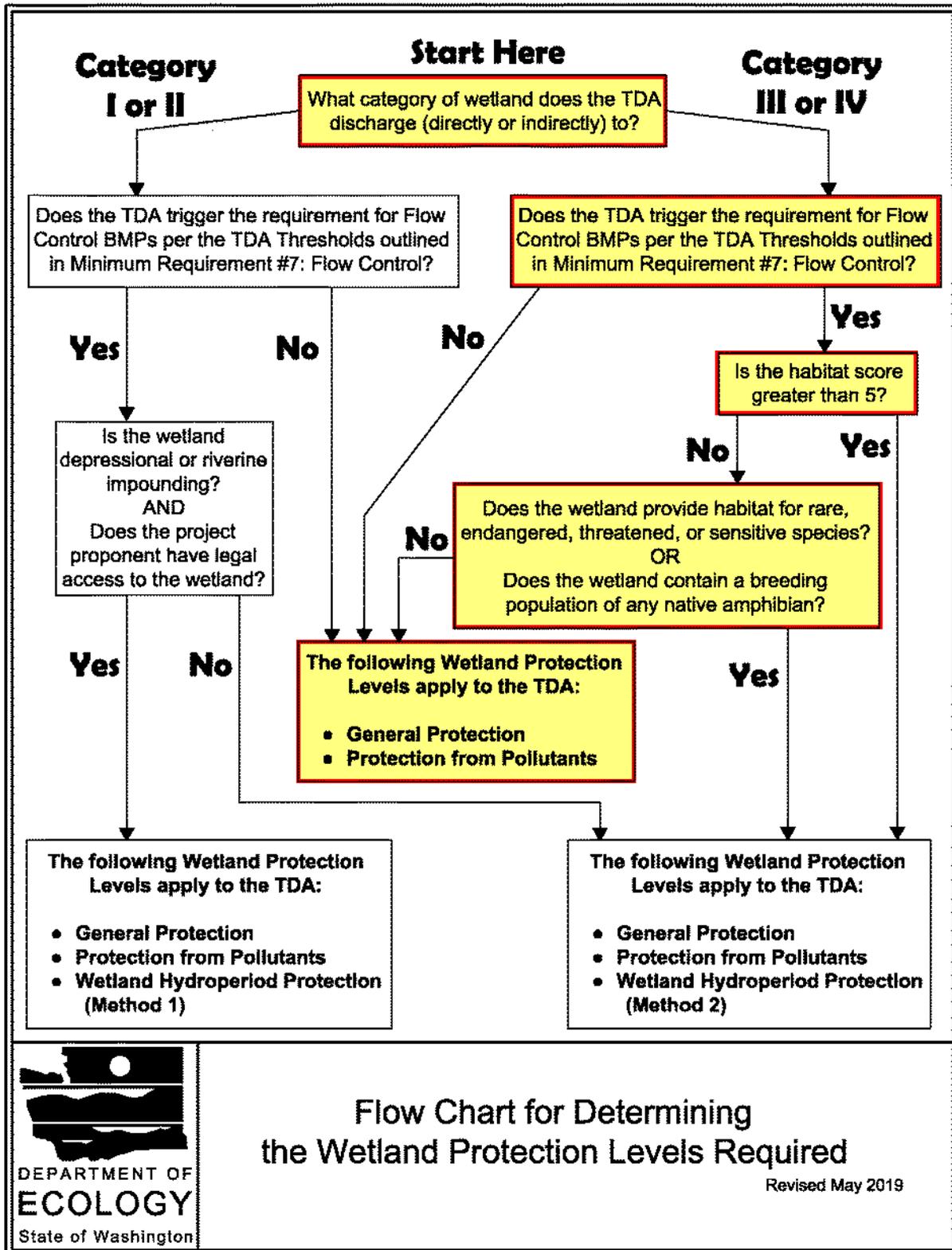


Flow Chart for Determining
the Wetland Protection Levels Required

Revised May 2019

Wetland D (Category IV, habitat score of 4)

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



6. Construction Stormwater Pollution Prevention Plan (SWPPP)

A Construction Stormwater Pollution Prevention Plan will be provided during Final Engineering submittal. The SWPPP will address the 13 required elements from the Washington State Department of Ecology and the construction drawings will contain full Erosion and Sedimentation Control Plans, Notes and Details.

7. Special Reports and Studies

The following reports were prepared for this project and are included as an appendix within this report:

- *Geotechnical Engineering Report*, Aspect Consulting, Dated February 13, 2025. See Appendix 'B' of this report and addendum.
- *City of Poulsbo Critical Area Report - Parcels #2322260114001-2009 & 2008*, Sewall Wetland Consulting, Inc., Dated February 20, 2025. This report has been included with the submittal documents.

8. Other Permits

Building and NPDES permits will be required for this project, together with permits for utility connections. An Army Corp of Engineers Section 404 permit will also be required.

9. Operations and Maintenance Manual

An Operation and Maintenance Manual will be provided in the appendix of this report during the final engineering submittal.

Appendix A - Hydrology Model Output

WWHM2012

PROJECT REPORT

DETENTION POND
(WEST BASIN)

General Model Information

WWHM2012 Project Name: 2025-06-19 - Pond

Site Name: Pinnacle at Liberty Bay

Site Address:

City: Poulsbo

Report Date: 6/20/2025

Gage: Quilcene

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.800

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

Landuse Basin Data

Predeveloped Land Use

Pre-Developed Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 20.384
Pervious Total	20.384
Impervious Land Use	acre
Impervious Total	0
Basin Total	20.384

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Pre-Developed Bypass Basin

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 0.253
Pervious Total	0.253
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.253

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Pre-Developed Bypass Flows

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 0.253
Pervious Total	0.253
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.253

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

Mitigated Land Use

Developed Pond Basin

Bypass: No

GroundWater: No

Pervious Land Use acre
C, Pasture, Mod 12.349

Pervious Total 12.349

Impervious Land Use acre
ROADS MOD 4.306
ROOF TOPS FLAT 8.445

Impervious Total 12.751

Basin Total 25.1

Element Flow Components:

Surface Interflow Groundwater

Component Flows To:

Trapezoidal Pond 1 Trapezoidal Pond 1

Developed Bypass Basin

Bypass:	Yes
GroundWater:	No
Pervious Land Use C, Pasture, Mod	acre 0.021
Pervious Total	0.021
Impervious Land Use ROADS MOD	acre 0.232
Impervious Total	0.232
Basin Total	0.253

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Developed Bypass Flows

Bypass:	No
GroundWater:	No
Pervious Land Use C, Pasture, Mod	acre 0.021
Pervious Total	0.021
Impervious Land Use ROADS MOD	acre 0.232
Impervious Total	0.232
Basin Total	0.253

Element Flow Components:		
Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 212.00 ft.
 Bottom Width: 100.00 ft.
 Depth: 11 ft.
 Volume at riser head: 6.4398 acre-feet.
 Side slope 1: 2 To 1
 Side slope 2: 2 To 1
 Side slope 3: 2 To 1
 Side slope 4: 2 To 1
 Discharge Structure
 Riser Height: 10 ft.
 Riser Diameter: 18 in.
 Orifice 1 Diameter: 3.625 in. Elevation:0 ft.
 Orifice 2 Diameter: 3.500 in. Elevation:6.2 ft.
 Orifice 3 Diameter: 3.688 in. Elevation:8.6 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

Pond Hydraulic Table

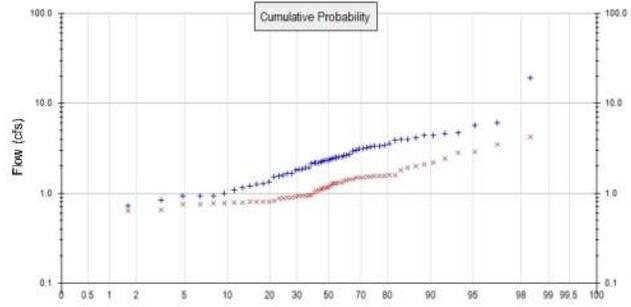
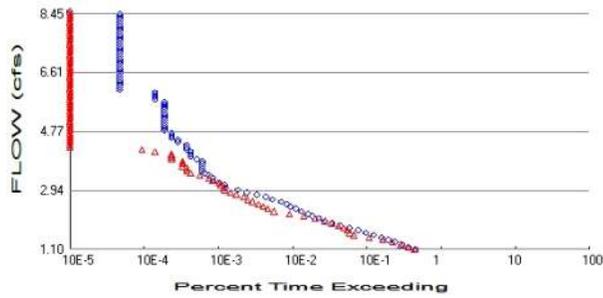
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.486	0.000	0.000	0.000
0.1222	0.490	0.059	0.124	0.000
0.2444	0.493	0.119	0.176	0.000
0.3667	0.497	0.180	0.215	0.000
0.4889	0.500	0.241	0.249	0.000
0.6111	0.504	0.302	0.278	0.000
0.7333	0.507	0.364	0.305	0.000
0.8556	0.511	0.426	0.329	0.000
0.9778	0.515	0.489	0.352	0.000
1.1000	0.518	0.552	0.374	0.000
1.2222	0.522	0.616	0.394	0.000
1.3444	0.525	0.680	0.413	0.000
1.4667	0.529	0.745	0.431	0.000
1.5889	0.533	0.809	0.449	0.000
1.7111	0.536	0.875	0.466	0.000
1.8333	0.540	0.941	0.482	0.000
1.9556	0.544	1.007	0.498	0.000
2.0778	0.547	1.074	0.514	0.000
2.2000	0.551	1.141	0.528	0.000
2.3222	0.555	1.209	0.543	0.000
2.4444	0.558	1.277	0.557	0.000
2.5667	0.562	1.345	0.571	0.000
2.6889	0.566	1.414	0.584	0.000
2.8111	0.570	1.484	0.597	0.000
2.9333	0.573	1.554	0.610	0.000
3.0556	0.577	1.624	0.623	0.000
3.1778	0.581	1.695	0.635	0.000
3.3000	0.585	1.766	0.647	0.000
3.4222	0.589	1.838	0.659	0.000
3.5444	0.592	1.910	0.671	0.000
3.6667	0.596	1.983	0.682	0.000
3.7889	0.600	2.056	0.694	0.000

3.9111	0.604	2.129	0.705	0.000
4.0333	0.608	2.204	0.716	0.000
4.1556	0.612	2.278	0.726	0.000
4.2778	0.616	2.353	0.737	0.000
4.4000	0.619	2.429	0.748	0.000
4.5222	0.623	2.505	0.758	0.000
4.6444	0.627	2.581	0.768	0.000
4.7667	0.631	2.658	0.778	0.000
4.8889	0.635	2.736	0.788	0.000
5.0111	0.639	2.814	0.798	0.000
5.1333	0.643	2.892	0.807	0.000
5.2556	0.647	2.971	0.817	0.000
5.3778	0.651	3.050	0.826	0.000
5.5000	0.655	3.130	0.836	0.000
5.6222	0.659	3.210	0.845	0.000
5.7444	0.663	3.291	0.854	0.000
5.8667	0.667	3.373	0.863	0.000
5.9889	0.671	3.454	0.872	0.000
6.1111	0.675	3.537	0.881	0.000
6.2333	0.679	3.619	0.951	0.000
6.3556	0.683	3.703	1.030	0.000
6.4778	0.687	3.787	1.082	0.000
6.6000	0.691	3.871	1.126	0.000
6.7222	0.695	3.956	1.164	0.000
6.8444	0.700	4.041	1.199	0.000
6.9667	0.704	4.127	1.232	0.000
7.0889	0.708	4.213	1.262	0.000
7.2111	0.712	4.300	1.291	0.000
7.3333	0.716	4.387	1.319	0.000
7.4556	0.720	4.475	1.346	0.000
7.5778	0.724	4.563	1.371	0.000
7.7000	0.729	4.652	1.396	0.000
7.8222	0.733	4.742	1.420	0.000
7.9444	0.737	4.832	1.444	0.000
8.0667	0.741	4.922	1.467	0.000
8.1889	0.745	5.013	1.489	0.000
8.3111	0.750	5.104	1.511	0.000
8.4333	0.754	5.196	1.532	0.000
8.5556	0.758	5.289	1.553	0.000
8.6778	0.763	5.382	1.676	0.000
8.8000	0.767	5.475	1.758	0.000
8.9222	0.771	5.569	1.823	0.000
9.0444	0.775	5.664	1.879	0.000
9.1667	0.780	5.759	1.930	0.000
9.2889	0.784	5.854	1.977	0.000
9.4111	0.788	5.951	2.022	0.000
9.5333	0.793	6.047	2.064	0.000
9.6556	0.797	6.145	2.105	0.000
9.7778	0.801	6.242	2.144	0.000
9.9000	0.806	6.341	2.182	0.000
10.022	0.810	6.439	2.271	0.000
10.144	0.815	6.539	3.123	0.000
10.267	0.819	6.639	4.413	0.000
10.389	0.824	6.739	5.833	0.000
10.511	0.828	6.840	7.093	0.000
10.633	0.832	6.942	7.981	0.000
10.756	0.837	7.044	8.580	0.000
10.878	0.841	7.146	9.091	0.000

11.000	0.846	7.249	9.569	0.000
11.122	0.850	7.353	10.02	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 20.637
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 12.37
 Total Impervious Area: 12.983

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	2.200395
5 year	3.701045
10 year	4.941218
25 year	6.814601
50 year	8.449484
100 year	10.303945

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	1.171111
5 year	1.715901
10 year	2.139485
25 year	2.751621
50 year	3.267035
100 year	3.836438

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	4.407	1.394
1950	1.322	0.809
1951	3.127	1.437
1952	1.518	0.870
1953	1.826	1.284
1954	4.391	1.574
1955	4.153	0.954
1956	19.054	1.498
1957	3.365	1.805
1958	4.559	0.888

1959	3.937	4.231
1960	2.338	1.319
1961	5.712	0.944
1962	1.651	1.060
1963	2.143	1.574
1964	1.812	0.761
1965	0.928	0.811
1966	4.739	0.936
1967	3.253	2.184
1968	3.133	1.523
1969	2.265	1.287
1970	2.327	1.512
1971	3.917	1.155
1972	3.202	0.922
1973	1.925	1.137
1974	2.499	2.821
1975	2.643	0.805
1976	3.404	1.022
1977	1.571	1.080
1978	2.722	1.148
1979	2.198	1.377
1980	1.667	0.867
1981	1.204	0.887
1982	1.075	0.794
1983	2.510	2.096
1984	0.925	0.646
1985	0.719	0.636
1986	2.175	1.548
1987	1.855	1.282
1988	1.558	1.106
1989	0.838	0.747
1990	0.987	0.927
1991	1.917	1.490
1992	2.166	2.409
1993	1.242	0.781
1994	2.955	3.521
1995	2.441	1.548
1996	3.020	1.938
1997	2.212	1.491
1998	2.540	1.547
1999	3.975	2.884
2000	1.288	0.782
2001	0.621	0.773
2002	6.010	1.213
2003	3.533	1.992
2004	1.143	0.755
2005	2.647	0.804
2006	3.354	1.424
2007	2.372	0.912
2008	2.455	1.307
2009	0.929	0.548

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	19.0536	4.2306
2	6.0105	3.5206
3	5.7117	2.8842

4	4.7387	2.8212
5	4.5592	2.4088
6	4.4067	2.1839
7	4.3911	2.0956
8	4.1532	1.9919
9	3.9751	1.9380
10	3.9372	1.8048
11	3.9169	1.5738
12	3.5333	1.5736
13	3.4038	1.5479
14	3.3653	1.5478
15	3.3544	1.5468
16	3.2527	1.5226
17	3.2022	1.5124
18	3.1334	1.4976
19	3.1268	1.4912
20	3.0204	1.4902
21	2.9554	1.4372
22	2.7216	1.4244
23	2.6468	1.3938
24	2.6430	1.3772
25	2.5403	1.3194
26	2.5104	1.3073
27	2.4990	1.2873
28	2.4549	1.2844
29	2.4405	1.2823
30	2.3717	1.2130
31	2.3379	1.1546
32	2.3268	1.1480
33	2.2647	1.1366
34	2.2117	1.1062
35	2.1975	1.0801
36	2.1751	1.0595
37	2.1661	1.0217
38	2.1432	0.9541
39	1.9253	0.9440
40	1.9166	0.9364
41	1.8554	0.9272
42	1.8265	0.9222
43	1.8117	0.9125
44	1.6674	0.8881
45	1.6509	0.8872
46	1.5713	0.8700
47	1.5581	0.8668
48	1.5176	0.8110
49	1.3223	0.8089
50	1.2876	0.8049
51	1.2418	0.8044
52	1.2037	0.7942
53	1.1428	0.7821
54	1.0755	0.7813
55	0.9870	0.7734
56	0.9289	0.7614
57	0.9280	0.7549
58	0.9248	0.7469
59	0.8377	0.6465
60	0.7188	0.6357
61	0.6208	0.5479

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.1002	9610	9353	97	Pass
1.1744	7800	7807	100	Pass
1.2487	6387	6192	96	Pass
1.3229	5142	4759	92	Pass
1.3971	4158	3482	83	Pass
1.4714	3362	2301	68	Pass
1.5456	2656	1427	53	Pass
1.6198	2067	1257	60	Pass
1.6941	1620	1167	72	Pass
1.7683	1244	1038	83	Pass
1.8425	949	879	92	Pass
1.9168	724	719	99	Pass
1.9910	577	580	100	Pass
2.0653	479	433	90	Pass
2.1395	397	302	76	Pass
2.2137	343	192	55	Pass
2.2880	280	120	42	Pass
2.3622	237	99	41	Pass
2.4364	199	86	43	Pass
2.5107	179	74	41	Pass
2.5849	149	62	41	Pass
2.6591	115	53	46	Pass
2.7334	92	47	51	Pass
2.8076	70	37	52	Pass
2.8818	52	31	59	Pass
2.9561	39	26	66	Pass
3.0303	27	25	92	Pass
3.1045	26	23	88	Pass
3.1788	22	22	100	Pass
3.2530	18	18	100	Pass
3.3273	18	16	88	Pass
3.4015	16	12	75	Pass
3.4757	14	9	64	Pass
3.5500	13	8	61	Pass
3.6242	13	8	61	Pass
3.6984	13	7	53	Pass
3.7727	13	7	53	Pass
3.8469	13	7	53	Pass
3.9211	11	5	45	Pass
3.9954	9	5	55	Pass
4.0696	9	5	55	Pass
4.1438	9	3	33	Pass
4.2181	8	2	25	Pass
4.2923	8	0	0	Pass
4.3665	8	0	0	Pass
4.4408	6	0	0	Pass
4.5150	6	0	0	Pass
4.5893	5	0	0	Pass
4.6635	5	0	0	Pass
4.7377	5	0	0	Pass
4.8120	4	0	0	Pass
4.8862	4	0	0	Pass
4.9604	4	0	0	Pass

5.0347	4	0	0	Pass
5.1089	4	0	0	Pass
5.1831	4	0	0	Pass
5.2574	4	0	0	Pass
5.3316	4	0	0	Pass
5.4058	4	0	0	Pass
5.4801	4	0	0	Pass
5.5543	4	0	0	Pass
5.6285	4	0	0	Pass
5.7028	4	0	0	Pass
5.7770	3	0	0	Pass
5.8513	3	0	0	Pass
5.9255	3	0	0	Pass
5.9997	3	0	0	Pass
6.0740	1	0	0	Pass
6.1482	1	0	0	Pass
6.2224	1	0	0	Pass
6.2967	1	0	0	Pass
6.3709	1	0	0	Pass
6.4451	1	0	0	Pass
6.5194	1	0	0	Pass
6.5936	1	0	0	Pass
6.6678	1	0	0	Pass
6.7421	1	0	0	Pass
6.8163	1	0	0	Pass
6.8905	1	0	0	Pass
6.9648	1	0	0	Pass
7.0390	1	0	0	Pass
7.1133	1	0	0	Pass
7.1875	1	0	0	Pass
7.2617	1	0	0	Pass
7.3360	1	0	0	Pass
7.4102	1	0	0	Pass
7.4844	1	0	0	Pass
7.5587	1	0	0	Pass
7.6329	1	0	0	Pass
7.7071	1	0	0	Pass
7.7814	1	0	0	Pass
7.8556	1	0	0	Pass
7.9298	1	0	0	Pass
8.0041	1	0	0	Pass
8.0783	1	0	0	Pass
8.1525	1	0	0	Pass
8.2268	1	0	0	Pass
8.3010	1	0	0	Pass
8.3752	1	0	0	Pass
8.4495	1	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: ~~3.153 acre-feet~~

On-line facility target flow: ~~3.2933 cfs.~~

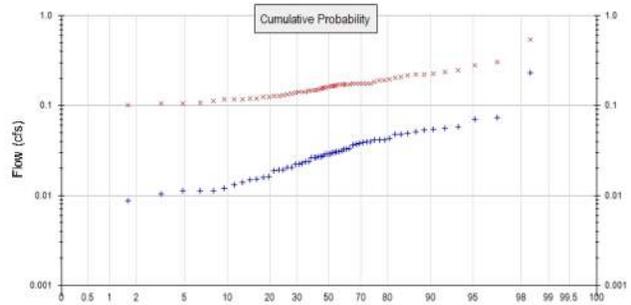
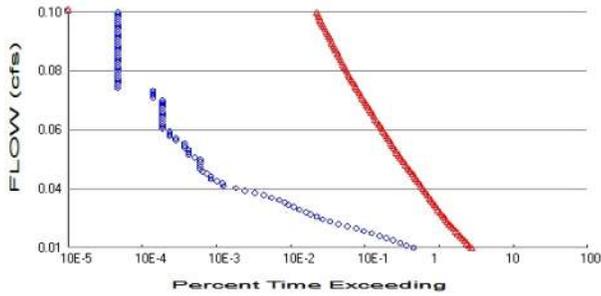
Adjusted for 15 min: ~~3.2933 cfs.~~

Off-line facility target flow: ~~1.8787 cfs.~~

Adjusted for 15 min: ~~1.8787 cfs.~~

See separate WWHM Report for
Pond WQ facility sizing.

