Pinnacle at Liberty Bay

Preliminary Stormwater Site Plan Report

June 20, 2025
Revised: November 26, 2025

Prepared for

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

Paul Devenzio
(206) 391-8366

BRANDON MICHAEL LOUCKS
50085
11/26/2025

"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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APPENDICES

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 situated on the north side of State Hwy 305, east of the Plat of Baywatch at Poulsbo, and west of the Plat of Crystal View. The subject property consists of four undeveloped parcels zoned RL (232601-4-001-2009, 242601-3-003-2008, 242601-3-018-2001, and 242601-3-005-2006) totaling approximately 41 acres.

The project is a phased residential subdivision comprising 148 detached single-family lots. Proposed improvements include domestic water, sanitary sewer, public roads, utility services, open space, pedestrian trails, and stormwater management facilities (one detention pond and one detention vault).

Primary access will be provided via Baywatch Ct NE within the Plat of Baywatch at Poulsbo. Additional access will be provided from NE Crystal Ct (Plat of Crystal View) and Johnson Parkway (Plat of Johnson Ridge). The project is requesting a Type III permit from the City of Poulsbo. Additional required permits include water and sewer extensions, a Construction Stormwater General Permit (CSWGP) from the State of Washington, Wetland Mitigation, Final Plat permits, and Building permits for retaining walls. Refer to Figure 1.1 for a vicinity map and Figure 1.3 for proposed conditions.

The development is designed to meet flow control and Enhanced stormwater treatment standards. Stormwater will be collected and conveyed by a series of pipes and catch basins. To meet flow control requirements, a stormwater detention pond is proposed on the southwest side of the property, and an underground detention vault is proposed on the southeast side. These facilities will mitigate runoff generated from the project’s new and replaced surface areas.

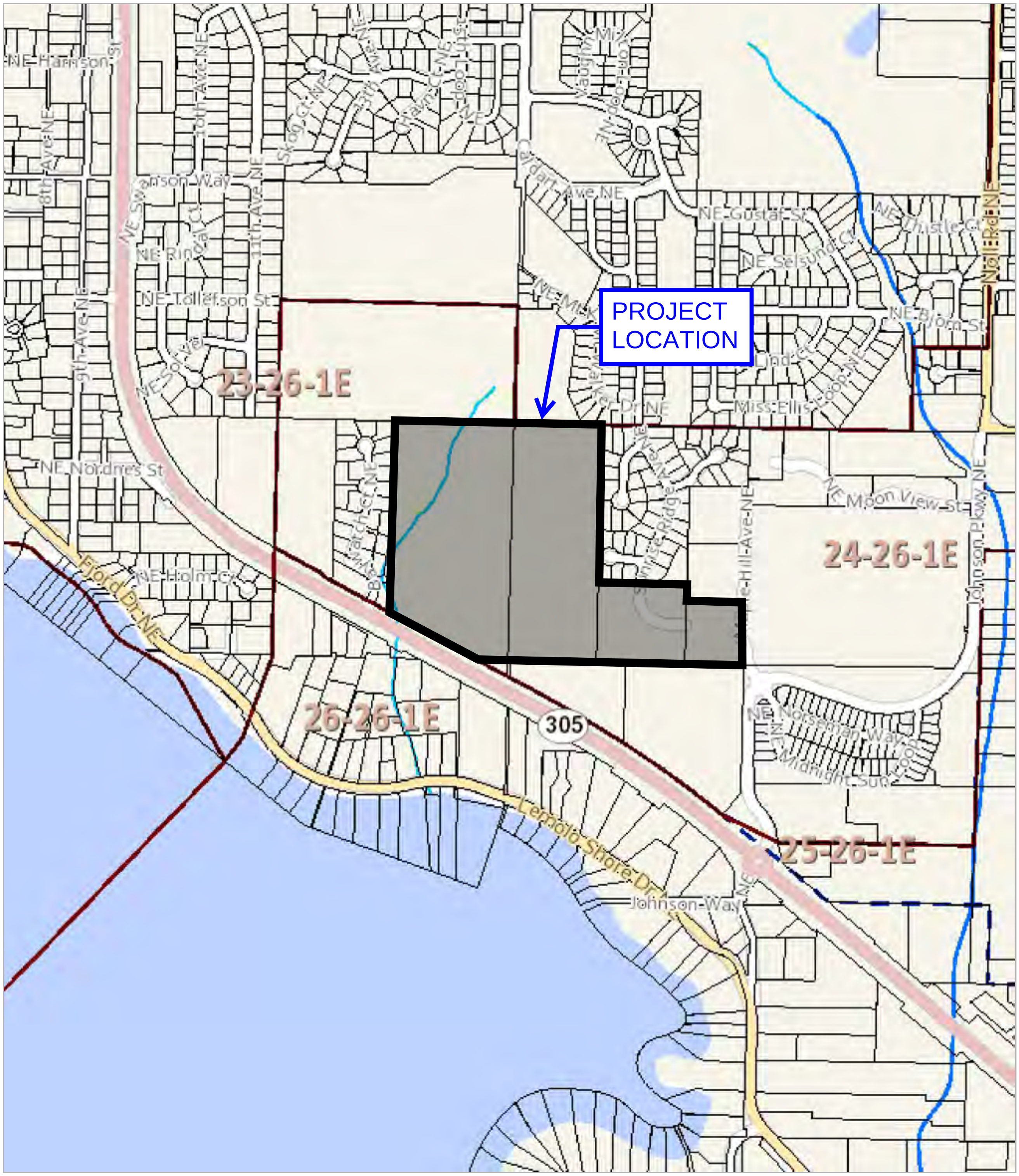
Enhanced treatment will be provided using Oldcastle Infrastructure, Inc. BioPod Biofilter systems. One system will be located downstream of the detention vault, and two systems will be located upstream of the detention pond. Note that the location of the treatment units relative to the pond may be revised during the final design phase.

Discharge from the detention pond will be directed to Barrantes Creek (Stream C) along the west side of the site. The detention vault will discharge into an existing onsite stream (Stream D). Refer to 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

N

W

E

S

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.

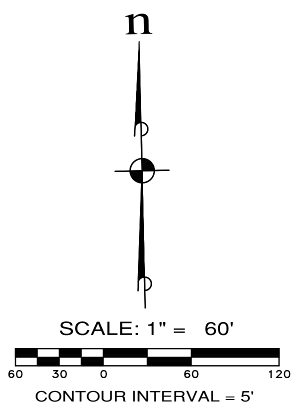
PROCEDURE USED : FIELD TRAVERSE WORK COMPLIES WITH CURRENT STANDARDS AS OUTLINED IN WAC–332–130–070, –080 AND –090. ALL INSTRUMENTS MAINTAINED TO MANUFACTURER'S SPECIFICATIONS AS REQUIRED BY WAC–332–130–100.

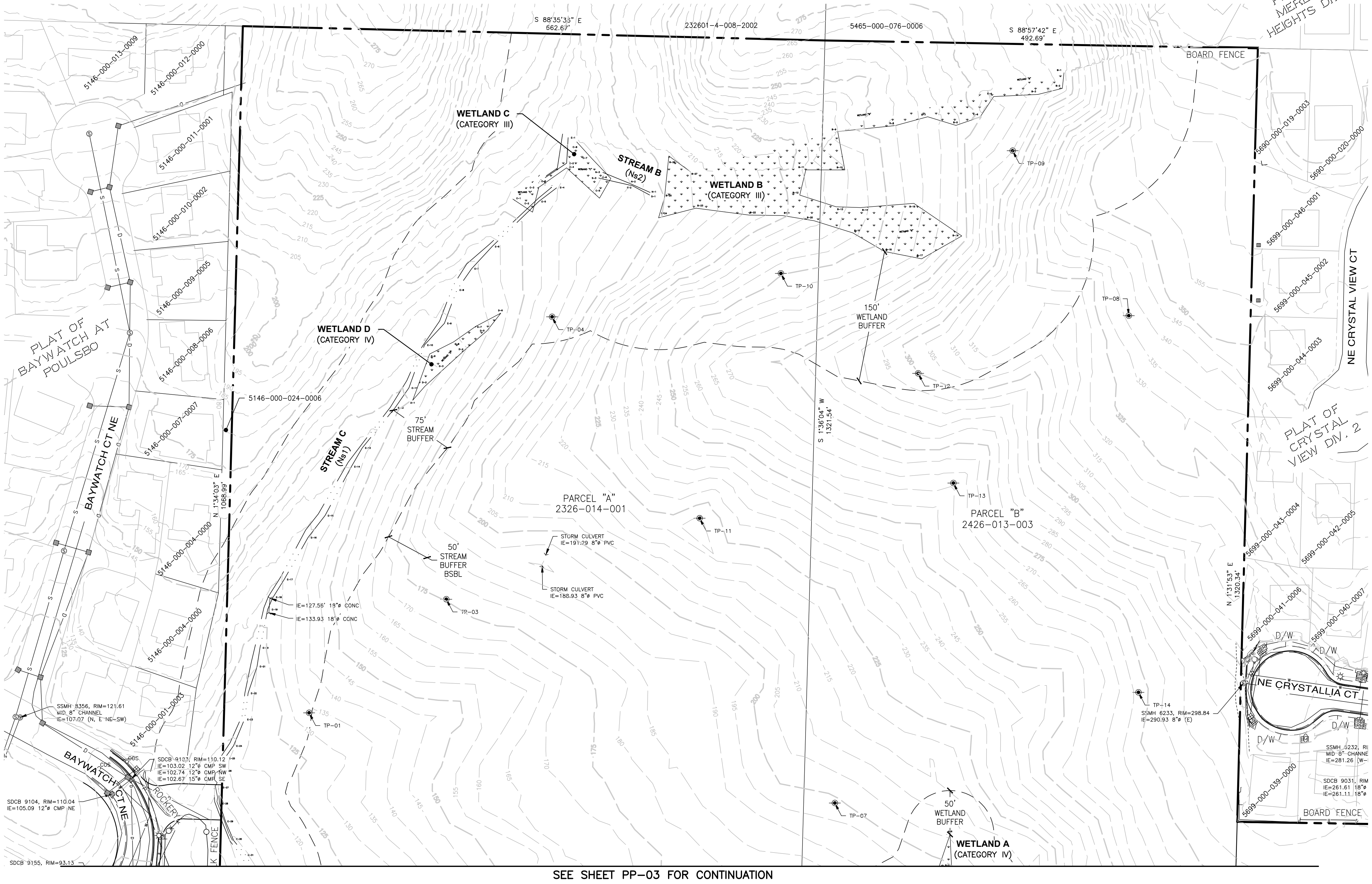
NOTES:

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.





SEE SHEET PP–03 FOR CONTINUATION

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 CONNCETION
STORM DRAINAGE DITCH
TELEPHONE UNDERGROUND
WATER
RIGHT–OF–WAY
BOUNDARY LINE
EASEMENT LINE
CONTOUR
WETLAND BUFFER

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MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY SUBDIVISION

EXISTING CONDITIONS

CITY OF POULSBO WASHINGTON

JOB NO.: 2090–004–022
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DATE: 6/20/2025
DATE OF PRINT:

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 SOUTHEAST 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 (PORTIOIN 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 COMER 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, WHICH IS 200 FEET WEST OF THE NORTHEAST CORNER 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 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:

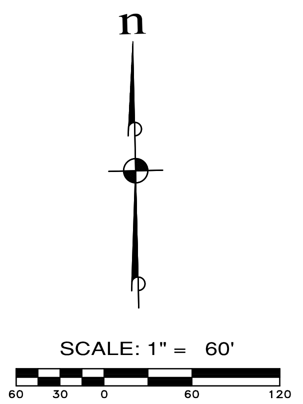
BEGINNING AT THE SOUTHEAST CORNER OF SAID SUBDIVISION:

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.

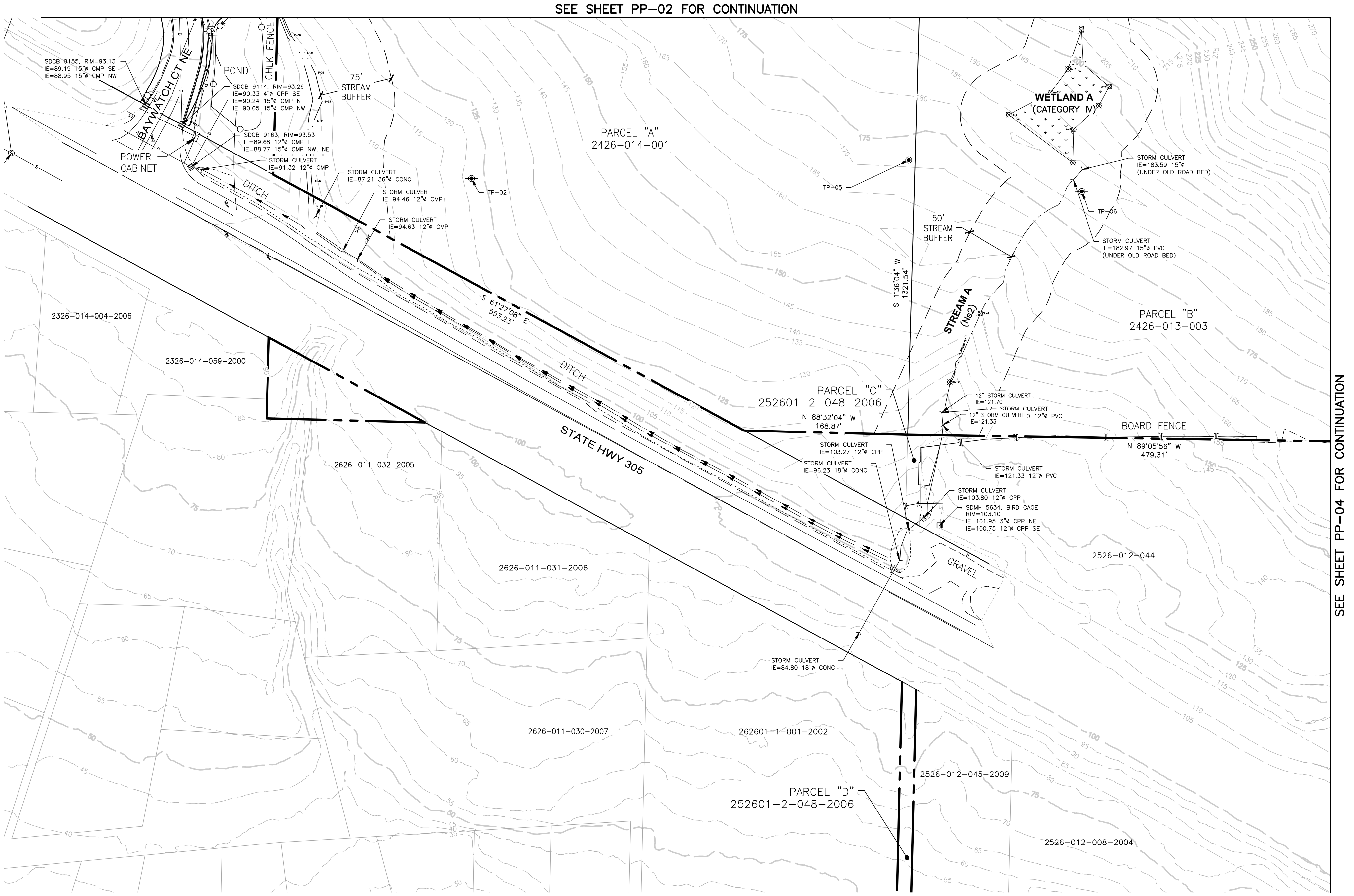
SITUATE IN THE COUNTY OF KITSAP, STATE OF WASHINGTON.



SCALE: 1" = 60'

CONTOUR INTERVAL = 5'

SEE LEGEND ON SHEET PP-02



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PINNACLE AT LIBERTY BAY SUBDIVISION

EXISTING CONDITIONS

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3 OF 26 SHEETS

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FIGURE 1.2 - EXISTING CONDITIONS (3 of 3)

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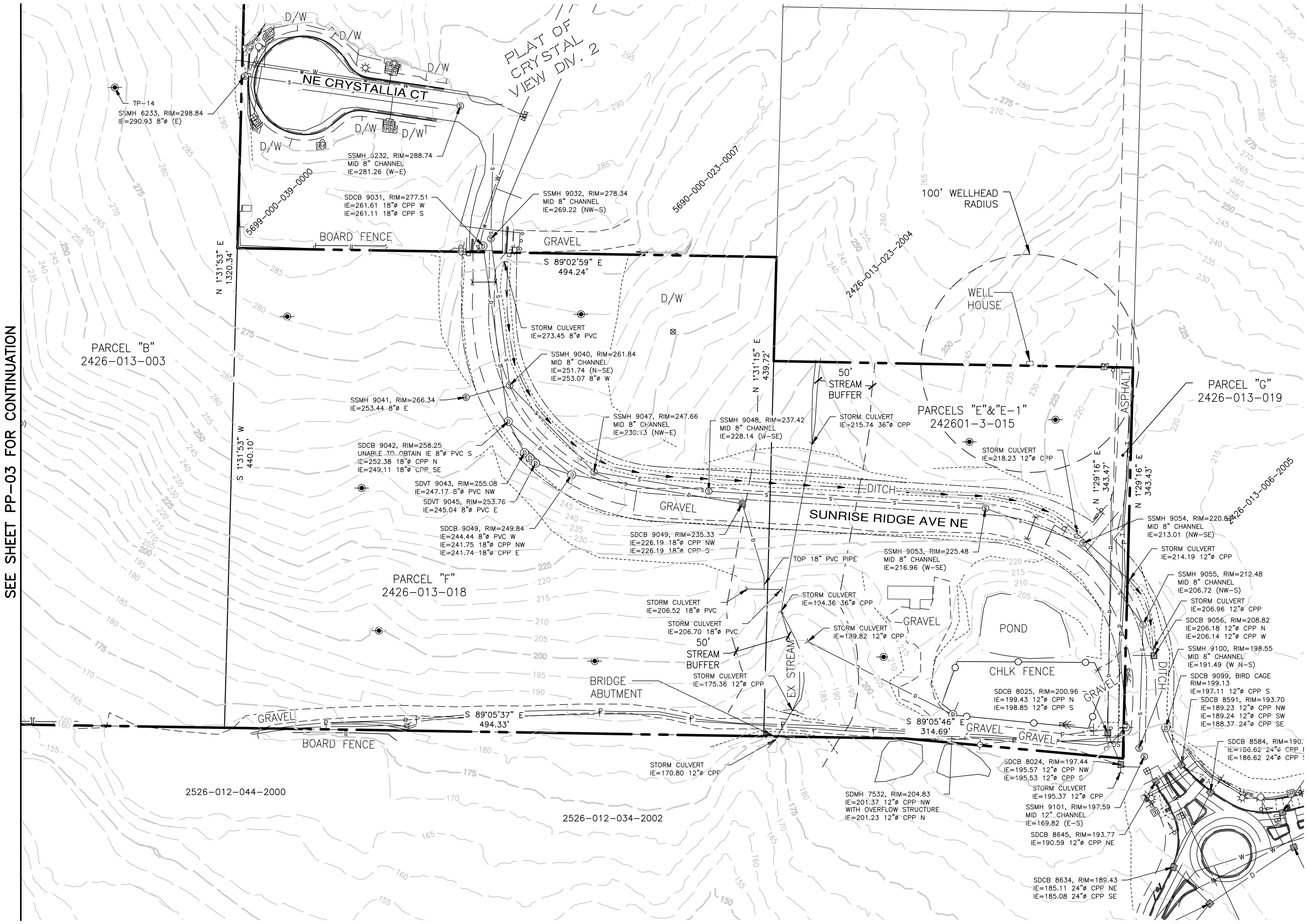
SCALE: 1" = 60'
60 30 0 60 120
CONTOUR INTERVAL = 5'

SEE LEGEND ON SHEET PP-02

SEE SHEET PP-03 FOR CONTINUATION



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PINNACLE AT LIBERTY BAY SUBDIVISION
EXISTING CONDITIONS
CITY OF POULSBO WASHINGTON

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PP-04

4 OF 26 SHEETS

A PORTION OF THE SE 1/4 OF SECTION 23, TWP. 26 N., RGE. 1 E.,WM

TRACT AREA TABLE			
TRACT	USE	OWNERSHIP	AREA (SF)
A	OPEN SPACE	HOA	514,511
B	OPEN SPACE	HOA	27,408
C	OPEN SPACE	HOA	6,842
D	STORMWATER	CITY	94,659
E	ACCESS/UTILITY	HOA	2,578
F	RECREATION	HOA	2,969
G	RECREATION	HOA	9,478
H	RECREATION	HOA	13,908
I	ACCESS/UTILITY	HOA	1,482
J	OPEN SPACE	HOA	133,489
K	ACCESS/UTILITY	HOA	3,487
L	OPEN SPACE	HOA	35,621
M	OPEN SPACE	HOA	2,535

TRACT AREA TABLE			
TRACT	USE	OWNERSHIP	AREA (SF)
N	ACCESS/UTILITY	HOA	3,453
O	ACCESS/UTILITY	HOA	2,761
P	OPEN SPACE	HOA	10,285
Q	ACCESS/UTILITY	HOA	4,062
R	ACCESS/UTILITY	HOA	2,969
S	OPEN SPACE	HOA	4,081
T	RECREATION	HOA	6,478
U	RECREATION	HOA	5,209
V	ACCESS/UTILITY	HOA	1,661
W	OPEN SPACE	HOA	22,900
X	ACCESS/UTILITY	HOA	3,528
Y	OPEN SPACE W/PUBLIC STORM EASEMENT	HOA	22,234

LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE	
LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)
1	4068	14	3759	27	4476	40	3780	54	4614	68	4477
2	4011	15	3895	28	4015	41	4420	55	4871	69	4477
3	4095	16	4220	29	3916	42	4429	56	5209	70	6263
4	4697	17	5052	30	5408	43	4427	57	3669	71	4098
5	4903	18	4801	31	3937	44	4425	59	3851	72	4100
6	4104	19	4353	32	3675	45	5015	60	4832	73	4100
7	4175	20	4345	33	3675	46	4326	61	4386	74	4100
8	4338	21	4345	34	3675	47	3799	62	4132	75	4100
9	3770	22	5185	35	3675	48	3798	63	5615	76	4100
10	3760	23	6188	36	3891	49	4305	64	6277	77	4100
11	3760	24	5122	37	3780	51	3327	65	5076	78	4613
12	3754	25	4786	38	3780	52	4446	66	5923	79	4200
13	3753	26	4680	39	3780	53	4521	67	5037	80	4200

LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE		LOT AREA TABLE	
LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)	LOT #	AREA (S.F.)
81	4064	94	4100	107	4100	120	4100	133	4100	146	4100
82	5825	95	4100	108	4100	121	4100	134	4100	147	4100
83	6303	96	4100	109	4100	122	4100	135	4100	148	4041
84	5274	97	4100	110	4143	123	4100	136	5512		
85	4439	98	7739	111	4526	124	4542	137	4100		
86	4100	99	4610	112	5340	125	4542	138	4346		
87	4100	100	4212	113	4900	126	4100	139	4471		
88	4100	101	4073	114	4100	127	4100	140	4131		
89	4100	102	4383	115	4100	128	4100	141	4100		
90	4100	103	5233	116	4215	129	4980	142	4100		
91	4100	104	7739	117	4676	130	5406	143	4100		
92	4100	105	4100	118	4232	131	4980	144	5716		
93	4100	106	4100	119	4101	132	4100	145	4100		

SCALE: 1" = 80'

KEY MAP

BUILDING SETBACKS

REAR:	10'
FRONT:	20'
SIDE:	5'
STREET SIDE:	10'
STREAM:	25'
WETLAND:	15'

LEGEND

- - - - -	BUILDING SETBACK LINE
———	LOT LINE/TRACT LINE
— - —	RIGHT OF WAY LINE
◐	MONUMENT
▨	CRITICAL AREA BUFFER
⁘	WETLAND
🟩	PHASE 1
🟧	PHASE 2
🟪	PHASE 3
☐	PRELIMINARY HOUSE FOOTPRINTS

REVISIONS		
NO.	DESCRIPTION/DATE	BY

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MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY SUBDIVISION

CITY OF POULSBO
OVERALL SITE PLAN & LOT/TRACT PHASING PLAN
WASHINGTON

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7 OF 32 SHEETS

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Figure 1.4 - Web Soil Survey (1 of 3)

Custom Soil Resource Report

Soil Map

Map Scale: 1:3,520 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Figure 1.4 - Web Soil Survey (2 of 3)

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)

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, 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 zoned RL (232601-4-001-2009, 242601-3-003-2008, 242601-3-018-2001, and 242601-3-005-2006), totaling approximately 41 acres. The site generally slopes toward the south, southwest, and west, with elevations ranging from approximately 120 feet to 376 feet. Existing site improvements include a paved/gravel access road (Sunrise Ridge Road), a stormwater detention pond, storm conveyance pipes and ditches, and a sanitary sewer main located on the east side of the project site. Sunrise Ridge Road provides access to the existing onsite utilities and the 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 and brush. Refer to Figure 1.2 for existing conditions.

A site investigation conducted by Sewall Wetland Consulting, Inc. identified four (4) onsite wetlands and four (4) streams. Wetlands A and D are classified as Category IV wetlands with a standard 50-foot buffer. Wetlands B and C are classified as Category III wetlands with a standard 150-foot buffer. Streams A, B, and D are classified as Type Ns2 streams with a standard 50-foot buffer. Stream C is classified as a Type Ns1 stream with a standard 75-foot buffer.

According to the NRCS Web Soil Survey (Figure 1.4), onsite soils consist of Poulsbo Gravelly Sandy Loam. Additionally, a subsurface investigation was conducted by Aspect Consulting, in which 14 test pits were excavated to a maximum depth of 13 feet below existing grades. In general, soil conditions consist of a 6-inch to 18-inch layer of topsoil overlying native soils. Native soils encountered on the site consist primarily of Vashon Recessional Outwash, characterized as 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, Pre-Vashon Silt was found underlying the outwash. The Pre-Vashon Silt consists of medium dense to dense sand with silt, and silt with sand, with varied degrees of weathering. Perched groundwater seepage was observed at 5 test pit locations at approximately 2 to 7 feet below ground surface. A copy of the Aspect Consulting report is provided in Appendix B.

Stormwater runoff from the project site generally flows toward existing onsite streams, onsite conveyance ditches 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 this public ditch, which conveys flows south to Liberty Bay through various pipes and swales. Upstream of the project site, an existing stormwater conveyance system constructed as part of the Crystal View Plat discharges to an onsite stream on the eastern side of the property. Additionally, Maple Height Ave NE and two single-family residences on predominately wooded lots drain by sheet flow onto the project site. Runoff from other upstream areas is generally conveyed through the project site by onsite streams traversing the property.

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

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

The topography of the project site yields two Threshold Discharge Areas (TDA). A detention pond and a detention vault are proposed to meet flow control requirements. The project also proposes two 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 a detention vault located in the eastern area of the project site. The detention facilities will release runoff at controlled release rates to Barrantes Creek (Stream C). The total flow control basin area of the project site is approximately 25 acres.

In the predeveloped condition, the project disturbance areas have been modeled as C, Forest, Steep. New and replaced surfaces 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	897,500 (20.604)	-	-	897,500 (20.604)
West Basin (Bypass)	10,908 (0.251)	-	-	10,908 (0.251)
Total West Basin	**908,408 (20,854)**	**-**	**-**	**908,408 (20,854)**
East Basin	88,322 (2.028)	-	-	88,322 (2.028)
East Basin (Bypass)	-	-	-	-
Total East Basin	**88,322 (2.028)**			**88,322 (2.028)**
Total Project Area	**1,114,068 (25.575)**	**-**	**-**	**1,114,068 (25.575)**

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)					
139 Lots	367,595 (8.439)	256,395 (5.886)	-	-	623,989 (14.325)
R.O.W. & Tract J	-	-	8,962 (0.206)	1,946 (0.045)	-
Tracts D-I, Tracts K-V, & R.O.W.	224,137 (5.145)	158,581 (3.641)	-	-	382,718 (8.786)
Total Area to Detention Pond	**591,731 (13.584)**	**414,976 (9.527)**	**-**	**-**	**1,006,707 (23.111)**
Total Area to Bypass Detention Pond	**-**	**-**	**8,962 (0.206)**	**1,946 (0.045)**	**10,908 (0.251)**
Detention Vault (East Basin)					
9 Lots	28,652 (0.658)	20,009 (0.459)	-	-	48,661 (1.117)
Tracts X & Y, R.O.W.	34,446 (0.791)	13,346 (0.306)	-	-	47,792 (1.097)
Total Area to Detention Vault	**63,098 (1.339)**	**33,355 (0.766)**	**-**	**-**	**96,453 (2.214)**
Project Total	**654,829 (15,033)**	**448,331 (10.292)**	**8,962 (0.206)**	**1,946 (0.045)**	**1,114,068 (25.575)**

*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. A spill control structure 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 upstream of the detention pond and downstream of the detention vault. The 2-year release rate for the detention vault and peak 15-minute off-line flow rate for the detention pond were calculated utilizing WWHM and are 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	387,929 (8.906)	228,501 (5.246)	616,430 (14.151)	1.312 (POC #2)
West Basin (Pond) - East WQ Treatment Facility #2	187,112 (4.296)	111,068 (2.550)	298,180 (6.845)	0.632 (POC #3)
East Basin (Vault) WQ Treatment Facility #3	63,098 (1.339)	33,355 (0.766)	96,453 (2.214)	0.334 (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 off-line 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: 1.31 cfs

Proposed BioPod Biofilter Unit: 15’ x 38’
Max. Treatment Flow Rate: 1.31 cfs

WQ Unit #2 Sizing (West Basin – Pond ‘East Treatment Facility’)
Required Treatment Flow Rate: 0.63 cfs

Proposed BioPod Biofilter Unit: 10’ x 24’
Max. Treatment Flow Rate: 0.72 cfs

WQ Unit #3 Sizing (East Basin – Vault #1)
Required Treatment Flow Rate: 0.334 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 4,818 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)	303,598 cf (6.970 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 (0.15 ac-ft)	6,500 cf (0.15 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	2.224	1.144
10-year	4.993	2.032
25-year	6.887	2.583
50-year	8.539	3.042
100-year	10.413	3.546

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

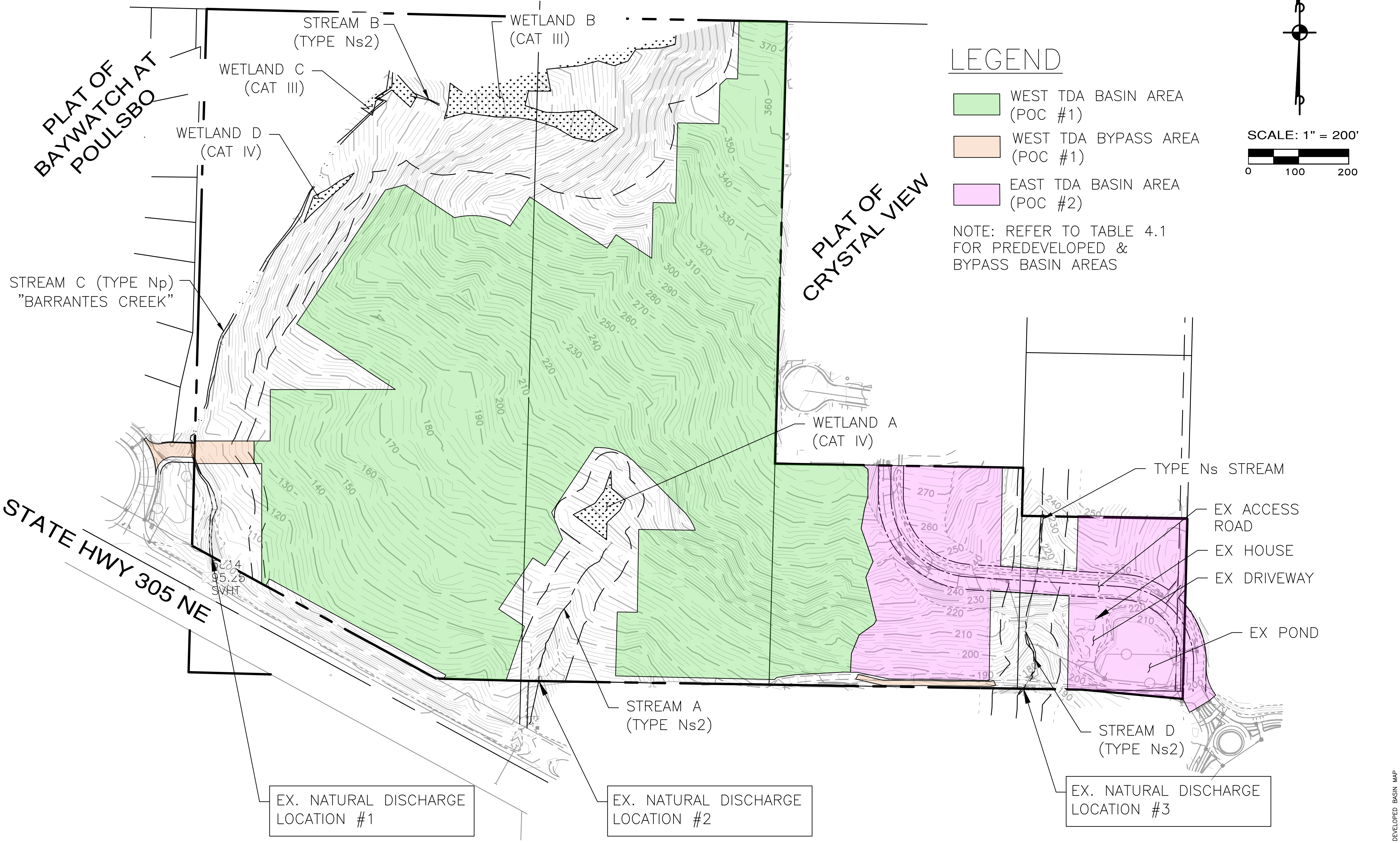
Return Period	Flow (cfs)	
	Predeveloped	Developed
2-year	0.320	0.334
10-year	0.719	0.460
25-year	0.984	0.530
50-year	1.210	0.584
100-year	1.463	0.640

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



LEGEND

🟩 WEST TDA BASIN AREA (POC #1)

🟧 WEST TDA BYPASS AREA (POC #1)

🟪 EAST TDA BASIN AREA (POC #2)

NOTE: REFER TO TABLE 4.1 FOR PREDEVELOPED & BYPASS BASIN AREAS

FIGURE 4.1

MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY

PREDEVELOPED BASIN MAP

DRAWING: DEVELOPED BASIN MAP

ESM CONSULTING ENGINEERS LLC
32001 32nd Ave S, Suite 200
Federal Way, WA 98001

FEDERAL WAY (253) 838-6113
LYNNWOOD (425) 297-9900

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JOB NO. 2090-004-022
DATE: 5/21/2025
DRAWN: DRD
SHEET 1 OF 1

File: \\esm8\ENGR\ESM-JOBS\2090\004\022\StormReport\Resources\CAD\Pre-Developed Basin Map.dwg
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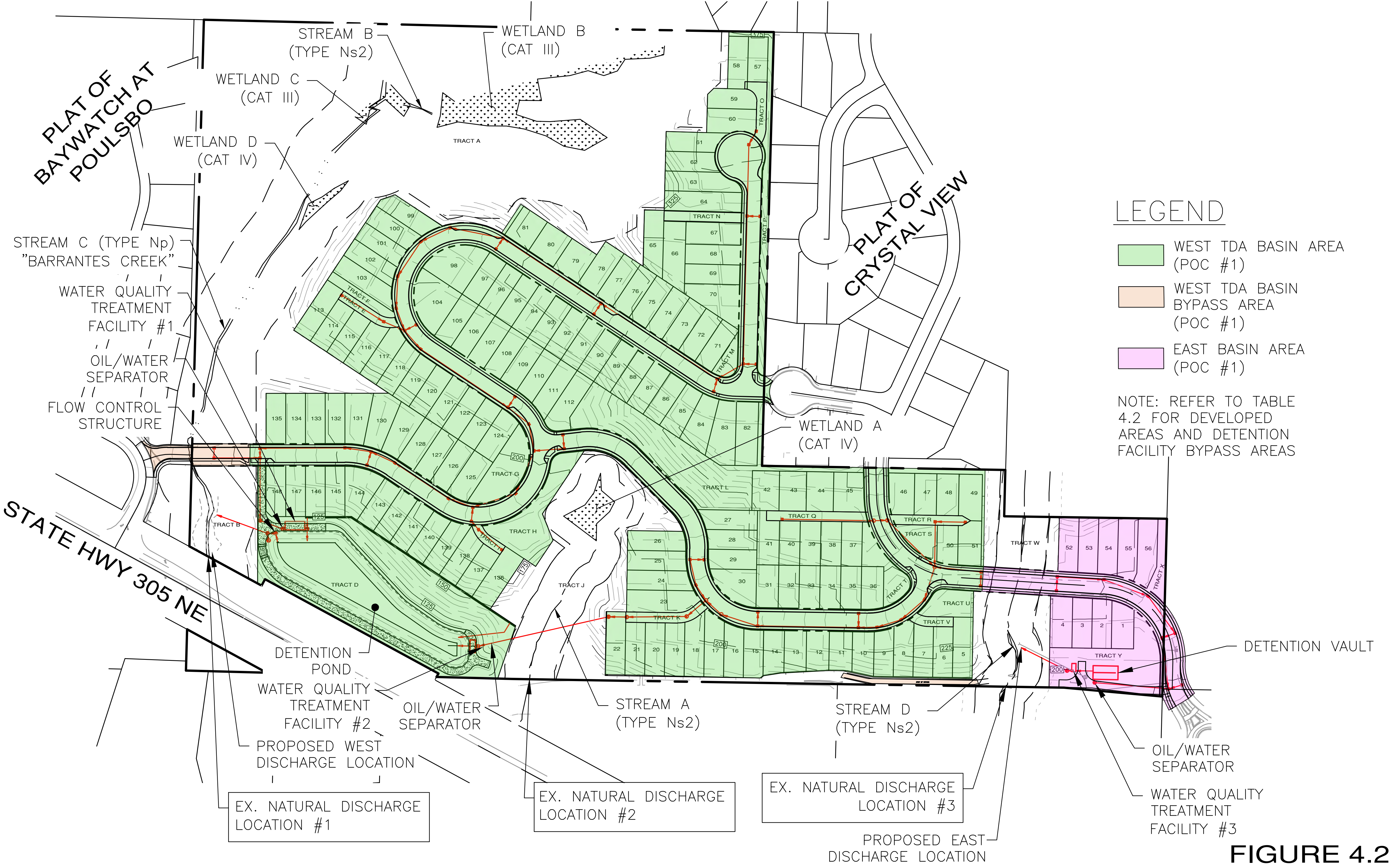
DEVELOPED BASIN MAP

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



LEGEND

🟩 WEST TDA BASIN AREA (POC #1)

🟧 WEST TDA BASIN BYPASS AREA (POC #1)

🟪 EAST BASIN AREA (POC #1)

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

FIGURE 4.2

MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY

DEVELOPED BASIN MAP

DRAWING: DEVELOPED BASIN MAP

ESM CONSULTING ENGINEERS LLC
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Civil Engineering | Land Surveying | Land Planning
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JOB NO. 2090-004-022 DATE: 5/21/2025
DRAWN: DRD SHEET 1 OF 1

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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 phase.

