Madrona Ridge

Stormwater Site Plan Report

August 12, 2021

Prepared for

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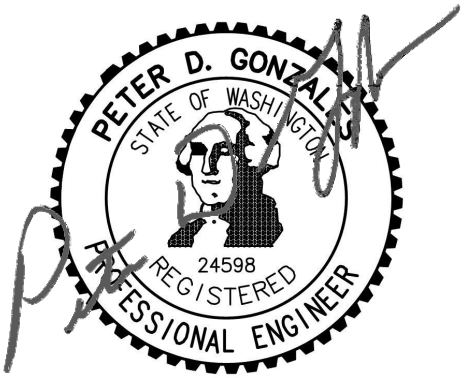

08/12/2021

Submitted by

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Section Tab #1

1. PROJECT OVERVIEW

The proposed Madrona Ridge project is located on the west side of Rainier Street, north of the intersection of Rainier Street & Discovery Road within Section 09, Township 30 North, Range 01 West, W.M.), City of Port Townsend, WA 98368. The site contains parcels 00109-1002 that is partially zoned R-II & R-III (Singe Family & Multi Family respectively), 00109-2005 zoned R-II, 00109-2006 zoned R-III, 97380-0201, and 97380-0301 for a total of 39.8 acres; however, the project will only disturb 27.75 acres. The proposed project is a residential development with 167 lots, pedestrian access, utility services, and detention ponds for stormwater flow control & water quality mitigation. Refer to Figure 1.1 and 1.3 for a vicinity map and proposed conditions, respectively.

The 2014 Stormwater Management Manual for Western Washington (SWMMWW) was used to construct this Stormwater Site Plan Report, with additional guidance from the pre-application conference summary for the proposed development. A Geotechnical Report has been prepared for this project and are included in the appendix of this report.

The site is a located at a topographic high point with very limited potential upstream run-on from the adjacent parcel to the north. Since the site is a high point, there are 2 threshold discharge areas that the site drains to (cardinally east and west). The proposed Pond 1 will discharge to the west and the remaining ponds will discharge to the east which are the natural discharge locations for the project site. Refer to Sections 3 & 4 of this report for more information.

Water quality treatment required for this project is Basic Treatment because the runoff is not tributary to a fish-bearing stream prior to convergence with a major receiving water. Refer to Sections 2 & 4 of this report for more information.

Figure I-2.4.1 Flow Chart for Determining Requirements for New Development

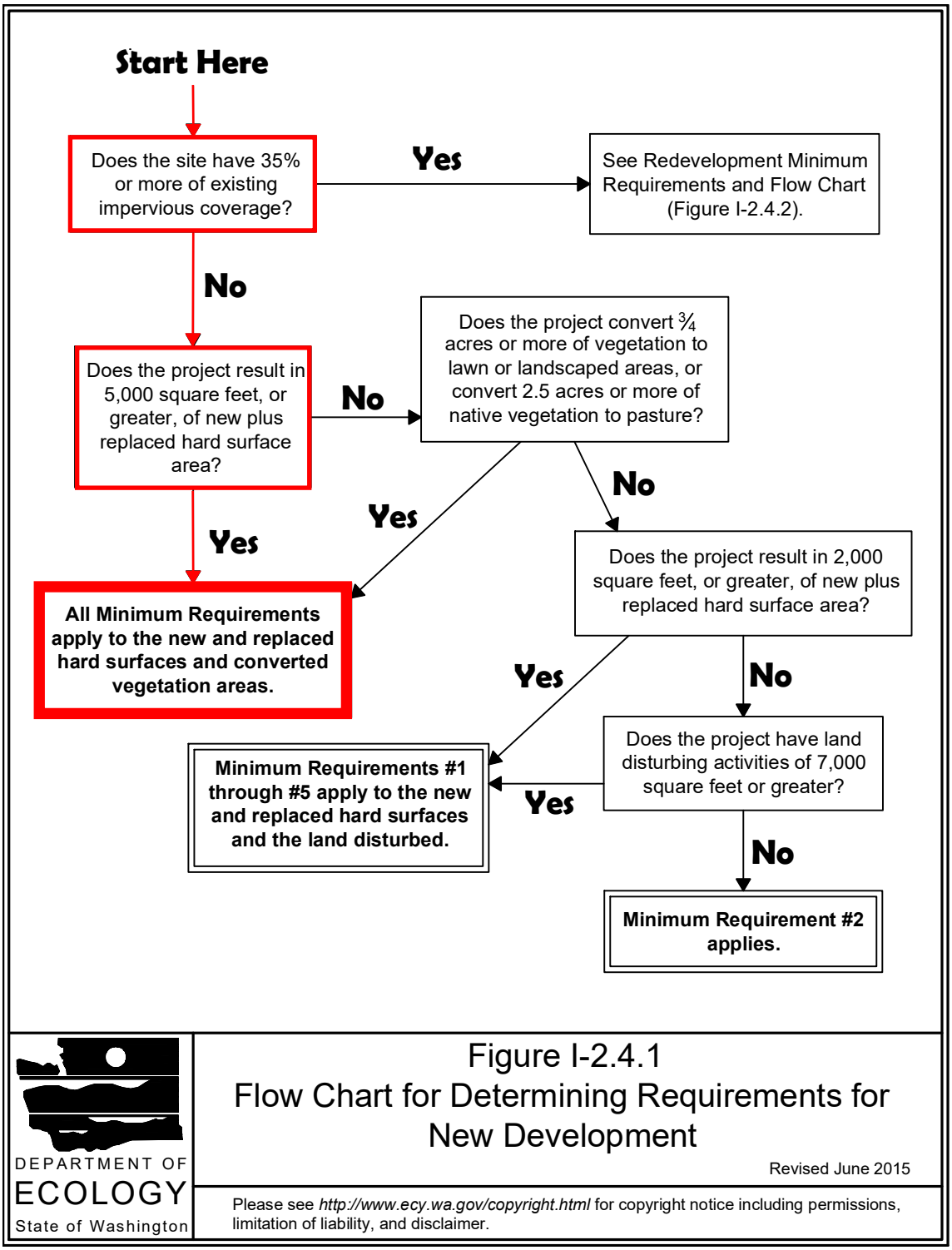
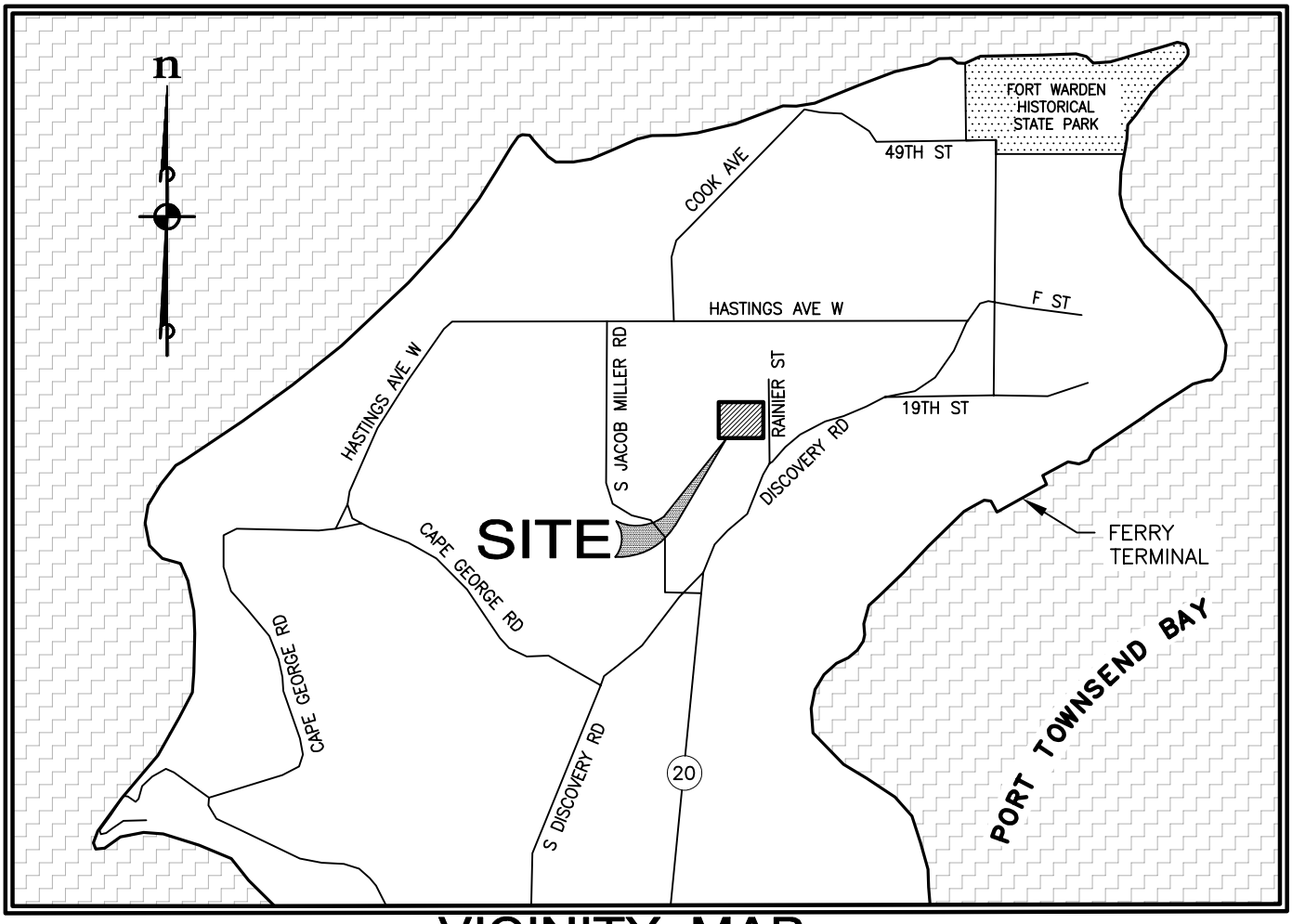


Figure 1.1



VICINITY MAP

NOT TO SCALE

TDA 1

TDA 2

Basin Break (Approx.)

Project Parcel Boundary

PARCEL D

18TH ST.

16TH ST.

15TH ST.

13TH ST.

RAINIER ST.

SPRING ST.

HOOD ST.

BAKER ST.

SHASTA ST.

WETLAND/WETLAND BUFFER APPROXIMATE LOCATION, NOT SURVEYED

LIDAR CONTOUR BOUNDARY (TYP.)

CONTOURS IN THIS AREA ARE FROM ANDERSON CIVIL ENGINEERS & SURVEYORS PORT TOWNSEND, WA. DATE OF MAPPING UNKNOWN.

SCALE: 1" = 60'

60 30 0 60 120

NOTE:
MAPPING AND WETLAND INFORMATION FROM DAVID EVANS AND ASSOCIATES. LIDAR CONTOURS AND OUTSIDE SOURCE CONTOURS ALSO UTILIZED. SEE DRAWING FOR BOUNDARIES/LIMITS

BLOCK 2 MOTORLINE ADD. VOL. 2 OF PLATS, PG. 10

BLOCK 3 VOL. 2 OF PLATS, PG. 10 MOTORLINE ADD.

BLOCK 56 COLUMBIA PARK.

BLOCK 15

PHILLIPS ADD. VOL. 2 OF PLATS, PG.2

30' PRIVATE ACCESS AND UTILITY EASE. PER A.F.N. 449206

24' PUBLIC ACCESS AND UTILITY EASEMENT PER A.F.N. 539061

30' ACCESS AND UTILITY EASE. PER A.F.N. 312280

40' ACCESS AND UTILITY EASE. PER A.F.N. 312280

A.P.N. 001-092-005

A.P.N. 001-092-006

001091001

001092004

001092001

973800201

973800301

954000101

WETLAND WL-#M

WETLAND WL-#E

WETLAND WL-#3

WETLAND A1

WETLAND A2

WETLAND A3

WETLAND WL-#5

Figure 1.2 - Existing Conditions

REVISIONS

NO.	DESCRIPTION/DATE	BY

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Civil Engineering
Public Works
Land Planning
Landscape Architecture
Land Surveying
Project Management

MADRONA RIDGE PUD

EXISTING CONDITIONS

PORT TOWNSEND WASHINGTON

JOB NO.	2090-003-021
DWG. NAME	EN-01
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
DATE:	06/10/2021

EN-01

1 OF 1 SHEETS

File: \\esm8\ENGR\LSM-JOBS\2090\003\021\exhibits\EN-01.dwg
Plotted: 6/5/2021 7:55 AM
Plotted By: Chad Cartendall

TDA 1

TDA 2

UPSAN DOWN LN

TRACT F

TRACT H

RAINIER ST

18TH ST

16TH ST

15TH ST

PICKETT CT

UPSAN DOWNS LN

PEGEEN CT

BEAUREGARD CT

MADRONA BLVD

KNICKERBOCKER CT

TRACT E

MONTEBANC CT

BURNSIDE BLVD

TRACT G

TRACT A STORM POND 1

TRACT B STORM POND 2

TRACT C STORM POND 3

TRACT D STORM POND 4

TRACT I OPEN SPACE

(POTENTIAL JANKE PARK DEDICATION)

TRACT O OPEN SPACE

TRACT P OPEN SPACE

TRACT Q OPEN SPACE

TRACT R OPEN SPACE

TRACT S OPEN SPACE

TRACT T OPEN SPACE

PLAY AREA

Pervious area dispersed to wetland

n

SCALE: 1" = 60'

50 30 0 60 120

CONTOUR INTERVAL = 2'

MADRONA RIDGE PRE-PLAT P.U.D.

File: \\esmfs\ENGR\ESM--JOBS\2090\003\021\exhibits\EN-12.dwg
Plotted: 8/2/2021 10:29 AM
Plotted By: Carr Roberts

Figure 1.3 - Proposed Conditions

Map Scale: 1:4,420 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:20,000.

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: Jefferson County Area, Washington
Survey Area Data: Version 19, Jun 4, 2020

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

Date(s) aerial images were photographed: Apr 27, 2019—May 10, 2019

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmC	Clallam gravelly sandy loam, 0 to 15 percent slopes	D	83.0	100.0%
Totals for Area of Interest			**83.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Section Tab #2

2. EXISTING CONDITIONS

The existing project currently has a local flat area near an existing dwelling at the high point of the site with vehicle access. From there, the site generally slopes east & west into 2 separate Threshold Discharge Areas (TDA). The remainder of the parcels are undeveloped and are largely undisturbed. There are Category III wetlands located within the parcel boundaries and are documented in greater detail in the Wetland Report, included in Appendix D of this report. Refer to Figure 1.2 for existing conditions.

According to the information available in the public GIS portal, the site is not within a flood hazard area, there are no steep slopes onsite, there are no landslide hazards within the project site, and the risk of liquefaction appears to be very low. Due to the existing dwelling onsite, there is a septic tank which will be removed prior to construction.

According to NRCS's Web Soil Survey, the onsite soils are Clallum Gravely Sandy loam ranging from 0 to 15 percent slopes with a hydrologic soil group rating of D. Refer to Figure 1.4 for the Web Soil Survey.

Section Tab #3

3. OFFSITE ANALYSIS

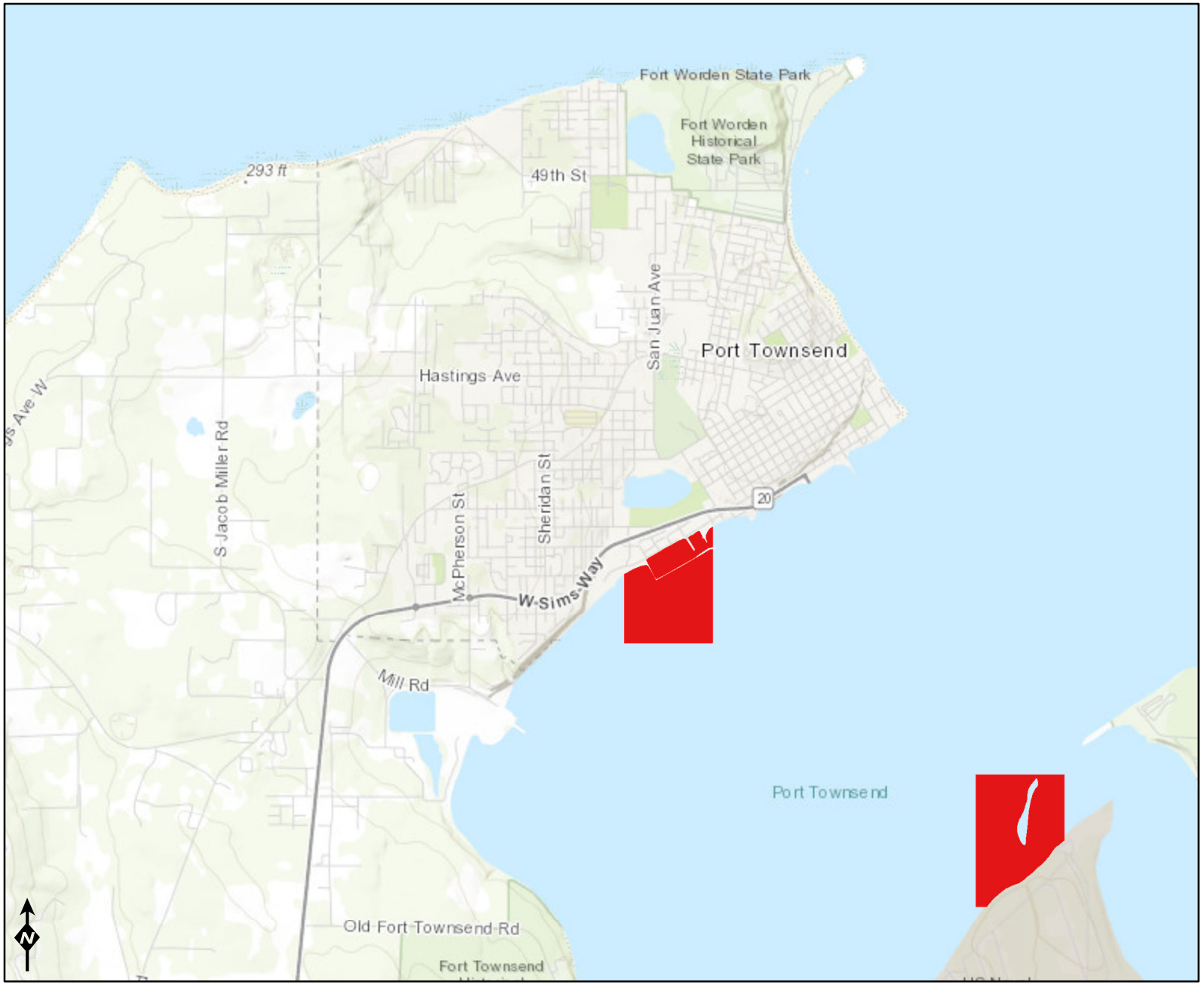
The existing project site drains to 2 separate discharge areas (west & southeast) and does not appear to have any upstream tributary areas that drain to the site.

The westerly portion of the project site that drains to the west TDA (as shown in Figure 3.1) hydrates Wetland C3 and continues downstream to a lowland area. The easterly portion of the project site that drains to the southeast TDA (also shown in Figure 3.1) hydrates the various wetlands along that easterly parcel boundary and continues downstream with wetland overflow.

The downstream stormwater system in both TDAs is comprised of natural features and appears to be adequate to convey the existing stormwater flows. There were no notable or applicable drainage complaints located for the project site. The only downstream 303(d) listed water is the Port Townsend Bay (approx. 1 mile downstream) with various contaminants, refer to Figure 3.3 for all 303(d) listings.

July 27, 2021

Water Quality Atlas



Assessed Water/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

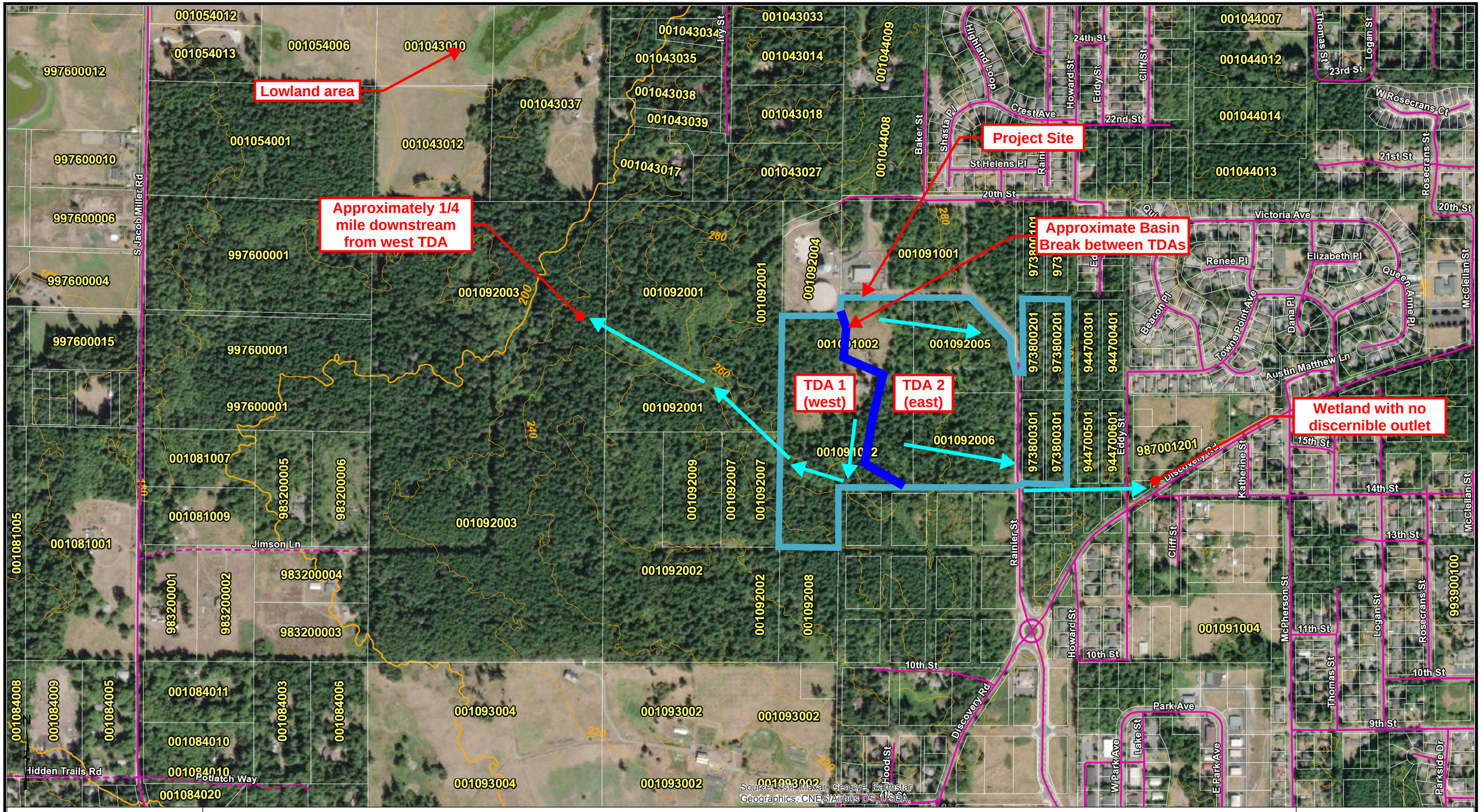
Miles
0 0.5 1 2

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and

DEPARTMENT OF ECOLOGY
State of Washington

Category 5, 303(d) Listings

Listing ID	Parameter	Details
63391	Benzo(a)anthracene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63391
63392	Benzo(a)pyrene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63392
63393	Benzo(b)fluoranthene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63393
63394	Benzo(k)fluoranthene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63394
63395	Chrysene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63395
63396	Dibenzo(a,h)anthracene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63396
63404	Indeno(1,2,3-c,d)pyrene	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63404
63410	Polychlorinated Biphenyls (PCBs)	https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?LISTING_ID=63410



These data are provided on an "AS-IS" basis, without warranty of any type, expressed or implied, including but not limited to any warranty as to their performance, merchantability, or fitness for any particular purpose.

Jefferson County, WA

1:9,083

Date: 7/27/2021

This map is not a substitute for accurate field surveys or for locating actual property lines and any adjacent features.

Section Tab #4

4. PERMANENT STORMWATER CONTROL PLAN

This project has 2 TDAs that do not converge downstream. Multiple detention ponds with dead storage are proposed to meet flow control and water quality requirements for each TDA and each basin tributary to any given pond independently of the other ponds implemented as part of this project.

The 2012 Western Washington Hydrology Model (WWHM) was used to size the detention facilities in accordance with the requirements of the SWMMWW.

Since the project is located within a Basic Water Quality Treatment area, the project is only subject to Basic Water Quality Treatment requirements as defined in the SWMMWW.

Predeveloped Site Hydrology

The total parcel area is 39.8 acres; however, the project disturbance limit area is 27.75 acres in total. The project site contains wetlands and stormwater excess stormwater downstream in 2 separate TDAs. To determine the developed condition compliance for site improvements with respect to flow control mitigation, the predeveloped land use condition is considered to be flat till forest (the steeper portions of the site will not be disturbed and are conservatively not included in the model).

Refer to Table 4.1 below for the predeveloped hydrology model Land Use basin input.

Table 4.1: Hydrology Model - Predeveloped Land Cover Types

Land Cover Types	Predeveloped Disturbance Limits (Acres)					
	TDA 1 & 2	TDA 1 (west)	TDA 2 (east)			
	Total	Pond 1	Pond 2	Pond 3	Pond 4	Bypass
Forest (Flat)	**27.75**	7.92	8.53	7.06	3.81	0.43

Developed Site Hydrology

Due to the ever-evolving nature of site plan development, exact numbers for each pond basin area & land use type cannot be fully defined until the final submittal; therefore, a simplified approximation of land use area distribution has been used for preliminary sizing and will be updated with the final report to reflect the final site design. The following tables show the site-wide land use area percent (defined as percent area of a given land use type within the disturbance limits of the project) and the estimated total tributary basin area for each pond. With those factors and the assumption that land use distribution across the site is approximately homogeneous (which is generally true with an optimized site plan), each pond tributary basin is assumed to have a similar land use proportion to the total area within the disturbance limits.

Example Computation:

If the total area within the disturbance limits is 27.75 acres and the total proposed impervious area is 16.80 acres, then the overall impervious percentage is 61%. If Basin 1 for Pond 1 is 7.92 acres, then 7.92 * 61% = 4.79 acres of impervious are estimated to drain to Pond 1 and the remainder is pervious landscaped area.

Refer to the following tables for a site-wide summarization of the above example computation and the corresponding hydrology model inputs.

In the developed condition, the pervious and impervious surfaces will all be collected or graded to flow into the appropriate detention pond to maintain predeveloped discharge rates and volumes as required. The discharge peaks and flow exceedances from each detention pond will comply the threshold set by the corresponding predeveloped area. There are areas within the clearing limits that cannot be collected and routed to (bypass) a detention facility; however, these bypass areas are small (0.7 acres or less). Due to the limited size of the bypass areas, the 100-year peak unmitigated runoff flow rate is less that a 0.15 cubic-feet-per-second increase over the existing 100-year peak flow rate; therefore, no further flow control mitigation is required. These bypass areas utilize various dispersion methods to dissipate concentrated runoff prior to rehydrating the adjacent wetlands. BMPs include splash blocks (Basic Dispersion) for the roofs, a dispersion trench for the runoff from the paved areas, and sheet flow dispersion for the pervious areas.

Table 4.2: Developed Land Cover Types within Disturbance Limits

Land Cover Types	Total (Acres)	Impervious (Acres)	Percent Impervious
Lots	15.48	8.88	32.0%
Roads	7.54	5.90	21.2%
Open Space & Pond Tracts	4.73	2.01	7.3%
Total	**27.75**	**16.80**	**60.5%**

Table 4.3: Developed Land Use within TDAs (WWHM Input)

Pond & TDA	Total (Acres)	Impervious* (Acres)	Pervious** (Acres)
Pond 1, TDA 1	7.92	4.79	3.13
Pond 2, TDA 2	8.53	5.16	3.37
Pond 3, TDA 2	7.06	4.30	2.76
Pond 4, TDA 2	3.81	2.31	1.50
Bypass, TDA 2	0.43	0.00	0.43
Total	**27.75**	**16.80**	**10.95**

* Impervious coverage is 61% (60.5% rounded up), pervious coverage (Lawn) is the remainder of the total areas that is not impervious.
** BMP T5.13: Post-Construction Soil Quality and Depth allows “Lawn” to be modeled as “Pasture”.

Flow Control System

This project proposes to create more than 10,000 square feet of total effective impervious surface within each TDA; therefore, flow control must be provided to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions. Detention ponds for each of the 4 basins onsite are sized to mitigate all proposed improvements that can be collected and conveyed to each facility. A summary description of the overall flow control system is provided below, refer to Appendix C for the full hydrology model output.

TDA 1 - Pond 1

The area draining to this pond is composed of lots, right-of-way, and open space. Some area along the westerly basin boundary bypasses collection and disperses into the adjacent vegetation offsite. The pond volume and flow control structure (fully detailed in Appendix C of this report) is sized such that the mitigated outflow rates are within acceptable thresholds for the mitigated area.

TDA 2 - Pond 2

The area draining to this pond is composed of lots, right-of-way, and open space. Some area along the northerly basin boundary bypasses collection and disperses onto the adjacent property. The pond volume and flow control structure (fully detailed in Appendix C of this report) is sized such that the mitigated outflow rates are within acceptable thresholds for the mitigated area.

TDA 2 - Pond 3

The area draining to this pond is composed of lots, right-of-way, and open space. Some pervious area along the easterly basin boundary between the pond tract and the adjacent wetland bypasses collection and disperses east into the wetland tract. The areas of bypassed runoff converge within 1/4 mile of the pond discharge, the pond volume and control structure design mitigates the effects of the bypassed peak flows, the 100-year peak flow from the bypass area is less than 0.4 cfs, the bypass runoff will be dispersed through dispersion BMPs (sheetflow dispersion) to eliminate adverse downstream impacts, and all areas of bypass are considered to be non-pollution generating; therefore, this area of bypass flows is in compliance with current flow control and treatment standards.

This pond volume and flow control structure (fully detailed in Appendix C of this report) is sized such that the mitigated outflow rates are within acceptable thresholds for the mitigated area (including the bypassed runoff).

TDA 2 - Pond 4

The area draining to this pond is composed of lots, right-of-way, and open space. The pond volume and flow control structure (fully detailed in Appendix C of this report) is sized such that the mitigated outflow rates are within acceptable thresholds for the mitigated area.

In summary, Pond 1 within TDA 1 is only responsible for its own tributary area; however, Ponds 2 -4 act both independently and in concert to mitigate the effects of development on stormwater peak runoff rates for their respective and collective mitigation areas. Ponds 2 – 4 pass the thresholds established for each pond in isolation

and the overall combined flows from ponds 2 – 4 are also in compliance with the overall area for those ponds with the mitigated bypass area.

Tables 4.4 and 4.5 below show the proposed detention volume meets the modeled detention volume (with the given factor of safety) and that the peak flows of the modeled volume meet the Conservation flow control requirements from WWHM. Refer to Appendix C for the hydrology model output.

Table 4.4: Modeled vs. Provided

Pond #	Modeled (Ac-Ft)	Provided (Ac-Ft)	% Over Modeled
1	4.00	5.74	44%
2	4.18	4.25	1.7%
3	2.07	2.07	0%
4	2.48	3.06	23%

Table 4.5: Hydrology Model Peak Flows (Bypass Only, POC 5 in WWHM output)

Return Period	Predeveloped (CFS)	Developed (CFS)
100-year	0.0227	0.0226

Water Quality System

This project proposes to create more than 5,000 square feet of Pollution Generating Hard Surface (PGHS); therefore, stormwater treatment is required.

Both TDA 1 and TDA 2 have the same Basic Water Quality Treatment requirement. Each proposed detention pond (Pond 1 through Pond 4) will provide an adequate dead-storage volume (as determined by WWHM) below its live-storage elevation to treat stormwater in a Wetpond and will be configured with cells in accordance with the design specifications for BMP T10.10: Wetponds - Basic & Large of the SWMMWW. Those specifications include 3:1 length to width ratio, 2 cells separated by a berm 1' below the dead-storage elevation, cell 1 with 25% to 35% of the total water quality volume (excluding access ramp), pond inlet minimum 2-feet off the bottom of cell 1, and a maximum wetpond depth of 8-feet. Specifications for each water quality pond are shown on the pond detail sheets of the submitted plan set.

The bypass areas within the project site are not considered to be pollution generating and do not require treatment.

Conventional Conveyance System Analysis and Design

Conveyance analysis and design will be fully documented in the final version of this report. The proposed stormwater conveyance system will convey the 25-year peak flow event and contain the 100-year backwater event. The flows used in the design will be derived from a separate WWHM site model where each catchment area has a designated land use basin element and corresponding POC number. For example, the land use basin element tributary to CB#12 would be connected to POC 12.

Refer to this section of the final report for more information and detailed calculations.

Flow Control BMPs

The project will evaluate List #2 of the SWMMWW and implement the resultant BMPs.

BMPs for all new pervious (lawn & landscaped) areas within the disturbance limits of the project:

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

BMPs for the proposed roofs of the project:

1. Full Dispersion is not feasible due to the limited availability of vegetated areas to which the proposed roofs would be dispersed. Downspout Full Infiltration Systems are not feasible due to the limited latent infiltration capacity of the in-situ till soils onsite.

2. Bioretention is not feasible due to the limited infiltration capacity onsite any potential bioretention unit design proposed would require an underdrain to prevent mosquito breeding, which would circumvent the desired and intended flow attenuation effects of this BMP. Furthermore, bioretention is not feasible with the given space limitations on the lots and in the ROW within the proposed site configuration.

3. BMP T5.10B: Downspout Dispersion Systems (splash blocks specifically) will be applied to Lot 1 (adjacent to the wetland tract by Pond 3) because space is available to do so and there are no adjacent slopes greater than 20%. For simplicity, the modeling credit for this one roof (50% impervious / 50% landscape) has been conservatively neglected.

4. BMP T5.10C: Perforated Stub-out Connections will be applied to all proposed roofs in this project (aside from Lot 1 as noted above) because those areas must be collected in pipes to drain to the designated discharge locations throughout the site.

BMPs for the remaining proposed hard surfaces of the project:

1. Full Dispersion is not feasible due to the limited vegetated flow path area onsite that is topographically available for runoff dispersion. Additionally, the project will not retain sufficient vegetation (65%) to qualify for this BMP.

2. Permeable Pavement is not proposed for this project due to the limited infiltration capacity across the site. Given that infiltration restriction, this BMP would require an underdrain to function properly and would no longer satisfy Minimum Requirement #5.

3. Bioretention is not feasible due to the limited infiltration capacity onsite since any potential bioretention unit design proposed would require an underdrain to prevent mosquito breeding, which would circumvent the desired and intended flow attenuation effects of this BMP. Furthermore, bioretention is not feasible with the given space limitations on the lots and in the ROW within the proposed site configuration.

4. Sheet Flow Dispersion and Concentrated Flow Dispersion are not feasible for this project due to the space limitations of the proposed site configuration.

Section Tab #5

5. DISCUSSION OF MINIMUM REQUIREMENTS

All minimum requirements apply to the new and replaced hard surfaces and converted vegetation areas in accordance with Figure I-2.4.1 from the SWMMWW. Below, each minimum requirement is listed and how the project satisfies them.

Minimum Requirement #1 - Preparation of Stormwater Site Plans

A Stormwater Site Plan Report outline and checklist (Section 1) and stormwater site plans are being provided with this submittal.

Minimum Requirement #2 - Construction Stormwater Pollution Prevention Plan (SWPPP)

The SWPPP will be included in Appendix B of the final version of this report.

Minimum Requirement #3 - Source Control of Pollution

The applicable construction source control BMPs for this project include silt fence, stabilized construction access, and catch basin inserts to mitigate the effects of construction activities on downstream water quality. All applicable BMPs will be shown on the grading sheets of the construction plans.

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

The project site will maintain the natural drainage patterns of the existing site by discharging proportionately to each of the 2 TDAs at the natural discharge locations of the site.

Minimum Requirement #5 - On-site Stormwater Management

Since this project triggers Minimum Requirements #1 through #9, List #2 will be applied to the project to satisfy this Minimum Requirement. BMPs have been fully evaluated for each surface in accordance with the SWMMWW and the results are documented under Flow Control BMPs of Section 4 in this report. The following is a summary listing of the BMPs applied throughout the project:

5. BMP T5.13 applied to new pervious surfaces

6. Basic Dispersion BMPs will be applied to eliminate concentrated runoff from bypassed areas and mitigated pond discharges.