POC 2



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2

Total Pervious Area: 0.253
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2

Total Pervious Area: 0.021
Total Impervious Area: 0.232

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	Flow(cfs)
2 year	0.026976
5 year	0.045373
10 year	0.060577
25 year	0.083544
50 year	0.103587
100 year	0.126321

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	0.154828
5 year	0.203062
10 year	0.238904
25 year	0.288813
50 year	0.32949
100 year	0.373292

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1949	0.054	0.210
1950	0.016	0.155
1951	0.038	0.174
1952	0.019	0.144
1953	0.022	0.117
1954	0.054	0.227
1955	0.051	0.283
1956	0.234	0.537
1957	0.041	0.189
1958	0.056	0.221
1959	0.048	0.164

1960	0.029	0.117
1961	0.070	0.220
1962	0.020	0.106
1963	0.026	0.160
1964	0.022	0.127
1965	0.011	0.087
1966	0.058	0.245
1967	0.040	0.166
1968	0.038	0.173
1969	0.028	0.170
1970	0.029	0.168
1971	0.048	0.192
1972	0.039	0.171
1973	0.024	0.119
1974	0.031	0.147
1975	0.032	0.157
1976	0.042	0.176
1977	0.019	0.112
1978	0.033	0.174
1979	0.027	0.165
1980	0.020	0.156
1981	0.015	0.125
1982	0.013	0.143
1983	0.031	0.194
1984	0.011	0.106
1985	0.009	0.137
1986	0.027	0.132
1987	0.023	0.147
1988	0.019	0.143
1989	0.010	0.105
1990	0.012	0.102
1991	0.023	0.128
1992	0.027	0.152
1993	0.015	0.131
1994	0.036	0.172
1995	0.030	0.118
1996	0.037	0.171
1997	0.027	0.147
1998	0.031	0.139
1999	0.049	0.202
2000	0.016	0.125
2001	0.008	0.175
2002	0.074	0.302
2003	0.043	0.177
2004	0.014	0.142
2005	0.032	0.183
2006	0.041	0.219
2007	0.029	0.239
2008	0.030	0.175
2009	0.011	0.120

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	0.2336	0.5372
2	0.0737	0.3020
3	0.0700	0.2829
4	0.0581	0.2446

5	0.0559	0.2386
6	0.0540	0.2266
7	0.0538	0.2207
8	0.0509	0.2197
9	0.0487	0.2191
10	0.0483	0.2102
11	0.0480	0.2019
12	0.0433	0.1939
13	0.0417	0.1918
14	0.0413	0.1892
15	0.0411	0.1830
16	0.0399	0.1773
17	0.0393	0.1755
18	0.0384	0.1754
19	0.0383	0.1749
20	0.0370	0.1739
21	0.0362	0.1739
22	0.0334	0.1725
23	0.0324	0.1720
24	0.0324	0.1715
25	0.0311	0.1710
26	0.0308	0.1701
27	0.0306	0.1680
28	0.0301	0.1660
29	0.0299	0.1649
30	0.0291	0.1642
31	0.0287	0.1596
32	0.0285	0.1572
33	0.0278	0.1563
34	0.0271	0.1551
35	0.0269	0.1517
36	0.0267	0.1470
37	0.0266	0.1468
38	0.0263	0.1465
39	0.0236	0.1435
40	0.0235	0.1431
41	0.0227	0.1426
42	0.0224	0.1422
43	0.0222	0.1390
44	0.0204	0.1372
45	0.0202	0.1322
46	0.0193	0.1310
47	0.0191	0.1282
48	0.0186	0.1269
49	0.0162	0.1253
50	0.0158	0.1251
51	0.0152	0.1198
52	0.0148	0.1193
53	0.0140	0.1175
54	0.0132	0.1172
55	0.0121	0.1168
56	0.0114	0.1125
57	0.0114	0.1065
58	0.0113	0.1062
59	0.0103	0.1048
60	0.0088	0.1016
61	0.0076	0.0872

Duration Flows

The Duration Matching **Failed**

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0135	9619	57942	602	Fail
0.0144	7809	53921	690	Fail
0.0153	6387	50242	786	Fail
0.0162	5140	46713	908	Fail
0.0171	4167	43590	1046	Fail
0.0180	3364	40746	1211	Fail
0.0189	2656	38008	1431	Fail
0.0199	2066	35505	1718	Fail
0.0208	1623	33302	2051	Fail
0.0217	1245	31228	2508	Fail
0.0226	949	29260	3083	Fail
0.0235	723	27506	3804	Fail
0.0244	577	25902	4489	Fail
0.0253	479	24469	5108	Fail
0.0262	397	23100	5818	Fail
0.0271	343	21817	6360	Fail
0.0280	280	20659	7378	Fail
0.0290	237	19556	8251	Fail
0.0299	199	18536	9314	Fail
0.0308	180	17614	9785	Fail
0.0317	149	16705	11211	Fail
0.0326	117	15909	13597	Fail
0.0335	92	15053	16361	Fail
0.0344	70	14273	20390	Fail
0.0353	52	13569	26094	Fail
0.0362	39	12897	33069	Fail
0.0372	27	12226	45281	Fail
0.0381	26	11599	44611	Fail
0.0390	22	10983	49922	Fail
0.0399	18	10412	57844	Fail
0.0408	18	9879	54883	Fail
0.0417	16	9330	58312	Fail
0.0426	14	8853	63235	Fail
0.0435	13	8378	64446	Fail
0.0444	13	7948	61138	Fail
0.0453	13	7495	57653	Fail
0.0463	13	7120	54769	Fail
0.0472	13	6746	51892	Fail
0.0481	11	6412	58290	Fail
0.0490	9	6066	67400	Fail
0.0499	9	5771	64122	Fail
0.0508	9	5508	61200	Fail
0.0517	8	5272	65900	Fail
0.0526	8	5031	62887	Fail
0.0535	8	4806	60075	Fail
0.0544	6	4577	76283	Fail
0.0554	6	4380	73000	Fail
0.0563	5	4167	83340	Fail
0.0572	5	3961	79220	Fail
0.0581	5	3779	75580	Fail
0.0590	4	3621	90525	Fail
0.0599	4	3463	86575	Fail
0.0608	4	3300	82500	Fail
0.0617	4	3138	78450	Fail

0.0626	4	2986	74650	Fail
0.0635	4	2862	71550	Fail
0.0645	4	2740	68500	Fail
0.0654	4	2603	65075	Fail
0.0663	4	2481	62025	Fail
0.0672	4	2353	58825	Fail
0.0681	4	2254	56350	Fail
0.0690	4	2156	53900	Fail
0.0699	4	2064	51600	Fail
0.0708	3	1982	66066	Fail
0.0717	3	1879	62633	Fail
0.0726	3	1804	60133	Fail
0.0736	3	1738	57933	Fail
0.0745	1	1651	165100	Fail
0.0754	1	1580	158000	Fail
0.0763	1	1511	151100	Fail
0.0772	1	1444	144400	Fail
0.0781	1	1379	137900	Fail
0.0790	1	1325	132500	Fail
0.0799	1	1273	127300	Fail
0.0808	1	1230	123000	Fail
0.0817	1	1187	118700	Fail
0.0827	1	1135	113500	Fail
0.0836	1	1090	109000	Fail
0.0845	1	1048	104800	Fail
0.0854	1	1008	100800	Fail
0.0863	1	977	97700	Fail
0.0872	1	946	94600	Fail
0.0881	1	904	90400	Fail
0.0890	1	865	86500	Fail
0.0899	1	835	83500	Fail
0.0908	1	806	80600	Fail
0.0918	1	781	78100	Fail
0.0927	1	759	75900	Fail
0.0936	1	726	72600	Fail
0.0945	1	698	69800	Fail
0.0954	1	671	67100	Fail
0.0963	1	637	63700	Fail
0.0972	1	615	61500	Fail
0.0981	1	591	59100	Fail
0.0990	1	565	56500	Fail
0.0999	1	548	54800	Fail
0.1009	1	532	53200	Fail
0.1018	1	516	51600	Fail
0.1027	1	500	50000	Fail
0.1036	1	478	47800	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #2

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.

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



Pre-Develope
Bypass
Basin
0.25ac

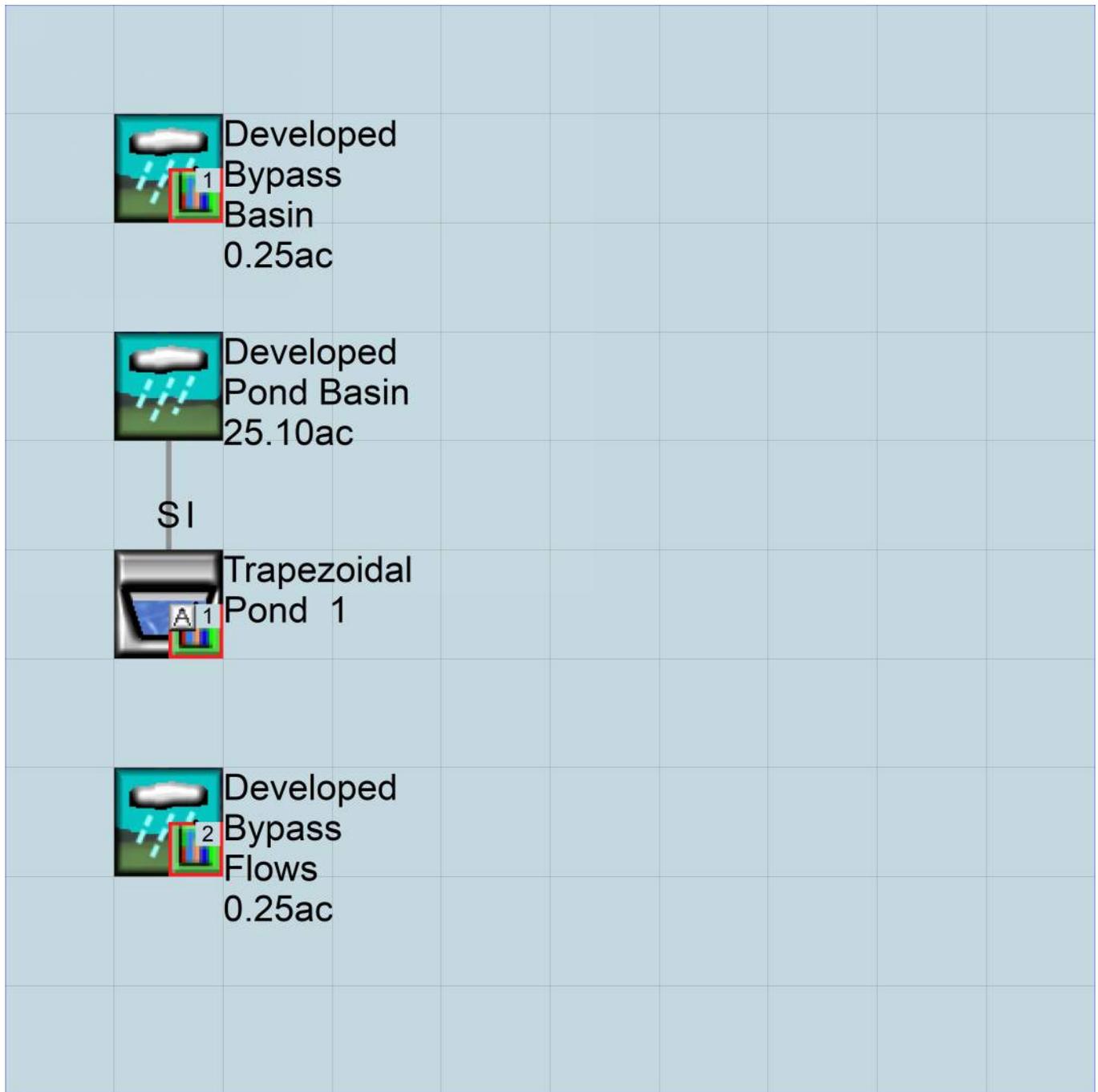


Pre-Develope
Pond Basin
20.38ac



Pre-Develope
Bypass
Flows
0.25ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 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      2025-06-19 - Pond.wdm
MESSU    25      Pre2025-06-19 - Pond.MES
          27      Pre2025-06-19 - Pond.L61
          28      Pre2025-06-19 - Pond.L62
          30      POC2025-06-19 - Pond1.dat
          31      POC2025-06-19 - Pond2.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND       12
  COPY         501
  COPY         502
  DISPLY       1
  DISPLY       2
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  1      Pre-Developed Pond Basin      MAX      1      2      30      9
  2      Pre-Developed Bypass Flow     MAX      1      2      31      9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
  1      1      1
  501    1      1
  502    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 ***
  12      C, Forest, Steep      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 ***
  12      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  *****
12  - 0  0  4  0  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 ***
12  - 0  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
12  - 0  4.5  0.08  400  0.15  0.5  0.996
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3          ***
# - # ***PETMAX  PETMIN  INFEXP  INFILD  DEEPFR  BASETP  AGWETP
12  - 0  0  2  2  0  0  0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4          ***
# - # CEPSC  UZSN  NSUR  INTFW  IRC  LZETP ***
12  - 0.2  0.3  0.35  6  0.3  0.7
END PWAT-PARM4

```

```

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS  SURS  UZS  IFWS  LZS  AGWS  GWVS
12  - 0  0  0  0  2.5  1  0
END PWAT-STATE1

```

END PERLND

IMPLND

```

GEN-INFO
<PLS ><-----Name-----> Unit-systems  Printer ***
# - # User t-series Engl Metr ***
in out ***

```

```

END GEN-INFO
*** Section IWATER***

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```


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>	#	#	***
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

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	#<-factor->	<Name>	#	#	***
MASS-LINK		12						
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN	
END MASS-LINK		12						
MASS-LINK		13						
PERLND	PWATER	IFWO		0.083333	COPY	INPUT	MEAN	
END MASS-LINK		13						

END MASS-LINK

END RUN

Mitigated UCI File

RUN

GLOBAL

WVHM4 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	2025-06-19 - Pond.wdm	
MESSU	25	Mit2025-06-19 - Pond.MES	
	27	Mit2025-06-19 - Pond.L61	
	28	Mit2025-06-19 - Pond.L62	
	31	POC2025-06-19 - Pond2.dat	
	30	POC2025-06-19 - Pond1.dat	

END FILES

OPN SEQUENCE

INGRP INDELT 00:15
PERLND 14
IMPLND 2
IMPLND 4
RCHRES 1
COPY 502
COPY 1
COPY 501
COPY 601
DISPLY 2
DISPLY 1

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

#	-	#	<-----Title----->	***	TRAN	PIVL	DIG1	FIL1	PYR	DIG2	FIL2	YRND
2			Developed Bypass Flows		MAX				1	2	31	9
1			Trapezoidal Pond 1		MAX				1	2	30	9

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

#	-	#	NPT	NMN	***
1			1	1	
502			1	1	
501			1	1	
601			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			***
14	C, Pasture, 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 ***
14 0 0 1 0 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 *****
14 0 0 4 0 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 ***
14 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
14 0 4.5 0.06 400 0.1 0.5 0.996
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
14 0 0 2 2 0 0 0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
14 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
14 0 0 0 0 2.5 1 0
END PWAT-STATE1

```

END PERLND

IMPLND

```

GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***
2 ROADS/MOD 1 1 1 27 0
4 ROOF TOPS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

```

```

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

```

```

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

```

```

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

```

```

2      0      0      0      0      0
4      0      0      0      0      0
END IWAT-PARM1

```

```

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

```

```

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

```

```

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

```

END IMPLND

```

SCHEMATIC
<-Source->      <--Area-->      <-Target->      MBLK      ***
<Name> #      <-factor->      <Name> #      Tbl#      ***
Developed Pond Basin***
PERLND 14      12.349      RCHRES 1      2
PERLND 14      12.349      RCHRES 1      3
IMPLND 2      4.306      RCHRES 1      5
IMPLND 4      8.445      RCHRES 1      5
Developed Bypass Basin***
PERLND 14      0.021      COPY 501      12
PERLND 14      0.021      COPY 601      12
PERLND 14      0.021      COPY 501      13
PERLND 14      0.021      COPY 601      13
IMPLND 2      0.232      COPY 501      15
IMPLND 2      0.232      COPY 601      15
Developed Bypass Flows***
PERLND 14      0.021      COPY 502      12
PERLND 14      0.021      COPY 502      13
IMPLND 2      0.232      COPY 502      15

*****Routing*****
PERLND 14      12.349      COPY 1      12
IMPLND 2      4.306      COPY 1      15
IMPLND 4      8.445      COPY 1      15
PERLND 14      12.349      COPY 1      13
RCHRES 1      1      COPY 501      16
END SCHEMATIC

```

```

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
COPY 502 OUTPUT MEAN 1 1 48.4      DISPLY 2      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 Engr Metr LKFG          ***
                        in out
1   Trapezoidal Pond-009 1 1 1 1 28 0 1
END GEN-INFO
*** Section RCHRES***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFQ PKFG PHFG ***
1   1 0 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 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 0.04 0.0 0.0 0.5 0.0
END HYDR-PARM2

```

```

HYDR-INIT
RCHRES Initial conditions for each HYDR section          ***
# - # *** VOL Initial value of COLIND Initial value of OUTDGT
      *** ac-ft for each possible exit for each possible exit
<-----><-----> <---><---><---><---><---> *** <---><---><---><---><--->
1   0 4.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

```