Minimum Requirement #3 - Source Control of Pollution

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

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 and Barrantes Creek. 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.

<u>Other Hard Surfaces:</u>

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

Stormwater treatment will be provided for the site pollution generating surfaces at a minimum. 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 ¾ 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 for Wetlands A, C, & D.

- General Protection
- Protection from Pollutants

According to Figure I-3.5 of the SWMMWW, the project is required to apply the following levels of wetland protection to the TDA for Wetland B.

- General Protection
- Protection from Pollutants
- Wetland Hydroperiod Protection (Method 2)

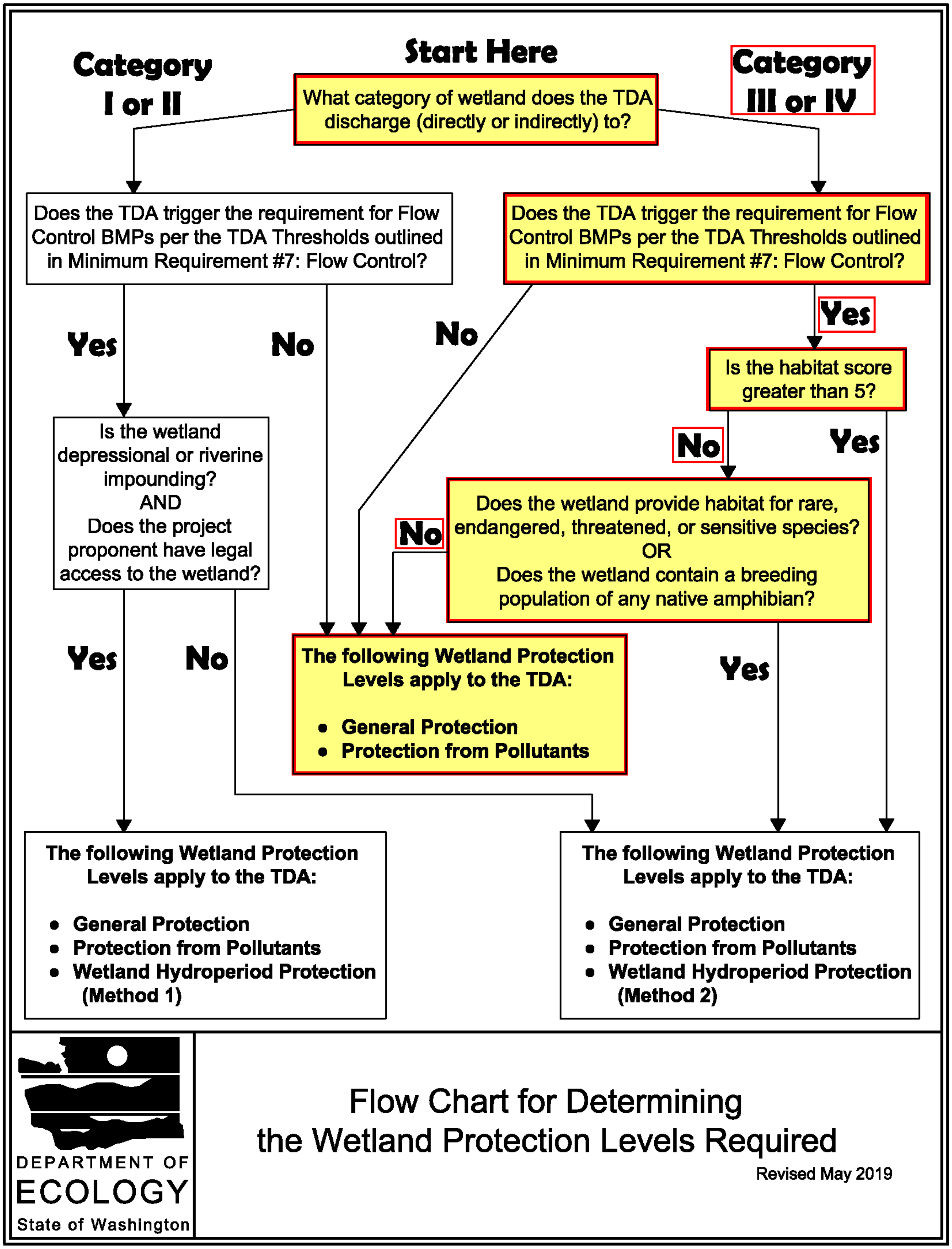
Wetland B has been analyzed using Method 2 criteria from Appendix I-C.4 of the SWMMWW. The results of the analysis show that the project will have no adverse impact on the Wetland B. Refer to Appendix D for further information on the wetland hydroperiod protection analysis and results. Refer to Figure 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.

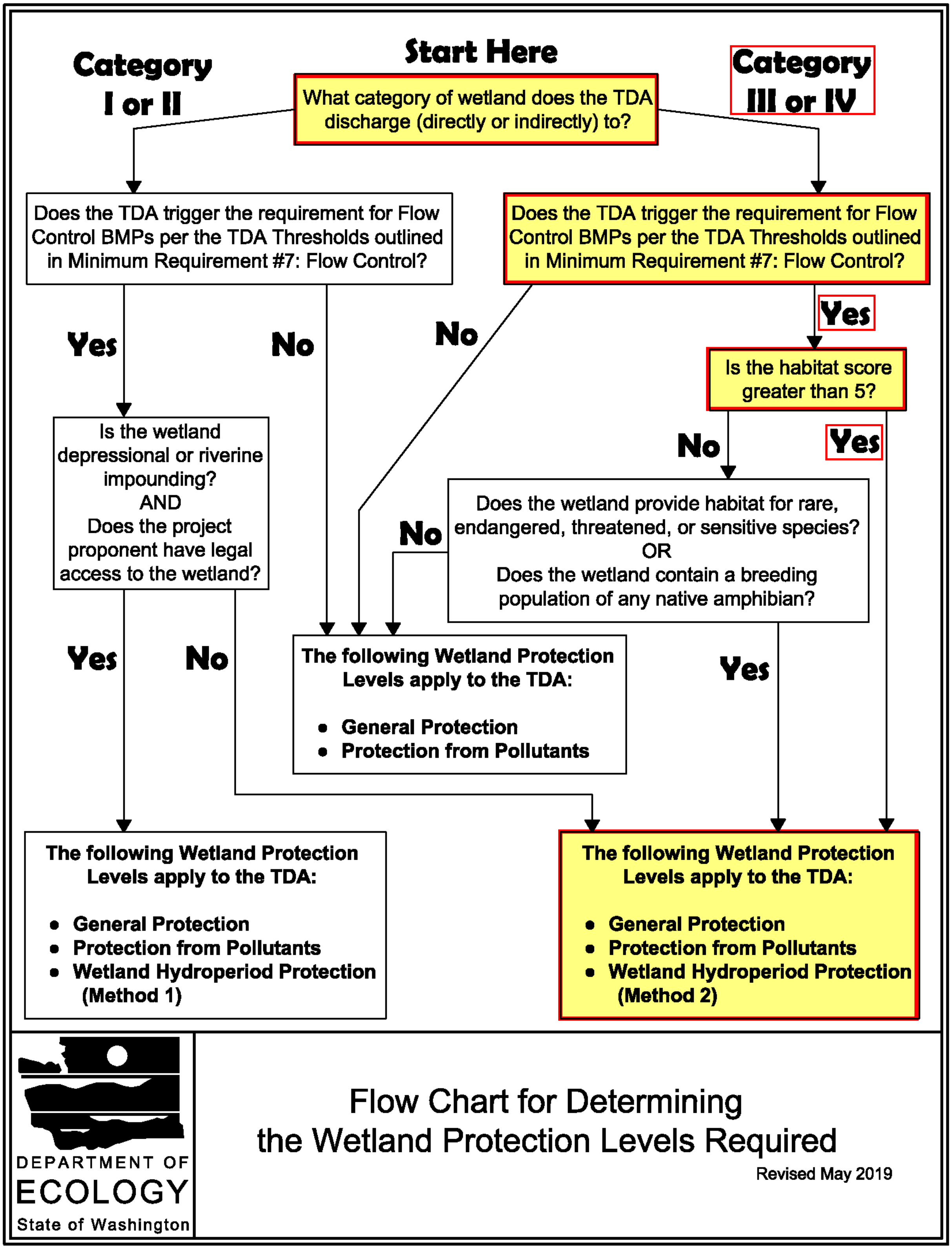
Wetland A (Category IV, habitat score of 4)

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



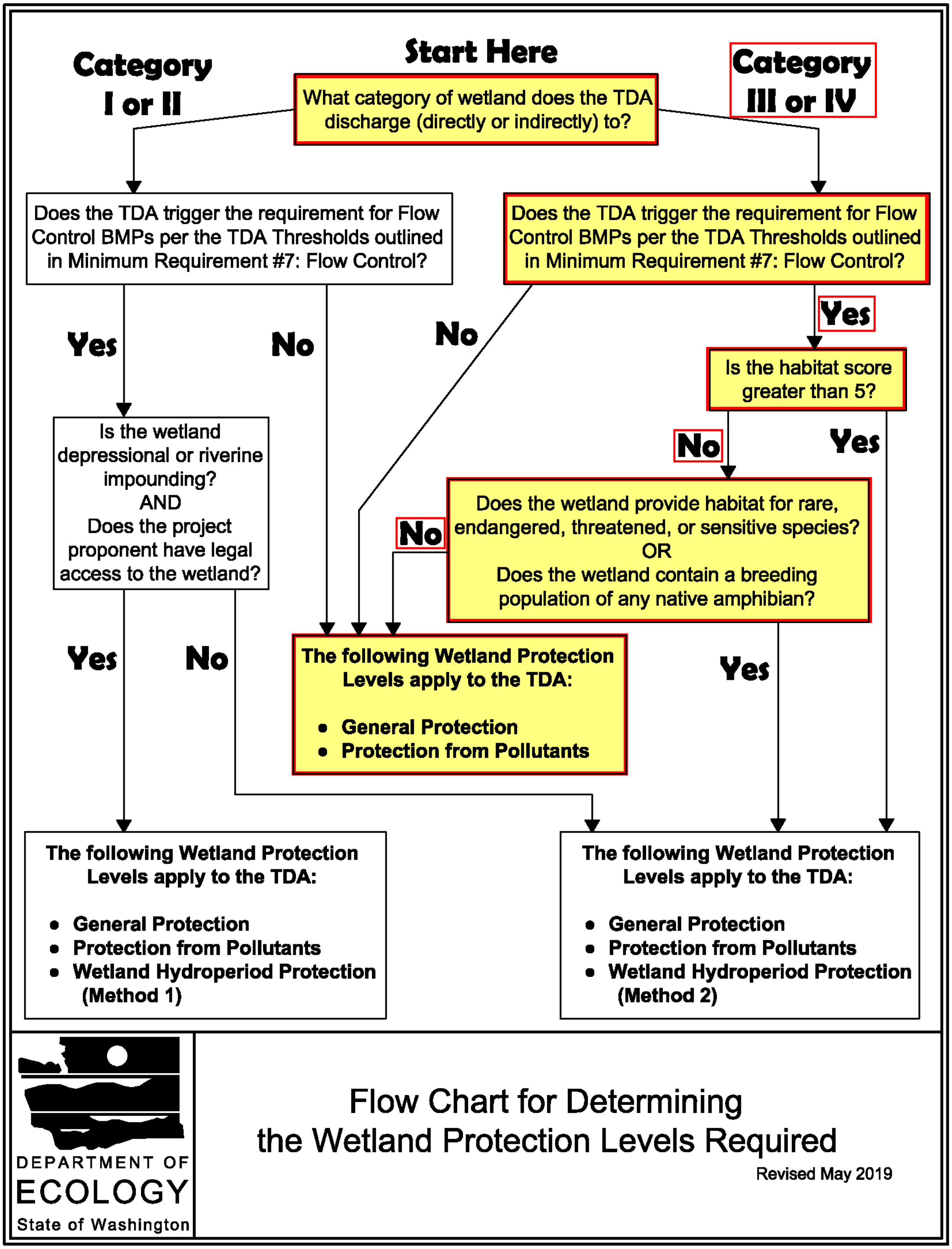
Wetland B (Category III, habitat score of 6)

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



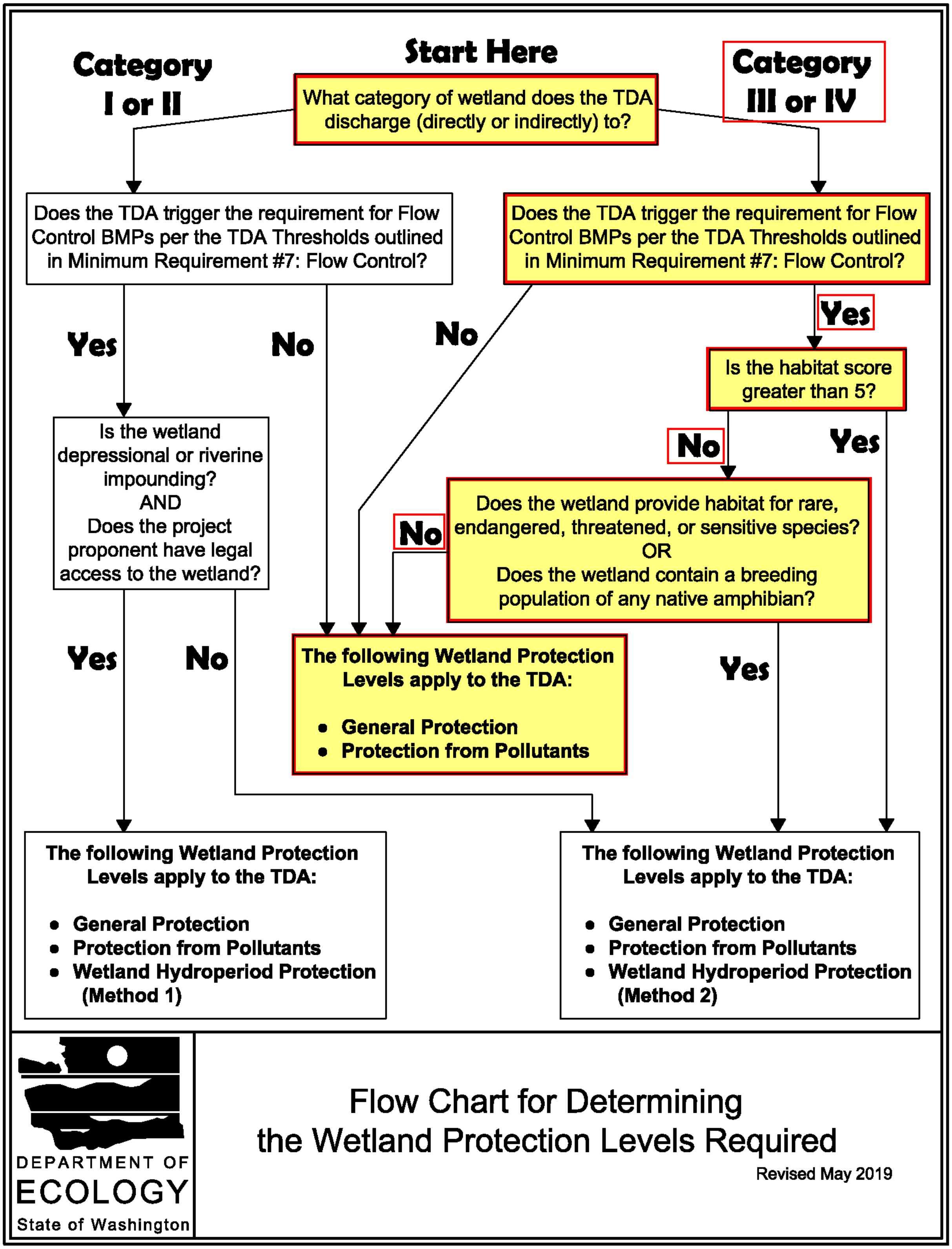
Wetland C (Category III, habitat score of 5)

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



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 July 14, 2025 and subsequent addendum. 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: 2025-11-10 - Pond

Site Name:	Pinnacle at Liberty Bay
Site Address:	
City:	Poulsbo
Report Date:	11/13/2025
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
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year

Landuse Basin Data

Predeveloped Land Use

Pre-Developed Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	20.604
Pervious Total	20.604
Impervious Land Use	acre
Impervious Total	0
Basin Total	20.604

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Pre-Developed Bypass Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	0.251
Pervious Total	0.251
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.251

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Pre-Developed Bypass Flows

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	0.251
Pervious Total	0.251
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.251

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 2	POC 2	

Predev WQ Treatment Inflow (West)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	14.151
Pervious Total	14.151
Impervious Land Use	acre
Impervious Total	0
Basin Total	14.151

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 3	POC 3	

Predev WQ Treatment Inflow (East)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	6.845
Pervious Total	6.845
Impervious Land Use	acre
Impervious Total	0
Basin Total	6.845

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 4	POC 4	

Mitigated Land Use

Developed Pond Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	9.527
Pervious Total	9.527
Impervious Land Use	acre
ROADS MOD	5.145
ROOF TOPS FLAT	8.439
Impervious Total	13.584
Basin Total	23.111

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Trapezoidal Pond 1	Trapezoidal Pond 1	

Developed Bypass Basin

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.045
Pervious Total	0.045
Impervious Land Use	acre
ROADS MOD	0.206
Impervious Total	0.206
Basin Total	0.251

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Developed Bypass Flows

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.045
Pervious Total	0.045
Impervious Land Use	acre
ROADS MOD	0.206
Impervious Total	0.206
Basin Total	0.251

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 2	POC 2	

WQ Treatment Inflow (West)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	5.246
Pervious Total	5.246
Impervious Land Use	acre
ROADS MOD	3.268
ROOF TOPS FLAT	5.638
Impervious Total	8.906
Basin Total	14.152

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 3	POC 3	

WQ Treatment Inflow (East)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	2.55
Pervious Total	2.55
Impervious Land Use	acre
ROADS MOD	1.495
ROOF TOPS FLAT	2.801
Impervious Total	4.296
Basin Total	6.846

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 4	POC 4	

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

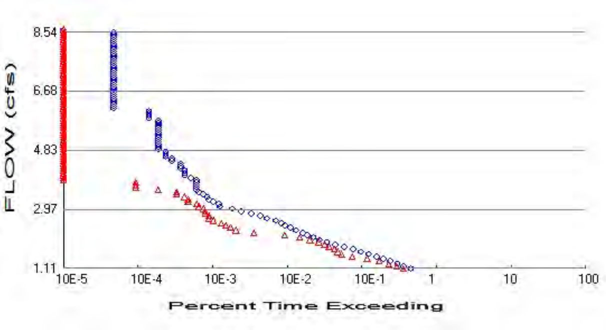
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.486	0.000	0.000	0.000
0.1222	0.490	0.059	0.124	0.000
0.2444	0.493	0.119	0.176	0.000
0.3667	0.497	0.180	0.215	0.000
0.4889	0.500	0.241	0.249	0.000
0.6111	0.504	0.302	0.278	0.000
0.7333	0.507	0.364	0.305	0.000
0.8556	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

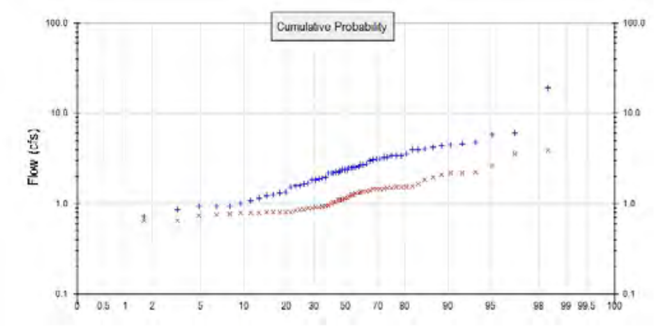
3.9111	0.604	2.129	0.705	0.000
4.0333	0.608	2.204	0.716	0.000
4.1556	0.612	2.278	0.726	0.000
4.2778	0.616	2.353	0.737	0.000
4.4000	0.619	2.429	0.748	0.000
4.5222	0.623	2.505	0.758	0.000
4.6444	0.627	2.581	0.768	0.000
4.7667	0.631	2.658	0.778	0.000
4.8889	0.635	2.736	0.788	0.000
5.0111	0.639	2.814	0.798	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:	20.855
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	9.572
Total Impervious Area:	13.79

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	2.223639
5 year	3.740141
10 year	4.993414
25 year	6.886587
50 year	8.538741
100 year	10.412791

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	1.143713
5 year	1.646289
10 year	2.03176
25 year	2.582711
50 year	3.042128
100 year	3.545773

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	4.453	1.353
1950	1.336	0.789
1951	3.160	1.396
1952	1.534	0.846
1953	1.846	1.250
1954	4.437	1.525
1955	4.197	0.950
1956	19.255	1.460
1957	3.401	1.650
1958	4.607	0.884

1959	3.979	3.874
1960	2.363	1.312
1961	5.772	0.932
1962	1.668	1.099
1963	2.166	1.557
1964	1.831	0.764
1965	0.938	0.804
1966	4.789	0.906
1967	3.287	2.097
1968	3.167	1.484
1969	2.289	1.241
1970	2.351	1.469
1971	3.958	1.105
1972	3.236	0.907
1973	1.946	1.101
1974	2.525	2.225
1975	2.671	0.804
1976	3.440	0.947
1977	1.588	1.026
1978	2.750	1.045
1979	2.221	1.348
1980	1.685	0.846
1981	1.216	0.860
1982	1.087	0.794
1983	2.537	2.198
1984	0.935	0.644
1985	0.726	0.642
1986	2.198	1.515
1987	1.875	1.199
1988	1.575	1.147
1989	0.847	0.733
1990	0.997	0.996
1991	1.937	1.462
1992	2.189	2.186
1993	1.255	0.779
1994	2.987	3.524
1995	2.466	1.521
1996	3.052	1.832
1997	2.235	1.470
1998	2.567	1.499
1999	4.017	2.621
2000	1.301	0.802
2001	0.627	0.784
2002	6.074	1.161
2003	3.571	1.946
2004	1.155	0.751
2005	2.675	0.800
2006	3.390	1.375
2007	2.397	0.883
2008	2.481	1.309
2009	0.939	0.557

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	19.2549	3.8738
2	6.0740	3.5243
3	5.7720	2.6214

4	4.7887	2.2249
5	4.6074	2.1985
6	4.4532	2.1859
7	4.4374	2.0974
8	4.1971	1.9461
9	4.0171	1.8317
10	3.9788	1.6503
11	3.9583	1.5574
12	3.5707	1.5250
13	3.4398	1.5207
14	3.4008	1.5149
15	3.3898	1.4989
16	3.2871	1.4838
17	3.2360	1.4701
18	3.1665	1.4689
19	3.1598	1.4620
20	3.0523	1.4604
21	2.9866	1.3960
22	2.7504	1.3749
23	2.6747	1.3534
24	2.6709	1.3479
25	2.5671	1.3119
26	2.5370	1.3089
27	2.5254	1.2500
28	2.4808	1.2409
29	2.4663	1.1993
30	2.3968	1.1610
31	2.3626	1.1467
32	2.3514	1.1048
33	2.2886	1.1013
34	2.2351	1.0994
35	2.2208	1.0450
36	2.1981	1.0264
37	2.1890	0.9959
38	2.1658	0.9498
39	1.9457	0.9467
40	1.9368	0.9315
41	1.8750	0.9069
42	1.8458	0.9055
43	1.8308	0.8836
44	1.6850	0.8834
45	1.6684	0.8604
46	1.5879	0.8462
47	1.5746	0.8455
48	1.5336	0.8045
49	1.3362	0.8039
50	1.3012	0.8019
51	1.2549	0.8002
52	1.2164	0.7938
53	1.1549	0.7889
54	1.0868	0.7839
55	0.9974	0.7788
56	0.9387	0.7641
57	0.9378	0.7508
58	0.9346	0.7329
59	0.8465	0.6443
60	0.7264	0.6416
61	0.6273	0.5566

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.1118	9623	7649	79	Pass
1.1868	7809	6220	79	Pass
1.2619	6389	4887	76	Pass
1.3369	5142	3640	70	Pass
1.4119	4173	2511	60	Pass
1.4869	3367	1589	47	Pass
1.5619	2661	1151	43	Pass
1.6370	2069	1019	49	Pass
1.7120	1625	916	56	Pass
1.7870	1246	776	62	Pass
1.8620	945	673	71	Pass
1.9370	722	569	78	Pass
2.0121	577	433	75	Pass
2.0871	478	311	65	Pass
2.1621	397	198	49	Pass
2.2371	343	76	22	Pass
2.3121	279	44	15	Pass
2.3871	237	37	15	Pass
2.4622	199	32	16	Pass
2.5372	178	28	15	Pass
2.6122	149	22	14	Pass
2.6872	115	19	16	Pass
2.7622	92	19	20	Pass
2.8373	70	17	24	Pass
2.9123	52	17	32	Pass
2.9873	39	16	41	Pass
3.0623	27	14	51	Pass
3.1373	26	13	50	Pass
3.2124	22	10	45	Pass
3.2874	19	10	52	Pass
3.3624	18	9	50	Pass
3.4374	16	7	43	Pass
3.5124	14	7	50	Pass
3.5875	13	4	30	Pass
3.6625	13	2	15	Pass
3.7375	13	2	15	Pass
3.8125	13	2	15	Pass
3.8875	13	0	0	Pass
3.9626	11	0	0	Pass
4.0376	9	0	0	Pass
4.1126	9	0	0	Pass
4.1876	9	0	0	Pass
4.2626	8	0	0	Pass
4.3377	8	0	0	Pass
4.4127	8	0	0	Pass
4.4877	6	0	0	Pass
4.5627	6	0	0	Pass
4.6377	5	0	0	Pass
4.7128	5	0	0	Pass
4.7878	5	0	0	Pass
4.8628	4	0	0	Pass
4.9378	4	0	0	Pass
5.0128	4	0	0	Pass

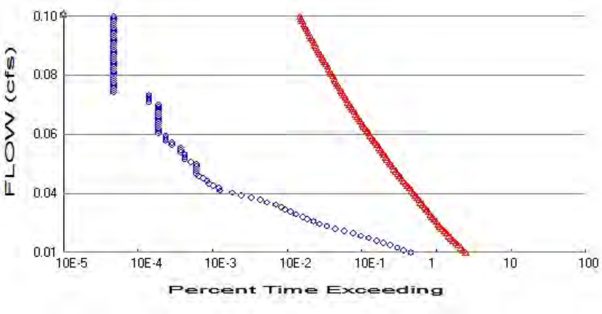
5.0878	4	0	0	Pass
5.1629	4	0	0	Pass
5.2379	4	0	0	Pass
5.3129	4	0	0	Pass
5.3879	4	0	0	Pass
5.4629	4	0	0	Pass
5.5380	4	0	0	Pass
5.6130	4	0	0	Pass
5.6880	4	0	0	Pass
5.7630	4	0	0	Pass
5.8380	3	0	0	Pass
5.9131	3	0	0	Pass
5.9881	3	0	0	Pass
6.0631	3	0	0	Pass
6.1381	1	0	0	Pass
6.2131	1	0	0	Pass
6.2882	1	0	0	Pass
6.3632	1	0	0	Pass
6.4382	1	0	0	Pass
6.5132	1	0	0	Pass
6.5882	1	0	0	Pass
6.6633	1	0	0	Pass
6.7383	1	0	0	Pass
6.8133	1	0	0	Pass
6.8883	1	0	0	Pass
6.9633	1	0	0	Pass
7.0384	1	0	0	Pass
7.1134	1	0	0	Pass
7.1884	1	0	0	Pass
7.2634	1	0	0	Pass
7.3384	1	0	0	Pass
7.4134	1	0	0	Pass
7.4885	1	0	0	Pass
7.5635	1	0	0	Pass
7.6385	1	0	0	Pass
7.7135	1	0	0	Pass
7.7885	1	0	0	Pass
7.8636	1	0	0	Pass
7.9386	1	0	0	Pass
8.0136	1	0	0	Pass
8.0886	1	0	0	Pass
8.1636	1	0	0	Pass
8.2387	1	0	0	Pass
8.3137	1	0	0	Pass
8.3887	1	0	0	Pass
8.4637	1	0	0	Pass
8.5387	1	0	0	Pass

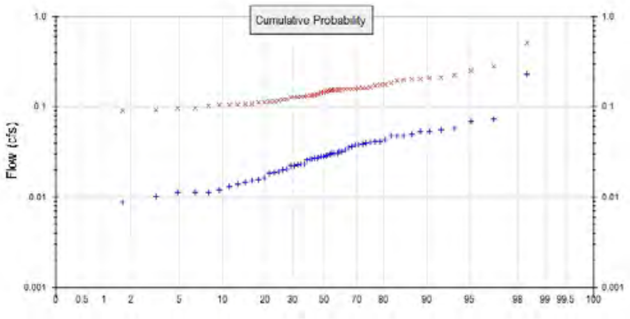
Water Quality

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: ~~3.2384 acre-feet~~
On-line facility target flow: ~~3.5148 cfs.~~
Adjusted for 15 min: ~~3.5148 cfs.~~
Off-line facility target flow: ~~2.0044 cfs.~~
Adjusted for 15 min: ~~2.0044 cfs.~~

See POC #3 for west WQ Treatment Flow
See POC #4 for east WQ Treatment Flow.

POC 2





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.251
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.045
Total Impervious Area: 0.206

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.026763
5 year	0.045014
10 year	0.060098
25 year	0.082883
50 year	0.102768
100 year	0.125323

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.140104
5 year	0.184839
10 year	0.218234
25 year	0.264916
50 year	0.303094
100 year	0.344321

The increase in the 100-year peak discharge is less than 0.4 cfs

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	0.054	0.194
1950	0.016	0.139
1951	0.038	0.159
1952	0.018	0.130
1953	0.022	0.106
1954	0.053	0.208
1955	0.051	0.251
1956	0.232	0.503
1957	0.041	0.173
1958	0.055	0.204
1959	0.048	0.151

1960	0.028	0.105
1961	0.069	0.205
1962	0.020	0.096
1963	0.026	0.145
1964	0.022	0.114
1965	0.011	0.078
1966	0.058	0.225
1967	0.040	0.152
1968	0.038	0.158
1969	0.028	0.153
1970	0.028	0.153
1971	0.048	0.175
1972	0.039	0.157
1973	0.023	0.108
1974	0.030	0.132
1975	0.032	0.144
1976	0.041	0.161
1977	0.019	0.102
1978	0.033	0.154
1979	0.027	0.147
1980	0.020	0.139
1981	0.015	0.111
1982	0.013	0.127
1983	0.031	0.175
1984	0.011	0.096
1985	0.009	0.123
1986	0.026	0.121
1987	0.023	0.133
1988	0.019	0.129
1989	0.010	0.093
1990	0.012	0.091
1991	0.023	0.115
1992	0.026	0.136
1993	0.015	0.117
1994	0.036	0.157
1995	0.030	0.106
1996	0.037	0.156
1997	0.027	0.132
1998	0.031	0.127
1999	0.048	0.184
2000	0.016	0.113
2001	0.008	0.155
2002	0.073	0.277
2003	0.043	0.160
2004	0.014	0.128
2005	0.032	0.166
2006	0.041	0.200
2007	0.029	0.212
2008	0.030	0.160
2009	0.011	0.108

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	**Predeveloped**	**Mitigated**
1	0.2317	0.5032
2	0.0731	0.2773
3	0.0695	0.2513
4	0.0576	0.2255

5	0.0555	0.2120
6	0.0536	0.2077
7	0.0534	0.2046
8	0.0505	0.2040
9	0.0483	0.2000
10	0.0479	0.1942
11	0.0476	0.1844
12	0.0430	0.1754
13	0.0414	0.1751
14	0.0409	0.1731
15	0.0408	0.1662
16	0.0396	0.1608
17	0.0389	0.1596
18	0.0381	0.1595
19	0.0380	0.1588
20	0.0367	0.1580
21	0.0359	0.1571
22	0.0331	0.1567
23	0.0322	0.1564
24	0.0321	0.1554
25	0.0309	0.1544
26	0.0305	0.1533
27	0.0304	0.1529
28	0.0299	0.1519
29	0.0297	0.1510
30	0.0288	0.1473
31	0.0284	0.1446
32	0.0283	0.1436
33	0.0275	0.1388
34	0.0269	0.1388
35	0.0267	0.1360
36	0.0265	0.1329
37	0.0263	0.1319
38	0.0261	0.1318
39	0.0234	0.1300
40	0.0233	0.1292
41	0.0226	0.1278
42	0.0222	0.1274
43	0.0220	0.1272
44	0.0203	0.1226
45	0.0201	0.1205
46	0.0191	0.1174
47	0.0190	0.1154
48	0.0185	0.1139
49	0.0161	0.1126
50	0.0157	0.1114
51	0.0151	0.1083
52	0.0146	0.1078
53	0.0139	0.1063
54	0.0131	0.1063
55	0.0120	0.1051
56	0.0113	0.1021
57	0.0113	0.0960
58	0.0112	0.0957
59	0.0102	0.0930
60	0.0087	0.0913
61	0.0076	0.0779

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0134	9610	52788	549	Fail
0.0143	7800	48660	623	Fail
0.0152	6380	45023	705	Fail
0.0161	5127	41815	815	Fail
0.0170	4158	38757	932	Fail
0.0179	3362	35997	1070	Fail
0.0188	2656	33495	1261	Fail
0.0197	2059	31185	1514	Fail
0.0206	1621	29025	1790	Fail
0.0215	1245	27142	2180	Fail
0.0224	945	25431	2691	Fail
0.0233	723	23827	3295	Fail
0.0242	577	22373	3877	Fail
0.0251	479	21032	4390	Fail
0.0260	397	19797	4986	Fail
0.0269	343	18683	5446	Fail
0.0278	279	17646	6324	Fail
0.0287	237	16636	7019	Fail
0.0296	199	15714	7896	Fail
0.0305	179	14780	8256	Fail
0.0314	149	13986	9386	Fail
0.0323	115	13186	11466	Fail
0.0332	92	12459	13542	Fail
0.0341	70	11760	16800	Fail
0.0351	52	11056	21261	Fail
0.0360	39	10429	26741	Fail
0.0369	27	9841	36448	Fail
0.0378	26	9257	35603	Fail
0.0387	22	8688	39490	Fail
0.0396	19	8224	43284	Fail
0.0405	18	7717	42872	Fail
0.0414	16	7285	45531	Fail
0.0423	14	6838	48842	Fail
0.0432	13	6444	49569	Fail
0.0441	13	6089	46838	Fail
0.0450	13	5784	44492	Fail
0.0459	13	5486	42200	Fail
0.0468	13	5202	40015	Fail
0.0477	11	4941	44918	Fail
0.0486	9	4697	52188	Fail
0.0495	9	4475	49722	Fail
0.0504	9	4235	47055	Fail
0.0513	8	4006	50075	Fail
0.0522	8	3794	47425	Fail
0.0531	8	3621	45262	Fail
0.0540	6	3435	57250	Fail
0.0549	6	3255	54250	Fail
0.0558	5	3076	61520	Fail
0.0567	5	2926	58520	Fail
0.0576	5	2800	56000	Fail
0.0585	4	2648	66200	Fail
0.0594	4	2505	62625	Fail
0.0603	4	2372	59300	Fail
0.0612	4	2254	56350	Fail

0.0621	4	2150	53750	Fail
0.0630	4	2052	51300	Fail
0.0639	4	1945	48625	Fail
0.0648	4	1843	46075	Fail
0.0657	4	1755	43875	Fail
0.0667	4	1678	41950	Fail
0.0676	4	1607	40175	Fail
0.0685	4	1524	38100	Fail
0.0694	4	1450	36250	Fail
0.0703	3	1383	46100	Fail
0.0712	3	1329	44300	Fail
0.0721	3	1276	42533	Fail
0.0730	3	1217	40566	Fail
0.0739	1	1168	116800	Fail
0.0748	1	1115	111500	Fail
0.0757	1	1070	107000	Fail
0.0766	1	1016	101600	Fail
0.0775	1	982	98200	Fail
0.0784	1	941	94100	Fail
0.0793	1	909	90900	Fail
0.0802	1	872	87200	Fail
0.0811	1	835	83500	Fail
0.0820	1	795	79500	Fail
0.0829	1	771	77100	Fail
0.0838	1	742	74200	Fail
0.0847	1	709	70900	Fail
0.0856	1	675	67500	Fail
0.0865	1	644	64400	Fail
0.0874	1	618	61800	Fail
0.0883	1	591	59100	Fail
0.0892	1	565	56500	Fail
0.0901	1	543	54300	Fail
0.0910	1	526	52600	Fail
0.0919	1	505	50500	Fail
0.0928	1	488	48800	Fail
0.0937	1	470	47000	Fail
0.0946	1	447	44700	Fail
0.0955	1	433	43300	Fail
0.0964	1	414	41400	Fail
0.0974	1	397	39700	Fail
0.0983	1	379	37900	Fail
0.0992	1	368	36800	Fail
0.1001	1	357	35700	Fail
0.1010	1	340	34000	Fail
0.1019	1	325	32500	Fail
0.1028	1	316	31600	Fail

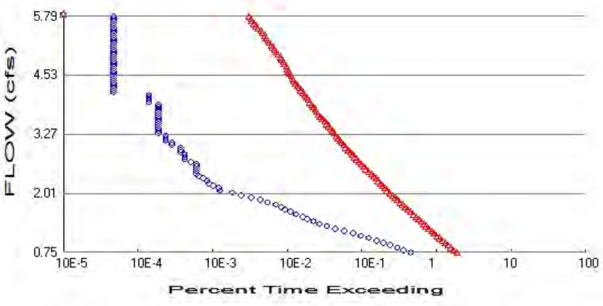
The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

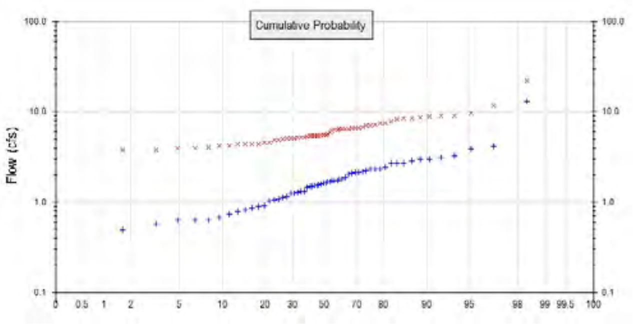
Water Quality

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.