Lawn and landscaped areas:

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

   This BMP's design criteria are feasible for this project, where the slope is not greater than 33%, and shall be followed in accordance with the SWMMWW. Areas meeting the design guidelines have been entered into the approved runoff models as "Pasture" rather than "Lawn".

Minimum Requirement #6 - Runoff Treatment

Basic water quality treatment is provided in the dead-storage of the detention ponds, Refer to Section 4: Water Quality System of this report for more information.

Minimum Requirement #7 - Flow Control

The composite stormwater flow control system (Pond 1 for TDA 1 and Ponds 2-4 for TDA 2) are designed to meet flow control mitigation requirements for their respective tributary areas; therefore, the project is in compliance with the applicable flow control mitigation standards.

Refer to Section 4: Flow Control System for more information.

Minimum Requirement #8 - Wetlands Protection

The project proposes to develop the site outside of the all adjacent wetland buffers and discharge only flow mitigated and treated water to the wetlands, which is sufficient for wetlands protection.

Minimum Requirement #9 - Operations and Maintenance

The Operations and Maintenance Manual will be included in Appendix A of the final version of this report.

Minimum Requirement #10 – Offsite Analysis

Refer to Section 3: Offsite Analysis of this report for more information.

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APPENDIX A – OPERATIONS AND MAINTENANCE MANUAL

The operation and maintenance manual will be provided in the final version of this report.

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APPENDIX B - CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

The SWPPP will be provided in this appendix of the final version of this report.

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APPENDIX C - HYDRAULIC / HYDROLOGIC ANALYSIS AND MODELING RESULTS

The project was modeled using WWHM 2012, an approved hydrology model.

Listing of primary POCs for each TDA in this analysis and their associations:

- **POC 1** is the threshold analysis point for Pond 1 & **TDA 1** --> Passes
- **POC 10** is the threshold analysis point for **TDA 2** --> Passes

Supporting POCs (needed for water quality mitigation sizing):

- POC 2 is the threshold analysis point for Pond 2 (Oversized for flow control to compensate for Pond 3)
- POC 3 is the threshold analysis point for Pond 3 (Undersized for flow control due to space constraints)
- POC 4 is the threshold analysis point for Pond 4 (Oversized for flow control to compensate for Pond 3)
- POC 5 is the threshold analysis point for TDA 2 Bypass (to show flow thresholds)

Unused POCs

- POC 6
- POC 7
- POC 8
- POC 9

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Madrona Ridge
Site Name:	Madrona Ridge
Site Address:	
City:	
Report Date:	8/9/2021
Gage:	Port Angeles
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year
Low Flow Threshold for POC5:	50 Percent of the 2 Year
High Flow Threshold for POC5:	50 Year
Low Flow Threshold for POC10:	50 Percent of the 2 Year
High Flow Threshold for POC10:	50 Year

Landuse Basin Data
Predeveloped Land Use

PreDev - Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	7.92
Pervious Total	7.92
Impervious Land Use	acre
Impervious Total	0
Basin Total	7.92

Element Flows To:

Surface	Interflow	Groundwater

PreDev - Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	8.53
Pervious Total	8.53

Impervious Land Use	acre
Impervious Total	0
Basin Total	8.53

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

PreDev - Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	6.46
Pervious Total	6.46

Impervious Land Use	acre
Impervious Total	0
Basin Total	6.46

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

PreDev - Basin 4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	3.81
Pervious Total	3.81

Impervious Land Use	acre
Impervious Total	0
Basin Total	3.81

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

PreDev - Basin 3 - Lots 1-5

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.6
Pervious Total	0.6
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.6

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

PreDev - Basin 3 - Perv Bypass

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	0.43
Pervious Total	0.43

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.43

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

Mitigated Land Use

Dev - Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	3.13
Pervious Total	3.13

Impervious Land Use	acre
ROADS FLAT	4.79
Impervious Total	4.79
Basin Total	7.92

Element Flows To:

Surface	Interflow	Groundwater
Pond 1 - 3.8:1 RSS, 3:1SS	Pond 1 - 3.8:1 RSS, 3:1SS	

Dev - Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	3.37
Pervious Total	3.37

Impervious Land Use	acre
ROADS FLAT	5.16
Impervious Total	5.16
Basin Total	8.53

Element Flows To:

Surface	Interflow	Groundwater
Pond 2 - 2.2:2 TSS, 3:1SS	Pond 2 - 2.2:2 TSS, 3:1SS	

Dev - Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	2.55
Pervious Total	2.55

Impervious Land Use	acre
ROADS FLAT	3.91
Impervious Total	3.91
Basin Total	6.46

Element Flows To:

Surface	Interflow	Groundwater
Pond 3 - 1.75:1 RSS, 0:1SS	Pond 3 - 1.75:1 RSS, 0:1SS	

Dev - Basin 4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	1.5
Pervious Total	1.5

Impervious Land Use	acre
ROADS FLAT	2.31
Impervious Total	2.31
Basin Total	3.81

Element Flows To:

Surface	Interflow	Groundwater
Pond 4 (modeled as a Pond, to be updated with final)	Pond 4 (modeled as a Pond, to be updated with final)	

Dev - Basin 3 - Lots 1-5

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.21
Pervious Total	0.21

Impervious Land Use	acre
ROADS FLAT	0.39
Impervious Total	0.39
Basin Total	0.6

Element Flows To:

Surface	Interflow	Groundwater
Pond 3 - 1.75:1 RSS, 0:1SS	Pond 3 - 1.75:1 RSS, 0:1SS	

Dev - Basin 3 - Perv Bypass

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.43
Pervious Total	0.43

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.43

Element Flows To:

Surface	Interflow	Groundwater
TDA 2 POC Node	TDA 2 POC Node	

Routing Elements
Predeveloped Routing

TDA 2 POC Node

Bottom Length: 10.00 ft.
Bottom Width: 10.00 ft.
Manning's n: 0.0001
Channel bottom slope 1: 0.1 To 1
Channel Left side slope 0: 0 To 1
Channel right side slope 2: 0 To 1
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.
Element Flows To:
Outlet 1 Outlet 2

Channel Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.002	0.000	0.000	0.000
0.0250	0.002	0.000	100.3	0.000
0.0500	0.002	0.000	317.6	0.000
0.0750	0.002	0.000	622.2	0.000
0.1000	0.002	0.000	1001.	0.000
0.1250	0.002	0.000	1448.	0.000
0.1500	0.002	0.000	1956.	0.000
0.1750	0.002	0.000	2521.	0.000
0.2000	0.002	0.000	3139.	0.000
0.2250	0.002	0.000	3808.	0.000
0.2500	0.002	0.000	4525.	0.000
0.2750	0.002	0.000	5287.	0.000
0.3000	0.002	0.000	6093.	0.000
0.3250	0.002	0.000	6941.	0.000
0.3500	0.002	0.000	7829.	0.000
0.3750	0.002	0.000	8755.	0.000
0.4000	0.002	0.000	9720.	0.000
0.4250	0.002	0.001	10720	0.000
0.4500	0.002	0.001	11755	0.000
0.4750	0.002	0.001	12825	0.000
0.5000	0.002	0.001	13927	0.000
0.5250	0.002	0.001	15061	0.000
0.5500	0.002	0.001	16227	0.000
0.5750	0.002	0.001	17422	0.000
0.6000	0.002	0.001	18647	0.000
0.6250	0.002	0.001	19901	0.000
0.6500	0.002	0.001	21183	0.000
0.6750	0.002	0.001	22492	0.000
0.7000	0.002	0.001	23827	0.000
0.7250	0.002	0.001	25189	0.000
0.7500	0.002	0.001	26576	0.000
0.7750	0.002	0.001	27987	0.000
0.8000	0.002	0.001	29423	0.000
0.8250	0.002	0.001	30883	0.000
0.8500	0.002	0.002	32366	0.000
0.8750	0.002	0.002	33872	0.000

0.9000	0.002	0.002	35399	0.000
0.9250	0.002	0.002	36949	0.000
0.9500	0.002	0.002	38520	0.000
0.9750	0.002	0.002	40112	0.000
1.0000	0.002	0.002	41725	0.000
1.0250	0.002	0.002	43357	0.000
1.0500	0.002	0.002	45010	0.000
1.0750	0.002	0.002	46682	0.000
1.1000	0.002	0.002	48372	0.000
1.1250	0.002	0.002	50082	0.000
1.1500	0.002	0.002	51809	0.000
1.1750	0.002	0.002	53555	0.000
1.2000	0.002	0.002	55318	0.000
1.2250	0.002	0.002	57099	0.000
1.2500	0.002	0.002	58897	0.000
1.2750	0.002	0.003	60711	0.000
1.3000	0.002	0.003	62542	0.000
1.3250	0.002	0.003	64390	0.000
1.3500	0.002	0.003	66253	0.000
1.3750	0.002	0.003	68131	0.000
1.4000	0.002	0.003	70026	0.000
1.4250	0.002	0.003	71935	0.000
1.4500	0.002	0.003	73859	0.000
1.4750	0.002	0.003	75798	0.000
1.5000	0.002	0.003	77751	0.000
1.5250	0.002	0.003	79719	0.000
1.5500	0.002	0.003	81700	0.000
1.5750	0.002	0.003	83695	0.000
1.6000	0.002	0.003	85704	0.000
1.6250	0.002	0.003	87726	0.000
1.6500	0.002	0.003	89761	0.000
1.6750	0.002	0.003	91810	0.000
1.7000	0.002	0.004	93870	0.000
1.7250	0.002	0.004	95944	0.000
1.7500	0.002	0.004	98030	0.000
1.7750	0.002	0.004	10012	0.000
1.8000	0.002	0.004	10223	0.000
1.8250	0.002	0.004	10436	0.000
1.8500	0.002	0.004	10649	0.000
1.8750	0.002	0.004	10863	0.000
1.9000	0.002	0.004	11079	0.000
1.9250	0.002	0.004	11296	0.000
1.9500	0.002	0.004	11514	0.000
1.9750	0.002	0.004	11733	0.000
2.0000	0.002	0.004	11953	0.000
2.0250	0.002	0.004	12174	0.000
2.0500	0.002	0.004	12396	0.000
2.0750	0.002	0.004	12619	0.000
2.1000	0.002	0.004	12843	0.000
2.1250	0.002	0.005	13068	0.000
2.1500	0.002	0.005	13295	0.000
2.1750	0.002	0.005	13522	0.000
2.2000	0.002	0.005	13750	0.000
2.2250	0.002	0.005	13979	0.000
2.2500	0.002	0.005	14209	0.000
2.2750	0.002	0.005	14440	0.000

Mitigated Routing

Pond 4 (modeled as a vault, to be updated with final)

Width: 90 ft.
Length: 150 ft.
Depth: 9 ft.
Discharge Structure
Riser Height: 8 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.021 ft.
Notch Height: 1.200 ft.
Orifice 1 Diameter: 0.38 in. Elevation:0 ft.
Orifice 2 Diameter: 0.631 in. Elevation:6.3 ft.
Orifice 3 Diameter: 0.817 in. Elevation:6.4 ft.
Element Flows To:
Outlet 1 Outlet 2
TDA 2 POC Node

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.309	0.000	0.000	0.000
0.1000	0.309	0.031	0.001	0.000
0.2000	0.309	0.062	0.001	0.000
0.3000	0.309	0.093	0.002	0.000
0.4000	0.309	0.124	0.002	0.000
0.5000	0.309	0.155	0.002	0.000
0.6000	0.309	0.186	0.003	0.000
0.7000	0.309	0.216	0.003	0.000
0.8000	0.309	0.247	0.003	0.000
0.9000	0.309	0.278	0.003	0.000
1.0000	0.309	0.309	0.003	0.000
1.1000	0.309	0.340	0.004	0.000
1.2000	0.309	0.371	0.004	0.000
1.3000	0.309	0.402	0.004	0.000
1.4000	0.309	0.433	0.004	0.000
1.5000	0.309	0.464	0.004	0.000
1.6000	0.309	0.495	0.005	0.000
1.7000	0.309	0.526	0.005	0.000
1.8000	0.309	0.557	0.005	0.000
1.9000	0.309	0.588	0.005	0.000
2.0000	0.309	0.619	0.005	0.000
2.1000	0.309	0.650	0.005	0.000
2.2000	0.309	0.681	0.005	0.000
2.3000	0.309	0.712	0.005	0.000
2.4000	0.309	0.743	0.006	0.000
2.5000	0.309	0.774	0.006	0.000
2.6000	0.309	0.805	0.006	0.000
2.7000	0.309	0.836	0.006	0.000
2.8000	0.309	0.867	0.006	0.000
2.9000	0.309	0.898	0.006	0.000
3.0000	0.309	0.929	0.006	0.000
3.1000	0.309	0.960	0.006	0.000
3.2000	0.309	0.991	0.007	0.000
3.3000	0.309	1.022	0.007	0.000
3.4000	0.309	1.053	0.007	0.000

3.5000	0.309	1.084	0.007	0.000
3.6000	0.309	1.115	0.007	0.000
3.7000	0.309	1.146	0.007	0.000
3.8000	0.309	1.177	0.007	0.000
3.9000	0.309	1.208	0.007	0.000
4.0000	0.309	1.239	0.007	0.000
4.1000	0.309	1.270	0.007	0.000
4.2000	0.309	1.301	0.008	0.000
4.3000	0.309	1.332	0.008	0.000
4.4000	0.309	1.363	0.008	0.000
4.5000	0.309	1.394	0.008	0.000
4.6000	0.309	1.425	0.008	0.000
4.7000	0.309	1.456	0.008	0.000
4.8000	0.309	1.487	0.008	0.000
4.9000	0.309	1.518	0.008	0.000
5.0000	0.309	1.549	0.008	0.000
5.1000	0.309	1.580	0.008	0.000
5.2000	0.309	1.611	0.008	0.000
5.3000	0.309	1.642	0.009	0.000
5.4000	0.309	1.673	0.009	0.000
5.5000	0.309	1.704	0.009	0.000
5.6000	0.309	1.735	0.009	0.000
5.7000	0.309	1.766	0.009	0.000
5.8000	0.309	1.797	0.009	0.000
5.9000	0.309	1.828	0.009	0.000
6.0000	0.309	1.859	0.009	0.000
6.1000	0.309	1.890	0.009	0.000
6.2000	0.309	1.921	0.009	0.000
6.3000	0.309	1.952	0.009	0.000
6.4000	0.309	1.983	0.013	0.000
6.5000	0.309	2.014	0.020	0.000
6.6000	0.309	2.045	0.024	0.000
6.7000	0.309	2.076	0.026	0.000
6.8000	0.309	2.107	0.029	0.000
6.9000	0.309	2.138	0.033	0.000
7.0000	0.309	2.169	0.039	0.000
7.1000	0.309	2.200	0.046	0.000
7.2000	0.309	2.231	0.053	0.000
7.3000	0.309	2.262	0.060	0.000
7.4000	0.309	2.293	0.068	0.000
7.5000	0.309	2.324	0.076	0.000
7.6000	0.309	2.355	0.084	0.000
7.7000	0.309	2.386	0.092	0.000
7.8000	0.309	2.417	0.101	0.000
7.9000	0.309	2.448	0.110	0.000
8.0000	0.309	2.479	0.121	0.000
8.1000	0.309	2.510	0.624	0.000
8.2000	0.309	2.541	1.527	0.000
8.3000	0.309	2.572	2.625	0.000
8.4000	0.309	2.603	3.757	0.000
8.5000	0.309	2.634	4.765	0.000
8.6000	0.309	2.665	5.528	0.000
8.7000	0.309	2.696	6.021	0.000
8.8000	0.309	2.727	6.468	0.000
8.9000	0.309	2.758	6.853	0.000
9.0000	0.309	2.789	7.218	0.000
9.1000	0.309	2.820	7.565	0.000
9.2000	0.000	0.000	7.896	0.000

TDA 2 POC Node

Bottom Length: 10.00 ft.
Bottom Width: 10.00 ft.
Manning's n: 0.0001
Channel bottom slope 1: 0.1 To 1
Channel Left side slope 0: 0 To 1
Channel right side slope 2: 0 To 1
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.
Element Flows To:
Outlet 1 Outlet 2

Channel Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.002	0.000	0.000	0.000
0.0250	0.002	0.000	100.3	0.000
0.0500	0.002	0.000	317.6	0.000
0.0750	0.002	0.000	622.2	0.000
0.1000	0.002	0.000	1001.	0.000
0.1250	0.002	0.000	1448.	0.000
0.1500	0.002	0.000	1956.	0.000
0.1750	0.002	0.000	2521.	0.000
0.2000	0.002	0.000	3139.	0.000
0.2250	0.002	0.000	3808.	0.000
0.2500	0.002	0.000	4525.	0.000
0.2750	0.002	0.000	5287.	0.000
0.3000	0.002	0.000	6093.	0.000
0.3250	0.002	0.000	6941.	0.000
0.3500	0.002	0.000	7829.	0.000
0.3750	0.002	0.000	8755.	0.000
0.4000	0.002	0.000	9720.	0.000
0.4250	0.002	0.001	10720	0.000
0.4500	0.002	0.001	11755	0.000
0.4750	0.002	0.001	12825	0.000
0.5000	0.002	0.001	13927	0.000
0.5250	0.002	0.001	15061	0.000
0.5500	0.002	0.001	16227	0.000
0.5750	0.002	0.001	17422	0.000
0.6000	0.002	0.001	18647	0.000
0.6250	0.002	0.001	19901	0.000
0.6500	0.002	0.001	21183	0.000
0.6750	0.002	0.001	22492	0.000
0.7000	0.002	0.001	23827	0.000
0.7250	0.002	0.001	25189	0.000
0.7500	0.002	0.001	26576	0.000
0.7750	0.002	0.001	27987	0.000
0.8000	0.002	0.001	29423	0.000
0.8250	0.002	0.001	30883	0.000
0.8500	0.002	0.002	32366	0.000
0.8750	0.002	0.002	33872	0.000
0.9000	0.002	0.002	35399	0.000
0.9250	0.002	0.002	36949	0.000
0.9500	0.002	0.002	38520	0.000
0.9750	0.002	0.002	40112	0.000

1.0000	0.002	0.002	41725	0.000
1.0250	0.002	0.002	43357	0.000
1.0500	0.002	0.002	45010	0.000
1.0750	0.002	0.002	46682	0.000
1.1000	0.002	0.002	48372	0.000
1.1250	0.002	0.002	50082	0.000
1.1500	0.002	0.002	51809	0.000
1.1750	0.002	0.002	53555	0.000
1.2000	0.002	0.002	55318	0.000
1.2250	0.002	0.002	57099	0.000
1.2500	0.002	0.002	58897	0.000
1.2750	0.002	0.003	60711	0.000
1.3000	0.002	0.003	62542	0.000
1.3250	0.002	0.003	64390	0.000
1.3500	0.002	0.003	66253	0.000
1.3750	0.002	0.003	68131	0.000
1.4000	0.002	0.003	70026	0.000
1.4250	0.002	0.003	71935	0.000
1.4500	0.002	0.003	73859	0.000
1.4750	0.002	0.003	75798	0.000
1.5000	0.002	0.003	77751	0.000
1.5250	0.002	0.003	79719	0.000
1.5500	0.002	0.003	81700	0.000
1.5750	0.002	0.003	83695	0.000
1.6000	0.002	0.003	85704	0.000
1.6250	0.002	0.003	87726	0.000
1.6500	0.002	0.003	89761	0.000
1.6750	0.002	0.003	91810	0.000
1.7000	0.002	0.004	93870	0.000
1.7250	0.002	0.004	95944	0.000
1.7500	0.002	0.004	98030	0.000
1.7750	0.002	0.004	10012	0.000
1.8000	0.002	0.004	10223	0.000
1.8250	0.002	0.004	10436	0.000
1.8500	0.002	0.004	10649	0.000
1.8750	0.002	0.004	10863	0.000
1.9000	0.002	0.004	11079	0.000
1.9250	0.002	0.004	11296	0.000
1.9500	0.002	0.004	11514	0.000
1.9750	0.002	0.004	11733	0.000
2.0000	0.002	0.004	11953	0.000
2.0250	0.002	0.004	12174	0.000
2.0500	0.002	0.004	12396	0.000
2.0750	0.002	0.004	12619	0.000
2.1000	0.002	0.004	12843	0.000
2.1250	0.002	0.005	13068	0.000
2.1500	0.002	0.005	13295	0.000
2.1750	0.002	0.005	13522	0.000
2.2000	0.002	0.005	13750	0.000
2.2250	0.002	0.005	13979	0.000
2.2500	0.002	0.005	14209	0.000
2.2750	0.002	0.005	14440	0.000

Pond 1 - 3.8:1 RSS, 3:1SS

Bottom Length: 210.00 ft.
Bottom Width: 50.00 ft.
Depth: 13.5 ft.
Volume at riser head: 4.0037 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3.8 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 9 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 0.571 in. Elevation:0 ft.
Orifice 2 Diameter: 1 in. Elevation:7.05 ft.
Orifice 3 Diameter: 1.5 in. Elevation:7.35 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.241	0.000	0.000	0.000
0.1500	0.247	0.036	0.003	0.000
0.3000	0.253	0.074	0.004	0.000
0.4500	0.259	0.112	0.005	0.000
0.6000	0.265	0.151	0.006	0.000
0.7500	0.271	0.192	0.007	0.000
0.9000	0.277	0.233	0.008	0.000
1.0500	0.283	0.275	0.009	0.000
1.2000	0.290	0.318	0.009	0.000
1.3500	0.296	0.362	0.010	0.000
1.5000	0.302	0.407	0.010	0.000
1.6500	0.309	0.453	0.011	0.000
1.8000	0.315	0.500	0.011	0.000
1.9500	0.322	0.547	0.012	0.000
2.1000	0.328	0.596	0.012	0.000
2.2500	0.335	0.646	0.013	0.000
2.4000	0.341	0.697	0.013	0.000
2.5500	0.348	0.748	0.014	0.000
2.7000	0.355	0.801	0.014	0.000
2.8500	0.361	0.855	0.014	0.000
3.0000	0.368	0.910	0.015	0.000
3.1500	0.375	0.965	0.015	0.000
3.3000	0.382	1.022	0.016	0.000
3.4500	0.389	1.080	0.016	0.000
3.6000	0.396	1.139	0.016	0.000
3.7500	0.403	1.199	0.017	0.000
3.9000	0.410	1.260	0.017	0.000
4.0500	0.417	1.322	0.017	0.000
4.2000	0.424	1.385	0.018	0.000
4.3500	0.431	1.449	0.018	0.000
4.5000	0.438	1.514	0.018	0.000
4.6500	0.445	1.581	0.019	0.000
4.8000	0.453	1.648	0.019	0.000
4.9500	0.460	1.717	0.019	0.000
5.1000	0.467	1.786	0.020	0.000

5.2500	0.475	1.857	0.020	0.000
5.4000	0.482	1.929	0.020	0.000
5.5500	0.490	2.002	0.020	0.000
5.7000	0.497	2.076	0.021	0.000
5.8500	0.505	2.151	0.021	0.000
6.0000	0.512	2.227	0.021	0.000
6.1500	0.520	2.305	0.021	0.000
6.3000	0.528	2.383	0.022	0.000
6.4500	0.535	2.463	0.022	0.000
6.6000	0.543	2.544	0.022	0.000
6.7500	0.551	2.626	0.023	0.000
6.9000	0.559	2.710	0.023	0.000
7.0500	0.567	2.794	0.023	0.000
7.2000	0.575	2.880	0.034	0.000
7.3500	0.583	2.967	0.038	0.000
7.5000	0.591	3.055	0.066	0.000
7.6500	0.599	3.144	0.078	0.000
7.8000	0.607	3.235	0.089	0.000
7.9500	0.615	3.326	0.098	0.000
8.1000	0.623	3.419	0.105	0.000
8.2500	0.632	3.514	0.113	0.000
8.4000	0.640	3.609	0.119	0.000
8.5500	0.648	3.706	0.126	0.000
8.7000	0.657	3.804	0.131	0.000
8.8500	0.665	3.903	0.137	0.000
9.0000	0.673	4.003	0.142	0.000
9.1500	0.682	4.105	0.752	0.000
9.3000	0.691	4.208	1.662	0.000
9.4500	0.699	4.312	2.259	0.000
9.6000	0.708	4.418	2.602	0.000
9.7500	0.716	4.525	2.894	0.000
9.9000	0.725	4.633	3.159	0.000
10.050	0.734	4.742	3.402	0.000
10.200	0.743	4.853	3.629	0.000
10.350	0.752	4.965	3.843	0.000
10.500	0.760	5.079	4.044	0.000
10.650	0.769	5.194	4.237	0.000
10.800	0.778	5.310	4.420	0.000
10.950	0.787	5.427	4.596	0.000
11.100	0.796	5.546	4.766	0.000
11.250	0.805	5.666	4.930	0.000
11.400	0.815	5.788	5.088	0.000
11.550	0.824	5.911	5.242	0.000
11.700	0.833	6.035	5.391	0.000
11.850	0.842	6.161	5.536	0.000
12.000	0.852	6.288	5.678	0.000
12.150	0.861	6.416	5.815	0.000
12.300	0.870	6.546	5.950	0.000
12.450	0.880	6.678	6.082	0.000
12.600	0.889	6.810	6.211	0.000
12.750	0.899	6.944	6.337	0.000
12.900	0.908	7.080	6.461	0.000
13.050	0.918	7.217	6.582	0.000
13.200	0.927	7.355	6.701	0.000
13.350	0.937	7.495	6.819	0.000
13.500	0.947	7.637	6.934	0.000

Pond 2 - 2.2:2 TSS, 3:1SS

Bottom Length: 195.00 ft.
Bottom Width: 79.00 ft.
Depth: 9 ft.
Volume at riser head: 4.1820 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 2.2 To 1
Discharge Structure
Riser Height: 8 ft.
Riser Diameter: 12 in.
Orifice 1 Diameter: 0.594 in. Elevation:0 ft.
Orifice 2 Diameter: 1.0625 in Elevation:6.8 ft.
Orifice 3 Diameter: 1.25 in. Elevation:7 ft.
Element Flows To:
Outlet 1 Outlet 2
TDA 2 POC Node

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.353	0.000	0.000	0.000
0.1000	0.357	0.035	0.003	0.000
0.2000	0.360	0.071	0.004	0.000
0.3000	0.364	0.107	0.005	0.000
0.4000	0.368	0.144	0.006	0.000
0.5000	0.372	0.181	0.006	0.000
0.6000	0.375	0.218	0.007	0.000
0.7000	0.379	0.256	0.008	0.000
0.8000	0.383	0.294	0.008	0.000
0.9000	0.386	0.333	0.009	0.000
1.0000	0.390	0.372	0.009	0.000
1.1000	0.394	0.411	0.010	0.000
1.2000	0.398	0.450	0.010	0.000
1.3000	0.402	0.490	0.010	0.000
1.4000	0.405	0.531	0.011	0.000
1.5000	0.409	0.572	0.011	0.000
1.6000	0.413	0.613	0.012	0.000
1.7000	0.417	0.654	0.012	0.000
1.8000	0.421	0.696	0.012	0.000
1.9000	0.425	0.739	0.013	0.000
2.0000	0.429	0.781	0.013	0.000
2.1000	0.433	0.824	0.013	0.000
2.2000	0.437	0.868	0.014	0.000
2.3000	0.440	0.912	0.014	0.000
2.4000	0.444	0.956	0.014	0.000
2.5000	0.448	1.001	0.015	0.000
2.6000	0.452	1.046	0.015	0.000
2.7000	0.456	1.091	0.015	0.000
2.8000	0.460	1.137	0.016	0.000
2.9000	0.464	1.184	0.016	0.000
3.0000	0.469	1.230	0.016	0.000
3.1000	0.473	1.277	0.016	0.000
3.2000	0.477	1.325	0.017	0.000
3.3000	0.481	1.373	0.017	0.000
3.4000	0.485	1.421	0.017	0.000

3.5000	0.489	1.470	0.017	0.000
3.6000	0.493	1.519	0.018	0.000
3.7000	0.497	1.569	0.018	0.000
3.8000	0.501	1.619	0.018	0.000
3.9000	0.506	1.669	0.018	0.000
4.0000	0.510	1.720	0.019	0.000
4.1000	0.514	1.771	0.019	0.000
4.2000	0.518	1.823	0.019	0.000
4.3000	0.522	1.875	0.019	0.000
4.4000	0.527	1.927	0.020	0.000
4.5000	0.531	1.980	0.020	0.000
4.6000	0.535	2.034	0.020	0.000
4.7000	0.540	2.087	0.020	0.000
4.8000	0.544	2.142	0.021	0.000
4.9000	0.548	2.196	0.021	0.000
5.0000	0.553	2.251	0.021	0.000
5.1000	0.557	2.307	0.021	0.000
5.2000	0.561	2.363	0.021	0.000
5.3000	0.566	2.419	0.022	0.000
5.4000	0.570	2.476	0.022	0.000
5.5000	0.574	2.533	0.022	0.000
5.6000	0.579	2.591	0.022	0.000
5.7000	0.583	2.649	0.022	0.000
5.8000	0.588	2.708	0.023	0.000
5.9000	0.592	2.767	0.023	0.000
6.0000	0.597	2.826	0.023	0.000
6.1000	0.601	2.886	0.023	0.000
6.2000	0.606	2.947	0.023	0.000
6.3000	0.610	3.007	0.024	0.000
6.4000	0.615	3.069	0.024	0.000
6.5000	0.619	3.130	0.024	0.000
6.6000	0.624	3.193	0.024	0.000
6.7000	0.628	3.255	0.024	0.000
6.8000	0.633	3.318	0.025	0.000
6.9000	0.638	3.382	0.034	0.000
7.0000	0.642	3.446	0.039	0.000
7.1000	0.647	3.511	0.055	0.000
7.2000	0.652	3.576	0.064	0.000
7.3000	0.656	3.641	0.070	0.000
7.4000	0.661	3.707	0.076	0.000
7.5000	0.666	3.773	0.081	0.000
7.6000	0.670	3.840	0.086	0.000
7.7000	0.675	3.907	0.091	0.000
7.8000	0.680	3.975	0.095	0.000
7.9000	0.685	4.044	0.099	0.000
8.0000	0.689	4.112	0.103	0.000
8.1000	0.694	4.182	0.440	0.000
8.2000	0.699	4.251	1.017	0.000
8.3000	0.704	4.321	1.623	0.000
8.4000	0.709	4.392	2.076	0.000
8.5000	0.713	4.463	2.323	0.000
8.6000	0.718	4.535	2.562	0.000
8.7000	0.723	4.607	2.760	0.000
8.8000	0.728	4.680	2.945	0.000
8.9000	0.733	4.753	3.119	0.000
9.0000	0.738	4.826	3.283	0.000
9.1000	0.743	4.900	3.440	0.000

Pond 3 - 1.75:1 RSS, 0:1SS

Bottom Length: 220.00 ft.
Bottom Width: 62.00 ft.
Depth: 9 ft.
Volume at riser head: 2.0745 acre-feet.
Side slope 1: 0 To 1
Side slope 2: 0 To 1
Side slope 3: 1.75 To 1
Side slope 4: 0 To 1
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 12 in.
Notch Type: Rectangular
Notch Width: 0.083 ft.
Notch Height: 0.500 ft.
Orifice 1 Diameter: 0.67 in. Elevation:0 ft.
Orifice 2 Diameter: 1 in. Elevation:4.3 ft.
Orifice 3 Diameter: 2.25 in. Elevation:4.6 ft.
Element Flows To:
Outlet 1 Outlet 2
TDA 2 POC Node

Pond Hydraulic Table

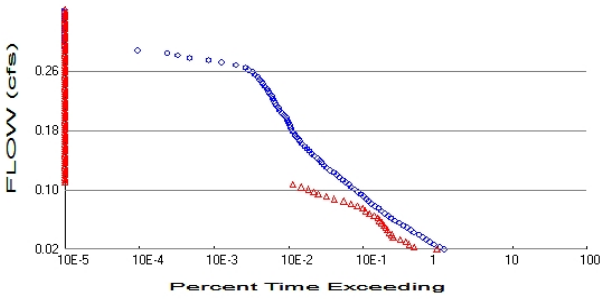
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.313	0.000	0.000	0.000
0.1000	0.314	0.031	0.003	0.000
0.2000	0.314	0.062	0.005	0.000
0.3000	0.315	0.094	0.006	0.000
0.4000	0.316	0.126	0.007	0.000
0.5000	0.317	0.157	0.008	0.000
0.6000	0.318	0.189	0.009	0.000
0.7000	0.319	0.221	0.010	0.000
0.8000	0.320	0.253	0.010	0.000
0.9000	0.321	0.285	0.011	0.000
1.0000	0.322	0.317	0.012	0.000
1.1000	0.322	0.349	0.012	0.000
1.2000	0.323	0.382	0.013	0.000
1.3000	0.324	0.414	0.013	0.000
1.4000	0.325	0.447	0.014	0.000
1.5000	0.326	0.479	0.014	0.000
1.6000	0.327	0.512	0.015	0.000
1.7000	0.328	0.545	0.015	0.000
1.8000	0.329	0.578	0.016	0.000
1.9000	0.329	0.610	0.016	0.000
2.0000	0.330	0.643	0.017	0.000
2.1000	0.331	0.677	0.017	0.000
2.2000	0.332	0.710	0.018	0.000
2.3000	0.333	0.743	0.018	0.000
2.4000	0.334	0.777	0.018	0.000
2.5000	0.335	0.810	0.019	0.000
2.6000	0.336	0.844	0.019	0.000
2.7000	0.337	0.877	0.020	0.000
2.8000	0.337	0.911	0.020	0.000
2.9000	0.338	0.945	0.020	0.000
3.0000	0.339	0.979	0.021	0.000
3.1000	0.340	1.013	0.021	0.000

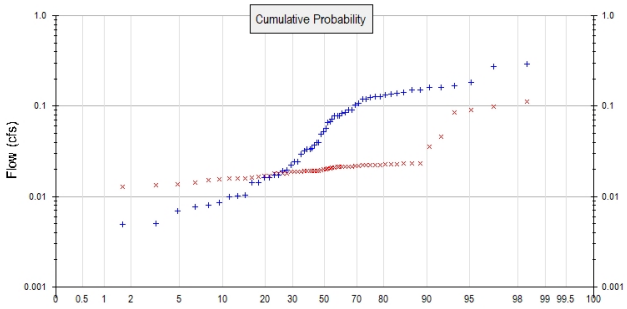
3.2000	0.341	1.047	0.021	0.000
3.3000	0.342	1.081	0.022	0.000
3.4000	0.343	1.115	0.022	0.000
3.5000	0.344	1.150	0.022	0.000
3.6000	0.344	1.184	0.023	0.000
3.7000	0.345	1.219	0.023	0.000
3.8000	0.346	1.253	0.023	0.000
3.9000	0.347	1.288	0.024	0.000
4.0000	0.348	1.323	0.024	0.000
4.1000	0.349	1.358	0.024	0.000
4.2000	0.350	1.393	0.025	0.000
4.3000	0.351	1.428	0.025	0.000
4.4000	0.352	1.463	0.034	0.000
4.5000	0.352	1.498	0.038	0.000
4.6000	0.353	1.533	0.041	0.000
4.7000	0.354	1.569	0.087	0.000
4.8000	0.355	1.604	0.107	0.000
4.9000	0.356	1.640	0.123	0.000
5.0000	0.357	1.676	0.136	0.000
5.1000	0.358	1.711	0.148	0.000
5.2000	0.359	1.747	0.159	0.000
5.3000	0.360	1.783	0.170	0.000
5.4000	0.360	1.819	0.179	0.000
5.5000	0.361	1.855	0.188	0.000
5.6000	0.362	1.892	0.205	0.000
5.7000	0.363	1.928	0.229	0.000
5.8000	0.364	1.964	0.255	0.000
5.9000	0.365	2.001	0.285	0.000
6.0000	0.366	2.037	0.315	0.000
6.1000	0.367	2.074	0.656	0.000
6.2000	0.367	2.111	1.237	0.000
6.3000	0.368	2.148	1.845	0.000
6.4000	0.369	2.185	2.302	0.000
6.5000	0.370	2.222	2.552	0.000
6.6000	0.371	2.259	2.794	0.000
6.7000	0.372	2.296	2.996	0.000
6.8000	0.373	2.333	3.183	0.000
6.9000	0.374	2.371	3.360	0.000
7.0000	0.375	2.408	3.527	0.000
7.1000	0.375	2.446	3.686	0.000
7.2000	0.376	2.483	3.838	0.000
7.3000	0.377	2.521	3.984	0.000
7.4000	0.378	2.559	4.125	0.000
7.5000	0.379	2.597	4.261	0.000
7.6000	0.380	2.635	4.393	0.000
7.7000	0.381	2.673	4.520	0.000
7.8000	0.382	2.711	4.644	0.000
7.9000	0.383	2.749	4.764	0.000
8.0000	0.383	2.787	4.882	0.000
8.1000	0.384	2.826	4.997	0.000
8.2000	0.385	2.864	5.108	0.000
8.3000	0.386	2.903	5.218	0.000
8.4000	0.387	2.942	5.325	0.000
8.5000	0.388	2.980	5.430	0.000
8.6000	0.389	3.019	5.533	0.000
8.7000	0.390	3.058	5.634	0.000
8.8000	0.390	3.097	5.733	0.000
8.9000	0.391	3.136	5.831	0.000