```

FTABLE 1
91 4
Depth Area Volume Outflow1 Velocity Travel Time***
(ft) (acres) (acre-ft) (cfs) (ft/sec) (Minutes)***
0.000000 0.486685 0.000000 0.000000 0.124667
0.122222 0.490192 0.059698 0.124667
0.244444 0.493710 0.119825 0.176305
0.366667 0.497239 0.180383 0.215929
0.488889 0.500780 0.241374 0.249333
0.611111 0.504331 0.302797 0.278763
0.733333 0.507893 0.364655 0.305369
0.855556 0.511466 0.426949 0.329837
0.977778 0.515050 0.489681 0.352610
1.100000 0.518645 0.552851 0.374000
1.222222 0.522251 0.616461 0.394230
1.344444 0.525867 0.680513 0.413472
1.466667 0.529495 0.745007 0.431857
1.588889 0.533134 0.809946 0.449492
1.711111 0.536784 0.875330 0.466459
1.833333 0.540445 0.941160 0.482831
1.955556 0.544117 1.007439 0.498666
2.077778 0.547799 1.074167 0.514013
2.200000 0.551493 1.141346 0.528915
2.322222 0.555198 1.208977 0.543409
2.444444 0.558913 1.277062 0.557526
2.566667 0.562640 1.345601 0.571294
2.688889 0.566378 1.414597 0.584738

```

2.811111	0.570126	1.484050	0.597880
2.933333	0.573886	1.553962	0.610739
3.055556	0.577656	1.624334	0.623333
3.177778	0.581438	1.695167	0.635677
3.300000	0.585230	1.766464	0.647786
3.422222	0.589034	1.838224	0.659673
3.544444	0.592848	1.910450	0.671350
3.666667	0.596674	1.983143	0.682827
3.788889	0.600510	2.056305	0.694114
3.911111	0.604358	2.129935	0.705220
4.033333	0.608216	2.204037	0.716155
4.155556	0.612085	2.278611	0.726924
4.277778	0.615965	2.353659	0.737537
4.400000	0.619857	2.429181	0.747999
4.522222	0.623759	2.505180	0.758317
4.644444	0.627672	2.581656	0.768496
4.766667	0.631596	2.658612	0.778542
4.888889	0.635532	2.736047	0.788460
5.011111	0.639478	2.813964	0.798255
5.133333	0.643435	2.892365	0.807931
5.255556	0.647403	2.971249	0.817493
5.377778	0.651382	3.050619	0.826944
5.500000	0.655372	3.130476	0.836288
5.622222	0.659373	3.210822	0.845529
5.744444	0.663385	3.291657	0.854671
5.866667	0.667408	3.372983	0.863715
5.988889	0.671442	3.454802	0.872666
6.111111	0.675487	3.537114	0.881525
6.233333	0.679542	3.619922	0.890384
6.355556	0.683609	3.703225	0.900094
6.477778	0.687687	3.787027	0.909753
6.600000	0.691776	3.871327	0.919362
6.722222	0.695876	3.956128	0.928921
6.844444	0.699986	4.041431	0.938430
6.966667	0.704108	4.127237	0.947889
7.088889	0.708241	4.213547	0.957308
7.211111	0.712384	4.300363	0.966677
7.333333	0.716539	4.387686	0.976006
7.455556	0.720705	4.475518	0.985295
7.577778	0.724881	4.563859	0.994544
7.700000	0.729069	4.652711	1.003753
7.822222	0.733267	4.742076	1.012922
7.944444	0.737477	4.831955	1.022051
8.066667	0.741697	4.922349	1.031140
8.188889	0.745929	5.013260	1.040189
8.311111	0.750171	5.104688	1.049198
8.433333	0.754425	5.196636	1.058167
8.555556	0.758689	5.289104	1.067096
8.677778	0.762964	5.382094	1.075985
8.800000	0.767251	5.475607	1.084834
8.922222	0.771548	5.569644	1.093643
9.044444	0.775856	5.664208	1.102412
9.166667	0.780175	5.759299	1.111141
9.288889	0.784506	5.854918	1.119830
9.411111	0.788847	5.951068	1.128479
9.533333	0.793199	6.047748	1.137088
9.655556	0.797562	6.144961	1.145657
9.777778	0.801936	6.242708	1.154186
9.900000	0.806321	6.340991	1.162675
10.022222	0.810717	6.439810	1.171124
10.144444	0.815124	6.539167	1.179533
10.266667	0.819542	6.639063	1.187902
10.388889	0.823971	6.739500	1.196231
10.511111	0.828411	6.840479	1.204520
10.633333	0.832862	6.942001	1.212769
10.755556	0.837324	7.044068	1.220978
10.877778	0.841797	7.146681	1.229147
11.000000	0.846281	7.249842	1.237276

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 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 601 OUTPUT MEAN 1 1 48.4 WDM 901 FLOW ENGL REPL
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 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 602 OUTPUT MEAN 1 1 48.4 WDM 902 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

Disclaimer

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WWHM2012

PROJECT REPORT

DETENTION POND
(WQ TREATMENT
FLOWRATES)

General Model Information

WWHM2012 Project Name: 2025-06-19 - Pond (WQ)

Site Name: Pinnacle at Liberty Bay

Site Address:

City: Poulsbo

Report Date: 6/20/2025

Gage: Quilcene

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.800

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

Pre-Developed Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 20.384
Pervious Total	20.384
Impervious Land Use	acre
Impervious Total	0
Basin Total	20.384

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To: POC 1	POC 1	

Pre-Developed Bypass Basin

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 0.253
Pervious Total	0.253
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.253

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Predeveloped Pond Basin (West)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	13.88
Pervious Total	13.88
Impervious Land Use	acre
Impervious Total	0
Basin Total	13.88

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 2	POC 2	

Predeveloped Pond Basin (East)

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Steep	acre 6.829
Pervious Total	6.829
Impervious Land Use	acre
Impervious Total	0
Basin Total	6.829

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 3	POC 3	

Mitigated Land Use

Developed Pond Basin (West)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	5.572
Pervious Total	5.572
Impervious Land Use	acre
ROADS MOD	2.767
ROOF TOPS FLAT	5.554
Impervious Total	8.321
Basin Total	13.893

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	POC 2

Developed Bypass Basin

Bypass:	Yes
GroundWater:	No
Pervious Land Use C, Pasture, Mod	acre 0.021
Pervious Total	0.021
Impervious Land Use ROADS MOD	acre 0.232
Impervious Total	0.232
Basin Total	0.253

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Developed Pond Basin (East)

Bypass:	No
GroundWater:	No
Pervious Land Use C, Pasture, Mod	acre 2.777
Pervious Total	2.777
Impervious Land Use ROADS MOD ROOF TOPS FLAT	acre 1.157 2.892
Impervious Total	4.049
Basin Total	6.826

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	POC 3

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 212.00 ft.
 Bottom Width: 100.00 ft.
 Depth: 11 ft.
 Volume at riser head: 6.4398 acre-feet.
 Side slope 1: 2 To 1
 Side slope 2: 2 To 1
 Side slope 3: 2 To 1
 Side slope 4: 2 To 1
 Discharge Structure
 Riser Height: 10 ft.
 Riser Diameter: 18 in.
 Orifice 1 Diameter: 3.625 in. Elevation:0 ft.
 Orifice 2 Diameter: 3.500 in. Elevation:6.2 ft.
 Orifice 3 Diameter: 3.688 in. Elevation:8.6 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

Pond Hydraulic Table

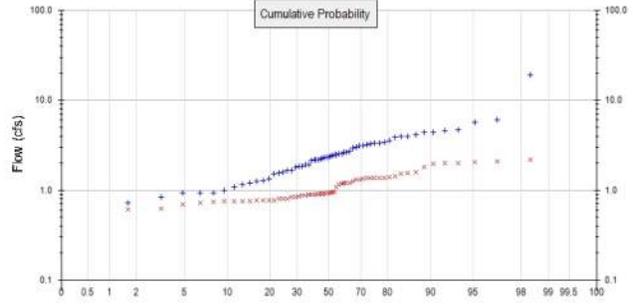
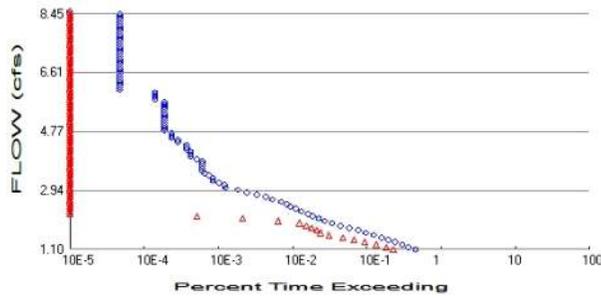
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.486	0.000	0.000	0.000
0.1222	0.490	0.059	0.124	0.000
0.2444	0.493	0.119	0.176	0.000
0.3667	0.497	0.180	0.215	0.000
0.4889	0.500	0.241	0.249	0.000
0.6111	0.504	0.302	0.278	0.000
0.7333	0.507	0.364	0.305	0.000
0.8556	0.511	0.426	0.329	0.000
0.9778	0.515	0.489	0.352	0.000
1.1000	0.518	0.552	0.374	0.000
1.2222	0.522	0.616	0.394	0.000
1.3444	0.525	0.680	0.413	0.000
1.4667	0.529	0.745	0.431	0.000
1.5889	0.533	0.809	0.449	0.000
1.7111	0.536	0.875	0.466	0.000
1.8333	0.540	0.941	0.482	0.000
1.9556	0.544	1.007	0.498	0.000
2.0778	0.547	1.074	0.514	0.000
2.2000	0.551	1.141	0.528	0.000
2.3222	0.555	1.209	0.543	0.000
2.4444	0.558	1.277	0.557	0.000
2.5667	0.562	1.345	0.571	0.000
2.6889	0.566	1.414	0.584	0.000
2.8111	0.570	1.484	0.597	0.000
2.9333	0.573	1.554	0.610	0.000
3.0556	0.577	1.624	0.623	0.000
3.1778	0.581	1.695	0.635	0.000
3.3000	0.585	1.766	0.647	0.000
3.4222	0.589	1.838	0.659	0.000
3.5444	0.592	1.910	0.671	0.000
3.6667	0.596	1.983	0.682	0.000
3.7889	0.600	2.056	0.694	0.000

3.9111	0.604	2.129	0.705	0.000
4.0333	0.608	2.204	0.716	0.000
4.1556	0.612	2.278	0.726	0.000
4.2778	0.616	2.353	0.737	0.000
4.4000	0.619	2.429	0.748	0.000
4.5222	0.623	2.505	0.758	0.000
4.6444	0.627	2.581	0.768	0.000
4.7667	0.631	2.658	0.778	0.000
4.8889	0.635	2.736	0.788	0.000
5.0111	0.639	2.814	0.798	0.000
5.1333	0.643	2.892	0.807	0.000
5.2556	0.647	2.971	0.817	0.000
5.3778	0.651	3.050	0.826	0.000
5.5000	0.655	3.130	0.836	0.000
5.6222	0.659	3.210	0.845	0.000
5.7444	0.663	3.291	0.854	0.000
5.8667	0.667	3.373	0.863	0.000
5.9889	0.671	3.454	0.872	0.000
6.1111	0.675	3.537	0.881	0.000
6.2333	0.679	3.619	0.951	0.000
6.3556	0.683	3.703	1.030	0.000
6.4778	0.687	3.787	1.082	0.000
6.6000	0.691	3.871	1.126	0.000
6.7222	0.695	3.956	1.164	0.000
6.8444	0.700	4.041	1.199	0.000
6.9667	0.704	4.127	1.232	0.000
7.0889	0.708	4.213	1.262	0.000
7.2111	0.712	4.300	1.291	0.000
7.3333	0.716	4.387	1.319	0.000
7.4556	0.720	4.475	1.346	0.000
7.5778	0.724	4.563	1.371	0.000
7.7000	0.729	4.652	1.396	0.000
7.8222	0.733	4.742	1.420	0.000
7.9444	0.737	4.832	1.444	0.000
8.0667	0.741	4.922	1.467	0.000
8.1889	0.745	5.013	1.489	0.000
8.3111	0.750	5.104	1.511	0.000
8.4333	0.754	5.196	1.532	0.000
8.5556	0.758	5.289	1.553	0.000
8.6778	0.763	5.382	1.676	0.000
8.8000	0.767	5.475	1.758	0.000
8.9222	0.771	5.569	1.823	0.000
9.0444	0.775	5.664	1.879	0.000
9.1667	0.780	5.759	1.930	0.000
9.2889	0.784	5.854	1.977	0.000
9.4111	0.788	5.951	2.022	0.000
9.5333	0.793	6.047	2.064	0.000
9.6556	0.797	6.145	2.105	0.000
9.7778	0.801	6.242	2.144	0.000
9.9000	0.806	6.341	2.182	0.000
10.022	0.810	6.439	2.271	0.000
10.144	0.815	6.539	3.123	0.000
10.267	0.819	6.639	4.413	0.000
10.389	0.824	6.739	5.833	0.000
10.511	0.828	6.840	7.093	0.000
10.633	0.832	6.942	7.981	0.000
10.756	0.837	7.044	8.580	0.000
10.878	0.841	7.146	9.091	0.000

11.000	0.846	7.249	9.569	0.000
11.122	0.850	7.353	10.02	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 20.637
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 8.37
 Total Impervious Area: 12.602

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	2.200395
5 year	3.701045
10 year	4.941218
25 year	6.814601
50 year	8.449484
100 year	10.303945

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	1.035204
5 year	1.399266
10 year	1.654391
25 year	1.993177
50 year	2.257715
100 year	2.532854

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	4.407	1.200
1950	1.322	0.754
1951	3.127	1.262
1952	1.518	0.796
1953	1.826	1.091
1954	4.391	1.370
1955	4.153	0.932
1956	19.054	1.319
1957	3.365	1.506
1958	4.559	0.840

1959	3.937	2.184
1960	2.338	1.144
1961	5.712	0.894
1962	1.651	0.907
1963	2.143	1.439
1964	1.812	0.727
1965	0.928	0.760
1966	4.739	0.876
1967	3.253	1.790
1968	3.133	1.373
1969	2.265	0.933
1970	2.327	1.360
1971	3.917	0.943
1972	3.202	0.863
1973	1.925	0.898
1974	2.499	2.013
1975	2.643	0.771
1976	3.404	0.900
1977	1.571	0.898
1978	2.722	0.879
1979	2.198	1.194
1980	1.667	0.800
1981	1.204	0.809
1982	1.075	0.752
1983	2.510	1.939
1984	0.925	0.614
1985	0.719	0.624
1986	2.175	1.371
1987	1.855	0.943
1988	1.558	0.917
1989	0.838	0.690
1990	0.987	0.907
1991	1.917	1.324
1992	2.166	1.988
1993	1.242	0.752
1994	2.955	2.090
1995	2.441	1.375
1996	3.020	1.543
1997	2.212	1.318
1998	2.540	1.393
1999	3.975	2.043
2000	1.288	0.770
2001	0.621	0.762
2002	6.010	0.918
2003	3.533	1.586
2004	1.143	0.730
2005	2.647	0.767
2006	3.354	1.211
2007	2.372	0.832
2008	2.455	1.165
2009	0.929	0.533

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	19.0536	2.1837
2	6.0105	2.0902
3	5.7117	2.0427

4	4.7387	2.0126
5	4.5592	1.9877
6	4.4067	1.9394
7	4.3911	1.7902
8	4.1532	1.5863
9	3.9751	1.5426
10	3.9372	1.5065
11	3.9169	1.4392
12	3.5333	1.3928
13	3.4038	1.3747
14	3.3653	1.3729
15	3.3544	1.3713
16	3.2527	1.3703
17	3.2022	1.3595
18	3.1334	1.3238
19	3.1268	1.3187
20	3.0204	1.3178
21	2.9554	1.2624
22	2.7216	1.2105
23	2.6468	1.2003
24	2.6430	1.1941
25	2.5403	1.1652
26	2.5104	1.1439
27	2.4990	1.0912
28	2.4549	0.9432
29	2.4405	0.9426
30	2.3717	0.9328
31	2.3379	0.9318
32	2.3268	0.9180
33	2.2647	0.9166
34	2.2117	0.9074
35	2.1975	0.9068
36	2.1751	0.8997
37	2.1661	0.8985
38	2.1432	0.8978
39	1.9253	0.8938
40	1.9166	0.8789
41	1.8554	0.8759
42	1.8265	0.8632
43	1.8117	0.8396
44	1.6674	0.8317
45	1.6509	0.8088
46	1.5713	0.8004
47	1.5581	0.7963
48	1.5176	0.7712
49	1.3223	0.7702
50	1.2876	0.7666
51	1.2418	0.7623
52	1.2037	0.7604
53	1.1428	0.7541
54	1.0755	0.7523
55	0.9870	0.7518
56	0.9289	0.7298
57	0.9280	0.7272
58	0.9248	0.6896
59	0.8377	0.6238
60	0.7188	0.6138
61	0.6208	0.5331

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.1002	9610	4830	50	Pass
1.1744	7800	3878	49	Pass
1.2487	6387	2860	44	Pass
1.3229	5142	1991	38	Pass
1.3971	4158	1423	34	Pass
1.4714	3362	1016	30	Pass
1.5456	2656	662	24	Pass
1.6198	2067	510	24	Pass
1.6941	1620	453	27	Pass
1.7683	1244	384	30	Pass
1.8425	949	326	34	Pass
1.9168	724	265	36	Pass
1.9910	577	137	23	Pass
2.0653	479	45	9	Pass
2.1395	397	11	2	Pass
2.2137	343	0	0	Pass
2.2880	280	0	0	Pass
2.3622	237	0	0	Pass
2.4364	199	0	0	Pass
2.5107	179	0	0	Pass
2.5849	149	0	0	Pass
2.6591	115	0	0	Pass
2.7334	92	0	0	Pass
2.8076	70	0	0	Pass
2.8818	52	0	0	Pass
2.9561	39	0	0	Pass
3.0303	27	0	0	Pass
3.1045	26	0	0	Pass
3.1788	22	0	0	Pass
3.2530	18	0	0	Pass
3.3273	18	0	0	Pass
3.4015	16	0	0	Pass
3.4757	14	0	0	Pass
3.5500	13	0	0	Pass
3.6242	13	0	0	Pass
3.6984	13	0	0	Pass
3.7727	13	0	0	Pass
3.8469	13	0	0	Pass
3.9211	11	0	0	Pass
3.9954	9	0	0	Pass
4.0696	9	0	0	Pass
4.1438	9	0	0	Pass
4.2181	8	0	0	Pass
4.2923	8	0	0	Pass
4.3665	8	0	0	Pass
4.4408	6	0	0	Pass
4.5150	6	0	0	Pass
4.5893	5	0	0	Pass
4.6635	5	0	0	Pass
4.7377	5	0	0	Pass
4.8120	4	0	0	Pass
4.8862	4	0	0	Pass
4.9604	4	0	0	Pass

5.0347	4	0	0	Pass
5.1089	4	0	0	Pass
5.1831	4	0	0	Pass
5.2574	4	0	0	Pass
5.3316	4	0	0	Pass
5.4058	4	0	0	Pass
5.4801	4	0	0	Pass
5.5543	4	0	0	Pass
5.6285	4	0	0	Pass
5.7028	4	0	0	Pass
5.7770	3	0	0	Pass
5.8513	3	0	0	Pass
5.9255	3	0	0	Pass
5.9997	3	0	0	Pass
6.0740	1	0	0	Pass
6.1482	1	0	0	Pass
6.2224	1	0	0	Pass
6.2967	1	0	0	Pass
6.3709	1	0	0	Pass
6.4451	1	0	0	Pass
6.5194	1	0	0	Pass
6.5936	1	0	0	Pass
6.6678	1	0	0	Pass
6.7421	1	0	0	Pass
6.8163	1	0	0	Pass
6.8905	1	0	0	Pass
6.9648	1	0	0	Pass
7.0390	1	0	0	Pass
7.1133	1	0	0	Pass
7.1875	1	0	0	Pass
7.2617	1	0	0	Pass
7.3360	1	0	0	Pass
7.4102	1	0	0	Pass
7.4844	1	0	0	Pass
7.5587	1	0	0	Pass
7.6329	1	0	0	Pass
7.7071	1	0	0	Pass
7.7814	1	0	0	Pass
7.8556	1	0	0	Pass
7.9298	1	0	0	Pass
8.0041	1	0	0	Pass
8.0783	1	0	0	Pass
8.1525	1	0	0	Pass
8.2268	1	0	0	Pass
8.3010	1	0	0	Pass
8.3752	1	0	0	Pass
8.4495	1	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: ~~3.153 acre-feet~~

On-line facility target flow: ~~3.2933 cfs.~~

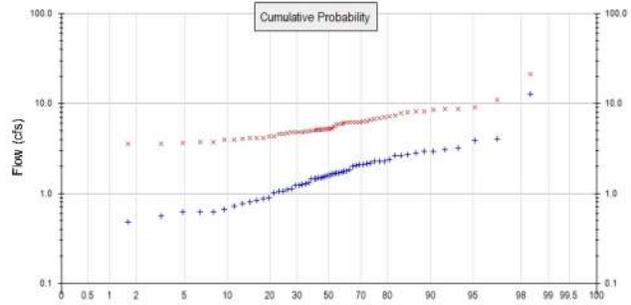
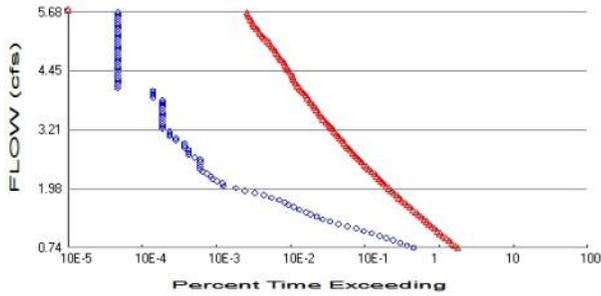
Adjusted for 15 min: ~~3.2933 cfs.~~

Off-line facility target flow: ~~1.8787 cfs.~~

Adjusted for 15 min: ~~1.8787 cfs.~~

See POC #2 for west WQ Treatment Flow
See POC #3 for east WQ Treatment Flow.

POC 2



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2

Total Pervious Area: 13.88
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2

Total Pervious Area: 5.572
Total Impervious Area: 8.321

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	Flow(cfs)
2 year	1.479938
5 year	2.489242
10 year	3.323354
25 year	4.58335
50 year	5.682935
100 year	6.930203

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	5.384804
5 year	7.238779
10 year	8.64337
25 year	10.630977
50 year	12.274536
100 year	14.065154

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1949	2.964	8.676
1950	0.889	4.906
1951	2.103	6.711
1952	1.021	5.273
1953	1.228	4.296
1954	2.953	8.109
1955	2.793	8.539
1956	12.815	21.118
1957	2.263	6.865
1958	3.066	8.239
1959	2.648	6.162

1960	1.572	3.974
1961	3.842	8.755
1962	1.110	3.986
1963	1.441	5.611
1964	1.219	4.343
1965	0.624	2.857
1966	3.187	9.158
1967	2.188	5.951
1968	2.107	6.157
1969	1.523	5.193
1970	1.565	6.177
1971	2.634	6.609
1972	2.154	5.933
1973	1.295	4.116
1974	1.681	4.901
1975	1.778	5.321
1976	2.289	6.167
1977	1.057	3.676
1978	1.830	5.057
1979	1.478	5.029
1980	1.121	5.128
1981	0.810	4.157
1982	0.723	5.071
1983	1.688	6.983
1984	0.622	3.527
1985	0.483	4.802
1986	1.463	4.599
1987	1.248	5.079
1988	1.048	4.663
1989	0.563	3.657
1990	0.664	3.530
1991	1.289	4.810
1992	1.457	4.972
1993	0.835	4.084
1994	1.988	6.261
1995	1.641	4.132
1996	2.031	5.827
1997	1.488	4.837
1998	1.709	4.789
1999	2.674	7.390
2000	0.866	4.583
2001	0.418	6.185
2002	4.043	10.997
2003	2.376	7.184
2004	0.769	5.177
2005	1.780	6.366
2006	2.256	7.889
2007	1.595	7.972
2008	1.651	6.111
2009	0.625	3.753

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	12.8150	21.1175
2	4.0425	10.9965
3	3.8416	9.1584
4	3.1871	8.7553

5	3.0664	8.6758
6	2.9638	8.5393
7	2.9533	8.2389
8	2.7934	8.1086
9	2.6736	7.9722
10	2.6481	7.8885
11	2.6344	7.3896
12	2.3764	7.1838
13	2.2893	6.9826
14	2.2634	6.8653
15	2.2561	6.7110
16	2.1877	6.6086
17	2.1537	6.3656
18	2.1075	6.2613
19	2.1030	6.1848
20	2.0315	6.1771
21	1.9877	6.1670
22	1.8305	6.1620
23	1.7802	6.1565
24	1.7776	6.1109
25	1.7085	5.9507
26	1.6885	5.9330
27	1.6807	5.8269
28	1.6511	5.6111
29	1.6414	5.3210
30	1.5952	5.2733
31	1.5725	5.1928
32	1.5650	5.1773
33	1.5232	5.1276
34	1.4876	5.0787
35	1.4780	5.0714
36	1.4630	5.0572
37	1.4569	5.0293
38	1.4414	4.9718
39	1.2949	4.9059
40	1.2890	4.9008
41	1.2479	4.8373
42	1.2284	4.8103
43	1.2185	4.8017
44	1.1214	4.7888
45	1.1104	4.6625
46	1.0568	4.5993
47	1.0480	4.5828
48	1.0207	4.3430
49	0.8893	4.2962
50	0.8660	4.1571
51	0.8352	4.1321
52	0.8096	4.1158
53	0.7686	4.0840
54	0.7233	3.9859
55	0.6638	3.9744
56	0.6247	3.7533
57	0.6242	3.6764
58	0.6220	3.6571
59	0.5634	3.5295
60	0.4834	3.5273
61	0.4175	2.8575

Duration Flows

The Duration Matching **Failed**

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7400	9638	38243	396	Fail
0.7899	7820	34735	444	Fail
0.8398	6391	31570	493	Fail
0.8898	5144	28896	561	Fail
0.9397	4175	26351	631	Fail
0.9896	3367	24041	714	Fail
1.0395	2659	21988	826	Fail
1.0895	2066	20144	975	Fail
1.1394	1623	18503	1140	Fail
1.1893	1245	17002	1365	Fail
1.2393	948	15676	1653	Fail
1.2892	723	14416	1993	Fail
1.3391	577	13265	2298	Fail
1.3890	478	12200	2552	Fail
1.4390	398	11169	2806	Fail
1.4889	344	10299	2993	Fail
1.5388	280	9422	3365	Fail
1.5888	237	8658	3653	Fail
1.6387	199	7954	3996	Fail
1.6886	180	7311	4061	Fail
1.7385	149	6686	4487	Fail
1.7885	117	6190	5290	Fail
1.8384	93	5715	6145	Fail
1.8883	70	5232	7474	Fail
1.9383	52	4827	9282	Fail
1.9882	39	4451	11412	Fail
2.0381	27	4122	15266	Fail
2.0881	26	3811	14657	Fail
2.1380	22	3544	16109	Fail
2.1879	19	3320	17473	Fail
2.2378	18	3091	17172	Fail
2.2878	16	2870	17937	Fail
2.3377	14	2635	18821	Fail
2.3876	13	2438	18753	Fail
2.4376	13	2244	17261	Fail
2.4875	13	2066	15892	Fail
2.5374	13	1921	14776	Fail
2.5873	13	1796	13815	Fail
2.6373	11	1680	15272	Fail
2.6872	9	1573	17477	Fail
2.7371	9	1465	16277	Fail
2.7871	9	1358	15088	Fail
2.8370	8	1266	15825	Fail
2.8869	8	1191	14887	Fail
2.9368	8	1121	14012	Fail
2.9868	6	1054	17566	Fail
3.0367	6	981	16350	Fail
3.0866	5	929	18580	Fail
3.1366	5	867	17340	Fail
3.1865	5	820	16400	Fail
3.2364	4	774	19350	Fail
3.2863	4	728	18200	Fail
3.3363	4	687	17175	Fail
3.3862	4	640	16000	Fail

3.4361	4	587	14675	Fail
3.4861	4	556	13900	Fail
3.5360	4	523	13075	Fail
3.5859	4	506	12650	Fail
3.6358	4	480	12000	Fail
3.6858	4	448	11200	Fail
3.7357	4	425	10625	Fail
3.7856	4	400	10000	Fail
3.8356	4	384	9600	Fail
3.8855	3	359	11966	Fail
3.9354	3	341	11366	Fail
3.9854	3	319	10633	Fail
4.0353	3	300	10000	Fail
4.0852	1	283	28300	Fail
4.1351	1	264	26400	Fail
4.1851	1	252	25200	Fail
4.2350	1	244	24400	Fail
4.2849	1	233	23300	Fail
4.3349	1	229	22900	Fail
4.3848	1	218	21800	Fail
4.4347	1	207	20700	Fail
4.4846	1	196	19600	Fail
4.5346	1	189	18900	Fail
4.5845	1	181	18100	Fail
4.6344	1	172	17200	Fail
4.6844	1	159	15900	Fail
4.7343	1	152	15200	Fail
4.7842	1	144	14400	Fail
4.8341	1	136	13600	Fail
4.8841	1	131	13100	Fail
4.9340	1	122	12200	Fail
4.9839	1	118	11800	Fail
5.0339	1	112	11200	Fail
5.0838	1	104	10400	Fail
5.1337	1	94	9400	Fail
5.1836	1	89	8900	Fail
5.2336	1	83	8300	Fail
5.2835	1	80	8000	Fail
5.3334	1	74	7400	Fail
5.3834	1	69	6900	Fail
5.4333	1	66	6600	Fail
5.4832	1	65	6500	Fail
5.5331	1	61	6100	Fail
5.5831	1	59	5900	Fail
5.6330	1	57	5700	Fail
5.6829	1	55	5500	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume: 1.9807 acre-feet

On-line facility target flow: 2.1437 cfs.

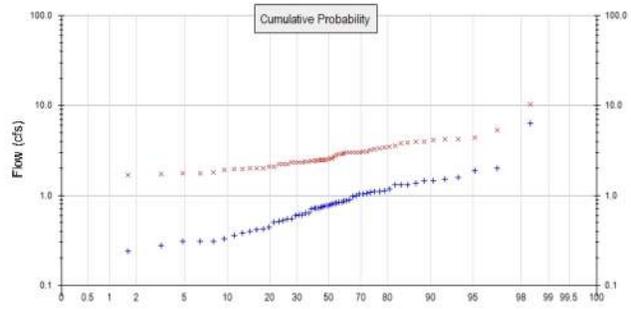
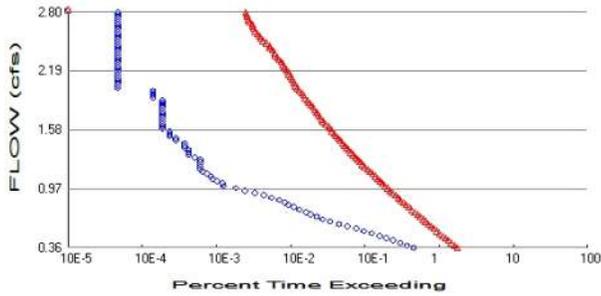
Adjusted for 15 min: 2.1437 cfs.

Off-line facility target flow: 1.222 cfs.

Adjusted for 15 min: 1.222 cfs.

← Water Quality Treatment Facility #1
(West WQ Treatment Flow)

POC 3



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3

Total Pervious Area: 6.829
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3

Total Pervious Area: 2.777
Total Impervious Area: 4.049

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	Flow(cfs)
2 year	0.728134
5 year	1.224714
10 year	1.6351
25 year	2.255021
50 year	2.79602
100 year	3.40968

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	Flow(cfs)
2 year	2.605988
5 year	3.507177
10 year	4.190533
25 year	5.158246
50 year	5.958982
100 year	6.831828

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	Predeveloped	Mitigated
1949	1.458	4.232
1950	0.438	2.361
1951	1.035	3.265
1952	0.502	2.561
1953	0.604	2.085
1954	1.453	3.921
1955	1.374	4.154
1956	6.305	10.241
1957	1.114	3.324
1958	1.509	3.990
1959	1.303	2.988

1960	0.774	1.917
1961	1.890	4.255
1962	0.546	1.939
1963	0.709	2.716
1964	0.600	2.099
1965	0.307	1.379
1966	1.568	4.439
1967	1.076	2.879
1968	1.037	2.977
1969	0.749	2.488
1970	0.770	2.997
1971	1.296	3.187
1972	1.060	2.862
1973	0.637	1.988
1974	0.827	2.384
1975	0.875	2.563
1976	1.126	2.978
1977	0.520	1.769
1978	0.901	2.421
1979	0.727	2.414
1980	0.552	2.479
1981	0.398	2.014
1982	0.356	2.463
1983	0.831	3.388
1984	0.306	1.702
1985	0.238	2.330
1986	0.720	2.221
1987	0.614	2.461
1988	0.516	2.245
1989	0.277	1.776
1990	0.327	1.710
1991	0.634	2.342
1992	0.717	2.398
1993	0.411	1.962
1994	0.978	3.035
1995	0.808	2.014
1996	0.999	2.808
1997	0.732	2.342
1998	0.841	2.316
1999	1.315	3.582
2000	0.426	2.228
2001	0.205	3.006
2002	1.989	5.322
2003	1.169	3.511
2004	0.378	2.519
2005	0.876	3.099
2006	1.110	3.819
2007	0.785	3.859
2008	0.812	2.953
2009	0.307	1.802

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	6.3050	10.2407
2	1.9889	5.3221
3	1.8901	4.4386
4	1.5681	4.2546

5	1.5087	4.2321
6	1.4582	4.1541
7	1.4530	3.9902
8	1.3743	3.9205
9	1.3154	3.8588
10	1.3029	3.8193
11	1.2961	3.5819
12	1.1692	3.5107
13	1.1264	3.3879
14	1.1136	3.3243
15	1.1100	3.2651
16	1.0764	3.1872
17	1.0597	3.0987
18	1.0369	3.0350
19	1.0347	3.0063
20	0.9995	2.9969
21	0.9780	2.9883
22	0.9006	2.9780
23	0.8758	2.9767
24	0.8746	2.9528
25	0.8406	2.8787
26	0.8307	2.8616
27	0.8269	2.8078
28	0.8123	2.7155
29	0.8076	2.5633
30	0.7848	2.5608
31	0.7736	2.5190
32	0.7700	2.4875
33	0.7494	2.4787
34	0.7319	2.4632
35	0.7272	2.4609
36	0.7198	2.4206
37	0.7168	2.4136
38	0.7092	2.3985
39	0.6371	2.3835
40	0.6342	2.3609
41	0.6140	2.3425
42	0.6044	2.3420
43	0.5995	2.3296
44	0.5517	2.3164
45	0.5463	2.2448
46	0.5200	2.2275
47	0.5156	2.2214
48	0.5022	2.0991
49	0.4375	2.0852
50	0.4261	2.0138
51	0.4109	2.0137
52	0.3983	1.9881
53	0.3782	1.9624
54	0.3559	1.9390
55	0.3266	1.9174
56	0.3074	1.8024
57	0.3071	1.7761
58	0.3060	1.7686
59	0.2772	1.7096
60	0.2379	1.7020
61	0.2054	1.3792

Duration Flows

The Duration Matching **Failed**

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3641	9610	37687	392	Fail
0.3886	7833	34308	437	Fail
0.4132	6380	31142	488	Fail
0.4378	5159	28468	551	Fail
0.4623	4175	25923	620	Fail
0.4869	3379	23720	701	Fail
0.5115	2665	21624	811	Fail
0.5360	2058	19742	959	Fail
0.5606	1628	18140	1114	Fail
0.5852	1245	16670	1338	Fail
0.6097	953	15359	1611	Fail
0.6343	724	14091	1946	Fail
0.6588	578	12983	2246	Fail
0.6834	479	11886	2481	Fail
0.7080	398	10908	2740	Fail
0.7325	344	9986	2902	Fail
0.7571	279	9139	3275	Fail
0.7817	237	8414	3550	Fail
0.8062	199	7717	3877	Fail
0.8308	180	7073	3929	Fail
0.8554	149	6489	4355	Fail
0.8799	117	6000	5128	Fail
0.9045	93	5512	5926	Fail
0.9291	70	5026	7180	Fail
0.9536	52	4650	8942	Fail
0.9782	39	4295	11012	Fail
1.0028	27	3970	14703	Fail
1.0273	26	3672	14123	Fail
1.0519	22	3433	15604	Fail
1.0765	19	3185	16763	Fail
1.1010	18	2960	16444	Fail
1.1256	16	2725	17031	Fail
1.1502	14	2522	18014	Fail
1.1747	13	2316	17815	Fail
1.1993	13	2126	16353	Fail
1.2238	13	1981	15238	Fail
1.2484	13	1850	14230	Fail
1.2730	13	1725	13269	Fail
1.2975	11	1610	14636	Fail
1.3221	9	1489	16544	Fail
1.3467	9	1391	15455	Fail
1.3712	9	1292	14355	Fail
1.3958	8	1211	15137	Fail
1.4204	8	1136	14200	Fail
1.4449	8	1066	13325	Fail
1.4695	6	990	16500	Fail
1.4941	6	933	15550	Fail
1.5186	5	871	17420	Fail
1.5432	5	824	16480	Fail
1.5678	5	775	15500	Fail
1.5923	4	731	18275	Fail
1.6169	4	691	17275	Fail
1.6415	4	634	15850	Fail
1.6660	4	583	14575	Fail

1.6906	4	558	13950	Fail
1.7152	4	524	13100	Fail
1.7397	4	501	12525	Fail
1.7643	4	477	11925	Fail
1.7888	4	451	11275	Fail
1.8134	4	425	10625	Fail
1.8380	4	396	9900	Fail
1.8625	4	377	9425	Fail
1.8871	4	358	8950	Fail
1.9117	3	333	11100	Fail
1.9362	3	319	10633	Fail
1.9608	3	301	10033	Fail
1.9854	3	278	9266	Fail
2.0099	1	265	26500	Fail
2.0345	1	247	24700	Fail
2.0591	1	241	24100	Fail
2.0836	1	234	23400	Fail
2.1082	1	223	22300	Fail
2.1328	1	214	21400	Fail
2.1573	1	203	20300	Fail
2.1819	1	195	19500	Fail
2.2065	1	186	18600	Fail
2.2310	1	176	17600	Fail
2.2556	1	167	16700	Fail
2.2802	1	160	16000	Fail
2.3047	1	150	15000	Fail
2.3293	1	142	14200	Fail
2.3538	1	133	13300	Fail
2.3784	1	130	13000	Fail
2.4030	1	122	12200	Fail
2.4275	1	112	11200	Fail
2.4521	1	111	11100	Fail
2.4767	1	101	10100	Fail
2.5012	1	91	9100	Fail
2.5258	1	85	8500	Fail
2.5504	1	81	8100	Fail
2.5749	1	76	7600	Fail
2.5995	1	71	7100	Fail
2.6241	1	68	6800	Fail
2.6486	1	65	6500	Fail
2.6732	1	65	6500	Fail
2.6978	1	60	6000	Fail
2.7223	1	57	5700	Fail
2.7469	1	55	5500	Fail
2.7715	1	55	5500	Fail
2.7960	1	53	5300	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #3

On-line facility volume: 0.9662 acre-feet

On-line facility target flow: 1.0378 cfs.

Adjusted for 15 min: 1.0378 cfs.

Off-line facility target flow: 0.592 cfs.

Adjusted for 15 min: 0.592 cfs.

← Water Quality Treatment Facility #2
(East WQ Treatment Flow)

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

	Pre-Developed Bypass Basin 0.25ac								
	Pre-Developed Pond Basin 20.38ac								
	Predeveloped Pond Basin (West) 13.88ac								
	Predeveloped Pond Basin (East) 6.83ac								

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

WVHM4 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 2025-06-19 - Pond (WQ).wdm  
MESSU 25 Pre2025-06-19 - Pond (WQ).MES  
27 Pre2025-06-19 - Pond (WQ).L61  
28 Pre2025-06-19 - Pond (WQ).L62  
30 POC2025-06-19 - Pond (WQ)1.dat  
31 POC2025-06-19 - Pond (WQ)2.dat  
32 POC2025-06-19 - Pond (WQ)3.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15
PERLND 12
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			Pre-Developed Pond Basin	MAX				1	2	30	9
2			Predeveloped Pond Basin (MAX				1	2	31	9
3			Predeveloped Pond Basin (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		***	
12	C, Forest, Steep	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 ***
12 0 0 1 0 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 *****
12 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 ***
12 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
12 0 4.5 0.08 400 0.15 0.5 0.996
END PWAT-PARM2
```

```
PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
12 0 0 2 2 0 0 0
END PWAT-PARM3
```

```
PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
12 0.2 0.3 0.35 6 0.3 0.7
END PWAT-PARM4
```

```
PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
12 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
```



```

# - # 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

END EXT TARGETS

MASS-LINK
<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
<Name> <Name> # #<-factor-> <Name> <Name> # #***
MASS-LINK 12
PERLND PWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 12

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

END MASS-LINK

END RUN