POC 3





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3

Total Pervious Area:	14.151
Total Impervious Area:	0

Mitigated Landuse Totals for POC #3

Total Pervious Area:	5.246
Total Impervious Area:	8.906

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	1.508833
5 year	2.537843
10 year	3.38824
25 year	4.672836
50 year	5.79389
100 year	7.06551

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	5.722185
5 year	7.659856
10 year	9.122997
25 year	11.187749
50 year	12.89087
100 year	14.742674

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	3.022	9.094
1950	0.907	5.269
1951	2.144	7.080
1952	1.041	5.594
1953	1.252	4.554
1954	3.011	8.568
1955	2.848	8.979
1956	13.065	22.051
1957	2.308	7.257
1958	3.126	8.664
1959	2.700	6.491

1960	1.603	4.209
1961	3.917	9.160
1962	1.132	4.226
1963	1.470	5.961
1964	1.242	4.619
1965	0.636	3.064
1966	3.249	9.639
1967	2.230	6.292
1968	2.149	6.509
1969	1.553	5.570
1970	1.596	6.539
1971	2.686	7.000
1972	2.196	6.279
1973	1.320	4.373
1974	1.714	5.182
1975	1.812	5.643
1976	2.334	6.523
1977	1.077	3.917
1978	1.866	5.478
1979	1.507	5.415
1980	1.143	5.515
1981	0.825	4.429
1982	0.737	5.416
1983	1.721	7.423
1984	0.634	3.771
1985	0.493	5.133
1986	1.492	4.877
1987	1.272	5.403
1988	1.068	4.980
1989	0.574	3.919
1990	0.677	3.766
1991	1.314	5.110
1992	1.485	5.326
1993	0.852	4.387
1994	2.027	6.628
1995	1.673	4.364
1996	2.071	6.175
1997	1.517	5.172
1998	1.742	5.077
1999	2.726	7.814
2000	0.883	4.873
2001	0.426	6.624
2002	4.121	11.602
2003	2.423	7.518
2004	0.784	5.498
2005	1.815	6.756
2006	2.300	8.349
2007	1.626	8.563
2008	1.683	6.484
2009	0.637	4.022

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	**Predeveloped**	**Mitigated**
1	13.0652	22.0506
2	4.1215	11.6024
3	3.9166	9.6393
4	3.2494	9.1596

5	3.1263	9.0936
6	3.0217	8.9787
7	3.0110	8.6637
8	2.8479	8.5677
9	2.7258	8.5630
10	2.6998	8.3486
11	2.6858	7.8141
12	2.4228	7.5179
13	2.3340	7.4226
14	2.3076	7.2566
15	2.3001	7.0803
16	2.2304	6.9996
17	2.1958	6.7559
18	2.1486	6.6282
19	2.1441	6.6238
20	2.0711	6.5388
21	2.0265	6.5230
22	1.8662	6.5090
23	1.8149	6.4910
24	1.8123	6.4837
25	1.7419	6.2921
26	1.7214	6.2795
27	1.7136	6.1749
28	1.6833	5.9613
29	1.6735	5.6434
30	1.6263	5.5938
31	1.6032	5.5697
32	1.5955	5.5145
33	1.5529	5.4976
34	1.5166	5.4777
35	1.5069	5.4163
36	1.4915	5.4153
37	1.4853	5.4029
38	1.4696	5.3255
39	1.3202	5.2691
40	1.3142	5.1821
41	1.2723	5.1718
42	1.2524	5.1327
43	1.2423	5.1097
44	1.1433	5.0767
45	1.1321	4.9797
46	1.0775	4.8770
47	1.0684	4.8731
48	1.0406	4.6187
49	0.9067	4.5543
50	0.8829	4.4289
51	0.8515	4.3866
52	0.8254	4.3725
53	0.7836	4.3643
54	0.7375	4.2260
55	0.6768	4.2092
56	0.6369	4.0222
57	0.6364	3.9194
58	0.6342	3.9175
59	0.5744	3.7708
60	0.4929	3.7655
61	0.4257	3.0636

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7544	9619	40061	416	Fail
0.8053	7805	36447	466	Fail
0.8562	6376	33195	520	Fail
0.9071	5129	30458	593	Fail
0.9580	4156	27934	672	Fail
1.0089	3369	25645	761	Fail
1.0598	2663	23485	881	Fail
1.1107	2069	21560	1042	Fail
1.1616	1625	19825	1220	Fail
1.2126	1245	18320	1471	Fail
1.2635	949	16884	1779	Fail
1.3144	723	15631	2161	Fail
1.3653	577	14442	2502	Fail
1.4162	479	13325	2781	Fail
1.4671	397	12271	3090	Fail
1.5180	344	11308	3287	Fail
1.5689	280	10451	3732	Fail
1.6198	237	9582	4043	Fail
1.6707	199	8857	4450	Fail
1.7216	180	8177	4542	Fail
1.7725	149	7516	5044	Fail
1.8234	116	6936	5979	Fail
1.8743	92	6402	6958	Fail
1.9252	70	5927	8467	Fail
1.9761	52	5493	10563	Fail
2.0270	39	5061	12976	Fail
2.0779	27	4684	17348	Fail
2.1288	26	4344	16707	Fail
2.1797	22	4032	18327	Fail
2.2306	19	3764	19810	Fail
2.2815	18	3497	19427	Fail
2.3324	16	3281	20506	Fail
2.3833	14	3046	21757	Fail
2.4342	13	2855	21961	Fail
2.4851	13	2635	20269	Fail
2.5360	13	2428	18676	Fail
2.5870	13	2263	17407	Fail
2.6379	13	2096	16123	Fail
2.6888	11	1945	17681	Fail
2.7397	9	1823	20255	Fail
2.7906	9	1707	18966	Fail
2.8415	9	1607	17855	Fail
2.8924	8	1506	18825	Fail
2.9433	8	1400	17500	Fail
2.9942	8	1306	16325	Fail
3.0451	6	1230	20500	Fail
3.0960	6	1153	19216	Fail
3.1469	5	1088	21760	Fail
3.1978	5	1026	20520	Fail
3.2487	5	968	19360	Fail
3.2996	4	914	22850	Fail
3.3505	4	858	21450	Fail
3.4014	4	810	20250	Fail
3.4523	4	764	19100	Fail

3.5032	4	721	18025	Fail
3.5541	4	682	17050	Fail
3.6050	4	630	15750	Fail
3.6559	4	591	14775	Fail
3.7068	4	557	13925	Fail
3.7577	4	526	13150	Fail
3.8086	4	507	12675	Fail
3.8595	4	480	12000	Fail
3.9105	4	454	11350	Fail
3.9614	3	428	14266	Fail
4.0123	3	409	13633	Fail
4.0632	3	389	12966	Fail
4.1141	3	369	12300	Fail
4.1650	1	348	34800	Fail
4.2159	1	326	32600	Fail
4.2668	1	309	30900	Fail
4.3177	1	291	29100	Fail
4.3686	1	276	27600	Fail
4.4195	1	261	26100	Fail
4.4704	1	250	25000	Fail
4.5213	1	243	24300	Fail
4.5722	1	231	23100	Fail
4.6231	1	223	22300	Fail
4.6740	1	214	21400	Fail
4.7249	1	207	20700	Fail
4.7758	1	194	19400	Fail
4.8267	1	190	19000	Fail
4.8776	1	179	17900	Fail
4.9285	1	173	17300	Fail
4.9794	1	161	16100	Fail
5.0303	1	151	15100	Fail
5.0812	1	144	14400	Fail
5.1321	1	138	13800	Fail
5.1830	1	130	13000	Fail
5.2339	1	122	12200	Fail
5.2849	1	118	11800	Fail
5.3358	1	111	11100	Fail
5.3867	1	107	10700	Fail
5.4376	1	99	9900	Fail
5.4885	1	95	9500	Fail
5.5394	1	86	8600	Fail
5.5903	1	82	8200	Fail
5.6412	1	77	7700	Fail
5.6921	1	72	7200	Fail
5.7430	1	70	7000	Fail
5.7939	1	65	6500	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.

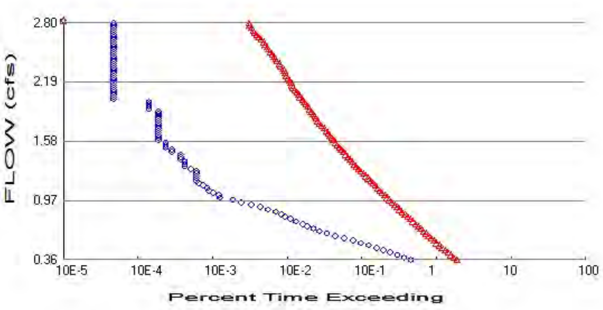
Water Quality

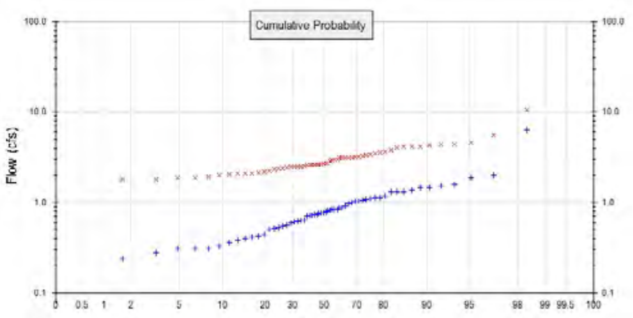
Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	2.0814 acre-feet
On-line facility target flow:	2.3005 cfs.
Adjusted for 15 min:	2.3005 cfs.
Off-line facility target flow:	1.3121 cfs.
Adjusted for 15 min:	1.3121 cfs.

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

POC 4





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4

Total Pervious Area:	6.845
Total Impervious Area:	0

Mitigated Landuse Totals for POC #4

Total Pervious Area:	2.55
Total Impervious Area:	4.296

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	0.72984
5 year	1.227583
10 year	1.638931
25 year	2.260304
50 year	2.802571
100 year	3.417668

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	2.753086
5 year	3.686606
10 year	4.391699
25 year	5.386931
50 year	6.208018
100 year	7.10093

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	1.462	4.388
1950	0.439	2.530
1951	1.037	3.414
1952	0.503	2.695
1953	0.606	2.194
1954	1.456	4.120
1955	1.378	4.328
1956	6.320	10.613
1957	1.116	3.492
1958	1.512	4.168
1959	1.306	3.125

1960	0.775	2.022
1961	1.894	4.413
1962	0.548	2.038
1963	0.711	2.868
1964	0.601	2.221
1965	0.308	1.473
1966	1.572	4.639
1967	1.079	3.026
1968	1.039	3.130
1969	0.751	2.669
1970	0.772	3.149
1971	1.299	3.362
1972	1.062	3.017
1973	0.639	2.102
1974	0.829	2.498
1975	0.877	2.710
1976	1.129	3.135
1977	0.521	1.880
1978	0.903	2.625
1979	0.729	2.597
1980	0.553	2.653
1981	0.399	2.132
1982	0.357	2.610
1983	0.833	3.575
1984	0.307	1.812
1985	0.238	2.473
1986	0.721	2.344
1987	0.615	2.599
1988	0.517	2.391
1989	0.278	1.889
1990	0.327	1.813
1991	0.636	2.465
1992	0.718	2.560
1993	0.412	2.105
1994	0.980	3.191
1995	0.809	2.106
1996	1.002	2.965
1997	0.734	2.485
1998	0.843	2.442
1999	1.318	3.762
2000	0.427	2.349
2001	0.206	3.194
2002	1.994	5.581
2003	1.172	3.631
2004	0.379	2.651
2005	0.878	3.259
2006	1.113	4.017
2007	0.787	4.122
2008	0.814	3.117
2009	0.308	1.929

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	6.3198	10.6128
2	1.9936	5.5812
3	1.8945	4.6393
4	1.5718	4.4127

5	1.5122	4.3885
6	1.4616	4.3282
7	1.4565	4.1684
8	1.3776	4.1217
9	1.3185	4.1199
10	1.3059	4.0170
11	1.2992	3.7617
12	1.1720	3.6308
13	1.1290	3.5753
14	1.1162	3.4917
15	1.1126	3.4137
16	1.0789	3.3625
17	1.0621	3.2586
18	1.0393	3.1937
19	1.0371	3.1909
20	1.0018	3.1491
21	0.9803	3.1351
22	0.9027	3.1300
23	0.8779	3.1250
24	0.8766	3.1174
25	0.8426	3.0264
26	0.8327	3.0165
27	0.8289	2.9652
28	0.8143	2.8682
29	0.8095	2.7097
30	0.7867	2.6952
31	0.7755	2.6690
32	0.7718	2.6530
33	0.7512	2.6511
34	0.7336	2.6250
35	0.7289	2.6104
36	0.7215	2.5986
37	0.7185	2.5974
38	0.7109	2.5595
39	0.6386	2.5300
40	0.6357	2.4982
41	0.6154	2.4854
42	0.6058	2.4726
43	0.6009	2.4648
44	0.5530	2.4419
45	0.5476	2.3910
46	0.5212	2.3491
47	0.5168	2.3443
48	0.5034	2.2211
49	0.4386	2.1938
50	0.4271	2.1320
51	0.4119	2.1058
52	0.3993	2.1049
53	0.3791	2.1021
54	0.3567	2.0377
55	0.3274	2.0222
56	0.3081	1.9294
57	0.3078	1.8891
58	0.3068	1.8802
59	0.2779	1.8126
60	0.2384	1.8123
61	0.2059	1.4728

Duration Flows

The Duration Matching Failed

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3649	9668	40061	414	Fail
0.3895	7828	36382	464	Fail
0.4142	6380	33110	518	Fail
0.4388	5159	30436	589	Fail
0.4634	4179	27827	665	Fail
0.4880	3360	25495	758	Fail
0.5127	2669	23399	876	Fail
0.5373	2067	21453	1037	Fail
0.5619	1633	19780	1211	Fail
0.5865	1249	18228	1459	Fail
0.6111	948	16788	1770	Fail
0.6358	725	15569	2147	Fail
0.6604	578	14369	2485	Fail
0.6850	478	13229	2767	Fail
0.7096	398	12224	3071	Fail
0.7343	343	11199	3265	Fail
0.7589	280	10386	3709	Fail
0.7835	237	9512	4013	Fail
0.8081	199	8774	4409	Fail
0.8328	180	8104	4502	Fail
0.8574	149	7456	5004	Fail
0.8820	118	6872	5823	Fail
0.9066	93	6361	6839	Fail
0.9312	70	5884	8405	Fail
0.9559	52	5448	10476	Fail
0.9805	40	5014	12535	Fail
1.0051	27	4631	17151	Fail
1.0297	26	4301	16542	Fail
1.0544	22	3989	18131	Fail
1.0790	19	3732	19642	Fail
1.1036	18	3467	19261	Fail
1.1282	16	3240	20250	Fail
1.1528	14	3022	21585	Fail
1.1775	13	2819	21684	Fail
1.2021	13	2599	19992	Fail
1.2267	13	2402	18476	Fail
1.2513	13	2229	17146	Fail
1.2760	13	2060	15846	Fail
1.3006	11	1920	17454	Fail
1.3252	9	1794	19933	Fail
1.3498	9	1685	18722	Fail
1.3745	9	1589	17655	Fail
1.3991	8	1484	18550	Fail
1.4237	8	1377	17212	Fail
1.4483	8	1288	16100	Fail
1.4729	6	1211	20183	Fail
1.4976	6	1141	19016	Fail
1.5222	5	1070	21400	Fail
1.5468	5	1005	20100	Fail
1.5714	5	954	19080	Fail
1.5961	4	894	22350	Fail
1.6207	4	840	21000	Fail
1.6453	4	798	19950	Fail
1.6699	4	755	18875	Fail

1.6945	4	712	17800	Fail
1.7192	4	672	16800	Fail
1.7438	4	619	15475	Fail
1.7684	4	579	14475	Fail
1.7930	4	546	13650	Fail
1.8177	4	519	12975	Fail
1.8423	4	499	12475	Fail
1.8669	4	476	11900	Fail
1.8915	4	446	11150	Fail
1.9162	3	424	14133	Fail
1.9408	3	403	13433	Fail
1.9654	3	381	12700	Fail
1.9900	3	361	12033	Fail
2.0146	1	341	34100	Fail
2.0393	1	316	31600	Fail
2.0639	1	304	30400	Fail
2.0885	1	289	28900	Fail
2.1131	1	268	26800	Fail
2.1378	1	255	25500	Fail
2.1624	1	247	24700	Fail
2.1870	1	239	23900	Fail
2.2116	1	228	22800	Fail
2.2362	1	219	21900	Fail
2.2609	1	210	21000	Fail
2.2855	1	200	20000	Fail
2.3101	1	194	19400	Fail
2.3347	1	188	18800	Fail
2.3594	1	174	17400	Fail
2.3840	1	168	16800	Fail
2.4086	1	155	15500	Fail
2.4332	1	150	15000	Fail
2.4579	1	142	14200	Fail
2.4825	1	135	13500	Fail
2.5071	1	126	12600	Fail
2.5317	1	119	11900	Fail
2.5563	1	115	11500	Fail
2.5810	1	108	10800	Fail
2.6056	1	103	10300	Fail
2.6302	1	95	9500	Fail
2.6548	1	88	8800	Fail
2.6795	1	83	8300	Fail
2.7041	1	78	7800	Fail
2.7287	1	75	7500	Fail
2.7533	1	71	7100	Fail
2.7779	1	67	6700	Fail
2.8026	1	65	6500	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 #4
On-line facility volume: 1.0052 acre-feet
On-line facility target flow: 1.1083 cfs.
Adjusted for 15 min: 1.1083 cfs.
Off-line facility target flow: 0.6316 cfs.
Adjusted for 15 min: 0.6316 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

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   2025-11-10 - Pond.wdm
MESSU      25   Pre2025-11-10 - Pond.MES
           27   Pre2025-11-10 - Pond.L61
           28   Pre2025-11-10 - Pond.L62
           30   POC2025-11-10 - Pond1.dat
           31   POC2025-11-10 - Pond2.dat
           32   POC2025-11-10 - Pond3.dat
           33   POC2025-11-10 - Pond4.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
    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
    3        Predev WQ Treatment Inflo   MAX                    1    2   32    9
    4        Predev WQ Treatment Inflo   MAX                    1    2   33    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  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    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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre-Developed Pond Basin***
PERLND  12                      20.604     COPY   501     12
PERLND  12                      20.604     COPY   501     13
Pre-Developed Bypass Basin***
PERLND  12                       0.251     COPY   501     12
PERLND  12                       0.251     COPY   501     13
Pre-Developed Bypass Flows***
PERLND  12                       0.251     COPY   502     12
PERLND  12                       0.251     COPY   502     13
Predev WQ Treatment Inflow (West)***
PERLND  12                      14.151     COPY   503     12
PERLND  12                      14.151     COPY   503     13
Predev WQ Treatment Inflow (East)***
PERLND  12                       6.845     COPY   504     12
PERLND  12                       6.845     COPY   504     13

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

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    502 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    503 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    504 FLOW     ENGL      REPL
END EXT TARGETS

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   2025-11-10 - Pond.wdm
MESSU      25   Mit2025-11-10 - Pond.MES
           27   Mit2025-11-10 - Pond.L61
           28   Mit2025-11-10 - Pond.L62
           31   POC2025-11-10 - Pond2.dat
           32   POC2025-11-10 - Pond3.dat
           33   POC2025-11-10 - Pond4.dat
           30   POC2025-11-10 - Pond1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      14
      IMPLND       2
      IMPLND       4
      RCHRES       1
      COPY       502
      COPY       503
      COPY       504
      COPY         1
      COPY       501
      COPY       601
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    2        Developed Bypass Flows      MAX                    1    2   31    9
    3        WQ Treatment Inflow (West   MAX                    1    2   32    9
    4        WQ Treatment Inflow (East   MAX                    1    2   33    9
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  502         1    1
  503         1    1
  504         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
  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 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 Pond Basin***
PERLND  14                       9.527     RCHRES   1      2
PERLND  14                       9.527     RCHRES   1      3
IMPLND   2                       5.145     RCHRES   1      5
IMPLND   4                       8.439     RCHRES   1      5
Developed Bypass Basin***
PERLND  14                       0.045     COPY   501     12
PERLND  14                       0.045     COPY   601     12
PERLND  14                       0.045     COPY   501     13
PERLND  14                       0.045     COPY   601     13
IMPLND   2                       0.206     COPY   501     15
IMPLND   2                       0.206     COPY   601     15
Developed Bypass Flows***
PERLND  14                       0.045     COPY   502     12
PERLND  14                       0.045     COPY   502     13
IMPLND   2                       0.206     COPY   502     15
WQ Treatment Inflow (West)***
PERLND  14                       5.246     COPY   503     12
PERLND  14                       5.246     COPY   503     13
IMPLND   2                       3.268     COPY   503     15
IMPLND   4                       5.638     COPY   503     15
WQ Treatment Inflow (East)***
PERLND  14                        2.55     COPY   504     12
PERLND  14                        2.55     COPY   504     13
IMPLND   2                       1.495     COPY   504     15
IMPLND   4                       2.801     COPY   504     15

******Routing******
PERLND  14                       9.527     COPY     1     12
IMPLND   2                       5.145     COPY     1     15
```

```
IMPLND   4                       8.439     COPY     1     15
PERLND  14                       9.527     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   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   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     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 NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.04       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
```

```
0.122222  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  0.950989
6.355556  0.683609  3.703225  1.030094
6.477778  0.687687  3.787027  1.082790
6.600000  0.691776  3.871327  1.126353
6.722222  0.695876  3.956128  1.164779
6.844444  0.699986  4.041431  1.199781
6.966667  0.704108  4.127237  1.232282
7.088889  0.708241  4.213547  1.262846
7.211111  0.712384  4.300363  1.291849
7.333333  0.716539  4.387686  1.319557
7.455556  0.720705  4.475518  1.346165
7.577778  0.724881  4.563859  1.371823
7.700000  0.729069  4.652711  1.396647
7.822222  0.733267  4.742076  1.420731
7.944444  0.737477  4.831955  1.444153
8.066667  0.741697  4.922349  1.466976
8.188889  0.745929  5.013260  1.489253
8.311111  0.750171  5.104688  1.511030
8.433333  0.754425  5.196636  1.532346
8.555556  0.758689  5.289104  1.553236
```

```
  8.677778  0.762964  5.382094  1.676637
  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
  10.02222  0.810717  6.439810  2.271604
  10.14444  0.815124  6.539167  3.123549
  10.26667  0.819542  6.639063  4.413153
  10.38889  0.823971  6.739500  5.833189
  10.51111  0.828411  6.840479  7.093837
  10.63333  0.832862  6.942001  7.981259
  10.75556  0.837324  7.044068  8.580674
  10.87778  0.841797  7.146681  9.091464
  11.00000  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>   #   #        <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
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
COPY     4 OUTPUT MEAN   1 1     48.4      WDM    704 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    804 FLOW     ENGL      REPL
COPY   604 OUTPUT MEAN   1 1     48.4      WDM    904 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 VAULT
(EAST BASIN)

General Model Information

WWHM2012 Project Name: 2025-11-11- Vault

Site Name:	Pinnacle at Liberty Bay
Site Address:	
City:	Poulsbo
Report Date:	11/12/2025
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 Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	4.721
Pervious Total	4.721
Impervious Land Use	acre
Impervious Total	0
Basin Total	4.721

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

Developed Vault Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.689
Pervious Total	0.689
Impervious Land Use	acre
ROADS MOD	0.791
ROOF TOPS FLAT	0.548
Impervious Total	1.339
Basin Total	2.028

Element Flow Componants:

Surface	Interflow	Groundwater
Componant 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:	2.625 in. Elevation:0 ft.
Orifice 2 Diameter:	1.188 in. Elevation:1.1 ft.
Orifice 3 Diameter:	0.688 in. Elevation:2 ft.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

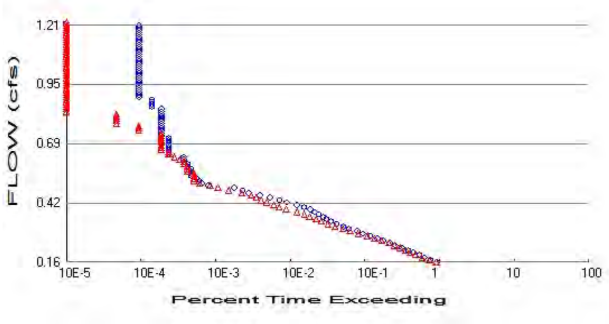
Vault Hydraulic Table

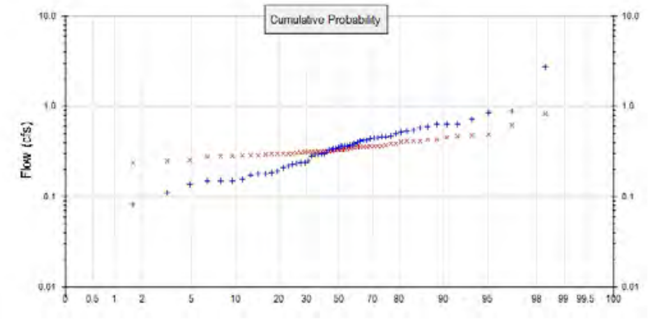
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.029	0.000	0.000	0.000
0.0667	0.029	0.002	0.048	0.000
0.1333	0.029	0.004	0.068	0.000
0.2000	0.029	0.006	0.083	0.000
0.2667	0.029	0.008	0.096	0.000
0.3333	0.029	0.009	0.108	0.000
0.4000	0.029	0.011	0.118	0.000
0.4667	0.029	0.013	0.127	0.000
0.5333	0.029	0.015	0.136	0.000
0.6000	0.029	0.017	0.144	0.000
0.6667	0.029	0.019	0.152	0.000
0.7333	0.029	0.021	0.160	0.000
0.8000	0.029	0.023	0.167	0.000
0.8667	0.029	0.025	0.174	0.000
0.9333	0.029	0.027	0.180	0.000
1.0000	0.029	0.029	0.187	0.000
1.0667	0.029	0.031	0.193	0.000
1.1333	0.029	0.033	0.206	0.000
1.2000	0.029	0.035	0.216	0.000
1.2667	0.029	0.037	0.226	0.000
1.3333	0.029	0.039	0.234	0.000
1.4000	0.029	0.041	0.242	0.000
1.4667	0.029	0.043	0.249	0.000
1.5333	0.029	0.045	0.256	0.000
1.6000	0.029	0.047	0.263	0.000
1.6667	0.029	0.049	0.270	0.000
1.7333	0.029	0.051	0.276	0.000
1.8000	0.029	0.053	0.282	0.000
1.8667	0.029	0.055	0.289	0.000
1.9333	0.029	0.057	0.294	0.000
2.0000	0.029	0.059	0.300	0.000
2.0667	0.029	0.061	0.309	0.000
2.1333	0.029	0.063	0.316	0.000
2.2000	0.029	0.065	0.323	0.000
2.2667	0.029	0.067	0.329	0.000
2.3333	0.029	0.069	0.335	0.000
2.4000	0.029	0.071	0.341	0.000

2.4667	0.029	0.073	0.347	0.000
2.5333	0.029	0.075	0.352	0.000
2.6000	0.029	0.077	0.358	0.000
2.6667	0.029	0.079	0.363	0.000
2.7333	0.029	0.081	0.369	0.000
2.8000	0.029	0.083	0.374	0.000
2.8667	0.029	0.085	0.379	0.000
2.9333	0.029	0.087	0.384	0.000
3.0000	0.029	0.089	0.389	0.000
3.0667	0.029	0.091	0.394	0.000
3.1333	0.029	0.093	0.399	0.000
3.2000	0.029	0.095	0.404	0.000
3.2667	0.029	0.097	0.408	0.000
3.3333	0.029	0.099	0.413	0.000
3.4000	0.029	0.101	0.418	0.000
3.4667	0.029	0.103	0.422	0.000
3.5333	0.029	0.105	0.427	0.000
3.6000	0.029	0.107	0.431	0.000
3.6667	0.029	0.109	0.435	0.000
3.7333	0.029	0.111	0.440	0.000
3.8000	0.029	0.113	0.444	0.000
3.8667	0.029	0.115	0.448	0.000
3.9333	0.029	0.117	0.453	0.000
4.0000	0.029	0.119	0.457	0.000
4.0667	0.029	0.121	0.461	0.000
4.1333	0.029	0.123	0.465	0.000
4.2000	0.029	0.125	0.469	0.000
4.2667	0.029	0.127	0.473	0.000
4.3333	0.029	0.129	0.477	0.000
4.4000	0.029	0.131	0.481	0.000
4.4667	0.029	0.133	0.485	0.000
4.5333	0.029	0.135	0.489	0.000
4.6000	0.029	0.137	0.493	0.000
4.6667	0.029	0.139	0.497	0.000
4.7333	0.029	0.141	0.501	0.000
4.8000	0.029	0.143	0.504	0.000
4.8667	0.029	0.145	0.508	0.000
4.9333	0.029	0.147	0.512	0.000
5.0000	0.029	0.149	0.515	0.000
5.0667	0.029	0.151	0.701	0.000
5.1333	0.029	0.153	1.032	0.000
5.2000	0.029	0.155	1.434	0.000
5.2667	0.029	0.157	1.848	0.000
5.3333	0.029	0.159	2.217	0.000
5.4000	0.029	0.161	2.497	0.000
5.4667	0.029	0.163	2.679	0.000
5.5333	0.029	0.165	2.844	0.000
5.6000	0.029	0.167	2.987	0.000
5.6667	0.029	0.169	3.123	0.000
5.7333	0.029	0.171	3.252	0.000
5.8000	0.029	0.173	3.375	0.000
5.8667	0.029	0.175	3.493	0.000
5.9333	0.029	0.177	3.607	0.000
6.0000	0.029	0.179	3.718	0.000
6.0667	0.029	0.181	3.824	0.000
6.1333	0.000	0.000	3.928	0.000

Analysis Results

POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	4.721
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0.689
Total Impervious Area:	1.339

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.319776
5 year	0.540187
10 year	0.718808
25 year	0.983517
50 year	1.210289
100 year	1.463467

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**	
2 year	0.33375	2-yr release rate for treatment design.
5 year	0.407973	
10 year	0.460155	
25 year	0.529557	
50 year	0.58383	
100 year	0.64036	

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.580	0.485
1950	0.190	0.313
1951	0.414	0.333
1952	0.185	0.351
1953	0.284	0.307
1954	0.628	0.358
1955	0.521	0.448
1956	2.730	0.414
1957	0.449	0.318
1958	0.627	0.333

1959	0.595	0.427
1960	0.345	0.321
1961	0.848	0.292
1962	0.248	0.355
1963	0.295	0.342
1964	0.237	0.289
1965	0.171	0.188
1966	0.714	0.301
1967	0.419	0.372
1968	0.437	0.319
1969	0.343	0.281
1970	0.366	0.357
1971	0.537	0.411
1972	0.463	0.335
1973	0.295	0.301
1974	0.424	0.312
1975	0.374	0.350
1976	0.468	0.387
1977	0.236	0.274
1978	0.367	0.285
1979	0.331	0.313
1980	0.229	0.305
1981	0.208	0.284
1982	0.154	0.289
1983	0.362	0.625
1984	0.137	0.247
1985	0.073	0.332
1986	0.334	0.299
1987	0.302	0.325
1988	0.217	0.314
1989	0.149	0.251
1990	0.147	0.301
1991	0.302	0.404
1992	0.399	0.323
1993	0.180	0.301
1994	0.450	0.477
1995	0.384	0.344
1996	0.456	0.327
1997	0.345	0.321
1998	0.369	0.354
1999	0.629	0.435
2000	0.179	0.361
2001	0.081	0.416
2002	0.881	0.466
2003	0.539	0.826
2004	0.148	0.317
2005	0.235	0.366
2006	0.502	0.390
2007	0.311	0.366
2008	0.367	0.366
2009	0.111	0.239

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	2.7299	0.8255
2	0.8810	0.6254
3	0.8479	0.4850

4	0.7140	0.4772
5	0.6287	0.4663
6	0.6275	0.4483
7	0.6274	0.4351
8	0.5946	0.4275
9	0.5803	0.4162
10	0.5391	0.4145
11	0.5371	0.4113
12	0.5205	0.4041
13	0.5015	0.3900
14	0.4685	0.3866
15	0.4629	0.3722
16	0.4565	0.3659
17	0.4504	0.3657
18	0.4494	0.3656
19	0.4372	0.3615
20	0.4238	0.3583
21	0.4194	0.3567
22	0.4141	0.3545
23	0.3990	0.3542
24	0.3841	0.3515
25	0.3740	0.3504
26	0.3690	0.3444
27	0.3674	0.3424
28	0.3671	0.3346
29	0.3658	0.3331
30	0.3624	0.3326
31	0.3449	0.3322
32	0.3448	0.3268
33	0.3426	0.3249
34	0.3342	0.3231
35	0.3306	0.3207
36	0.3115	0.3207
37	0.3024	0.3195
38	0.3020	0.3178
39	0.2952	0.3170
40	0.2947	0.3140
41	0.2840	0.3134
42	0.2480	0.3133
43	0.2372	0.3117
44	0.2358	0.3074
45	0.2347	0.3052
46	0.2289	0.3015
47	0.2165	0.3014
48	0.2081	0.3013
49	0.1903	0.3006
50	0.1845	0.2993
51	0.1801	0.2916
52	0.1794	0.2892
53	0.1707	0.2891
54	0.1544	0.2852
55	0.1489	0.2841
56	0.1483	0.2806
57	0.1473	0.2744
58	0.1371	0.2515
59	0.1106	0.2474
60	0.0813	0.2386
61	0.0734	0.1880

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1599	19430	19383	99	Pass
0.1705	16279	15744	96	Pass
0.1811	13488	12476	92	Pass
0.1917	11460	10085	88	Pass
0.2023	9557	8615	90	Pass
0.2129	8153	7557	92	Pass
0.2235	6776	6421	94	Pass
0.2342	5495	5373	97	Pass
0.2448	4616	4451	96	Pass
0.2554	3773	3587	95	Pass
0.2660	3144	2892	91	Pass
0.2766	2524	2319	91	Pass
0.2872	2014	1748	86	Pass
0.2978	1676	1355	80	Pass
0.3084	1310	1079	82	Pass
0.3190	1091	850	77	Pass
0.3296	896	686	76	Pass
0.3403	749	558	74	Pass
0.3509	652	471	72	Pass
0.3615	587	391	66	Pass
0.3721	516	330	63	Pass
0.3827	457	264	57	Pass
0.3933	393	189	48	Pass
0.4039	328	151	46	Pass
0.4145	263	129	49	Pass
0.4251	193	104	53	Pass
0.4358	154	87	56	Pass
0.4464	113	75	66	Pass
0.4570	83	64	77	Pass
0.4676	59	48	81	Pass
0.4782	49	32	65	Pass
0.4888	38	23	60	Pass
0.4994	17	18	105	Pass
0.5100	14	13	92	Pass
0.5206	13	11	84	Pass
0.5312	12	11	91	Pass
0.5419	10	11	110	Pass
0.5525	10	11	110	Pass
0.5631	10	9	90	Pass
0.5737	10	9	90	Pass
0.5843	9	9	100	Pass
0.5949	9	8	88	Pass
0.6055	8	8	100	Pass
0.6161	8	7	87	Pass
0.6267	8	6	75	Pass
0.6373	5	5	100	Pass
0.6480	5	5	100	Pass
0.6586	5	4	80	Pass
0.6692	5	4	80	Pass
0.6798	5	4	80	Pass
0.6904	5	4	80	Pass
0.7010	5	4	80	Pass
0.7116	5	4	80	Pass

0.7222	4	4	100	Pass
0.7328	4	4	100	Pass
0.7434	4	2	50	Pass
0.7541	4	2	50	Pass
0.7647	4	2	50	Pass
0.7753	4	1	25	Pass
0.7859	4	1	25	Pass
0.7965	4	1	25	Pass
0.8071	4	1	25	Pass
0.8177	4	1	25	Pass
0.8283	4	0	0	Pass
0.8389	4	0	0	Pass
0.8495	3	0	0	Pass
0.8602	3	0	0	Pass
0.8708	3	0	0	Pass
0.8814	3	0	0	Pass
0.8920	2	0	0	Pass
0.9026	2	0	0	Pass
0.9132	2	0	0	Pass
0.9238	2	0	0	Pass
0.9344	2	0	0	Pass
0.9450	2	0	0	Pass
0.9556	2	0	0	Pass
0.9663	2	0	0	Pass
0.9769	2	0	0	Pass
0.9875	2	0	0	Pass
0.9981	2	0	0	Pass
1.0087	2	0	0	Pass
1.0193	2	0	0	Pass
1.0299	2	0	0	Pass
1.0405	2	0	0	Pass
1.0511	2	0	0	Pass
1.0617	2	0	0	Pass
1.0724	2	0	0	Pass
1.0830	2	0	0	Pass
1.0936	2	0	0	Pass
1.1042	2	0	0	Pass
1.1148	2	0	0	Pass
1.1254	2	0	0	Pass
1.1360	2	0	0	Pass
1.1466	2	0	0	Pass
1.1572	2	0	0	Pass
1.1678	2	0	0	Pass
1.1785	2	0	0	Pass
1.1891	2	0	0	Pass
1.1997	2	0	0	Pass
1.2103	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

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------->***
<-ID->                                                               ***
WDM        26   2025-11-11- Vault.wdm
MESSU      25   Pre2025-11-11- Vault.MES
           27   Pre2025-11-11- Vault.L61
           28   Pre2025-11-11- Vault.L62
           30   POC2025-11-11- 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 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->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre-Developed Basin***
PERLND  10                       4.721     COPY   501     12
PERLND  10                       4.721     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    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
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   2025-11-11- Vault.wdm
MESSU      25   Mit2025-11-11- Vault.MES
           27   Mit2025-11-11- Vault.L61
           28   Mit2025-11-11- Vault.L62
           30   POC2025-11-11- Vault1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      14
      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
    #    # 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
  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 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  14                       0.689     RCHRES   1      2
PERLND  14                       0.689     RCHRES   1      3
IMPLND   2                       0.791     RCHRES   1      5
IMPLND   4                       0.548     RCHRES   1      5

******Routing******
PERLND  14                       0.689     COPY     1     12
IMPLND   2                       0.791     COPY     1     15
IMPLND   4                       0.548     COPY     1     15
PERLND  14                       0.689     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 NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