9.0000	0.392	3.176	5.927	0.000
9.1000	0.393	3.215	6.021	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 7.92
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 3.13
Total Impervious Area: 4.79

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.04753
5 year	0.116645
10 year	0.177073
25 year	0.26619
50 year	0.339566
100 year	0.417278

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.020359
5 year	0.030693
10 year	0.039433
25 year	0.052997
50 year	0.065188
100 year	0.079398

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.016	0.019
1950	0.078	0.022
1951	0.057	0.023
1952	0.010	0.014
1953	0.017	0.021
1954	0.161	0.091
1955	0.150	0.017
1956	0.053	0.021
1957	0.092	0.019
1958	0.014	0.016

1959	0.090	0.022
1960	0.135	0.019
1961	0.167	0.023
1962	0.010	0.014
1963	0.033	0.018
1964	0.039	0.022
1965	0.019	0.020
1966	0.017	0.019
1967	0.160	0.022
1968	0.029	0.017
1969	0.010	0.019
1970	0.008	0.015
1971	0.126	0.019
1972	0.184	0.023
1973	0.024	0.020
1974	0.020	0.021
1975	0.032	0.020
1976	0.040	0.022
1977	0.007	0.016
1978	0.005	0.016
1979	0.005	0.016
1980	0.086	0.036
1981	0.068	0.023
1982	0.127	0.046
1983	0.119	0.022
1984	0.022	0.018
1985	0.118	0.022
1986	0.277	0.021
1987	0.103	0.019
1988	0.037	0.019
1989	0.034	0.018
1990	0.066	0.022
1991	0.132	0.098
1992	0.151	0.021
1993	0.009	0.014
1994	0.002	0.012
1995	0.014	0.018
1996	0.072	0.019
1997	0.079	0.021
1998	0.008	0.015
1999	0.290	0.113
2000	0.083	0.021
2001	0.016	0.013
2002	0.108	0.022
2003	0.079	0.019
2004	0.125	0.084
2005	0.049	0.016
2006	0.143	0.023
2007	0.138	0.023
2008	0.024	0.019
2009	0.034	0.019

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.2902	0.1127
2	0.2767	0.0980
3	0.1844	0.0909

4	0.1667	0.0843
5	0.1613	0.0458
6	0.1603	0.0358
7	0.1514	0.0234
8	0.1497	0.0233
9	0.1428	0.0230
10	0.1377	0.0227
11	0.1351	0.0227
12	0.1319	0.0227
13	0.1271	0.0223
14	0.1263	0.0223
15	0.1247	0.0223
16	0.1187	0.0221
17	0.1184	0.0221
18	0.1082	0.0219
19	0.1033	0.0218
20	0.0915	0.0216
21	0.0900	0.0215
22	0.0855	0.0215
23	0.0826	0.0214
24	0.0790	0.0214
25	0.0786	0.0213
26	0.0779	0.0210
27	0.0724	0.0208
28	0.0677	0.0205
29	0.0661	0.0203
30	0.0567	0.0199
31	0.0525	0.0199
32	0.0490	0.0194
33	0.0396	0.0194
34	0.0394	0.0193
35	0.0372	0.0193
36	0.0343	0.0191
37	0.0336	0.0191
38	0.0334	0.0190
39	0.0323	0.0190
40	0.0295	0.0190
41	0.0244	0.0189
42	0.0240	0.0187
43	0.0221	0.0186
44	0.0197	0.0182
45	0.0191	0.0181
46	0.0172	0.0180
47	0.0172	0.0178
48	0.0163	0.0171
49	0.0162	0.0168
50	0.0143	0.0165
51	0.0142	0.0161
52	0.0103	0.0159
53	0.0102	0.0158
54	0.0099	0.0158
55	0.0086	0.0153
56	0.0081	0.0152
57	0.0078	0.0143
58	0.0070	0.0138
59	0.0050	0.0135
60	0.0049	0.0129
61	0.0016	0.0118

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0238	25731	20587	80	Pass
0.0270	22437	10239	45	Pass
0.0301	18859	8772	46	Pass
0.0333	16698	7963	47	Pass
0.0365	14921	6663	44	Pass
0.0397	13332	5366	40	Pass
0.0429	11854	5110	43	Pass
0.0461	10279	4725	45	Pass
0.0493	9176	4494	48	Pass
0.0525	8194	4248	51	Pass
0.0557	7300	4036	55	Pass
0.0589	6506	3816	58	Pass
0.0620	5634	3544	62	Pass
0.0652	5033	3332	66	Pass
0.0684	4560	3001	65	Pass
0.0716	4141	2565	61	Pass
0.0748	3771	2286	60	Pass
0.0780	3426	2084	60	Pass
0.0812	3005	1771	58	Pass
0.0844	2755	1467	53	Pass
0.0876	2520	1172	46	Pass
0.0908	2344	868	37	Pass
0.0939	2162	688	31	Pass
0.0971	1967	529	26	Pass
0.1003	1792	460	25	Pass
0.1035	1618	394	24	Pass
0.1067	1486	317	21	Pass
0.1099	1372	244	17	Pass
0.1131	1237	0	0	Pass
0.1163	1135	0	0	Pass
0.1195	1029	0	0	Pass
0.1227	935	0	0	Pass
0.1258	865	0	0	Pass
0.1290	761	0	0	Pass
0.1322	686	0	0	Pass
0.1354	640	0	0	Pass
0.1386	588	0	0	Pass
0.1418	555	0	0	Pass
0.1450	519	0	0	Pass
0.1482	475	0	0	Pass
0.1514	432	0	0	Pass
0.1546	403	0	0	Pass
0.1577	378	0	0	Pass
0.1609	349	0	0	Pass
0.1641	321	0	0	Pass
0.1673	303	0	0	Pass
0.1705	292	0	0	Pass
0.1737	272	0	0	Pass
0.1769	257	0	0	Pass
0.1801	242	0	0	Pass
0.1833	232	0	0	Pass
0.1865	223	0	0	Pass
0.1896	219	0	0	Pass

0.1928	213	0	0	Pass
0.1960	205	0	0	Pass
0.1992	198	0	0	Pass
0.2024	185	0	0	Pass
0.2056	172	0	0	Pass
0.2088	163	0	0	Pass
0.2120	157	0	0	Pass
0.2152	147	0	0	Pass
0.2183	141	0	0	Pass
0.2215	135	0	0	Pass
0.2247	130	0	0	Pass
0.2279	127	0	0	Pass
0.2311	118	0	0	Pass
0.2343	113	0	0	Pass
0.2375	110	0	0	Pass
0.2407	102	0	0	Pass
0.2439	97	0	0	Pass
0.2471	92	0	0	Pass
0.2502	87	0	0	Pass
0.2534	82	0	0	Pass
0.2566	76	0	0	Pass
0.2598	70	0	0	Pass
0.2630	62	0	0	Pass
0.2662	56	0	0	Pass
0.2694	42	0	0	Pass
0.2726	27	0	0	Pass
0.2758	18	0	0	Pass
0.2790	10	0	0	Pass
0.2821	7	0	0	Pass
0.2853	5	0	0	Pass
0.2885	2	0	0	Pass
0.2917	0	0	0	Pass
0.2949	0	0	0	Pass
0.2981	0	0	0	Pass
0.3013	0	0	0	Pass
0.3045	0	0	0	Pass
0.3077	0	0	0	Pass
0.3109	0	0	0	Pass
0.3140	0	0	0	Pass
0.3172	0	0	0	Pass
0.3204	0	0	0	Pass
0.3236	0	0	0	Pass
0.3268	0	0	0	Pass
0.3300	0	0	0	Pass
0.3332	0	0	0	Pass
0.3364	0	0	0	Pass
0.3396	0	0	0	Pass

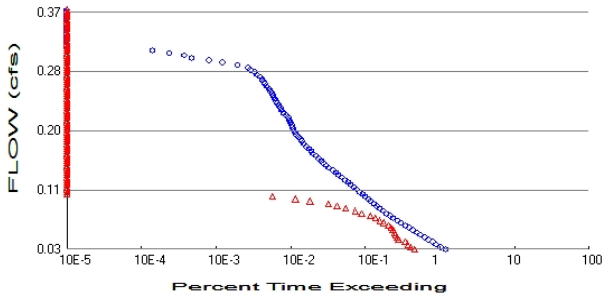
Water Quality

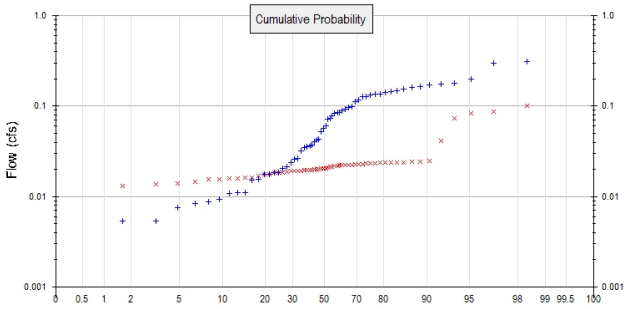
Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.4739 acre-feet
On-line facility target flow:	0.6286 cfs.
Adjusted for 15 min:	0.6286 cfs.
Off-line facility target flow:	0.3395 cfs.
Adjusted for 15 min:	0.3395 cfs.

LID Report

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 8.53
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 3.37
Total Impervious Area: 5.16

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.051191
5 year	0.125629
10 year	0.190712
25 year	0.286692
50 year	0.365719
100 year	0.449417

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.020695
5 year	0.030195
10 year	0.038026
25 year	0.049916
50 year	0.060393
100 year	0.072411

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	0.018	0.019
1950	0.084	0.023
1951	0.061	0.024
1952	0.011	0.014
1953	0.018	0.022
1954	0.174	0.084
1955	0.161	0.018
1956	0.057	0.022
1957	0.099	0.019
1958	0.015	0.016
1959	0.097	0.023

1960	0.146	0.020
1961	0.180	0.024
1962	0.011	0.015
1963	0.036	0.018
1964	0.042	0.023
1965	0.021	0.021
1966	0.019	0.020
1967	0.173	0.023
1968	0.032	0.017
1969	0.011	0.020
1970	0.009	0.016
1971	0.136	0.020
1972	0.199	0.024
1973	0.026	0.020
1974	0.021	0.021
1975	0.035	0.021
1976	0.043	0.023
1977	0.008	0.016
1978	0.005	0.016
1979	0.005	0.016
1980	0.092	0.025
1981	0.073	0.024
1982	0.137	0.041
1983	0.128	0.023
1984	0.024	0.019
1985	0.128	0.022
1986	0.298	0.022
1987	0.111	0.020
1988	0.040	0.020
1989	0.037	0.019
1990	0.071	0.022
1991	0.142	0.086
1992	0.163	0.022
1993	0.009	0.014
1994	0.002	0.011
1995	0.015	0.018
1996	0.078	0.019
1997	0.085	0.022
1998	0.008	0.016
1999	0.313	0.102
2000	0.089	0.022
2001	0.017	0.013
2002	0.117	0.023
2003	0.085	0.020
2004	0.134	0.073
2005	0.053	0.017
2006	0.154	0.024
2007	0.148	0.024
2008	0.026	0.020
2009	0.036	0.019

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	0.3125	0.1017
2	0.2980	0.0862
3	0.1986	0.0835
4	0.1796	0.0732

5	0.1737	0.0412
6	0.1727	0.0248
7	0.1630	0.0245
8	0.1612	0.0243
9	0.1538	0.0239
10	0.1483	0.0238
11	0.1455	0.0238
12	0.1421	0.0237
13	0.1369	0.0235
14	0.1360	0.0234
15	0.1343	0.0233
16	0.1279	0.0231
17	0.1275	0.0229
18	0.1165	0.0227
19	0.1113	0.0226
20	0.0986	0.0225
21	0.0970	0.0223
22	0.0921	0.0223
23	0.0890	0.0222
24	0.0851	0.0222
25	0.0847	0.0220
26	0.0839	0.0218
27	0.0780	0.0215
28	0.0729	0.0213
29	0.0712	0.0209
30	0.0611	0.0205
31	0.0566	0.0205
32	0.0528	0.0202
33	0.0427	0.0199
34	0.0424	0.0199
35	0.0401	0.0198
36	0.0369	0.0198
37	0.0362	0.0197
38	0.0360	0.0196
39	0.0348	0.0196
40	0.0317	0.0194
41	0.0263	0.0193
42	0.0259	0.0192
43	0.0238	0.0191
44	0.0212	0.0189
45	0.0206	0.0186
46	0.0186	0.0185
47	0.0185	0.0183
48	0.0175	0.0176
49	0.0175	0.0174
50	0.0154	0.0167
51	0.0153	0.0163
52	0.0111	0.0162
53	0.0110	0.0160
54	0.0107	0.0158
55	0.0093	0.0156
56	0.0087	0.0155
57	0.0083	0.0146
58	0.0075	0.0139
59	0.0054	0.0138
60	0.0053	0.0132
61	0.0018	0.0115

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0256	25474	9734	38	Pass
0.0290	21539	8656	40	Pass
0.0325	19070	7984	41	Pass
0.0359	17023	7319	42	Pass
0.0393	14786	5925	40	Pass
0.0428	13334	5664	42	Pass
0.0462	11554	5435	47	Pass
0.0496	10455	5249	50	Pass
0.0531	9107	5005	54	Pass
0.0565	8194	4755	58	Pass
0.0600	7368	4389	59	Pass
0.0634	6382	3762	58	Pass
0.0668	5775	3337	57	Pass
0.0703	5033	2928	58	Pass
0.0737	4586	2479	54	Pass
0.0771	4077	1906	46	Pass
0.0806	3743	1562	41	Pass
0.0840	3317	1159	34	Pass
0.0874	3024	891	29	Pass
0.0909	2787	684	24	Pass
0.0943	2505	388	15	Pass
0.0977	2340	247	10	Pass
0.1012	2123	122	5	Pass
0.1046	1981	0	0	Pass
0.1080	1772	0	0	Pass
0.1115	1617	0	0	Pass
0.1149	1492	0	0	Pass
0.1184	1357	0	0	Pass
0.1218	1257	0	0	Pass
0.1252	1131	0	0	Pass
0.1287	1038	0	0	Pass
0.1321	919	0	0	Pass
0.1355	860	0	0	Pass
0.1390	787	0	0	Pass
0.1424	689	0	0	Pass
0.1458	646	0	0	Pass
0.1493	583	0	0	Pass
0.1527	552	0	0	Pass
0.1561	509	0	0	Pass
0.1596	476	0	0	Pass
0.1630	427	0	0	Pass
0.1665	401	0	0	Pass
0.1699	378	0	0	Pass
0.1733	341	0	0	Pass
0.1768	322	0	0	Pass
0.1802	303	0	0	Pass
0.1836	292	0	0	Pass
0.1871	270	0	0	Pass
0.1905	254	0	0	Pass
0.1939	243	0	0	Pass
0.1974	233	0	0	Pass
0.2008	224	0	0	Pass
0.2042	219	0	0	Pass

0.2077	213	0	0	Pass
0.2111	205	0	0	Pass
0.2146	200	0	0	Pass
0.2180	187	0	0	Pass
0.2214	170	0	0	Pass
0.2249	163	0	0	Pass
0.2283	155	0	0	Pass
0.2317	148	0	0	Pass
0.2352	141	0	0	Pass
0.2386	135	0	0	Pass
0.2420	130	0	0	Pass
0.2455	125	0	0	Pass
0.2489	120	0	0	Pass
0.2523	113	0	0	Pass
0.2558	110	0	0	Pass
0.2592	102	0	0	Pass
0.2627	97	0	0	Pass
0.2661	92	0	0	Pass
0.2695	88	0	0	Pass
0.2730	83	0	0	Pass
0.2764	76	0	0	Pass
0.2798	70	0	0	Pass
0.2833	62	0	0	Pass
0.2867	57	0	0	Pass
0.2901	41	0	0	Pass
0.2936	26	0	0	Pass
0.2970	17	0	0	Pass
0.3004	10	0	0	Pass
0.3039	8	0	0	Pass
0.3073	5	0	0	Pass
0.3107	3	0	0	Pass
0.3142	0	0	0	Pass
0.3176	0	0	0	Pass
0.3211	0	0	0	Pass
0.3245	0	0	0	Pass
0.3279	0	0	0	Pass
0.3314	0	0	0	Pass
0.3348	0	0	0	Pass
0.3382	0	0	0	Pass
0.3417	0	0	0	Pass
0.3451	0	0	0	Pass
0.3485	0	0	0	Pass
0.3520	0	0	0	Pass
0.3554	0	0	0	Pass
0.3588	0	0	0	Pass
0.3623	0	0	0	Pass
0.3657	0	0	0	Pass

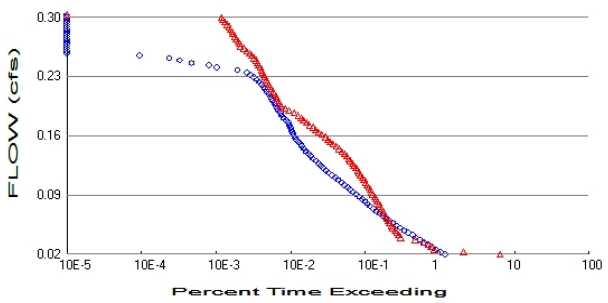
Water Quality

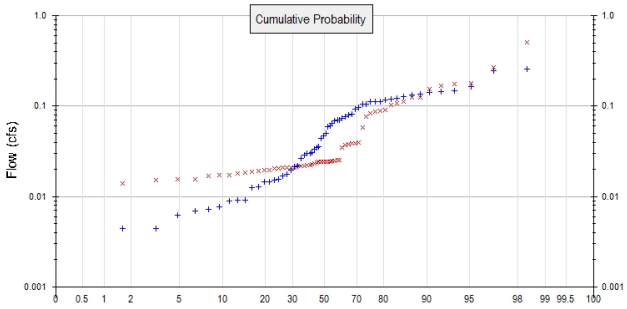
Water Quality BMP Flow and Volume for POC #2

On-line facility volume:	0.5108 acre-feet
On-line facility target flow:	0.6771 cfs.
Adjusted for 15 min:	0.6771 cfs.
Off-line facility target flow:	0.3658 cfs.
Adjusted for 15 min:	0.3658 cfs.

LID Report

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 7.06
Total Impervious Area: 0

Mitigated Landuse Totals for POC #3
Total Pervious Area: 2.76
Total Impervious Area: 4.3

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.042369
5 year	0.103979
10 year	0.157846
25 year	0.237285
50 year	0.302694
100 year	0.371968

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.032713
5 year	0.071429
10 year	0.114065
25 year	0.196974
50 year	0.287867
100 year	0.412367

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	0.015	0.024
1950	0.069	0.089
1951	0.051	0.087
1952	0.009	0.016
1953	0.015	0.024
1954	0.144	0.267
1955	0.133	0.020
1956	0.047	0.025
1957	0.082	0.024
1958	0.013	0.019
1959	0.080	0.113

1960	0.120	0.022
1961	0.149	0.039
1962	0.009	0.015
1963	0.030	0.021
1964	0.035	0.025
1965	0.017	0.024
1966	0.015	0.022
1967	0.143	0.077
1968	0.026	0.018
1969	0.009	0.022
1970	0.007	0.017
1971	0.113	0.021
1972	0.164	0.091
1973	0.022	0.024
1974	0.018	0.024
1975	0.029	0.024
1976	0.035	0.039
1977	0.006	0.020
1978	0.004	0.017
1979	0.004	0.018
1980	0.076	0.175
1981	0.060	0.156
1982	0.113	0.109
1983	0.106	0.125
1984	0.020	0.021
1985	0.106	0.040
1986	0.247	0.058
1987	0.092	0.023
1988	0.033	0.025
1989	0.031	0.020
1990	0.059	0.025
1991	0.118	0.179
1992	0.135	0.035
1993	0.008	0.015
1994	0.001	0.014
1995	0.013	0.020
1996	0.065	0.021
1997	0.070	0.083
1998	0.007	0.017
1999	0.259	0.512
2000	0.074	0.037
2001	0.014	0.014
2002	0.096	0.038
2003	0.070	0.023
2004	0.111	0.167
2005	0.044	0.019
2006	0.127	0.125
2007	0.123	0.104
2008	0.021	0.022
2009	0.030	0.022

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	0.2587	0.5116
2	0.2467	0.2670
3	0.1644	0.1794
4	0.1486	0.1747

5	0.1438	0.1667
6	0.1429	0.1558
7	0.1349	0.1249
8	0.1334	0.1247
9	0.1273	0.1130
10	0.1227	0.1086
11	0.1205	0.1042
12	0.1176	0.0910
13	0.1133	0.0889
14	0.1126	0.0872
15	0.1112	0.0831
16	0.1058	0.0771
17	0.1056	0.0575
18	0.0965	0.0398
19	0.0921	0.0389
20	0.0816	0.0387
21	0.0803	0.0382
22	0.0763	0.0371
23	0.0736	0.0349
24	0.0704	0.0251
25	0.0701	0.0251
26	0.0695	0.0250
27	0.0645	0.0249
28	0.0603	0.0244
29	0.0590	0.0243
30	0.0505	0.0242
31	0.0468	0.0241
32	0.0437	0.0240
33	0.0353	0.0240
34	0.0351	0.0238
35	0.0332	0.0232
36	0.0306	0.0226
37	0.0300	0.0222
38	0.0298	0.0220
39	0.0288	0.0220
40	0.0263	0.0218
41	0.0218	0.0216
42	0.0214	0.0211
43	0.0197	0.0210
44	0.0176	0.0210
45	0.0171	0.0207
46	0.0154	0.0204
47	0.0153	0.0203
48	0.0145	0.0197
49	0.0145	0.0197
50	0.0128	0.0194
51	0.0126	0.0190
52	0.0092	0.0183
53	0.0091	0.0179
54	0.0089	0.0173
55	0.0077	0.0172
56	0.0072	0.0169
57	0.0069	0.0156
58	0.0062	0.0154
59	0.0044	0.0150
60	0.0044	0.0140
61	0.0015	0.0138

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0212	24811	136739	551	Fail
0.0240	21517	44018	204	Fail
0.0269	18741	17973	95	Pass
0.0297	16482	16230	98	Pass
0.0326	14626	14887	101	Fail
0.0354	12953	12885	99	Pass
0.0382	11475	10023	87	Pass
0.0411	10241	6363	62	Pass
0.0439	9086	5980	65	Pass
0.0468	8042	5649	70	Pass
0.0496	7114	5334	74	Pass
0.0525	6310	5033	79	Pass
0.0553	5627	4785	85	Pass
0.0582	5001	4513	90	Pass
0.0610	4494	4325	96	Pass
0.0638	4062	4143	101	Pass
0.0667	3679	3974	108	Pass
0.0695	3317	3822	115	Fail
0.0724	2988	3679	123	Fail
0.0752	2725	3523	129	Fail
0.0781	2490	3371	135	Fail
0.0809	2304	3230	140	Fail
0.0837	2116	3099	146	Fail
0.0866	1958	2997	153	Fail
0.0894	1770	2838	160	Fail
0.0923	1601	2691	168	Fail
0.0951	1456	2579	177	Fail
0.0980	1340	2473	184	Fail
0.1008	1234	2361	191	Fail
0.1036	1125	2244	199	Fail
0.1065	1021	2160	211	Fail
0.1093	919	2042	222	Fail
0.1122	846	1952	230	Fail
0.1150	761	1843	242	Fail
0.1179	683	1750	256	Fail
0.1207	632	1674	264	Fail
0.1236	583	1597	273	Fail
0.1264	545	1504	275	Fail
0.1292	508	1428	281	Fail
0.1321	472	1346	285	Fail
0.1349	427	1273	298	Fail
0.1378	400	1201	300	Fail
0.1406	371	1119	301	Fail
0.1435	338	1036	306	Fail
0.1463	321	956	297	Fail
0.1491	303	870	287	Fail
0.1520	289	790	273	Fail
0.1548	270	714	264	Fail
0.1577	251	668	266	Fail
0.1605	242	622	257	Fail
0.1634	232	559	240	Fail
0.1662	223	499	223	Fail
0.1690	217	456	210	Fail
0.1719	211	429	203	Fail

0.1747	205	380	185	Fail
0.1776	198	347	175	Fail
0.1804	184	318	172	Fail
0.1833	169	296	175	Fail
0.1861	160	268	167	Fail
0.1890	155	238	153	Fail
0.1918	147	203	138	Fail
0.1946	141	179	126	Fail
0.1975	135	158	117	Fail
0.2003	130	151	116	Fail
0.2032	123	147	119	Fail
0.2060	118	140	118	Fail
0.2089	113	136	120	Fail
0.2117	108	128	118	Fail
0.2145	101	124	122	Fail
0.2174	97	118	121	Fail
0.2202	92	114	123	Fail
0.2231	87	109	125	Fail
0.2259	80	104	130	Fail
0.2288	76	100	131	Fail
0.2316	68	96	141	Fail
0.2344	62	93	150	Fail
0.2373	55	89	161	Fail
0.2401	41	87	212	Fail
0.2430	22	83	377	Fail
0.2458	17	79	464	Fail
0.2487	10	77	770	Fail
0.2515	7	73	1042	Fail
0.2544	5	69	1380	Fail
0.2572	2	64	3200	Fail
0.2600	0	60	n/a	Fail
0.2629	0	55	n/a	Fail
0.2657	0	51	n/a	Fail
0.2686	0	45	n/a	Fail
0.2714	0	44	n/a	Fail
0.2743	0	42	n/a	Fail
0.2771	0	40	n/a	Fail
0.2799	0	38	n/a	Fail
0.2828	0	36	n/a	Fail
0.2856	0	35	n/a	Fail
0.2885	0	33	n/a	Fail
0.2913	0	32	n/a	Fail
0.2942	0	30	n/a	Fail
0.2970	0	28	n/a	Fail
0.2999	0	26	n/a	Fail
0.3027	0	25	n/a	Fail

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

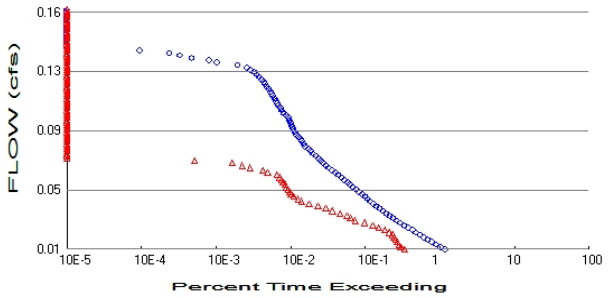
Water Quality

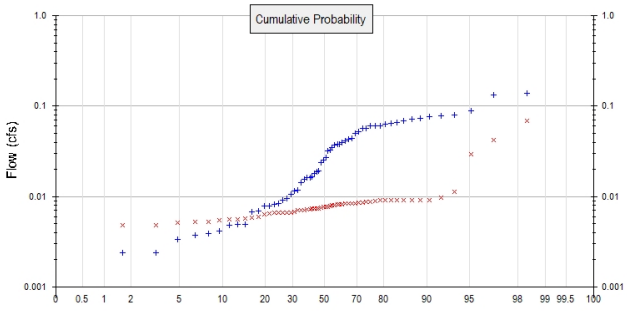
Water Quality BMP Flow and Volume for POC #3

On-line facility volume:	0.4256 acre-feet
On-line facility target flow:	0.5644 cfs.
Adjusted for 15 min:	0.5644 cfs.
Off-line facility target flow:	0.3048 cfs.
Adjusted for 15 min:	0.3048 cfs.

LID Report

POC 4





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4
Total Pervious Area: 3.81
Total Impervious Area: 0

Mitigated Landuse Totals for POC #4
Total Pervious Area: 1.5
Total Impervious Area: 2.31

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	0.022865
5 year	0.056113
10 year	0.085183
25 year	0.128054
50 year	0.163352
100 year	0.200736

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	0.007498
5 year	0.011282
10 year	0.014477
25 year	0.01943
50 year	0.023875
100 year	0.029053

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	0.008	0.006
1950	0.037	0.009
1951	0.027	0.009
1952	0.005	0.005
1953	0.008	0.008
1954	0.078	0.042
1955	0.072	0.007
1956	0.025	0.008
1957	0.044	0.007
1958	0.007	0.006
1959	0.043	0.008

1960	0.065	0.008
1961	0.080	0.009
1962	0.005	0.005
1963	0.016	0.007
1964	0.019	0.009
1965	0.009	0.008
1966	0.008	0.007
1967	0.077	0.008
1968	0.014	0.007
1969	0.005	0.007
1970	0.004	0.006
1971	0.061	0.008
1972	0.089	0.009
1973	0.012	0.007
1974	0.009	0.008
1975	0.016	0.007
1976	0.019	0.009
1977	0.003	0.005
1978	0.002	0.006
1979	0.002	0.005
1980	0.041	0.009
1981	0.033	0.009
1982	0.061	0.011
1983	0.057	0.008
1984	0.011	0.007
1985	0.057	0.008
1986	0.133	0.008
1987	0.050	0.007
1988	0.018	0.007
1989	0.016	0.007
1990	0.032	0.008
1991	0.063	0.030
1992	0.073	0.008
1993	0.004	0.005
1994	0.001	0.004
1995	0.007	0.007
1996	0.035	0.007
1997	0.038	0.008
1998	0.004	0.006
1999	0.140	0.069
2000	0.040	0.008
2001	0.008	0.005
2002	0.052	0.009
2003	0.038	0.008
2004	0.060	0.010
2005	0.024	0.006
2006	0.069	0.009
2007	0.066	0.009
2008	0.012	0.007
2009	0.016	0.007

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	Predeveloped	Mitigated
1	0.1396	0.0686
2	0.1331	0.0420
3	0.0887	0.0295
4	0.0802	0.0112

5	0.0776	0.0097
6	0.0771	0.0092
7	0.0728	0.0092
8	0.0720	0.0091
9	0.0687	0.0091
10	0.0662	0.0091
11	0.0650	0.0091
12	0.0635	0.0091
13	0.0611	0.0091
14	0.0608	0.0089
15	0.0600	0.0088
16	0.0571	0.0087
17	0.0570	0.0085
18	0.0521	0.0085
19	0.0497	0.0085
20	0.0440	0.0084
21	0.0433	0.0084
22	0.0412	0.0083
23	0.0397	0.0082
24	0.0380	0.0082
25	0.0378	0.0081
26	0.0375	0.0081
27	0.0348	0.0080
28	0.0326	0.0078
29	0.0318	0.0077
30	0.0273	0.0077
31	0.0253	0.0076
32	0.0236	0.0076
33	0.0191	0.0074
34	0.0189	0.0073
35	0.0179	0.0073
36	0.0165	0.0073
37	0.0162	0.0072
38	0.0161	0.0072
39	0.0155	0.0071
40	0.0142	0.0070
41	0.0117	0.0070
42	0.0115	0.0068
43	0.0106	0.0066
44	0.0095	0.0066
45	0.0092	0.0066
46	0.0083	0.0066
47	0.0083	0.0066
48	0.0078	0.0065
49	0.0078	0.0064
50	0.0069	0.0059
51	0.0068	0.0058
52	0.0049	0.0058
53	0.0049	0.0056
54	0.0048	0.0055
55	0.0041	0.0055
56	0.0039	0.0053
57	0.0037	0.0052
58	0.0034	0.0051
59	0.0024	0.0049
60	0.0024	0.0049
61	0.0008	0.0041

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0114	24811	7199	29	Pass
0.0130	21517	6415	29	Pass
0.0145	18741	6006	32	Pass
0.0160	16489	5704	34	Pass
0.0176	14621	5414	37	Pass
0.0191	12959	5180	39	Pass
0.0206	11477	4958	43	Pass
0.0222	10239	4453	43	Pass
0.0237	9090	3874	42	Pass
0.0252	8042	3249	40	Pass
0.0268	7114	2693	37	Pass
0.0283	6310	2083	33	Pass
0.0298	5627	1575	27	Pass
0.0314	5001	1347	26	Pass
0.0329	4498	1214	26	Pass
0.0345	4062	983	24	Pass
0.0360	3679	776	21	Pass
0.0375	3317	632	19	Pass
0.0391	2988	496	16	Pass
0.0406	2725	374	13	Pass
0.0421	2490	299	12	Pass
0.0437	2304	270	11	Pass
0.0452	2116	235	11	Pass
0.0467	1958	217	11	Pass
0.0483	1768	207	11	Pass
0.0498	1601	197	12	Pass
0.0513	1454	187	12	Pass
0.0529	1340	179	13	Pass
0.0544	1234	170	13	Pass
0.0559	1123	161	14	Pass
0.0575	1018	151	14	Pass
0.0590	918	139	15	Pass
0.0605	845	105	12	Pass
0.0621	761	90	11	Pass
0.0636	682	61	8	Pass
0.0651	632	48	7	Pass
0.0667	582	35	6	Pass
0.0682	544	11	2	Pass
0.0697	506	0	0	Pass
0.0713	470	0	0	Pass
0.0728	427	0	0	Pass
0.0743	400	0	0	Pass
0.0759	371	0	0	Pass
0.0774	336	0	0	Pass
0.0790	319	0	0	Pass
0.0805	303	0	0	Pass
0.0820	289	0	0	Pass
0.0836	270	0	0	Pass
0.0851	251	0	0	Pass
0.0866	242	0	0	Pass
0.0882	232	0	0	Pass
0.0897	223	0	0	Pass
0.0912	217	0	0	Pass

0.0928	211	0	0	Pass
0.0943	205	0	0	Pass
0.0958	197	0	0	Pass
0.0974	184	0	0	Pass
0.0989	169	0	0	Pass
0.1004	160	0	0	Pass
0.1020	155	0	0	Pass
0.1035	146	0	0	Pass
0.1050	141	0	0	Pass
0.1066	135	0	0	Pass
0.1081	130	0	0	Pass
0.1096	123	0	0	Pass
0.1112	118	0	0	Pass
0.1127	113	0	0	Pass
0.1142	108	0	0	Pass
0.1158	101	0	0	Pass
0.1173	97	0	0	Pass
0.1189	92	0	0	Pass
0.1204	87	0	0	Pass
0.1219	80	0	0	Pass
0.1235	76	0	0	Pass
0.1250	69	0	0	Pass
0.1265	62	0	0	Pass
0.1281	55	0	0	Pass
0.1296	41	0	0	Pass
0.1311	22	0	0	Pass
0.1327	17	0	0	Pass
0.1342	10	0	0	Pass
0.1357	7	0	0	Pass
0.1373	5	0	0	Pass
0.1388	2	0	0	Pass
0.1403	0	0	0	Pass
0.1419	0	0	0	Pass
0.1434	0	0	0	Pass
0.1449	0	0	0	Pass
0.1465	0	0	0	Pass
0.1480	0	0	0	Pass
0.1495	0	0	0	Pass
0.1511	0	0	0	Pass
0.1526	0	0	0	Pass
0.1541	0	0	0	Pass
0.1557	0	0	0	Pass
0.1572	0	0	0	Pass
0.1587	0	0	0	Pass
0.1603	0	0	0	Pass
0.1618	0	0	0	Pass
0.1634	0	0	0	Pass

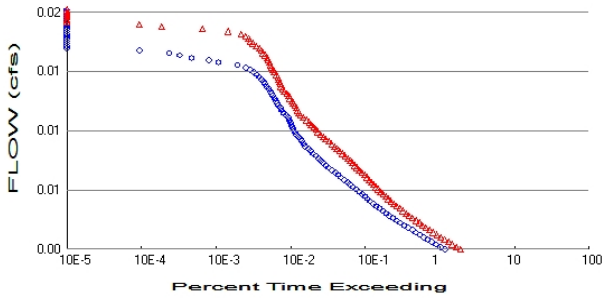
Water Quality

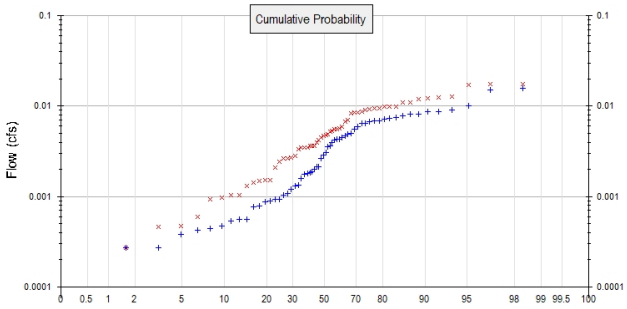
Water Quality BMP Flow and Volume for POC #4

On-line facility volume:	0.2293 acre-feet
On-line facility target flow:	0.3031 cfs.
Adjusted for 15 min:	0.3031 cfs.
Off-line facility target flow:	0.1637 cfs.
Adjusted for 15 min:	0.1637 cfs.