```

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 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    2025-06-19 - Pond (WQ).wdm
MESSU    25    Mit2025-06-19 - Pond (WQ).MES
          27    Mit2025-06-19 - Pond (WQ).L61
          28    Mit2025-06-19 - Pond (WQ).L62
          31    POC2025-06-19 - Pond (WQ)2.dat
          32    POC2025-06-19 - Pond (WQ)3.dat
          30    POC2025-06-19 - Pond (WQ)1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```
PERLND 14
IMPLND 2
IMPLND 4
RCHRES 1
COPY 502
COPY 503
COPY 1
COPY 501
COPY 601
DISPLY 2
DISPLY 3
DISPLY 1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
2    Developed Pond Basin (Wes MAX 1 2 31 9
3    Developed Pond Basin (Eas MAX 1 2 32 9
1    Trapezoidal Pond 1 MAX 1 2 30 9
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1    1 1
502  1 1
503  1 1
501  1 1
601  1 1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
# # OPCODE ***
```

END OPCODE

PARM

```
# # K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
```

14 C, Pasture, 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 ***
 14 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 *****
 14 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 ***
 14 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
 14 0 4.5 0.06 400 0.1 0.5 0.996
 END PWAT-PARM2

PWAT-PARM3
 <PLS > PWATER input info: Part 3 ***
 # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
 14 0 0 2 2 0 0 0
 END PWAT-PARM3

PWAT-PARM4
 <PLS > PWATER input info: Part 4 ***
 # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
 14 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
 14 0 0 0 0 2.5 1 0
 END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO
 <PLS ><-----Name-----> Unit-systems Printer ***
 # - # User t-series Engr Metr ***
 in out ***
 2 ROADS/MOD 1 1 1 27 0
 4 ROOF TOPS/FLAT 1 1 1 27 0
 END GEN-INFO
 *** Section IWATER***

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

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

END PRINT-INFO

IWAT-PARM1

```

<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
2 0 0 0 0 0
4 0 0 0 0 0

```

END IWAT-PARM1

IWAT-PARM2

```

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

```

END IWAT-PARM2

IWAT-PARM3

```

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

```

END IWAT-PARM3

IWAT-STATE1

```

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

```

END IWAT-STATE1

END IMPLND

SCHEMATIC

<-Source->	<--Area-->	<-Target->	MBLK	***
<Name> #	<-factor->	<Name> #	Tbl#	***
Developed Pond Basin (West)***				
PERLND 14	5.572	RCHRES 1	2	
PERLND 14	5.572	RCHRES 1	3	
IMPLND 2	2.767	RCHRES 1	5	
IMPLND 4	5.554	RCHRES 1	5	
Developed Pond Basin (East)***				
PERLND 14	2.777	RCHRES 1	2	
PERLND 14	2.777	RCHRES 1	3	
IMPLND 2	1.157	RCHRES 1	5	
IMPLND 4	2.892	RCHRES 1	5	
Developed Pond Basin (West)***				
PERLND 14	5.572	COPY 502	12	
PERLND 14	5.572	COPY 502	13	
IMPLND 2	2.767	COPY 502	15	
IMPLND 4	5.554	COPY 502	15	
Developed Bypass Basin***				
PERLND 14	0.021	COPY 501	12	
PERLND 14	0.021	COPY 601	12	
PERLND 14	0.021	COPY 501	13	
PERLND 14	0.021	COPY 601	13	
IMPLND 2	0.232	COPY 501	15	
IMPLND 2	0.232	COPY 601	15	
Developed Pond Basin (East)***				
PERLND 14	2.777	COPY 503	12	
PERLND 14	2.777	COPY 503	13	
IMPLND 2	1.157	COPY 503	15	
IMPLND 4	2.892	COPY 503	15	

*****Routing*****

PERLND 14	5.572	COPY 1	12
IMPLND 2	2.767	COPY 1	15
IMPLND 4	5.554	COPY 1	15
PERLND 14	5.572	COPY 1	13
PERLND 14	2.777	COPY 1	12
IMPLND 2	1.157	COPY 1	15

0.244444	0.493710	0.119825	0.176305
0.366667	0.497239	0.180383	0.215929
0.488889	0.500780	0.241374	0.249333
0.611111	0.504331	0.302797	0.278763
0.733333	0.507893	0.364655	0.305369
0.855556	0.511466	0.426949	0.329837
0.977778	0.515050	0.489681	0.352610
1.100000	0.518645	0.552851	0.374000
1.222222	0.522251	0.616461	0.394230
1.344444	0.525867	0.680513	0.413472
1.466667	0.529495	0.745007	0.431857
1.588889	0.533134	0.809946	0.449492
1.711111	0.536784	0.875330	0.466459
1.833333	0.540445	0.941160	0.482831
1.955556	0.544117	1.007439	0.498666
2.077778	0.547799	1.074167	0.514013
2.200000	0.551493	1.141346	0.528915
2.322222	0.555198	1.208977	0.543409
2.444444	0.558913	1.277062	0.557526
2.566667	0.562640	1.345601	0.571294
2.688889	0.566378	1.414597	0.584738
2.811111	0.570126	1.484050	0.597880
2.933333	0.573886	1.553962	0.610739
3.055556	0.577656	1.624334	0.623333
3.177778	0.581438	1.695167	0.635677
3.300000	0.585230	1.766464	0.647786
3.422222	0.589034	1.838224	0.659673
3.544444	0.592848	1.910450	0.671350
3.666667	0.596674	1.983143	0.682827
3.788889	0.600510	2.056305	0.694114
3.911111	0.604358	2.129935	0.705220
4.033333	0.608216	2.204037	0.716155
4.155556	0.612085	2.278611	0.726924
4.277778	0.615965	2.353659	0.737537
4.400000	0.619857	2.429181	0.747999
4.522222	0.623759	2.505180	0.758317
4.644444	0.627672	2.581656	0.768496
4.766667	0.631596	2.658612	0.778542
4.888889	0.635532	2.736047	0.788460
5.011111	0.639478	2.813964	0.798255
5.133333	0.643435	2.892365	0.807931
5.255556	0.647403	2.971249	0.817493
5.377778	0.651382	3.050619	0.826944
5.500000	0.655372	3.130476	0.836288
5.622222	0.659373	3.210822	0.845529
5.744444	0.663385	3.291657	0.854671
5.866667	0.667408	3.372983	0.863715
5.988889	0.671442	3.454802	0.872666
6.111111	0.675487	3.537114	0.881525
6.233333	0.679542	3.619922	0.890289
6.355556	0.683609	3.703225	0.900094
6.477778	0.687687	3.787027	0.910290
6.600000	0.691776	3.871327	0.920233
6.722222	0.695876	3.956128	0.930233
6.844444	0.699986	4.041431	0.940288
6.966667	0.704108	4.127237	0.950282
7.088889	0.708241	4.213547	0.960284
7.211111	0.712384	4.300363	0.970284
7.333333	0.716539	4.387686	0.980282
7.455556	0.720705	4.475518	0.990282
7.577778	0.724881	4.563859	0.999999
7.700000	0.729069	4.652711	1.000000
7.822222	0.733267	4.742076	1.000000
7.944444	0.737477	4.831955	1.000000
8.066667	0.741697	4.922349	1.000000
8.188889	0.745929	5.013260	1.000000
8.311111	0.750171	5.104688	1.000000
8.433333	0.754425	5.196636	1.000000
8.555556	0.758689	5.289104	1.000000
8.677778	0.762964	5.382094	1.000000

8.800000	0.767251	5.475607	1.758872
8.922222	0.771548	5.569644	1.823086
9.044444	0.775856	5.664208	1.879072
9.166667	0.780175	5.759299	1.929985
9.288889	0.784506	5.854918	1.977329
9.411111	0.788847	5.951068	2.021962
9.533333	0.793199	6.047748	2.064434
9.655556	0.797562	6.144961	2.105119
9.777778	0.801936	6.242708	2.144291
9.900000	0.806321	6.340991	2.182154
10.022222	0.810717	6.439810	2.271604
10.144444	0.815124	6.539167	3.123549
10.266667	0.819542	6.639063	4.413153
10.388889	0.823971	6.739500	5.833189
10.511111	0.828411	6.840479	7.093837
10.633333	0.832862	6.942001	7.981259
10.755556	0.837324	7.044068	8.580674
10.877778	0.841797	7.146681	9.091464
11.000000	0.846281	7.249842	9.569314

END FTABLE 1

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member-->	***
<Name>	#	<Name>	#	tem strg	<-factor-->	strg	<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
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	602	OUTPUT	MEAN	1 1	48.4	WDM	902	FLOW	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	601	OUTPUT	MEAN	1 1	48.4	WDM	901	FLOW	ENGL	REPL
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	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	603	OUTPUT	MEAN	1 1	48.4	WDM	903	FLOW	ENGL	REPL

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member-->	<--Mult-->	<Target>	<-Grp>	<-Member-->	***
<Name>	#	<Name>	#	<-factor-->	<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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WWHM2012

PROJECT REPORT

DETENTION VAULT
(EAST BASIN)

General Model Information

WWHM2012 Project Name: 2025-06-19 - Vault

Site Name: Pinnacle at Liberty Bay

Site Address:

City: Poulsbo

Report Date: 6/20/2025

Gage: Quilcene

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.800

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

Landuse Basin Data

Predeveloped Land Use

Pre-Developed Vault Basin

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Flat	acre 5.138
Pervious Total	5.138
Impervious Land Use	acre
Impervious Total	0
Basin Total	5.138

Element Flow Components:		
Surface	Interflow	Groundwater
Component Flows To:		
POC 1	POC 1	

Mitigated Land Use

Developed Vault Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.897
Pervious Total	0.897
Impervious Land Use	acre
ROADS MOD	0.611
ROOF TOPS FLAT	0.567
Impervious Total	1.178
Basin Total	2.075

Element Flow Components:

Surface	Interflow	Groundwater
Component Flows To:		
Vault 1	Vault 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Vault 1

Width: 26 ft.
 Length: 50 ft.
 Depth: 6 ft.
 Discharge Structure
 Riser Height: 5 ft.
 Riser Diameter: 12 in.
 Orifice 1 Diameter: 3.063 in. Elevation:0 ft.
 Orifice 2 Diameter: 0.688 in. Elevation:1.1 ft.
 Element Outlets:
 Outlet 1 Outlet 2
 Outlet Flows To:

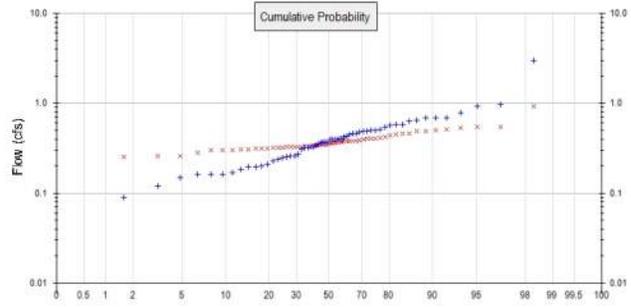
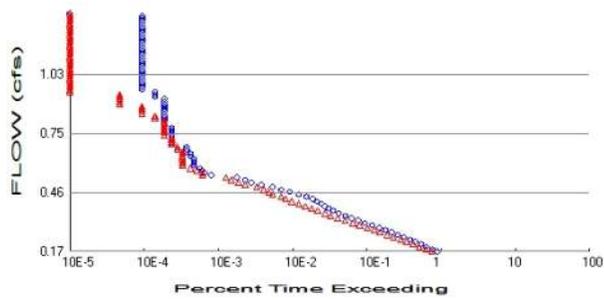
Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.029	0.000	0.000	0.000
0.0667	0.029	0.002	0.065	0.000
0.1333	0.029	0.004	0.092	0.000
0.2000	0.029	0.006	0.113	0.000
0.2667	0.029	0.008	0.131	0.000
0.3333	0.029	0.009	0.146	0.000
0.4000	0.029	0.011	0.161	0.000
0.4667	0.029	0.013	0.173	0.000
0.5333	0.029	0.015	0.185	0.000
0.6000	0.029	0.017	0.197	0.000
0.6667	0.029	0.019	0.207	0.000
0.7333	0.029	0.021	0.218	0.000
0.8000	0.029	0.023	0.227	0.000
0.8667	0.029	0.025	0.236	0.000
0.9333	0.029	0.027	0.245	0.000
1.0000	0.029	0.029	0.254	0.000
1.0667	0.029	0.031	0.262	0.000
1.1333	0.029	0.033	0.273	0.000
1.2000	0.029	0.035	0.282	0.000
1.2667	0.029	0.037	0.291	0.000
1.3333	0.029	0.039	0.300	0.000
1.4000	0.029	0.041	0.308	0.000
1.4667	0.029	0.043	0.316	0.000
1.5333	0.029	0.045	0.323	0.000
1.6000	0.029	0.047	0.331	0.000
1.6667	0.029	0.049	0.338	0.000
1.7333	0.029	0.051	0.345	0.000
1.8000	0.029	0.053	0.352	0.000
1.8667	0.029	0.055	0.359	0.000
1.9333	0.029	0.057	0.365	0.000
2.0000	0.029	0.059	0.372	0.000
2.0667	0.029	0.061	0.378	0.000
2.1333	0.029	0.063	0.384	0.000
2.2000	0.029	0.065	0.391	0.000
2.2667	0.029	0.067	0.397	0.000
2.3333	0.029	0.069	0.403	0.000
2.4000	0.029	0.071	0.408	0.000
2.4667	0.029	0.073	0.414	0.000

2.5333	0.029	0.075	0.420	0.000
2.6000	0.029	0.077	0.426	0.000
2.6667	0.029	0.079	0.431	0.000
2.7333	0.029	0.081	0.437	0.000
2.8000	0.029	0.083	0.442	0.000
2.8667	0.029	0.085	0.448	0.000
2.9333	0.029	0.087	0.453	0.000
3.0000	0.029	0.089	0.458	0.000
3.0667	0.029	0.091	0.463	0.000
3.1333	0.029	0.093	0.468	0.000
3.2000	0.029	0.095	0.473	0.000
3.2667	0.029	0.097	0.478	0.000
3.3333	0.029	0.099	0.483	0.000
3.4000	0.029	0.101	0.488	0.000
3.4667	0.029	0.103	0.493	0.000
3.5333	0.029	0.105	0.498	0.000
3.6000	0.029	0.107	0.503	0.000
3.6667	0.029	0.109	0.507	0.000
3.7333	0.029	0.111	0.512	0.000
3.8000	0.029	0.113	0.517	0.000
3.8667	0.029	0.115	0.521	0.000
3.9333	0.029	0.117	0.526	0.000
4.0000	0.029	0.119	0.530	0.000
4.0667	0.029	0.121	0.535	0.000
4.1333	0.029	0.123	0.539	0.000
4.2000	0.029	0.125	0.544	0.000
4.2667	0.029	0.127	0.548	0.000
4.3333	0.029	0.129	0.552	0.000
4.4000	0.029	0.131	0.557	0.000
4.4667	0.029	0.133	0.561	0.000
4.5333	0.029	0.135	0.565	0.000
4.6000	0.029	0.137	0.569	0.000
4.6667	0.029	0.139	0.574	0.000
4.7333	0.029	0.141	0.578	0.000
4.8000	0.029	0.143	0.582	0.000
4.8667	0.029	0.145	0.586	0.000
4.9333	0.029	0.147	0.590	0.000
5.0000	0.029	0.149	0.594	0.000
5.0667	0.029	0.151	0.780	0.000
5.1333	0.029	0.153	1.112	0.000
5.2000	0.029	0.155	1.514	0.000
5.2667	0.029	0.157	1.928	0.000
5.3333	0.029	0.159	2.297	0.000
5.4000	0.029	0.161	2.578	0.000
5.4667	0.029	0.163	2.760	0.000
5.5333	0.029	0.165	2.925	0.000
5.6000	0.029	0.167	3.069	0.000
5.6667	0.029	0.169	3.204	0.000
5.7333	0.029	0.171	3.334	0.000
5.8000	0.029	0.173	3.457	0.000
5.8667	0.029	0.175	3.576	0.000
5.9333	0.029	0.177	3.691	0.000
6.0000	0.029	0.179	3.801	0.000
6.0667	0.029	0.181	3.908	0.000
6.1333	0.000	0.000	4.012	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 5.138
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.897
 Total Impervious Area: 1.178

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.348022
5 year	0.587901
10 year	0.782299
25 year	1.07039
50 year	1.317193
100 year	1.592733

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.357608
5 year	0.440153
10 year	0.4985
25 year	0.576451
50 year	0.637655
100 year	0.701613

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.632	0.542
1950	0.207	0.330
1951	0.451	0.380
1952	0.201	0.374
1953	0.309	0.330
1954	0.683	0.390
1955	0.567	0.494
1956	2.971	0.495
1957	0.489	0.340
1958	0.683	0.343

1959	0.647	0.457
1960	0.375	0.330
1961	0.923	0.346
1962	0.270	0.367
1963	0.321	0.367
1964	0.258	0.307
1965	0.186	0.207
1966	0.777	0.381
1967	0.456	0.395
1968	0.476	0.350
1969	0.373	0.283
1970	0.398	0.371
1971	0.584	0.458
1972	0.504	0.376
1973	0.321	0.316
1974	0.461	0.350
1975	0.407	0.377
1976	0.510	0.412
1977	0.257	0.302
1978	0.400	0.306
1979	0.360	0.327
1980	0.249	0.319
1981	0.227	0.303
1982	0.168	0.316
1983	0.394	0.543
1984	0.149	0.258
1985	0.080	0.348
1986	0.364	0.302
1987	0.329	0.340
1988	0.236	0.317
1989	0.162	0.258
1990	0.160	0.316
1991	0.329	0.426
1992	0.434	0.335
1993	0.196	0.320
1994	0.490	0.511
1995	0.418	0.354
1996	0.497	0.337
1997	0.375	0.337
1998	0.402	0.383
1999	0.684	0.491
2000	0.195	0.407
2001	0.088	0.437
2002	0.959	0.538
2003	0.587	0.937
2004	0.161	0.329
2005	0.255	0.408
2006	0.546	0.449
2007	0.339	0.406
2008	0.399	0.366
2009	0.120	0.253

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	2.9710	0.9366
2	0.9589	0.5428
3	0.9228	0.5425

4	0.7770	0.5377
5	0.6842	0.5108
6	0.6830	0.4954
7	0.6828	0.4937
8	0.6471	0.4913
9	0.6315	0.4582
10	0.5867	0.4570
11	0.5845	0.4489
12	0.5665	0.4366
13	0.5458	0.4264
14	0.5098	0.4121
15	0.5038	0.4076
16	0.4968	0.4075
17	0.4902	0.4057
18	0.4891	0.3949
19	0.4758	0.3898
20	0.4613	0.3830
21	0.4564	0.3807
22	0.4507	0.3797
23	0.4342	0.3771
24	0.4181	0.3761
25	0.4070	0.3740
26	0.4016	0.3706
27	0.3999	0.3674
28	0.3995	0.3667
29	0.3981	0.3664
30	0.3944	0.3542
31	0.3754	0.3502
32	0.3752	0.3498
33	0.3729	0.3481
34	0.3637	0.3460
35	0.3598	0.3432
36	0.3390	0.3402
37	0.3291	0.3400
38	0.3287	0.3372
39	0.3213	0.3367
40	0.3208	0.3350
41	0.3091	0.3303
42	0.2699	0.3300
43	0.2581	0.3298
44	0.2567	0.3287
45	0.2554	0.3266
46	0.2491	0.3198
47	0.2356	0.3186
48	0.2265	0.3172
49	0.2071	0.3163
50	0.2008	0.3156
51	0.1960	0.3155
52	0.1952	0.3068
53	0.1858	0.3060
54	0.1680	0.3027
55	0.1620	0.3024
56	0.1614	0.3022
57	0.1603	0.2826
58	0.1492	0.2579
59	0.1204	0.2578
60	0.0884	0.2532
61	0.0799	0.2067

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1740	19137	15971	83	Pass
0.1856	16285	13306	81	Pass
0.1971	13486	10878	80	Pass
0.2087	11443	9022	78	Pass
0.2202	9537	7315	76	Pass
0.2317	8117	6109	75	Pass
0.2433	6733	4913	72	Pass
0.2548	5559	4017	72	Pass
0.2664	4577	3202	69	Pass
0.2779	3805	2684	70	Pass
0.2895	3118	2158	69	Pass
0.3010	2500	1716	68	Pass
0.3126	2028	1393	68	Pass
0.3241	1649	1084	65	Pass
0.3357	1313	858	65	Pass
0.3472	1096	694	63	Pass
0.3588	896	588	65	Pass
0.3703	749	462	61	Pass
0.3819	651	383	58	Pass
0.3934	585	315	53	Pass
0.4050	521	261	50	Pass
0.4165	456	209	45	Pass
0.4281	393	171	43	Pass
0.4396	327	149	45	Pass
0.4511	257	115	44	Pass
0.4627	196	102	52	Pass
0.4742	152	87	57	Pass
0.4858	114	70	61	Pass
0.4973	80	49	61	Pass
0.5089	59	40	67	Pass
0.5204	49	32	65	Pass
0.5320	38	27	71	Pass
0.5435	17	13	76	Pass
0.5551	14	13	92	Pass
0.5666	13	11	84	Pass
0.5782	12	9	75	Pass
0.5897	10	7	70	Pass
0.6013	10	7	70	Pass
0.6128	10	7	70	Pass
0.6244	10	7	70	Pass
0.6359	9	7	77	Pass
0.6475	9	7	77	Pass
0.6590	8	7	87	Pass
0.6705	8	6	75	Pass
0.6821	8	6	75	Pass
0.6936	5	5	100	Pass
0.7052	5	5	100	Pass
0.7167	5	5	100	Pass
0.7283	5	5	100	Pass
0.7398	5	4	80	Pass
0.7514	5	4	80	Pass
0.7629	5	4	80	Pass
0.7745	5	4	80	Pass

0.7860	4	4	100	Pass
0.7976	4	4	100	Pass
0.8091	4	4	100	Pass
0.8207	4	3	75	Pass
0.8322	4	3	75	Pass
0.8438	4	2	50	Pass
0.8553	4	2	50	Pass
0.8668	4	2	50	Pass
0.8784	4	2	50	Pass
0.8899	4	1	25	Pass
0.9015	4	1	25	Pass
0.9130	4	1	25	Pass
0.9246	3	1	33	Pass
0.9361	3	1	33	Pass
0.9477	3	0	0	Pass
0.9592	2	0	0	Pass
0.9708	2	0	0	Pass
0.9823	2	0	0	Pass
0.9939	2	0	0	Pass
1.0054	2	0	0	Pass
1.0170	2	0	0	Pass
1.0285	2	0	0	Pass
1.0401	2	0	0	Pass
1.0516	2	0	0	Pass
1.0632	2	0	0	Pass
1.0747	2	0	0	Pass
1.0862	2	0	0	Pass
1.0978	2	0	0	Pass
1.1093	2	0	0	Pass
1.1209	2	0	0	Pass
1.1324	2	0	0	Pass
1.1440	2	0	0	Pass
1.1555	2	0	0	Pass
1.1671	2	0	0	Pass
1.1786	2	0	0	Pass
1.1902	2	0	0	Pass
1.2017	2	0	0	Pass
1.2133	2	0	0	Pass
1.2248	2	0	0	Pass
1.2364	2	0	0	Pass
1.2479	2	0	0	Pass
1.2595	2	0	0	Pass
1.2710	2	0	0	Pass
1.2826	2	0	0	Pass
1.2941	2	0	0	Pass
1.3056	2	0	0	Pass
1.3172	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 1.9386 acre-feet

On-line facility target flow: 2.2277 cfs.

Adjusted for 15 min: 2.2277 cfs.

Off-line facility target flow: 1.2601 cfs.

Adjusted for 15 min: 1.2601 cfs.

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

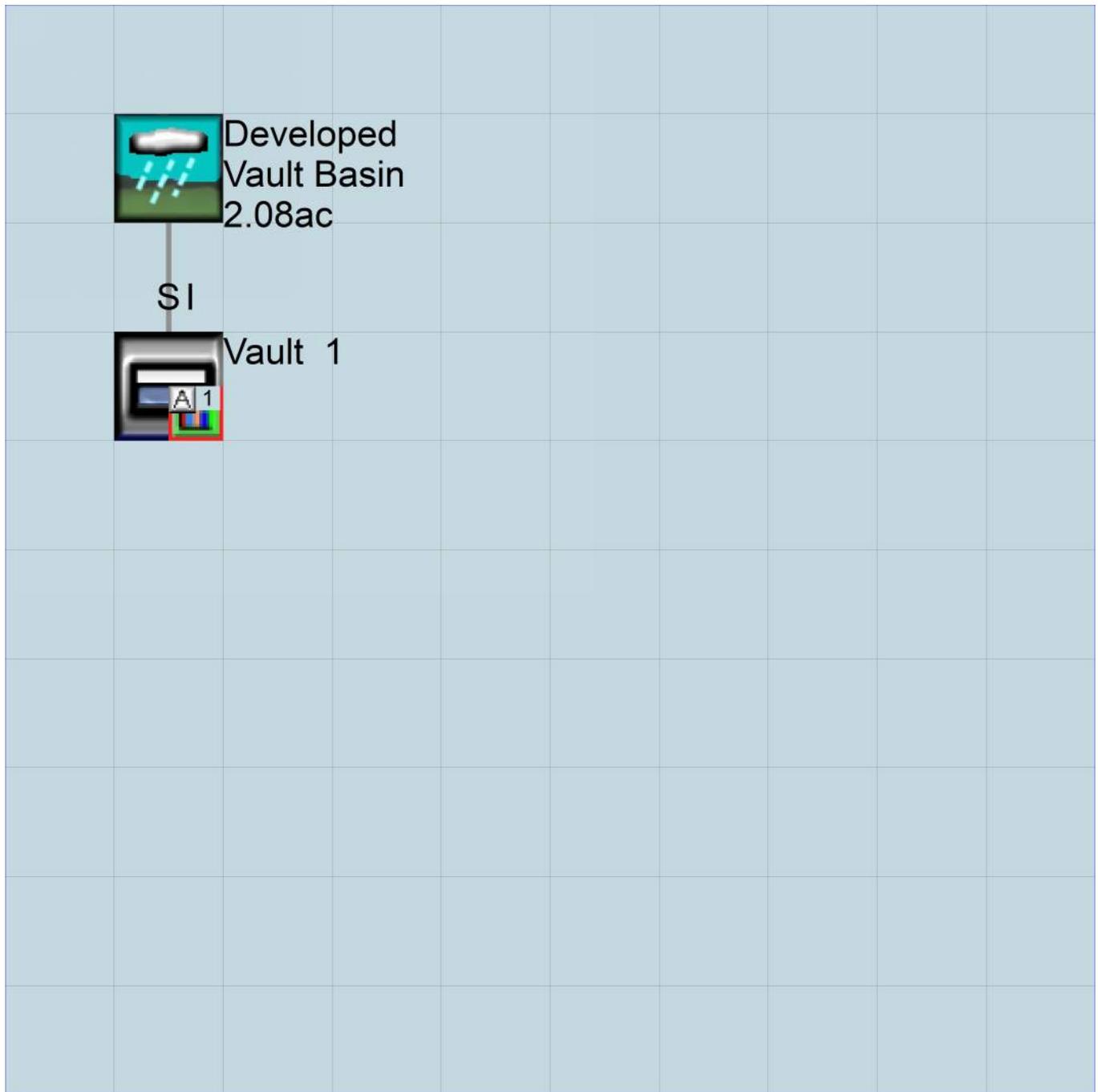
No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Pre-Develope
Vault Basin
5.14ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 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      2025-06-19 - Vault.wdm
MESSU    25      Pre2025-06-19 - Vault.MES
          27      Pre2025-06-19 - Vault.L61
          28      Pre2025-06-19 - Vault.L62
          30      POC2025-06-19 - Vault1.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND       10
  COPY         501
  DISPLY       1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Pre-Developed Vault Basin  MAX          1    2    30    9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1      1    1
501    1    1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCD ***
```