  HYDR-PARM1
```

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    4
     Depth      Area    Volume  Outflow1 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  0.048280
  0.133333  0.029844  0.003979  0.068279
  0.200000  0.029844  0.005969  0.083624
  0.266667  0.029844  0.007958  0.096561
  0.333333  0.029844  0.009948  0.107958
  0.400000  0.029844  0.011938  0.118263
  0.466667  0.029844  0.013927  0.127738
  0.533333  0.029844  0.015917  0.136558
  0.600000  0.029844  0.017906  0.144841
  0.666667  0.029844  0.019896  0.152676
  0.733333  0.029844  0.021886  0.160128
  0.800000  0.029844  0.023875  0.167249
  0.866667  0.029844  0.025865  0.174078
  0.933333  0.029844  0.027854  0.180649
  1.000000  0.029844  0.029844  0.186990
  1.066667  0.029844  0.031833  0.193122
  1.133333  0.029844  0.033823  0.206052
  1.200000  0.029844  0.035813  0.216938
  1.266667  0.029844  0.037802  0.226072
  1.333333  0.029844  0.039792  0.234402
  1.400000  0.029844  0.041781  0.242209
  1.466667  0.029844  0.043771  0.249627
  1.533333  0.029844  0.045761  0.256736
  1.600000  0.029844  0.047750  0.263584
  1.666667  0.029844  0.049740  0.270209
  1.733333  0.029844  0.051729  0.276637
  1.800000  0.029844  0.053719  0.282889
  1.866667  0.029844  0.055709  0.288983
  1.933333  0.029844  0.057698  0.294931
  2.000000  0.029844  0.059688  0.300747
  2.066667  0.029844  0.061677  0.309750
  2.133333  0.029844  0.063667  0.316699
  2.200000  0.029844  0.065657  0.323221
  2.266667  0.029844  0.067646  0.329478
  2.333333  0.029844  0.069636  0.335534
  2.400000  0.029844  0.071625  0.341426
  2.466667  0.029844  0.073615  0.347177
  2.533333  0.029844  0.075605  0.352802
  2.600000  0.029844  0.077594  0.358314
  2.666667  0.029844  0.079584  0.363723
  2.733333  0.029844  0.081573  0.369036
```

```
  2.800000  0.029844  0.083563  0.374260
  2.866667  0.029844  0.085552  0.379400
  2.933333  0.029844  0.087542  0.384462
  3.000000  0.029844  0.089532  0.389449
  3.066667  0.029844  0.091521  0.394366
  3.133333  0.029844  0.093511  0.399216
  3.200000  0.029844  0.095500  0.404002
  3.266667  0.029844  0.097490  0.408727
  3.333333  0.029844  0.099480  0.413393
  3.400000  0.029844  0.101469  0.418003
  3.466667  0.029844  0.103459  0.422559
  3.533333  0.029844  0.105448  0.427063
  3.600000  0.029844  0.107438  0.431518
  3.666667  0.029844  0.109428  0.435924
  3.733333  0.029844  0.111417  0.440283
  3.800000  0.029844  0.113407  0.444597
  3.866667  0.029844  0.115396  0.448868
  3.933333  0.029844  0.117386  0.453097
  4.000000  0.029844  0.119376  0.457285
  4.066667  0.029844  0.121365  0.461433
  4.133333  0.029844  0.123355  0.465543
  4.200000  0.029844  0.125344  0.469615
  4.266667  0.029844  0.127334  0.473652
  4.333333  0.029844  0.129324  0.477652
  4.400000  0.029844  0.131313  0.481619
  4.466667  0.029844  0.133303  0.485552
  4.533333  0.029844  0.135292  0.489452
  4.600000  0.029844  0.137282  0.493321
  4.666667  0.029844  0.139272  0.497159
  4.733333  0.029844  0.141261  0.500966
  4.800000  0.029844  0.143251  0.504745
  4.866667  0.029844  0.145240  0.508494
  4.933333  0.029844  0.147230  0.512215
  5.000000  0.029844  0.149219  0.515909
  5.066667  0.029844  0.151209  0.701810
  5.133333  0.029844  0.153199  1.032879
  5.200000  0.029844  0.155188  1.434508
  5.266667  0.029844  0.157178  1.848501
  5.333333  0.029844  0.159167  2.217454
  5.400000  0.029844  0.161157  2.497562
  5.466667  0.029844  0.163147  2.679371
  5.533333  0.029844  0.165136  2.844704
  5.600000  0.029844  0.167126  2.987704
  5.666667  0.029844  0.169115  3.123123
  5.733333  0.029844  0.171105  3.252071
  5.800000  0.029844  0.173095  3.375410
  5.866667  0.029844  0.175084  3.493826
  5.933333  0.029844  0.177074  3.607877
  6.000000  0.029844  0.179063  3.718020
  6.066667  0.029844  0.181053  3.824638
  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

Disclaimer

Legal Notice

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Appendix B – Geotechnical Engineering Study

GEOTECHNICAL ENGINEERING REPORT

Johnson Residential Development
Parcel Numbers:
232601-4-001-2009, 242601-3-003-2008,
and 252601-2-047-2007
Poulsbo, Washington

Prepared for: Montebanc Management, LLC

Project No. AS240561-02 • February 13, 2025 FINAL

earth + water

Aspect
A Geosyntec Company

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GEOTECHNICAL ENGINEERING REPORT

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Aspect Consulting

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1 Introduction

This report summarizes Aspect Consulting, a Geosyntec company's, (Aspect) 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; Figure 1). We performed our services in accordance with our agreed upon scope of work dated November 22, 2024, and authorized by you on December 18, 2024.

1.1 Scope of Services

The purpose of this study is to provide information concerning the distribution and characteristics of subsurface soils and groundwater conditions, to assess the geologic hazards present at and near the Site, and to present geotechnical engineering design recommendations for the proposed residential development. The results of our explorations, analysis, conclusions, and recommendations presented in this report include the following:

- Site and Project description.
- Distribution and characteristics of subsurface soils and groundwater.
- Geologic hazards assessment.
- Seismic design criteria in accordance with the current version of the International Building Code (IBC) with Washington State amendments as adopted by the City of Poulsbo (City).
- Suitable foundation types, anticipated settlements, and associated design criteria including allowable soil-bearing pressures, settlement estimates, and basement or slab-on-grade considerations.
- Lateral earth pressures for design of residential basement and exterior site retaining walls up to 8 feet in height.
- General Site earthwork considerations, including
  - Evaluation of the on-Site soils for use as structural fill;
  - Temporary and permanent slope inclinations;
  - Structural fill materials and preparation; and
  - Wet weather/wet conditions considerations.
- General stormwater recommendations.

A vicinity map (Figure 1), a site exploration plan showing the locations of the explorations (Figure 2), exploration logs (Appendix A), and geotechnical laboratory testing results (Appendix B) are provided as attachments to this report.

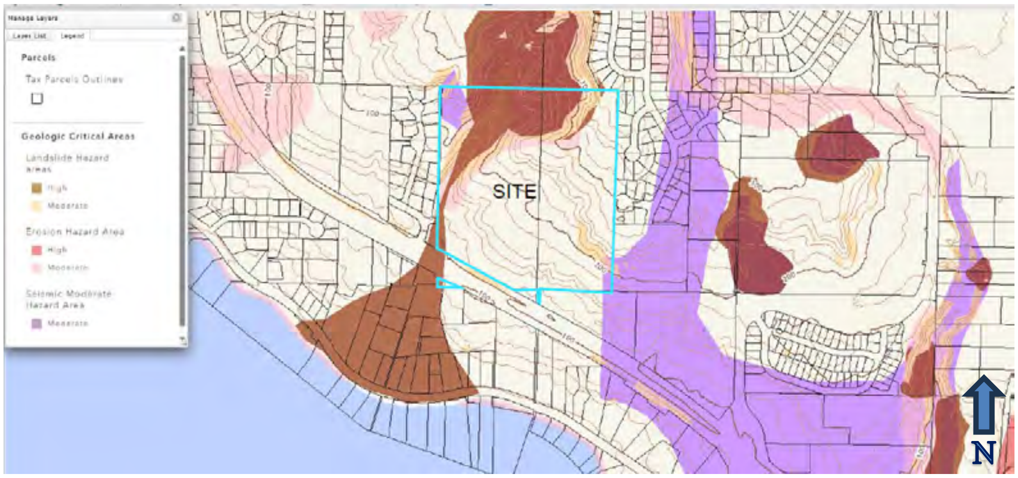
1.2 Project Description

This project will include the construction of a new residential development with 80 to 90 residences and associated infrastructure at the Site. Based on current Project plans, site development will involve approximately 110,000 cubic yards of cut and 148,380 cubic yards of fill (ESM, 2024).

The County's geologic hazard map designates four hazards on the Site (Graphic 1 below):

- High landslide hazard, defined as steeper than 30 percent slopes
- Moderate landslide hazard, defined as slopes between 15 to 30 percent
- A moderate erosion hazard
- A moderate seismic hazard

The high and moderate landslide hazards and erosion hazard are mapped along a roughly north-to-south trending ravine trending from the northwest to the southwest portion of the Site. The moderate erosion hazard is in the northwest portion of the Site. The moderate seismic hazard is mapped in the northwest corner of the Site. Moderate slopes are also mapped on slopes in the southeast portion of the Site. The Site is not mapped as or within the zone of influence (300 feet) of a liquefaction hazard or fault zone.



Graphic 1. *County Geologic Hazards Map (County, 2024)*

The City's standard buffer is 25 feet from the top, toe, and all edges of geologically hazardous areas and areas of geologic concern, unless otherwise specified.

2 Surface Conditions

Aspect conducted a geologic reconnaissance on November 21, 2024, and January 2 and January 3, 2025, we observed visible geologic features such as the slope configuration and the presence of outcrops, seeps, scarps, cracks, and springs. To supplement our field observations, we reviewed County geohazards maps; County parcel maps and information; geologic maps; geomorphic maps; Light Detection and Ranging (LiDAR) studies and images; current and historical aerial photographs, oblique coastal photographs, and topographic maps; and nearby subsurface exploration logs. The following sections discuss the results of our assessment.

2.1 Site Conditions

The Site consists of three undeveloped parcels: 232601-4-001-2009, 242601-3-003-2008, and 252601-2-047-2007. The west parcel (232601-4-001-2009) is approximately 19 acres and measures 1,300 feet north to south and 660 feet east to west, with State Highway 305 crossing through the southwest corner of the parcel. The east parcel (242601-3-003-2008) is approximately 15 acres and measures approximately 1,300 feet north to south and 440 feet east to west and is north of State Highway 305. The south property (252601-2-047-2007) is about 0.03 acres and measures approximately 90 feet north to south and 15 feet east-to-west (County, 2025). The Site is accessed on the east side from Crystallia Court NE. The Site contains an unpaved trail system constructed with cut slopes and graded paths (Photograph 1).

2.2 Topography

The Site generally slopes down from the northeast to the southwest, with an overall change in elevation of about 240 feet and an average inclination of 16 percent (9 degrees). A ravine drainage runs from north to south on the west side of the Site, with the western slopes of the drainage measuring about 100 feet high with a measured inclination of 35 degrees (70 percent), and eastern slope measuring about 100 feet high with a measured inclination of about 25 degrees (46 percent). The Site contains several smaller slopes that are oriented roughly northeast to southwest.

2.3 Drainage

We observed areas of standing water in the ravine drainage along the west side of the Site, and areas of very saturated soils along the southern property boundary (Photograph 2). We noted several 6-inch-diameter, smooth-walled plastic pipes running underneath portions of the trail system that moved water downslope. Surface drainage conditions, as well as groundwater conditions at the Site, will vary with fluctuations in precipitation, Site usage (such as irrigation), and off-Site land use.

Photograph 1. *Unpaved trail at the Site, view to the east.*

Photograph 2. *Area of standing water in the southwest portion of the Site, north of State Highway 305, view to the north.*

2.4 Vegetation

The Site is generally vegetated with mature evergreens up to 40 inches diameter at breast height, young to mature alder, fern, and woody underbrush. Limited numbers of evergreens located on the slopes had slight trunk curvature, indicating some soil movement over time (Photograph 3). The central and southern portion of the Site and within the ravine drainage along the west side of the Site is vegetated with young to mature alder, dense understory of blackberry, and woody underbrush (Photograph 4). We observed horsetail in the south portion of the Site, indicating the presence of saturated soils. Within the ravine drainage in the northwest portion of the Site we observed tilted and downed alders.

Photograph 3. *Vegetation at the Site, view to the south.*

Photograph 4. *Vegetation in the southern portion of the Site, view to the north.*

3 Subsurface Conditions

A description of the subsurface conditions at the Site is provided in the following sections based on a review of published geologic maps, publicly available well logs near the Site, nearby subsurface explorations by others, our experience with the local geology, and our own subsurface explorations.

3.1 Geologic Mapping

The Site is located within the geologic area known as the Puget Lowland, east of Liberty Bay in Poulsbo, Washington. The Puget Lowland is a complex tectonic environment, and an area of subsidence flanked by two mountain ranges—the Cascades to the east, and the Olympics to the west. The sediments within the Puget Lowland result from repeated cycles of glacial and non-glacial deposition and erosion. The most recent, the Vashon Stade of the Fraser Glaciation (about 13,000 to 16,000 years ago), is responsible for most of the present day geologic and topographic conditions. During the Vashon Stade, the Cordilleran Glacier advanced southward into the Puget Lowland, depositing lacustrine and fluvial sediments in front of the glacier. Pre-glacial and proglacial sediments were overridden and consolidated by the advancing glacier, creating dense and hard soil deposits. At the interface between the advance soils and the glacial ice, the Cordilleran Glacier sculpted and smoothed the surface, and then deposited a consolidated basal till. As the glacier retreated northward to British Columbia, it left an unconsolidated sediment veneer over glacially consolidated deposits. Unconsolidated recessional and post-glacial alluvial and mass-wasting soils have since accumulated in various locations across the landscape.

The geologic map indicates the Site is underlain by Quaternary Vashon till, described as a diamict of dense to very dense silt, sand, gravel, cobbles, and boulders that were deposited directly under the glacial ice (Polenz et al, 2013).

Pre-Vashon silt (Qpf) is mapped at the head of the ravine in the higher-elevation northwest corner of the Site. Pre-Vashon silt is described as gray or brown, compact, silty, and clay with some sand and rare dropstones, generally thought to be glaciolacustrine but may include non-glacial deposits. Glaciolacustrine is material deposited in a lake environment; however, it has been directly over-ridden by a glacier causing it to be over consolidated.

Pre-Vashon drift (Qpd) is mapped at the lower-elevation ravine bottom; it is described as a till deposit, similar to the Vashon till but associated with a different, older glacial advance.

Although not mapped, human-placed fill and colluvium could be present at the Site. Fill is human-placed materials that is often found in developed areas and can be highly variable. Fill was likely created when the trail system was constructed. Colluvium is often present on and at the base of steep slopes. Colluvium is generally loose to medium dense soil that mantles the slope surface due to accumulating soil creep, slope wash, and sloughing.

3.2 Subsurface Investigation

On January 2 and 3, 2025, Aspect oversaw the advancement of 14 test pits, designated ATP-01 through ATP-14, terminated between 10 and 13 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.

3.3 Stratigraphy

Below forest duff and topsoil, we encountered Vashon recessional outwash (Qgo) in test pits in the northeast portion of the Site. 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.

On the remainder of the Site, we 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.

3.3.1 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 1.5 feet bgs. The topsoil consisted of loose[1], dark brown silt (ML)[2] with sand, abundant wood debris, and roots.

3.3.2 Vashon Recessional Outwash

Underlying the topsoil in test pits ATP-05, ATP-08, ATP-09, ATP-11, ATP-12, and ATP-14, Vashon recessional outwash was encountered. Test pits ATP-08, ATP-09, ATP-12, and ATP-14 were terminated in this material, 10 and 13 feet bgs. The recessional outwash consisted of medium dense, moist, gray brown, sand with silt, gravel and cobbles (SP-SM), silty sand with gravel and cobbles (SM), and gravel with sand and cobbles (GP).

3.3.3 Pre-Vashon Fines: Glaciolacustrine Deposits

Underlying the Vashon recessional outwash in test pits ATP-05 and ATP-11, glaciolacustrine deposits were encountered 9 and 4 feet bgs, respectively. Underlying topsoil in test pits ATP-01 through ATP-04, ATP-06 and ATP-07, ATP-10, and ATP-13, glaciolacustrine deposits were encountered. 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 Site. The deposit consisted of medium dense to dense, sand with silt (SM) and silt with sand (SM) with varied degrees of weathering.

---

[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).

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

Table 1. Geologic Units Encountered

Exploration Number	Depth of Topsoil (feet bgs)	Depth of Vashon Recessional Outwash (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)	Ground Surface Elevation[1]
ATP-01	0-1	NE	1-4	4-12	12-13	13	125
ATP-02	0-1	NE	1-4	4-12	NE	12	130
ATP-03	0-1.5	NE	1.5-4	4-9	9-12.5	12.5	180
ATP-04	0-1.5	NE	1.5-5	5-10	NE	10	165
ATP-05	0-2	2-9	NE	9-12	12-13	13	160
ATP-06	0-3	NE	NE	3-5	5-13	13	180
ATP-07	0-1.5	NE	1.5-4	4-10	10-11.5	11.5	195
ATP-08	0-1.5	1.5-12	NE	NE	NE	12	335
ATP-09	0-1.5	1.5-10	NE	NE	NE	10	260
ATP-10	0-1	NE	NE	4-12.5	NE	12.5	240
ATP-11	0-1.5	1.5-4	NE	4-8	8-13	13	210
ATP-12	0-1.5	1.5-13	NE	NE	NE	13	290
ATP-13	0-1	NE	1-5.5	5.5-12	NE	12	265
ATP-14	0-1.5	1.5-12	NE	NE	NE	12	260

Notes:

1. Elevations from LiDAR (Kitsap County Opsw, 2018). NAVD88 refers to North American Vertical Datum of 1988.
2. bgs= below ground surface

3.4 Groundwater

We encountered groundwater seepage in test pits ATP-02, ATP-05 to ATP-06, ATP-09 and ATP-14 between 2 and 7 feet bgs, as shown in Table 2 below. 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.

Table 2. Groundwater Seepage

Exploration Number	Depth to Groundwater Seepage (feet bgs)	Elevation of Groundwater (feet[1])
ATP-02	2.5	126.5
ATP-05	2	140
ATP-06	2	178
ATP-09	7	262
ATP-14	2	253

Notes:

1. Elevations from LiDAR (Kitsap County Opsw, 2018). NAVD88 refers to North American Vertical Datum of 1988.
2. Groundwater seepage is not related to the groundwater table, it is representative of a perched groundwater condition.
3. Bgs = below ground surface

3.5 Laboratory Testing Results

Geotechnical laboratory tests were conducted on select samples to characterize engineering and index properties. Two grain size distributions and three 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 3. Summary of Particle Size Analysis Results and Moisture Content

Exploration Number	Sample Depth (feet bgs)	Percent Gravel	Percent Sand	Percent Fines	Moisture Content (percent)	USCS[2]	Geologic Unit
ATP-01	2	NT[1]	NT	75	35	SM	Highly weathered glaciolacustrine deposits
ATP-03	12	NT	NT	87	27	SM	Glaciolacustrine deposits
ATP-08	4	62.2	34.6	4.7	4.6	GP	Vashon Recessional Outwash
ATP-09	4	0	60.8	39.2	30.2	SM	Vashon Recessional Outwash
ATP-10	10	NT	NT	85	25.6	SM	Weathered Glaciolacustrine deposits

Notes:

1. NT – Not tested
2. SM – Silty sand
3. GP – Clean gravel
4. USCS – Unified Soils Classification System

4 Geologic Hazard and Associated Design Considerations

The following sections describe the mapped and observed geologic hazards at the Site and the design considerations associated with those hazards.

4.1 Seismic Hazards

The Site is located within the Puget Lowland physiographic province, an area of active seismicity that is subject to earthquakes on shallow crustal faults and deeper subduction zone earthquakes. The Site area lies about 7 miles northwest of the Seattle fault zone, which consists of shallow crustal tectonic structures that are considered active (evidence for movement within the Holocene [since about 15,000 years ago]) and is believed to be capable of producing earthquakes of magnitude 7.3 or greater. The recurrence interval of earthquakes on this fault zone is believed to be on the order of 1,000 years or more. The most recent large earthquake on the Seattle fault occurred about 1,100 years ago (Pratt et al., 2015). There are also several other shallow crustal faults in the region capable of producing earthquakes and strong ground shaking.

The Site also lies within the zone of strong ground shaking from earthquakes associated with the Cascadia Subduction Zone (CSZ). Subduction zone earthquakes occur due to rupture between the subducting oceanic plate and the overlying continental plate. The CSZ can produce earthquakes up to magnitude 9.3 and the recurrence interval is thought to be on the order of about 500 years. A recent study estimates the most recent subduction zone earthquake occurred around 1700 (Atwater et al., 2015).

Deep intraslab earthquakes, which occur from tensional rupture of the sinking oceanic plate, are also associated with the CSZ. An example of this type of seismicity is the 2001 Nisqually earthquake. Deep intraslab earthquakes typically are magnitude 7.5 or less and occur approximately every 10 to 30 years.

The following sections present descriptions of seismic design considerations for the Project.

4.1.1 Ground Response

Seismic design of the planned residences will likely be in accordance with the 2018 International Building Code (ICC, 2018), which references the American Society of Civil Engineers (ASCE) Standard ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures (ASCE, 2017) for seismic design. Supplements 1, 2, and 3 to ASCE/SEI 7-16 (ASCE, 2018; ASCE, 2021a and ASCE, 2021b) should be referenced where applicable per Washington State Building Code Council Emergency Rule WSR 22-11-010 (WSR 22-11-010; WA Building Code, 2022). In accordance with these codes, the seismic design will consider a “Maximum Considered Earthquake” (MCE) ground motion with a 2 percent probability of exceedance in 50 years, or a return period of 2,475 years.

The effects of Site-specific subsurface conditions on the MCE ground motion at the ground surface are determined based on the “Site Class.” The Site Class can be correlated to the average standard penetration resistance (N-value), average shear wave velocity, or average undrained strength (for fine-grained soils) in the upper 100 feet of the soil profile. Based on density of the glaciolacustrine deposits, we conclude the soil profile for the residences gaining support from this deposit can be classified as Site Class C (Very Dense Soil and Soft Rock).

The spectral response acceleration parameters adjusted for Site Class C in accordance with the 2018 IBC and ASCE/SEI 7-16 and its supplements are presented in Table 4 for the MCE.

Table 4. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	C – Very Dense Soil and Soft Rock
Peak Ground Acceleration (PGA)	0.576g(1)
Short Period Spectral Acceleration (S_S)	1.374g
1-Second Period Spectral Acceleration (S_1)	0.485g
Site Coefficient (F_a)	1.200
Site Coefficient (F_v)	1.500(2)
Design Short Period Spectral Acceleration (S_{DS})	1.099g
Design 1-Second Period Spectral Acceleration (S_{D1})	0.485g

Notes:

1. g = gravitational force.
2. Based on the latitude and longitude of the Site: 47.724333°N, 122.625457°W, World Geodetic System 1984 (WGS84).
3. The risk category used was II, residential use.
   Based on the ASCE online hazard tool (ASCE, 2025).

4.1.2 Surficial Ground Rupture

A trace of an east-west trending thrust fault zone (Seattle fault zone) projects through the middle of Bainbridge Island, with the nearest known active fault trace (an unnamed fault) located approximately 6.7 miles south of the Site (USGS, 2010). Due to the suspected long recurrence interval and the proximity of the Site to the mapped fault trace, the potential for surficial ground rupture at the Site is considered low during the expected life of the Project and is not a design consideration.

4.1.3 Liquefaction

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength from earthquake shaking. The primary factors controlling the onset of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soil, *in situ* stress conditions, and the depth to groundwater.

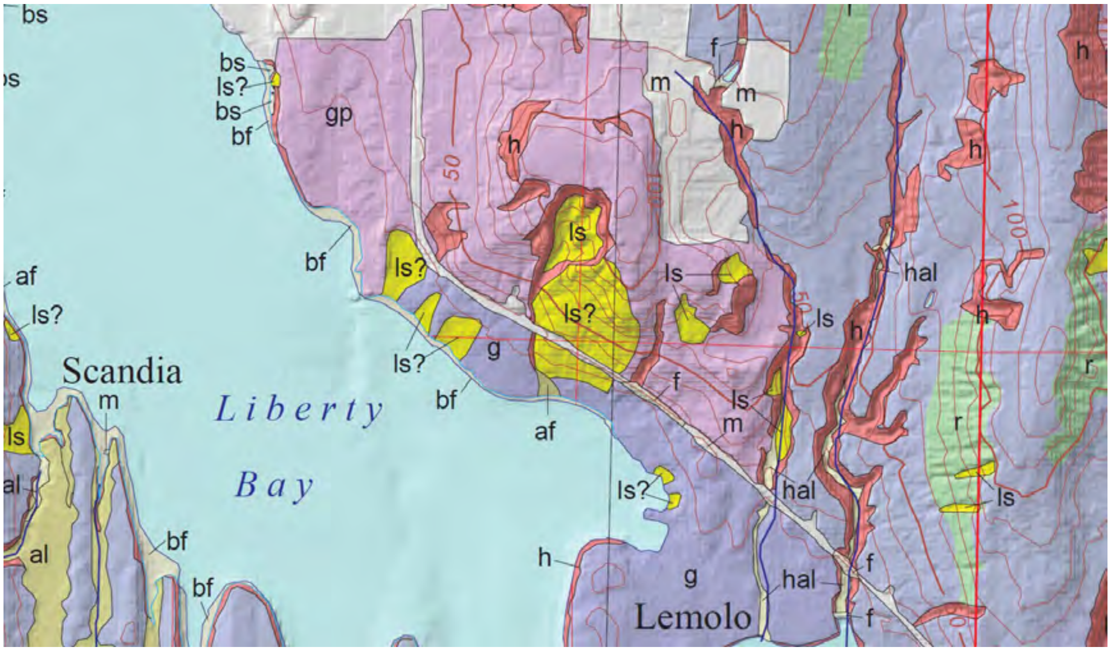
The pre-Vashon deposits underlying the Site are fine-grained and glacially over-ridden; therefore, not susceptible to soil liquefaction. Liquefaction is not a design consideration for the Project.

4.2 Landslide Hazards

Two types of landslides are common on similar inland slopes: deep-seated rotational landslides and surficial landslides (Varnes, 1978). These types of landslides are described in further detail in the following subsections. Landslides may be triggered by natural causes such as precipitation, or an earthquake, or by man-made features, such as broken water pipes or improperly managed stormwater flow.