LID Report

POC 5





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #5
Total Pervious Area: 0.43
Total Impervious Area: 0

Mitigated Landuse Totals for POC #5
Total Pervious Area: 0.43
Total Impervious Area: 0

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	**Flow(cfs)**
2 year	0.002581
5 year	0.006333
10 year	0.009614
25 year	0.014452
50 year	0.018436
100 year	0.022655

Flow Frequency Return Periods for Mitigated. POC #5

Return Period	**Flow(cfs)**
2 year	0.004479
5 year	0.009539
10 year	0.013052
25 year	0.017242
50 year	0.020066
100 year	0.022602

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #5

Year	**Predeveloped**	**Mitigated**
1949	0.001	0.004
1950	0.004	0.005
1951	0.003	0.004
1952	0.001	0.001
1953	0.001	0.001
1954	0.009	0.013
1955	0.008	0.011
1956	0.003	0.005
1957	0.005	0.007
1958	0.001	0.001
1959	0.005	0.006

1960	0.007	0.009
1961	0.009	0.012
1962	0.001	0.001
1963	0.002	0.003
1964	0.002	0.004
1965	0.001	0.003
1966	0.001	0.002
1967	0.009	0.011
1968	0.002	0.003
1969	0.001	0.001
1970	0.000	0.001
1971	0.007	0.017
1972	0.010	0.013
1973	0.001	0.005
1974	0.001	0.003
1975	0.002	0.003
1976	0.002	0.004
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.001
1980	0.005	0.008
1981	0.004	0.006
1982	0.007	0.008
1983	0.006	0.008
1984	0.001	0.003
1985	0.006	0.010
1986	0.015	0.017
1987	0.006	0.007
1988	0.002	0.003
1989	0.002	0.004
1990	0.004	0.005
1991	0.007	0.010
1992	0.008	0.010
1993	0.000	0.002
1994	0.000	0.000
1995	0.001	0.001
1996	0.004	0.005
1997	0.004	0.009
1998	0.000	0.000
1999	0.016	0.018
2000	0.004	0.006
2001	0.001	0.002
2002	0.006	0.009
2003	0.004	0.006
2004	0.007	0.009
2005	0.003	0.005
2006	0.008	0.009
2007	0.007	0.012
2008	0.001	0.002
2009	0.002	0.004

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	0.0158	0.0176
2	0.0150	0.0174
3	0.0100	0.0173
4	0.0091	0.0127

5	0.0088	0.0125
6	0.0087	0.0122
7	0.0082	0.0119
8	0.0081	0.0110
9	0.0078	0.0110
10	0.0075	0.0099
11	0.0073	0.0099
12	0.0072	0.0098
13	0.0069	0.0094
14	0.0069	0.0094
15	0.0068	0.0093
16	0.0064	0.0091
17	0.0064	0.0088
18	0.0059	0.0084
19	0.0056	0.0084
20	0.0050	0.0083
21	0.0049	0.0071
22	0.0046	0.0067
23	0.0045	0.0060
24	0.0043	0.0057
25	0.0043	0.0055
26	0.0042	0.0055
27	0.0039	0.0053
28	0.0037	0.0053
29	0.0036	0.0049
30	0.0031	0.0048
31	0.0029	0.0047
32	0.0027	0.0045
33	0.0022	0.0042
34	0.0021	0.0040
35	0.0020	0.0037
36	0.0019	0.0037
37	0.0018	0.0036
38	0.0018	0.0035
39	0.0018	0.0035
40	0.0016	0.0035
41	0.0013	0.0033
42	0.0013	0.0028
43	0.0012	0.0027
44	0.0011	0.0027
45	0.0010	0.0026
46	0.0009	0.0024
47	0.0009	0.0021
48	0.0009	0.0015
49	0.0009	0.0015
50	0.0008	0.0015
51	0.0008	0.0014
52	0.0006	0.0013
53	0.0006	0.0010
54	0.0005	0.0010
55	0.0005	0.0010
56	0.0004	0.0009
57	0.0004	0.0006
58	0.0004	0.0005
59	0.0003	0.0005
60	0.0003	0.0003
61	0.0001	0.0001

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0013	24811	40254	162	Fail
0.0015	21517	35356	164	Fail
0.0016	18745	31292	166	Fail
0.0018	16476	27720	168	Fail
0.0020	14619	24597	168	Fail
0.0022	12953	21902	169	Fail
0.0023	11475	19483	169	Fail
0.0025	10241	17357	169	Fail
0.0027	9090	15445	169	Fail
0.0028	8040	13815	171	Fail
0.0030	7110	12472	175	Fail
0.0032	6310	11304	179	Fail
0.0034	5627	10185	181	Fail
0.0035	5001	9163	183	Fail
0.0037	4494	8258	183	Fail
0.0039	4062	7499	184	Fail
0.0041	3679	6827	185	Fail
0.0042	3317	6218	187	Fail
0.0044	2988	5655	189	Fail
0.0046	2725	5148	188	Fail
0.0048	2490	4729	189	Fail
0.0049	2304	4344	188	Fail
0.0051	2116	4008	189	Fail
0.0053	1958	3702	189	Fail
0.0054	1770	3431	193	Fail
0.0056	1601	3187	199	Fail
0.0058	1455	2950	202	Fail
0.0060	1340	2757	205	Fail
0.0061	1234	2573	208	Fail
0.0063	1123	2411	214	Fail
0.0065	1017	2246	220	Fail
0.0067	918	2079	226	Fail
0.0068	844	1927	228	Fail
0.0070	761	1777	233	Fail
0.0072	682	1656	242	Fail
0.0074	631	1544	244	Fail
0.0075	582	1437	246	Fail
0.0077	544	1342	246	Fail
0.0079	506	1241	245	Fail
0.0080	470	1153	245	Fail
0.0082	427	1065	249	Fail
0.0084	400	965	241	Fail
0.0086	371	889	239	Fail
0.0087	336	825	245	Fail
0.0089	319	759	237	Fail
0.0091	303	695	229	Fail
0.0093	289	627	216	Fail
0.0094	270	580	214	Fail
0.0096	251	535	213	Fail
0.0098	242	496	204	Fail
0.0099	232	466	200	Fail
0.0101	223	436	195	Fail
0.0103	217	405	186	Fail
0.0105	211	380	180	Fail

0.0106	205	345	168	Fail
0.0108	198	313	158	Fail
0.0110	184	287	155	Fail
0.0112	169	274	162	Fail
0.0113	160	265	165	Fail
0.0115	155	254	163	Fail
0.0117	146	243	166	Fail
0.0119	141	233	165	Fail
0.0120	135	223	165	Fail
0.0122	130	210	161	Fail
0.0124	123	202	164	Fail
0.0125	118	190	161	Fail
0.0127	113	174	153	Fail
0.0129	108	167	154	Fail
0.0131	101	159	157	Fail
0.0132	97	155	159	Fail
0.0134	92	151	164	Fail
0.0136	87	147	168	Fail
0.0138	80	144	180	Fail
0.0139	76	138	181	Fail
0.0141	68	129	189	Fail
0.0143	62	125	201	Fail
0.0145	54	118	218	Fail
0.0146	41	114	278	Fail
0.0148	23	111	482	Fail
0.0150	17	106	623	Fail
0.0151	10	103	1030	Fail
0.0153	7	98	1400	Fail
0.0155	5	90	1800	Fail
0.0157	2	86	4300	Fail
0.0158	0	81	n/a	Fail
0.0160	0	73	n/a	Fail
0.0162	0	66	n/a	Fail
0.0164	0	61	n/a	Fail
0.0165	0	58	n/a	Fail
0.0167	0	53	n/a	Fail
0.0169	0	46	n/a	Fail
0.0171	0	31	n/a	Fail
0.0172	0	14	n/a	Fail
0.0174	0	4	n/a	Fail
0.0176	0	2	n/a	Fail
0.0177	0	0	n/a	Pass
0.0179	0	0	0	Pass
0.0181	0	0	0	Pass
0.0183	0	0	0	Pass
0.0184	0	0	0	Pass

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 #5

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

LID Report

POC 6

POC #6 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 7

POC #7 was not reported because POC must exist in both scenarios and both scenarios must have been run.

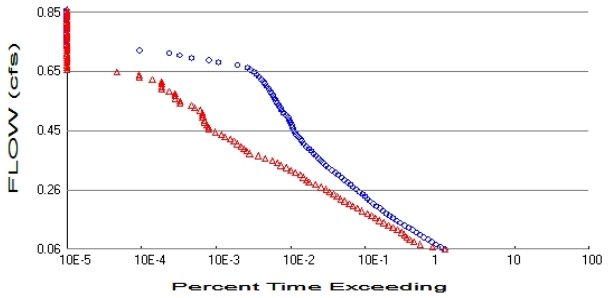
POC 8

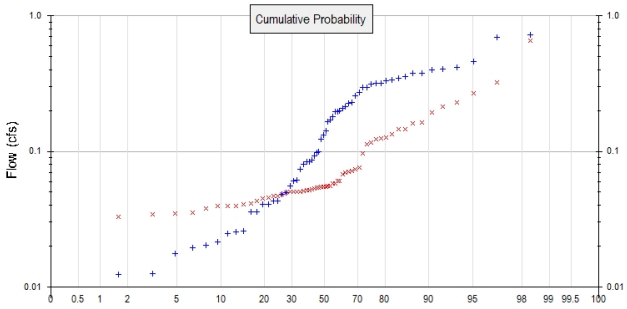
POC #8 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 9

POC #9 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 10





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #10
Total Pervious Area: 19.83
Total Impervious Area: 0

Mitigated Landuse Totals for POC #10
Total Pervious Area: 8.06
Total Impervious Area: 11.77

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #10

Return Period	**Flow(cfs)**
2 year	0.119004
5 year	0.292055
10 year	0.443356
25 year	0.666486
50 year	0.850207
100 year	1.044786

Flow Frequency Return Periods for Mitigated. POC #10

Return Period	**Flow(cfs)**
2 year	0.06507
5 year	0.116364
10 year	0.164864
25 year	0.247584
50 year	0.32838
100 year	0.429102

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #10

Year	**Predeveloped**	**Mitigated**
1949	0.041	0.051
1950	0.195	0.124
1951	0.142	0.123
1952	0.025	0.034
1953	0.043	0.055
1954	0.404	0.322
1955	0.375	0.053
1956	0.131	0.058
1957	0.229	0.051
1958	0.036	0.041
1959	0.225	0.146

1960	0.338	0.056
1961	0.417	0.076
1962	0.026	0.035
1963	0.084	0.047
1964	0.099	0.058
1965	0.048	0.054
1966	0.043	0.050
1967	0.401	0.113
1968	0.074	0.045
1969	0.026	0.049
1970	0.020	0.039
1971	0.316	0.061
1972	0.462	0.126
1973	0.061	0.055
1974	0.049	0.054
1975	0.081	0.054
1976	0.099	0.072
1977	0.017	0.041
1978	0.012	0.039
1979	0.012	0.039
1980	0.214	0.212
1981	0.169	0.194
1982	0.318	0.147
1983	0.297	0.161
1984	0.055	0.047
1985	0.296	0.067
1986	0.693	0.097
1987	0.259	0.055
1988	0.093	0.052
1989	0.086	0.048
1990	0.166	0.060
1991	0.330	0.266
1992	0.379	0.070
1993	0.022	0.035
1994	0.004	0.029
1995	0.036	0.046
1996	0.181	0.050
1997	0.198	0.116
1998	0.019	0.038
1999	0.727	0.652
2000	0.207	0.069
2001	0.041	0.033
2002	0.271	0.074
2003	0.197	0.052
2004	0.312	0.230
2005	0.123	0.043
2006	0.358	0.163
2007	0.345	0.134
2008	0.060	0.050
2009	0.084	0.050

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #10

Rank	Predeveloped	Mitigated
1	0.7266	0.6517
2	0.6928	0.3225
3	0.4617	0.2664
4	0.4175	0.2298

5	0.4039	0.2123
6	0.4015	0.1935
7	0.3790	0.1626
8	0.3747	0.1607
9	0.3575	0.1465
10	0.3446	0.1459
11	0.3383	0.1341
12	0.3303	0.1260
13	0.3183	0.1245
14	0.3162	0.1231
15	0.3122	0.1164
16	0.2972	0.1133
17	0.2965	0.0966
18	0.2709	0.0757
19	0.2588	0.0742
20	0.2292	0.0718
21	0.2254	0.0703
22	0.2142	0.0695
23	0.2068	0.0674
24	0.1978	0.0608
25	0.1969	0.0601
26	0.1951	0.0582
27	0.1813	0.0580
28	0.1695	0.0556
29	0.1656	0.0552
30	0.1420	0.0546
31	0.1315	0.0546
32	0.1227	0.0545
33	0.0992	0.0543
34	0.0986	0.0538
35	0.0931	0.0531
36	0.0858	0.0522
37	0.0842	0.0518
38	0.0836	0.0514
39	0.0808	0.0508
40	0.0737	0.0502
41	0.0611	0.0502
42	0.0601	0.0501
43	0.0553	0.0500
44	0.0493	0.0492
45	0.0479	0.0480
46	0.0432	0.0468
47	0.0430	0.0467
48	0.0407	0.0458
49	0.0406	0.0447
50	0.0359	0.0427
51	0.0355	0.0410
52	0.0257	0.0408
53	0.0256	0.0394
54	0.0249	0.0394
55	0.0216	0.0394
56	0.0202	0.0380
57	0.0194	0.0352
58	0.0175	0.0347
59	0.0125	0.0344
60	0.0124	0.0327
61	0.0041	0.0291

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0595	25068	24897	99	Pass
0.0675	21688	16970	78	Pass
0.0755	18891	11563	61	Pass
0.0835	16598	9535	57	Pass
0.0914	14715	8425	57	Pass
0.0994	13047	7664	58	Pass
0.1074	11544	7127	61	Pass
0.1154	10301	6519	63	Pass
0.1234	9133	5790	63	Pass
0.1314	8094	4988	61	Pass
0.1394	7146	4385	61	Pass
0.1474	6340	3797	59	Pass
0.1553	5647	3298	58	Pass
0.1633	5014	2907	57	Pass
0.1713	4513	2603	57	Pass
0.1793	4077	2286	56	Pass
0.1873	3692	1930	52	Pass
0.1953	3332	1679	50	Pass
0.2033	2999	1467	48	Pass
0.2113	2727	1305	47	Pass
0.2192	2496	1138	45	Pass
0.2272	2308	996	43	Pass
0.2352	2120	896	42	Pass
0.2432	1964	803	40	Pass
0.2512	1775	712	40	Pass
0.2592	1604	641	39	Pass
0.2672	1457	552	37	Pass
0.2751	1342	457	34	Pass
0.2831	1237	376	30	Pass
0.2911	1125	345	30	Pass
0.2991	1019	318	31	Pass
0.3071	919	289	31	Pass
0.3151	845	245	28	Pass
0.3231	761	213	27	Pass
0.3311	683	188	27	Pass
0.3390	632	158	25	Pass
0.3470	582	141	24	Pass
0.3550	544	122	22	Pass
0.3630	506	97	19	Pass
0.3710	476	79	16	Pass
0.3790	432	60	13	Pass
0.3870	401	55	13	Pass
0.3950	374	50	13	Pass
0.4029	342	46	13	Pass
0.4109	321	41	12	Pass
0.4189	303	37	12	Pass
0.4269	290	33	11	Pass
0.4349	271	28	10	Pass
0.4429	253	25	9	Pass
0.4509	242	21	8	Pass
0.4588	233	17	7	Pass
0.4668	223	17	7	Pass
0.4748	219	16	7	Pass

0.4828	211	15	7	Pass
0.4908	205	15	7	Pass
0.4988	198	14	7	Pass
0.5068	185	14	7	Pass
0.5148	170	14	8	Pass
0.5227	160	13	8	Pass
0.5307	155	11	7	Pass
0.5387	148	10	6	Pass
0.5467	141	7	4	Pass
0.5547	135	7	5	Pass
0.5627	130	6	4	Pass
0.5707	124	6	4	Pass
0.5787	118	6	5	Pass
0.5866	113	5	4	Pass
0.5946	109	4	3	Pass
0.6026	102	4	3	Pass
0.6106	97	4	4	Pass
0.6186	92	4	4	Pass
0.6266	87	3	3	Pass
0.6346	80	2	2	Pass
0.6425	76	2	2	Pass
0.6505	69	1	1	Pass
0.6585	62	0	0	Pass
0.6665	56	0	0	Pass
0.6745	41	0	0	Pass
0.6825	23	0	0	Pass
0.6905	17	0	0	Pass
0.6985	10	0	0	Pass
0.7064	7	0	0	Pass
0.7144	5	0	0	Pass
0.7224	2	0	0	Pass
0.7304	0	0	0	Pass
0.7384	0	0	0	Pass
0.7464	0	0	0	Pass
0.7544	0	0	0	Pass
0.7624	0	0	0	Pass
0.7703	0	0	0	Pass
0.7783	0	0	0	Pass
0.7863	0	0	0	Pass
0.7943	0	0	0	Pass
0.8023	0	0	0	Pass
0.8103	0	0	0	Pass
0.8183	0	0	0	Pass
0.8262	0	0	0	Pass
0.8342	0	0	0	Pass
0.8422	0	0	0	Pass
0.8502	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #10

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

LID Report

Model Default Modifications

Total of 0 changes have been made.

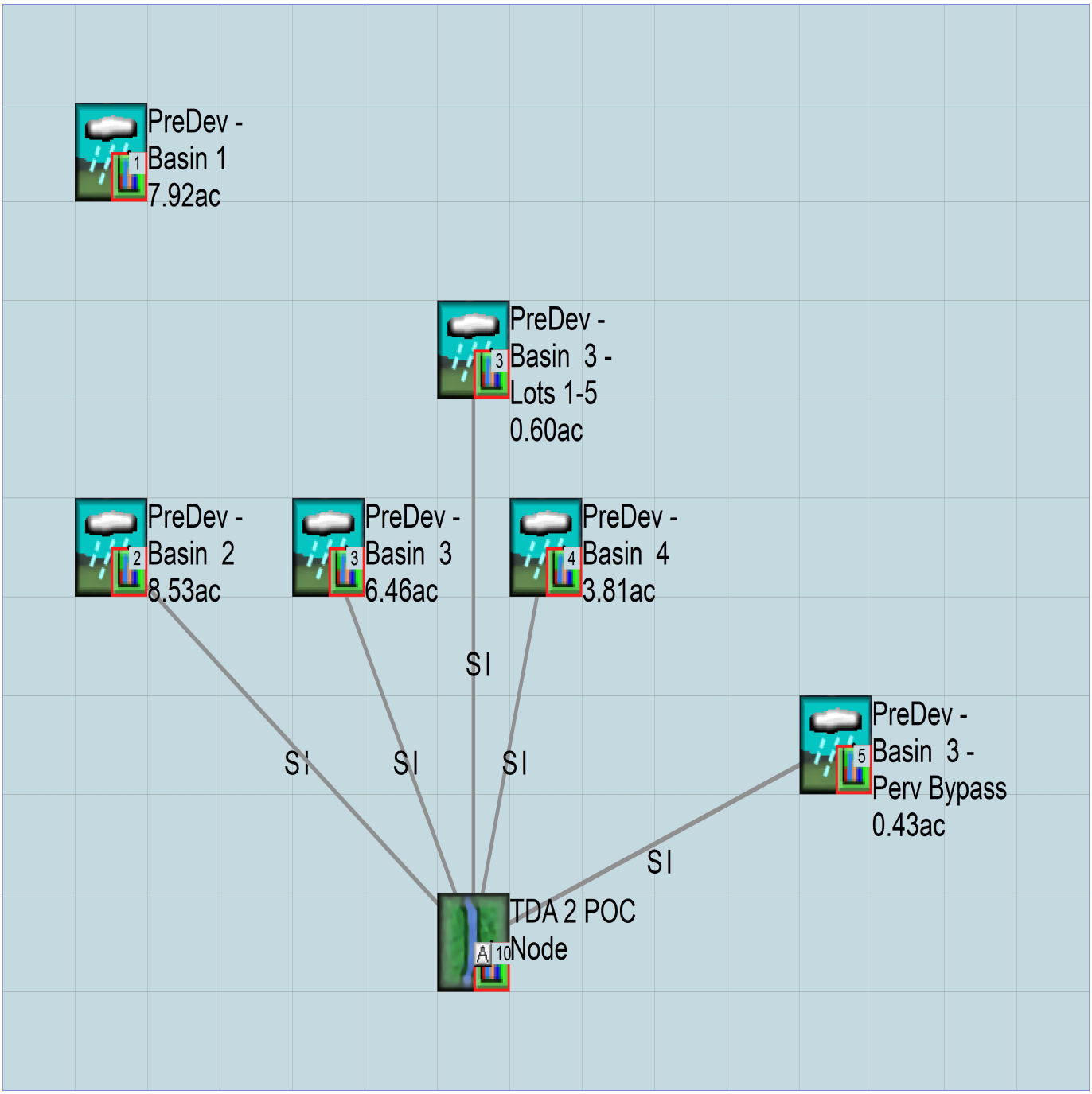
PERLND Changes

No PERLND changes have been made.

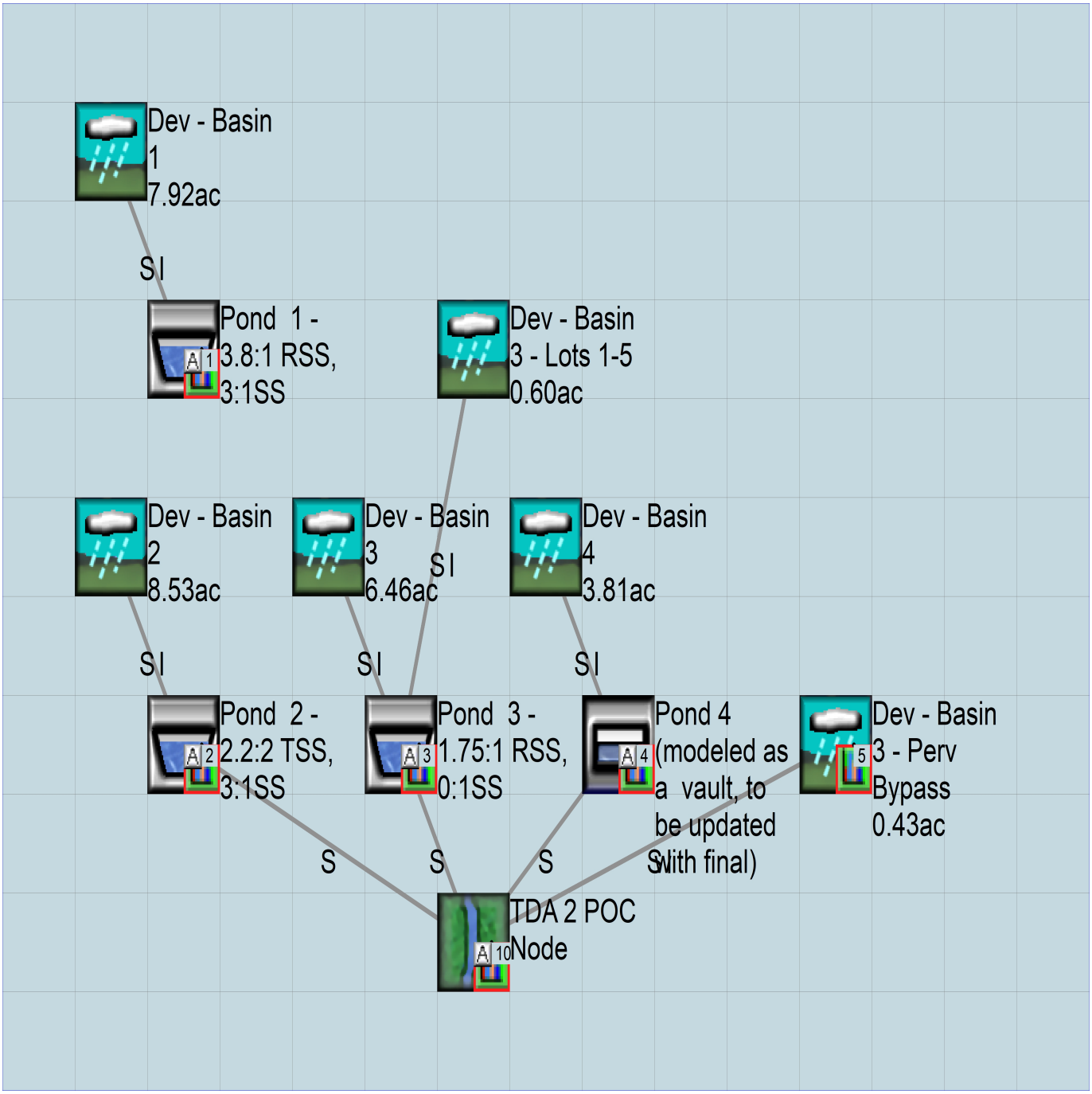
IMPLND Changes

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   Madrona Ridge.wdm
MESSU       25   PreMadrona Ridge.MES
            27   PreMadrona Ridge.L61
            28   PreMadrona Ridge.L62
            30   POCMadrona Ridge1.dat
            31   POCMadrona Ridge2.dat
            32   POCMadrona Ridge3.dat
            33   POCMadrona Ridge4.dat
            34   POCMadrona Ridge5.dat
            39   POCMadrona Ridge10.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      RCHRES       1
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       510
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY      10
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        PreDev - Basin 1           MAX                    1    2   30    9
    2        PreDev - Basin  2          MAX                    1    2   31    9
    3        PreDev - Basin  3          MAX                    1    2   32    9
    4        PreDev - Basin  4          MAX                    1    2   33    9
    5        PreDev - Basin  3 - Perv   MAX                    1    2   34    9
   10        TDA 2 POC Node             MAX                    1    2   39    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  510         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
  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#   ***
PreDev - Basin  2***
PERLND  10                        8.53     RCHRES   1      2
PERLND  10                        8.53     RCHRES   1      3
PreDev - Basin  3***
PERLND  10                        6.46     RCHRES   1      2
PERLND  10                        6.46     RCHRES   1      3
PreDev - Basin  3 - Lots 1-5***
PERLND  10                         0.6     RCHRES   1      2
PERLND  10                         0.6     RCHRES   1      3
PreDev - Basin  4***
PERLND  10                        3.81     RCHRES   1      2
PERLND  10                        3.81     RCHRES   1      3
PreDev - Basin  3 - Perv Bypass***
PERLND  10                        0.43     RCHRES   1      2
PERLND  10                        0.43     RCHRES   1      3
PreDev - Basin 1***
PERLND  10                        7.92     COPY   501     12
PERLND  10                        7.92     COPY   501     13
PreDev - Basin  2***
PERLND  10                        8.53     COPY   502     12
PERLND  10                        8.53     COPY   502     13
PreDev - Basin  3***
PERLND  10                        6.46     COPY   503     12
PERLND  10                        6.46     COPY   503     13
PreDev - Basin  4***
PERLND  10                        3.81     COPY   504     12
PERLND  10                        3.81     COPY   504     13
PreDev - Basin  3 - Lots 1-5***
PERLND  10                         0.6     COPY   503     12
PERLND  10                         0.6     COPY   503     13
PreDev - Basin  3 - Perv Bypass***
PERLND  10                        0.43     COPY   505     12
PERLND  10                        0.43     COPY   505     13

******Routing******
RCHRES   1                           1     COPY   510     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
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   510 OUTPUT MEAN   1 1   48.4        DISPLY  10     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     TDA 2 POC Node          1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.002296  0.000000  0.000000
  0.025000  0.002297  0.000057  100.3789
  0.050000  0.002298  0.000115  317.6304
  0.075000  0.002299  0.000172  622.2683
  0.100000  0.002300  0.000230  1001.812
```

0.125000	0.002301	0.000287	1448.395
0.150000	0.002303	0.000345	1956.351
0.175000	0.002304	0.000402	2521.290
0.200000	0.002305	0.000460	3139.646
0.225000	0.002306	0.000518	3808.433
0.250000	0.002307	0.000575	4525.085
0.275000	0.002308	0.000633	5287.363
0.300000	0.002309	0.000691	6093.280
0.325000	0.002311	0.000749	6941.055
0.350000	0.002312	0.000806	7829.076
0.375000	0.002313	0.000864	8755.872
0.400000	0.002314	0.000922	9720.093
0.425000	0.002315	0.000980	10720.49
0.450000	0.002316	0.001038	11755.91
0.475000	0.002317	0.001096	12825.26
0.500000	0.002319	0.001154	13927.54
0.525000	0.002320	0.001212	15061.80
0.550000	0.002321	0.001270	16227.14
0.575000	0.002322	0.001328	17422.73
0.600000	0.002323	0.001386	18647.75
0.625000	0.002324	0.001444	19901.45
0.650000	0.002326	0.001502	21183.10
0.675000	0.002327	0.001560	22492.03
0.700000	0.002328	0.001618	23827.57
0.725000	0.002329	0.001676	25189.10
0.750000	0.002330	0.001735	26576.01
0.775000	0.002331	0.001793	27987.74
0.800000	0.002332	0.001851	29423.72
0.825000	0.002334	0.001910	30883.43
0.850000	0.002335	0.001968	32366.36
0.875000	0.002336	0.002026	33872.02
0.900000	0.002337	0.002085	35399.93
0.925000	0.002338	0.002143	36949.64
0.950000	0.002339	0.002202	38520.71
0.975000	0.002340	0.002260	40112.71
1.000000	0.002342	0.002319	41725.23
1.025000	0.002343	0.002377	43357.88
1.050000	0.002344	0.002436	45010.26
1.075000	0.002345	0.002494	46682.01
1.100000	0.002346	0.002553	48372.76
1.125000	0.002347	0.002612	50082.16
1.150000	0.002348	0.002670	51809.88
1.175000	0.002350	0.002729	53555.58
1.200000	0.002351	0.002788	55318.94
1.225000	0.002352	0.002847	57099.66
1.250000	0.002353	0.002905	58897.42
1.275000	0.002354	0.002964	60711.94
1.300000	0.002355	0.003023	62542.92
1.325000	0.002357	0.003082	64390.09
1.350000	0.002358	0.003141	66253.18
1.375000	0.002359	0.003200	68131.92
1.400000	0.002360	0.003259	70026.06
1.425000	0.002361	0.003318	71935.34
1.450000	0.002362	0.003377	73859.52
1.475000	0.002363	0.003436	75798.36
1.500000	0.002365	0.003495	77751.62
1.525000	0.002366	0.003554	79719.09
1.550000	0.002367	0.003613	81700.54
1.575000	0.002368	0.003673	83695.74
1.600000	0.002369	0.003732	85704.50
1.625000	0.002370	0.003791	87726.60
1.650000	0.002371	0.003850	89761.84
1.675000	0.002373	0.003910	91810.03
1.700000	0.002374	0.003969	93870.96
1.725000	0.002375	0.004028	95944.46
1.750000	0.002376	0.004088	98030.34
1.775000	0.002377	0.004147	100128.4
1.800000	0.002378	0.004207	102238.5
1.825000	0.002379	0.004266	104360.5
1.850000	0.002381	0.004326	106494.1

```
  1.875000  0.002382  0.004385  108639.2
  1.900000  0.002383  0.004445  110795.7
  1.925000  0.002384  0.004504  112963.4
  1.950000  0.002385  0.004564  115142.1
  1.975000  0.002386  0.004624  117331.7
  2.000000  0.002388  0.004683  119532.0
  2.025000  0.002389  0.004743  121742.9
  2.050000  0.002390  0.004803  123964.3
  2.075000  0.002391  0.004862  126196.0
  2.100000  0.002392  0.004922  128437.8
  2.125000  0.002393  0.004982  130689.7
  2.150000  0.002394  0.005042  132951.4
  2.175000  0.002396  0.005102  135223.0
  2.200000  0.002397  0.005162  137504.1
  2.225000  0.002398  0.005222  139794.8
  2.250000  0.002399  0.005282  142094.9
  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   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
RCHRES   1 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1009 STAG     ENGL      REPL
COPY   510 OUTPUT MEAN   1 1     48.4      WDM    510 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    505 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       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       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


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   Madrona Ridge.wdm
MESSU       25   MitMadrona Ridge.MES
            27   MitMadrona Ridge.L61
            28   MitMadrona Ridge.L62
            34   POCMadrona Ridge5.dat
            33   POCMadrona Ridge4.dat
            30   POCMadrona Ridge1.dat
            31   POCMadrona Ridge2.dat
            32   POCMadrona Ridge3.dat
            39   POCMadrona Ridge10.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      13
      IMPLND       1
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      RCHRES       5
      RCHRES       6
      RCHRES       7
      RCHRES       8
      COPY       505
      COPY         4
      COPY       504
      COPY         1
      COPY       501
      COPY         2
      COPY       502
      COPY         3
      COPY       503
      COPY        10
      COPY       510
      DISPLY       5
      DISPLY       4
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY      10
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    5        Dev - Basin  3 - Perv Byp   MAX                   1    2   34    9
    4        Pond 4 (modeled as a  vau   MAX                   1    2   33    9
    1        Pond  1 - 3.8:1 RSS, 3:1S   MAX                   1    2   30    9
    2        Pond  2 - 2.2:2 TSS, 3:1S   MAX                   1    2   31    9
    3        Pond  3 - 1.75:1 RSS, 0:1   MAX                   1    2   32    9
   10        TDA 2 POC Node              MAX                   1    2   39    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
```

```
    # -  #  NPT  NMN ***
    1         1    1
  505         1    1
    4         1    1
  504         1    1
  501         1    1
    2         1    1
  502         1    1
    3         1    1
  503         1    1
   10         1    1
  510         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   13     C, Pasture, Flat        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   13         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   13         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   13         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   13              0       4.5      0.06       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