END OPCODE

PARM

```
#      #          K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #          User  t-series  Engl Metr ***
          in  out          ***
```

```
10      C, Forest, 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 ***
10      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 *****
10      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 ***
10 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
10 0 4.5 0.08 400 0.05 0.5 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
10 0 0 2 2 0 0 0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
10 0.2 0.5 0.35 6 0.5 0.7
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
10 0 0 0 0 2.5 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***

END GEN-INFO
*** Section IWATER***

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

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

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

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

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

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

```

END IMPLND

SCHEMATIC

<-Source->	<Name> #	<--Area-->	<-factor-->	<-Target->	MBLK	***
Pre-Developed Vault Basin***					Tbl#	***
PERLND 10		5.138		COPY 501	12	
PERLND 10		5.138		COPY 501	13	

*****Routing*****
END SCHEMATIC

NETWORK

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

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

END NETWORK

RCHRES

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

END GEN-INFO
*** Section RCHRES***

ACTIVITY

<PLS > ***** Active Sections *****

#	-	#	HYFG	ADFG	CNFG	HTFG	SDFG	GQFG	OXFG	NUFG	PKFG	PHFG	***
#	-	#	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	*****
#	-	#	HYDR	ADCA	CONS	HEAT	SED	GQL	OXRX	NUTR	PLNK	PHCB	PIVL	PYR	*****

END PRINT-INFO

HYDR-PARM1

RCHRES	Flags for each HYDR Section	***	ODGTFG for each	FUNCT for each	***
# - #	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
	*** ac-ft	for each possible exit
		Initial value of OUTDGT
		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
END EXT TARGETS
```

MASS-LINK

```
<Volume>   <-Grp> <-Member-><--Mult-->   <Target>   <-Grp> <-Member->***
<Name>     #      <Name> # #<-factor->   <Name>     #      <Name> # #***
MASS-LINK  12
PERLND     PWATER SURO      0.083333   COPY      INPUT  MEAN
END MASS-LINK 12
```

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

END MASS-LINK

END RUN

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 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      2025-06-19 - Vault.wdm
MESSU    25      Mit2025-06-19 - Vault.MES
          27      Mit2025-06-19 - Vault.L61
          28      Mit2025-06-19 - Vault.L62
          30      POC2025-06-19 - Vault1.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND        17
  IMPLND         2
  IMPLND         4
  RCHRES         1
  COPY           1
  COPY          501
  DISPLY         1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  1 -   Vault 1          MAX          1   2   30   9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
  1 -   1   1
 501 -   1   1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
# # OPCODE ***
```

END OPCODE

PARM

```
# # K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #                               User  t-series  Engl Metr ***
                               in  out
 17      C, Lawn, Mod          1   1   1   1   27   0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC ***
 17 - 0   0   1   0   0   0   0   0   0   0   0   0   0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
```

```

# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
17 0 0 4 0 0 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
17 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

```

```

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
17 0 4.5 0.03 400 0.1 0.5 0.996
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
17 0 0 2 2 0 0 0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
17 0.1 0.25 0.25 6 0.5 0.25
END PWAT-PARM4

```

```

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
17 0 0 0 0 2.5 1 0
END PWAT-STATE1

```

END PERLND

IMPLND

```

GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
2 ROADS/MOD 1 1 1 27 0
4 ROOF TOPS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

```

```

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

```

```

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

```

```

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
2 0 0 0 0 0
4 0 0 0 0 0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC

```

```

2          400      0.05      0.1      0.08
4          400      0.01      0.1      0.1
END IWAT-PARM2

```

```

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

```

```

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

```

END IMPLND

```

SCHEMATIC
<-Source->      <--Area-->      <-Target->      MBLK      ***
<Name> #      <-factor->      <Name> #      Tbl#      ***
Developed Vault Basin***
PERLND 17      0.897      RCHRES 1      2
PERLND 17      0.897      RCHRES 1      3
IMPLND 2       0.611      RCHRES 1      5
IMPLND 4       0.567      RCHRES 1      5

```

```

*****Routing*****
PERLND 17      0.897      COPY 1      12
IMPLND 2       0.611      COPY 1      15
IMPLND 4       0.567      COPY 1      15
PERLND 17      0.897      COPY 1      13
RCHRES 1       1          COPY 501     16
END SCHEMATIC

```

```

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

```

```

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

```

```

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

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUGF 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 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
92      4
Depth      Area      Volume      Outflowl Velocity      Travel Time***
(ft)      (acres) (acre-ft) (cfs)      (ft/sec) (Minutes)***
0.000000  0.029844  0.000000  0.000000
0.066667  0.029844  0.001990  0.065715
0.133333  0.029844  0.003979  0.092935
0.200000  0.029844  0.005969  0.113822
0.266667  0.029844  0.007958  0.131430
0.333333  0.029844  0.009948  0.146943
0.400000  0.029844  0.011938  0.160969
0.466667  0.029844  0.013927  0.173866
0.533333  0.029844  0.015917  0.185870
0.600000  0.029844  0.017906  0.197145
0.666667  0.029844  0.019896  0.207809
0.733333  0.029844  0.021886  0.217952
0.800000  0.029844  0.023875  0.227644
0.866667  0.029844  0.025865  0.236939
0.933333  0.029844  0.027854  0.245883
1.000000  0.029844  0.029844  0.254514
1.066667  0.029844  0.031833  0.262860
1.133333  0.029844  0.033823  0.273292
1.200000  0.029844  0.035813  0.282862
1.266667  0.029844  0.037802  0.291682
1.333333  0.029844  0.039792  0.300083
1.400000  0.029844  0.041781  0.308170
1.466667  0.029844  0.043771  0.315998
1.533333  0.029844  0.045761  0.323602
1.600000  0.029844  0.047750  0.331007
1.666667  0.029844  0.049740  0.338231
1.733333  0.029844  0.051729  0.345290
1.800000  0.029844  0.053719  0.352197
1.866667  0.029844  0.055709  0.358962
1.933333  0.029844  0.057698  0.365596
2.000000  0.029844  0.059688  0.372105
2.066667  0.029844  0.061677  0.378497
2.133333  0.029844  0.063667  0.384779
2.200000  0.029844  0.065657  0.390957
2.266667  0.029844  0.067646  0.397036
2.333333  0.029844  0.069636  0.403020
2.400000  0.029844  0.071625  0.408915
2.466667  0.029844  0.073615  0.414724
2.533333  0.029844  0.075605  0.420451
2.600000  0.029844  0.077594  0.426100
2.666667  0.029844  0.079584  0.431673
2.733333  0.029844  0.081573  0.437174

```

```

2.800000 0.029844 0.083563 0.442606
2.866667 0.029844 0.085552 0.447971
2.933333 0.029844 0.087542 0.453272
3.000000 0.029844 0.089532 0.458510
3.066667 0.029844 0.091521 0.463689
3.133333 0.029844 0.093511 0.468810
3.200000 0.029844 0.095500 0.473875
3.266667 0.029844 0.097490 0.478886
3.333333 0.029844 0.099480 0.483844
3.400000 0.029844 0.101469 0.488752
3.466667 0.029844 0.103459 0.493611
3.533333 0.029844 0.105448 0.498421
3.600000 0.029844 0.107438 0.503186
3.666667 0.029844 0.109428 0.507905
3.733333 0.029844 0.111417 0.512581
3.800000 0.029844 0.113407 0.517214
3.866667 0.029844 0.115396 0.521806
3.933333 0.029844 0.117386 0.526357
4.000000 0.029844 0.119376 0.530870
4.066667 0.029844 0.121365 0.535344
4.133333 0.029844 0.123355 0.539780
4.200000 0.029844 0.125344 0.544181
4.266667 0.029844 0.127334 0.548546
4.333333 0.029844 0.129324 0.552876
4.400000 0.029844 0.131313 0.557172
4.466667 0.029844 0.133303 0.561436
4.533333 0.029844 0.135292 0.565667
4.600000 0.029844 0.137282 0.569867
4.666667 0.029844 0.139272 0.574036
4.733333 0.029844 0.141261 0.578174
4.800000 0.029844 0.143251 0.582283
4.866667 0.029844 0.145240 0.586364
4.933333 0.029844 0.147230 0.590415
5.000000 0.029844 0.149219 0.594440
5.066667 0.029844 0.151209 0.780671
5.133333 0.029844 0.153199 1.112070
5.200000 0.029844 0.155188 1.514028
5.266667 0.029844 0.157178 1.928350
5.333333 0.029844 0.159167 2.297632
5.400000 0.029844 0.161157 2.578068
5.466667 0.029844 0.163147 2.760204
5.533333 0.029844 0.165136 2.925864
5.600000 0.029844 0.167126 3.069191
5.666667 0.029844 0.169115 3.204935
5.733333 0.029844 0.171105 3.334208
5.800000 0.029844 0.173095 3.457871
5.866667 0.029844 0.175084 3.576612
5.933333 0.029844 0.177074 3.690985
6.000000 0.029844 0.179063 3.801451
6.066667 0.029844 0.181053 3.908391