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

- The Site 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 the Site may be a landslide (ls?), meaning it may be a surface of a deep-seated landslide as indicated by uphill scarps, bulbous toes and a position in hillslope hollows (Graphic 2 below; Haugerud, 2009).
- Aspect reviewed the newest publicly available LiDAR data for the Site and surrounding area (DNR, 2018), which shows bowl-shaped topography and hummocky terrain in the northwest portion of the Site, which may indicate a historic landslide in the ravine but lacks the surface roughness to indicate recent slide activity southeast of this area on the Site.
- We reviewed coastal aerial photographs (Ecology, 2025) and aerial photographs (Google, 2025 and NETR, 2025) of the Site area from 1951 through 2024 and did not observe any loss of vegetation at the Site that would suggest recent slope movement.



Graphic 2*.Geomorphic Map Indicating a Possible Deep-Seated, Rotational Landslide (Haugerud, 2009)*

4.2.1 Deep Seated Rotational Landslides

Rotational landslides consist of deep-seated failures that typically involve slip along a curved shear plane. Rotational landslides may transport large masses of semi-intact soil downslope, resulting in alternating steep headscarps along the upper portion of the failure plane, with more gently sloping benches composed of displaced soil.

The north- and northwest-facing slopes of the ravine in the northwest portion of the Site have indicators of slope movement, including bowl-shaped topography, hummocky terrain, and tilted and downed trees. If these are landslide areas, the failures would occur to the north and northwest, at least 100 feet from the area of planned development. It is our opinion a 100-foot setback distance from the top of the slope will be adequate for the planned development.

4.2.2 Surficial Landslides

Surficial landslides are also commonly referred to as shallow flows or colluvial landslides. They consist of relatively shallow failures that typically involve sliding of the loose colluvial soil and overlying vegetation that typically mantle steep slopes. Surficial landslides are typically triggered by a significant increase in the moisture content within the upper soil layer of a slope and commonly result from periods of extended or heavy precipitation, groundwater seepage, or concentrated surface water discharge onto a slope.

Surficial landslides can also occur over time in a process called ‘creep,’ in which surficial soils slowly move downslope. Surface creep is typically evidenced by curvatures in shade-intolerant trees on the slope. Shallow flows occur within the upper several feet of a slope and typically do not extensively affect the deep-seated or overall stability of a slope.

We observed few evergreens with slight trunk curvature on the Site slopes, which may indicate surface creep. Surficial failures along the Site slope would likely be limited to the outer weathered soils and would not affect the overall slope stability.

4.3 Erosion Hazards

The County maps an erosion hazard within the ravine drainage in the northwestern portion of the Site. Erosion hazards indicate areas where accelerated erosion may occur based on factors including soil type, condition and steepness of slope, proximity to shoreline, and vegetative cover. The erosion risk increases on sloped areas, whether natural or excavated during construction.

Based on our observation of the Site and subsurface conditions, it is our opinion that the erosion hazard at the Site is high but can be adequately managed with standard temporary erosion and sedimentation control (TESC) and best management practices (BMPs) during construction. After construction, permanent erosion control methods, including revegetating the Site with native vegetation, can be implemented.

5 Conclusions and Recommendations

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

Based on current Project plans, site development will involve approximately 110,000 cubic yards of cut and 148,380 cubic yards of fill (ESM, 2025). A qualified and highly experienced earthworks Contractor will be needed for the movement of the soil throughout the Project.

5.1 Geologically Hazardous Area Considerations

Four geologic hazards are mapped on and within the area of influence of the Site including: high landslide hazard, moderate landslide hazards, moderate erosion hazards, and a moderate seismic hazard (Graphic 1). The high landslide hazard, moderate erosion hazard, and the moderate seismic hazard are all located in the northwest corner of the Site, in a ravine area with a mapped non-fish habitat watercourse at the base. No development is planned on or within 100 feet of these mapped hazards. Based on our data review, reconnaissance, subsurface explorations, and our understanding of the Project, no additional setbacks are recommended.

A limited area of moderate landslide hazard, defined as slopes between 15 to 30 percent, are mapped near the southeast corner of the Site. We do not recommend a setback from this area.

5.2 Foundations

Based on the results of our subsurface explorations, shallow foundations or spread footings may be used for building support. Bearing surfaces for the footings should be prepared as described in Section 6.2, Site Preparation. Foundations should be placed on medium dense or better native soil, generally located 2 to 4 feet bgs.

5.2.1 Shallow Foundations

For shallow foundations bearing on medium dense or better, native, relatively undisturbed, and suitably prepared Vashon recessional outwash, weathered glaciolacustrine, and unweathered glaciolacustrine deposits, we recommend an allowable foundation bearing pressure of 2,500 pounds per square foot (psf) be utilized for design purposes, including both dead and live loads for the planned structures. This same bearing pressure can be used for structural fill compacted to a minimum of 95 percent maximum dry density (MDD; ASTM D1557; ASTM, 2022) This value may be increased by one-third (to 3,300 psf) for short-term wind or seismic loading. Perimeter footings should be buried at least 18 inches into the surrounding soil for frost protection; interior footings require only 12 inches burial below adjacent interior finished grade. No footing should be founded in or above yielding/loose or organic soils.

Assuming construction is accomplished as recommended above, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soils of less than

0.5 inches for the anticipated foundation loads. We anticipate that most of the estimated settlement will occur during construction, effective immediately after loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the planned residence to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structures.

An allowable coefficient of friction of 0.35 may be assumed along the interface between the base of the footing and subgrade soils. An allowable passive earth pressure of 400 pounds per cubic foot (pcf) may be assumed for soils adjacent to footings or other below-grade elements and accounting for nearby sloping ground conditions. The upper 1 foot of passive resistance should be neglected in design. The recommended coefficient of friction and passive pressure values include a factor of safety of 1.5 to limit deflection.

5.2.2 Slab-On-Grade Support

Slab-on-grade subgrade preparation should be completed in the same manner as shallow foundations described above in Section 5.2 (for foundations) except for interior slabs-on-grade beneath enclosed heated/air-conditioned interior spaces (such as those covered with flooring and carpet).

For interior slabs-on-grade, we recommend the uppermost 6 inches of the subgrade consist of compacted capillary break material (in lieu of 6 inches of crushed surfacing base course [CSBC]) to provide uniform support and moisture control. The capillary break material should consist of free-draining, clean, fine gravel, and coarse sand with a maximum particle size of about 1 inch and less than 3 percent material passing the U.S. No. 200 sieve by weight (fines). Angular material manufactured by crushing is preferred over rounded material such as bank run sand and gravel, to provide a subgrade surface that is not easily disturbed by workers laying steel rebar and concrete formwork. The capillary break material should be compacted to a relatively firm and unyielding condition and evaluated by Aspect prior to placement of steel rebar and formwork.

For building areas where moisture intrusion would be detrimental to the interior finished space (such as air-conditioned office areas that may be covered with flooring), consideration should be given to placement of a moisture protection barrier over the capillary break. Detailed design and performance issues with respect to moisture intrusion control as it relates to the interior environment of the structure are beyond the expertise of Aspect. Moisture protection barriers are specifically for moisture control and should not be confused with vapor barriers required for soil gas mitigation associated with naturally occurring gases (radon, methane) or gases related to environmental contamination (hydrocarbons, solvents, oils, volatile organic compounds). An environmental engineer and building envelope specialist or contractor should be consulted to address these issues, as needed.

For slabs-on-grade designed as a beam on elastic subgrade, we recommend using an initial vertical modulus (Kv1) of 200 pounds per cubic inch (pci) if bearing on the sequence of subgrade materials described above. The Kv1 value is appropriate for a 1-foot by 1-foot slab and needs to be adjusted based on the actual width (B) of the slab to a design vertical modulus (Ks) using the following equation below:

$K_s = K_{v1}(B+1)^2/(4B^2)$,

where B = slab width (in feet).

5.3 Wall Considerations

Low retaining walls, up to 10 feet in height, may be incorporated in the Project design to accommodate grade differentials across the Site. They may be incorporated as basement walls, stepped foundations, or retaining walls unassociated with a building.

Yielding walls, such as cantilever retaining walls, should be designed using a lateral earth pressure based on an equivalent fluid having a unit weight of 35 pcf, plus 1 pcf for each degree of backslope inclination. Nonyielding or restrained walls should be designed for an equivalent fluid weight of 55 pcf plus 1pcf for each degree of backslope inclination.

Walls should be backfilled with freely-draining sand and gravel and equipped with a footing drain to assure that hydrostatic pressures do not develop. Free-draining wall backfill material that meets the gradation requirements described in Section 9-03.12(2) of the Washington State Department of Transportation (WSDOT) Standard Specifications for Gravel Backfill for Walls (WSDOT, 2025), should be specified.

Earthquake shaking will subject retaining walls to a temporary additional earth pressure. We estimated the lateral seismic soil pressure increment using the Mononobe-Okabe method, with consideration of the possible backfill soil properties and MCE. We recommend an average seismic soil pressure increment of 10H (where H is the height of the wall) represented by a uniform rectangular pressure along the height of the wall.

For exterior Site retaining walls that are separate from new residence buildings, not more than 8 feet tall, and which are set back by at least 10 feet from a habitable structure, it is not necessary to design for incremental additional seismic soil pressure.

Over-compaction of the backfill behind walls should be avoided. In this regard, we recommend compacting the backfill to about 90 percent of the MDD (ASTM D1557; ASTM, 2022). Heavy compactors and large pieces of construction equipment should not operate within 5 feet of any embedded wall to avoid the buildup of excessive lateral pressures. Compaction close to the walls should be accomplished using hand-operated vibratory plate compactors.

Lateral forces that may be induced on the wall due to other surcharge loads should be considered by the structural engineer.

5.4 Stormwater Drainage Considerations

The presence of relatively impermeable glaciolacustrine deposits combined with our observations of surface water on the west side of the Site, concentrated stormwater infiltration is infeasible at the Site. We recommend stormwater management be accomplished using low impact development (LID) methods combined with conventional methods, including catch basins and storm drainpipes that discharge into an appropriate system. LID methods, such as small raingardens, bioswales, and dispersion, are feasible provided the systems incorporate underdrains and/or overflow redundancy to account for the low permeability and low-infiltration capacity of the Site soils.

Based on the current plans, a stormwater facility is located at the base of the Site, along the southern end near State Highway 305. This will allow all stormwater collections to gravity flow to the large facility. One test pit, ATP-02, was excavated near the west end of the facility and encountered 1 foot of topsoil underlain by about 4 feet of loose, silty with sand (ML), high-weathered, glaciolacustrine deposits underlain by about 8 feet of dense, silty with sand (ML), weathered glaciolacustrine deposits. Groundwater seepage was observed 2.5 feet bgs.

5.4.1 Foundation and Wall Drainage

Given the presence of designated wetlands in the low-lying ravine area in the northwest area of the Site, the sloping topography, and the presence of essentially impervious glacial till and glaciolacustrine deposits at the Site, foundation and wall drainage will be crucial.

The outside edges of all perimeter footings, and the upslope sides of all walls, should be provided with a drainage system consisting of 4-inch-diameter, perforated, rigid plastic pipe embedded in a clean, free-draining sand and gravel meeting the requirements of Section 9-03.12(4) of the WSDOT Standard Specifications for Gravel Backfill for Drains (WSDOT, 2025). The drainpipe and surrounding drain rock should be wrapped in filter fabric to minimize the potential for clogging and/or ground loss due to piping. A washed rock drain curtain at least 1-foot-thick should extend from the footing continuously upward to within 1 foot of the ground surface. A layer of low permeability soils should be used on the upper foot to reduce potential for surface water to enter these footing drains. The foundation drainage system should tie in with the permanent wall drainage systems and under-slab drainage system, if needed. The footing drains should include cleanouts to allow periodic maintenance and inspection.

Final grades around the proposed structures should be sloped such that surface water drains away from the structures. Water from hard surfaces should be collected and diverted to the stormwater outfall system. Roof drain downspouts should not be connected to the foundation drains and under-slab drains, in order to reduce the potential for clogging and flooding foundation drains.

6 Construction Considerations

Based on the explorations performed and our understanding of the Project, it is our opinion that the planned excavations can be completed with standard construction equipment. The topsoil and glaciolacustrine deposits contain a significant percentage of fines, making them moisture sensitive and subject to disturbance when wet. The topsoil contains significant amounts of organics, making it unsuitable for reuse as structural fill. Excavations of topsoil should be exported from the Site or used as landscaping fill.

The Vashon recessional outwash material encountered in the northern portion of the Site may be used for structural fill, as long as the density requirements are achieved. The contractor should anticipate the presence of potential obstructions, including possible cobbles and boulders.

Discussions about ways to reuse the glaciolacustrine deposits occurred at the time this report was prepared. An experienced Contractor would be required to successfully reuse the material and cement or kiln dust would likely be needed to treat the material if the soil moisture content were too high.

Fill placement and compaction could only be completed during the dry, summer months. If wet weather occurred, construction would be required to stop until dry conditions returned. A sheepsfoot roller would be used for compaction and benching on sloped areas would be required. An Aspect/Geosyntec representative would be required to observe the Contractors means and methods. A separate company would be required for frequent, in-place density testing.

We recommend that earthwork activities be specified in accordance with the following WSDOT Standard Specifications, except where specifically addressed in this report (WSDOT, 2025). Appropriate erosion control measures should be in accordance with Section 1-07.15, Temporary Water Pollution/Erosion Control, and should be implemented prior to beginning earthwork activities.

6.1 Wet Weather Earthwork

Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is above optimum and difficult to control, the following recommendations apply:

- Earthwork should be performed in small areas to minimize exposure.
- Excavation or removal of unsuitable soils should be followed promptly by the placement and compaction of the specified structural fill.
- The size, type, and access of construction equipment used may have to be limited to prevent soil disturbance.
- The ground surface within the construction area should be graded to promote runoff of surface water away from slopes and to prevent water ponding.

- The ground surface within the construction area should be properly covered and under no circumstances should be left uncompacted and/or exposed to moisture.
- Soils that become too wet for compaction should be removed and replaced with specified structural fill.
- Excavation and placement of fill should be observed by Aspect/Geosyntec to verify that all unsuitable materials are removed prior to placement, compaction requirements are met, and Site drainage is appropriate.
- Erosion and sedimentation control should be implemented in accordance with City requirements and BMPs.

6.2 Site Preparation

Site preparation within the proposed construction footprint should include removal of topsoil containing roots, organics, debris, and any other deleterious material. All soil with significant root debris, including the highly weathered glaciolacustrine deposits, should be removed from the planned foundations areas.

6.3 Structural Fill

Soils placed beneath or around foundations, walls, utilities, slabs-on-grade, or below pavements should be considered structural fill. For these fill areas, we provide the following recommendations:

- Structural fill to be used below foundations should consist of material meeting the requirements for Class A Gravel Backfill for Foundations, as described in Section 9-03.12(1)A of the WSDOT *Standard Specifications* (WSDOT, 2025). If desired, lean concrete or controlled density fill (CDF) can also be used as structural fill under foundations. If lean concrete is used, a 2-sack mix is recommended.
- The uppermost 6 inches of structural fill beneath slabs-on-grade should consist of capillary break consisting of free-draining, clean, fine gravel and coarse sand with a maximum particle size of 1 inch and less than 3 percent material passing the U.S. No. 200 sieve by weight (fines).
- Drain rock to surround footing and under-slab drainage pipes should consist of material meeting the requirements of Gravel Backfill for Drains as specified in Section 9-03.12(4) of the WSDOT *Standard Specifications*.
- Structural fill placed within 12 inches (behind) basement walls (if not cast directly against shoring) should consist of free-draining sand and gravel meeting the requirements for Gravel Backfill for Walls per WSDOT *Standard Specifications* Section 9-03.12(2), or similar locally available material approved by Aspect/Geosyntec.
- Structural fill to be used for general excavation backfill outside of the areas where materials are specified above should consist of material meeting the requirements for Gravel Borrow per WSDOT *Standard Specifications* Section 9-03.14(1).

6.3.1 Reuse of On-Site Soils as Structural Fill

The suitability of excavated Site soils for use as structural fill depends on the gradation and moisture content of the soil when it is placed. As the amount of fines (the portion passing through a No. 200 sieve) increases, the soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult to achieve. Soil containing more than about 5 percent fines typically cannot be consistently compacted to a dense, nonyielding condition when the moisture content is greater than about 3 to 4 percent above or below optimum. Kiln dust and cement can be added to soil with high moisture content to lower the moisture and to achieve the required compaction specifications. A pugmill mixing operation will need to be established to uniformly distribute the cement or kiln dust into the on-Site soil. An earthworks Contractor with experience in soil amendment will be needed if this is contemplated.

Aspect/Geosyntec and a separate company will be required for placement observations and in-place density testing. The amount of cement or kiln dust to add to the soil will be determined at the time of construction based on soil type, moisture content, and the contractor’s method(s) of mixing. Soil considered for use as structural fill must also be free of organic and other compressible materials.

The Vashon recessional outwash deposits may be used as structural fill provided the materials are screened to ensure they are relatively free of organics, cobbles, boulders, and other deleterious debris. Based on our explorations, the material is over optimum moisture content and would need to be moisture-conditioned in order to achieve adequate compaction.

6.3.2 Compaction

In general, suitable structural fill material for the Project is fill placed within 3 percent of its optimum moisture content per ASTM International (ASTM) Standard D1557 (modified Proctor test) that does not contain deleterious materials or particles larger than 3 inches in diameter (ASTM, 2022). Structural fill material should be compacted to a minimum of 95 percent of the MDD based on ASTM D1577. Structural fill adjacent to a wall should be compacted to a minimum of 90 percent of the MDD based on ASTM D1557.

The procedure to achieve the specified minimum relative compaction depends on the size and type of compacting equipment, the number of passes, thickness of the layer being compacted, and certain soil properties. When size of the excavation restricts the use of heavy equipment, smaller equipment can be used, but the soil must be placed in thin enough lifts to achieve the required compaction. A sufficient number of in-place density tests should be performed as the fill is placed to verify the required relative compaction is being achieved. The frequency of the in-place density testing can be determined at the time of construction when more details of the Project grading and backfilling plans are available and the Contractor has been selected.

Generally, loosely compacted soils are a result of poor construction technique or improper moisture content. Soils with a high percentage of silt or clay are particularly susceptible to becoming too wet, and coarse-grained materials easily become too dry, for proper compaction. Silty or clayey soils with a moisture content too high for adequate compaction should be dried, as necessary, or moisture conditioned by mixing with drier materials, or other methods. A sheepsfoot roller should be used with materials containing high percentages of silt and clay (materials passing the 200 sieve). A particle-size analysis, natural moisture content, and a proctor should be completed on the materials requiring compaction and density testing.

6.4 Temporary and Permanent Slopes