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

```
   13              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Dev - Basin  1***
PERLND  13                      3.13     RCHRES   5      2
PERLND  13                      3.13     RCHRES   5      3
IMPLND   1                      4.79     RCHRES   5      5
Dev - Basin  2***
PERLND  13                      3.37     RCHRES   6      2
PERLND  13                      3.37     RCHRES   6      3
IMPLND   1                      5.16     RCHRES   6      5
Dev - Basin  3***
PERLND  13                      2.55     RCHRES   7      2
PERLND  13                      2.55     RCHRES   7      3
IMPLND   1                      3.91     RCHRES   7      5
Dev - Basin  4***
PERLND  13                       1.5     RCHRES   4      2
PERLND  13                       1.5     RCHRES   4      3
```

```
IMPLND   1                          2.31     RCHRES   4      5
Dev - Basin  3 - Lots 1-5***
PERLND  13                          0.21     RCHRES   7      2
PERLND  13                          0.21     RCHRES   7      3
IMPLND   1                          0.39     RCHRES   7      5
Dev - Basin  3 - Perv Bypass***
PERLND  13                          0.43     RCHRES   8      2
PERLND  13                          0.43     RCHRES   8      3
Dev - Basin  3 - Perv Bypass***
PERLND  13                          0.43     COPY   505     12
PERLND  13                          0.43     COPY   505     13

******Routing******
PERLND  13                          3.13     COPY     1     12
IMPLND   1                          4.79     COPY     1     15
PERLND  13                          3.13     COPY     1     13
PERLND  13                          3.37     COPY     2     12
IMPLND   1                          5.16     COPY     2     15
PERLND  13                          3.37     COPY     2     13
PERLND  13                          2.55     COPY     3     12
IMPLND   1                          3.91     COPY     3     15
PERLND  13                          2.55     COPY     3     13
PERLND  13                           1.5     COPY     4     12
IMPLND   1                          2.31     COPY     4     15
PERLND  13                           1.5     COPY     4     13
RCHRES   4                             1     COPY    10     16
RCHRES   4                                   RCHRES   8      6
PERLND  13                          0.21     COPY     3     12
IMPLND   1                          0.39     COPY     3     15
PERLND  13                          0.21     COPY     3     13
RCHRES   6                             1     COPY    10     16
RCHRES   6                                   RCHRES   8      6
RCHRES   7                             1     COPY    10     16
RCHRES   7                                   RCHRES   8      6
PERLND  13                          0.43     COPY    10     12
PERLND  13                          0.43     COPY    10     13
RCHRES   4                             1     COPY   504     16
RCHRES   8                             1     COPY   510     16
RCHRES   5                             1     COPY   501     16
RCHRES   6                             1     COPY   502     16
RCHRES   7                             1     COPY   503     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     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
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   510 OUTPUT MEAN   1 1   48.4        DISPLY  10     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
    2     Vault  2               1    1    1    1   28    0    1
    3     Vault  3               1    1    1    1   28    0    1
    4     Pond 4 (modeled -016   1    1    1    1   28    0    1
    5     Pond  1 - 3.8:1 -021   1    1    1    1   28    0    1
    6     Pond  2 - 2.2:2 -022   1    1    1    1   28    0    1
```

```
  7     Pond  3 - 1.75:1-023    1    1    1    1   28    0    1
  8     TDA 2 POC Node          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
  2         1    0    0    0    0    0    0    0    0    0
  3         1    0    0    0    0    0    0    0    0    0
  4         1    0    0    0    0    0    0    0    0    0
  5         1    0    0    0    0    0    0    0    0    0
  6         1    0    0    0    0    0    0    0    0    0
  7         1    0    0    0    0    0    0    0    0    0
  8         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
  2         4    0    0    0    0    0    0    0    0    0    1    9
  3         4    0    0    0    0    0    0    0    0    0    1    9
  4         4    0    0    0    0    0    0    0    0    0    1    9
  5         4    0    0    0    0    0    0    0    0    0    1    9
  6         4    0    0    0    0    0    0    0    0    0    1    9
  7         4    0    0    0    0    0    0    0    0    0    1    9
  8         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
  2       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  3       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  4       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  5       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  6       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  7       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  8       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      0.03       0.0       0.0       0.5       0.0
  2              2      0.03       0.0       0.0       0.5       0.0
  3              3      0.03       0.0       0.0       0.5       0.0
  4              4      0.03       0.0       0.0       0.5       0.0
  5              5      0.04       0.0       0.0       0.5       0.0
  6              6      0.04       0.0       0.0       0.5       0.0
  7              7      0.04       0.0       0.0       0.5       0.0
  8              8      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
  2            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  3            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  4            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  5            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  6            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  7            0        4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
```

```
    8            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  0.533747  0.000000  0.000000
  0.100000  0.533747  0.053375  0.002798
  0.200000  0.533747  0.106749  0.003957
  0.300000  0.533747  0.160124  0.004846
  0.400000  0.533747  0.213499  0.005596
  0.500000  0.533747  0.266873  0.006256
  0.600000  0.533747  0.320248  0.006853
  0.700000  0.533747  0.373623  0.007403
  0.800000  0.533747  0.426997  0.007914
  0.900000  0.533747  0.480372  0.008394
  1.000000  0.533747  0.533747  0.008848
  1.100000  0.533747  0.587121  0.009280
  1.200000  0.533747  0.640496  0.009692
  1.300000  0.533747  0.693871  0.010088
  1.400000  0.533747  0.747245  0.010469
  1.500000  0.533747  0.800620  0.010836
  1.600000  0.533747  0.853994  0.011192
  1.700000  0.533747  0.907369  0.011536
  1.800000  0.533747  0.960744  0.011870
  1.900000  0.533747  1.014118  0.012196
  2.000000  0.533747  1.067493  0.012513
  2.100000  0.533747  1.120868  0.012822
  2.200000  0.533747  1.174242  0.013123
  2.300000  0.533747  1.227617  0.013418
  2.400000  0.533747  1.280992  0.013707
  2.500000  0.533747  1.334366  0.013989
  2.600000  0.533747  1.387741  0.014267
  2.700000  0.533747  1.441116  0.014538
  2.800000  0.533747  1.494490  0.014805
  2.900000  0.533747  1.547865  0.015067
  3.000000  0.533747  1.601240  0.015325
  3.100000  0.533747  1.654614  0.015578
  3.200000  0.533747  1.707989  0.015827
  3.300000  0.533747  1.761364  0.016073
  3.400000  0.533747  1.814738  0.016314
  3.500000  0.533747  1.868113  0.016553
  3.600000  0.533747  1.921488  0.016787
  3.700000  0.533747  1.974862  0.017019
  3.800000  0.533747  2.028237  0.017247
  3.900000  0.533747  2.081612  0.017473
  4.000000  0.533747  2.134986  0.017695
  4.100000  0.533747  2.188361  0.017915
  4.200000  0.533747  2.241736  0.018132
  4.300000  0.533747  2.295110  0.018347
  4.400000  0.533747  2.348485  0.018559
  4.500000  0.533747  2.401860  0.018769
  4.600000  0.533747  2.455234  0.018976
  4.700000  0.533747  2.508609  0.019181
  4.800000  0.533747  2.561983  0.019384
  4.900000  0.533747  2.615358  0.019585
  5.000000  0.533747  2.668733  0.019784
  5.100000  0.533747  2.722107  0.019981
  5.200000  0.533747  2.775482  0.020176
  5.300000  0.533747  2.828857  0.020369
  5.400000  0.533747  2.882231  0.020560
  5.500000  0.533747  2.935606  0.020750
  5.600000  0.533747  2.988981  0.020938
  5.700000  0.533747  3.042355  0.021124
  5.800000  0.533747  3.095730  0.021308
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5.900000  0.533747  3.149105  0.021491
6.000000  0.533747  3.202479  0.021672
6.100000  0.533747  3.255854  0.021852
6.200000  0.533747  3.309229  0.022031
6.300000  0.533747  3.362603  0.022208
6.400000  0.533747  3.415978  0.022383
6.500000  0.533747  3.469353  0.030833
6.600000  0.533747  3.522727  0.048318
6.700000  0.533747  3.576102  0.056871
6.800000  0.533747  3.629477  0.063671
6.900000  0.533747  3.682851  0.074777
7.000000  0.533747  3.736226  0.089308
7.100000  0.533747  3.789601  0.105711
7.200000  0.533747  3.842975  0.123409
7.300000  0.533747  3.896350  0.142042
7.400000  0.533747  3.949725  0.161349
7.500000  0.533747  4.003099  0.181121
7.600000  0.533747  4.056474  0.201185
7.700000  0.533747  4.109848  0.221389
7.800000  0.533747  4.163223  0.241599
7.900000  0.533747  4.216598  0.265614
8.000000  0.533747  4.269972  0.290499
8.100000  0.533747  4.323347  0.795615
8.200000  0.533747  4.376722  1.700754
8.300000  0.533747  4.430096  2.800328
8.400000  0.533747  4.483471  3.933972
8.500000  0.533747  4.536846  4.943501
8.600000  0.533747  4.590220  5.708206
8.700000  0.533747  4.643595  6.202040
8.800000  0.533747  4.696970  6.650481
8.900000  0.533747  4.750344  7.037393
9.000000  0.533747  4.803719  7.403427
9.100000  0.533747  4.857094  7.751645
END FTABLE  1
FTABLE      2
 92    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.600723  0.000000  0.000000
0.100000  0.600723  0.060072  0.003183
0.200000  0.600723  0.120145  0.004501
0.300000  0.600723  0.180217  0.005513
0.400000  0.600723  0.240289  0.006365
0.500000  0.600723  0.300362  0.007117
0.600000  0.600723  0.360434  0.007796
0.700000  0.600723  0.420506  0.008421
0.800000  0.600723  0.480579  0.009002
0.900000  0.600723  0.540651  0.009548
1.000000  0.600723  0.600723  0.010065
1.100000  0.600723  0.660795  0.010556
1.200000  0.600723  0.720868  0.011025
1.300000  0.600723  0.780940  0.011475
1.400000  0.600723  0.841012  0.011909
1.500000  0.600723  0.901085  0.012326
1.600000  0.600723  0.961157  0.012731
1.700000  0.600723  1.021229  0.013123
1.800000  0.600723  1.081302  0.013503
1.900000  0.600723  1.141374  0.013873
2.000000  0.600723  1.201446  0.014233
2.100000  0.600723  1.261519  0.014585
2.200000  0.600723  1.321591  0.014928
2.300000  0.600723  1.381663  0.015264
2.400000  0.600723  1.441736  0.015592
2.500000  0.600723  1.501808  0.015913
2.600000  0.600723  1.561880  0.016229
2.700000  0.600723  1.621952  0.016538
2.800000  0.600723  1.682025  0.016841
2.900000  0.600723  1.742097  0.017139
3.000000  0.600723  1.802169  0.017432
3.100000  0.600723  1.862242  0.017720
```

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3.200000  0.600723  1.922314  0.018004
3.300000  0.600723  1.982386  0.018283
3.400000  0.600723  2.042459  0.018558
3.500000  0.600723  2.102531  0.018829
3.600000  0.600723  2.162603  0.019096
3.700000  0.600723  2.222676  0.019360
3.800000  0.600723  2.282748  0.019619
3.900000  0.600723  2.342820  0.019876
4.000000  0.600723  2.402893  0.020129
4.100000  0.600723  2.462965  0.020379
4.200000  0.600723  2.523037  0.020626
4.300000  0.600723  2.583110  0.020870
4.400000  0.600723  2.643182  0.021112
4.500000  0.600723  2.703254  0.021350
4.600000  0.600723  2.763326  0.021586
4.700000  0.600723  2.823399  0.021819
4.800000  0.600723  2.883471  0.022050
4.900000  0.600723  2.943543  0.022279
5.000000  0.600723  3.003616  0.022505
5.100000  0.600723  3.063688  0.022729
5.200000  0.600723  3.123760  0.022951
5.300000  0.600723  3.183833  0.023170
5.400000  0.600723  3.243905  0.023388
5.500000  0.600723  3.303977  0.023603
5.600000  0.600723  3.364050  0.023817
5.700000  0.600723  3.424122  0.024029
5.800000  0.600723  3.484194  0.024239
5.900000  0.600723  3.544267  0.024447
6.000000  0.600723  3.604339  0.024653
6.100000  0.600723  3.664411  0.024858
6.200000  0.600723  3.724483  0.025060
6.300000  0.600723  3.784556  0.025262
6.400000  0.600723  3.844628  0.025461
6.500000  0.600723  3.904700  0.035229
6.600000  0.600723  3.964773  0.055145
6.700000  0.600723  4.024845  0.064908
6.800000  0.600723  4.084917  0.072674
6.900000  0.600723  4.144990  0.084610
7.000000  0.600723  4.205062  0.099882
7.100000  0.600723  4.265134  0.116961
7.200000  0.600723  4.325207  0.135285
7.300000  0.600723  4.385279  0.154505
7.400000  0.600723  4.445351  0.174365
7.500000  0.600723  4.505424  0.194663
7.600000  0.600723  4.565496  0.215228
7.700000  0.600723  4.625568  0.235913
7.800000  0.600723  4.685640  0.256586
7.900000  0.600723  4.745713  0.281048
8.000000  0.600723  4.805785  0.306364
8.100000  0.600723  4.865857  0.811899
8.200000  0.600723  4.925930  1.717444
8.300000  0.600723  4.986002  2.817413
8.400000  0.600723  5.046074  3.951442
8.500000  0.600723  5.106147  4.961347
8.600000  0.600723  5.166219  5.726420
8.700000  0.600723  5.226291  6.220612
8.800000  0.600723  5.286364  6.669404
8.900000  0.600723  5.346436  7.056660
9.000000  0.600723  5.406508  7.423032
9.100000  0.600723  5.466581  7.771581
END FTABLE  2
FTABLE      3
 92    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.514807  0.000000  0.000000
0.100000  0.514807  0.051481  0.002586
0.200000  0.514807  0.102961  0.003658
0.300000  0.514807  0.154442  0.004480
0.400000  0.514807  0.205923  0.005173
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0.500000	0.514807	0.257404	0.005783
0.600000	0.514807	0.308884	0.006335
0.700000	0.514807	0.360365	0.006843
0.800000	0.514807	0.411846	0.007316
0.900000	0.514807	0.463326	0.007759
1.000000	0.514807	0.514807	0.008179
1.100000	0.514807	0.566288	0.008578
1.200000	0.514807	0.617769	0.008960
1.300000	0.514807	0.669249	0.009326
1.400000	0.514807	0.720730	0.009678
1.500000	0.514807	0.772211	0.010017
1.600000	0.514807	0.823691	0.010346
1.700000	0.514807	0.875172	0.010664
1.800000	0.514807	0.926653	0.010973
1.900000	0.514807	0.978134	0.011274
2.000000	0.514807	1.029614	0.011567
2.100000	0.514807	1.081095	0.011853
2.200000	0.514807	1.132576	0.012132
2.300000	0.514807	1.184056	0.012404
2.400000	0.514807	1.235537	0.012671
2.500000	0.514807	1.287018	0.012932
2.600000	0.514807	1.338499	0.013188
2.700000	0.514807	1.389979	0.013440
2.800000	0.514807	1.441460	0.013686
2.900000	0.514807	1.492941	0.013928
3.000000	0.514807	1.544421	0.014167
3.100000	0.514807	1.595902	0.014401
3.200000	0.514807	1.647383	0.014631
3.300000	0.514807	1.698864	0.014858
3.400000	0.514807	1.750344	0.015081
3.500000	0.514807	1.801825	0.015302
3.600000	0.514807	1.853306	0.015519
3.700000	0.514807	1.904787	0.015733
3.800000	0.514807	1.956267	0.015944
3.900000	0.514807	2.007748	0.016152
4.000000	0.514807	2.059229	0.016358
4.100000	0.514807	2.110709	0.016561
4.200000	0.514807	2.162190	0.016762
4.300000	0.514807	2.213671	0.016960
4.400000	0.514807	2.265152	0.017157
4.500000	0.514807	2.316632	0.017350
4.600000	0.514807	2.368113	0.017542
4.700000	0.514807	2.419594	0.017732
4.800000	0.514807	2.471074	0.017919
4.900000	0.514807	2.522555	0.018105
5.000000	0.514807	2.574036	0.018289
5.100000	0.514807	2.625517	0.018471
5.200000	0.514807	2.676997	0.018651
5.300000	0.514807	2.728478	0.018830
5.400000	0.514807	2.779959	0.019006
5.500000	0.514807	2.831439	0.019182
5.600000	0.514807	2.882920	0.019355
5.700000	0.514807	2.934401	0.019527
5.800000	0.514807	2.985882	0.019698
5.900000	0.514807	3.037362	0.019867
6.000000	0.514807	3.088843	0.020035
6.100000	0.514807	3.140324	0.020201
6.200000	0.514807	3.191804	0.020366
6.300000	0.514807	3.243285	0.020529
6.400000	0.514807	3.294766	0.020692
6.500000	0.514807	3.346247	0.028484
6.600000	0.514807	3.397727	0.044619
6.700000	0.514807	3.449208	0.052511
6.800000	0.514807	3.500689	0.058786
6.900000	0.514807	3.552169	0.068924
7.000000	0.514807	3.603650	0.082139
7.100000	0.514807	3.655131	0.097032
7.200000	0.514807	3.706612	0.113086
7.300000	0.514807	3.758092	0.129978
7.400000	0.514807	3.809573	0.147473

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7.500000  0.514807  3.861054  0.165384
7.600000  0.514807  3.912534  0.183553
7.700000  0.514807  3.964015  0.201846
7.800000  0.514807  4.015496  0.220143
7.900000  0.514807  4.066977  0.241869
8.000000  0.514807  4.118457  0.264376
8.100000  0.514807  4.169938  0.769266
8.200000  0.514807  4.221419  1.674185
8.300000  0.514807  4.272899  2.773543
8.400000  0.514807  4.324380  3.906978
8.500000  0.514807  4.375861  4.916304
8.600000  0.514807  4.427342  5.680810
8.700000  0.514807  4.478822  6.174449
8.800000  0.514807  4.530303  6.622700
8.900000  0.514807  4.581784  7.009425
9.000000  0.514807  4.633264  7.375276
9.100000  0.514807  4.684745  7.723314
END FTABLE  3
FTABLE      4
 92    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.309917  0.000000  0.000000
0.100000  0.309917  0.030992  0.001239
0.200000  0.309917  0.061983  0.001752
0.300000  0.309917  0.092975  0.002146
0.400000  0.309917  0.123967  0.002478
0.500000  0.309917  0.154959  0.002771
0.600000  0.309917  0.185950  0.003035
0.700000  0.309917  0.216942  0.003278
0.800000  0.309917  0.247934  0.003505
0.900000  0.309917  0.278926  0.003717
1.000000  0.309917  0.309917  0.003919
1.100000  0.309917  0.340909  0.004110
1.200000  0.309917  0.371901  0.004293
1.300000  0.309917  0.402893  0.004468
1.400000  0.309917  0.433884  0.004636
1.500000  0.309917  0.464876  0.004799
1.600000  0.309917  0.495868  0.004957
1.700000  0.309917  0.526860  0.005109
1.800000  0.309917  0.557851  0.005257
1.900000  0.309917  0.588843  0.005401
2.000000  0.309917  0.619835  0.005542
2.100000  0.309917  0.650826  0.005679
2.200000  0.309917  0.681818  0.005812
2.300000  0.309917  0.712810  0.005943
2.400000  0.309917  0.743802  0.006071
2.500000  0.309917  0.774793  0.006196
2.600000  0.309917  0.805785  0.006318
2.700000  0.309917  0.836777  0.006439
2.800000  0.309917  0.867769  0.006557
2.900000  0.309917  0.898760  0.006673
3.000000  0.309917  0.929752  0.006787
3.100000  0.309917  0.960744  0.006899
3.200000  0.309917  0.991736  0.007010
3.300000  0.309917  1.022727  0.007118
3.400000  0.309917  1.053719  0.007225
3.500000  0.309917  1.084711  0.007331
3.600000  0.309917  1.115702  0.007435
3.700000  0.309917  1.146694  0.007537
3.800000  0.309917  1.177686  0.007639
3.900000  0.309917  1.208678  0.007739
4.000000  0.309917  1.239669  0.007837
4.100000  0.309917  1.270661  0.007934
4.200000  0.309917  1.301653  0.008031
4.300000  0.309917  1.332645  0.008126
4.400000  0.309917  1.363636  0.008220
4.500000  0.309917  1.394628  0.008313
4.600000  0.309917  1.425620  0.008404
4.700000  0.309917  1.456612  0.008495
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4.800000  0.309917  1.487603  0.008585
4.900000  0.309917  1.518595  0.008674
5.000000  0.309917  1.549587  0.008762
5.100000  0.309917  1.580579  0.008849
5.200000  0.309917  1.611570  0.008936
5.300000  0.309917  1.642562  0.009021
5.400000  0.309917  1.673554  0.009106
5.500000  0.309917  1.704545  0.009190
5.600000  0.309917  1.735537  0.009273
5.700000  0.309917  1.766529  0.009355
5.800000  0.309917  1.797521  0.009437
5.900000  0.309917  1.828512  0.009518
6.000000  0.309917  1.859504  0.009598
6.100000  0.309917  1.890496  0.009678
6.200000  0.309917  1.921488  0.009757
6.300000  0.309917  1.952479  0.009835
6.400000  0.309917  1.983471  0.013330
6.500000  0.309917  2.014463  0.020550
6.600000  0.309917  2.045455  0.024086
6.700000  0.309917  2.076446  0.026898
6.800000  0.309917  2.107438  0.029314
6.900000  0.309917  2.138430  0.033620
7.000000  0.309917  2.169421  0.039394
7.100000  0.309917  2.200413  0.045974
7.200000  0.309917  2.231405  0.053110
7.300000  0.309917  2.262397  0.060648
7.400000  0.309917  2.293388  0.068474
7.500000  0.309917  2.324380  0.076502
7.600000  0.309917  2.355372  0.084656
7.700000  0.309917  2.386364  0.092874
7.800000  0.309917  2.417355  0.101100
7.900000  0.309917  2.448347  0.110885
8.000000  0.309917  2.479339  0.121028
8.100000  0.309917  2.510331  0.624389
8.200000  0.309917  2.541322  1.527825
8.300000  0.309917  2.572314  2.625744
8.400000  0.309917  2.603306  3.757777
8.500000  0.309917  2.634298  4.765736
8.600000  0.309917  2.665289  5.528910
8.700000  0.309917  2.696281  6.021246
8.800000  0.309917  2.727273  6.468223
8.900000  0.309917  2.758264  6.853701
9.000000  0.309917  2.789256  7.218330
9.100000  0.309917  2.820248  7.565169
END FTABLE  4
FTABLE      8
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.002296  0.000000  0.000000
0.025000  0.002297  0.000057  100.3789
0.050000  0.002298  0.000115  317.6304
0.075000  0.002299  0.000172  622.2683
0.100000  0.002300  0.000230  1001.812
0.125000  0.002301  0.000287  1448.395
0.150000  0.002303  0.000345  1956.351
0.175000  0.002304  0.000402  2521.290
0.200000  0.002305  0.000460  3139.646
0.225000  0.002306  0.000518  3808.433
0.250000  0.002307  0.000575  4525.085
0.275000  0.002308  0.000633  5287.363
0.300000  0.002309  0.000691  6093.280
0.325000  0.002311  0.000749  6941.055
0.350000  0.002312  0.000806  7829.076
0.375000  0.002313  0.000864  8755.872
0.400000  0.002314  0.000922  9720.093
0.425000  0.002315  0.000980  10720.49
0.450000  0.002316  0.001038  11755.91
0.475000  0.002317  0.001096  12825.26
0.500000  0.002319  0.001154  13927.54
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0.525000	0.002320	0.001212	15061.80
0.550000	0.002321	0.001270	16227.14
0.575000	0.002322	0.001328	17422.73
0.600000	0.002323	0.001386	18647.75
0.625000	0.002324	0.001444	19901.45
0.650000	0.002326	0.001502	21183.10
0.675000	0.002327	0.001560	22492.03
0.700000	0.002328	0.001618	23827.57
0.725000	0.002329	0.001676	25189.10
0.750000	0.002330	0.001735	26576.01
0.775000	0.002331	0.001793	27987.74
0.800000	0.002332	0.001851	29423.72
0.825000	0.002334	0.001910	30883.43
0.850000	0.002335	0.001968	32366.36
0.875000	0.002336	0.002026	33872.02
0.900000	0.002337	0.002085	35399.93
0.925000	0.002338	0.002143	36949.64
0.950000	0.002339	0.002202	38520.71
0.975000	0.002340	0.002260	40112.71
1.000000	0.002342	0.002319	41725.23
1.025000	0.002343	0.002377	43357.88
1.050000	0.002344	0.002436	45010.26
1.075000	0.002345	0.002494	46682.01
1.100000	0.002346	0.002553	48372.76
1.125000	0.002347	0.002612	50082.16
1.150000	0.002348	0.002670	51809.88
1.175000	0.002350	0.002729	53555.58
1.200000	0.002351	0.002788	55318.94
1.225000	0.002352	0.002847	57099.66
1.250000	0.002353	0.002905	58897.42
1.275000	0.002354	0.002964	60711.94
1.300000	0.002355	0.003023	62542.92
1.325000	0.002357	0.003082	64390.09
1.350000	0.002358	0.003141	66253.18
1.375000	0.002359	0.003200	68131.92
1.400000	0.002360	0.003259	70026.06
1.425000	0.002361	0.003318	71935.34
1.450000	0.002362	0.003377	73859.52
1.475000	0.002363	0.003436	75798.36
1.500000	0.002365	0.003495	77751.62
1.525000	0.002366	0.003554	79719.09
1.550000	0.002367	0.003613	81700.54
1.575000	0.002368	0.003673	83695.74
1.600000	0.002369	0.003732	85704.50
1.625000	0.002370	0.003791	87726.60
1.650000	0.002371	0.003850	89761.84
1.675000	0.002373	0.003910	91810.03
1.700000	0.002374	0.003969	93870.96
1.725000	0.002375	0.004028	95944.46
1.750000	0.002376	0.004088	98030.34
1.775000	0.002377	0.004147	100128.4
1.800000	0.002378	0.004207	102238.5
1.825000	0.002379	0.004266	104360.5
1.850000	0.002381	0.004326	106494.1
1.875000	0.002382	0.004385	108639.2
1.900000	0.002383	0.004445	110795.7
1.925000	0.002384	0.004504	112963.4
1.950000	0.002385	0.004564	115142.1
1.975000	0.002386	0.004624	117331.7
2.000000	0.002388	0.004683	119532.0
2.025000	0.002389	0.004743	121742.9
2.050000	0.002390	0.004803	123964.3
2.075000	0.002391	0.004862	126196.0
2.100000	0.002392	0.004922	128437.8
2.125000	0.002393	0.004982	130689.7
2.150000	0.002394	0.005042	132951.4
2.175000	0.002396	0.005102	135223.0
2.200000	0.002397	0.005162	137504.1
2.225000	0.002398	0.005222	139794.8
2.250000	0.002399	0.005282	142094.9

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END FTABLE  8
FTABLE      5
 90    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.241047  0.000000  0.000000
0.150000  0.247018  0.036605  0.003427
0.300000  0.253032  0.074109  0.004846
0.450000  0.259088  0.112518  0.005935
0.600000  0.265186  0.151838  0.006853
0.750000  0.271326  0.192076  0.007662
0.900000  0.277508  0.233239  0.008394
1.050000  0.283732  0.275332  0.009066
1.200000  0.289999  0.318362  0.009692
1.350000  0.296308  0.362335  0.010280
1.500000  0.302658  0.407257  0.010836
1.650000  0.309051  0.453136  0.011365
1.800000  0.315487  0.499976  0.011870
1.950000  0.321964  0.547785  0.012355
2.100000  0.328483  0.596568  0.012822
2.250000  0.335045  0.646333  0.013272
2.400000  0.341648  0.697085  0.013707
2.550000  0.348294  0.748831  0.014129
2.700000  0.354982  0.801576  0.014538
2.850000  0.361713  0.855328  0.014937
3.000000  0.368485  0.910093  0.015325
3.150000  0.375299  0.965877  0.015703
3.300000  0.382156  1.022686  0.016073
3.450000  0.389055  1.080527  0.016434
3.600000  0.395996  1.139406  0.016787
3.750000  0.402979  1.199329  0.017134
3.900000  0.410004  1.260302  0.017473
4.050000  0.417071  1.322333  0.017806
4.200000  0.424181  1.385427  0.018132
4.350000  0.431332  1.449590  0.018453
4.500000  0.438526  1.514830  0.018769
4.650000  0.445762  1.581151  0.019079
4.800000  0.453040  1.648562  0.019384
4.950000  0.460360  1.717067  0.019685
5.100000  0.467723  1.786673  0.019981
5.250000  0.475127  1.857387  0.020273
5.400000  0.482574  1.929214  0.020560
5.550000  0.490063  2.002162  0.020844
5.700000  0.497594  2.076236  0.021124
5.850000  0.505167  2.151443  0.021400
6.000000  0.512782  2.227790  0.021672
6.150000  0.520440  2.305281  0.021942
6.300000  0.528139  2.383925  0.022208
6.450000  0.535881  2.463726  0.022470
6.600000  0.543665  2.544692  0.022730
6.750000  0.551491  2.626829  0.022987
6.900000  0.559359  2.710143  0.023241
7.050000  0.567270  2.794640  0.023492
7.200000  0.575222  2.880327  0.034251
7.350000  0.583217  2.967210  0.038850
7.500000  0.591253  3.055295  0.066082
7.650000  0.599332  3.144589  0.078934
7.800000  0.607453  3.235098  0.089170
7.950000  0.615617  3.326828  0.097986
8.100000  0.623822  3.419786  0.105866
8.250000  0.632070  3.513978  0.113065
8.400000  0.640359  3.609410  0.119739
8.550000  0.648691  3.706089  0.125992
8.700000  0.657065  3.804020  0.131898
8.850000  0.665481  3.903211  0.137509
9.000000  0.673939  4.003668  0.142868
9.150000  0.682440  4.105396  0.752792
9.300000  0.690982  4.208403  1.662622
9.450000  0.699567  4.312694  2.259208
9.600000  0.708194  4.418276  2.602027
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 9.750000  0.716863  4.525156  2.894467
 9.900000  0.725574  4.633338  3.159154
10.05000  0.734327  4.742831  3.402790
10.20000  0.743123  4.853640  3.629745
10.35000  0.751960  4.965771  3.843055
10.50000  0.760840  5.079231  4.044934
10.65000  0.769762  5.194026  4.237052
10.80000  0.778726  5.310163  4.420709
10.95000  0.787732  5.427647  4.596937
11.10000  0.796781  5.546486  4.766575
11.25000  0.805871  5.666685  4.930315
11.40000  0.815004  5.788250  5.088734
11.55000  0.824179  5.911189  5.242322
11.70000  0.833396  6.035507  5.391498
11.85000  0.842655  6.161211  5.536622
12.00000  0.851956  6.288307  5.678008
12.15000  0.861299  6.416801  5.815934
12.30000  0.870685  6.546700  5.950641
12.45000  0.880113  6.678009  6.082345
12.60000  0.889582  6.810736  6.211240
12.75000  0.899094  6.944887  6.337499
12.90000  0.908648  7.080468  6.461277
13.05000  0.918245  7.217485  6.582715
13.20000  0.927883  7.355945  6.701942
13.35000  0.937564  7.495853  6.819075
END FTABLE  5
FTABLE      6
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.353650  0.000000  0.000000
0.100000  0.357286  0.035547  0.003028
0.200000  0.360937  0.071458  0.004282
0.300000  0.364602  0.107735  0.005244
0.400000  0.368281  0.144379  0.006056
0.500000  0.371974  0.181392  0.006770
0.600000  0.375682  0.218775  0.007417
0.700000  0.379404  0.256529  0.008011
0.800000  0.383141  0.294656  0.008564
0.900000  0.386891  0.333158  0.009083
1.000000  0.390657  0.372035  0.009575
1.100000  0.394436  0.411290  0.010042
1.200000  0.398230  0.450923  0.010489
1.300000  0.402038  0.490936  0.010917
1.400000  0.405860  0.531331  0.011329
1.500000  0.409697  0.572109  0.011727
1.600000  0.413548  0.613271  0.012111
1.700000  0.417413  0.654820  0.012484
1.800000  0.421293  0.696755  0.012846
1.900000  0.425187  0.739079  0.013198
2.000000  0.429096  0.781793  0.013541
2.100000  0.433018  0.824899  0.013875
2.200000  0.436955  0.868397  0.014202
2.300000  0.440907  0.912290  0.014521
2.400000  0.444872  0.956579  0.014833
2.500000  0.448852  1.001266  0.015139
2.600000  0.452846  1.046351  0.015439
2.700000  0.456855  1.091836  0.015733
2.800000  0.460878  1.137722  0.016022
2.900000  0.464915  1.184012  0.016305
3.000000  0.468967  1.230706  0.016584
3.100000  0.473033  1.277806  0.016858
3.200000  0.477113  1.325313  0.017128
3.300000  0.481208  1.373229  0.017394
3.400000  0.485317  1.421556  0.017655
3.500000  0.489440  1.470293  0.017913
3.600000  0.493577  1.519444  0.018167
3.700000  0.497729  1.569010  0.018418
3.800000  0.501896  1.618991  0.018665
3.900000  0.506076  1.669389  0.018909
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4.000000  0.510271  1.720207  0.019150
4.100000  0.514480  1.771444  0.019388
4.200000  0.518704  1.823104  0.019623
4.300000  0.522941  1.875186  0.019855
4.400000  0.527194  1.927693  0.020084
4.500000  0.531460  1.980625  0.020311
4.600000  0.535741  2.033985  0.020536
4.700000  0.540036  2.087774  0.020758
4.800000  0.544345  2.141993  0.020977
4.900000  0.548669  2.196644  0.021195
5.000000  0.553007  2.251728  0.021410
5.100000  0.557360  2.307246  0.021623
5.200000  0.561727  2.363200  0.021834
5.300000  0.566108  2.419592  0.022043
5.400000  0.570503  2.476423  0.022250
5.500000  0.574913  2.533693  0.022455
5.600000  0.579337  2.591406  0.022658
5.700000  0.583775  2.649562  0.022860
5.800000  0.588228  2.708162  0.023059
5.900000  0.592695  2.767208  0.023257
6.000000  0.597176  2.826701  0.023453
6.100000  0.601672  2.886644  0.023648
6.200000  0.606182  2.947036  0.023841
6.300000  0.610706  3.007881  0.024033
6.400000  0.615245  3.069178  0.024223
6.500000  0.619798  3.130931  0.024411
6.600000  0.624365  3.193139  0.024598
6.700000  0.628947  3.255804  0.024784
6.800000  0.633543  3.318929  0.024968
6.900000  0.638153  3.382514  0.034839
7.000000  0.642778  3.446560  0.039033
7.100000  0.647417  3.511070  0.055701
7.200000  0.652070  3.576044  0.064030
7.300000  0.656738  3.641485  0.070756
7.400000  0.661419  3.707393  0.076593
7.500000  0.666116  3.773769  0.081835
7.600000  0.670826  3.840616  0.086641
7.700000  0.675551  3.907935  0.091107
7.800000  0.680290  3.975727  0.095301
7.900000  0.685044  4.043994  0.099267
8.000000  0.689812  4.112737  0.103042
8.100000  0.694594  4.181957  0.440171
8.200000  0.699390  4.251656  1.017790
8.300000  0.704201  4.321836  1.623122
8.400000  0.709026  4.392497  2.076705
8.500000  0.713866  4.463642  2.323124
8.600000  0.718720  4.535271  2.562507
8.700000  0.723588  4.607387  2.760923
8.800000  0.728470  4.679989  2.945730
8.900000  0.733367  4.753081  3.119406
9.000000  0.738278  4.826664  3.283758
END FTABLE  6
FTABLE      7
 91    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.313131  0.000000  0.000000
0.100000  0.314015  0.031357  0.003852
0.200000  0.314899  0.062803  0.005448
0.300000  0.315783  0.094337  0.006672
0.400000  0.316667  0.125960  0.007704
0.500000  0.317551  0.157670  0.008614
0.600000  0.318434  0.189470  0.009436
0.700000  0.319318  0.221357  0.010192
0.800000  0.320202  0.253333  0.010896
0.900000  0.321086  0.285398  0.011557
1.000000  0.321970  0.317551  0.012182
1.100000  0.322854  0.349792  0.012776
1.200000  0.323737  0.382121  0.013344
1.300000  0.324621  0.414539  0.013889
```

1.400000	0.325505	0.447045	0.014414
1.500000	0.326389	0.479640	0.014919
1.600000	0.327273	0.512323	0.015409
1.700000	0.328157	0.545095	0.015883
1.800000	0.329040	0.577955	0.016343
1.900000	0.329924	0.610903	0.016791
2.000000	0.330808	0.643939	0.017228
2.100000	0.331692	0.677064	0.017653
2.200000	0.332576	0.710278	0.018068
2.300000	0.333460	0.743580	0.018474
2.400000	0.334343	0.776970	0.018872
2.500000	0.335227	0.810448	0.019261
2.600000	0.336111	0.844015	0.019642
2.700000	0.336995	0.877670	0.020017
2.800000	0.337879	0.911414	0.020384
2.900000	0.338763	0.945246	0.020745
3.000000	0.339646	0.979167	0.021099
3.100000	0.340530	1.013176	0.021448
3.200000	0.341414	1.047273	0.021791
3.300000	0.342298	1.081458	0.022129
3.400000	0.343182	1.115732	0.022462
3.500000	0.344066	1.150095	0.022790
3.600000	0.344949	1.184545	0.023113
3.700000	0.345833	1.219085	0.023432
3.800000	0.346717	1.253712	0.023747
3.900000	0.347601	1.288428	0.024057
4.000000	0.348485	1.323232	0.024363
4.100000	0.349369	1.358125	0.024666
4.200000	0.350253	1.393106	0.024965
4.300000	0.351136	1.428176	0.025261
4.400000	0.352020	1.463333	0.034134
4.500000	0.352904	1.498580	0.037977
4.600000	0.353788	1.533914	0.040990
4.700000	0.354672	1.569337	0.087016
4.800000	0.355556	1.604848	0.107316
4.900000	0.356439	1.640448	0.123232
5.000000	0.357323	1.676136	0.136830
5.100000	0.358207	1.711913	0.148924
5.200000	0.359091	1.747778	0.159937
5.300000	0.359975	1.783731	0.170122
5.400000	0.360859	1.819773	0.179646
5.500000	0.361742	1.855903	0.188626
5.600000	0.362626	1.892121	0.205734
5.700000	0.363510	1.928428	0.229067
5.800000	0.364394	1.964823	0.255859
5.900000	0.365278	2.001307	0.285035
6.000000	0.366162	2.037879	0.315930
6.100000	0.367045	2.074539	0.656429
6.200000	0.367929	2.111288	1.237346
6.300000	0.368813	2.148125	1.845905
6.400000	0.369697	2.185051	2.302651
6.500000	0.370581	2.222064	2.552167
6.600000	0.371465	2.259167	2.794587
6.700000	0.372348	2.296357	2.995983
6.800000	0.373232	2.333636	3.183714
6.900000	0.374116	2.371004	3.360263
7.000000	0.375000	2.408460	3.527437
7.100000	0.375884	2.446004	3.686603
7.200000	0.376768	2.483636	3.838824
7.300000	0.377652	2.521357	3.984943
7.400000	0.378535	2.559167	4.125649
7.500000	0.379419	2.597064	4.261507
7.600000	0.380303	2.635051	4.392989
7.700000	0.381187	2.673125	4.520497
7.800000	0.382071	2.711288	4.644374
7.900000	0.382955	2.749539	4.764915
8.000000	0.383838	2.787879	4.882378
8.100000	0.384722	2.826307	4.996990
8.200000	0.385606	2.864823	5.108949
8.300000	0.386490	2.903428	5.218434