```

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 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***
RCHRES 1 HYDR RO 1 1 1 WDM 1002 FLOW ENGL REPL
RCHRES 1 HYDR STAGE 1 1 1 WDM 1003 STAG ENGL REPL
COPY 1 OUTPUT MEAN 1 1 48.4 WDM 701 FLOW ENGL REPL
COPY 501 OUTPUT MEAN 1 1 48.4 WDM 801 FLOW ENGL REPL

```

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member-><--Mult-->	<Target>	<-Grp>	<-Member->***
<Name>		<Name> # #<-factor->	<Name>		<Name> # #***

MASS-LINK		2			
PERLND	PWATER	SURO	0.083333	RCHRES	INFLOW IVOL
END MASS-LINK		2			

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

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

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

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

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

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

END MASS-LINK

END RUN

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Appendix B - Geotechnical Engineering Study



June 16, 2025

Montebanc Management, LLC
Attn: Chip McBroom and Paul DeVenzio
400 NW Gilman Blvd., #2781
Issaquah, Washington 98027

Re: Geotechnical Engineering Report - Addendum

Johnson Residential Development
Kitsap County Parcel Numbers: 242601-3-018-2001, 242601-3-005-2006, and 242601-3-019-2000
Poulsbo, Washington
Project No. AS240561-03

Dear Mr. McBroom and Mr. DeVenzio:

Aspect Consulting, a Geosyntec company (Aspect), prepared a Geotechnical Engineering Report dated February 14, 2025 (Aspect, 2025), documenting our geologic hazard assessment and geotechnical engineering evaluation for the proposed residential development (Project) on three parcels north of State Route 305 in Poulsbo, Washington, known as Kitsap County (County) parcel numbers 232601-4-001-2009, 242601-3-003-2008, and 252601-2-047-2007 (collectively the Site).

We understand you are now contracted to purchase three additional County parcels: 242601-3-018-2001, 242601-3-005-2006, and 242601-3-019-2000, which collectively cover about 8 acres. These parcels are referred to as the Owl Ridge Parcels. Our additional scope of work included a geologic reconnaissance, the advancement of additional test pits to understand the subsurface soil and groundwater conditions, laboratory testing, and the associated analysis and this addendum.

Project Understanding

Current project plans for the Owl Ridge Parcels include about 26 residential parcels, a connector roadway from Sunrise Ridge Avenue NE from the northern property line near the northwest corner that will extend through the properties to the southern property line near the southeast corner, and associated utilities and infrastructure (Graphic 1; ESM, 2025).



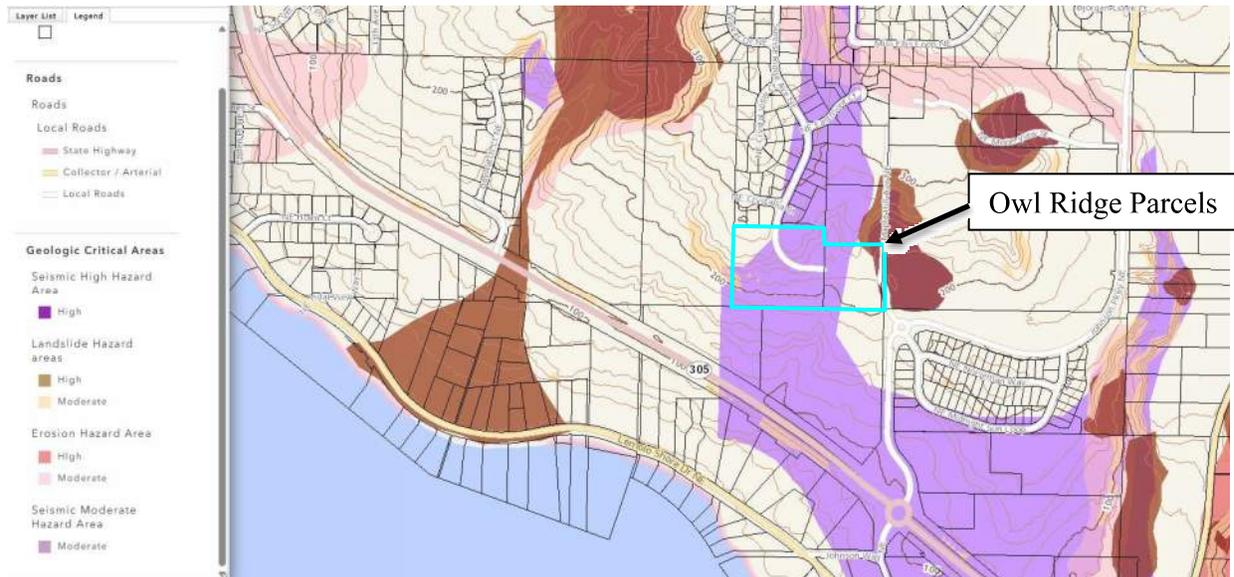


Graphic 1. Current Project Plans (ESM, 2025)

The County’s geologic hazard map designates four hazards on the Owl Ridge Parcels (Graphic 2 below):

- A high landslide hazard, defined as steeper than 30 percent slopes, is present along the east side of the parcels.
- A limited area of moderate landslide hazard, defined as slopes between 15 to 30 percent is along the west property line, extending onto the previously evaluated property.
- A moderate seismic hazard covers a large area through the middle and east side of the parcels.

The City’s standard buffer requirement is 25 feet from the top, toe, and all edges of geologically hazardous areas and areas of geologic concern, unless otherwise specified. In our experience, a geotechnical report will be required by the City for the Project.



Graphic 2. County Geologic Hazards Map (County, 2025)

Existing Conditions

The Owl Ridge Parcels consists of three undeveloped parcels. The west parcel (242601-3-018-2001) is approximately 5 acres and measures about 440 feet north to south and 490 feet east to west, with Sunrise Ridge Avenue NE to the north. The central parcel (242601-3-005-2006) is approximately 2.5 acres and measures approximately 310 feet north to south and 345 feet east to west. The eastern parcel (242601-3-019-2000) is about 0.12 acres and measures approximately 140 feet north to south and 15 feet east-to-west (County, 2025).

The central parcel is developed with a one-story, 577-square-foot residence built in 1935 with a gravel access driveway from the south, near the central area of the parcel (Photograph 1). A stormwater pond is located in the southeast corner of the central parcel (Photograph 2).

An asphalt paved roadway (Sunrise Ridge Avenue NE) cuts through the parcels and other gravel and dirt roadways cross throughout the parcels. A gravel roadway along the southern boundary provides access to a residential property to the west while another roadway provides access along the eastern boundary to the north, Maple Hill Avenue NE.

Topography

The ground surface of the Owl Ridge Parcels slopes down to the south with about 90 feet of elevation loss and an average slope of about 27 percent (15 degrees).

Drainage

Water was observed in the stormwater pond. Outside the pond, no water seepage, springs, flowing water, evidence of past standing or flowing water, hydrophilic vegetation, or saturated soils were observed.



Photograph 1. Existing Residence on central parcel, view to the northwest, on April 17, 2025.



Photograph 2. Stormwater pond in southeast corner of central parcel, view to the east, on April 17, 2025.

Vegetation

Vegetation in the areas of more recent development (i.e., the roadways, stormwater pond, and residence), consists largely of alders, maples, scotch broom, grasses, and woody shrubs. Other areas contain more mature evergreens up to 40 inches diameter at breast height, and forest undergrowth of sword ferns and woody underbrush.

Subsurface Conditions

The geologic map (Haugerud and Troost, 2011) indicates the center of the Owl Ridge Parcels is underlain by Vashon Esperance Sand Member (Qve) with Vashon till (Qvt) to both the east and west. Landslide deposits (Qls) are mapped along the eastern property line and are described as a diamict of sand, gravel, silt, and soil transported in deep-seated landslides.

The Esperance Sand Member was an advance outwash material deposited in broad low areas and fluvial channels in front of the advancing 3,000-foot-tall Cordilleran Glacier icesheet at the end of the Vashon Stade of the Fraser Glaciation (about 13,000 to 16,000 years ago) and is generally described as a mostly quartzofeldspathic fine to medium sand, locally pebbly or with small amounts of gravel or silt with a dense/hard configuration. Vashon till was deposited directly under the glacier and is described as a diamict of dense to very dense silt, sand, gravel, cobbles, and boulders.

Although not mapped, human-placed fill would be expected due to the roadway and stormwater pond constructed on the parcels. Fill is human-placed materials that is often found in developed areas and can be highly variable.

Stratigraphy

On April 17, 2025, we oversaw the advancement of eight (8) test pits, designated ATP-15 through ATP-22, which terminated between 6 and 11 feet below ground surface (bgs). Detailed descriptions of the subsurface conditions and soil characteristics are provided in the exploration logs in Appendix A. The locations of the test pits are shown on Figure 2.

Below surficial topsoil, we encountered Vashon recessional outwash (Qgo) in test pit ATP-17 in the northwest corner of the Owl Ridge Parcels. Recessional outwash is a fluvial deposit laid down during the retreat of the Vashon-age glacier. The geologic map shows this unit about 2,300 feet northwest, in a lower lying area (Polenz et al, 2013). We did encounter this unit on the western adjacent parcel somewhat nearby to this location.

Two of the test pits, APT-18 and ATP-21, encountered Vashon till, in agreement with the geologic map. The remaining five test pits, ATP-15, ATP-16, ATP-19, ATP-20, and ATP-22, encountered pre-Vashon glaciolacustrine deposits with varying degrees of weathering. A geologic map presenting inferred geologic contacts based on our subsurface investigation is presented as Figure 3. A summary table of the units encountered at the respective depths is presented in Table 1 following the descriptions.

Topsoil: Topsoil refers to a unit that contains a high percentage of organics. We encountered topsoil at the ground surface in all of the test pits, extending from 0.5 to 1.8 feet bgs. The topsoil consisted of loose¹, dark brown silt (ML)² with sand, abundant wood debris, and roots.

Vashon till: Underlying the topsoil, Vashon till was encountered in two of the explorations, ATP-18 and ATP-22, and both test pits were terminated in this unit. It consisted of very dense, gray, silty sand (ML) with subrounded to faceted gravels socketed into the diamict structure.

Pre-Vashon Fines: Glaciolacustrine Deposits: Underlying the topsoil, glaciolacustrine deposits were encountered in the remaining five test pits to the depths explored. We interpreted the glaciolacustrine deposits to be part of the pre-Vashon silt (Qpf), in agreement with geologic mapped material in the ravine in the northwest corner of the Owl Ridge Parcels. The deposit consisted of medium dense to dense, sand with silt (SM) and silt with sand (SM) with varied degrees of weathering.

The upper horizon of the deposit has been highly weathered, underlain by a slightly less weathered horizon, and lastly underlain by a relatively unweathered horizon. The amount of weathering decreases with depth while the density of the material increases. The highly-weathered glaciolacustrine deposits are loose, moist to very moist, brown silt with sand (ML) with iron-oxide staining and few root fragments. The weathered glaciolacustrine deposits are dense, moist, gray brown silt with sand (ML) with 0.1- to 0.2-inch-thick iron-oxide stained sand partings. The relatively unweathered glaciolacustrine deposits are very dense, blue gray silt with sand (ML) with 0.1- to 0.2-inch-thick sand partings.

¹ Relative density was assessed at various depth intervals in the explorations qualitatively with a 0.5-inch-diameter, pointed steel T-probe, and qualitatively with a dynamic cone penetrometer test (DCPT).

² Soils were classified per the Unified Soil Classification System (USCS) in general accordance with ASTM International (ASTM) D2488, *Standard Practice for Description and Identification of Soils* (ASTM, 2022).

Table 1. Geologic Units Encountered

Exploration Number	Depth of Topsoil (feet bgs)	Depth of Vashon Recessional Outwash (feet bgs)	Depth of Vashon Till (feet bgs)	Depth of Highly-Weathered Glaciolacustrine (feet bgs)	Depth of Weathered Glaciolacustrine (feet bgs)	Depth of Glaciolacustrine Deposits (feet bgs)	Total Depth (feet bgs)
ATP-15	0-1	NE	NE	1-4	4-7	7-11	11
ATP-16	0-0.5	NE	NE	0.5-2	2-5	5-9.5	9.5
ATP-17	0-0.5	0.5-9.5	NE	NE	NE	NE	9.5
ATP-18	0-1	1-3	3-5	NE	NE	NE	5
ATP-19	0-0.5	NE	NE	0.5-2	2-3.5	3.5-9	9
ATP-20	0-0.5	NE	NE	0.5-2	2-3.8	3.8-8	8
ATP-21	0-1	NE	1-6	NE	NE	NE	6
ATP-22	0-1.8	NE	NE	1.8-3	3-8	8-8.5	8.5

Notes:

1. NE – not encountered

Groundwater

We encountered groundwater seepage from the sidewalls about 2 to 3 feet bgs in two test pits, ATP-15 and ATP-22. We interpreted the observed seepage to be perched groundwater and not representative of a regional groundwater table. A perched groundwater condition occurs when surface water percolates into the shallow subsurface and collects on relatively impermeable materials. In this case, the topsoil and highly-weathered glaciolacustrine units are considered low permeability units, while the glaciolacustrine deposits are essentially impermeable. Sand partings in the upper highly-weathered and weathered glaciolacustrine deposits allow water to move through the upper units and perch on top of the glaciolacustrine deposits.

Laboratory Testing Results

Geotechnical laboratory tests were conducted on six selected samples to characterize engineering and index properties. Four grain-size distributions and two fines content (particles passing the No. 200 sieve) analyses were completed, and the natural moisture contents of these soil samples were also determined and are presented on the test pit logs. The test methodology and results of all the laboratory testing are presented in Appendix B along with a summary table including the geologic unit classification.

Table 2. Summary of Geotechnical Laboratory Test Results

Exploration Number	Sample Depth (feet bgs)	Percent Gravel	Percent Sand	Percent Fines	Moisture Content (percent)	USCS ²	Geologic Unit
ATP-16	2	1	97	8	12.6	SP-SM	Highly Weathered Glaciolacustrine
ATP-16	5	NT ¹	NT ¹	66	21.5	ML	Weathered Glaciolacustrine Deposits
ATP-17	5	48	45	7	3.8	GP-GM	Vashon Recessional Outwash
ATP-18	4	14	56	30	7.9	SM	Vashon Till
ATP-19	3	NT ¹	NT ¹	89	29.6	ML	Weathered Glaciolacustrine
ATP-21	5	13	28	59	41.1	ML	Vashon Till

Notes:

1. NT – Not tested
2. USCS – Unified Soils Classification System

Landslide Hazards

The results of our review of publicly available resources are as follows:

- The Owl Ridge Parcels is mapped as “Stable,” and described as slopes that generally rise less than 15 percent in grade and are underlain by stable material (Ecology, 1979).
- Analysis using LiDAR maps did not identify this slope as a landslide (McKenna, et al., 2008).
- The geomorphic map indicates a landslide (ls) along the eastern boundary of the Owl Ridge Parcels, meaning there is evidence of a deep-seated landslide as indicated by uphill scarps, bulbous toes, and a position in hillslope hollows (Haugerud, 2009).
- The geologic map is in agreement with the geomorphic map in that a deep-seated rotational landslide is located along the eastern boundary of the Owl Ridge Parcels (Polenz et al, 2013).
- Aspect reviewed the newest publicly available LiDAR data for the Owl Ridge Parcels and surrounding area (DNR, 2019), which shows bowl-shaped topography and hummocky

terrain along the eastern boundary, indicating a possible landslide. None of these features were observed on the Owl Ridge Parcels themselves.

- We reviewed coastal aerial photographs (Ecology, 2025) and aerial photographs (Google, 2025 and NETR, 2025) of the Owl Ridge Parcels area from 1951 through 2024 and did not observe any loss of vegetation that would suggest recent slope movement.

The results of this data review indicate that the Owl Ridge Parcels are not underlain by landslide deposits, but that there may be landslide deposits on the adjoining eastern property. Due to the topography of the area, this landslide is unlikely to put the Project at risk of a landslide.

Conclusions and Recommendations

From our geotechnical investigation, we conclude that the Owl Ridge Parcels is suitable for the proposed residential development, provided the recommendations contained herein are incorporated into the Project design and construction.

Geologically Hazardous Area Considerations

Three geologic hazards are mapped on and within the area of influence of the Owl Ridge Parcels including: high landslide hazard, moderate landslide hazards, and a moderate seismic hazard (Graphic 1). The seismic hazard shape matches the mapped extents of Esperance Sand Member on the geologic map. None of the materials encountered are liquefiable, thus soil liquefaction is not a seismic hazard or design consideration.

The moderate landslide hazard area along the western boundary was fully evaluated during our previous work and we concluded that the area was stable and no setback from the area was needed.

The high landslide hazard along the eastern boundary matches the shape of the deep-seated rotational landslide noted on the geologic and geomorphic maps. Our test pits closest to that boundary did not encounter landslide deposits. It is our opinion that this landslide is currently dormant; therefore, we do NOT recommend a minimum setback from the area; however, this area should be closely monitored during construction by us to confirm no landslide deposits are encountered.

Additional Project Design and Construction Monitoring

All of our previous design and construction recommendations presented in our previous Geotechnical Engineering Report apply to the Owl Ridge Parcels and should be brought to the attention of designers and contractors and incorporated into the Project plans and specifications.

If significant cuts and fills are planned for the Owl Ridge Parcels, we recommend Aspect/Geosyntec be involved during construction, starting with our participation in a pre-construction meeting with you and your contractor. The integrity of the Project and the overall Site and Owl Ridge Parcels stability depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent.

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Montebanc Management, LLC
June 16, 2025

Project No. AS240561-03

Washington State Department of Natural Resources (DNR), 2018, Washington Lidar Portal, Olympics South Opsw 2019 DTM hillshade, Kitsap County Opsw 2018 DTM hillshade, and Puget Lowlands 2005 DTM hillshade, lidarportal.dnr.wa.gov, accessed January 23, 2025.

Limitations

Work for this project was performed for Montebanc Management, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the Client.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor's site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

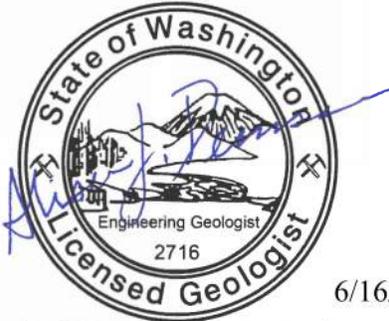
Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Alison J. Dennison, LEG, Senior Engineering Geologist at 206-780-7717.

We appreciate the opportunity to perform these services.

Sincerely,

Aspect consulting



6/16/2025

Alison J. Dennison

Alison J. Dennison, LEG
Senior Engineering Geologist
Alison.Dennison@aspectconsulting.com



6/16/2025

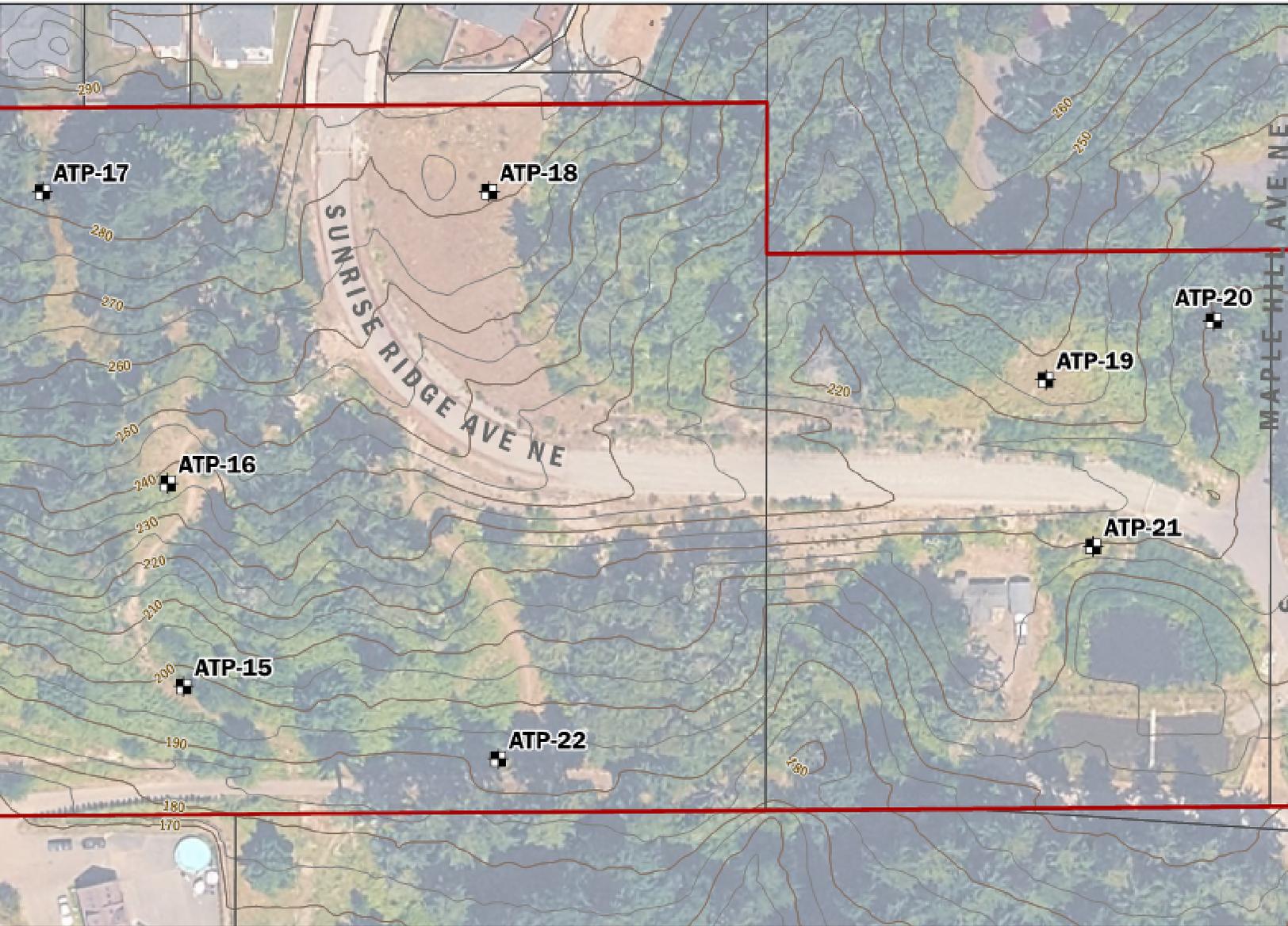
Erik O. Andersen, PE
Senior Principal Geotechnical Engineer
Erik.Andersen@aspectconsulting.com

Attachments:

- Figure 1 – Vicinity Map
- Figure 2 – Site Exploration Plan
- Figure 3 – Inferred Geologic Map
- Appendix A – Exploration Logs
- Appendix B – Geotechnical Laboratory Test Results
- Appendix C – Report Limitations and Guidelines for Use

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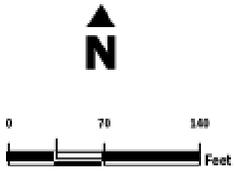
FIGURES



Pit
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Note:
 Topography Contours generated from Washington DNR LIDAR Imagery (2018)

Map Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



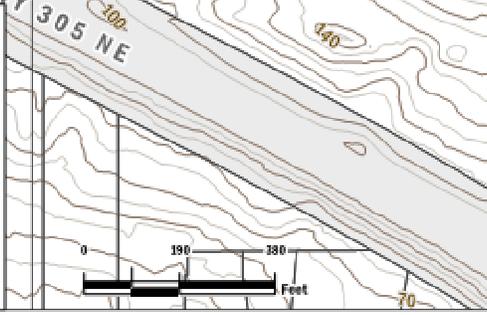
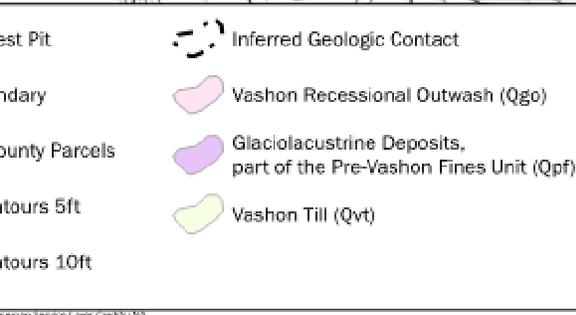
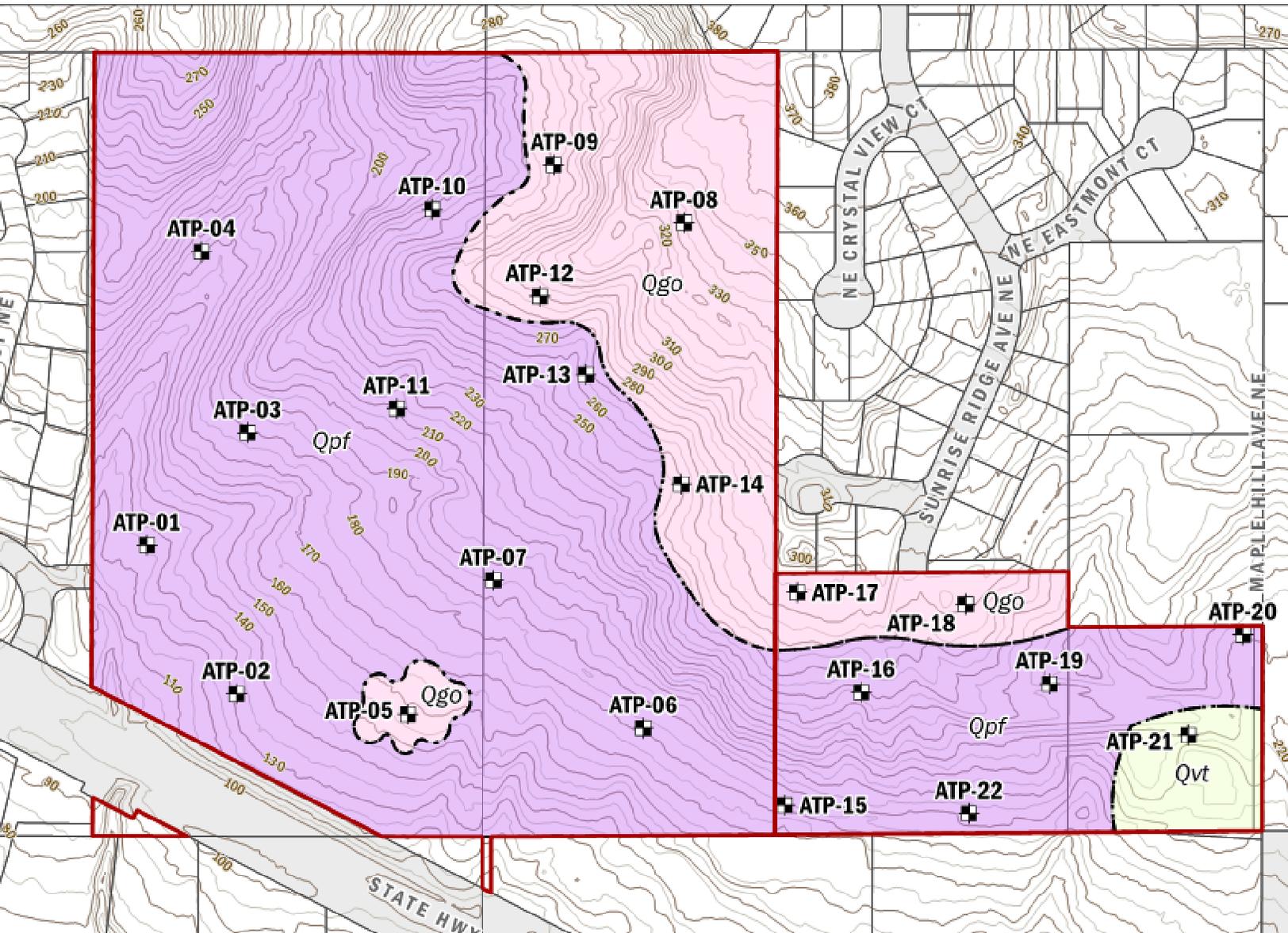
Site Exploration Plan

Geotechnical Engineering Report
 Addendum Johnson Residential Development
 Kitsap County Parcel Numbers: 242601-3-005-2006, and 242601-3-019
 Poulsbo, Washington



MAY-2025
 PROJECT NO.
 AS240561

BY
 AID / HMD
 REVISED BY
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Inferred Geologic Map
 Geotechnical Engineering Report
 Johnson Residential Development
 State Route 305
 Poulsbo, Washington

	MAY-2025	BY: AJD / HMD
	PROJECT NO. AS240561-02	REVISED BY: AJD / RAP

APPENDIX A

Subsurface Exploration Logs

A. Subsurface Explorations

On April 17, 2025, Aspect observed the excavation of eight test pits, ATP-15 through ATP-22. The test pits were excavated by an excavation company provided by you. Test pits were excavated using a Kubota KX040-U tracked excavator. An Aspect representative, Chelsea Bush, LG, was present throughout the field exploration program to determine the locations of the explorations, observe the explorations, assist in sampling, and to prepare descriptive logs of each exploration. Samples were obtained from select soil units to aid in the determination of engineering properties of the subsurface materials and laboratory testing. The locations of explorations are shown on Figure 2 and were collected with a Global Positioning System (GPS).

Detailed descriptions of the subsurface conditions encountered in our explorations, as well as the depths where characteristics of the soils changed, are indicated on the logs presented herein. The depths indicated on the log where conditions changed may represent gradational variations between soil types. Soils were described per the Unified Soils Classification System (USCS) in general accordance with the ASTM International Standard Practice for Description and Identification of Soils (ASTM D2488; ASTM, 2022). The depths on the logs where conditions changed may represent gradational variations between soil types and actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and locations reported, and therefore, are not necessarily representative of other locations and times. A key to the symbols and terms used on the logs is provided in the Exploration Log Key.

The relative density/consistency of the soils was evaluated qualitatively with a 0.5-inch-diameter steel T-probe and observation of digging difficulty. Relative density was quantitatively assessed with Dynamic Cone Penetrometer Testing (DCPT) at various depth intervals within the test pits. The test pits were backfilled with the excavated soils.

The DCPT method involves a 15-pound steel mass falling 20 inches to strike an anvil, which drives a 1.5-inch-diameter, 45-degree cone into the soil. The number of blows required to drive the cone 1.75 inches is considered one data point. The DCPT data has been calibrated with Standard Penetration Test (SPT, ASTM Method D1586) results to provide a more refined estimate of soil relative density and consistency.

The test pits were backfilled with the excavated soils and tamped into place to reduce the amount of settlement.

Coarse-Grained Soils - More than 50% Retained on No. 200 Sieve	Gravels - More than 50% ¹ of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	GW	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
		≥15% Fines	GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
	Sands - 50% ¹ or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
		≥15% Fines	GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50% ¹ or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	SW	Well-graded SAND Well-graded SAND WITH GRAVEL
		≤5% Fines	SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
≥15% Fines		SM	SILTY SAND SILTY SAND WITH GRAVEL	
Fine-Grained Soils - 50% ¹ or More Passes No. 200 Sieve	Sands - 50% ¹ or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
		≥15% Fines	ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
	Sils and Clays Liquid Limit Less than 50%		CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
			MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
	Sils and Clays Liquid Limit 50% or More		CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
		OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL	
Highly Organic Soils		PT	PEAT and other mostly organic soils	

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel, • "SANDY" or "GRAVELLY" means >30% sand and gravel, • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

MC	=	Natural Moisture Content	GEOTECHNICAL LAB TESTS
PS	=	Particle Size Distribution	
FC	=	Fines Content (% < 0.075 mm)	
GH	=	Hydrometer Test	
AL	=	Atterberg Limits	
C	=	Consolidation Test	
Str	=	Strength Test	
OC	=	Organic Content (% Loss by Ignition)	
Comp	=	Proctor Test	
K	=	Hydraulic Conductivity Test	
SG	=	Specific Gravity Test	

Organic Chemicals			CHEMICAL LAB TESTS
BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes	
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons	
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons	
VOCs	=	Volatile Organic Compounds	
SVOCs	=	Semi-Volatile Organic Compounds	
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds	
PCBs	=	Polychlorinated Biphenyls	
Metals			
RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)	
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)	
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)	

PID	=	Photoionization Detector	FIELD TESTS
Sheen	=	Oil Sheen Test	
SPT ²	=	Standard Penetration Test	
NSPT	=	Non-Standard Penetration Test	
DCPT	=	Dynamic Cone Penetration Test	

Descriptive Term	Size Range and Sieve Number	COMPONENT DEFINITIONS
Boulders	= Larger than 12 inches	
Cobbles	= 3 inches to 12 inches	
Coarse Gravel	= 3 inches to 3/4 inches	
Fine Gravel	= 3/4 inches to No. 4 (4.75 mm)	
Coarse Sand	= No. 4 (4.75 mm) to No. 10 (2.00 mm)	
Medium Sand	= No. 10 (2.00 mm) to No. 40 (0.425 mm)	
Fine Sand	= No. 40 (0.425 mm) to No. 200 (0.075 mm)	
Silt and Clay	= Smaller than No. 200 (0.075 mm)	

% by Weight	Modifier	% by Weight	Modifier	ESTIMATED¹ PERCENTAGE
<1	=	Subtrace	15 to 25 = Little	
1 to <5	=	Trace	30 to 45 = Some	
5 to 10	=	Few	>50 = Mostly	

Dry	=	Absence of moisture, dusty, dry to the touch	MOISTURE CONTENT
Slightly Moist	=	Perceptible moisture	
Moist	=	Damp but no visible water	
Very Moist	=	Water visible but not free draining	
Wet	=	Visible free water, usually from below water table	

Non-Cohesive or Coarse-Grained Soils			RELATIVE DENSITY
Density³	SPT² Blows/Foot	Penetration with 1/2" Diameter Rod	
Very Loose	= 0 to 4	≥ 2'	
Loose	= 5 to 10	1' to 2'	
Medium Dense	= 11 to 30	3" to 1'	
Dense	= 31 to 50	1" to 3"	
Very Dense	= > 50	< 1"	

Cohesive or Fine-Grained Soils			CONSISTENCY
Consistency³	SPT² Blows/Foot	Manual Test	
Very Soft	= 0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.	
Soft	= 2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.	
Medium Stiff	= 5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.	
Stiff	= 9 to 15	Indented ~1/4" with effort by thumb.	
Very Stiff	= 16 to 30	Indented easily by thumbnail.	
Hard	= > 30	Indented with difficulty by thumbnail.	

GEOLOGIC CONTACTS		
Observed and Distinct	Observed and Gradual	Inferred

	<h2>Exploration Log Key</h2>
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Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7230, -122.6255 (est)
Ground Surface Elev. (NAVD88)
195' (est)

Exploration Number

ATP-15

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

2.5' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)		
				0	10	20	30	40						50	
1	194	Exploration backfilled with excavated materials, tamped in place. 4/17/2025										TOPSOIL SILT WITH SAND (ML); loose, moist, brown; small roots, some organics.	1		
2	193												HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); medium dense, moist, light brown; fine to coarse sand; iron-oxide staining.	2	
3	192													3	
4	191												WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); dense, moist, gray.	4	
5	190													5	
6	189													6	
7	188													7	
8	187												UNWEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); very dense, moist, blue gray.	8	
9	186													9	
10	185				S1										10
11	184												Bottom of exploration at 11 ft. bgs. Note: Test pit excavated prior to arrival. No test pit caving observed.	11	
12	183											12			
13	182											13			
14	181											14			

Legend

Grab sample

Plastic Limit — Liquid Limit

Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log ATP-15

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
 Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
 47.7233, -122.6255 (est)
 Ground Surface Elev. (NAVD88)
 238' (est)

Exploration Number

ATP-16

Contractor
 Freedom Boring &
 Excavating

Equipment
 Kubota KX040-4

Sampling Method
 Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40				
1	237	Exploration backfilled with excavated materials, tamped in place.	S1						DCPT =8,10,12 PS,MC FC=8%	TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics.	1	
2	236			12.6							VASHON RECESSONAL OUTWASH SAND WITH SILT (SP-SM); medium dense, moist, light brown; iron-oxide staining; few small roots.	2
3	235										Becomes without roots.	3
4	234									DCPT =10,8,14		4
5	233				S2					FC, MC FC=66%	WEATHERED GLACIOLACUSTRINE DEPOSITS SANDY SILT (ML); dense, moist, gray brown.	5
6	232											6
7	231											7
8	230										UNWEATHERED GLACIOLACUSTRINE DEPOSITS SANDY SILT (ML); very dense, moist, blue gray.	8
9	229											9
10	228										Bottom of exploration at 9.5 ft. bgs. Note: No test pit caving observed.	10
11	227											11
12	226											12
13	225											13
14	224											14

Legend

Grab sample

Plastic Limit — Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: CB
 Approved by: AJD 5/14/2025

Exploration Log ATP-16

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7238, -122.6258 (est)
Ground Surface Elev. (NAVD88)
275' (est)

Exploration Number

ATP-17

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40					
1	274	Exploration backfilled with excavated materials, tamped in place.									TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics.	1	
2	273									T-probe = 4 inches	VASHON RECESSONAL OUTWASH SAND WITH SILT, GRAVEL, AND COBBLES (SP-SM); medium dense, moist, brown; fine to coarse sand; fine to coarse, subrounded gravel; up to 5-inch-diameter subrounded cobbles; iron-oxide staining; roots up to 2-inch-diameter.	2	
3	272									DCPT =9,12,17	GRAVEL WITH SILT, SAND, COBBLES, AND BOULDERS (GP-GM); medium dense, moist, brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; up to 5-inch-diameter subangular cobbles.	3	
4	271												4
5	270			S	3.8						PS, MC FC=7%	Becomes very moist, gray.	5
6	269												6
7	268											Becomes dense, moist; fine to coarse sand; fine to coarse, subangular to subrounded gravel; up to 8-inch-diameter subangular to subrounded cobbles. Boulder observed at 7 feet bgs.	7
8	267												8
9	266												9
10	265											Bottom of exploration at 9.5 ft. bgs. Note: No test pit caving observed.	10
11	264												11
12	263												12
13	262												13
14	261												14

Legend

Grab sample

Plastic Limit — Liquid Limit

No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log ATP-17

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7238, -122.6247 (est)
Ground Surface Elev. (NAVD88)
267' (est)

Exploration Number

ATP-18

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)		
				0	10	20	30	40						50	
1	266	Exploration backfilled with excavated materials, tamped in place.	S1							DCPT =4,21,30 PS, MC FC=30%		TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; abundant organics; small roots.	1		
2	265											VASHON TILL SAND WITH SILT, GRAVEL, AND COBBLES (SP-SM); medium dense, moist, brown; fine to coarse sand; fine to coarse, subrounded gravel; up to 5-inch-diameter subrounded cobbles; iron-oxide staining; roots up to 2-inch-diameter.	2		
3	264												SILTY SAND (SM); very dense, moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; gravel socketed in matrix.	3	
4	263														4
5	262														5
6	261										Bottom of exploration at 5 ft. bgs. Note: No test pit caving observed.	6			
7	260											7			
8	259											8			
9	258											9			
10	257											10			
11	256											11			
12	255											12			
13	254											13			
14	253											14			

Legend

Grab sample

Plastic Limit | Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log
ATP-18

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7235, -122.6233 (est)
Ground Surface Elev. (NAVD88)
234' (est)

Exploration Number

ATP-19

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)	
				0	10	20	30	40						50
1	233	Exploration backfilled with excavated materials, tamped in place.	S1							DCPT =8,17,20 FC,MC FC=89%	<p>TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics.</p> <p>HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS SANDY SILT WITH GRAVEL (ML); medium dense, very moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; iron-oxide staining along fractures. Becomes very moist.</p>	1		
2	232											2		
3	231												3	
4	230													4
5	229													5
6	228													6
7	227													7
8	226													8
9	225													9
10	224										10			
11	223										11			
12	222										12			
13	221										13			
14	220										14			

Legend

Grab sample

Plastic Limit | Liquid Limit

No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log ATP-19

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7237, -122.6227 (est)
Ground Surface Elev. (NAVD88)
267' (est)

Exploration Number

ATP-20

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40					
1	266	Exploration backfilled with excavated materials, tamped in place.									TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; abundant organics.	1	
2	265											HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); medium dense, very moist, brown; fine to medium sand; iron-oxide staining along fractures.	2
3	264									DCPT =4,11,13			3
4	263											WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); dense, very moist, gray; fine to medium sand; iron-oxide staining along fractures.	
5	262												
6	261												6
7	260												7
8	259										Bottom of exploration at 7.5 ft. bgs. Note: No test pit caving observed.	8	
9	258											9	
10	257											10	
11	256											11	
12	255											12	
13	254											13	
14	253											14	

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\AS240561 JOHNSON PROPERTY POULSBO.GPJ May 15, 2025

Legend

Plastic Limit | Liquid Limit

No Water Encountered

Sample Type

Water Level

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log ATP-20



Johnson Property - AS240561

Project Address & Site Specific Location
 Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
 47.7232, -122.6232 (est)
 Ground Surface Elev. (NAVD88)
 222' (est)

Exploration Number

ATP-21

Contractor
 Freedom Boring &
 Excavating

Equipment
 Kubota KX040-4

Sampling Method
 Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40					
1	221	Exploration backfilled with excavated materials, tamped in place.	S1							DCPT =7,13,9	TOPSOIL	SILT WITH SAND (ML); loose, moist, dark brown; fine to medium sand; up to 2 inch diameter roots.	1
2	220											VASHON TILL	SILT WITH SAND (ML); medium dense, moist, brown; fine to coarse sand; trace fine to coarse, subrounded gravel; iron-oxide staining.
3	219										Becomes without roots.		3
4	218										SILT WITH SAND (ML); dense, moist, gray; fine to coarse sand; trace fine to coarse, subrounded gravel; iron-oxide staining.	4	
5	217				S2	14	1				PS, MC FC=59%	SILTY SAND WITH GRAVEL AND COBBLES (SM); dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to rounded gravel; up to 6-inch-diameter, subangular to subrounded cobbles; gravel and cobbles socketed in matrix.	5
6	216												Bottom of exploration at 6 ft. bgs.
7	215									Note: No test pit caving observed.	7		
8	214										8		
9	213										9		
10	212										10		
11	211										11		
12	210										12		
13	209										13		
14	208										14		

Legend

Grab sample

Plastic Limit — Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: CB
 Approved by: AJD 5/14/2025

Exploration Log ATP-21

Sheet 1 of 1



Johnson Property - AS240561

Project Address & Site Specific Location
Poulsbo, WA, See Figure 2.

Geotechnical Exploration Log

Coordinates (Lat, Lon WGS84)
47.7228, -122.6242 (est)
Ground Surface Elev. (NAVD88)
190' (est)

Exploration Number

ATP-22

Contractor
Freedom Boring &
Excavating

Equipment
Kubota KX040-4

Sampling Method
Grab

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Neil

Trackhoe

4/17/2025

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40					
1	189	Exploration backfilled with excavated materials, tamped in place.	S1							DCPT =8, 15, 9	TOPSOIL SILTY SAND WITH GRAVEL (SM); loose, moist, dark brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; organics; up to 1-inch-diameter roots.	1	
2	188											VASHON TILL SANDY SILT WITH GRAVEL (ML); loose, wet, gray brown; fine to coarse sand; trace fine to coarse, subrounded gravel; up to 5-inch-diameter cobbles; iron-oxide staining.	2