Maintenance of safe working conditions, including temporary excavation stability, is the sole responsibility of the contractor. All temporary cuts exceeding 4 feet in height that are not protected by trench boxes, or otherwise shored, should be sloped in accordance with Part N of Washington Administrative Code (WAC) 296-155 (WSL, 2019), as shown in Table 5 below.

Table 5. Temporary Excavation Cut Slope Recommendations

Soil Unit	WAC Soil Classification	Maximum Temporary Slope	Maximum Height (ft)
Topsoil, Fill	Type C	1.5H:1V[2]	12
Vashon Recessional Outwash, Highly-Weathered Glaciolacustrine Deposits, and Weathered Glaciolacustrine Deposits	Type C	1.5H:1V[2]	12
Glaciolacustrine Deposits	Type A	0.75H:1V	20

Notes:
1. H:V = Horizontal to Vertical

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. We recommend planning the construction schedule to have excavation occur during the summer months and to minimize the amount of time that the temporary slopes will be unsupported during construction. The contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly. Vibrations created by traffic and construction equipment may cause caving and raveling of the face of the temporary slopes. At no time should soil stockpiles, equipment, and other loads be placed immediately adjacent to an excavation.

The cut-slope inclinations provided here are for planning purposes only and are applicable to excavations without inflowing perched groundwater or runoff. The contractor shall be responsible for safe working conditions at the Site.

Permanent slopes for the Project should be no steeper than 2H:1V (horizontal:vertical).

7 Additional Project Design and Construction Monitoring

At the time of this report, site grading, structural plans, and construction methods were not finalized, and the recommendations presented herein are preliminary. We are available to provide additional geotechnical consultation as the Project design develops, and possibly changes, from that upon which this report is based. Additional explorations, testing, and assessments may be needed as the Project plans develop. The information and recommendations contained herein should be brought to the attention of the appropriate design team personnel and incorporated into the Project plans and specifications.

We recommend a pre-construction meeting be organized at the start of construction including you, your contractor, and Aspect/Geosyntec. During this meeting, we will understand the goals and schedule to be upheld during construction. We will also discuss effective lines of communication. The integrity of the Project and the overall Site 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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9 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, a Geosyntec company, (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.

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.

FIGURES

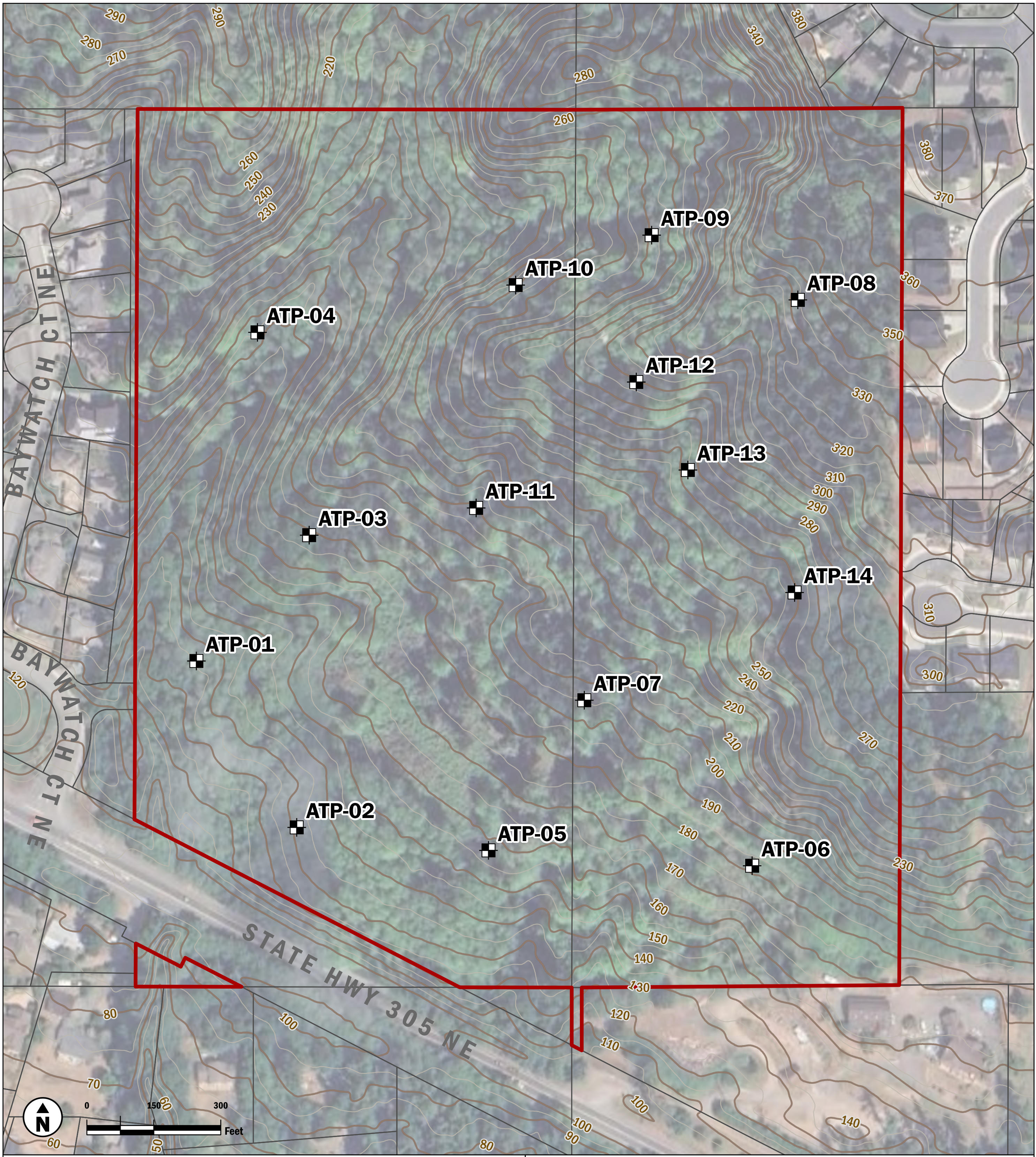
Vicinity Map

Geotechnical Engineering Report
Johnson Residential Development
State Route 305
Poulsbo, Washington

Aspect CONSULTING	JAN-2025	BY: AJD / HMD	FIGURE NO.
	PROJECT NO. 240561	REVISED BY: - - - / - - -	1

Data source credits: None || Basemap Service Layer Credits: County of Kitsap, King County, WA State Parks GIS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS, Esri, HERE, Garmin, USGS, EPA, County of Kitsap, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA

GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561\JohnsonProperty_240561.aprx 01 - Vicinity Map || User: haley.duran || Print Date: 1/14/2025



GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561.aprx: 02 - Site Exploration Plan | | User: haley.duran | | Print Date: 1/14/2025

- ⊞ Aspect Test Pit
- 🟥 Site Boundary
- ☐ Kitsap County Parcels
- ∿ Topo Contours 5ft
- ∿ Topo Contours 10ft

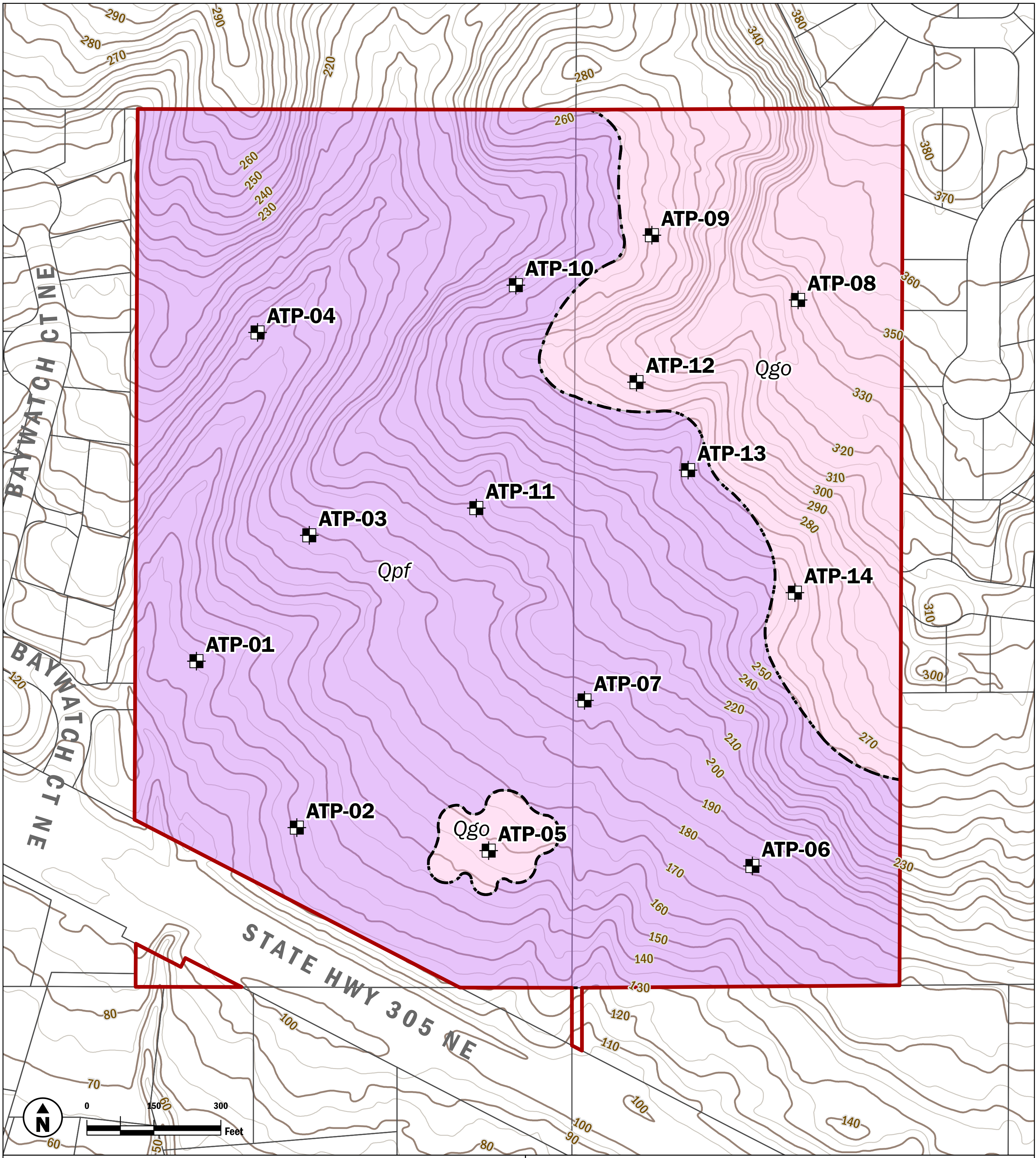
Topography Contours from Kitsap County

Site Exploration Plan

Geotechnical Engineering Report
Johnson Residential Development
State Route 305
Poulsbo, Washington

Aspect CONSULTING	JAN-2025	BY: AJD / HMD	FIGURE NO.
	PROJECT NO. 240561	REVISED BY: - - - / - - -	2

Data source credits: None | | Basemap Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561\JohnsonProperty_240561.aprx: 03 - Inferred Geologic Map || User: haley.duran || Print Date: 2/13/2025

■ Aspect Test Pit

▭ Site Boundary

▭ Kitsap County Parcels

Topo Contours 5ft

Topo Contours 10ft

Inferred Geologic Contact

▭ Vashon Recessional Outwash (Qgo)

▭ Glaciolacustrine Deposits,
part of the Pre-Vashon Fines Unit (Qpf)

Topography Contours from Kitsap County

Inferred Geologic Map

Geotechnical Engineering Report
Johnson Residential Development
State Route 305
Poulsbo, Washington

Aspect
CONSULTING

FEB-2025

PROJECT NO.
AS240561-02

BY:
AJD / HMD

REVISED BY:
- - - / - - -

FIGURE NO.
3

Data source credits: None || Basemap Service Layer Credits: NA

APPENDIX A

Subsurface Exploration Logs

A. Subsurface Explorations

On January 2 and 3, 2025, Aspect observed the excavation of 14 test pits, ATP-01 through ATP-14. The test pits were excavated by High Meadows Excavating, LLC., an experienced and local excavation contractor, under subcontract to Aspect. Test pits were excavated using a Zaxis 85 USB 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%[1] 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
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
			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
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			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
	Silts and Clays Liquid Limit 50% or More		MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			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.

GEOTECHNICAL LAB TESTS

MC = Natural Moisture Content
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

CHEMICAL LAB TESTS

Organic Chemicals

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)

FIELD TESTS

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

COMPONENT DEFINITIONS

Descriptive Term		***Size Range and Sieve Number***
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)

ESTIMATED[1] PERCENTAGE

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

MOISTURE CONTENT

Dry = Absence of moisture, dusty, dry to the touch
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

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		***SPT[2] 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"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		***SPT[2] 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
———	———	– – – – –

Exploration Log Key

AI Path: Q:_ACAD Standards\FIELD REFERENCE\MASTERS\Exploration Log Key-2018.ai // user: jinman // last saved: 12/31/2018

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7241, -122.6303 (est)	**ATP-01**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	125' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
							TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	124	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.					**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SANDY SILT (ML); medium dense, moist, light brown; non-plastic; fine to medium sand; roots up to 0.5 inches in diameter; iron-oxide staining.	1
2	123		S1			DCPT =3,8,8		2
3	122							3
4	121		S2	35 ●		DCPT =6,18,13 FC,MC FC=75%	**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); medium dense, moist, gray brown; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	4
5	120							5
6	119							6
7	118							7
8	117							8
9	116							9
10	115		S3					10
11	114							11
12	113		S4				**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, blue gray; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings.	12
13	112						Bottom of exploration at 13 ft. bgs. Note: No test pit caving observed.	13
14	111							14

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type: 🖐 Grab sample

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-01

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location	*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.	47.7234, -122.6297 (est)	**ATP-02**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	130' (est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	2.5' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	129	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); loose, very moist, light brown; non-plastic; fine to medium sand; trace woody debris and small roots; iron-oxide staining.	1
2	128								2
		♀ 1/2/2025						Groundwater seep at 2.5 feet bgs.	
3	127								3
4	126		✋ S1			DCPT =12,13,8		**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, light brown; low plasticity; fine to medium sand; trace, fine, subangular to subrounded gravel.	4
5	125								5
6	124								6
7	123								7
8	122								8
9	121								9
10	120		✋ S2						10
11	119								11
12	118							Bottom of exploration at 12 ft. bgs. Note: No test pit caving observed.	12
13	117								13
14	116								14

Legend

Sample Type
✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level
♀ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-02

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7246, -122.6297 (est)	**ATP-03**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	180' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	179	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
2	178							**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); medium dense, moist, light brown; non-plastic; fine to medium sand; fine to coarse, subangular to subrounded gravel; roots up to 2 inches in diameter; iron-oxide staining.	2
3	177					T-probe =5"			3
4	176		✋ S1			T-probe =3" FC,MC FC=87%		**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, light brown; low plasticity; fine to medium sand; 0.1- to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	4
5	175								5
6	174								6
7	173								7
8	172								8
9	171							**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, blue gray; low plasticity; fine to medium sand; 0.1- to 0.2-inch-thick fine sand (SP) partings.	9
10	170								10
11	169								11
12	168		✋ S2					Bottom of exploration at 12.5 ft. bgs. Note: No test pit caving observed.	12
13	167								13
14	166								14

Legend

Sample Type

✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level

No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-03

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location	Poulsbo, WA, See Figure 2.	*Coordinates (Lat,Lon WGS84)*	47.7255, -122.6295 (est)	*Exploration Number* ATP-04
Contractor	High Meadows Excavating, LLC	*Equipment*	Hitachi Zaxis 85B	
Sampling Method	Grab	*Ground Surface Elev. (NAVD88)*	165' (est)	
Operator	Dave Monsaas	*Exploration Method(s)*	Trackhoe	
Work Start/Completion Dates	1/2/2025	*Top of Casing Elev. (NAVD88)*	NA	
Depth to Water (Below GS)	No Water Encountered			

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
0	165						**TOPSOIL** SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	164	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						1
1.5							**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SANDY SILT WITH GRAVEL (ML); medium dense, moist, light brown; low plasticity; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 4 inches in diameter; iron-oxide staining.	
2	163							2
3	162							3
4	161		🖐 S1			DCPT =3,8,9		4
5	160						**WEATHERED GLACIOLACUSTRINE DEPOSITS** SANDY SILT (ML); very dense, moist, gray; low plasticity; fine to medium sand; 0.1- to 0.2-inch-thick fine sand (SP) partings.	5
6	159							6
7	158							7
8	157							8
9	156							9
9.5			🖐 S2					
10	155						Bottom of exploration at 10 ft. bgs. Note: No test pit caving observed.	10
11	154							11
12	153							12
13	152							13
14	151							14

Legend

Sample Type: 🖐 Grab sample

Plastic Limit ⊢—⊣ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-04

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7233, -122.6286 (est)	**ATP-05**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	160' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	2' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	159	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						4-inch-diameter roots at 1.5 feet bgs.	1
2	158	♀ 1/2/2025						**VASHON RECESSIONAL OUTWASH** SAND WITH SILT AND GRAVEL (SP-SM); medium dense, moist, light brown; fine to coarse sand; fine to coarse, subangular to subrounded, faceted gravel; subangular to subrounded cobbles up to 5 inches in diameter; iron-oxide staining. Groundwater seep at 2 feet bgs.	2
3	157								3
4	156		✋ S1			DCPT =8,16,22			4
5	155								5
6	154								6
7	153								7
8	152								8
9	151		✋ S2					**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, gray brown; low plasticity; fine to medim sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	9
10	150								10
11	149								11
12	148							**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, blue gray; low plasticity; fine to medim sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	12
13	147							Bottom of exploration at 13 ft. bgs. Note: No test pit caving observed.	13
14	146								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├─┤ Liquid Limit

Water Level: ♀ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-05

Sheet 1 of 1

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7232, -122.6269 (est)	**ATP-06**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	180' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	2' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SANDY SILT WITH GRAVEL (ML); loose, moist, dark brown; non-plastic; fine to coarse sandl fine to coarse, subangular to subrounded gravel; roots up to 3 inches in diameter.	
1	179	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
2	178	♀ 1/2/2025						Groundwater seep at 2 feet bgs.	2
3	177							**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); medium dense, very moist, light brown; low plasticity; fine to coarse sand; fine to coarse, subangular to subrounded gravel; iron-oxide staining.	3
4	176		🖑 S1			DCPT =8,13,11			4
5	175							**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, blue gray; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings.	5
6	174								6
7	173								7
8	172								8
9	171								9
10	170								10
11	169								11
12	168		🖑 S2						12
13	167							Bottom of exploration at 13 ft. bgs. Note: No test pit caving observed.	13
14	166								14

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type: 🖑 Grab sample

Water Level: ♀ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-06

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7239, -122.6280 (est)	**ATP-07**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	195' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/2/2025	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	194	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
								HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); medium dense, very moist, light brown; low plasticity; fine to medium sand 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	
2	193								2
3	192								3
4	191		✋ S1			DCPT =13,9,19		**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, very moist, light brown; low plasticity; fine to medium sand 0.1-to 0.2-inch-thick fine sand (SP) partings.	4
5	190								5
6	189								6
7	188								7
8	187								8
9	186								9
10	185							**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, blue gray; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings.	10
11	184		✋ S2						11
								Bottom of exploration at 11.5 ft. bgs. Note: No test pit caving observed.	
12	183								12
13	182								13
14	181								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-07

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location	*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.	47.7256, -122.6267 (est)	**ATP-08**

Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	335' (est)

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/3/2025	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	334	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
2	333							**VASHON RECESSIONAL OUTWASH** GRAVEL WITH SAND AND COBBLES (GP); medium dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 5 inches in diameter.	2
3	332								3
4	331	DCPT blow counts elevated due to presence of cobbles.	🖐 S1	● 4.6		DCPT =8,16,30 PS,MC FC=4.7%		Becomes dense.	4
5	330								5
6	329								6
7	328								7
8	327								8
9	326							Becomes with subangular to subrounded cobbles up to 8 inches in diameter.	9
10	325								10
11	324		🖐 S2						11
12	323							Bottom of exploration at 12 ft. bgs. Note: No test pit caving observed.	12
13	322								13
14	321								14

Legend

Sample Type: 🖐 Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-08

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE \\ASP-BAI-01\PROJECTS\GINTW\PROJECTS\AS240561 JOHNSON PROPERTY POULSBO.GPJ February 10, 2025

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7258, -122.6276 (est)	*Exploration Number* **ATP-09**
Contractor High Meadows Excavating, LLC	*Equipment* Hitachi Zaxis 85B	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 260' (est)	
Operator Dave Monsaas	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 1/3/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 7' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
							TOPSOIL SILTY SAND WITH GRAVEL AND COBBLES (SM); loose, moist, dark brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 4 inches in diameter; roots up to 2 inches in diameter.	
1	259	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						1
							VASHON RECESSIONAL OUTWASH SILTY SAND WITH GRAVEL AND COBBLES (SM); medium dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 4 inches in diameter; iron-oxide staining.	
2	258					T-probe =6"		2
3	257						SILTY SAND (SM); medium dense, wet, light brown; fine to medium sand; iron-oxide staining.	3
4	256		🖐 S1	30.2 ●		T-probe =4" PS,MC FC=39.2%		4
5	255							5
6	254							6
7	253	♀ 1/3/2025						7
8	252							8
9	251	Bottom of exploration at 10 feet bgs due to cave-in.						9
			🖐 S2					
10	250						Bottom of exploration at 10 ft. bgs. Note: Test pit caved in from sidewalls between 9 and 10 feet bgs.	10
11	249							11
12	248							12
13	247							13
14	246							14

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type: 🖐 Grab sample

Water Level: ♀ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log
ATP-09
Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7256, -122.6284 (est)	**ATP-10**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	240' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/3/2025	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	239	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); loose to medium dense, moist, light brown; low plasticity; fine to medium sand; few small roots and organics; mottled iron-oxide staining.	1
2	238								2
3	237							2-foot-diameter granodiorite boulder at 3 feet bgs.	3
4	236		✋ S1			T-probe =3"		**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, light brown; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	4
5	235								5
6	234								6
7	233								7
8	232								8
9	231								9
10	230		✋ S2	25.6 ●		FC=85%		**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); very dense, moist, light brown; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	10
11	229								11
12	228		✋ S3						12
								Bottom of exploration at 12.5 ft. bgs. Note: No test pit caving observed.	
13	227								13
14	226								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├─┤ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log
ATP-10
Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7247, -122.6286 (est)	*Exploration Number* **ATP-11**
Contractor High Meadows Excavating, LLC	*Equipment* Hitachi Zaxis 85B	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 210' (est)	
Operator Dave Monsaas	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 1/3/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	209	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
2	208							**VASHON RECESSIONAL OUTWASH** SANDY SILT WITH GRAVEL (ML); loose, very moist, mottled light brown; non-plastic; fine to coarse sand; fine to coarse, subangular to subrounded gravel; few organics and roots up to 1 inch in diameter; iron-oxide staining.	2
3	207					T-probe =6"		1-foot-diameter granodiorite boulder at 3 feet bgs.	3
4	206							**WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, gray brown; non-plastic; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	4
5	205		✋ S1						5
6	204								6
7	203								7
8	202							**GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, blue gray; non-plastic; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings.	8
9	201								9
10	200								10
11	199								11
12	198		✋ S2						12
13	197							Bottom of exploration at 13 ft. bgs. Note: No test pit caving observed.	13
14	196								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-11

Sheet 1 of 1

Aspect CONSULTING	Johnson Property - AS240561		Geotechnical Exploration Log	
	Project Address & Site Specific Location Poulsbo, WA, See Figure 2.		*Coordinates (Lat,Lon WGS84)* 47.7252, -122.6276 (est)	*Exploration Number* **ATP-12**
Contractor High Meadows Excavating, LLC	*Equipment* Hitachi Zaxis 85B	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 290' (est)	
Operator Dave Monsaas	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 1/3/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; fine to medium sand; roots up to 1 inch in diameter.	
1	289	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.							1
2	288							**VASHON RECESSIONAL OUTWASH** SILTY SAND WITH GRAVEL AND COBBLES (SM); medium dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 3 inches in diameter.	2
3	287		✋ S1			T-probe =6"			3
4	286					T-probe =3"			4
5	285							Becomes with subangular to subrounded cobbles up to 6 inches in diameter.	5
6	284							SAND WITH SILT, GRAVEL, AND COBBLES (SP-SM); dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 8 inches in diameter.	6
7	283								7
8	282		✋ S2						8
9	281								9
10	280							GRAVEL WITH SILT, SAND, AND COBBLES (GP-GM); dense, moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 8 inches in diameter.	10
11	279								11
12	278								12
13	277							Bottom of exploration at 13 ft. bgs. Note: No test pit caving observed.	13
14	276								14

Legend

Sample Type

✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level

No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-12

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Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7249, -122.6273 (est)	*Exploration Number* **ATP-13**
Contractor High Meadows Excavating, LLC	*Equipment* Hitachi Zaxis 85B	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 265' (est)	
Operator Dave Monsaas	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 1/3/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; non-plastic; fine to medium sand; roots up to 1 inch in diameter.	
1	264	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); medium dense, moist, light brown; low plasticity; fine to medium sand; few woody debris and small roots; iron-oxide staining.	1
2	263								2
3	262		✋ S1			T-probe =3"			3
4	261					T-probe =3"			4
5	260								5
								WEATHERED GLACIOLACUSTRINE DEPOSITS SILT WITH SAND (ML); dense, moist, light brown; low plasticity; fine to medium sand; 0.1-to 0.2-inch-thick fine sand (SP) partings with iron-oxide staining.	
6	259								6
7	258		✋ S2						7
8	257								8
9	256								9
10	255								10
11	254		✋ S3						11
12	253							Bottom of exploration at 12 ft. bgs. Note: No test pit caving observed.	12
13	252								13
14	251								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ⊢—⊣ Liquid Limit

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-13

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7244, -122.6267 (est)	**ATP-14**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
High Meadows Excavating, LLC	Hitachi Zaxis 85B	Grab	260' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
Dave Monsaas	Trackhoe	1/3/2025	NA	2' (Seep)