```
  8.400000  0.387374  2.942121  5.325601
  8.500000  0.388258  2.980903  5.430594
  8.600000  0.389141  3.019773  5.533541
  8.700000  0.390025  3.058731  5.634556
  8.800000  0.390909  3.097778  5.733746
  8.900000  0.391793  3.136913  5.831206
  9.000000  0.392677  3.176136  5.927025
  END FTABLE  7
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   4 HYDR   RO     1 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1007 STAG     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
RCHRES   8 HYDR   RO     1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   8 HYDR   STAGE  1 1        1      WDM   1011 STAG     ENGL      REPL
COPY    10 OUTPUT MEAN   1 1     48.4      WDM    710 FLOW     ENGL      REPL
COPY   510 OUTPUT MEAN   1 1     48.4      WDM    810 FLOW     ENGL      REPL
RCHRES   5 HYDR   RO     1 1        1      WDM   1012 FLOW     ENGL      REPL
RCHRES   5 HYDR   STAGE  1 1        1      WDM   1013 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
RCHRES   6 HYDR   RO     1 1        1      WDM   1014 FLOW     ENGL      REPL
RCHRES   6 HYDR   STAGE  1 1        1      WDM   1015 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
RCHRES   7 HYDR   RO     1 1        1      WDM   1016 FLOW     ENGL      REPL
RCHRES   7 HYDR   STAGE  1 1        1      WDM   1017 STAG     ENGL      REPL
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 FLOW     ENGL      REPL
COPY     5 OUTPUT MEAN   1 1     48.4      WDM    705 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    805 FLOW     ENGL      REPL
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        6
RCHRES     ROFLOW                          RCHRES         INFLOW
  END MASS-LINK    6

  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

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1955/ 9/30 24: 0

RCHRES :    7

RELERR       STORS        STOR       MATIN      MATDIF
-1.955E-03     0.00000  3.5753E-10     0.00000  -2.339E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1959/ 8/31 24: 0