3	187												Becomes dense, moist, gray brown.
4	186											Becomes with 0.1- to 0.2-inch-thick SAND partings.	
5	185												Becomes very moist.
6	184											Bottom of exploration at 8.5 ft. bgs. Note: No test pit caving observed.	
7	183												
8	182												
9	181								9				
10	180									10			
11	179									11			
12	178									12			
13	177									13			
14	176									14			

Legend

Grab sample

Plastic Limit | Liquid Limit

No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 5/14/2025

Exploration Log
ATP-22

Sheet 1 of 1

APPENDIX B

Geotechnical Laboratory Testing Results

B. Geotechnical Laboratory Testing Results

Geotechnical laboratory tests were conducted on selected soil samples collected during the field exploration program. The tests performed, and the procedures followed, are outlined below. The laboratory tests were conducted in general accordance with appropriate ASTM International (ASTM) test methods and were conducted by AAR Testing and Inspection, Inc., an accredited laboratory in Redmond, Washington.

B.1. Moisture Content Determination, MC

All four samples submitted for particle-size analyses and the two samples submitted for fines content determination were analyzed for water content by the ASTM D 2216 test method. This test method allows for the laboratory determination of the moisture (water) content of a soil sample by measuring and recording the mass of a sample before and then after drying. Test results are illustrated graphically on the logs in Appendix A.

B.2. Particle-Size Analyses, PF

Two select soil samples were submitted for particle-size with #200 sieve analysis in general accordance with ASTM D-2216, D-2419, D-4318, and D-5821 methods. This test method allows for the laboratory determination of the percent of the size fractions (by weight) of coarse-grained soil and the percent of fines in a soil sample, as well as the grain size diameter percentages of the material. The result of the test is presented in this appendix as curves depicting the percent finer by weight versus particle size.

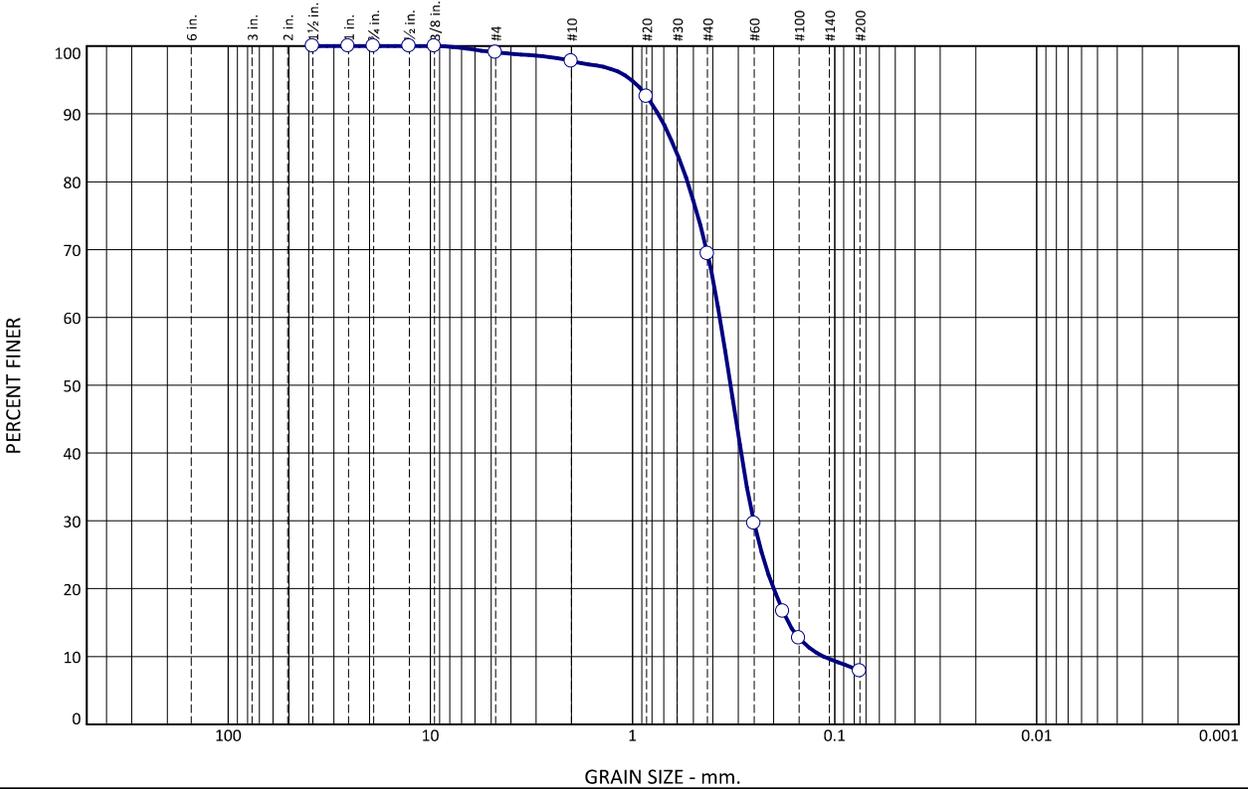
B.3. Fines Content Determination, FC

The fines content was determined on four selected soil samples in general accordance with ASTM D1140. The results of the tests are shown in the table below, on the exploration logs, and tabulated in this appendix.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM C117 & C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	1	29	61	8	

Test Results (ASTM C117 & C136)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1 1/2	100			
1	100			
3/4	100			
1/2	100			
3/8	100			
#4	99			
#10	98			
#20	93			
#40	69			
#60	30			
#80	17			
#100	13			
#200	7.8			

* (no specification provided)

Material Description

Poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.7473 D₈₅= 0.6181 D₆₀= 0.3696
D₅₀= 0.3271 D₃₀= 0.2517 D₁₅= 0.1695
D₁₀= 0.1132 C_u= 3.26 C_c= 1.51

Classification

USCS= SP-SM AASHTO=

Test Remarks

As Received Moisture: 12.6%
F.M.=1.67

Source of Sample: ATP-16; S1
Sample Number: 27917

Depth: 2

Sample Date: 04/17/2025

AAR Testing and Inspection, Inc.	Client: Geosyntec Consultants, Inc. Project: Johnson Owl Ridge, AS240561 Project No: 25-287
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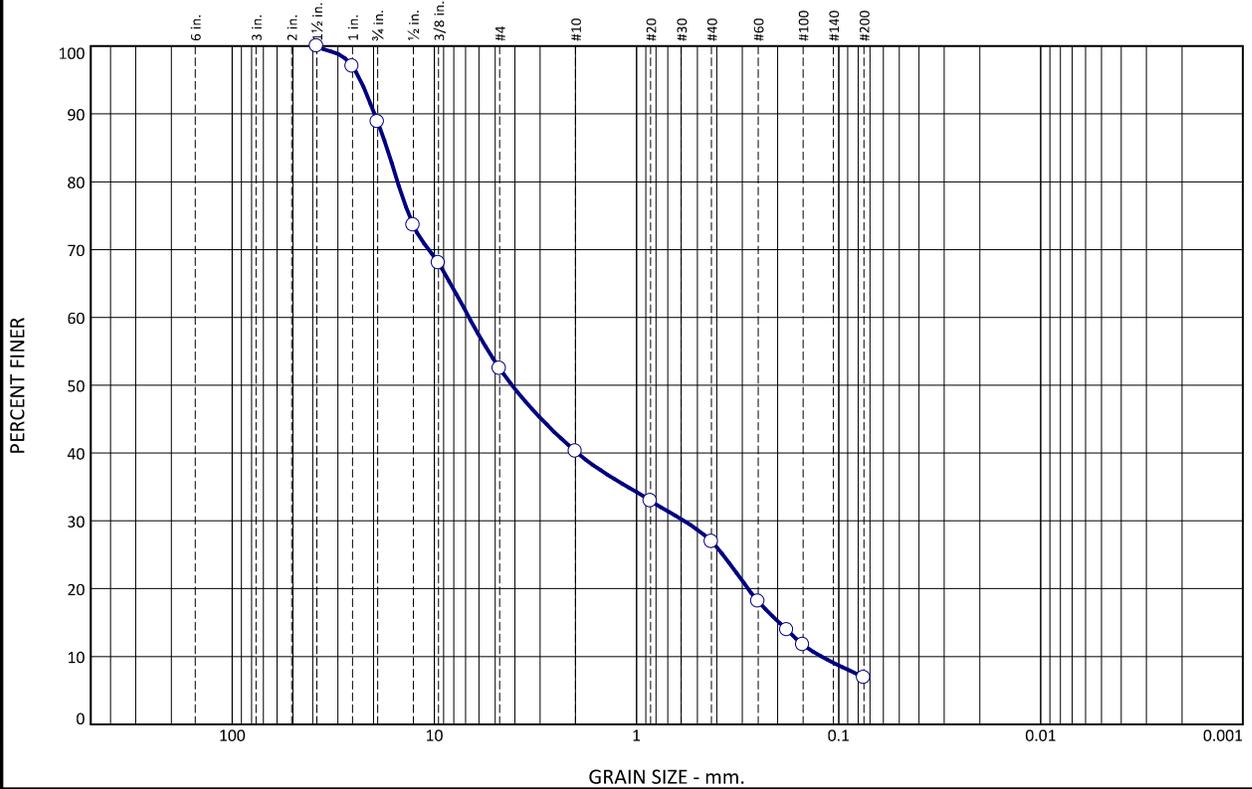
Tested By: Tama Lewis #60698

Checked By: Stu Swenson, CET

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM C117 & C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	11	37	12	13	20	7	

Test Results (ASTM C117 & C136)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1 1/2	100			
1	97			
3/4	89			
1/2	74			
3/8	68			
#4	52			
#10	40			
#20	33			
#40	27			
#60	18			
#80	14			
#100	12			
#200	6.9			

* (no specification provided)

Material Description

Poorly graded gravel with silt and sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 19.7381 D₈₅= 17.1663 D₆₀= 6.7325
D₅₀= 4.1282 D₃₀= 0.5806 D₁₅= 0.1968
D₁₀= 0.1217 C_u= 55.34 C_c= 0.41

Classification

USCS= GP-GM AASHTO=

Test Remarks

As Received Moisture: 3.8%
F.M.=4.50

Source of Sample: ATP-17; S1
Sample Number: 27919

Depth: 5

Sample Date: 04/17/2025

AAR Testing and Inspection, Inc.	Client: Geosyntec Consultants, Inc. Project: Johnson Owl Ridge, AS240561 Project No: 25-287
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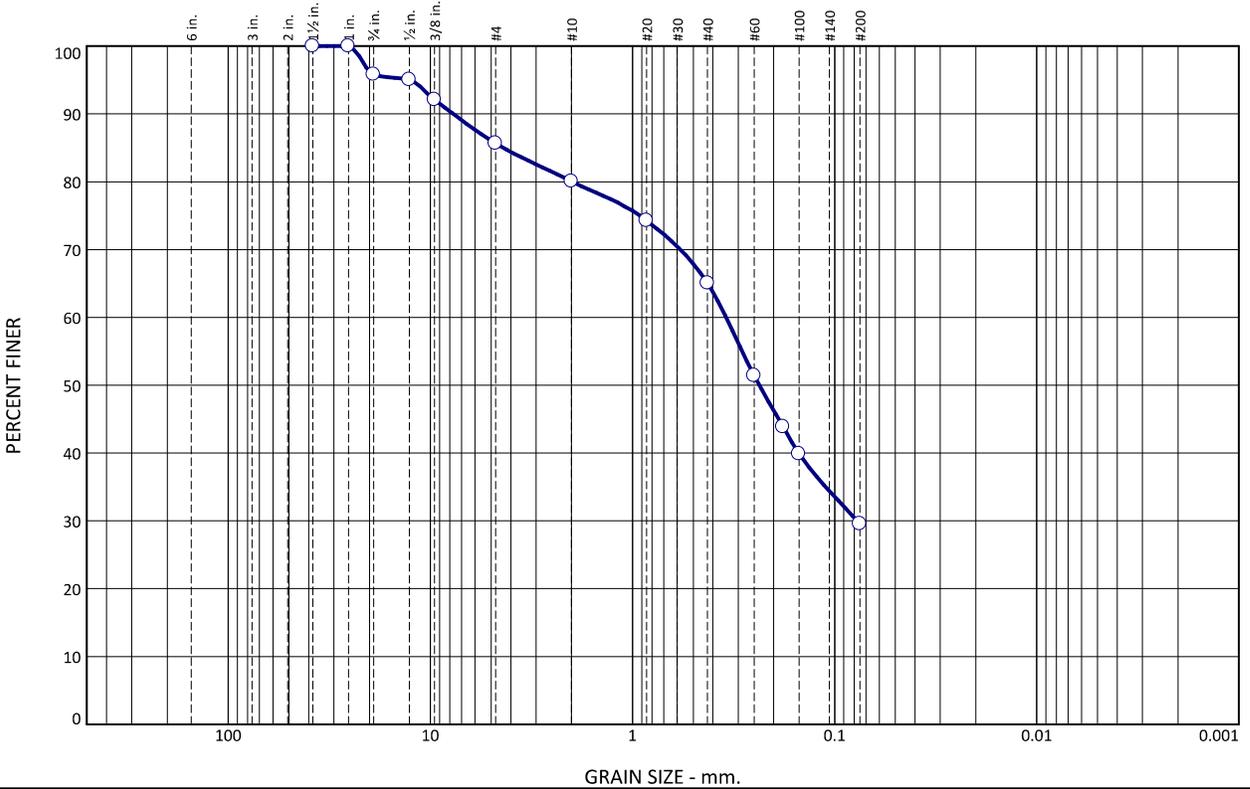
Tested By: Tama Lewis #60698

Checked By: Stu Swenson, CET

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM C117 & C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	10	6	15	35	30	

Test Results (ASTM C117 & C136)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1 1/2	100			
1	100			
3/4	96			
1/2	95			
3/8	92			
#4	86			
#10	80			
#20	74			
#40	65			
#60	51			
#80	44			
#100	40			
#200	30			

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 7.6977 D₈₅= 4.3545 D₆₀= 0.3439
D₅₀= 0.2358 D₃₀= 0.0774 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO=

Test Remarks

As Received Moisture: 7.9%
F.M.=2.02

Source of Sample: ATP-18; S1
Sample Number: 27920

Depth: 4

Sample Date: 04/17/2025

AAR Testing and Inspection, Inc.	Client: Geosyntec Consultants, Inc. Project: Johnson Owl Ridge, AS240561 Project No: 25-287
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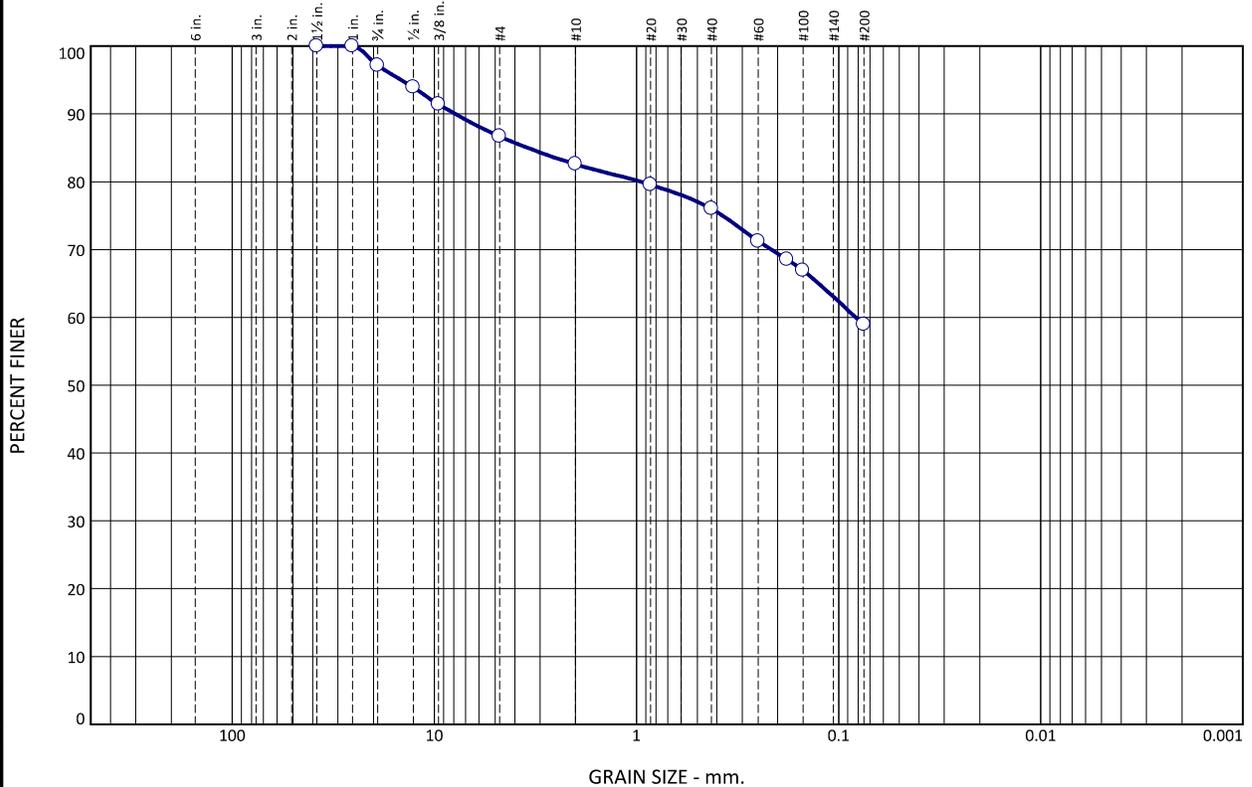
Tested By: Tama Lewis #60698

Checked By: Stu Swenson, CET

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM C117 & C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	3	10	4	7	17	59	

Test Results (ASTM C117 & C136)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1 1/2	100			
1	100			
3/4	97			
1/2	94			
3/8	91			
#4	87			
#10	83			
#20	80			
#40	76			
#60	71			
#80	69			
#100	67			
#200	59			

* (no specification provided)

Material Description

Sandy silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 7.8918 D₈₅= 3.4619 D₆₀= 0.0822
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= ML AASHTO=

Test Remarks

As Received Moisture: 14.1%
F.M.=1.43

Source of Sample: ATP-21; S1
Sample Number: 27922

Depth: 5

Sample Date: 04/17/2025

AAR Testing and Inspection, Inc.	Client: Geosyntec Consultants, Inc. Project: Johnson Owl Ridge, AS240561 Project No: 25-287
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Tested By: Tama Lewis #60698

Checked By: Stu Swenson, CET

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

Geoscience is Not Exact

The geoscience practices (geotechnical engineering, geology, and environmental science) are far less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or property, you should contact Aspect Consulting (Aspect).

This Report and Project-Specific Factors

Aspect's services are designed to meet the specific needs of our clients. Aspect has performed the services in general accordance with our agreement (the Agreement) with the Client (defined under the Limitations section of this project's work product). This report has been prepared for the exclusive use of the Client. This report should not be applied for any purpose or project except the purpose described in the Agreement.

Aspect considered many unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you;
- Not prepared for the specific purpose identified in the Agreement;
- Not prepared for the specific subject property assessed; or
- Completed before important changes occurred concerning the subject property, project, or governmental regulatory actions.

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical, Geologic, and Environmental Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions, please contact the Aspect Project Manager for this project.

Appendix C - Offsite Analysis Report

Pinnacle at Liberty Bay

Off-Site Analysis Report

May 20, 2025

Prepared for

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Issaquah, WA 98027

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06/20/2025

"I hereby state that this Stormwater Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume liability for the sufficiency, suitability or performance of stormwater drainage facilities prepared by me."

Submitted by

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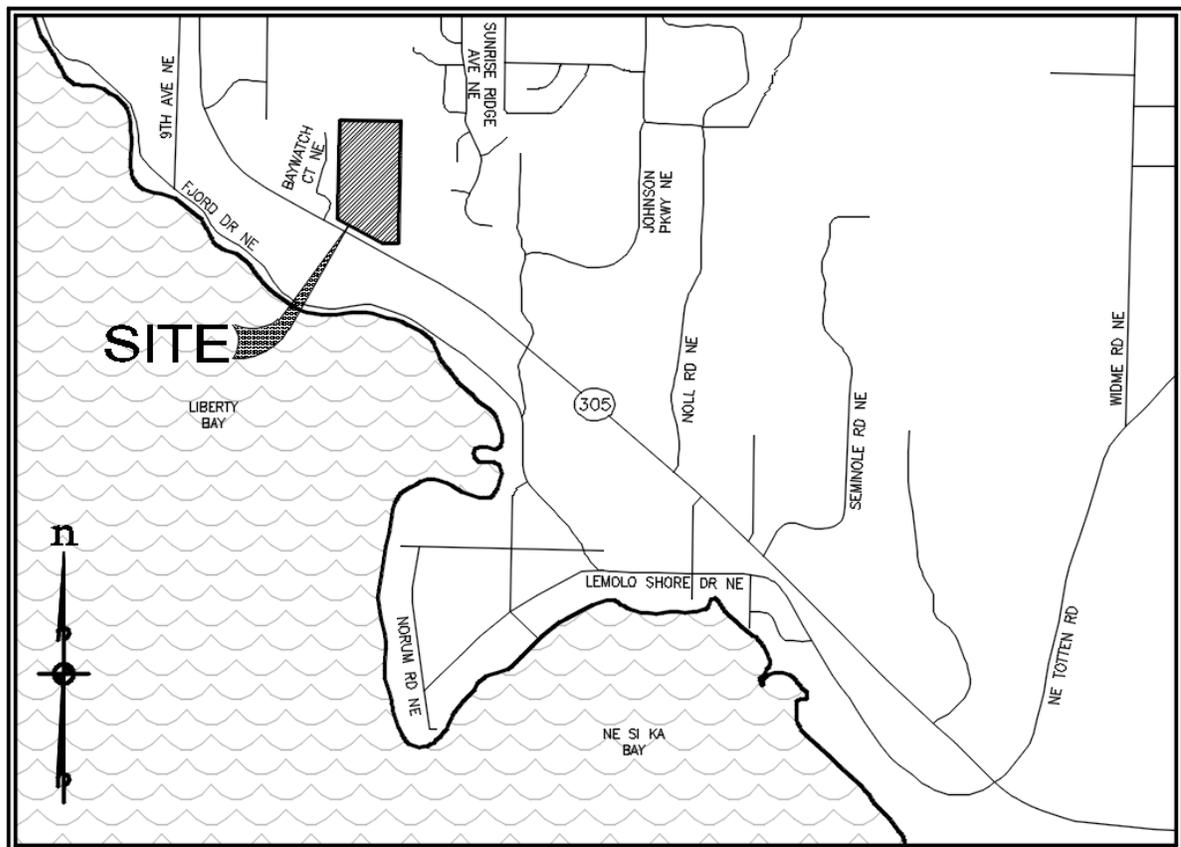
1. INTRODUCTION & PROJECT OVERVIEW

This Off-Site Analysis Report has been prepared to discuss the potential drainage impacts associated with the project. The off-site analysis includes an investigation of the drainage conditions upstream and downstream of the site as well as identifying any downstream drainage constraints.

The proposed Pinnacle at Liberty Bay project is a planned residential development located in the southwest quarter of Section 24, Township 26 North, Range 1 East, W.M., in the City of Poulsbo, WA. The site is located on the north side of State Hwy 305 and situated east of the Plat of Baywatch at Poulsbo and west of the Plat of Cystal View. See Figure 1.1 below for Vicinity Map.

The subject property consists of four undeveloped parcels: 232601-4-001-2009, 242601-3-003-2008, 242601-3-018-2001, and 242601-3-005-2006 zoned RL, for a total of 1,803,847 square feet (41.41 acres). The proposed project is a phased residential subdivision containing 151 detached single-family lots, pedestrian access, domestic water, sanitary sewer, public road improvements, utility services, open space, a stormwater detention pond and a stormwater detention vault.

Figure 1.1 - Vicinity Map



2. QUALITATIVE ANALYSIS

The project site has three natural discharge locations. Natural discharge locations #1 and #2 converge within one-quarter mile downstream from the project site in Liberty Bay and their tributary areas are considered a single threshold discharge area. Natural discharge location #3 does not reach Liberty Bay within one-quarter mile and therefore is considered a separate threshold discharge area. Therefore, the project contains two threshold discharge areas. There are multiple upstream areas that discharge stormwater to the project site and are summarized below.

Offsite - Upstream:

The first of the upstream areas that contribute stormwater to the project site include stormwater discharge from the Crystal View Plat's storm detention vault. Stormwater from the vault drains into the site by an 18-inch diameter storm pipe system located under an access road on the eastern side of the project site. These upstream flows are treated by an 8'x16' Oldcastle Biopod system located along an onsite access road. The treated stormwater is ultimately conveyed downstream by the storm pipe system to an onsite stream on the east side of the project site. An 18" diameter energy dissipater tee and riprap mat are provided at the discharge location next to the stream. The project proposes to leave the existing 18-inch storm conveyance system and Biopod system in place.

The second upstream area contributing stormwater to the project site is located east of the Crystal View Plat and includes two single family residences, a shared-access driveway, and a stream located within the rear yard areas of these lots. Runoff generated from these upstream areas drain to project parcel 242601-3-005-2006. The upstream area drainage, which is not conveyed by the stream, is collected by the storm conveyance system located along the existing onsite access road. These flows are then conveyed to an onsite detention pond constructed as part of the offsite improvements for the Crystal View Plat project. Discharge from the detention pond is conveyed west to the onsite stream. Under post-developed conditions, the existing onsite access road will be regraded and paved and have a new storm conveyance system installed. The existing detention pond will be removed and flows from the upstream single-family lots and upstream shared driveway will be diverted directly to the stream. An energy dissipator will be provided at the discharge location for these diverted flows for erosion control. Runoff generated from the new onsite access road will be conveyed to two new detention vaults in lieu of the existing detention pond.

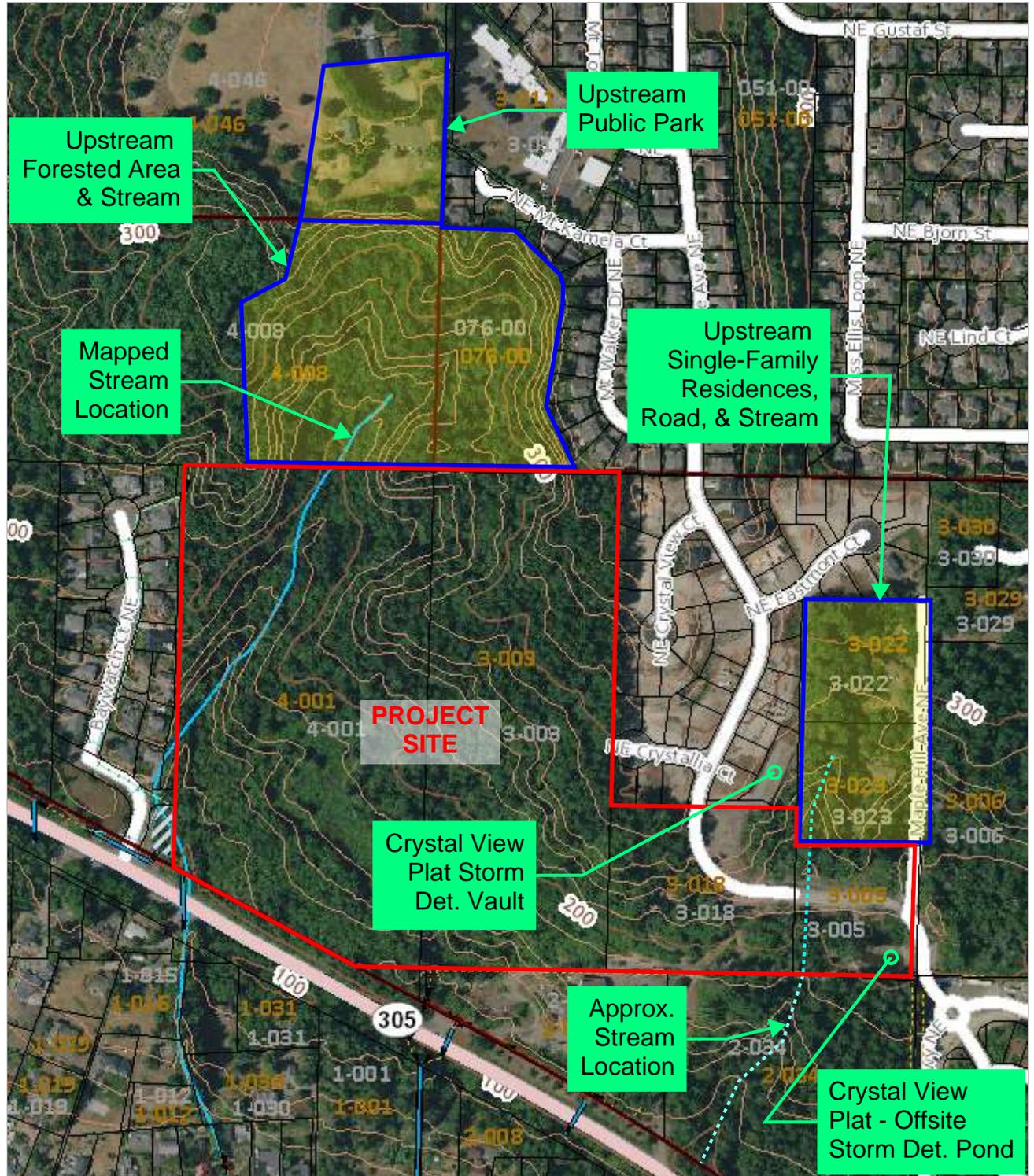
The third upstream area contributing stormwater to the project site is from parcels 232601-4-008-2002 and 5465-000-076-0006. These upstream parcels located north of the project site are undeveloped and contain predominantly forest coverage. A small area of parcel 5465-000-076-0006 contributes runoff to the project site in the form of sheet flow and the remainder of the parcel is contributed to the project site as stream flow. Upstream parcel 232601-4-008-2002 contains a stream which drains into the site on the western side of the project site. This stream also collects runoff from parcel 232601-4-046-2006, which is developed as a public park (Frank Raab Park) and from parcel 5465-000-076-0006, previously described above.

Refer to Figure 2.1 for a map of the upstream tributary areas

Figure 2.1 - Upstream Tributary Area Map

Map Scale: 1 : 4,800

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** This map is not a substitute for field survey **

500 ft



Comments



Offsite - Downstream:

The project site contains three natural discharge locations which are described below in conjunction with their corresponding downstream flowpaths.

Natural discharge location #1 (NDL #1) is located near the southwest corner of the project site and the stormwater discharge generally consists of stream flow and sheet flow. These flows combine within the existing roadside ditch on the northern side of State Hwy 305 NE and reach the upstream end of a 36-inch concrete culvert pipe, located near the southwest corner of the subject property. From this point, the culvert conveys site stormwater to the south side of the highway where it is discharged into Barrantes Creek. Upon being discharged from the culvert, the stormwater flows south along the creek until reaching an existing storm conveyance pipe system located on the north side of Lemolo Shore Dr NE. The stream is collected by an 18-inch CMP pipe and conveys the flows south to a storm catch basin and then east via 12-inch concrete pipe to a second storm catch basin. The flows are then conveyed south into Liberty Bay via a 36-inch concrete pipe. The downstream analysis was concluded at Liberty Bay which is located approximately 0.20 miles downstream from NDL #1.

Natural discharge location #2 (NDL #2) is centrally located along the south property line with stormwater discharge generally consisting of stream flow and sheet flow which discharge to parcels 252601-2-044-2000, 252601-2-047-2007, and 262601-1-001-2002. Parcel 252601-2-044-2000 is developed as a single-family residence while the other two parcels are undeveloped and consist of forest coverage. These three parcels drain to the roadside ditch located along the northern side of State Hwy 305 NE. Stormwater collected by the ditch drains into two 18-inch concrete culvert pipes which conveys the stormwater to the south side of the highway where it is discharged into separate swales. The swales converge at the upstream end of a 15-inch diameter HDPE pipe. The pipe conveys the flows further south to a storm catch basin with inlet and outlet offset for energy dissipation. The flows are then conveyed into Liberty Bay via a 15-inch diameter N-12 pipe. The downstream analysis was concluded at Liberty Bay which is located approximately 0.16 miles downstream from NDL #2.

Natural discharge location #3 (NDL #3) is located along the south property line on the eastern side of the site with stormwater discharge generally consisting of stream flow and sheet flow from project parcels 242601-3-018-2001 and 242601-3-005-2006. Stormwater from these parcels discharge into parcel 252601-2-034-2002 which is predominantly undeveloped and covered by forest. Stormwater is conveyed south through the parcel in the form of sheet flow and stream flow until combining within the roadside ditch located along the northern side of State Hwy 305 NE. The stormwater is collected by an 18" concrete culvert pipe which conveys the drainage to the south side of the highway where it is discharges to parcel 252601-2-053-2008. The stormwater is conveyed south through this parcel by sheet flow and shallow channel flow until reaching a roadside ditch located on the north side of Lemolo Shore Dr NE. The ditch conveys the flows to the west until reaching a 15-inch diameter CPEP pipe. The flows are collected by the pipe and drain west to a storm catch basin. The flows are then conveyed south under Lemolo Shore Drive NE and are discharged to Liberty Bay. The downstream analysis was concluded at Liberty Bay which is located approximately 0.33 miles downstream from NDL #3.

The downstream paths were investigated for the following potential problems:

1. **Conveyance system capacity problems** - no issues were identified.
2. **Localized flooding** - no issues were identified.
3. **Erosion impacts** - no issues were identified.
4. **Violations of surface water quality standards** - impaired downstream water bodies were identified.
 - Liberty Bay (Category 5 - 303d, Dissolved Oxygen).

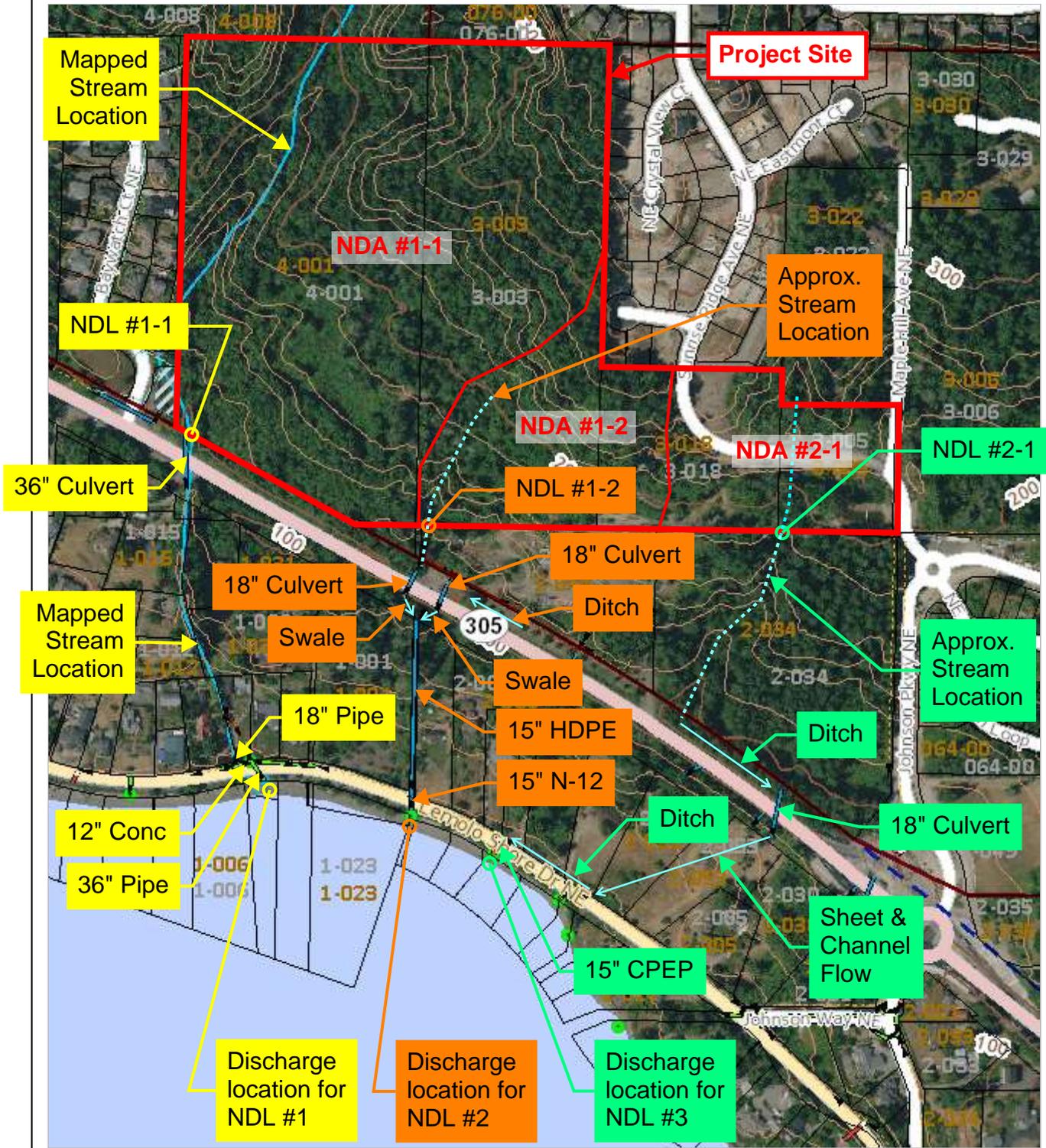
No negative drainage impacts are expected to be created by the project to the downstream drainage systems and properties based on the observations during this analysis.

Refer to Figure 2.2 for a map of the site's discharge locations and corresponding downstream flowpaths.

Figure 2.2 - Downstream Flowpath Map

Map Scale: 1 : 4,800

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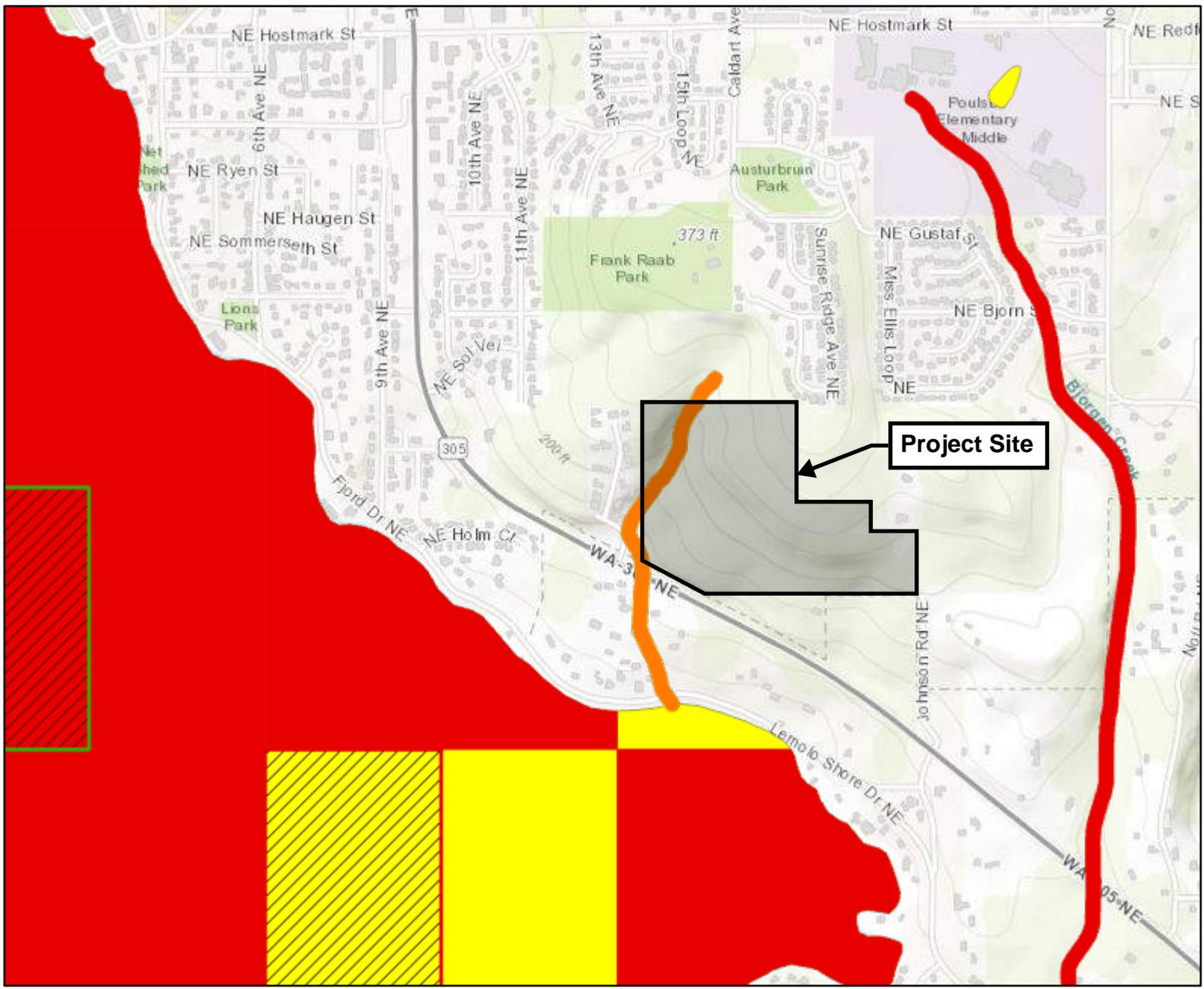
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Comments



Figure 2.3 - Downstream 303(d) Water Quality Assessment Map



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Project Site

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