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
							TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; fine to medium sand; roots up to 1 inch in diameter.	
1	259	Backfilled with excavated material in one-foot-thick lifts and tamped with the excavator bucket.						1
							VASHON RECESSIONAL OUTWASH SILTY SAND WITH GRAVEL AND COBBLES (SM); medium dense, moist, brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 6 inches in diameter; iron-oxide staining.	
2	258	♀ 1/3/2025						2
3	257							3
4	256		S1			DCPT =7,14,19	Becomes gray brown and without iron-oxide staining.	4
5	255							5
6	254							6
7	253		S2				SAND WITH SILT, GRAVEL, AND COBBLES (SP-SM); dense, very moist, gray brown; fine to coarse sand; fine to coarse, subangular to subrounded gravel; subangular to subrounded cobbles up to 5 inches in diameter.	7
8	252							8
9	251							9
10	250							10
11	249		S3					11
12	248						Bottom of exploration at 12 ft. bgs. Note: No test pit caving observed.	12
13	247							13
14	246							14

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type: Grab sample

Water Level: ♀ Water Level (Seepage)

See Exploration Log Key for explanation of symbols

Logged by: CB
Approved by: AJD 1/13/2025

Exploration Log ATP-14

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE \\ASP-BAI-01\PROJECTS\GINTW\PROJECTS\AS240561 JOHNSON PROPERTY POULSBO.GPJ February 10, 2025

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 Hayre McElroy & Associates, LLC.

B.1. Moisture Content Determination, MC

The five samples submitted for particle-size analyses and the five 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 three 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.

Aspect CONSULTING

Project name: Johnson Property
Project # AS240561
8883

Please send report to:
alison.dennsion@aspectconsulting.com
chelsea.bush@aspectconsulting.com

Laboratory Testing Schedule

	Lab Test Procedure (ASTM)	Unit pricing from:	HMA 2024
PS	Sieve analysis and #200 wash (includes MC)		$120
FC	minus No. 200 wash (D1140)		$90

	Exploration	Sample	Depth (ft.)	Lab Tests	Line Total ($)	Test Notes
A	ATP-01	S-2	2	FC	90	Include Moisture Content
B	ATP-03	S-2	12	FC	90	Include Moisture Content
C	ATP-10	S-2	10	FC	90	Include Moisture Content
D	ATP-08	S1	4	PS	120	Include Moisture Content
E	ATP-09	S1	4	PS	120	Include Moisture Content

Test	No. of samples per test	Subtotal		
PS	2	$240		
FC	3	$270	RDER SUBMITTED ON:	1/14/2025
			ULTS REQUESTED BY:	ASAP
TOTAL:	5 samples	$510		

hayremcelroy
& associates, llc

9644 153rd Ave NE
Redmond, WA 98052
p 425.869.6750

Moisture Content

ASTM D-2216

HMA Project Number: 08-175
Project Name: Johnson Property
Description: Soil
Lab Number: 8883

Received Date: 01/15/25
Start Date: 01/15/25
Finish Date: 01/16/25
Technician: HL

Lab #	Tare ID	Boring	Sample #	Depth (ft)	Weight of Moist Soil + Tare (g)	Weight of Dry Soil + Tare (g)	Tare Weight (g)	Weight of Water (g)	Moisture Content (%)
8883-A	PDX-01	**ATP-01**	S-2	2'	698.54	520.61	12.56	177.93	**35.0**
8883-B	NY-01	**ATP-03**	S-2	12'	593.03	469.51	12.58	123.52	**27.0**
8883-C	SEA-01	**ATP-10**	S-2	10'	587.00	470.01	12.56	116.99	**25.6**
8883-D	SF-01	**ATP-08**	S1	4'	1785.45	1707.42	12.59	78.03	**4.6**
8883-E	ATL-01	**ATP-09**	S1	4'	958.82	739.57	12.43	219.25	**30.2**

Oven No.	Oven In-Calibration	Calibration Due	Balance	In Calibration	Calibration Due
B23ERS-0026	8/9/2024	August 2025	545249	8/9/2025	August 2025

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Redmond, WA 98052
p 425.869.6750

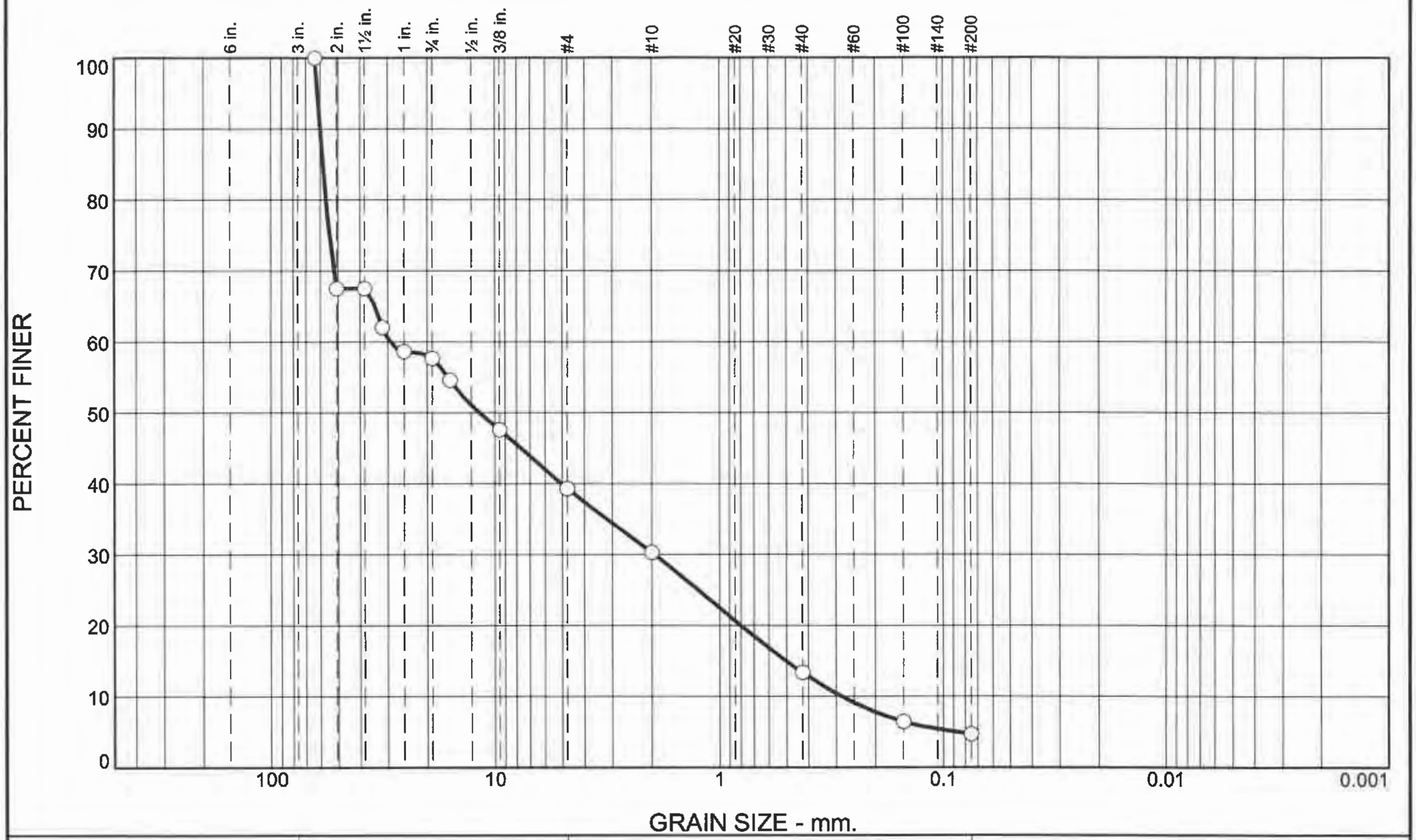
Fines Content
ASTM C117

Project Number: 08-175
Project Name: Johnson Property
Sample ID: Soil
Spec: FC
HMA LAB NO 8883

Technician: HL
Received: 01/15/25
Start Date: 01/16/25
Finish Date: 01/17/25

Lab Number	Boring	Sample	Depth (ft)	Tare #	Tare Weight (g)	Tare+Dry Weight Before Wash (g)	Tare+Dry Weight After Wash (g)	% Retained	% PASSING
8883-A	**ATP-01**	S-2	2'	PDX-01	12.56	520.61	139.42	24.97	**75.03**
8883-B	**ATP-03**	S-2	12'	NY-01	12.58	469.51	72.05	13.02	**86.98**
8883-C	**ATP-10**	S-2	10'	SEA-01	12.56	470.01	82.64	15.32	**84.68**
Oven No.	**Oven In-Calibration**		**Calibration Due**		**Balance**		**In Calibration**	**Calibration Due**	
B23ERS-0026	8/9/2024		August 2025		545249		8/9/2025	August 2025	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	42.3	18.4	9.0	16.9	8.7	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2 1/2"	100.0		
2"	67.5		
1 1/2"	67.5		
1 1/4"	62.0		
1"	58.7		
3/4"	57.7		
5/8"	54.6		
3/8"	47.6		
#4	39.3		
#10	30.3		
#40	13.4		
#100	6.5		
#200	4.7		

* (no specification provided)

Soil Description

Poorly graded GRAVEL with sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 60.0814 D_{85}= 58.3581 D_{60}= 29.3048
D_{50}= 11.6632 D_{30}= 1.9453 D_{15}= 0.5019
D_{10}= 0.2821 C_u= 103.90 C_c= 0.46

Classification

USCS= GP AASHTO=

Remarks

MC - 4.6%

Source of Sample: ATP-08 **Depth:** 4 ft.
Sample Number: S1

Date: 01/17/2025

Hayre McElroy & Associates, LLC

Redmond, WA

Client: Aspect Consulting
Project: Johnson Property
Project #AS240561
Project No: Lab #8883 **Figure**

Tested By: HL **Checked By:** JM

GRAIN SIZE DISTRIBUTION TEST DATA

1/17/2025

Client: Aspect Consulting
Project: Johnson Property
Project #AS240561
Project Number: Lab #8883
Location: ATP-08
Depth: 4 ft. **Sample Number:** S1
Material Description: Poorly graded GRAVEL with sand
Date: 01/17/2025
USCS Classification: GP
Testing Remarks: MC - 4.6%
Tested by: HL **Checked by:** JM

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 1621.20
Tare Wt. = 12.59
Minus #200 from wash = 5.1%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
1707.47	12.59	0.00	2 1/2"	0.00	100.0
			2"	550.40	67.5
			1 1/2"	550.40	67.5
			1 1/4"	643.50	62.0
			1"	700.80	58.7
			3/4"	717.60	57.7
			5/8"	769.70	54.6
			3/8"	888.10	47.6
			#4	1028.60	39.3
			#10	1181.40	30.3
			#40	1467.80	13.4
			#100	1585.40	6.5
			#200	1615.10	4.7

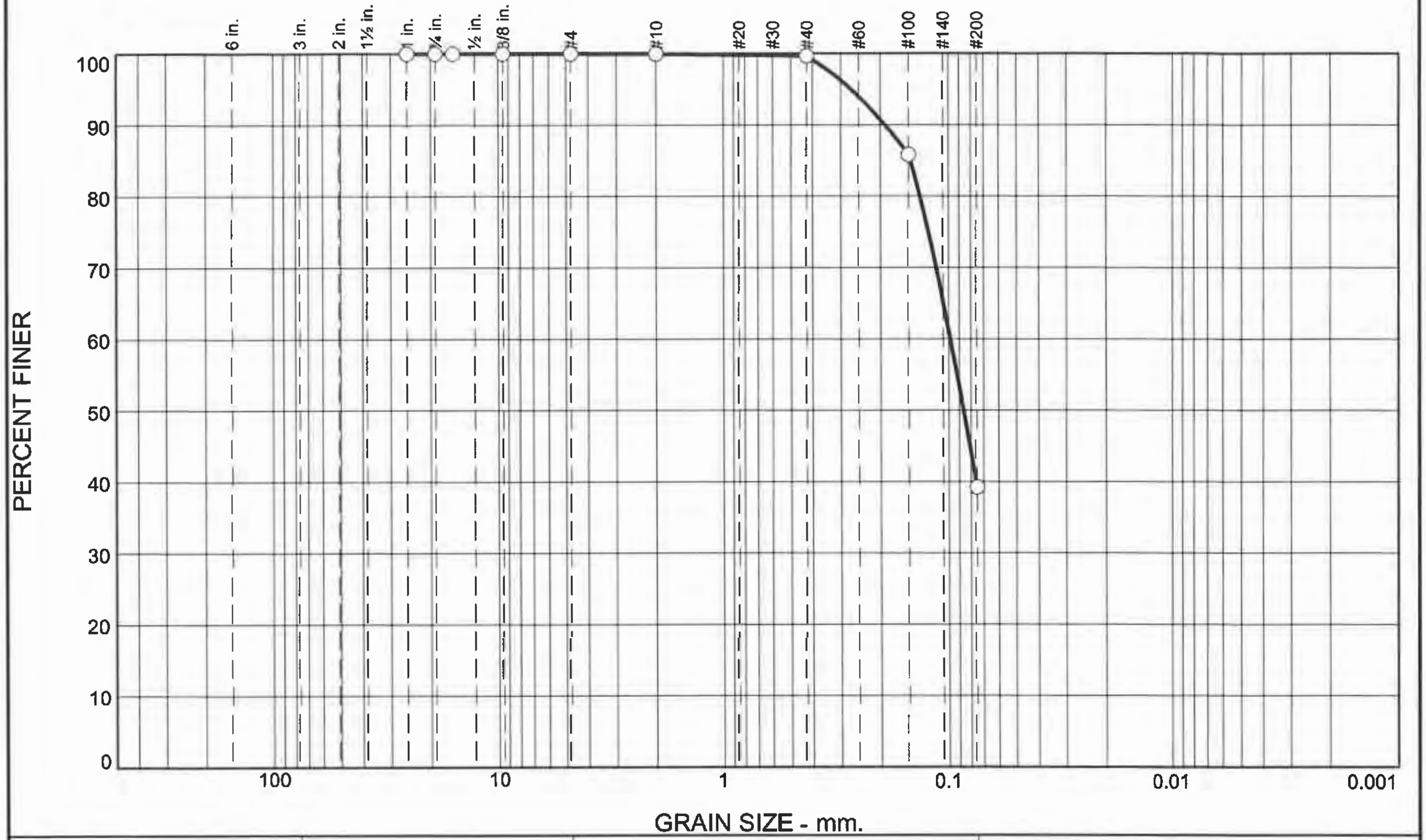
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	42.3	18.4	60.7	9.0	16.9	8.7	34.6			4.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0875	0.2821	0.5019	0.8015	1.9453	5.0463	11.6632	29.3048	56.5651	58.3581	60.0814	61.7833

Fineness Modulus	C_u	C_c
5.98	103.90	0.46

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	60.5	39.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
5/8"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#40	99.7		
#100	85.9		
#200	39.2		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1905 D_{85}= 0.1472 D_{60}= 0.0984
D_{50}= 0.0862 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

MC - 30.2%

Source of Sample: ATP-09 **Depth:** 4 ft.
Sample Number: S1

Date: 01/17/2025

Hayre McElroy & Associates, LLC

Redmond, WA

Client: Aspect Consulting
Project: Johnson Property
Project #AS240561
Project No: Lab #8883 **Figure**

Tested By: HL **Checked By:** JM

GRAIN SIZE DISTRIBUTION TEST DATA

1/17/2025

Client: Aspect Consulting

Project: Johnson Property
Project #AS240561

Project Number: Lab #8883

Location: ATP-09

Depth: 4 ft. **Sample Number:** S1

Material Description: Silty SAND

Date: 01/17/2025

USCS Classification: SM

Testing Remarks: MC - 30.2%

Tested by: HL **Checked by:** JM

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 635.31
Tare Wt. = 12.43
Minus #200 from wash = 14.3%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
739.57	12.43	0.00	1"	0.00	100.0
			3/4"	0.00	100.0
			5/8"	0.00	100.0
			3/8"	0.00	100.0
			#4	0.00	100.0
			#10	0.30	100.0
			#40	2.40	99.7
			#100	102.80	85.9
			#200	442.00	39.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.3	60.5	60.8			39.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.0758	0.0862	0.0984	0.1336	0.1472	0.1905	0.2700

Fineness Modulus
0.18

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.

Aspect
A Geosyntec Company

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

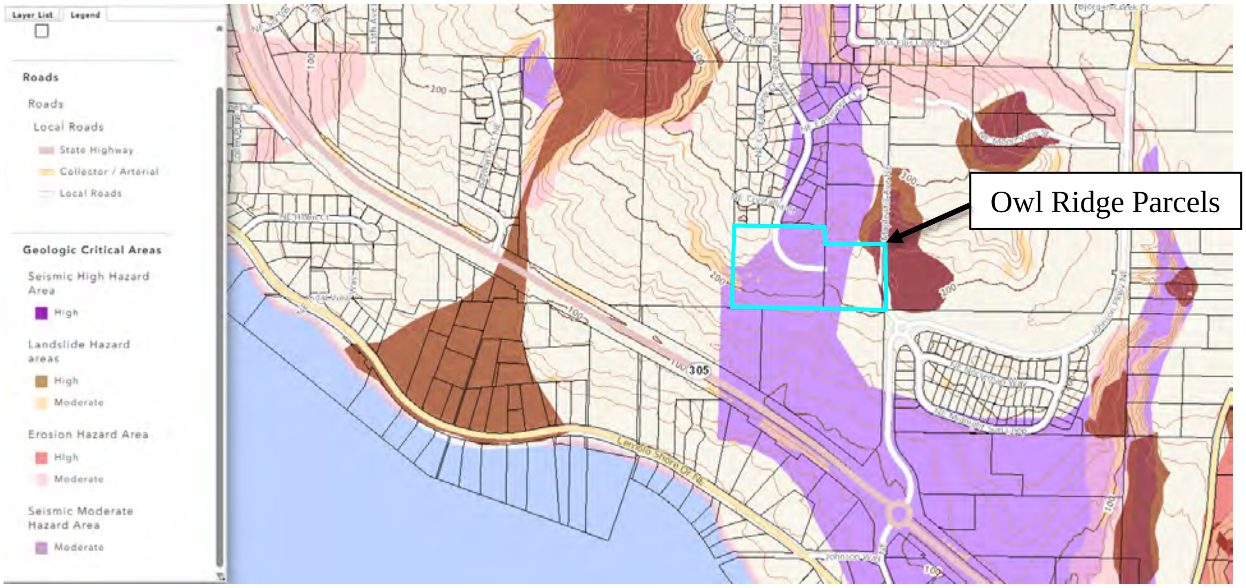
Current project plans for the Owl Ridge Parcels include about 26 residential parcels, a connector roadway from Sunrise Ridge Avenue NE from the northern property line near the northwest corner that will extend through the properties to the southern property line near the southeast corner, and associated 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 loose[1], 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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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

Engineering Geologist
2716
Alison J. Dennison

6/16/2025

ERIK O. ANDERSEN
36468

6/16/2025

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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

V:\240561 Johnson Residential Development\Deliverables\Johnson Property Geotechnical Report Addendum_2025.06.16 revised.docx

FIGURES

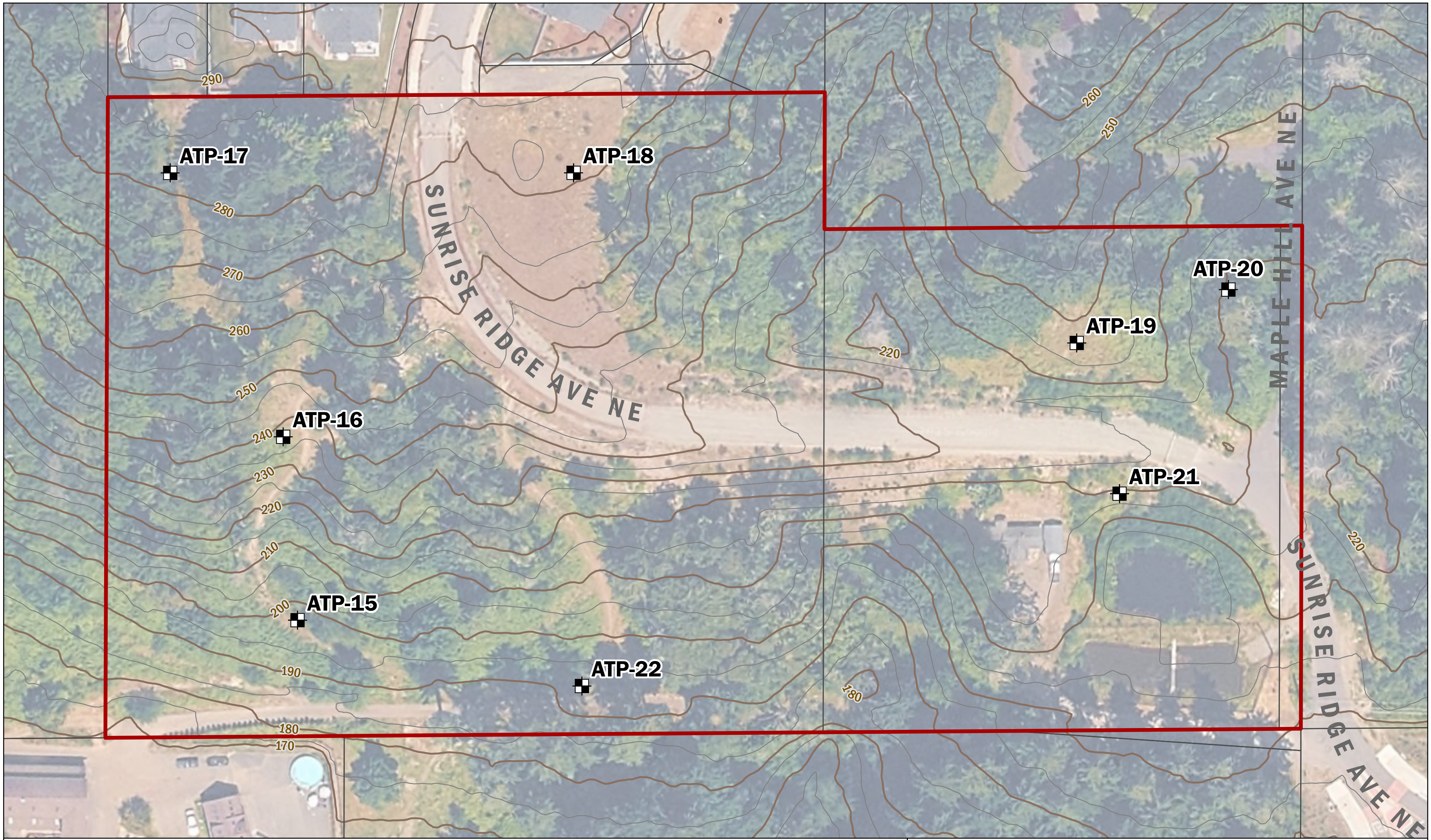
Vicinity Map

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

Aspect CONSULTING	MAY-2025	BY: AJD / HMD	FIGURE NO. 1
	PROJECT NO. AS240561	REVISED BY: - - - / - - -	

GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561\JohnsonProperty_240561.aprx: Site Location Map || User: haleyduran || Print Date: 5/8/2025

Data source credits: None || Basemap Service Layer Credits: County of Kitsap, King County, WA State Parks GIS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS, County of Kitsap, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Esri, HERE, Garmin, USGS, EPA, NPS



GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561\JohnsonProperty_240561.aprx: 02 - Site Exploration Map| | User: haley.duran | | Print Date: 5/8/2025

Aspect Test Pit

Site Boundary

Kitsap County Parcels

Topo Contours 5ft

Topo Contours 10ft

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

N

0 70 140 Feet

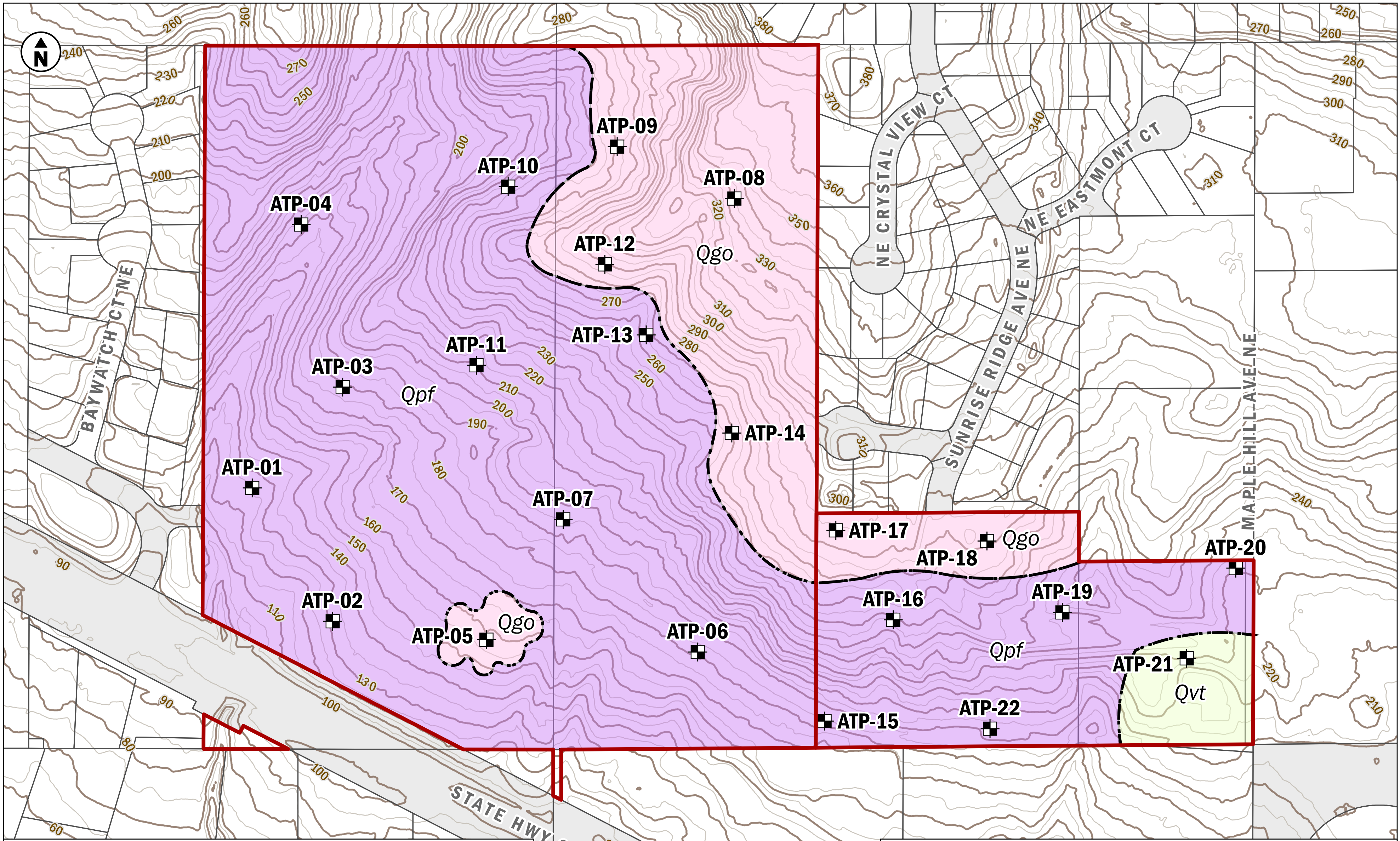
Site Exploration Plan

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

Aspect CONSULTING

MAY-2025	BY: AJD / HMD	FIGURE NO.
PROJECT NO. AS240561	REVISED BY: - - - / - - -	2

Data source credits: None | | Basemap Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



- ■ Aspect Test Pit
- ▭ Site Boundary
- ▭ Kitsap County Parcels
- ∿ Topo Contours 5ft
- ∿ Topo Contours 10ft
- ◌ Inferred Geologic Contact
- ▨ Vashon Recessional Outwash (Qgo)
- ▨ Glaciolacustrine Deposits, part of the Pre-Vashon Fines Unit (Qpf)
- ▨ Vashon Till (Qvt)

0 190 380
Feet

Inferred Geologic Map

Geotechnical Engineering Report
Johnson Residential Development
State Route 305
Poulsbo, Washington

Aspect
CONSULTING

MAY-2025	BY: AJD / HMD	FIGURE NO.
PROJECT NO. AS240561-02	REVISED BY: AJD / RAP	3

Data source credits: None || Basemap Service Layer Credits: NA

GIS Path: G:\projects\JohnsonProperty_240561\JohnsonProperty_240561\JohnsonProperty_240561.aprx: 03 - Inferred Geologic Map || User: Robyn.Pepin || Print Date: 5/19/2025

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%1 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
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
			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
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%1 or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			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
	Silts and Clays Liquid Limit 50% or More		MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			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.

GEOTECHNICAL LAB TESTS

MC = Natural Moisture Content
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

CHEMICAL LAB TESTS

Organic Chemicals

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)

FIELD TESTS

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

COMPONENT DEFINITIONS

Descriptive Term		***Size Range and Sieve Number***
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)

ESTIMATED^1 PERCENTAGE

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

MOISTURE CONTENT

Dry = Absence of moisture, dusty, dry to the touch
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

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density^3		***SPT^2 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"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency^3		***SPT^2 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
———	———	— — —

Aspect CONSULTING

Exploration Log Key

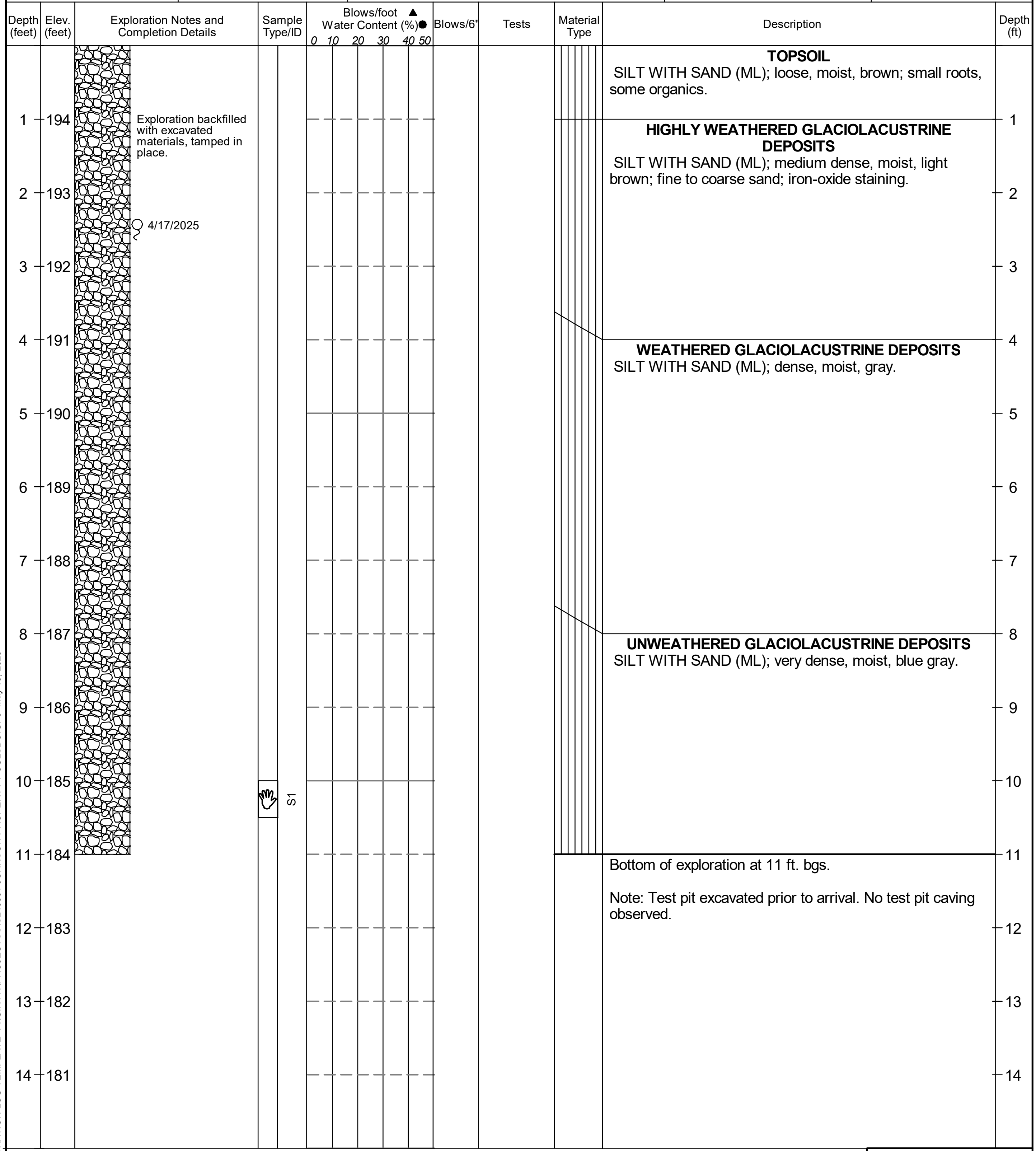
AI Path: Q:_ACAD Standards\FIELD REFERENCE\MASTERS\Exploration Log Key-2018.ai // user: jinman // last saved: 12/31/2018

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7230, -122.6255 (est)	*Exploration Number* **ATP-15**
Contractor Freedom Boring & Excavating	*Equipment* Kubota KX040-4	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 195' (est)	
Operator Neil	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 4/17/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 2.5' (Seep)



Exploration backfilled with excavated materials, tamped in place.

TOPSOIL
SILT WITH SAND (ML); loose, moist, brown; small roots, some organics.

HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS
SILT WITH SAND (ML); medium dense, moist, light brown; fine to coarse sand; iron-oxide staining.

WEATHERED GLACIOLACUSTRINE DEPOSITS
SILT WITH SAND (ML); dense, moist, gray.

UNWEATHERED GLACIOLACUSTRINE DEPOSITS
SILT WITH SAND (ML); very dense, moist, blue gray.

Bottom of exploration at 11 ft. bgs.

Note: Test pit excavated prior to arrival. No test pit caving observed.

Legend

Plastic Limit ├──┤ Liquid Limit

Sample Type: Grab sample

Water Level: Water Level (Seepage)

See Exploration Log Key for explanation of symbols

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

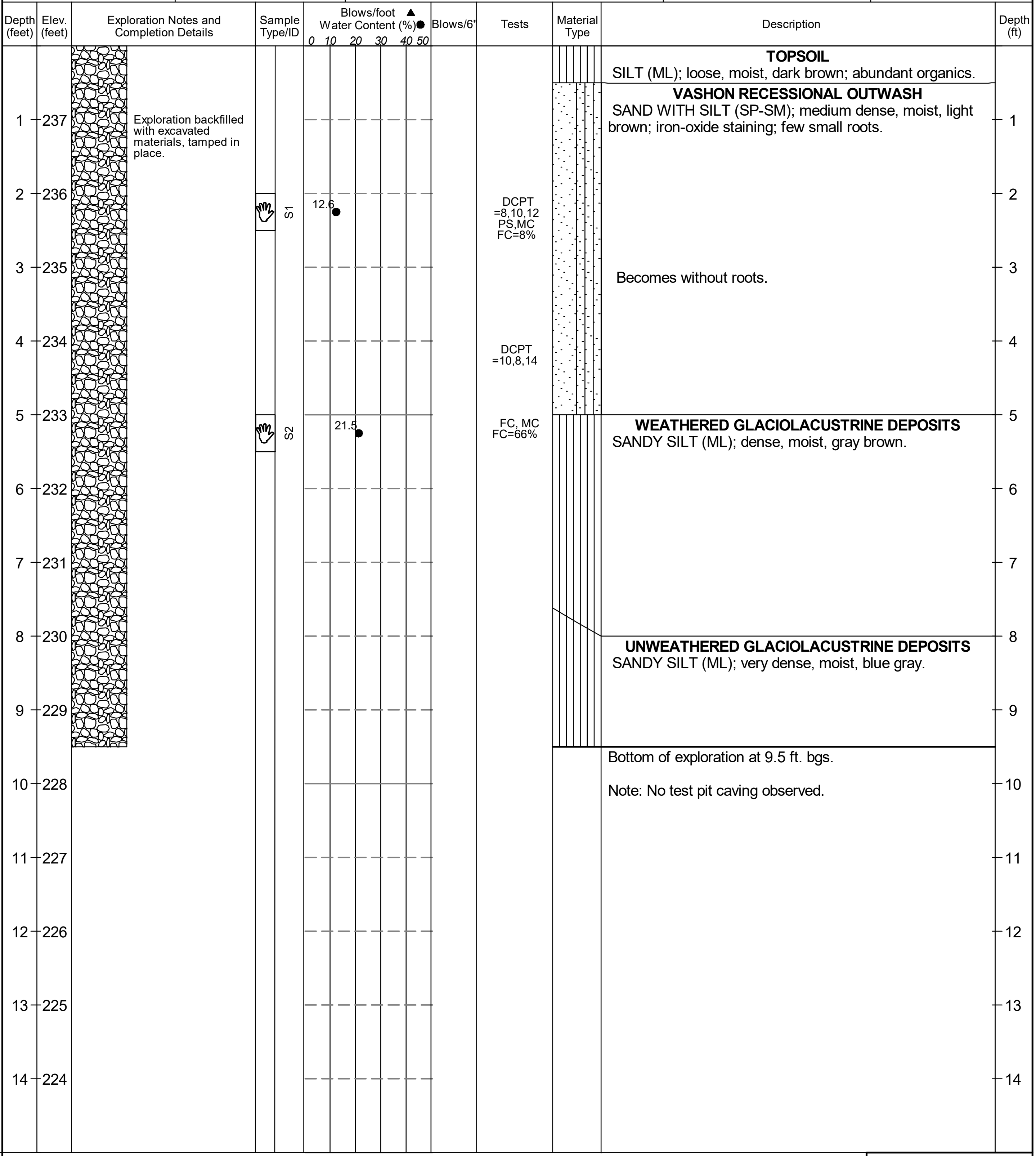
Exploration Log
ATP-15
Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

	Project Address & Site Specific Location		*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
	Poulsbo, WA, See Figure 2.		47.7233, -122.6255 (est)	**ATP-16**
Contractor Freedom Boring & Excavating	*Equipment* Kubota KX040-4	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 238' (est)	
Operator Neil	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 4/17/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered



Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ●	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics.	
								VASHON RECESSIONAL OUTWASH SAND WITH SILT (SP-SM); medium dense, moist, light brown; iron-oxide staining; few small roots.	
1	237	Exploration backfilled with excavated materials, tamped in place.							1
2	236		S1	12.6 ●		DCPT =8,10,12 PS,MC FC=8%			2
3	235							Becomes without roots.	3
4	234					DCPT =10,8,14			4
5	233		S2	21.5 ●		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
								Bottom of exploration at 9.5 ft. bgs. Note: No test pit caving observed.	
10	228								10
11	227								11
12	226								12
13	225								13
14	224								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

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

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7238, -122.6258 (est)	**ATP-17**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Freedom Boring & Excavating	Kubota KX040-4	Grab	275' (est)	
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 ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics.	
								VASHON RECESSIONAL 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.	
1	274	Exploration backfilled with excavated materials, tamped in place.							1
2	273					T-probe = 4 inches			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		🖑 S1	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
								Bottom of exploration at 9.5 ft. bgs. Note: No test pit caving observed.	
10	265								10
11	264								11
12	263								12
13	262								13
14	261								14

Legend

Sample Type: 🖑 Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: 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

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

Aspect CONSULTING	Johnson Property - AS240561			Geotechnical Exploration Log	
	Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7238, -122.6247 (est)	*Exploration Number* **ATP-18**
Contractor Freedom Boring & Excavating	*Equipment* Kubota KX040-4	*Sampling Method* Grab		*Ground Surface Elev. (NAVD88)* 267' (est)	
Operator Neil	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 4/17/2025		*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%) ● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; abundant organics; small roots.	
1	266	Exploration backfilled with excavated materials, tamped in place.						**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.	1
2	265							SILTY SAND (SM); very dense, moist, gray; fine to coarse sand; fine to coarse, subangular to subrounded gravel; gravel socketed in matrix.	2
3	264					DCPT =4,21,30			3
4	263		✋ S1	7.9 ●		PS, MC FC=30%			4
5	262							Bottom of exploration at 5 ft. bgs. Note: No test pit caving observed.	5
6	261								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

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

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

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location Poulsbo, WA, See Figure 2.			*Coordinates (Lat,Lon WGS84)* 47.7235, -122.6233 (est)	*Exploration Number* **ATP-19**
Contractor Freedom Boring & Excavating	*Equipment* Kubota KX040-4	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 234' (est)	
Operator Neil	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 4/17/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT (ML); loose, moist, dark brown; abundant organics. **HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS**	
1	233	Exploration backfilled with excavated materials, tamped in place.						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.	1
2	232							Becomes very moist.	2
3	231		✋ S1	29.6 ●		DCPT =8,17,20 FC,MC FC=89%			3
4	230							**UNWEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); dense, moist, gray brown; fine to medium sand.	4
5	229								5
6	228								6
7	227								7
8	226								8
9	225							Bottom of exploration at 9 ft. bgs. Note: No test pit caving observed.	9
10	224								10
11	223								11
12	222								12
13	221								13
14	220								14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: 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

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location		Poulsbo, WA, See Figure 2.	*Coordinates (Lat,Lon WGS84)* 47.7237, -122.6227 (est)	*Exploration Number* **ATP-20**
Contractor Freedom Boring & Excavating	*Equipment* Kubota KX040-4	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 267' (est)	
Operator Neil	*Exploration Method(s)* Trackhoe	*Work Start/Completion Dates* 4/17/2025	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Notes and Completion Details	Sample Type/ID	Blows/foot ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Material Type	Description	Depth (ft)
								TOPSOIL SILT WITH SAND (ML); loose, moist, dark brown; abundant organics.	
1	266	Exploration backfilled with excavated materials, tamped in place.						**HIGHLY WEATHERED GLACIOLACUSTRINE DEPOSITS** SILT WITH SAND (ML); medium dense, very moist, brown; fine to medium sand; iron-oxide staining along fractures.	1
2	265								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.	4
5	262								5
6	261								6
7	260								7
								Bottom of exploration at 7.5 ft. bgs. Note: No test pit caving observed.	
8	259								8
9	258								9
10	257								10
11	256								11
12	255								12
13	254								13
14	253								14

Legend

Sample Type

Plastic Limit ⊢⊣ Liquid Limit

Water Level

No Water Encountered

See Exploration Log Key for explanation of symbols

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

Exploration Log ATP-20

Sheet 1 of 1

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7232, -122.6232 (est)	**ATP-21**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Freedom Boring & Excavating	Kubota KX040-4	Grab	222' (est)	
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 ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
0	222						**TOPSOIL** SILT WITH SAND (ML); loose, moist, dark brown; fine to medium sand; up to 2 inch diameter roots.	
1	221	Exploration backfilled with excavated materials, tamped in place.					**VASHON TILL** SILT WITH SAND (ML); medium dense, moist, brown; fine to coarse sand; trace fine to coarse, subrounded gravel; iron-oxide staining.	1
2	220							2
3	219					DCPT =7,13,9	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		S1	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
			S2					
6	216						Bottom of exploration at 6 ft. bgs. Note: No test pit caving observed.	6
7	215							7
8	214							8
9	213							9
10	212							10
11	211							11
12	210							12
13	209							13
14	208							14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: No Water Encountered

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

Aspect CONSULTING

Johnson Property - AS240561

Geotechnical Exploration Log

Project Address & Site Specific Location			*Coordinates (Lat,Lon WGS84)*	*Exploration Number*
Poulsbo, WA, See Figure 2.			47.7228, -122.6242 (est)	**ATP-22**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
Freedom Boring & Excavating	Kubota KX040-4	Grab	190' (est)	
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 ▲ Water Content (%)● 0 10 20 30 40 50	Blows/6"	Tests	Description	Depth (ft)
0	190						**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	189	Exploration backfilled with excavated materials, tamped in place.						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		S1			DCPT =8,15,9		3
4	186						Becomes dense, moist, gray brown.	4
5	185							5
6	184							6
7	183		S2				Becomes with 0.1- to 0.2-inch-thick SAND partings.	7
8	182		S3				Becomes very moist.	8
							Bottom of exploration at 8.5 ft. bgs. Note: No test pit caving observed.	
9	181							9
10	180							10
11	179							11
12	178							12
13	177							13
14	176							14

Legend

Sample Type: ✋ Grab sample

Plastic Limit ├──┤ Liquid Limit

Water Level: 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.

MOISTURE CONTENT / PERCENT FINER THAN #200

AAR Project No. 25-287
Project Name Johnson Owl Ridge, AS240561
Client Geosyntec Consultants, Inc.
Sample By Chelsea Bush
Date Sample 4/17/2025
Date Received 5/6/2025

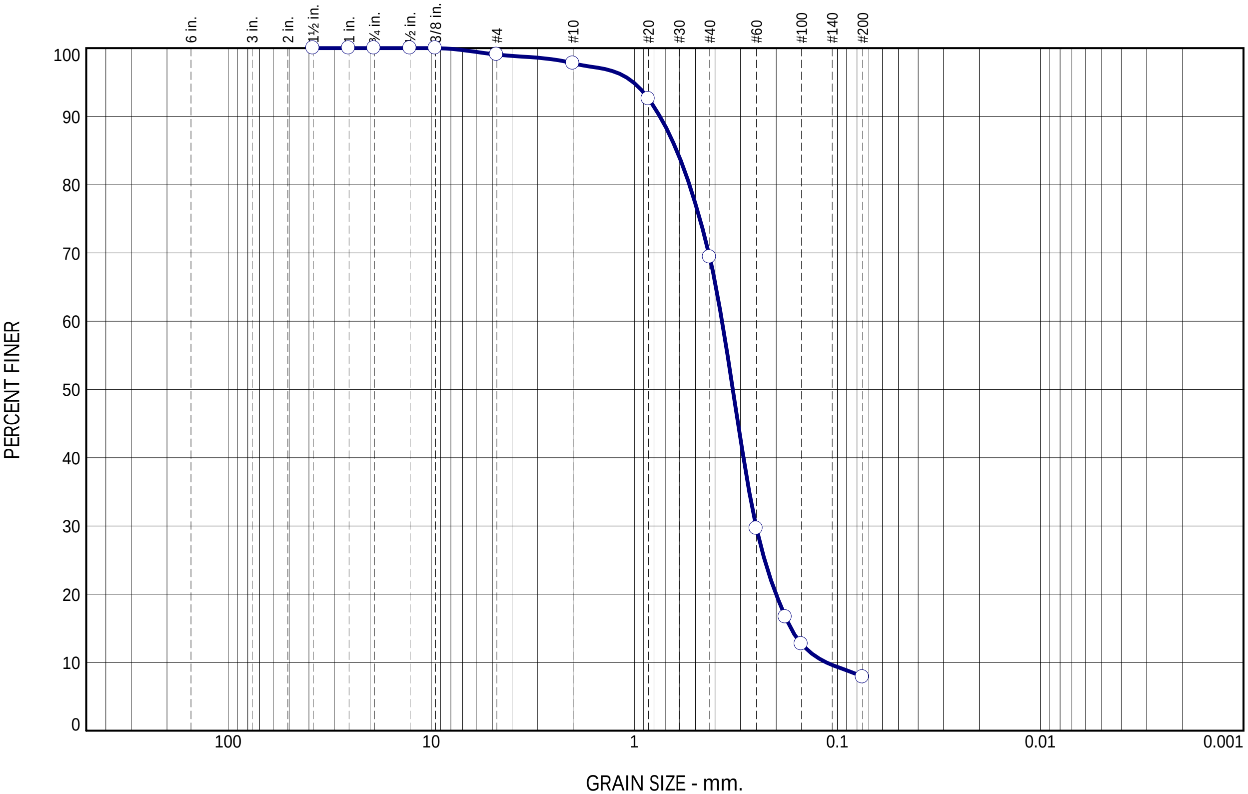
Lab Number See below
Sample ID See below
Source See below
Method (s) ASTM D2216, D1140
Tested By Tama L.
Date Tested 5/10/2025

Lab No.	27917	27918	27919	27920	27921	27922					
Boring / Location	ATP-16	ATP-16	ATP-17	ATP-18	ATP-19	ATP-21					
Sample / Depth	S1/2	S2/5	S1/5	S1/4	S1/3	S1/5					
Desciption	SP-SM	ML	GP-GM	SM	ML	ML					
Tare ID	Jam	MacBeth	Head	Taco	Pink	Row					
Tare Weight	736.5	177.6	673.4	481.3	174	678.9					
Wet & Tare Weight	1807	929.3	2079.8	1687.4	891.1	2597.8					
Dry & Tare Weight	1687.6	796.4	2028.4	1599	727.4	2360.9					
Washed & Tare	1620	389.1	1996.7	1314.5	237.6	1488.6					
Moistue Content %	**12.6**	**21.5**	**3.8**	**7.9**	**29.6**	**14.1**					
Finer than 200 %	**X**	**66**	**X**	**X**	**89**	**X**					
Dry Weight	951.1	618.8	1355	1117.7	553.4	1682					

Lab No.											
Boring / Location											
Sample / Depth											
Description											
Tare ID											
Tare Weight											
Wet & Tare Weight											
Dry & Tare Weight											
Washed & Tare											
Moistue Content %											
Finer than 200 %											
Dry Weight											

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

D_{90}= 0.7473	D_{85}= 0.6181	D_{60}= 0.3696
D_{50}= 0.3271	D_{30}= 0.2517	D_{15}= 0.1695
D_{10}= 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 Depth: 2
Sample Number: 27917
Sample Date: 04/17/2025

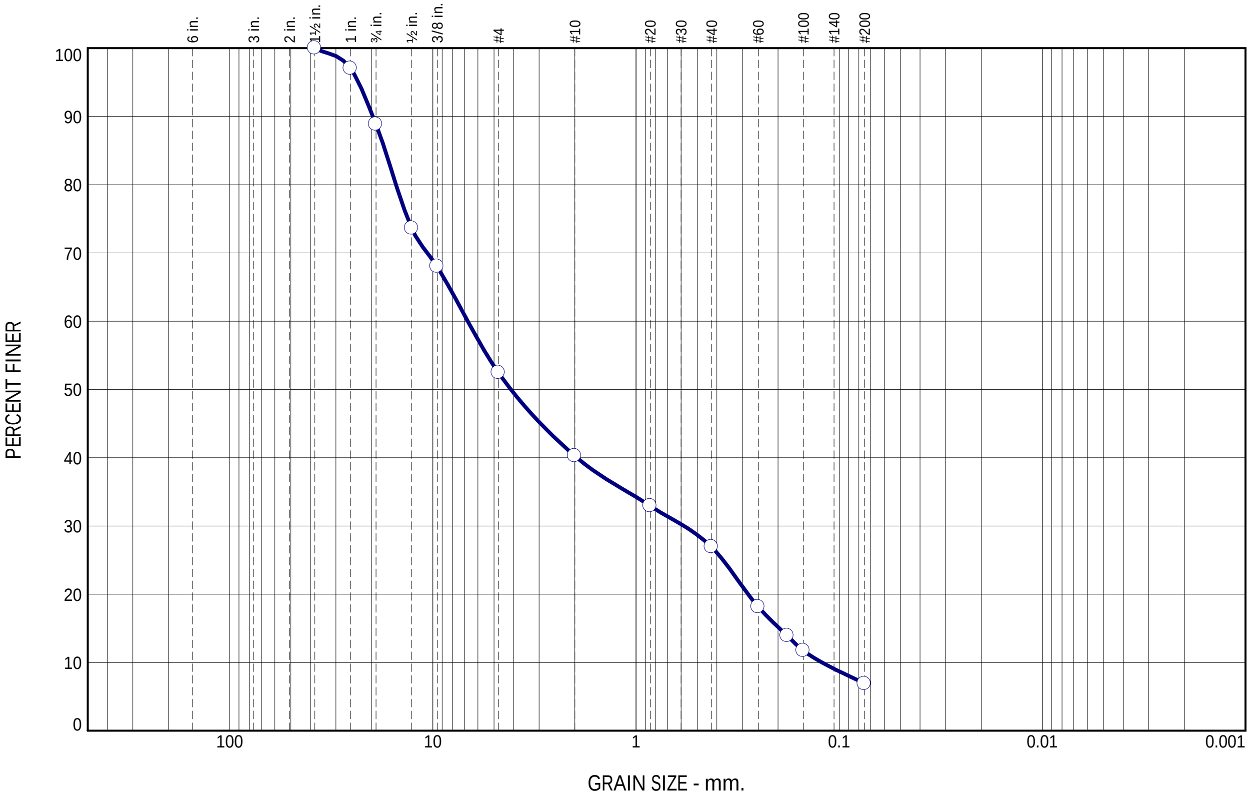
AAR Testing and Inspection, Inc.

Client: Geosyntec Consultants, Inc.
Project: Johnson Owl Ridge, AS240561
Project No: 25-287 .

Tested By: Tama Lewis #60698 Checked By: Stu Swenson, CET

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

D_{90}= 19.7381 D_{85}= 17.1663 D_{60}= 6.7325
D_{50}= 4.1282 D_{30}= 0.5806 D_{15}= 0.1968
D_{10}= 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 Depth: 5
Sample Number: 27919
Sample Date: 04/17/2025

AAR Testing
and
Inspection, Inc.