RCHRES :    7

RELERR       STORS        STOR       MATIN      MATDIF
-2.399E-03     0.00000  3.0194E-10     0.00000  -2.131E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
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printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
```

DATE/TIME: 1974/ 9/30 24: 0

RCHRES :   7

RELERR	STORS	STOR	MATIN	MATDIF
-3.726E-03	0.00000	2.7959E-10	0.00000	-1.428E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1975/ 7/31 24: 0

RCHRES :   5

RELERR	STORS	STOR	MATIN	MATDIF
-8.062E-02	0.00000	0.0000E+00	0.00000	-9.551E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1975/ 6/30 24: 0

RCHRES :   7

RELERR	STORS	STOR	MATIN	MATDIF
-1.592E-01	0.00000	0.0000E+00	0.00000	-3.087E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.

REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238 1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1979/ 7/31 24: 0

RCHRES : 5

RELERR	STORS	STOR	MATIN	MATDIF
-1.484E-02	0.00000	3.9253E-10	0.00000	-4.453E-08

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238 1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1979/ 7/31 24: 0

RCHRES : 7

RELERR	STORS	STOR	MATIN	MATDIF
-6.013E-01	0.00000	0.0000E+00	0.00000	-2.297E-10

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

The count for the WARNING printed above has reached its maximum.

If the condition is encountered again the message will not be repeated.

ERROR/WARNING ID: 238 1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1986/ 8/31 24: 0

RCHRES :   5

RELERR	STORS	STOR	MATIN	MATDIF
-1.136E-03	0.00000	8.3565E-10	0.00000	-2.058E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present
printout reporting period.
MATIN is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.

ERROR/WARNING ID: 238 1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1997/ 9/30 24: 0

RCHRES :   5

RELERR	STORS	STOR	MATIN	MATDIF
-1.263E-01	0.00000	0.0000E+00	0.00000	-5.796E-09

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present
printout reporting period.
MATIN is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.

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APPENDIX D – OTHER SPECIAL REPORTS

The following reports were prepared for this report and are included in this appendix.

- Geotechnical Report by Aspect Consulting, LLC., dated August 11, 2021
- Critical Area Determination by Loggy Sol and Wetland Consulting dated May, 2021

GEOTECHNICAL REPORT

Madrona Ridge Residential Development

Rainier Street

Port Townsend, Washington

Prepared for: Montebanc Management, LLC

Project No. 210338 • August 11, 2021 FINAL

Aspect CONSULTING

earth + water

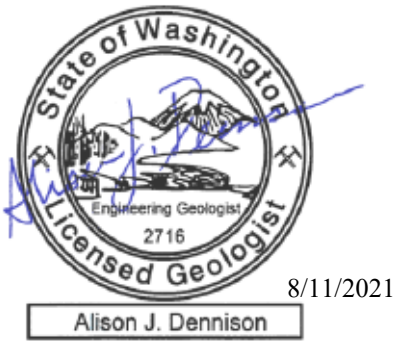
GEOTECHNICAL REPORT

Madrona Ridge Residential Development
Rainier Street
Port Townsend, Washington

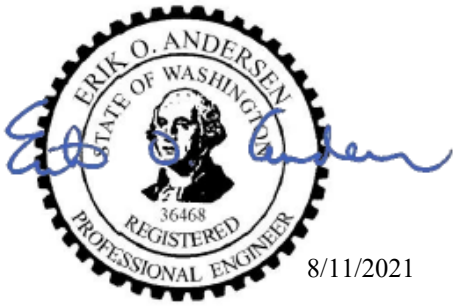
Prepared for: Montebanc Management, LLC

Project No. 210338 • August 11, 2021 FINAL

Aspect Consulting, LLC



8/11/2021



8/11/2021

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1 Introduction

This report summarizes Aspect Consulting, LLC's (Aspect) observations, conclusions, and recommendations made during a geotechnical evaluation for the Madrona Ridge residential development (Project) located at 1601 Rainier Street in Port Townsend< Washington (Site; Figure 1) on five adjoining Jefferson County (County) parcel numbers 001091002, 001092005, 001092006, 973200201, and 973200301.

We performed our services in accordance with our contract dated June 11, 2021.

1.1 Scope of Services

Our scope of services included a Site reconnaissance, subsurface explorations, and geotechnical engineering analyses. This report describes Site conditions, summarizes the results of the completed analyses, and provides geotechnical engineering conclusions and design recommendations, including:

- Site and Project descriptions.
- Distribution and characteristics of subsurface soils and groundwater.
- Seismic design considerations in accordance with the current version of the International Building Code (IBC), as adopted by Port Townsend.
- Suitable foundation types, allowable soil bearing pressure(s), anticipated settlements, and geotechnical design parameters.
- Lateral earth pressures for design of residential basement and exterior site retaining walls.
- General Site earthwork considerations, including:
    - Evaluation of the Site soils for use as fill.
    - Temporary and permanent slope inclinations.
    - Structural fill materials and preparation.
    - Wet weather/wet conditions considerations.
- General Site earthwork considerations, including excavation, backfill, and subgrade preparation.
- Structural fill requirements and evaluation of the suitability of on-Site soil for reuse as fill.
- General stormwater drainage recommendations.
- A qualitative evaluation of stormwater infiltration feasibility.

The Site Exploration Plan (Figure 2) showing the locations of the exploratory test pits, the exploration logs (Appendix A), and the lab testing results (Appendix B) are included as appendices to this report.

1.2 Project Understanding

The Site is located west of Rainier Street and south of 20th Street in Port Townsend, Washington (Figure 2). The Project includes development of the 30-acre Site with about 180 single-family residential lots and associated infrastructure (Figure 2). To prepare the area for development, cuts and fills up to 10 feet thick are planned along with the installation of utilities and roadways. Four proposed stormwater facilities have been identified at the southwest corner, northeast corner, and southeast corner of the Site. We assume the new residential structures will typically be wood-framed above cast-in-place concrete foundations with crawl spaces and/or with concrete slabs-on-grade.

2 Surface Conditions

Aspect assessed the surface conditions of the Site through a literature review and field observations. We conducted our Site reconnaissance on July 8, 2021. The following sections discuss the results of our assessment.

2.1 Site and Topography

The approximately 30-acre Site occupies a rectangular footprint of approximately 640 feet (east-west) by 1,060 feet north-south (Figure 2). It is bounded by a City of Port Townsend water storage facility to the north and undeveloped properties to the west, east, and south. Rainier Street extends in a north-south direction through the eastern portion of the Site.

The western parcel, 001091002, is developed with a single-family residence and some outbuildings. The gravel access driveway to this residence crosses through the east-adjacent parcel, 001092005.

The Site gently slopes down to the west with less than 50 feet of elevation loss. A ravine is located towards the southwest corner of the Site and is out of the area of planned development.

2.2 Vegetation

The area around the existing residence and outbuildings has been cleared and is vegetated with grass. Other areas of the Site are vegetated with young to mature evergreens and deciduous trees with an established understory of ferns, woody shrubs, herbaceous ground cover, and areas of blackberries. In general, the mature evergreen trees were relatively straight, indicating relatively stable ground conditions.

2.3 Drainage and Surface Water

No surface water or saturated soils were observed on the Site in the areas traversed. Surface drainage conditions at the Site will vary with fluctuations in precipitation, Site usage (such as irrigation), and off-Site land use.

3 Subsurface Conditions

Subsurface conditions at the Site are inferred from our review of applicable geologic literature and maps, our experience with the local geology, and our subsurface explorations advanced on July 8, 2021. The following sections discuss the results of our assessment.

3.1 Geologic Setting

The Site is located within the Puget Lowland, a broad area of tectonic subsidence flanked by two mountain ranges: the Cascades to the east and the Olympics to the west. The sediments within the Puget Lowland are the result of repeated cycles of glacial and nonglacial deposition and erosion. The most recent cycle, the Vashon Stade (stage) 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 3,000-foot-thick Cordilleran ice sheet advanced into the Puget Lowland from the north. As the ice sheet advanced southward, sediments transported by rivers flowing from the ice front were deposited in advance of the ice in rivers (glaciofluvial deposits or glacial outwash) and lakes (advance glaciolacustrine deposits). When the advancing ice overran these preglacial and proglacial sediments, it deposited a veneer of glacial till and then consolidated the entire package with its enormous weight, creating dense and hard soil deposits. In addition to consolidating the soils it overran, the Cordilleran ice sheet sculpted and smoothed the surface, directly by the ice and by high-pressure water flowing under the ice. Then, as the Cordilleran ice sheet retreated from the Puget Lowland, it left a layer of recessional deposits over the glacially consolidated deposits. This sequence of glacial deposition and erosion has been repeated as many as 7 times in the past 2 million years.

The geologic map indicates that the Site is underlain by Vashon-age ablation till (Qgt_a) with Vashon-age lodgment till (Qgt) mapped nearby (Schasse and Slaughter, 2011). Ablation till is found overlying lodgment till up to 5 feet thick and forms as the ice is melting. The lodgment till is deposited under the moving ice and has been consolidated by the weight of the ice sheet. Both deposits are described as an unsorted mix of silt, sand, and gravel. However, the lodgment till is considerably denser.

3.2 Subsurface Investigation

Aspect conducted a subsurface investigation on July 8, 2021, to collect subsurface soil and groundwater information. Fifteen test pits, ATP-01 through ATP-15, were excavated to depths of 6 to 12 feet below the existing ground surface (bgs). A summary of our field explorations, including geologic soil units and groundwater observations, are presented in the following sections. Detailed descriptions of the subsurface conditions encountered in our explorations, as well as the depths where characteristics of the soils changed, are on the test pit logs presented in Appendix A. Locations of the explorations are shown on Figure 2.

3.3 Stratigraphy

Our explorations encountered a relatively thin layer of topsoil and/or fill overlying native soil consisting of lodgment till (Qgt). The soil conditions we observed in the subsurface explorations are described in stratigraphic order from top to bottom below.

3.3.1 Topsoil

Topsoil refers to a unit that contains a high percentage of organics. Topsoil varying from 6 to 12 inches thick was encountered at the ground surface in our explorations ATP-01, ATP-02, ATP-04 through ATP-11, ATP-13, and ATP-15. The topsoil is dark in color and contains numerous organics.

3.3.2 Fill

Fill refers to human-placed material. Fill was encountered in ATP-03, ATP-12, and ATP-14, varying from about 10 to 18 inches thick. The fill was identified by color, presence of refuse, and lower density. It is typically very loose to medium dense,[1] dry to moist, brown to brown to dark brown, silty sand (SM)[2] with various amounts of gravel, iron-oxide staining, and refuse.

Our interpretations of the extents and depths of fill at the Site are based on limited, isolated, and discontinuous subsurface data across the Site. Variation in the subsurface conditions should be expected and verification of our interpretations and recommendations can only be completed at the time of construction.

3.3.3 Lodgment Till

Lodgment till was encountered underlying the topsoil or fill in all test pits, and extending to the maximum depths explored, 6 to 12 feet bgs. The lodgment till consists of medium dense to very dense, slightly moist, brown to gray, silty sand (SM) with variable amounts of gravel, cobbles, and boulders. The upper 2 to 4 feet of this unit is weathered with iron-oxide staining and is slightly less dense.

As observed in some of the test pits, lodgment till contains occasional large cobbles and boulders, which can impede earthwork activities, and should be expected during Site earthwork. Lodgment till exhibits high shear strength and low compressibility characteristics, making it suitable for support of new structure foundations. The very dense nature and high silt/clay content (fines) of this unit yields very low permeability causing an impediment to groundwater movement. It has moderate to high moisture sensitivity due to its significant fines content.

[1] Relative density was qualitatively assessed with a 0.5-inch-diameter, pointed steel T-probe at various depth intervals and difficulty by the excavator to advance the test pit.

[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, 2018).

3.4 Groundwater

We did not observe any groundwater seepage or signs of saturated soils (such as hydrophilic vegetation) at the Site. A perched groundwater condition may develop on the top of the lodgment till in localized closed depressions during extended periods of wet weather.

3.5 Laboratory Testing Results

Seven samples collected from the test pits were submitted for laboratory testing to characterize engineering and index properties of the Site soils. Moisture content was measured for all seven samples and the particle-size distribution was determined for six of those samples. The table below contains a summary of the results and soil type based on the USCS. The laboratory testing report is presented in Appendix B. The moisture content results are also presented on the test pit logs presented in Appendix A.

Table 1. Summary of Particle-Size Distribution Results

Exploration Number	Sample Depth (feet bgs)	Percent Gravel	Percent Sand	Percent Fines	Moisture Content (percent)	USCS
ATP-01	6	0	68.5	31.5	5.8	SM
ATP-01	9.5	0	67.8	32.2	5.3	SM
ATP-02	2	0	79.8	20.2	6.2	SM
ATP-05 + ATP-06	4	8.3	57.9	33.8	10.5	SM
ATP-09	6	11.5	53.0	35.5	5.5	SM
ATP-10	2	6.5	59.1	34.4	8.9	SM

4 Geologic Hazards

The following sections describe the geologic hazards at and near the Site and associated design considerations, including seismic considerations, erosion hazards, and slope stability.

4.1 Seismic Design Considerations

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 just south of the Southern Whidbey Island 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 7.0 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 Southern Whidbey Island fault occurred about 3,200 to 2,800 years ago. There are also several other shallow crustal faults in the region capable of producing earthquakes and strong ground shaking (Pratt et al., 2015).

The Site area 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.

4.2 Ground Response

Seismic design of the residences will be in accordance with the 2018 International Building Code (IBC) that references the American Society of Civil Engineers (ASCE) Standard ASCE/SEI 7-16, *Minimum Design Loads for Buildings and Other Structures* (ASCE, 2018) for seismic design. 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 (ICC, 2018).

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 the difficulty digging our test pits and the known geologic conditions,

we conclude the Site soil profile can be classified as Site Class C (very dense soil and stiff rock).

The design spectral response acceleration parameters adjusted for Site Class C in accordance with the 2018 IBC and ASCE/SEI 7-16 are presented in Table 2.

Table 2. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	C – Very dense soil and soft rock
Peak Ground Acceleration (PGA)	0.543g(1)
Short Period Spectral Acceleration (S_s)	1.306g
1-Second Period Spectral Acceleration (S_1)	0.529g
Site Coefficient (F_v)	1.300
Design Short Period Spectral Acceleration (S_{DS})	0.871g
Design 1-Second Period Spectral Acceleration (S_{D1})	0.459g

Notes:
1. g = gravitational force
   Based on the latitude and longitude of the Site: 48.112717°N, 122.809659°W, World Geodetic System 1984 (WGS84).
   The risk category used was II, residential use.
   Based on the American Society of Civil Engineers (ASCE) hazard tool (ASCE, 2018).

4.3 Surficial Ground Rupture

A trace of an east-west trending thrust fault zone (Southern Whidbey Island fault zone) projects through Port Townsend, with the nearest known active fault trace (an unnamed fault, class B) located approximately 1.9 miles southeast of the Site (Johnson et al., 2000). Due to the suspected long recurrence interval and the distance between the Site and the mapped fault trace, the potential for surficial ground rupture at the Site is considered low.

4.4 Liquefaction

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength from seismic 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 Washington Department of Natural Resources (DNR) maps the Site as having very low liquefaction susceptibility (Palmer et al., 2004). Given the relative density, grain-size distribution, and geologic origin of the soils at the Site, liquefaction is not a hazard for this Site and Project.

4.5 Erosion Hazard

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 relatively low and can be addressed through standard temporary erosion and sedimentation control (TESC) best management practices (BMPs) during construction. TESC measures should be used in accordance with the local BMPs. Specific TESC measures may include appropriately placed silt fencing, straw wattles, rock check dams, and plastic covering of exposed slope cuts and soil stockpiles. Outside of the proposed construction areas, the existing vegetation should be retained.

Permanent erosion control within the areas of construction should be achieved through pavement surfacing or the reestablishment of vegetation.

Areas on/near the Site slopes exposed to construction activities should be aggressively revegetated. Depending on the weather patterns, slope inclination, and degree of disturbance, the placement of an erosion-control blanket to provide temporary ground cover while vegetation takes root, or the use of live-staking, may be required to ensure successful establishment of new vegetation.

5 Conclusions and Recommendations

The native Vashon lodgment till underlying the Site will provide good bearing support for planned structures, retaining walls, and pavements. Structures may be supported using conventional spread footings, and site development may be completed via standard equipment and methods.

The lodgment till is infeasible for large-scale stormwater infiltration due its high relative density and high fines content. Stormwater generated from new impervious surfaces will need to be collected and conveyed off the Site.

The following sections present details of our geotechnical engineering recommendations for the Project.

5.1 Foundation Considerations

Spread footings and/or slab-on-grade are planned to be used for planned residence support. Bearing surfaces for the footings should be prepared as described in the Site Preparation Section 6.2.

5.1.1 Shallow Foundations

Shallow conventional isolated or continuous spread footings may be used to support the planned residence, provided they are founded on native, undisturbed lodgment till. Based on the anticipated foundation-bearing soils and our understanding of the planned construction, we recommend a maximum allowable bearing pressure of 3,000 pounds per square foot (psf) for spread and strip footings bearing on competent lodgment till. The recommended maximum allowable bearing pressure may be increased by one-third (i.e., to 4,000 psf) for short-term transient conditions, such as wind and seismic loading.

All exterior footings should be founded at least 18 inches below the lowest adjacent finished grade for frost protection; interior footings may be founded a minimum of 12 inches below grade.

Assuming construction is accomplished as recommended above, we estimate total settlement of spread foundations of less than 1 inch and differential settlement between two adjacent load-bearing components supported on competent soils of less than 0.5 inches. We anticipate that the majority 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 0.4 may be assumed along the interface between the base of the footing and subgrade soils. An allowable passive earth pressure of 300 pounds per cubic foot (pcf) may be assumed for soils adjacent to footings or other below-grade elements. The upper 1 foot of passive resistance should be neglected in design.

The above-recommended allowable coefficient of friction and passive pressure values include factors of safety of 1.5.

5.2 Slab-On-Grade Support

Slab-on-grade subgrade preparation should be completed in the same manner as shallow foundations described above in Section 5.1 (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 relatively firm and unyielding condition and evaluated by Aspect prior to placement of steel rebar and formwork.

For building areas where vapor intrusion mitigation 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 vapor barrier over the capillary break. Detailed design and performance issues with respect to vapor intrusion and moisture control as it relates to the interior environment of the structure are beyond the expertise of Aspect. A building envelope specialist or contractor should be consulted to address these issues, as needed.

5.3 Retaining Walls

Based on our project understanding, retaining walls up to 8 feet in height may be used to accommodate exterior grade changes, and will be used in residences with daylight basements.

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. Nonyielding or restrained walls should be designed for an equivalent fluid weight of 55 pcf. These values assume level backslope conditions, and adequate drainage. If inclined backslopes exist, we recommend adding 1 pound per cubic foot for each degree of inclination. For example, if the backslope is inclined at 2H:1V (Horizontal:Vertical; or 26 degrees) and the subject wall is a nonyielding basement wall, then the design earth pressure that should be utilized is 81 (55 plus 26) pcf.

Adequate drainage should consist of a subsurface drain combined with a free-draining wall backfill material that meets the gradation requirements described in Section 9-03.12(2) of the Standard Specifications for Gravel Backfill for Walls (WSDOT, 2021). Refer to the following section, Drainage Considerations, for detailed subsurface drain recommendations.

Earthquake shaking will subject 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. For retaining walls that support inhabited structures, such as daylight basement walls, we recommend an average seismic soil pressure increment of 8H (where H is the height of the wall) represented by a uniform rectangular pressure along the height of the wall. For exterior site walls that are less than 10 feet tall, the incremental seismic earth pressure need not be considered.

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

Wind, earthquakes, and unbalanced earth loads will subject the proposed structures to lateral forces. Lateral forces will be resisted by passive and frictional resistance of below-grade portions of foundation elements. Please refer to Section 5.1.1 of this report for allowable design parameters for friction and passive earth pressure.

5.4 Temporary and Permanent Slopes

Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the Contractor. All temporary cuts in excess of four 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 (WAC, 2009), as shown in Table 3 below.

Table 3. Temporary Excavation Cut Slope

Soil Unit	OSHA Soil Classification	Maximum Temporary Slope	Maximum Height (ft)
Vashon Lodgment Till	A	0.75H:1V	20

The estimated maximum cut slope inclinations are provided for planning purposes only and are applicable to excavations without groundwater seepage, or runoff, and assume dewatered conditions. Flatter slopes will likely be necessary in areas where groundwater seepage exists, or where construction equipment surcharges are placed in close proximity to the crest of the excavation.

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. Therefore, all temporary slopes should be protected from erosion by installing a surface water diversion ditch or berm at the top of the slope. In addition, 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 temporary slopes. In such an event, lateral support for the temporary slopes should be provided by the Contractor to prevent loss of ground support.

Ideally, permanent slopes for the Project should be no steeper than 2H:1V. Please contact us if permanent cut or fill slopes steeper than 2H:1V are proposed in certain locations.

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

5.5 Drainage Considerations

The outside edge of all perimeter footings and embedded walls should be provided with a drainage system consisting of a 4-inch-diameter, perforated, rigid pipe embedded in free-draining gravel meeting the requirements of Section 9-03.12(4) of the Standard Specifications for Gravel Backfill for Drains (WSDOT, 2021). The footing and wall drains should be a minimum of 1 foot thick, and a layer of low permeability soils should be used over the upper foot of the drain section to reduce potential for surface water to enter the drain curtain. Prefabricated drain mats combined with relatively free-draining backfill may be used as an alternative to washed-rock footings and wall drains.

Final grades around the planned residences should be sloped such that surface water drains away from the structures. Downspouts and roof drains should not be connected to the foundation drains to reduce the potential for flooding foundation drains and clogging. The footing drains should include cleanouts to allow for periodic maintenance and inspection.

5.5.1 Stormwater Infiltration

The Project's current layout includes four stormwater ponds. Test pits advanced in and nearby to the areas of the planned ponds encountered very dense, lodgment till within 6 feet of the ground surface. Seasonal high groundwater was not encountered; however, a perched groundwater condition could develop at the contact with the lodgment till.

Stormwater infiltration facilities are designed to collect stormwater runoff and convey it into underlying soils where it can infiltrate and disperse. This requires moderate to higher permeability soils, absence of shallow groundwater, absence of shallow perching stratum, and an absence of nearby facilities that may be sensitive to increases in groundwater level, or discharge of groundwater to surface sources.

Lodgment till is glacially consolidated and has a high fines content (20 to 36 percent silt and clay). Infiltrated stormwater would generally perch, or mound, on this low permeability soil and migrate laterally and downgradient. The presence of relatively impermeable lodgment till combined with potential for shallow perched groundwater during the wet, winter months indicates that large-scale stormwater infiltration is infeasible at the Site. It should be assumed that infiltration rates would be less than 0.3 inches per hour for the lodgment till.

6 Earthwork and Construction Recommendations

Based on the explorations performed and our understanding of the Project, it is our opinion that the Contractor should be able to complete planned excavations and earthwork with standard construction equipment. However, the presence of potential obstructions, such as small boulders or other large debris, in any of the materials encountered should be anticipated.

The soils encountered contain a significant percentage of fines (particles passing the U.S. Standard No. 200 sieve), making them moisture sensitive and subject to disturbance when wet. We recommend planning the earthwork portions of the Project during the drier summer months. From a geotechnical standpoint, the lodgment till may be suitable for reuse as structural fill on the Project provided the materials are screened to ensure they are relatively free of organics and other deleterious debris and can be moisture conditioned for compaction.

6.1 Wet Weather Earthwork

The soils encountered during explorations at the Site contain a high percentage of fines (silty and clay, soil particles passing the No. 200 sieve) and are typically moisture sensitive and will be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. 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 difficult to control, we provide the following recommendations:

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- If bearing surfaces are open during the winter season or periods of wet weather, it may be helpful to provide a layer of crushed rock or gravel to help preserve the subgrade. If gravel is used to protect the bearing surfaces, it should meet the gradation requirements for Class A Gravel Backfill for Foundations, as described in Section 9-03.12(1)A of the Standard Specifications (WSDOT, 2021).
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Local BMPs for erosion protection should be strictly followed.

6.2 Site Preparation

Site preparation within the proposed construction footprint should include removal of topsoil and fill containing roots, organics, debris, and any other deleterious materials. The

suitable bearing soils should consist of undisturbed, medium dense or better lodgment till. The Contractor must use care during Site preparation and excavation operations so that any bearing surfaces are not disturbed. If disturbance does occur, the disturbed material should be removed to expose undisturbed material or be compacted in place to acceptable criteria as determined by Aspect. Overexcavated soils in footing subgrade areas should be replaced with compacted CSBC specified in Section 9-03.9(3) of the Standard Specifications (WSDOT, 2021) and placed as structural fill.

All bearing surfaces should be trimmed neat, and the bottom of the excavation should be carefully prepared. All loose or softened soil should be removed or compacted in place prior to placing reinforcing steel bars, concrete, structural fill, or capillary break materials. We recommend that all bearing surfaces be observed by Aspect prior to placing steel and concrete to verify the recommendations in this report have been followed.

If bearing surfaces are open during the winter season or periods of wet weather, it may be helpful to provide a layer of crushed rock or gravel to help preserve the subgrade. If gravel is used to protect the bearing surfaces, it should meet the gradation requirements for Class A Gravel Backfill for Foundations, as described in Section 9-03.12(1)A of the Standard Specifications (WSDOT, 2021).

6.3 Structural Fill

Structural fill is anticipated to be required for the minor grade adjustments, foundation support, pavement support, and for utility trench backfill. the lodgment till may be suitable for reuse as structural fill on the Project provided the materials are screened to ensure they are relatively free of organics and other deleterious debris and can be moisture conditioned for compaction. For these applications, we provide the following recommendations:

- Excavation and placement of fill should be observed by Aspect to verify that all unsuitable materials are removed, and suitable compaction is achieved.
- Imported structural fill should consist of relatively freely draining, uniformly graded sand and gravel. We recommend Gravel Borrow, as specified in Section 9-03.14(1) of the Standard Specifications (WSDOT, 2021), be specified for imported structural fill.
- CSBC as specified in Section 9-03.9(3) of the Standard Specifications (WSDOT, 2021) should be underneath new pavement.
- Structural fill should be at or within 3 percent of optimum moisture content at the time of placement and should be compacted to at least 95 percent of the maximum dry density (MDD; ASTM D1557; ASTM, 2018).
- Overcompaction of the backfill behind retaining walls should be avoided. In this regard, we recommend compacting the backfill to about 90 percent of the MDD (as determined by test method ASTM D1557). 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.

- The moisture content of the structural fill should be controlled to within 3 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the MDD (as determined by test method ASTM D 1557).
- Nonstructural fill areas (e.g., general grading, landscape, or common areas not beneath or around structures, utilities, slabs-on-grade, or below paved areas) that can accommodate some settlement may be placed and compacted to a relatively firm and unyielding condition.

6.3.1 Compaction Considerations

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. Structural fill should be placed and compacted in lifts with a loose thickness no greater than 12 inches when using relatively large compaction equipment, such as a vibrating plate attached to an excavator (hoe pack) or a large drum roller. If small, hand-operated compaction equipment is used to compact structural fill, lifts should not exceed 6 inches in loose thickness. 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 by Aspect at the time of final design, when more details of the Project grading and backfilling plans are available.

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.

6.4 Utility Construction Considerations

6.4.1 Pipe Support and Bedding

The fill encountered in our completed subsurface explorations is generally expected to provide suitable foundation support for the utilities, provided it is free of organics/deleterious debris and is not disturbed during construction, and appropriate provisions for bedding and backfilling are included. Disturbance of trench bottoms can be minimized by excavating with a smooth-bladed bucket wherever possible and limiting foot traffic on the trench bottoms. If very soft, organic-rich, or otherwise unsuitable soils are encountered at the invert level of utilities, we recommend that they be removed and replaced with bedding materials or a geosynthetic fabric may be used to maintain separation between the bedding and poor subgrade soil. The fill could contain oversized particles that if encountered, should be removed from the utility subgrade and replaced with bedding materials.

We recommend that pipe bedding meet the requirements of Section 7-08.3(1)C of the Standard Specifications (WSDOT, 2021). Specific recommendations relative to the bedding of the proposed underground pipelines include:

- Bedding for the proposed pipes should meet the gradation requirements for Gravel Backfill for Pipe Zone Bedding, Section 9-03.12(3) of the Standard Specifications (WSDOT, 2021).
- Prior to installation of the pipe, the bedding material should be shaped to fit the lower portion of the pipe exterior with reasonable closeness to provide continuous support along the pipe.
- Backfill around the pipe should be placed in layers and tamped around the pipe to obtain complete contact. Pipe zone bedding material should extend at least 6 inches above the crown of the pipe, for the full width of the trench. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.
- Where a trench box is used and restraint of the installed pipe appears to be in question, we recommend that pipe restraint in the form of a cable and winch system be used inside the pipe so that the joints of previously laid pipe are not pulled apart as the trench box is advanced.

6.4.2 Trench Backfill and Compaction Criteria

For general structural fill and compaction considerations, refer to Section 6.3 of this report. The following criteria for trench backfill and compaction is provided.

Trench backfill should follow the requirements of Section 7-08.3(3) of the Standard Specifications (WSDOT, 2021). During placement of the initial lifts, the trench backfill material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate over the pipe until at least 2 feet of backfill has been placed. The trench backfill should be placed in 8- to 12-inch, loose lifts and compacted using mechanical equipment. Trench backfill more than 3 feet below the finish grades should be compacted to at least 90 percent of the MDD (ASTM D1557). Within the proposed building pads or extents of the access roadways, the upper 3 feet of the backfill should be compacted to at least 95 percent of the MDD to provide an adequate subgrade for the future buildings and pavement sections.

7 Recommendations for Continuing Geotechnical Services

Throughout this report, we have provided recommendations where we consider it would be appropriate for Aspect to provide additional geotechnical input to the design and construction process. Additional recommendations are summarized in this section.

7.1 Additional Design and Consultation Services

Before construction begins, we recommend that Aspect:

- Continue to meet with the design team, as needed, to address geotechnical questions that may arise throughout the remainder of the design process.
- Review the geotechnical elements of the Project plans and specifications to see that the geotechnical engineering recommendations are properly interpreted.

7.2 Additional Construction Services

We are available to provide geotechnical engineering and monitoring services during construction. The integrity of the geotechnical elements depends on proper Site preparation and construction procedures. In addition, engineering decisions may have to be made in the field if variations in subsurface conditions become apparent.

During the construction phase of the Project, Aspect should perform the following tasks:

- Review applicable submittals
- Observe and evaluate subgrade and structural fill placement for all footings, slabs-on-grade, and retaining walls
- Evaluate pavement subgrade prior to placement of base coarse
- Attend meetings, as needed
- Address other geotechnical engineering considerations that may arise during construction

The purpose of our observations is to verify compliance with design concepts and recommendations, and to allow design changes or evaluation of appropriate construction methods should subsurface conditions differ from those anticipated prior to the start of construction.

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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, LLC (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 Dennison, project manager, at 206-780-7717.

FIGURES

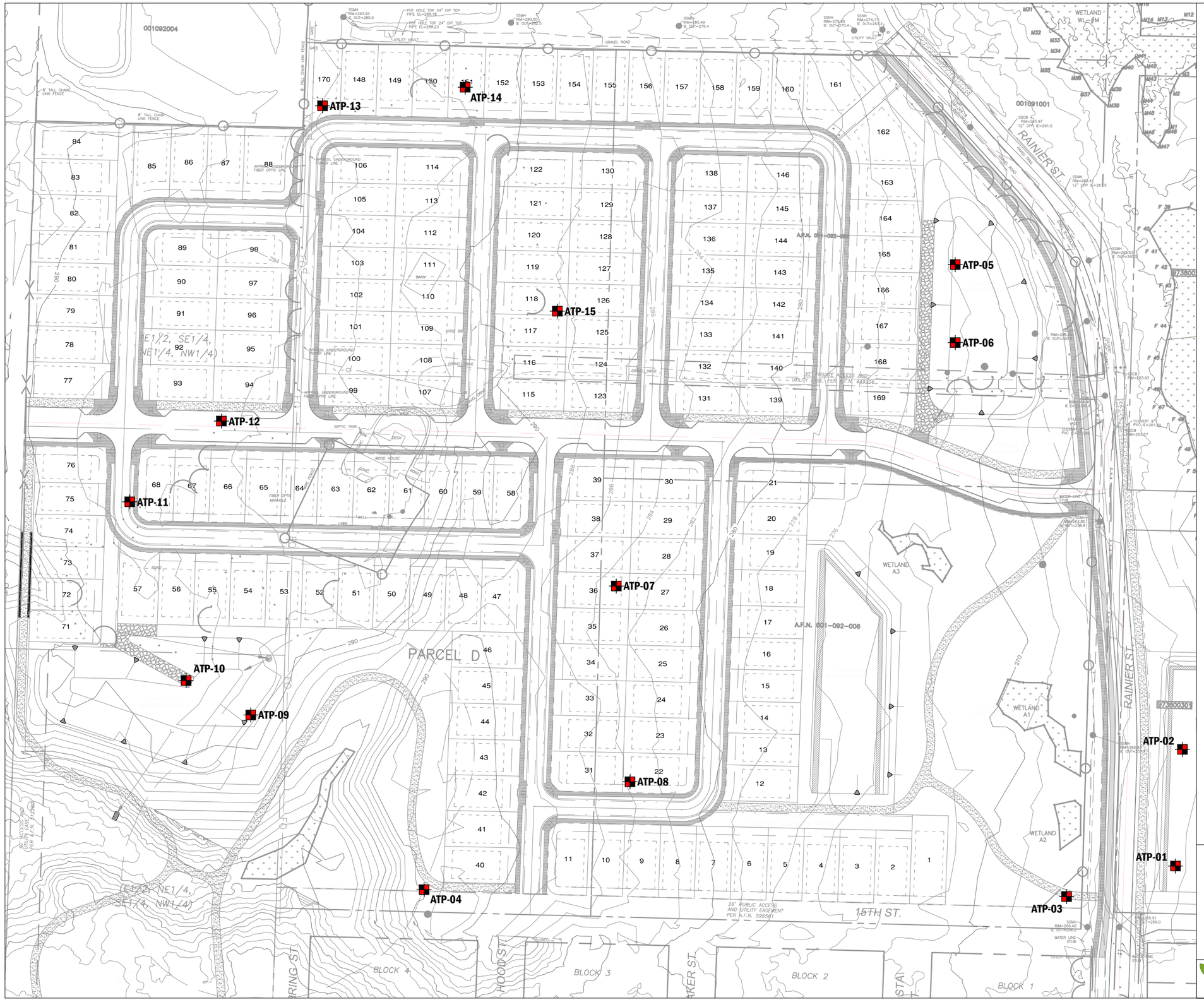
Site Location Map

Geotechnical Report
Madrona Ridge Residential Development
Rainier Street
Port Townsend, Washington

Aspect CONSULTING	AUG-2021	BY: AJD / SCC	FIGURE NO. 1
	PROJECT NO. 210338	REVISED BY: ---	

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

GIS Path: Q:_GeoTech\210338 Madrona Ridge Residential Development\2021-08 Geotechnical Report\GIS\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 8/2/2021 || User: scudd || Print Date: 8/2/2021



Legend

- Test Pit Location
- Elevation Contour (2 Foot Interval)

0 120 240 Feet

Source: Base CAD files from "Madrona Ridge Pre-Plat P.U.D., Preliminary Lot Layout", ESM Consulting Engineers, LLC, Federal Way, Washington, 7/29/21.

Site Exploration Plan

Geotechnical Report
Madrona Ridge Residential Development
Rainier Street
Port Townsend, Washington

Aspect Consulting			
	Aug-2021	BY: AJD/SCC	FIGURE NO.
	PROJECT NO. 210338	REVISED BY: -	2

CAD Path: Q:_GeoTech\210338 Madrona Ridge Residential Development\2021-08 Geotechnical Report\210338-02.dwg 17x11 Landscape || Date Saved: Aug 02, 2021 3:25pm || User: scudd

APPENDIX A

Test Pit Logs

A. Field Exploration Program

A.1. Test Pits

Aspect observed the excavation of 15 test pits (ATP-01 through ATP-15) on July 8, 2021, across the Site. Test pits were advanced using a mini-tracked excavator, John Deere 50G, operated by Seton Construction, Inc., under direction of Aspect. The locations of the test pits are shown on Figure 2. Copies of the test pit logs are included in this appendix.

Samples were obtained from select soil units to aid in the determination of engineering properties of the subsurface materials. The relative density/consistency of the materials was evaluated qualitatively by observation of digging difficulty and in the shallow depths using a 0.5-inch-diameter, pointed steel T-probe at various depth intervals. The test pits were backfilled with the excavated materials and compacted with the excavator bucket.

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 test pit logs. The depths indicated on the log where conditions changed may represent gradational variations between soil types. Soils were classified in general accordance with the ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual and Manual Procedure)*. A key to the symbols and terms used on the logs is provided on the first page of Appendix A.

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

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1103, -122.8061	*Exploration Number* **ATP-01**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 268'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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 SILTY SAND (SM); loose, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	
1	267	Backfilled with excavated material.						**VASHON TILL** SILTY SAND WITH GRAVEL (SM); medium dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; rounded 3- to 5-inch diameter cobbles; few roots.	1
2	266		S1			T-probe =< 1"			2
3	265	Difficulty digging.							3
4	264		S2			T-probe =< 1"		Becomes very dense, light gray; trace rounded 3-inch diameter cobbles; massive structure with socketing; few faceted gravel.	4
5	263								5
6	262		S3	●		PS, MC FC=31.5%			6
7	261								7
8	260								8
9	259	Machine limited end of excavation.	S4	●		PS, MC FC=32.2%			9
								Bottom of exploration at 9.5 ft. bgs. Note: No sidewall caving observed.	
10	258								10
11	257								11
12	256								12
13	255								13
14	254								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-01
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1107, -122.8061	*Exploration Number* **ATP-02**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 268'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
1	267	Backfilled with excavated material.	S1			T-probe =3-4"		**TOPSOIL** SILTY SAND WITH GRAVEL (SM); loose, dry, brown; fine sand; fine to coarse, rounded gravel; trace 3- to 5-inch diameter, rounded to subrounded cobbles; some roots, decomposed organic matter, and woody debris.	1
2	266	Difficulty digging. Benched down to 2 feet bgs.	S2	●		T-probe =< 1" PS, MC FC=20.2%		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); medium dense to dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; rounded 3- to 5-inch diameter cobbles; few roots.	2
3	265								3
4	264		S3			T-probe =< 1"			4
5	263					T-probe =< 1"		Becomes very dense, light gray; trace rounded 3-inch diameter cobbles; massive structure with socketing; few faceted gravel.	5
6	262								6
7	261	Difficulty digging.	S4						7
8	260								8
9	259								9
10	258								10
11	257								11
								Bottom of exploration at 11.5 ft. bgs. Note: No sidewall caving observed.	
12	256								12
13	255								13
14	254								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-02

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1102, -122.8067	*Exploration Number* **ATP-03**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 272'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
0						T-probe =1"-2"		**FILL** SILTY SAND (SM); loose to medium dense, dry, brown; fine sand; fine to coarse, rounded to angular gravel; few branches, decomposed organics, and woody debris; trace plastic coated wire and rusted fencing pieces.	0
1	271	Backfilled with excavated material.				T-probe =< 1"		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); dense, slightly moist to moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; few roots.	1
2	270								2
3	269								3
4	268					T-probe =< 1"			4
5	267							Becomes very dense, moist, light gray; trace rounded 3- to 5-inch diameter cobbles; massive structure with socketing; few faceted gravel.	5
6	266								6
7	265		S2	●		PS, MC			7
8	264	Difficulty digging.							8
9	263								9
10	262								10
11	261							Bottom of exploration at 11 ft. bgs. Note: No sidewall caving observed.	11
12	260								12
13	259								13
14	258								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-03

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1102, -122.8100	*Exploration Number* **ATP-04**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 293'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
0								**TOPSOIL** SILTY SAND (SM); loose, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	0
1	292	Backfilled with excavated material.						**VASHON TILL** SILTY SAND (SM); dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; few fine to coarse, rounded to subrounded gravel; few roots.	1
2	291		S1			T-probe =< 1"			2
3	290							SILTY SAND (SM); very dense, slightly moist, light gray; fine to coarse sand; few fine to coarse, rounded to subrounded gravel; massive structure with socketing; volcanic and granitic gravel; few faceted gravel.	3
4	289		S2			T-probe =< 1"			4
5	288	Difficulty digging.							5
6	287								6
7	286								7
8	285							Bottom of exploration at 7.5 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	8
9	284								9
10	283								10
11	282								11
12	281								12
13	280								13
14	279								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-04
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1124, -122.8074	*Exploration Number* **ATP-05**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 277'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
0						T-probe =3-4"		**TOPSOIL** SILTY SAND (SM); medium dense, dry, brown; fine sand; some roots, decomposed organic matter, charcoal, and woody debris.	0
1	276	Backfilled with excavated material.						**VASHON TILL** SILTY SAND (SM); dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; few fine to coarse, rounded to subrounded gravel; few roots.	1
2	275		S1			T-probe =< 1"			2
3	274								3
4	273		S2	●		T-probe =< 1" PS, MC FC=33.8%			4
5	272							SILTY SAND WITH GRAVEL (SM); very dense, slightly moist, light gray; fine to coarse sand; fine to coarse, rounded to angular gravel; trace rounded 3- to 5-inch diameter cobbles; massive structure with socketing; few faceted gravel.	5
6	271								6
7	270		S3						7
8	269							Bottom of exploration at 7.5 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	8
9	268								9
10	267								10
11	266								11
12	265								12
13	264								13
14	263								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-05
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1121, -122.8073	*Exploration Number* **ATP-06**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 277'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
1	276	Backfilled with excavated material.				T-probe =< 1"		**TOPSOIL** SILTY SAND (SM); loose to medium dense, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	1
2	275							**VASHON TILL** SILTY SAND WITH GRAVEL (SM); medium dense to dense, moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; rounded 3-inch to 4-inch diameter cobbles; few roots.	2
3	274								3
4	273		S1	●		T-probe =< 1" PS, MC FC=33.8%		Becomes very dense, light gray; trace rounded 3-inch diameter cobbles; massive structure with socketing; few faceted gravel.	4
5	272								5
6	271		S2					Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	270								7
8	269								8
9	268								9
10	267								10
11	266								11
12	265								12
13	264								13
14	263								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-06

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Madrona Ridge Development - 210338

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
1601 Rainier Street, Port Townsend, Washington, See Figure 2	48.1113, -122.8091	**ATP-07**

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
Seton Construction, Inc.	John Deere 50G Mini Excavator	Grab	293'	
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
Kyle	Excavator	7/8/2021	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)
1	292	Backfilled with excavated material.	S1					**TOPSOIL** SILTY SAND (SM); loose, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	1
2	291					T-probe =0.5-4"		**VASHON TILL** SILTY SAND (SM); medium dense to very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; few fine to coarse, rounded to subrounded gravel; few roots; trace oxidized iron bearing minerals.	2