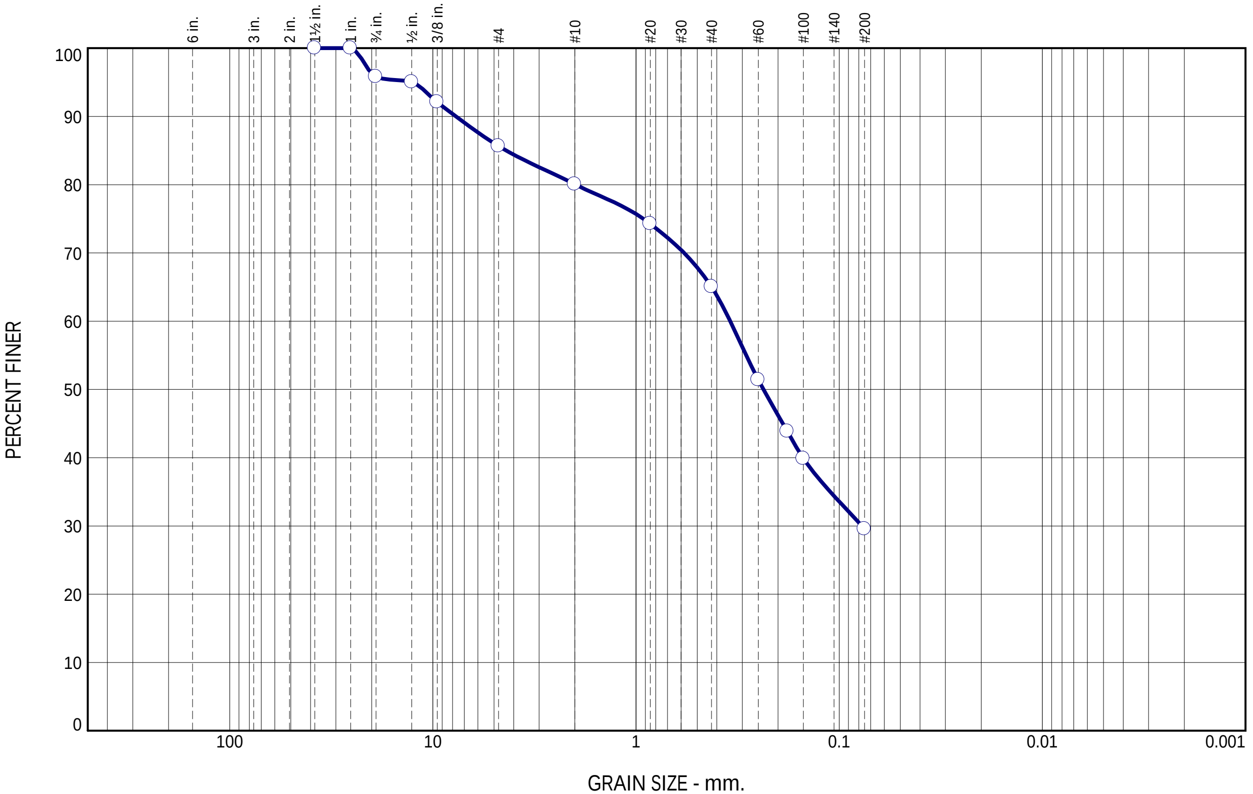
Client: Geosyntec Consultants, Inc.
Project: Johnson Owl Ridge, AS240561

Project No: 25-287 .

Tested By: Tama Lewis #60698 Checked By: Stu Swenson, CET

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

D_{90}= 7.6977	D_{85}= 4.3545	D_{60}= 0.3439
D_{50}= 0.2358	D_{30}= 0.0774	D_{15}=
D_{10}=	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 Depth: 4
Sample Number: 27920
Sample Date: 04/17/2025

**AAR Testing
and
Inspection, Inc.**

Client: Geosyntec Consultants, Inc.
Project: Johnson Owl Ridge, AS240561

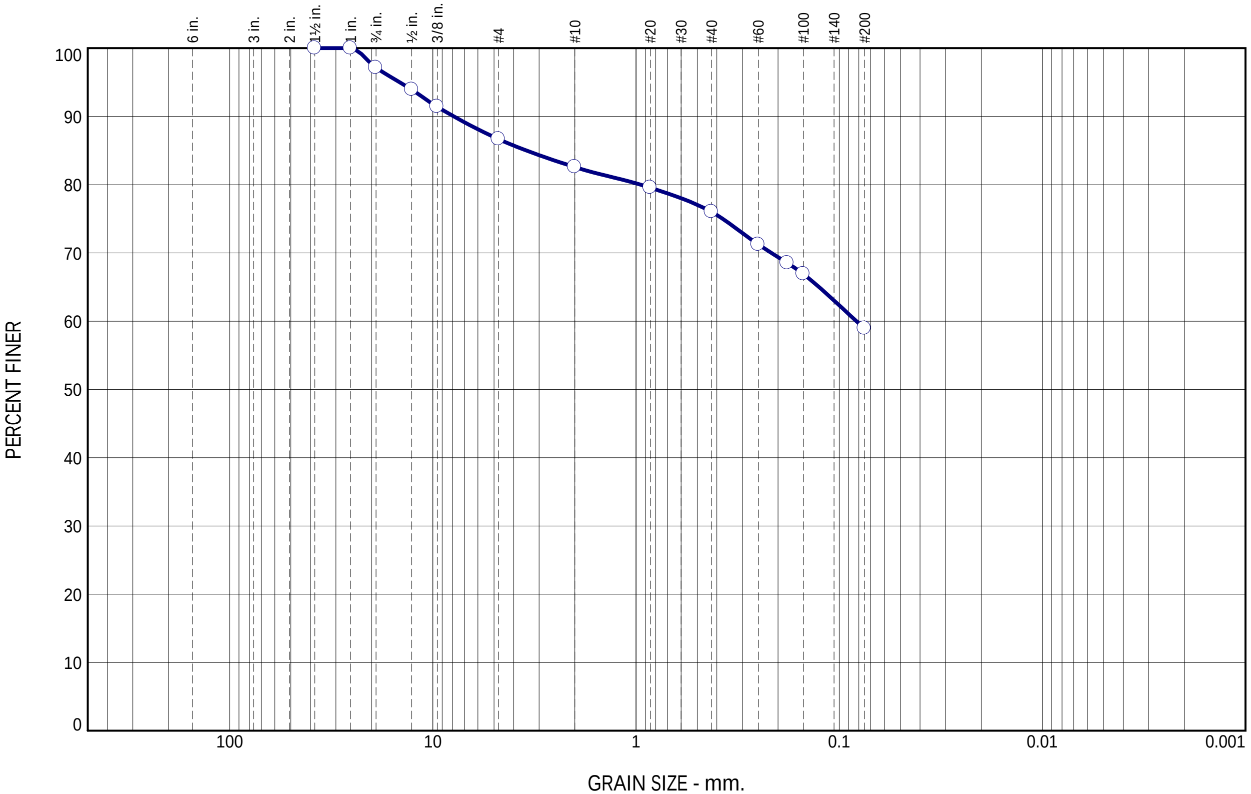
Project No: 25-287 .

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 indicitive of apparently identical samples.

Tested By: Tama Lewis #60698 Checked By: Stu Swenson, CET

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

D_{90}= 7.8918 D_{85}= 3.4619 D_{60}= 0.0822
D_{50}= D_{30}= D_{15}=
D_{10}= 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 Depth: 5
Sample Number: 27922
Sample Date: 04/17/2025

AAR Testing and Inspection, Inc.

Client: Geosyntec Consultants, Inc.
Project: Johnson Owl Ridge, AS240561

Project No: 25-287 .

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
Revised: November 12, 2025

Prepared for

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

Paul Devenzio
(206) 391-8366

BRANDON MICHAEL LOUCKS
50085

11/26/2025

"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
33400 8th Avenue S, Suite 205
Federal Way, WA 98003

253.838.6113 tel
253.838.7104 fax

ESM

www.esmcivil.com

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FIGURES

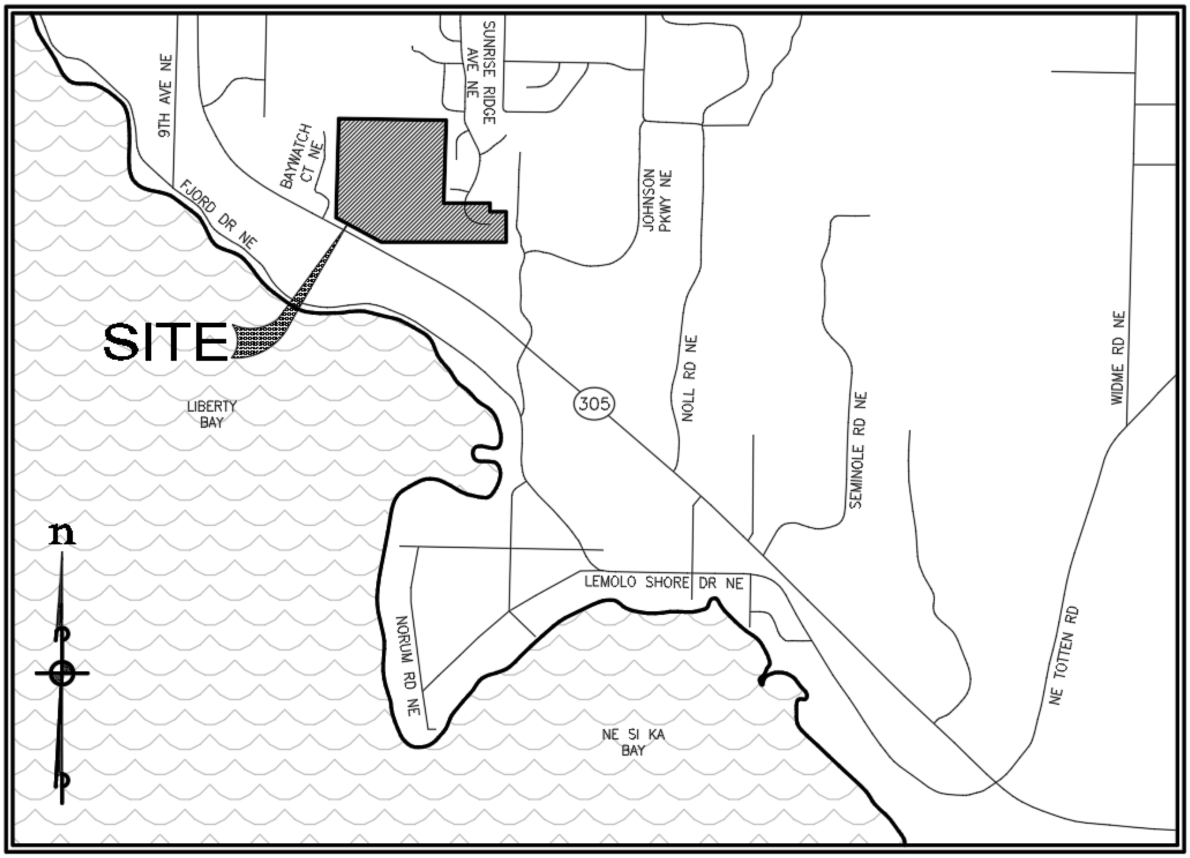
1. INTRODUCTION & PROJECT OVERVIEW

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 approximately 41 acres. The proposed project is a phased residential subdivision containing 148 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 #1-1 and #1-2 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 #2-1 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.

<u>Offsite – Upstream:</u>
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 upsteam 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. This upstream area is either conveyed through the project site by ditches and pipes beneath Sunrise Ridge Avenue NE and discharges to an offsite ditch located west of Johnson Road NE. Under post-developed conditions, the existing conveyance system will remain in place to maintain the existing drainage pattens for this upstream area.

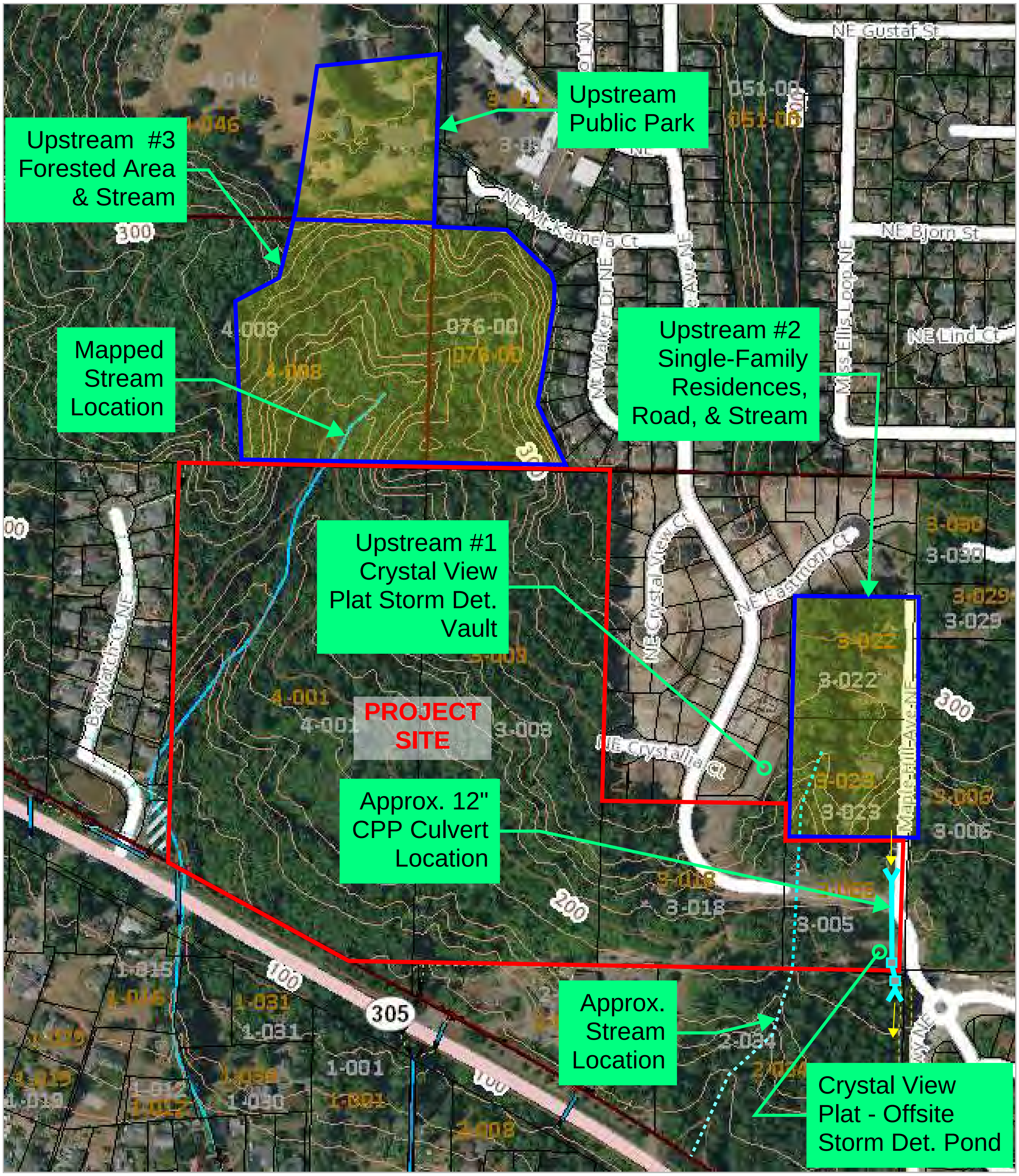
The third upstream area contributing stormwater to the project site is from parcels 232601-4-008-2002 and 5465-000-076-0006. These upstream parcels located north of the project site are undeveloped and contain predominantly forest coverage. A small area of parcel 5465-000-076-0006 contributes runoff 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

Printed: Friday. May 23, 2025



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

500 ft

Comments

N
W E
S

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

Natural discharge location #1-1 (NDL #1-1) 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 #1-1.

Natural discharge location #1-2 (NDL #1-2) 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 #1-2.

Natural discharge location #2-1 (NDL #2-1) 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 #2-1.

The downstream paths were investigated for the following potential problems:

1. **Conveyance system capacity problems** – No known issues.
2. **Localized flooding** – Stream C (Barrantes Creek), located within NDA #1-1 and downstream of the site, has been known to overflow during the wetter months of the year. Overflow from Barrantes Creek has been noted by City of Poulsbo staff to occur where the creek intersects with Lemolo Shore Drive, which is located approximately 910 feet downstream of the project site. No other known issues.
3. **Erosion impacts** – No known issues.

4. **Violations of surface water quality standards** – Impaired downstream water bodies were identified.
    - Liberty Bay (Category 5 - 303d, Dissolved Oxygen).

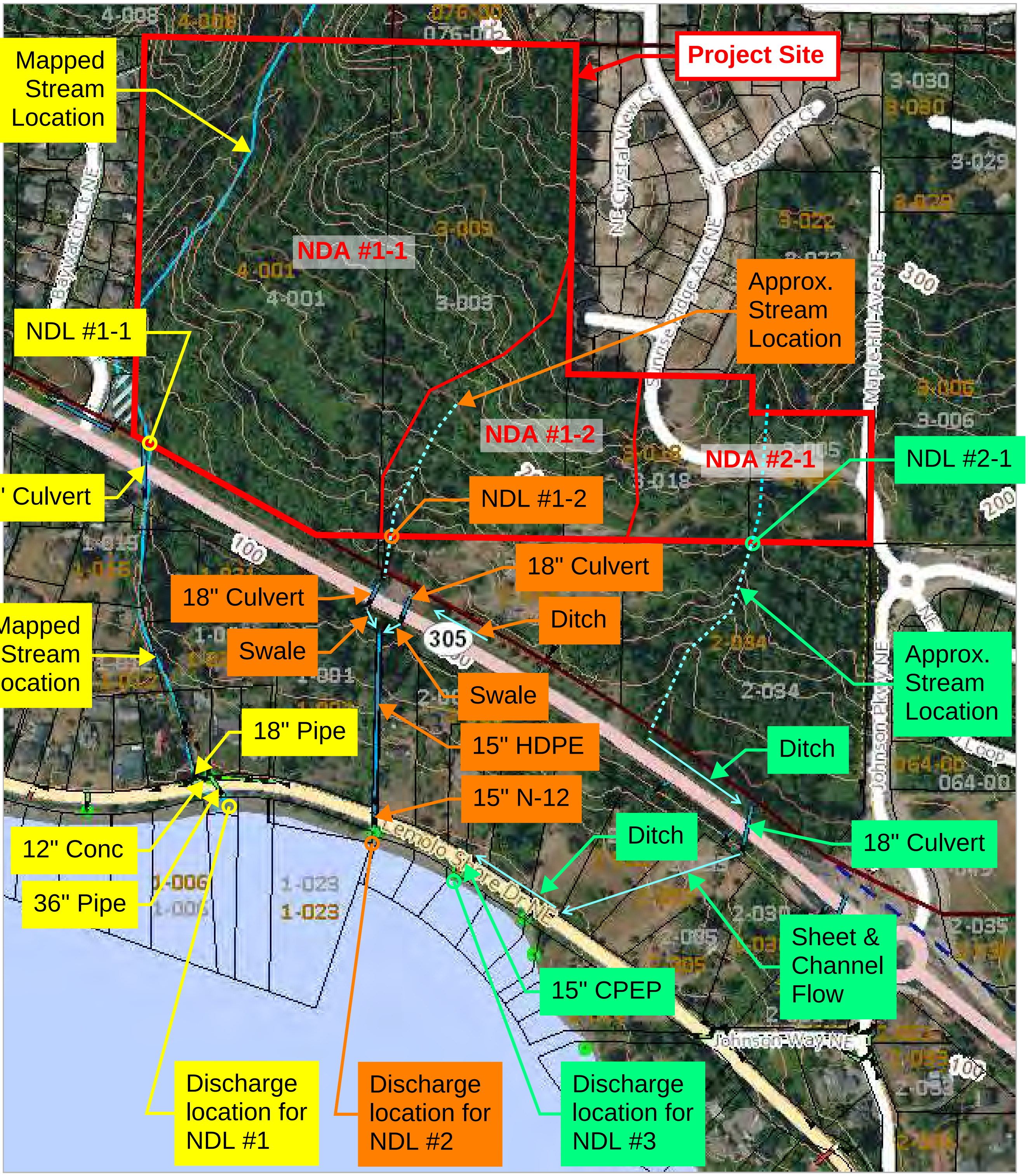
No negative drainage impacts are expected to be created by the project to the downstream drainage systems and properties based on the observations during this analysis.

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

Printed: Friday. May 23, 2025



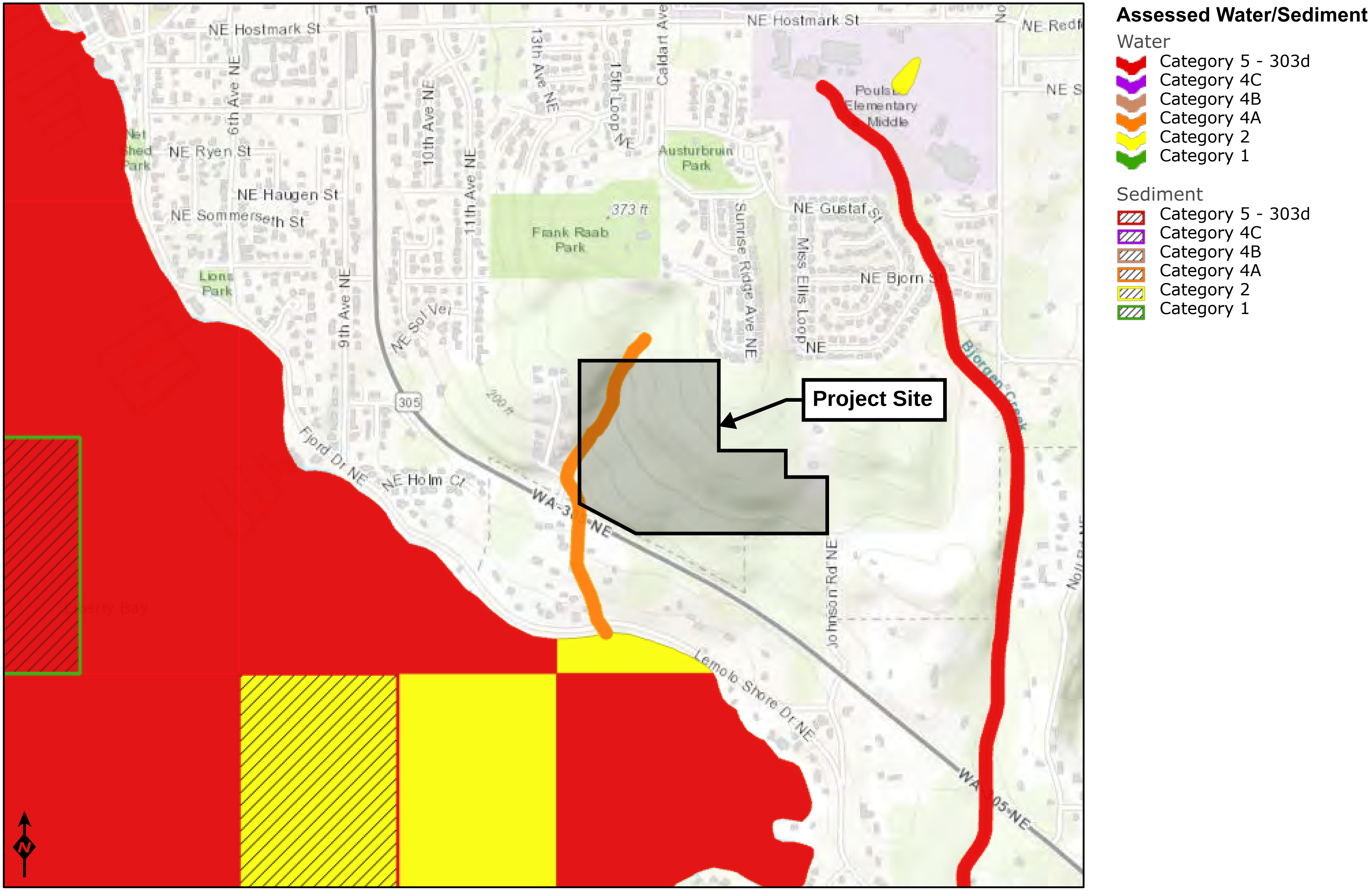
** This map is not a substitute for field survey **

500 ft

Comments

May 27, 2025

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



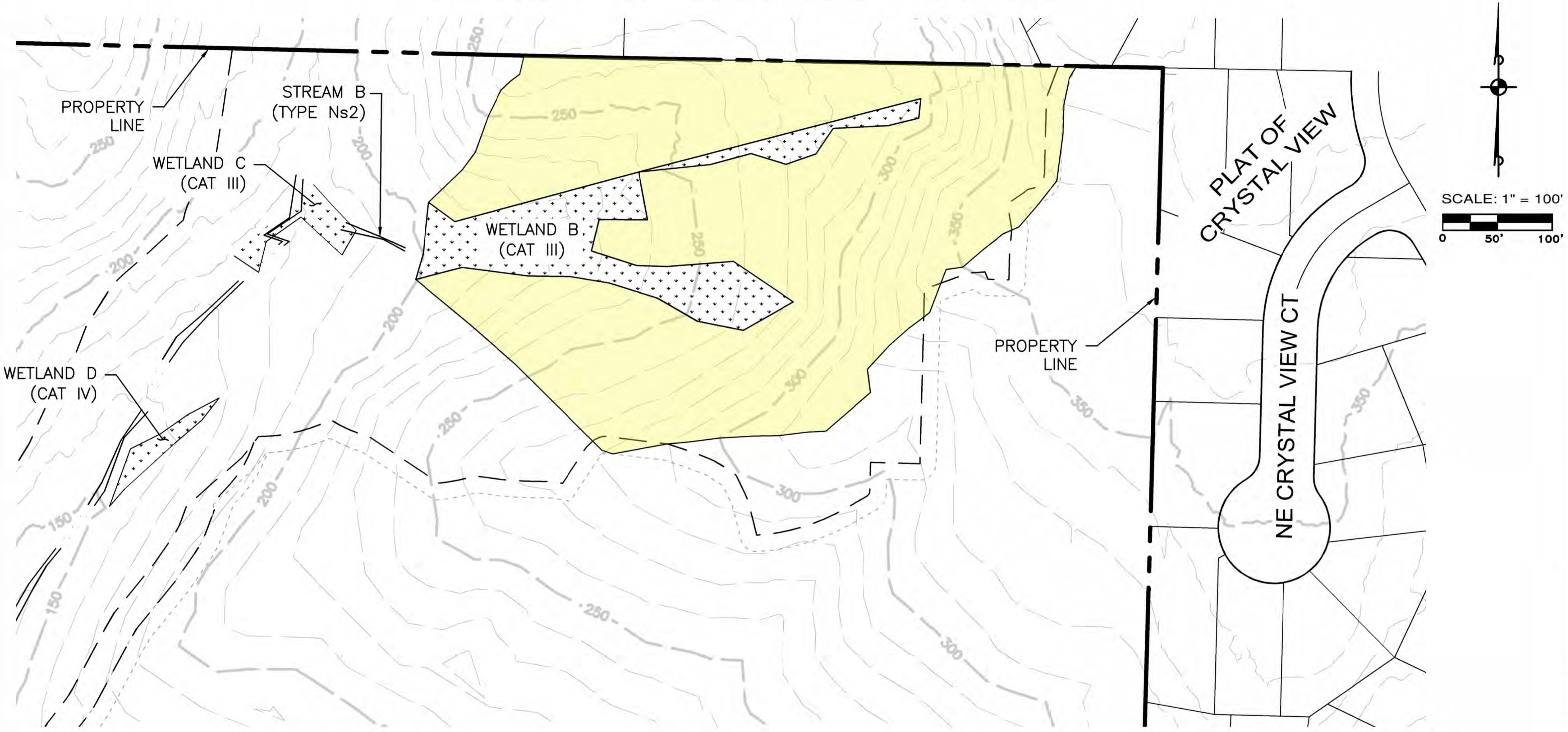
Esri, NASA, NGA, USGS, FEMA
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Appendix D – Wetland Hydroperiod Protection Analysis

PINNACLE AT LIBERTY BAY PLAT

WETLAND HYDROLOGY ANALYSIS

FIGURE 1 - EXISTING WETLAND BASIN MAP



LEGEND

🟨 C, FOREST, STEEP

WETLAND BASIN EX. CONDITION		
SURFACE COVERAGE	TOTAL SF	TOTAL AC
ROAD, MOD (SF)	0	0.000
C, LAWN, FLAT (SF)	0	0.000
C, FOREST, STEEP (SF)	134,158	3.080
TOTAL (SF)	134,158	–
TOTAL (AC)	–	3.080

DRAWING: BS-01

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Public Works | Project Management | Landscape Architecture

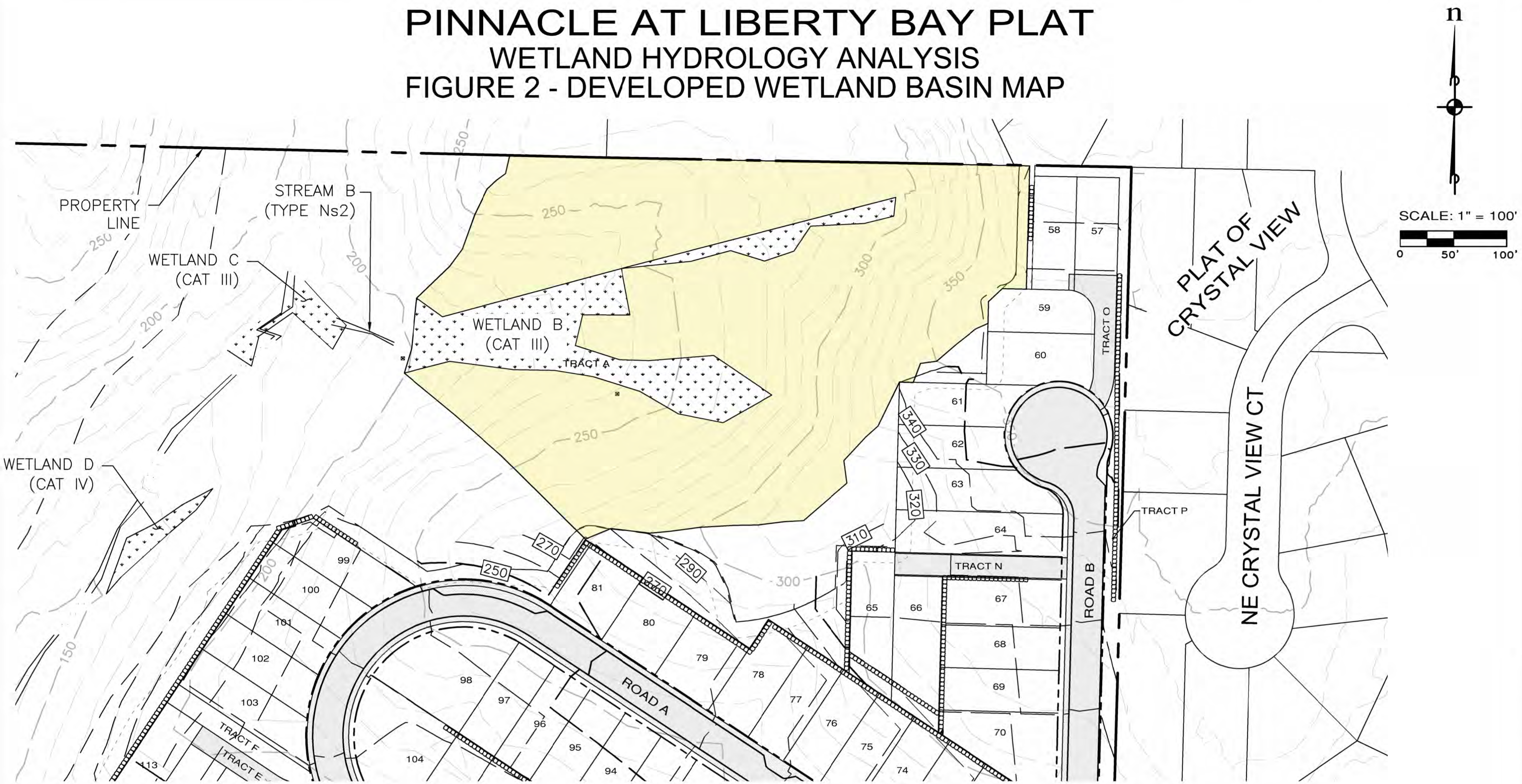
JOB NO. 2352-001-023
DATE: 10/31/2025
DRAWN: DRD
SHEET 1 OF 1

MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY PLAT

FIGURE 1 – EXISTING WETLAND BASIN MAP

PINNACLE AT LIBERTY BAY PLAT
WETLAND HYDROLOGY ANALYSIS
FIGURE 2 - DEVELOPED WETLAND BASIN MAP



LEGEND

🟨 C, FOREST, STEEP

WETLAND BASIN – POST–DEVELOPMENT CONDITION

SURFACE COVERAGE	TOTAL SF	TOTAL AC
ROAD, MOD (SF)	0	0.000
C, LAWN, FLAT (SF)	0	0.000
C, FOREST, STEEP (SF)	132,276	3.037
TOTAL (SF)	132,276	–
TOTAL (AC)	–	3.037

MONTEBANC MANAGEMENT, LLC

PINNACLE AT LIBERTY BAY PLAT

FIGURE 2 – DEVELOPED WETLAND BASIN MAP

DRAWING: BS–01

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DATE: 11/07/2025
DRAWN: DRD
SHEET 1 OF 1

WWHM2012

PROJECT REPORT

WETLAND B HYDROPERIOD PROTECTION ANALYSIS

General Model Information

WWHM2012 Project Name: 2025-11-11 - Wetland Hyd Analysis

Site Name:	Pinnacle at Liberty Bay
Site Address:	
City:	Poulsbo
Report Date:	11/11/2025
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 Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	3.08
Pervious Total	3.08
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.08

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

Mitigated Land Use

Developed Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Steep	3.037
Pervious Total	3.037
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.037

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1	

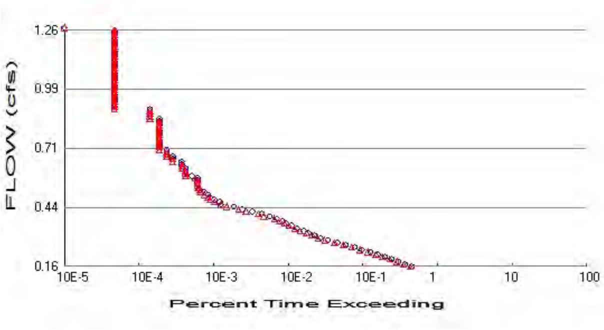
Routing Elements

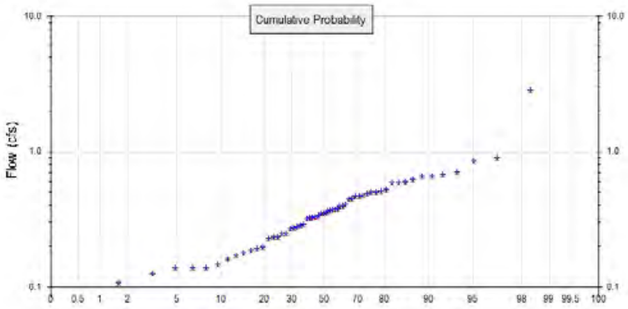
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	3.08
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	3.037
Total Impervious Area:	0

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.328401
5 year	0.552368
10 year	0.737459
25 year	1.017054
50 year	1.261054
100 year	1.537826

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.323816
5 year	0.544656
10 year	0.727164
25 year	1.002856
50 year	1.24345
100 year	1.516358

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.658	0.648
1950	0.197	0.195
1951	0.467	0.460
1952	0.226	0.223
1953	0.273	0.269
1954	0.655	0.646
1955	0.620	0.611
1956	2.844	2.804
1957	0.502	0.495
1958	0.680	0.671

1959	0.588	0.579
1960	0.349	0.344
1961	0.852	0.841
1962	0.246	0.243
1963	0.320	0.315
1964	0.270	0.267
1965	0.139	0.137
1966	0.707	0.697
1967	0.485	0.479
1968	0.468	0.461
1969	0.338	0.333
1970	0.347	0.342
1971	0.585	0.576
1972	0.478	0.471
1973	0.287	0.283
1974	0.373	0.368
1975	0.394	0.389
1976	0.508	0.501
1977	0.235	0.231
1978	0.406	0.401
1979	0.328	0.323
1980	0.249	0.245
1981	0.180	0.177
1982	0.161	0.158
1983	0.375	0.369
1984	0.138	0.136
1985	0.107	0.106
1986	0.325	0.320
1987	0.277	0.273
1988	0.233	0.229
1989	0.125	0.123
1990	0.147	0.145
1991	0.286	0.282
1992	0.323	0.319
1993	0.185	0.183
1994	0.441	0.435
1995	0.364	0.359
1996	0.451	0.444
1997	0.330	0.325
1998	0.379	0.374
1999	0.593	0.585
2000	0.192	0.189
2001	0.093	0.091
2002	0.897	0.885
2003	0.527	0.520
2004	0.171	0.168
2005	0.395	0.390
2006	0.501	0.494
2007	0.354	0.349
2008	0.366	0.361
2009	0.139	0.137

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	2.8437	2.8040
2	0.8970	0.8845
3	0.8525	0.8406

4	0.7072	0.6974
5	0.6804	0.6709
6	0.6577	0.6485
7	0.6553	0.6462
8	0.6199	0.6112
9	0.5933	0.5850
10	0.5876	0.5794
11	0.5846	0.5764
12	0.5273	0.5200
13	0.5080	0.5009
14	0.5023	0.4952
15	0.5006	0.4936
16	0.4855	0.4787
17	0.4779	0.4712
18	0.4676	0.4611
19	0.4667	0.4601
20	0.4508	0.4445
21	0.4411	0.4349
22	0.4062	0.4005
23	0.3950	0.3895
24	0.3945	0.3890
25	0.3791	0.3738
26	0.3747	0.3694
27	0.3730	0.3678
28	0.3664	0.3613
29	0.3642	0.3592
30	0.3540	0.3490
31	0.3489	0.3441
32	0.3473	0.3424
33	0.3380	0.3333
34	0.3301	0.3255
35	0.3280	0.3234
36	0.3246	0.3201
37	0.3233	0.3188
38	0.3199	0.3154
39	0.2873	0.2833
40	0.2860	0.2820
41	0.2769	0.2730
42	0.2726	0.2688
43	0.2704	0.2666
44	0.2488	0.2454
45	0.2464	0.2430
46	0.2345	0.2312
47	0.2325	0.2293
48	0.2265	0.2233
49	0.1973	0.1946
50	0.1922	0.1895
51	0.1853	0.1827
52	0.1797	0.1771
53	0.1706	0.1682
54	0.1605	0.1583
55	0.1473	0.1453
56	0.1386	0.1367
57	0.1385	0.1366
58	0.1380	0.1361
59	0.1250	0.1233
60	0.1073	0.1058
61	0.0926	0.0914

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1642	9638	9225	95	Pass
0.1753	7833	7501	95	Pass
0.1864	6404	6085	95	Pass
0.1974	5161	4896	94	Pass
0.2085	4205	3959	94	Pass
0.2196	3388	3206	94	Pass
0.2307	2689	2500	92	Pass
0.2418	2099	1941	92	Pass
0.2528	1652	1518	91	Pass
0.2639	1266	1171	92	Pass
0.2750	969	889	91	Pass
0.2861	723	663	91	Pass
0.2972	578	537	92	Pass
0.3082	479	448	93	Pass
0.3193	398	374	93	Pass
0.3304	345	309	89	Pass
0.3415	280	260	92	Pass
0.3525	237	218	91	Pass
0.3636	200	190	95	Pass
0.3747	181	165	91	Pass
0.3858	151	140	92	Pass
0.3969	120	101	84	Pass
0.4079	94	85	90	Pass
0.4190	70	58	82	Pass
0.4301	52	46	88	Pass
0.4412	40	32	80	Pass
0.4523	27	27	100	Pass
0.4633	26	22	84	Pass
0.4744	22	19	86	Pass
0.4855	19	18	94	Pass
0.4966	18	16	88	Pass
0.5077	16	14	87	Pass
0.5187	14	14	100	Pass
0.5298	13	13	100	Pass
0.5409	13	13	100	Pass
0.5520	13	13	100	Pass
0.5631	13	13	100	Pass
0.5741	13	12	92	Pass
0.5852	11	9	81	Pass
0.5963	9	9	100	Pass
0.6074	9	9	100	Pass
0.6185	9	8	88	Pass
0.6295	8	8	100	Pass
0.6406	8	8	100	Pass
0.6517	8	6	75	Pass
0.6628	6	6	100	Pass
0.6738	6	5	83	Pass
0.6849	5	5	100	Pass
0.6960	5	5	100	Pass
0.7071	5	4	80	Pass
0.7182	4	4	100	Pass
0.7292	4	4	100	Pass
0.7403	4	4	100	Pass

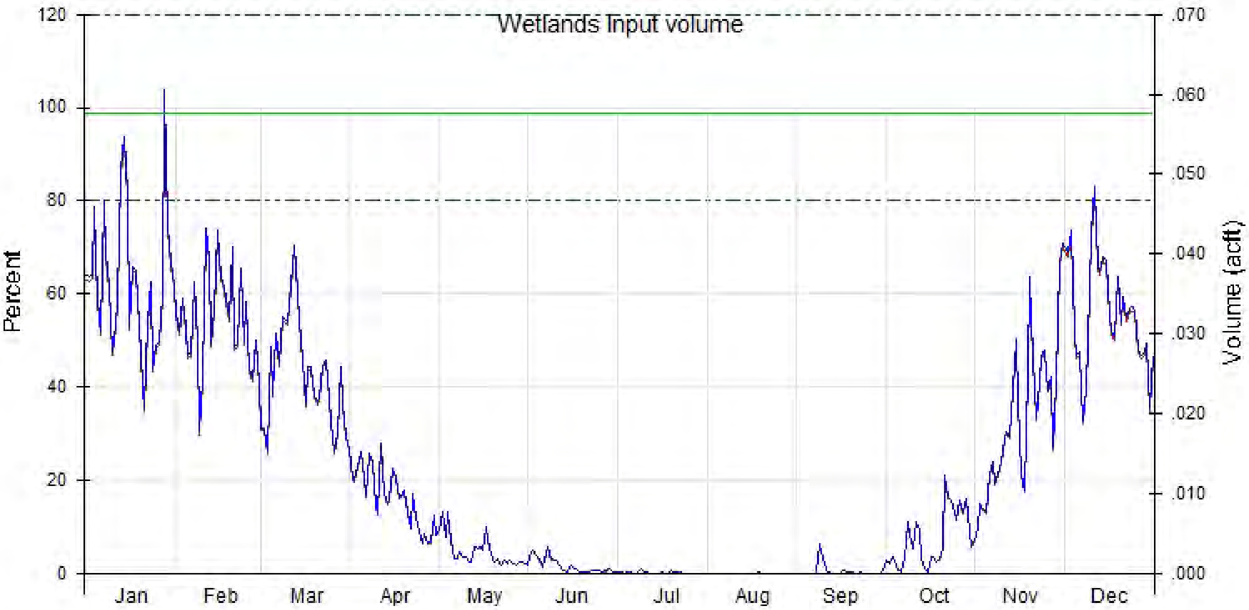
0.7514	4	4	100	Pass
0.7625	4	4	100	Pass
0.7736	4	4	100	Pass
0.7846	4	4	100	Pass
0.7957	4	4	100	Pass
0.8068	4	4	100	Pass
0.8179	4	4	100	Pass
0.8290	4	4	100	Pass
0.8400	4	4	100	Pass
0.8511	4	3	75	Pass
0.8622	3	3	100	Pass
0.8733	3	3	100	Pass
0.8844	3	3	100	Pass
0.8954	3	1	33	Pass
0.9065	1	1	100	Pass
0.9176	1	1	100	Pass
0.9287	1	1	100	Pass
0.9398	1	1	100	Pass
0.9508	1	1	100	Pass
0.9619	1	1	100	Pass
0.9730	1	1	100	Pass
0.9841	1	1	100	Pass
0.9952	1	1	100	Pass
1.0062	1	1	100	Pass
1.0173	1	1	100	Pass
1.0284	1	1	100	Pass
1.0395	1	1	100	Pass
1.0505	1	1	100	Pass
1.0616	1	1	100	Pass
1.0727	1	1	100	Pass
1.0838	1	1	100	Pass
1.0949	1	1	100	Pass
1.1059	1	1	100	Pass
1.1170	1	1	100	Pass
1.1281	1	1	100	Pass
1.1392	1	1	100	Pass
1.1503	1	1	100	Pass
1.1613	1	1	100	Pass
1.1724	1	1	100	Pass
1.1835	1	1	100	Pass
1.1946	1	1	100	Pass
1.2057	1	1	100	Pass
1.2167	1	1	100	Pass
1.2278	1	1	100	Pass
1.2389	1	1	100	Pass
1.2500	1	1	100	Pass
1.2611	1	1	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

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

Wetland Input Volumes



- Percent - Predeveloped - Mitigated

Wetlands Input Volume for POC 1
Average Annual Volume (acft)
Series 1: 501 POC 1 Predeveloped flow
Series 2: 801 POC 1 Mitigated flow

Month	**Series 1**	**Series 2**	**Percent**	**Pass/Fail**	**Excursion Threshold(cm)**	**Mitigated(cm)**	**Pass/Fail**
Jan	1.1347	1.1189	98.6	Pass			
Feb	0.9120	0.8992	98.6	Pass			
Mar	0.7826	0.7717	98.6	Pass			
Apr	0.2927	0.2886	98.6	Pass			
May	0.0869	0.0857	98.6	Pass			
Jun	0.0289	0.0285	98.6	Pass			
Jul	0.0033	0.0032	98.6	Pass			
Aug	0.0005	0.0005	98.6	Pass			
Sep	0.0081	0.0080	98.6	Pass			
Oct	0.1317	0.1299	98.6	Pass			
Nov	0.5616	0.5538	98.6	Pass			
Dec	1.0294	1.0150	98.6	Pass			

Day	**Predevel**	**Mitigated**	**Percent**	**Pass/Fail**
Jan1	0.0373	0.0368	98.6	Pass
2	0.0371	0.0365	98.6	Pass
3	0.0374	0.0369	98.6	Pass
4	0.0460	0.0453	98.6	Pass
5	0.0344	0.0339	98.6	Pass
6	0.0302	0.0298	98.6	Pass
7	0.0468	0.0461	98.6	Pass
8	0.0403	0.0398	98.6	Pass
9	0.0360	0.0355	98.6	Pass
10	0.0277	0.0273	98.6	Pass
11	0.0311	0.0307	98.6	Pass
12	0.0343	0.0339	98.6	Pass
13	0.0506	0.0499	98.6	Pass

14	0.0547	0.0539	98.6	Pass
15	0.0477	0.0470	98.6	Pass
16	0.0308	0.0304	98.6	Pass
17	0.0384	0.0379	98.6	Pass
18	0.0380	0.0375	98.6	Pass
19	0.0313	0.0309	98.6	Pass
20	0.0274	0.0270	98.6	Pass
21	0.0205	0.0203	98.6	Pass
22	0.0314	0.0310	98.6	Pass
23	0.0366	0.0361	98.6	Pass
24	0.0256	0.0252	98.6	Pass
25	0.0287	0.0283	98.6	Pass
26	0.0290	0.0286	98.6	Pass
27	0.0349	0.0345	98.6	Pass
28	0.0606	0.0598	98.6	Pass
29	0.0436	0.0430	98.6	Pass
30	0.0390	0.0385	98.6	Pass
31	0.0361	0.0356	98.6	Pass
Feb1	0.0327	0.0322	98.6	Pass
2	0.0303	0.0299	98.6	Pass
3	0.0344	0.0339	98.6	Pass
4	0.0309	0.0305	98.6	Pass
5	0.0272	0.0269	98.6	Pass
6	0.0275	0.0271	98.6	Pass
7	0.0365	0.0360	98.6	Pass
8	0.0293	0.0289	98.6	Pass
9	0.0176	0.0174	98.6	Pass
10	0.0244	0.0241	98.6	Pass
11	0.0432	0.0426	98.6	Pass
12	0.0395	0.0390	98.6	Pass
13	0.0288	0.0284	98.6	Pass
14	0.0331	0.0327	98.6	Pass
15	0.0430	0.0424	98.6	Pass
16	0.0371	0.0366	98.6	Pass
17	0.0368	0.0363	98.6	Pass
18	0.0346	0.0341	98.6	Pass
19	0.0319	0.0315	98.6	Pass
20	0.0410	0.0404	98.6	Pass
21	0.0284	0.0280	98.6	Pass
22	0.0288	0.0284	98.6	Pass
23	0.0382	0.0377	98.6	Pass
24	0.0290	0.0286	98.6	Pass
25	0.0340	0.0335	98.6	Pass
26	0.0257	0.0253	98.6	Pass
27	0.0243	0.0240	98.6	Pass
28	0.0293	0.0289	98.6	Pass
29	0.0237	0.0234	98.6	Pass
Mar1	0.0182	0.0179	98.6	Pass
2	0.0182	0.0179	98.6	Pass
3	0.0152	0.0150	98.6	Pass
4	0.0284	0.0280	98.6	Pass
5	0.0224	0.0221	98.6	Pass
6	0.0301	0.0297	98.6	Pass
7	0.0262	0.0259	98.6	Pass
8	0.0322	0.0318	98.6	Pass
9	0.0319	0.0314	98.6	Pass
10	0.0316	0.0311	98.6	Pass
11	0.0363	0.0358	98.6	Pass

12	0.0410	0.0404	98.6	Pass
13	0.0387	0.0382	98.6	Pass
14	0.0320	0.0316	98.6	Pass
15	0.0268	0.0264	98.6	Pass
16	0.0212	0.0209	98.6	Pass
17	0.0258	0.0255	98.6	Pass
18	0.0258	0.0254	98.6	Pass
19	0.0223	0.0220	98.6	Pass
20	0.0214	0.0211	98.6	Pass
21	0.0219	0.0216	98.6	Pass
22	0.0261	0.0258	98.6	Pass
23	0.0268	0.0264	98.6	Pass
24	0.0221	0.0218	98.6	Pass
25	0.0190	0.0187	98.6	Pass
26	0.0153	0.0151	98.6	Pass
27	0.0175	0.0173	98.6	Pass
28	0.0258	0.0255	98.6	Pass
29	0.0215	0.0212	98.6	Pass
30	0.0171	0.0169	98.6	Pass
31	0.0157	0.0155	98.6	Pass
Apr1	0.0118	0.0116	98.6	Pass
2	0.0117	0.0115	98.6	Pass
3	0.0134	0.0132	98.6	Pass
4	0.0153	0.0151	98.6	Pass
5	0.0121	0.0119	98.6	Pass
6	0.0097	0.0096	98.6	Pass
7	0.0150	0.0148	98.6	Pass
8	0.0140	0.0138	98.6	Pass
9	0.0085	0.0084	98.6	Pass
10	0.0074	0.0073	98.6	Pass
11	0.0162	0.0160	98.6	Pass
12	0.0101	0.0099	98.6	Pass
13	0.0087	0.0086	98.6	Pass
14	0.0093	0.0092	98.6	Pass
15	0.0132	0.0130	98.6	Pass
16	0.0121	0.0119	98.6	Pass
17	0.0094	0.0093	98.6	Pass
18	0.0097	0.0096	98.6	Pass
19	0.0104	0.0102	98.6	Pass
20	0.0077	0.0076	98.6	Pass
21	0.0056	0.0055	98.6	Pass
22	0.0099	0.0098	98.6	Pass
23	0.0070	0.0069	98.6	Pass
24	0.0054	0.0054	98.6	Pass
25	0.0037	0.0037	98.6	Pass
26	0.0050	0.0049	98.6	Pass
27	0.0037	0.0036	98.6	Pass
28	0.0039	0.0038	98.6	Pass
29	0.0072	0.0071	98.6	Pass
30	0.0048	0.0048	98.6	Pass
May1	0.0054	0.0054	98.6	Pass
2	0.0077	0.0076	98.6	Pass
3	0.0045	0.0045	98.6	Pass
4	0.0078	0.0077	98.6	Pass
5	0.0041	0.0040	98.6	Pass
6	0.0019	0.0019	98.6	Pass
7	0.0018	0.0018	98.6	Pass
8	0.0027	0.0027	98.6	Pass

9	0.0021	0.0021	98.6	Pass
10	0.0021	0.0021	98.6	Pass
11	0.0015	0.0015	98.6	Pass
12	0.0015	0.0015	98.6	Pass
13	0.0034	0.0033	98.6	Pass
14	0.0031	0.0031	98.6	Pass
15	0.0032	0.0032	98.6	Pass
16	0.0030	0.0029	98.6	Pass
17	0.0057	0.0057	98.6	Pass
18	0.0031	0.0031	98.6	Pass
19	0.0019	0.0019	98.6	Pass
20	0.0015	0.0015	98.6	Pass
21	0.0018	0.0018	98.6	Pass
22	0.0011	0.0011	98.6	Pass
23	0.0016	0.0016	98.6	Pass
24	0.0013	0.0013	98.6	Pass
25	0.0017	0.0017	98.6	Pass
26	0.0012	0.0012	98.6	Pass
27	0.0010	0.0010	98.6	Pass
28	0.0014	0.0014	98.6	Pass
29	0.0015	0.0014	98.6	Pass
30	0.0013	0.0013	98.6	Pass
31	0.0011	0.0011	98.6	Pass
Jun1	0.0027	0.0026	98.6	Pass
2	0.0029	0.0029	98.6	Pass
3	0.0023	0.0023	98.6	Pass
4	0.0018	0.0017	98.6	Pass
5	0.0009	0.0009	98.6	Pass
6	0.0017	0.0017	98.6	Pass
7	0.0032	0.0032	98.6	Pass
8	0.0018	0.0017	98.6	Pass
9	0.0016	0.0015	98.6	Pass
10	0.0017	0.0017	98.6	Pass
11	0.0010	0.0010	98.6	Pass
12	0.0003	0.0003	98.6	Pass
13	0.0001	0.0001	98.6	Pass
14	0.0003	0.0003	98.6	Pass
15	0.0010	0.0010	98.6	Pass
16	0.0006	0.0006	98.6	Pass
17	0.0005	0.0005	98.6	Pass
18	0.0002	0.0002	98.6	Pass
19	0.0002	0.0002	98.6	Pass
20	0.0001	0.0001	98.6	Pass
21	0.0002	0.0002	98.6	Pass
22	0.0005	0.0005	98.6	Pass
23	0.0005	0.0005	98.6	Pass
24	0.0003	0.0003	98.6	Pass
25	0.0002	0.0002	98.6	Pass
26	0.0002	0.0002	98.6	Pass
27	0.0003	0.0003	98.6	Pass
28	0.0005	0.0005	98.6	Pass
29	0.0002	0.0002	98.6	Pass
30	0.0001	0.0001	98.6	Pass
Jul1	0.0003	0.0003	98.6	Pass
2	0.0001	0.0001	98.6	Pass
3	0.0001	0.0001	98.6	Pass
4	0.0001	0.0001	98.6	Pass
5	0.0002	0.0002	98.6	Pass

6	0.0001	0.0001	98.6	Pass
7	0.0000	0.0000	98.6	Pass
8	0.0003	0.0003	98.6	Pass
9	0.0005	0.0005	98.6	Pass
10	0.0003	0.0003	98.6	Pass
11	0.0001	0.0001	98.6	Pass
12	0.0000	0.0000	98.6	Pass
13	0.0000	0.0000	98.6	Pass
14	0.0000	0.0000	98.6	Pass
15	0.0000	0.0000	98.6	Pass
16	0.0001	0.0001	98.6	Pass
17	0.0000	0.0000	98.6	Pass
18	0.0000	0.0000	98.6	Pass
19	0.0003	0.0003	98.6	Pass
20	0.0001	0.0001	98.6	Pass
21	0.0001	0.0001	98.6	Pass
22	0.0001	0.0001	98.6	Pass
23	0.0001	0.0001	98.6	Pass
24	0.0000	0.0000	98.6	Pass
25	0.0000	0.0000	98.6	Pass
26	0.0000	0.0000	98.6	Pass
27	0.0000	0.0000	98.6	Pass
28	0.0000	0.0000	98.6	Pass
29	0.0000	0.0000	98.6	Pass
30	0.0000	0.0000	98.6	Pass
31	0.0000	0.0000	98.6	Pass
Aug1	0.0000	0.0000	98.6	Pass
2	0.0000	0.0000	98.6	Pass
3	0.0000	0.0000	98.6	Pass
4	0.0000	0.0000	98.6	Pass
5	0.0000	0.0000	98.6	Pass
6	0.0000	0.0000	98.6	Pass
7	0.0000	0.0000	98.6	Pass
8	0.0000	0.0000	98.6	Pass
9	0.0000	0.0000	98.6	Pass
10	0.0000	0.0000	98.6	Pass
11	0.0000	0.0000	98.6	Pass
12	0.0000	0.0000	98.6	Pass
13	0.0000	0.0000	98.6	Pass
14	0.0000	0.0000	98.6	Pass
15	0.0000	0.0000	98.6	Pass
16	0.0000	0.0000	98.6	Pass
17	0.0000	0.0000	98.6	Pass
18	0.0001	0.0001	98.6	Pass
19	0.0000	0.0000	98.6	Pass
20	0.0000	0.0000	98.6	Pass
21	0.0000	0.0000	98.6	Pass
22	0.0000	0.0000	98.6	Pass
23	0.0001	0.0001	98.6	Pass
24	0.0001	0.0001	98.6	Pass
25	0.0000	0.0000	98.6	Pass
26	0.0000	0.0000	98.6	Pass
27	0.0000	0.0000	98.6	Pass
28	0.0000	0.0000	98.6	Pass
29	0.0000	0.0000	98.6	Pass
30	0.0000	0.0000	98.6	Pass
31	0.0000	0.0000	98.6	Pass
Sep1	0.0000	0.0000	98.6	Pass

2	0.0000	0.0000	98.6	Pass
3	0.0000	0.0000	98.6	Pass
4	0.0000	0.0000	98.6	Pass
5	0.0000	0.0000	98.6	Pass
6	0.0000	0.0000	98.6	Pass
7	0.0002	0.0002	98.6	Pass
8	0.0038	0.0037	98.6	Pass
9	0.0019	0.0019	98.6	Pass
10	0.0006	0.0006	98.6	Pass
11	0.0002	0.0002	98.6	Pass
12	0.0001	0.0001	98.6	Pass
13	0.0000	0.0000	98.6	Pass
14	0.0000	0.0000	98.6	Pass
15	0.0000	0.0000	98.6	Pass
16	0.0005	0.0005	98.6	Pass
17	0.0002	0.0002	98.6	Pass
18	0.0001	0.0001	98.6	Pass
19	0.0001	0.0001	98.6	Pass
20	0.0001	0.0001	98.6	Pass
21	0.0000	0.0000	98.6	Pass
22	0.0001	0.0001	98.6	Pass
23	0.0000	0.0000	98.6	Pass
24	0.0000	0.0000	98.6	Pass
25	0.0000	0.0000	98.6	Pass
26	0.0000	0.0000	98.6	Pass
27	0.0000	0.0000	98.6	Pass
28	0.0000	0.0000	98.6	Pass
29	0.0000	0.0000	98.6	Pass
30	0.0011	0.0011	98.6	Pass
Oct1	0.0016	0.0016	98.6	Pass
2	0.0012	0.0011	98.6	Pass
3	0.0021	0.0021	98.6	Pass
4	0.0011	0.0011	98.6	Pass
5	0.0004	0.0004	98.6	Pass
6	0.0002	0.0002	98.6	Pass
7	0.0019	0.0019	98.6	Pass
8	0.0064	0.0063	98.6	Pass
9	0.0050	0.0049	98.6	Pass
10	0.0031	0.0031	98.6	Pass
11	0.0064	0.0064	98.6	Pass
12	0.0054	0.0054	98.6	Pass
13	0.0018	0.0018	98.6	Pass
14	0.0006	0.0006	98.6	Pass
15	0.0003	0.0003	98.6	Pass
16	0.0021	0.0021	98.6	Pass
17	0.0021	0.0021	98.6	Pass
18	0.0015	0.0015	98.6	Pass
19	0.0018	0.0017	98.6	Pass
20	0.0031	0.0031	98.6	Pass
21	0.0123	0.0121	98.6	Pass
22	0.0095	0.0094	98.6	Pass
23	0.0092	0.0091	98.6	Pass
24	0.0078	0.0077	98.6	Pass
25	0.0067	0.0066	98.6	Pass
26	0.0091	0.0090	98.6	Pass
27	0.0076	0.0075	98.6	Pass
28	0.0093	0.0092	98.6	Pass
29	0.0076	0.0075	98.6	Pass

30	0.0033	0.0033	98.6	Pass
31	0.0041	0.0040	98.6	Pass
Nov1	0.0057	0.0056	98.6	Pass
2	0.0088	0.0087	98.6	Pass
3	0.0081	0.0080	98.6	Pass
4	0.0077	0.0076	98.6	Pass
5	0.0125	0.0123	98.6	Pass
6	0.0140	0.0138	98.6	Pass
7	0.0113	0.0111	98.6	Pass
8	0.0126	0.0124	98.6	Pass
9	0.0140	0.0138	98.6	Pass
10	0.0169	0.0166	98.6	Pass
11	0.0177	0.0175	98.6	Pass
12	0.0171	0.0168	98.6	Pass
13	0.0232	0.0229	98.6	Pass
14	0.0295	0.0291	98.6	Pass
15	0.0215	0.0212	98.6	Pass
16	0.0125	0.0123	98.6	Pass
17	0.0103	0.0101	98.6	Pass
18	0.0251	0.0248	98.6	Pass
19	0.0371	0.0366	98.6	Pass
20	0.0272	0.0268	98.6	Pass
21	0.0195	0.0192	98.6	Pass
22	0.0240	0.0237	98.6	Pass
23	0.0273	0.0269	98.6	Pass
24	0.0280	0.0276	98.6	Pass
25	0.0230	0.0227	98.6	Pass
26	0.0246	0.0242	98.6	Pass
27	0.0156	0.0154	98.6	Pass
28	0.0239	0.0236	98.6	Pass
29	0.0391	0.0385	98.6	Pass
30	0.0414	0.0408	98.6	Pass
Dec1	0.0410	0.0404	98.6	Pass
2	0.0403	0.0397	98.6	Pass
3	0.0431	0.0425	98.6	Pass
4	0.0303	0.0298	98.6	Pass
5	0.0272	0.0269	98.6	Pass
6	0.0277	0.0273	98.6	Pass
7	0.0190	0.0188	98.6	Pass
8	0.0233	0.0229	98.6	Pass
9	0.0290	0.0286	98.6	Pass
10	0.0427	0.0421	98.6	Pass
11	0.0485	0.0478	98.6	Pass
12	0.0386	0.0381	98.6	Pass
13	0.0378	0.0373	98.6	Pass
14	0.0396	0.0391	98.6	Pass
15	0.0392	0.0387	98.6	Pass
16	0.0325	0.0321	98.6	Pass
17	0.0305	0.0301	98.6	Pass
18	0.0297	0.0293	98.6	Pass
19	0.0372	0.0366	98.6	Pass
20	0.0316	0.0311	98.6	Pass
21	0.0347	0.0342	98.6	Pass
22	0.0320	0.0316	98.6	Pass
23	0.0332	0.0328	98.6	Pass
24	0.0333	0.0328	98.6	Pass
25	0.0330	0.0326	98.6	Pass
26	0.0282	0.0278	98.6	Pass

27	0.0274	0.0270	98.6	Pass
28	0.0278	0.0274	98.6	Pass
29	0.0289	0.0285	98.6	Pass
30	0.0206	0.0203	98.6	Pass
31	0.0273	0.0269	98.6	Pass

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

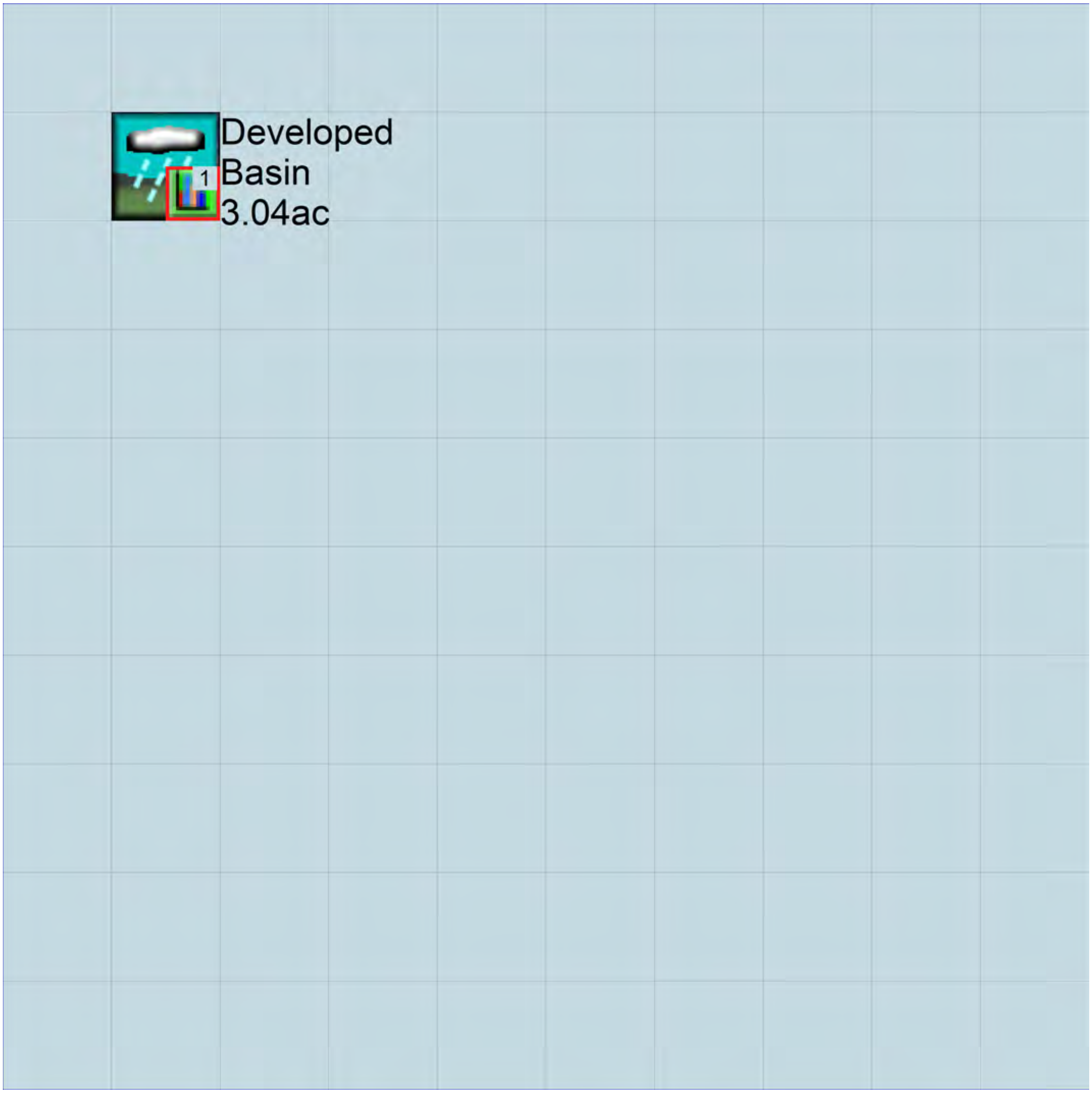
IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic

Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   2025-11-11 - Wetland Hyd Analysis.wdm
MESSU      25   Pre2025-11-11 - Wetland Hyd Analysis.MES
           27   Pre2025-11-11 - Wetland Hyd Analysis.L61
           28   Pre2025-11-11 - Wetland Hyd Analysis.L62
           30   POC2025-11-11 - Wetland Hyd Analysis1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Pre-Developed 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           ***
   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    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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre-Developed Basin***
PERLND  12                        3.08     COPY   501     12
PERLND  12                        3.08     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    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
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   2025-11-11 - Wetland Hyd Analysis.wdm
MESSU      25   Mit2025-11-11 - Wetland Hyd Analysis.MES
           27   Mit2025-11-11 - Wetland Hyd Analysis.L61
           28   Mit2025-11-11 - Wetland Hyd Analysis.L62
           30   POC2025-11-11 - Wetland Hyd Analysis1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Developed 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           ***
   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    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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Developed Basin***
PERLND  12                       3.037     COPY   501     12
PERLND  12                       3.037     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    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
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
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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