3	290								3
4	289					T-probe =< 1"		SILTY SAND WITH GRAVEL (SM); very dense, slightly moist, light gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; trace rounded 3-inch diameter cobbles; massive structure with socketing; few faceted gravel.	4
5	288								5
6	287		S2					Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	286								7
8	285								8
9	284								9
10	283								10
11	282								11
12	281								12
13	280								13
14	279								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-07

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1106, -122.8090	*Exploration Number* **ATP-08**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 289'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/8/2021	*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)
0						T-probe =1"		**TOPSOIL** SILTY SAND (SM); dense, slightly moist, brown; fine sand; some roots, decomposed organic matter, and woody debris.	
1	288	Backfilled with excavated material.						**VASHON TILL** SILTY SAND WITH GRAVEL (SM); dense to very dense, moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; few roots.	1
2	287								2
3	286		S1			T-probe =0.5-2"			3
4	285	Difficulty digging.				T-probe =< 1"		Becomes very dense, moist, light gray; massive structure with socketing; few faceted gravel.	4
5	284	Difficulty digging.							5
6	283							Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	282								7
8	281								8
9	280								9
10	279								10
11	278								11
12	277								12
13	276								13
14	275								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-08

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1108, -122.8109	*Exploration Number* **ATP-09**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 294'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/9/2021	*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)
						T-probe =6"		**TOPSOIL** SILTY SAND (SM); medium dense, slightly moist, brown; fine sand; fine to coarse, rounded gravel; some roots, decomposed organic matter, and woody debris.	
1	293	Backfilled with excavated material.	S1					**VASHON TILL**	1
2	292					T-probe =1-3"		SILTY SAND WITH GRAVEL (SM); dense to very dense, moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; trace rounded 3-inch diameter cobble; few roots.	2
3	291	Difficulty digging.							3
4	290					T-probe =< 1"			4
		Difficulty digging.						Becomes very dense, light gray; massive structure with socketing; few faceted gravel.	
5	289								5
		Difficulty digging.				PS, MC FC=35.5%			
6	288		S2	●				Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	287								7
8	286								8
9	285								9
10	284								10
11	283								11
12	282								12
13	281								13
14	280								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-09
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Madrona Ridge Development - 210338

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
1601 Rainier Street, Port Townsend, Washington, See Figure 2	48.1109, -122.8112	**ATP-10**

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
Seton Construction, Inc.	John Deere 50G Mini Excavator	Grab	293'	
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
Kyle	Excavator	7/9/2021	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)
0						T-probe =6"		**TOPSOIL** SILTY SAND (SM); medium dense, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	0
1	292	Backfilled with excavated material.						**VASHON TILL** SILTY SAND WITH GRAVEL (SM); very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; trace rounded 5-inch diameter cobbles; few roots.	1
2	291	Difficulty digging.	S1	●		T-probe =< 1" PS, MC FC=34.4%			2
3	290								3
4	289	Difficulty digging.				T-probe =< 1"		Becomes light gray; massive structure with socketing; few faceted gravel.	4
5	288								5
6	287							Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	286								7
8	285								8
9	284								9
10	283								10
11	282								11
12	281								12
13	280								13
14	279								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-10

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1115, -122.8116	*Exploration Number* **ATP-11**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 295'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/9/2021	*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)
						T-probe =3-4"		**TOPSOIL** SILTY SAND (SM); medium dense, dry, brown; fine sand; some roots, decomposed organic matter, and woody debris.	
1	294	Backfilled with excavated material.							1
						T-probe =1-2"		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); dense to very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; rounded 3-inch to 8-inch diameter cobbles; few 12-inch to 14-inch boulders; few roots.	
2	293								2
3	292		S1						3
4	291							Becomes very dense, moist, light gray; massive structure with socketing; few faceted gravel.	4
5	290		S2			T-probe =< 1"			5
6	289								6
7	288								7
8	287								8
9	286								9
10	285	Difficulty diging.						3-inch pocket of gray fine to medium sand	10
11	284								11
12	283							Bottom of exploration at 12 ft. bgs. Note: No sidewall caving observed.	12
13	282								13
14	281								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-11

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Madrona Ridge Development - 210338

Geotechnical Exploration Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (Lat,Lon WGS84)	Exploration Number
1601 Rainier Street, Port Townsend, Washington, See Figure 2	48.1118, -122.8111	**ATP-12**

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
Seton Construction, Inc.	John Deere 50G Mini Excavator	Grab	302'	
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
Kyle	Excavator	7/9/2021	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)
1	301	Backfilled with excavated material.				T-probe =1-4"		**FILL** SILTY SAND (SM); medium dense, slightly moist, brown; fine to coarse sand; fine to coarse, rounded to subrounded gravel; little to some tree branches, logs, roots, decomposed grass, wire fence pieces, plastic twine.	1
2	300					T-probe =1"		**OLDER TOPSOIL** SILTY SAND (SM); loose, slightly moist, light brown; fine sand; some roots, decomposed organic matter, and woody debris.	2
3	299					T-probe =< 1"		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; few roots.	3
4	298							Becomes light gray; trace rounded 3- to 5-inch diameter cobbles; massive structure with socketing; few faceted gravel.	4
5	297	Difficulty digging.	S1			T-probe =< 1"			5
6	296							Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	295								7
8	294								8
9	293								9
10	292								10
11	291								11
12	290								12
13	289								13
14	288								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-12

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1129, -122.8106	*Exploration Number* **ATP-13**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 304'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/9/2021	*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)
0						T-probe =3"		**TOPSOIL** SILTY SAND (SM); medium dense, slightly moist, light brown; fine sand; some roots, decomposed organic matter, and woody debris.	0
1	303	Backfilled with excavated material.						**VASHON TILL** SILTY SAND WITH GRAVEL (SM); very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; few roots.	1
2	302	Difficulty digging.	S1			T-probe =< 1"			2
3	301								3
4	300					T-probe =< 1"		Becomes, light gray; trace rounded 3-inch diameter cobbles; massive structure with socketing; few faceted gravel.	4
5	299								5
6	298		S2					Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	297								7
8	296								8
9	295								9
10	294								10
11	293								11
12	292								12
13	291								13
14	290								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-13
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1130, -122.8099	*Exploration Number* **ATP-14**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 306'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/9/2021	*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)
1	305	Backfilled with excavated material.				T-probe =1"-1.5'		**FILL** SILTY SAND WITH GRAVEL AND COBBLES (SM); loose to medium dense, dry, light brown; fine to coarse sand; fine to coarse, rounded gravel; 3-inch diameter rounded cobbles; little roots, woody debris, and alumium bottle cap.	1
2	304		S1			T-probe =0.5-1"		**BURIED TOPSOIL** SILTY SAND WITH GRAVEL (SM); loose, dry, brown; fine to coarse sand; fine, rounded to subrounded gravel; some roots, decomposed organic matter, and woody debris.	2
3	303							**VASHON TILL** SILTY SAND WITH GRAVEL (SM); dense to very dense, slightly moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; little to some rounded 5-inch diameter cobbles; few roots.	3
4	302					T-probe =< 1"		Becomes very dense, light gray; massive structure with socketing; few faceted gravel.	4
5	301								5
6	300	Difficulty digging.	S2						6
7	299								7
8	298							Bottom of exploration at 7.5 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	8
9	297								9
10	296								10
11	295								11
12	294								12
13	293								13
14	292								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-14

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

Aspect CONSULTING	Madrona Ridge Development - 210338		Geotechnical Exploration Log	
	Project Address & Site Specific Location 1601 Rainier Street, Port Townsend, Washington, See Figure 2		*Coordinates (Lat,Lon WGS84)* 48.1122, -122.8094	*Exploration Number* **ATP-15**
Contractor Seton Construction, Inc.	*Equipment* John Deere 50G Mini Excavator	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 302'	
Operator Kyle	*Exploration Method(s)* Excavator	*Work Start/Completion Dates* 7/9/2021	*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)
1	301	Backfilled with excavated material.				T-probe =3-4"		**TOPSOIL** SILTY SAND WITH GRAVEL (SM); medium dense, slightly moist, dark brown; fine to medium sand; fine to coarse, rounded to subangular gravel; rounded 3- to 5-inch diameter cobbles; some roots, decomposed organic matter, and woody debris.	1
2	300		S1			T-probe =0.5-3"		**VASHON TILL** SILTY SAND WITH GRAVEL (SM); medium dense to very dense, moist, mottled orange, brown, and gray; fine to coarse sand; fine to coarse, rounded to subrounded gravel; rounded 3-inch to 4-inch diameter cobbles; one 12-inch diameter boulder; few roots.	2
3	299								3
4	298					T-probe =< 1"			4
5	297							Becomes very dense, moist, light gray; massive structure with socketing; few faceted gravel.	5
6	296		S2					Bottom of exploration at 6 ft. bgs. Note: No sidewall caving observed. Practical refusal on dense soils.	6
7	295								7
8	294								8
9	293								9
10	292								10
11	291								11
12	290								12
13	289								13
14	288								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: CAL
Approved by: AJD 8/3/2021

Exploration Log ATP-15

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\210338 MADRONA RIDGE.GPJ August 5, 2021

APPENDIX B

Laboratory Testing Results

B. Geotechnical Laboratory Testing

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 by Phoenix Soil Research in general accordance with appropriate ASTM International (ASTM) test methods.

B.1. Particle-Size Analyses, PS

A particle-size analysis was performed on six selected soil samples in general accordance with ASTM D6913. 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. The result of the test is presented in this appendix as curves depicting the percent finer by weight versus grain size.

B.2. Moisture Content Determination, MC

All six of the selected soil samples previously mentioned plus one additional sample were submitted for analysis of water content by the ASTM D2216 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 boring logs in Appendix A and tabulated in this appendix.

MATERIALS TESTING & CONSULTING, INC.

Moisture Content - ASTM C566, ASTM D2216

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Date Received: July 15, 2021
Date Tested: July 16, 2021

Client: Aspect Consulting
Sampled by: Client
Tested by: C. Kriss

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1074	ATP-01, S-3 @ 6.0 ft	414.2	1372.6	1319.8	52.8	905.6	5.8%
B21-1075	ATP-01, S-4 @ 9.5 ft	394.8	1078.1	1043.8	34.3	649.0	5.3%
B21-1076	ATP-02, S-2 @ 2.0 ft	379.6	1140.5	1095.8	44.7	716.2	6.2%
B21-1077	ATP-03, S-2 @ 7.0 ft	394.2	1203.0	1154.2	48.8	760.0	6.4%
B21-1078	ATP-05 + 06, S-2/S-1 @ 4.0 ft	379.8	907.5	857.2	50.3	477.4	10.5%
B21-1079	ATP-09, S-2 @ 6.0 ft	420.8	846.8	824.5	22.3	403.7	5.5%
B21-1080	ATP-10, S-1 @ 2.0 ft	419.3	643.3	624.9	18.4	205.6	8.9%

Reviewed by: Meghan Blodgett-Carrillo

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-01, S-3 @ 6.0 ft
Sample#: B21-1074

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
grayish-brown

ACCREDITED
Certificate #: 1366.01

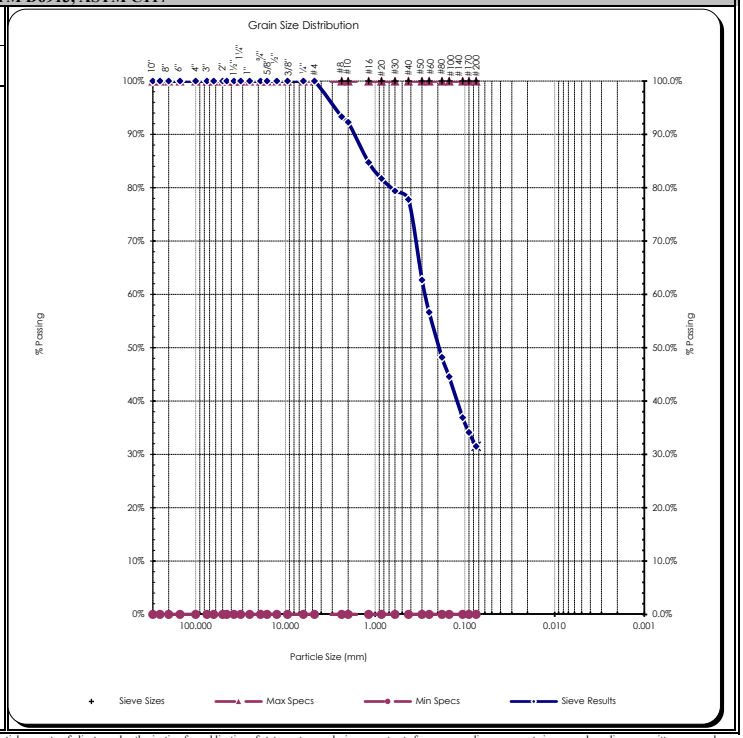
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	0.0%	Coeff. of Curvature, C_C = 0.77
$D_{(10)}$ =	0.024	mm	% Sand =	68.5%	Coeff. of Uniformity, C_U = 11.66
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.5%	Fineness Modulus = 1.35
$D_{(30)}$ =	0.071	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.195	mm	Plasticity Index =	n/a	Moisture %, as sampled = 5.8%
$D_{(60)}$ =	0.278	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	1.751	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	32/79		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		93%	100.0%	0.0%
#10	2.00	92%	92%	100.0%	0.0%
#16	1.18		85%	100.0%	0.0%
#20	0.850		82%	100.0%	0.0%
#30	0.600		79%	100.0%	0.0%
#40	0.425	78%	78%	100.0%	0.0%
#50	0.300		63%	100.0%	0.0%
#60	0.250		57%	100.0%	0.0%
#80	0.180		48%	100.0%	0.0%
#100	0.150	45%	45%	100.0%	0.0%
#140	0.106		37%	100.0%	0.0%
#170	0.090		34%	100.0%	0.0%
#200	0.075	31.5%	31.5%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

MATERIALS TESTING & CONSULTING, INC.

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-01, S-4 @ 9.5 ft
Sample#: B21-1075

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
grayish-brown

ACCREDITED
Certificate #: 1366.01

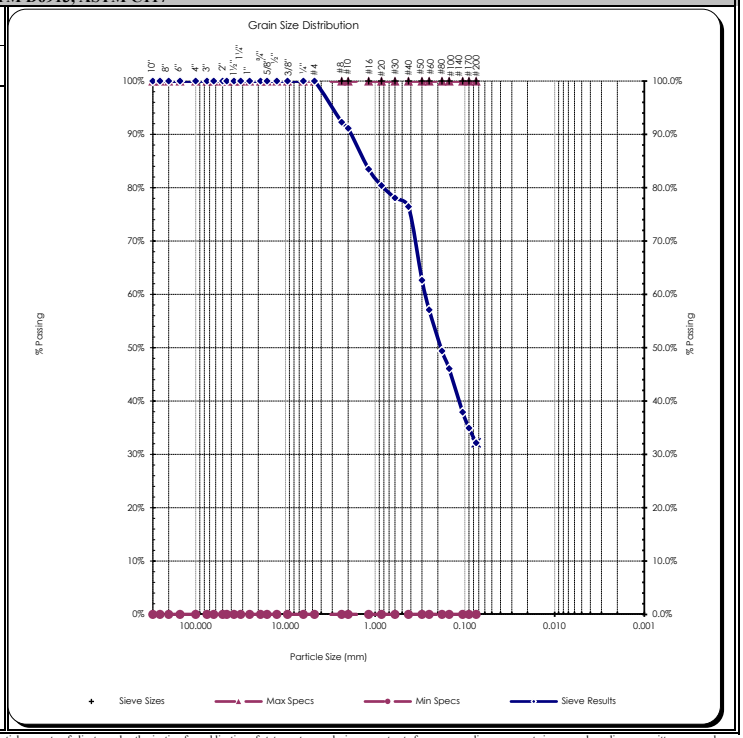
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	0.0%	Coeff. of Curvature, C_C =	0.76
$D_{(10)}$ =	0.023	mm	% Sand =	67.8%	Coeff. of Uniformity, C_U =	11.84
$D_{(15)}$ =	0.035	mm	% Silt & Clay =	32.2%	Fineness Modulus =	1.37
$D_{(30)}$ =	0.070	mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.185	mm	Plasticity Index =	n/a	Moisture %, as sampled =	5.3%
$D_{(60)}$ =	0.276	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	1.878	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	8/19		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		92%	100.0%	0.0%
#10	2.00	91%	91%	100.0%	0.0%
#16	1.18		83%	100.0%	0.0%
#20	0.850		80%	100.0%	0.0%
#30	0.600		78%	100.0%	0.0%
#40	0.425	76%	76%	100.0%	0.0%
#50	0.300		63%	100.0%	0.0%
#60	0.250		57%	100.0%	0.0%
#80	0.180		49%	100.0%	0.0%
#100	0.150	46%	46%	100.0%	0.0%
#140	0.106		38%	100.0%	0.0%
#170	0.090		35%	100.0%	0.0%
#200	0.075	32.2%	32.2%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-02, S-2 @ 2.0 ft
Sample#: B21-1076

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
brown

ACCREDITED
Certificate #: 1366.01

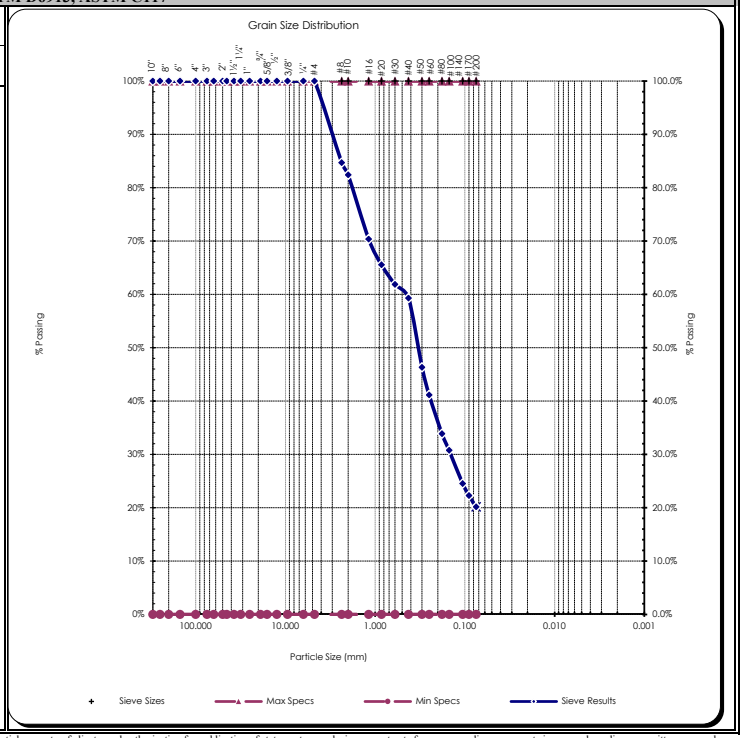
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.019	mm	% Gravel =	0.0%	Coeff. of Curvature, C_C = 1.19
$D_{(10)}$ =	0.037	mm	% Sand =	79.8%	Coeff. of Uniformity, C_U = 12.70
$D_{(15)}$ =	0.056	mm	% Silt & Clay =	20.2%	Fineness Modulus = 2.06
$D_{(30)}$ =	0.145	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.335	mm	Plasticity Index =	n/a	Moisture %, as sampled = 6.2%
$D_{(60)}$ =	0.472	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	3.186	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	16/47		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		85%	100.0%	0.0%
#10	2.00	82%	82%	100.0%	0.0%
#16	1.18		70%	100.0%	0.0%
#20	0.850		66%	100.0%	0.0%
#30	0.600		62%	100.0%	0.0%
#40	0.425	59%	59%	100.0%	0.0%
#50	0.300		46%	100.0%	0.0%
#60	0.250		41%	100.0%	0.0%
#80	0.180		34%	100.0%	0.0%
#100	0.150	31%	31%	100.0%	0.0%
#140	0.106		25%	100.0%	0.0%
#170	0.090		22%	100.0%	0.0%
#200	0.075	20.2%	20.2%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

MATERIALS TESTING & CONSULTING, INC.

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-05+06, S-2/S-1 @ 4.0 ft
Sample#: B21-1078

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
brown

ACCREDITED
Certificate #: 1366.01

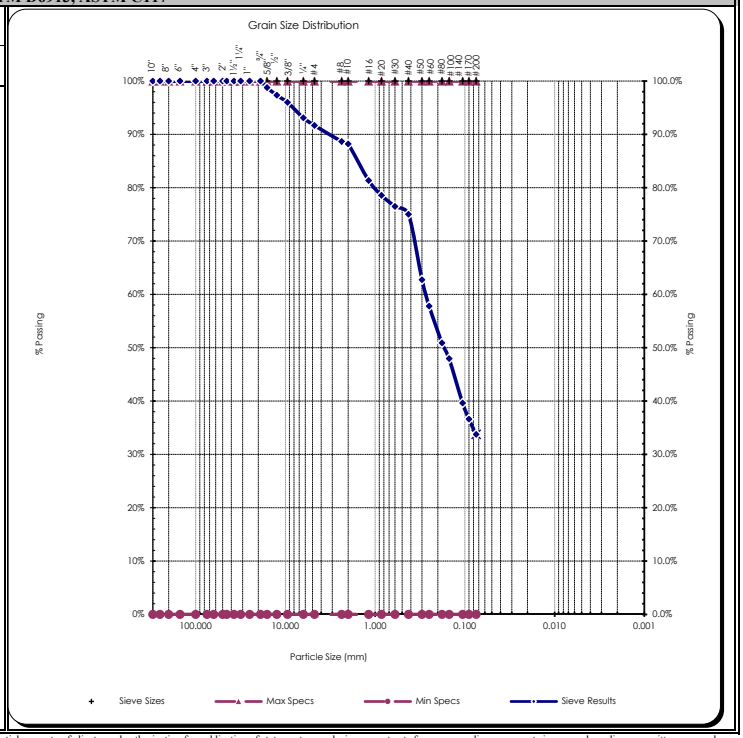
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.011	mm	% Gravel =	8.3%	Coeff. of Curvature, C_C = 0.73
$D_{(10)}$ =	0.022	mm	% Sand =	57.9%	Coeff. of Uniformity, C_U = 12.26
$D_{(15)}$ =	0.033	mm	% Silt & Clay =	33.8%	Fineness Modulus = 1.55
$D_{(30)}$ =	0.067	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.171	mm	Plasticity Index =	n/a	Moisture %, as sampled = 10.5%
$D_{(60)}$ =	0.272	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	3.418	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	9/20		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		99%	100.0%	0.0%
1/2"	12.50	97%	97%	100.0%	0.0%
3/8"	9.50	96%	96%	100.0%	0.0%
1/4"	6.30		93%	100.0%	0.0%
#4	4.75	92%	92%	100.0%	0.0%
#8	2.36		89%	100.0%	0.0%
#10	2.00	88%	88%	100.0%	0.0%
#16	1.18		81%	100.0%	0.0%
#20	0.850		79%	100.0%	0.0%
#30	0.600		76%	100.0%	0.0%
#40	0.425	75%	75%	100.0%	0.0%
#50	0.300		63%	100.0%	0.0%
#60	0.250		58%	100.0%	0.0%
#80	0.180		51%	100.0%	0.0%
#100	0.150	48%	48%	100.0%	0.0%
#140	0.106		40%	100.0%	0.0%
#170	0.090		37%	100.0%	0.0%
#200	0.075	33.8%	33.8%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

MATERIALS TESTING & CONSULTING, INC.

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-09, S-2 @ 6.0 ft
Sample#: B21-1079

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01

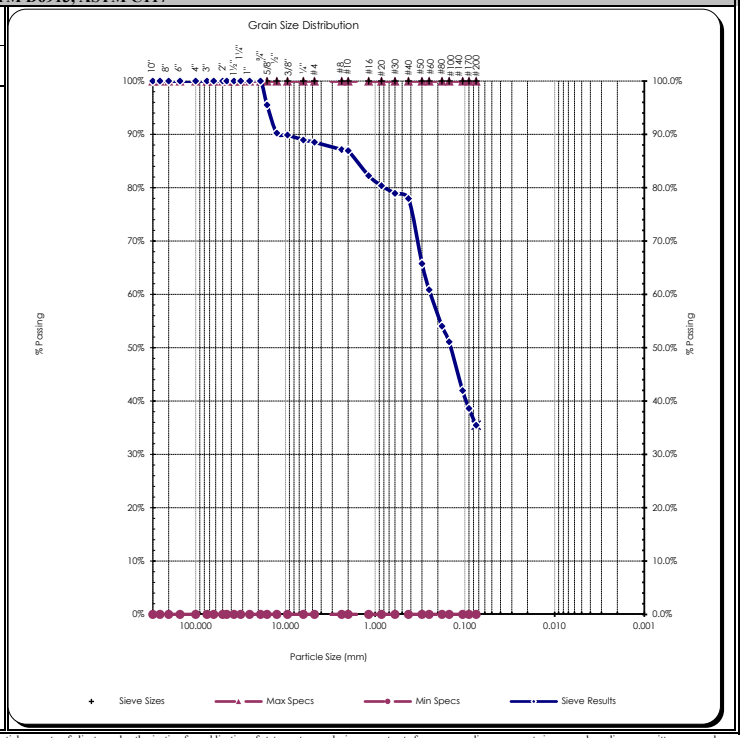
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.011	mm	% Gravel =	11.5%	Coeff. of Curvature, C_C = 0.79
$D_{(10)}$ =	0.021	mm	% Sand =	53.0%	Coeff. of Uniformity, C_U = 11.40
$D_{(15)}$ =	0.032	mm	% Silt & Clay =	35.5%	Fineness Modulus = 1.56
$D_{(30)}$ =	0.063	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.145	mm	Plasticity Index =	n/a	Moisture %, as sampled = 5.5%
$D_{(60)}$ =	0.241	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	10.494	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	5/11		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		96%	100.0%	0.0%
1/2"	12.50	90%	90%	100.0%	0.0%
3/8"	9.50	90%	90%	100.0%	0.0%
1/4"	6.30		89%	100.0%	0.0%
#4	4.75	89%	89%	100.0%	0.0%
#8	2.36		87%	100.0%	0.0%
#10	2.00	87%	87%	100.0%	0.0%
#16	1.18		82%	100.0%	0.0%
#20	0.850		80%	100.0%	0.0%
#30	0.600		79%	100.0%	0.0%
#40	0.425	78%	78%	100.0%	0.0%
#50	0.300		66%	100.0%	0.0%
#60	0.250		61%	100.0%	0.0%
#80	0.180		54%	100.0%	0.0%
#100	0.150	51%	51%	100.0%	0.0%
#140	0.106		42%	100.0%	0.0%
#170	0.090		39%	100.0%	0.0%
#200	0.075	35.5%	35.5%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

MATERIALS TESTING & CONSULTING, INC.

Sieve Report

Project: Q.C. - Madrona Ridge
Project #: 21B077-17
Client: Aspect Consulting
Source: ATP-10, S-1 @ 2.0 ft
Sample#: B21-1080

Date Received: 15-Jul-21
Sampled By: Client
Date Tested: 16-Jul-21
Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487
SM, Silty Sand
Sample Color:
reddish-brown

ACCREDITED
Certificate #: 1366.01

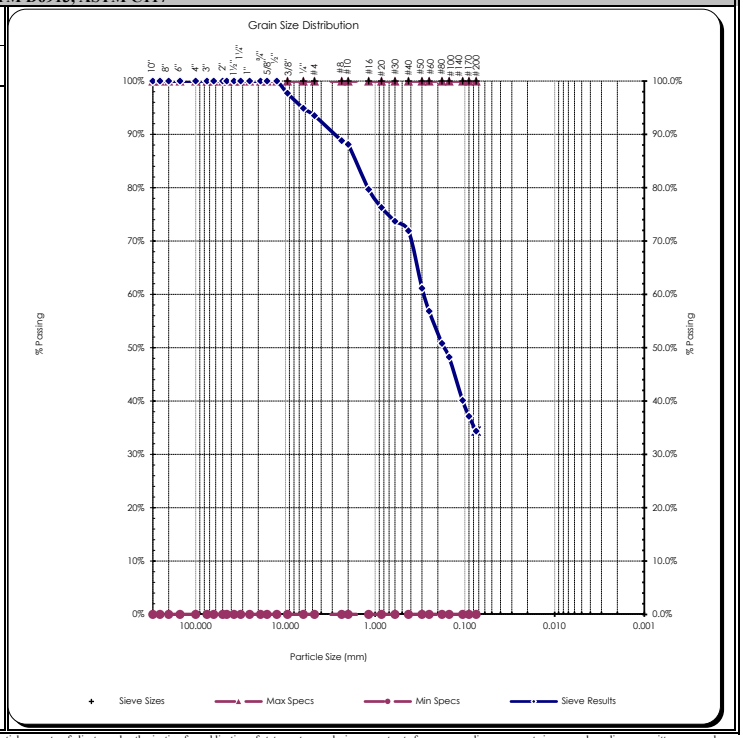
ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.011	mm	% Gravel =	6.5%	Coeff. of Curvature, C_C = 0.69
$D_{(10)}$ =	0.022	mm	% Sand =	59.1%	Coeff. of Uniformity, C_U = 13.13
$D_{(15)}$ =	0.033	mm	% Silt & Clay =	34.4%	Fineness Modulus = 1.57
$D_{(30)}$ =	0.065	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.170	mm	Plasticity Index =	n/a	Moisture %, as sampled = 8.9%
$D_{(60)}$ =	0.286	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	2.951	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	11/23		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

ASTM C136, ASTM D6913, ASTM C117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	98%	98%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	94%	94%	100.0%	0.0%
#8	2.36		89%	100.0%	0.0%
#10	2.00	88%	88%	100.0%	0.0%
#16	1.18		80%	100.0%	0.0%
#20	0.850		76%	100.0%	0.0%
#30	0.600		74%	100.0%	0.0%
#40	0.425	72%	72%	100.0%	0.0%
#50	0.300		61%	100.0%	0.0%
#60	0.250		57%	100.0%	0.0%
#80	0.180		51%	100.0%	0.0%
#100	0.150	48%	48%	100.0%	0.0%
#140	0.106		40%	100.0%	0.0%
#170	0.090		37%	100.0%	0.0%
#200	0.075	34.4%	34.4%	100.0%	0.0%



Comments:

Reviewed by:
Meghan Blodgett-Carrillo

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, LLC (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.

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CRITICAL AREA DETERMINATION:

PREPARED FOR:
Montebanc Management
6230 Hollywood Blvd.
Sarasota, FL 34231-3006

LALA PARCELS:
001091002, 0010912005 & 001092006

MARKEY PARCELS:
973800201 & 973800301

SITE LOCATION:
Rainier Street North of Discover Road

FOR SUBMITTAL TO:
Port Townsend Department of Community Development

Documenting Critical Areas Subject to PTMC title 19 – Environmental Protection Section 19.05.110
Critical Area 5 – Wetlands

PREPARED BY:
W David Loggy
Loggy Sol and Wetland Consulting
P.O. Box 2347
Port Angeles, WA 98362

Cover photograph – Barred Owl

TABLE OF CONTENTS

WETLAND CRITICAL AREA DETERMINATIONS FOR LALA AND MARKLEY PARCELS

CONSULTING COMPANY:	Loggy Soil and Wetland Consulting P.O. Box 2347 Port Angeles, WA 98362
LANDOWNERS	Jeremy Lala 1601Rainier Street Port Townsend, WA 986365-9304 Sharon Markley 6 Greensville Lane Longview, WA 98632-5392
MAP LOCATION	Appendix I
APPLICANT:	Montebanc Management 6230 Hollywood Blvd. Sarasota, FL 34231-3006
PROJECT	Critical Area determination of present or absent of wetlands for a new single-family residence land Plat.
TAX PARCEL NUMBER(S):	Lala Parcels - 001091002, 001092005 and 001092006 Markley Parcels - 973800201 & 973800301
SITE LOCATION	All Parcels are found in Section 09, Township 30 North, Range 01West, W.M., Jefferson County, Washington Starting at the Discovery Lane and Rainier Drive traffic circle take Rainier Street north. The parcels lie on the side of Rainier Street starting 764 feet for the traffic circle (Exhibit 1).
SIZE OF PARCEL	Lala Parcels – 001091002 – 20.73 acres 001092005 – 6.27 acres 001092006 – 7.40 acres Markley Parcels – 973800201 -5.62 acres 973800301 – 5.24 acres
INVESTIGATION PERIOD:	April thru May 2021

PRE-EXISTING INVENTORIES:

The United States Fish and Wildlife (USFW) Nation Wide Inventory (NWI) does not identify any wetlands on the parcel. The Washing State Department of Ecology does not identify any Natural Heritage Featured or High Conservation Value Wetlands.

At least three (3) private wetland firms have identified wetlands on one or more of the parcels. Two individual wetlands have been identified and delineated on Parcel 001091002 (Alkai Consultants, LLC., August 2008). Two wetlands on Parcel 001092006 (Loggy Soil and Wetland Consulting, April 2021). One wetland occurring on both parcels 973800201 and 973800301 (Alkai Consultants, LLC., August 2008, Loggy Soil and Wetland Consulting, and Westech Company, March 2008

METHOD AND APPROACH

Usually, a two-Level Assessment is used to identify, wetlands. The first level of assessment includes review of existing information conducted to develop background knowledge of physical features, and to identify the potential for wetland occurrence on the parcel. The resource documents available for preliminary review of the site conditions can included data for government agencies. Data from other agencies included USDA Soil Conservation Service (SCS), "Soil Survey of Jefferson County Area Washington", 2015, Jefferson County and Google aerial photography and any adjacent wetland reports on file with city or county governments.

The second level of assessment includes on-site investigation. On-site investigation includes establishing site plots on the wetlands. The plots describe the presence of wetland vegetation, soil and hydrology data describing it as a wetland. Field data and other pertinent area data is used to classify the wetland(s) as to category of importance with approved Washington State Rating System[1]. The next part includes marking the boundary of the wetland area so that it can be surveyed to plot its location correctly on a map.

WETLAND AND NON-WETLAND HABITATS

NON-WETLAND SITE

Vegetation - One upland area was sampled. Sample Plot 1 describes the undisturbed forested sites on the parcel. The data sheet and be viewed in Appendix II. The forested site consists of an over story of red alder (Alnus rubra), big-leaf maple (Acer macrophyllum) Douglas fir (Pseudotsuga menziesii) and Western hemlock (Tsuga heterophylla). Shrubby understory at the sample point is dominated by salal (1Gaultheria shallon. Herbaceous understory vegetation includes mostly Agrostis species.

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[1] **Department of Ecology State of Washington. Washington State Wetland Rating System, For Western Washington, 2014 Update: October 2014 – Effective January 22015 Publication no. 14-06-029.**

Soils - The soils are moderately deep well drained soil with slow runoff and rapid infiltration. and consist of a 4-inch thick very dark grayish brown sandy loam surface on top of greater than 8 inches dark yellowish brown loamy sand.

Hydrology – At time of soils sampling the was greater than 12 inches so the site did not meet wetland hydrology.

The three wetlands (A1-A3) delineated by Loggy Soils and Wetland Consulting occurred on Parcel 001092006. On-site investigation determined and verified all three wetlands are shallow depressional wetlands. The wetlands contain all three indicators of wetland vegetation, soils, and hydrology to meet the requirement to be wetlands.[2] The hydric soil was classified using Filed Indicators of Hydric Soils in the United States, Version 8.1, 2017.

One sample site was taken to describe the vegetation, soil, and hydrologic features of Wetlands A1 and A3 while two plots were described in Wetland A2. One plot was done to describe the vegetation, soils, and hydrologic features on the non-wetland area on the project site. The wetlands and plot sites are presented in Appendix I. The plot data is presented in Appendix II. The wetlands' classification rating data is presented in Appendix III.

WETLANDS

Wetlands A1-A3

Wetlands A1 -A3 are in shallow depressions. Wetland A1 and A2 are along the west boundary of the present location of Rainier Street. Wetland A3 is located on a gently slope to the north west of Wetlands A1 and A2 (Map Exhibit, Appendix I). Plot data can be viewed in Appendix II. Ratings for the wetlands are presented in Table I.

Vegetation – Wetland A2 and A3 supports herbaceous plant cover of creeping buttercup and grass plant. The two edges of wetlands are well defined by thick under growth of salal (Gaultheria shallon) and common snow (Symphoricarpos albus) and sword fern (Polystichum munitum). Wetland A2 has intrusions of Nootka Rose (Rosa nutkana). Upland trees around the wetlands include red alder (Alnus Rubra), Western hemlock (Tsuga heterophylla), Douglas fir (psesudotsuga menziesii). Bigleaf maple (Acer macrophyllum) and Pacific Madrone (Arbutus Madrone). C

Soils - The soils at sample Plots 1, 2 and 3 have dark colors greater than10 inches with common redoximorphic soil features starting at depths greater than 14 inches. The soils are loamy sand or sand loams throughout the soil's depth. The soils overlay glacial till. The soil on Plot 4, wetland 3, is shallow over glacial till with redoximorphic features starting before 10 inches in depth and are less than 16 inches to glacial till. The soil texture on plot 4 are same as the other 3 plots but are gravellier.

Hydrology – Parts of the wetland becomes seasonally inundated in the winter and spring but dry out during the summer. Portions of the wetland areas not seasonally inundated are seasonally saturated. All three wetland had saturated or inundated.

[2] **Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), May 2010.**

Wetland C3

In June 2007, C3 Habitat Corporation delineated and classified wetlands on the project area[3]. Three wetlands were identified with 2 of the wetlands not being large enough to be regulated. The largest wetland was identified and surveyed. The wetland is in the southwest corner of the of project area and is shown on the conceptional site plan (Exhibit II). The wetland in the report is titled Wetland C3. The review of the site indicates the wetland is still present and the wetland criteria are still present.

Vegetation – Dominate vegetation a dense tree cover consisting of Scoular's willow (Salix scouleriana) and dominant shrub cover of Douglas spiraea (Spiraea douglasii). The dominant herbaceous understory consists of soft rush (Juncus effusus). Plot data can be viewed in footnoted report. The vegetative cover meets the criteria for wetland vegetation.

Soils – The soil consisted of 4 inches of 4 inches of very dark grayish brown sandy loam over 8 inches of depleted (grayish brown) dense sandy clay loam. The soils meet the hydric (wetland) soil A11-Depleted Below Dark Surface criteria.

Hydrology – The present of wetland hydrology was made Drainage patterns, positive FAC-neutral ratio, and seasonal hydrology.

Wetland D – Wetland D cover two (2) parcels consisting of four (4) lots that are between the east side right-of-way (ROW) of Rainier Street and utilities ROW that also serves as a walking trail. The wetland continues onto parcel to the north. The wetland is probably the most delineated and wetland in all of Port Townsend. A least four wetland delineating companies have classified and delineated this wetland.

The wetland has been rated as both a Category II or III depending on the wetland specialist and company. Three of the ratings were done Washington State's 2014 Rating System. The most resent rating done by Westech Company rated the wetland as a Category III Wetland using the Washington State revised 2014 rating system. I rated the wetland myself using the revised 2014 rating system and concur with Westech that the wetland is a Category III wetland.

WETLAND RATING

Wetlands A1- A3 were rated using the updated 2014 Washington Wetland Rating System. Wetland C3 was rated using the existing field data and supplemented with the up dated rating system. An addendum wetland rating was done using the updated 2014 Washington State Wetland Rating System to ensure the wetland C3 is still a Category. The addendum was done due to inconsistencies found in the 2004 rating of the wetland. Only those figures needed to update new information are presented in the addendum. The classification rating sheets for Wetlands A1-A3 and well as the addendum for Wetland C3 can be reviewed in Appendix III.

[3] C3 Habitat Corporation, NE 3530 Old Belfair Hwy #56, Belfair, Washington 98528

EXHIBIT II – LOCATION OF WETLAND C3

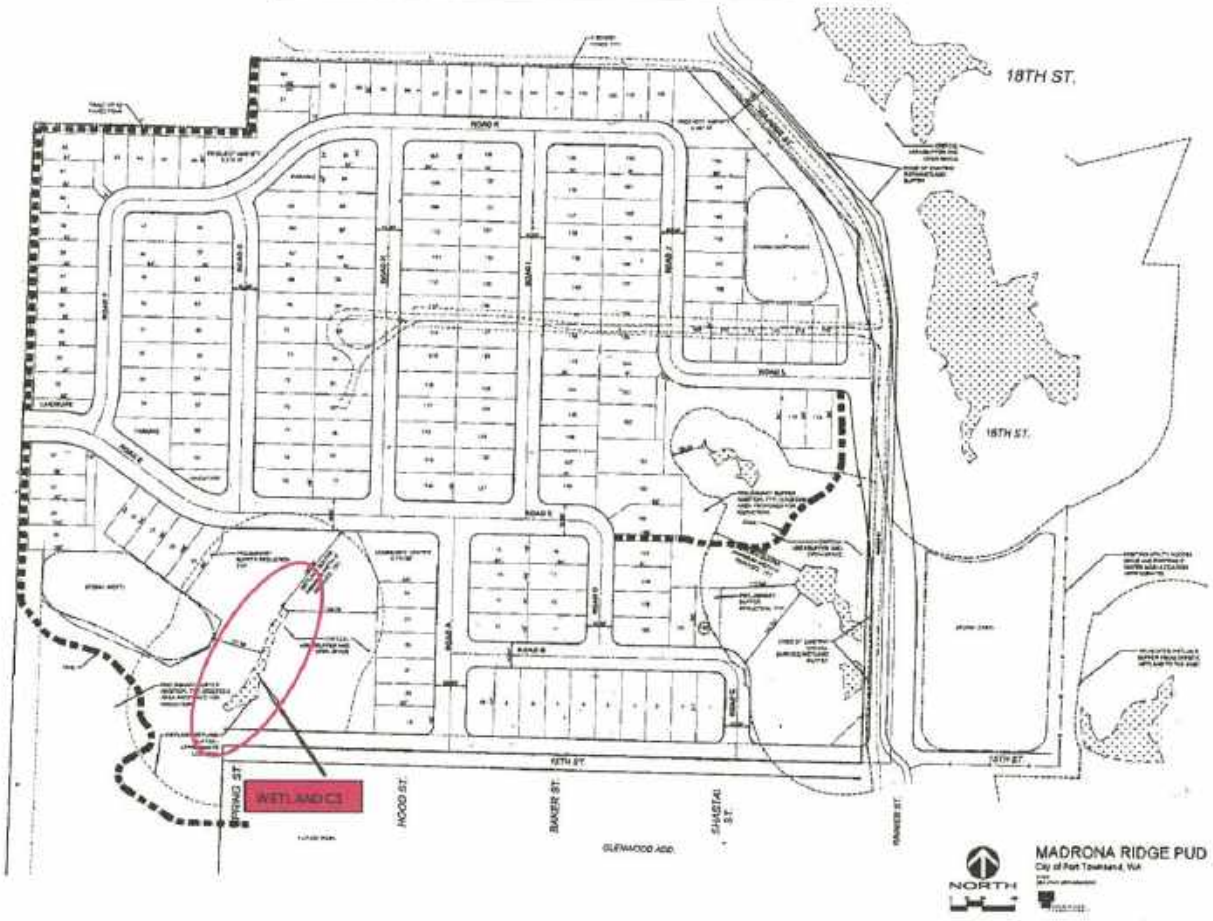


Table 1

Compiled Wetland Rating Information on Parcel 001091006

Wetland Name	Total Wetland Acres	Wetland Extends Off the Project Site? (Y/N)	WETLAND RATING FUNCTION SCORES				Total Functions Score	MGM Class, etc.	Wetland Category	Wetland Buffer Width
			FUNCTION	WATER QUALITY	HYDROLOGIC	HABITAT				
A1-A2		No	Site Potential	H	M	M				
			Landscape Potential	M	M	H				
			Value	L		M				
				6	5	7	18	1*	III	150'
A2		No	Site Potential	M	M	M				
			Landscape Potential	L	L	H				
			Value	L	L	M				
				4	4	7	15	1*	IV	50'
C3		No	Site Potential	M	M	M				
			Landscape Potential	M	L	H				
			Value	L	L	M				
				5	4	7	16	1*	III	150'
D	2.5	Yes	Site Potential	M	M					
			Landscape Potential	M	M					
			Value	L	M					
				5	6	7	18	1*	III	150'

HGM Wetland Classes
1.Depression, 2. Slope, 3 Fat, 4. Riverine, 5 Salt Water Tidal Fringe, 6. Coastal Lagoon, 7. Forest, 8. Estuarine, 9. Bogs, 10. Interdual Coastal and 11. High Conservation Value

WETLAND BUFFERS

Protection buffers will be established for each wetland as per directed in PTMC 19.05.110 (G) (2) (a). Buffer width for each of the wetlands are listed in Table 1.

Wetland D's buffer extends over the utility's corridor and trail, and onto other developable lots and Rainier Street. Under PTMC 19.05.110 (G) (7) buffers may be waived by the director for some circumstances. The buffer extending over the utility's corridor and trail, and onto other developable lots meet circumstances allowing a waiver.

The wetland buffer on the lots meets the requirement in 19.05.110 (G) (7) (b). That is the parcel lies landward of an existing legally established roadway (Rainier Street) and the utility corridor and trail. Although the train is not paved it is a heavily use trail by people of Port Townsend. With the development of Madrona Ridge Development, the existing trails and undeveloped trail along the utility corridor effectively eliminates the function and value derived from the required buffer width.

APPENDIX I

MAP OF LOACTION OF WETLANDS A1-A3

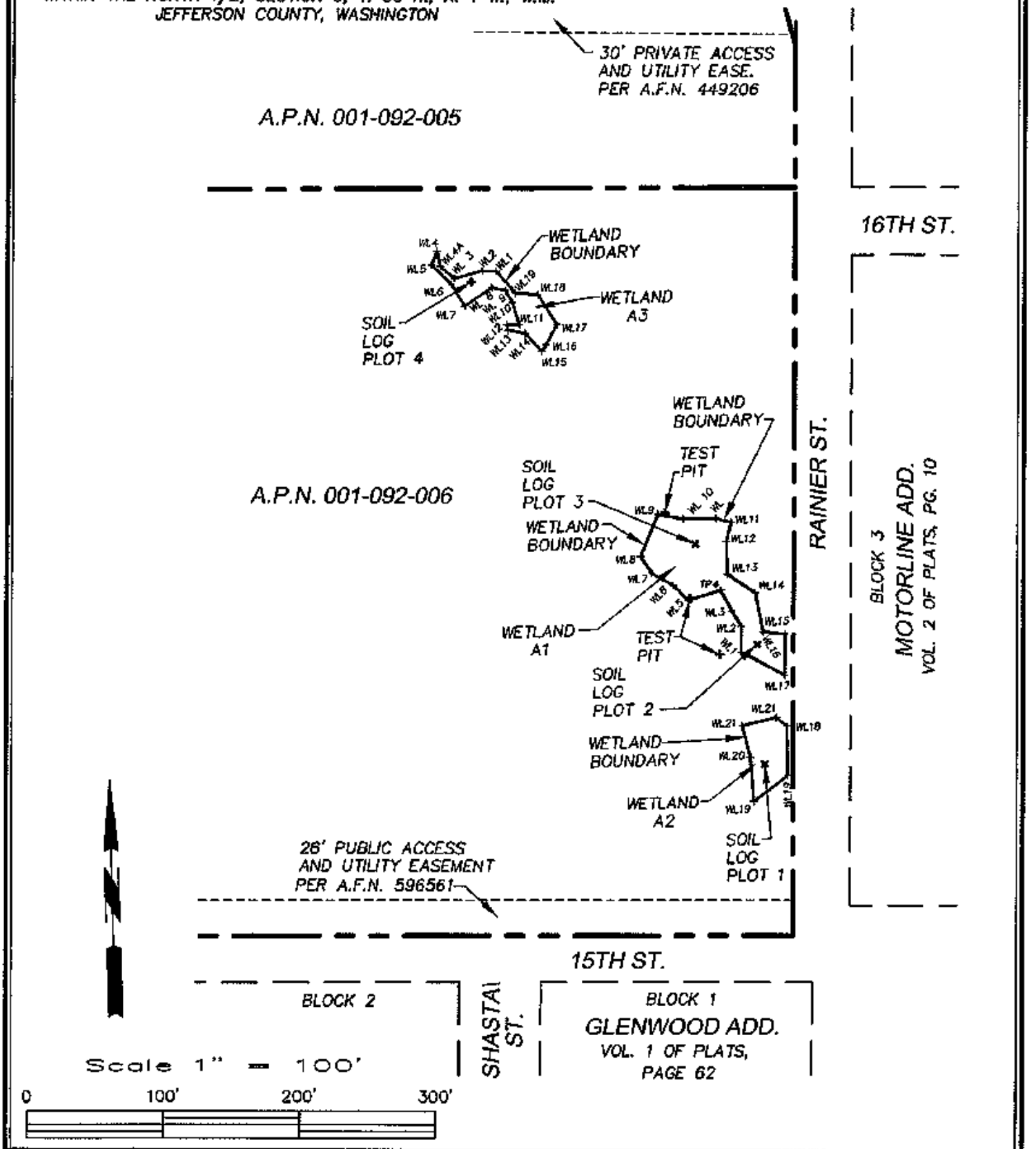
EXHIBIT MAP

SHOWING WETLAND BOUNDARY

WITHIN A.P.N. 001-092-006

WITHIN THE NORTH 1/2, SECTION 9, T. 30 N., R. 1 W., W.M.

JEFFERSON COUNTY, WASHINGTON



SHEET: 1 of 1	LOGGY SOIL AND WETLAND CONSULTING 534 GOA WAY * PORT ANGELES, WA * 98362 PHONE: (360) 457-3920	TITLE: EXHIBIT MAP SHOWING WETLAND BOUNDARY WITHIN A.P.N. 001-092-006

APPENDIX II

FIELD DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Regions 48.119

Project/Site: 001092006 Madrona Ridge Plot 5 Non-Wetland		City/County: Port Townsends	Sampling Date March 23, 2021
Applicant/Owner: Jeremy Elgin Lala		State: WA	Sampling Point: Plot 5 Non-Wetland
Investigator(s): W. David Loggy, Loggy Soil & Wetland Consulting		Section, 9. Township 30N, Range:1W	
Landform (hillslope) Terrace		Local relief (concave, convex, none): Convex	Slope (%) 10
Subregion (LRR): A	Lat: 48.1109 N	Long: -122.81	Datum:
Soil Map Unit Name: Clallam gravelly sandy loam (see any correction in Soil Section)			NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)			
Are vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?		Are "Normal Circumstances" present? Yes ☒ No ☐	
Are vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic?		(If needed, explain any answers in Remarks)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area Within a Wetland? Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks:
Soil has been disturbed in past that appears to be by a burn.

VEGETATION – Use scientific names of plants

Trees Stratum (Plot size:30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga menziesii	40	Yes	FACU
2.Alnus rubra	30	Yes	FAC
3.Arbutus menziesii	10	Yes	FACU
4.			
5.			
	80%= Total Cover		
Sapling/Shrub Stratum (Plot size: 10' Radius)			
1Gaultheria shallon	40	Yes	FACU
2. Rosa nutkana	10	Yes	FAC
3.Salix scouleriana	10	No	FAC
4.			
5.			
6.			
7.			
	60% =Total Cover		
Herb Stratum (Plot size: 1.64' Radius)			
1. Agrostis species	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	100% =Total Cover		
Woody Vine Stratum (Plot size: 10' Radius)			
1.			
2.			
	=Total Cover		
% Bare Ground in Herb Stratum			

Dominance Test worksheet:	
Number of Dominant Species That Are OBL, FACW, or FAC:	(A) 4
Total; Number of dominant Species Across All Strata:	(B) 6
Percent of Dominant Species That Are OBL, FCW, or FAC:	(A/B) 66

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species		X 1 =
FACW species		X 2 =
FAC species		X 3 =
FACU species		X 4 =
UPL Species		X 5 =
Column totals	(A)	(B)

Prevalence index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1. Rapid Test for Hydrophytic Vegetation
- ☒ 2.Dominance Test is >50%
- ☐ 3. Prevalence Index is ≤3.0[1]
- ☐ 4. Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5. Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: Plot 5 Non-Wetland

Profile Description: (Describe to the depth needed to document the indicators or confirm the absence of indicators)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Textures	Remarks
0-4	**10YR 3/2**	**100**					**LS**	
4-12	**10YR 4/5**	**100**					**LS**	

[1]**Type:** C=Concentrations, D=Depletion. RM=Reduced Matrix. CXS=Covered or Coated Sand Grains. [2]**Location:** PI=Pore lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11) ☐
- Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (SS)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks [3]

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks: **The soils are more gravely loamy sand. Are deeper than Clallam and have brighter value and chroma colors.**

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except **MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1') **(LRR A)**
- ☐ Other (Explain in remarks)

Secondary Indicators (2 or more required)

- Water Stained Leaves (B9) **(MRLA 1, 2, 4A and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations

Surface Water Present?	Yes ☐	No ☒	Depth (inches):
Water Table Present?	Yes ☐	No ☒	Depth (inches):. >12"
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: There were areas of shallow inundation within the wetland area on April 8.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Regions 48.119

Project/Site: 001092006 Madrona Ridge Plot, Wetland A1		City/County: Port Townsends	Sampling Date MAR 23, 2021
Applicant/Owner: Jeremy Elgin Lala		State: WA	Sampling Point: Plot 1 Wetland A1
Investigator(s): W. David Loggy, Loggy Soil & Wetland Consulting		Section, 9. Township 30N, Range:1W	
Landform (hillslope) - depression		Local relief (concave, convex, none): Concave	Slope (%) 4
Subregion (LRR): A	Lat: 48° 06' 08" N	Long: -122° 48'24" W	Datum:
Soil Map Unit Name: Clallam gravelly sandy loam (see any correction in Soil Section)			NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)			
Are vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?		Are "Normal Circumstances" present? Yes ☒ No ☐	
Are vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic?		(If needed, explain any answers in Remarks)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area Within a Wetland? Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks:
Soil has been disturbed in past that appears to be by a burn.

VEGETATION – Use scientific names of plants

Trees Stratum (Plot size:30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.Alnus rubra	40	Yes	FAC
2. Salix scouleriana	15	Yes	FAC
3.			
4.			
5.			
	55%= Total Cover		
Sapling/Shrub Stratum (Plot size: 10' Radius)			
1. Rosa nutkana	40	Yes	FAC
2. Rubus procerus	20	Yes	FACU
3. Rubus spectabilis	20	No	FAC
4. Symphoricarpos albus	10	No	FACU
5.			
6.			
7.			
	90% =Total Cover		
Herb Stratum (Plot size: 1.64' Radius)			
1.Juncus effusus	10	Yes	FACW
2.Ranunculus repens	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	100% =Total Cover		
Woody Vine Stratum (Plot size: 10' Radius)			
1.			
2.			
	=Total Cover		
% Bare Ground in Herb Stratum			

Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC:	(A) 5
Total; Number of dominant Species Across All Strata:	(B) 6
Percent of Dominant Species That Are OBL, FCW, or FAC:	(A/B) 84

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species		X 1 =
FACW species		X 2 =
FAC species		X 3 =
FACU species		X 4 =
UPL Species		X 5 =
Column totals	(A)	(B)
Prevalence index = B/A =		

Hydrophytic Vegetation Indicators:

- ☐ 1. Rapid Test for Hydrophytic Vegetation
- ☒ 2.Dominance Test is >50%
- ☐ 3. Prevalence Index is ≤3.0[1]
- ☐ 4. Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5. Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: Plot 1, Wetland A1

Profile Description: (Describe to the depth needed to document the indicators or confirm the absence of indicators)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Textures	Remarks
0-8	**10YR 3/2**	**100**					**LS**	
8-16	**10YR 4/1**	**100**	**10YR 4/5**	**20**	**C**	**M**	**LS**	
16-20	**10YR 4/2**		**10YR 4/5**	**20**	**C**	**M**	**LS**	

[1]**Type:** C=Concentrations, D=Depletion, RM=Reduced Matrix, CXS=Covered or Coated Sand Grains. [2]**Location:** PL=Pore lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks [3]

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks: **Soils are more gravelly loamy sand than gravelly sandy loams.**

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply).

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except **MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in remarks)

Secondary Indicators (2 or more required)

- Water Stained Leaves (B9) **(MRLA 1, 2, 4A and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations

Surface Water Present?	Yes ☒	No ☐	Depth (inches):
Water Table Present?	Yes ☒	No ☐	Depth (inches): 0" surface.
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches): 0" surface

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Regions 48.119

Project/Site: 001092006 Madrona Ridge Plot 4 Wetland A3		City/County: Port Townsends		Sampling Date April 7
Applicant/Owner: Jeremy Elgin Lala		State: WA		Sampling Point: Plot 4 Wetland A3
Investigator(s): W. David Loggy, Loggy Soil & Wetland Consulting		Section, 9. Township 30N, Range:1W		
Landform (hillslope) Terrace		Local relief (concave, convex, none): Concave		Slope (%) 4
Subregion (LRR): A	Lat: 48.119 N	Long: -122.8069		Datum:
Soil Map Unit Name: Clallam gravelly sandy loam (see any correction in Soil Section)			NWI classification: None	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)				
Are vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed?		Are "Normal Circumstances" present? Yes ☒ No ☐		
Are vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic?		(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area Within a Wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks:
Soil has been disturbed in past that appears to be by a burn.

VEGETATION – Use scientific names of plants

Trees Stratum (Plot size:30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.Alnus rubra	30	Yes	FAC
2.Pseudotsuga menziesii	20	Yes	FACU
3.			
4.			
5.			
	20%= Total Cover		
Sapling/Shrub Stratum (Plot size: 10' Radius)			
1. Symphoricarpos albus	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10% =Total Cover		
Herb Stratum (Plot size: 1.64' Radius)			
1.Poaceae mostly Agrostis species	80	Yes	FAC
2. Ranunculus repens	20	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	100% =Total Cover		
Woody Vine Stratum (Plot size: 10' Radius)			
1.			
2.			
	=Total Cover		
% Bare Ground in Herb Stratum			

Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC:	(A) 3
Total; Number of dominant Species Across All Strata:	(B) 5
Percent of Dominant Species That Are OBL, FCW, or FAC:	(A/B) 60

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species		X 1 =
FACW species		X 2 =
FAC species		X 3 =
FACU species		X 4 =
UPL Species		X 5 =
Column totals	(A)	(B)

Prevalence index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1. Rapid Test for Hydrophytic Vegetation
- ☒ 2.Dominance Test is >50%
- ☐ 3. Prevalence Index is ≤3.0[1]
- ☐ 4. Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5. Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: Plot 4 Wetland A3

Profile Description: (Describe to the depth needed to document the indicators or confirm the absence of indicators)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Textures	Remarks
0-4	10YR 3/3	100					LS	
4-11	10YR 3/3	80	7.5YR 4/4	20	C	M	LS	
11-12	10YR 2/1	100					LS	Charcoal Layer
12-16	10YR 5/2	100					LFS	

[1]**Type:** C=Concentrations, D=Depletion. RM=Reduced Matrix. CXS=Covered or Coated Sand Grains. [2]**Location**: PI=Pore lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11) ☐
- Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks [3]

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks: **Soils are more loamy sand in texture and deeper than the Clallam Series.**

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except **MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1`) **(LRR A)**
- ☐ Other (Explain in remarks)

Secondary Indicators (2 or more required)

- Water Stained Leaves (B9) **(MRLA 1, 2, 4A and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC=Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations

Surface Water Present?	Yes ☐	No ☐	Depth (inches):
Water Table Present?	Yes ☒	No ☐	Depth (inches): 0" surface.
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches): 0" surface

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: There were areas of shallow inundation within the wetland area on April 8.

APPENDIX III

WETLAND RATING DATA SHEETS
WETLAND FIGURES FOR RATING SHEETS

WETLAND A1-A3
WETLAND C3

APPENDIX III

WETLAND RATING DATA SHEETS
WETLAND FIGURES FOR RATING SHEETS

WETLAND A1-A3
WETLAND C3
WETLAND D

Wetland name or number A1 & A2 001092006

RATING SUMMARY – Western Washington

Name of wetland (or ID #): A1 & A2 001092006 Date of site visit: 7 april 2021

Rated by W. David loggy Loggy Soil & Wetland Consulting Trained by Ecology? __ Yes X No Date of training 11/8-9/20, 2017

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? ___Y X N

NOTE: Form is not complete without the figures requested *(figures can be combined).*

Source of base aerial photo/map Jefferson County & Google Photos, USFW, DRN & WF&W maps

OVERALL WETLAND CATEGORY III (based on functions X or special characteristics ___)

1. Category of wetland based on FUNCTIONS

___ **Category** I – Total score = 23 - 27

___ **Category** II – Total score = 20 - 22

X **Category** III – Total score = 16 - 19

___ **Category** IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	(H) M L	H (M) L	H (M) L	
Landscape Potential	H (M) L	H (M) L	(H) M L	
Value	H M (L)	H M (L)	H (M) L	TOTAL
Score Based on Ratings	6	5	7	18

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number AA1 & A2 001092006

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	SEE NOTE
Hydroperiods	D 1.4, H 1.2	SEE NOTE
Location of outlet *(can be added to map of hydroperiods)*	D 1.1, D 4.1	A
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	B
Map of the contributing basin	D 4.3, D 5.3	C
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	D
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	E
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	N/A

Riverine Wetlands

NOTE: HERBACEOUS AND SHRUB WETLAND AREA COULD NOT BE SHOWN BECAUSE OF DENSE TREES COVER OVER THE WETLAND.

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number A1 & A2 001092006 A1 001092006

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 ~~YES – the wetland class is **Tidal Fringe** – go to 1.1~~

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for Riverine wetlands. If it is Saltwater Tidal Fringe it is an Estuarine wetland and is not scored. This method cannot be used to score functions for estuarine wetlands.

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 ~~YES – The wetland class is **Flats**~~
   If your wetland can be classified as a Flats wetland, use the form for Depressional wetlands.

3. Does the entire wetland unit **meet all** of the following criteria?
   __The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   __At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 ~~YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)~~

4. Does the entire wetland unit **meet all** of the following criteria?
   _x_The wetland is on a slope (slope can be very gradual),
   _x_The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 ~~YES – The wetland class is **Slope**~~

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number A1 & A2 001092006

NO – go to 6 ~~YES – The wetland class is **Riverine**~~

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? This means that any outlet, if present, is higher than the interior of the wetland.

~~NO – go to 7~~ **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 ~~YES – The wetland class is **Depressional**~~

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as Depressional for the rating.

Wetland name or number A1 & A2 001092006

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	3
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*. Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	4
Total for D 1 Add the points in the boxes above	11

Rating of Site Potential If score is: ___ 12-16 = H _X_ 6-11 = M ___ 0-5 = L *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ 3 or 4 = H _X_ 1 or 2 = M ___ 0 = L *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 Add the points in the boxes above	0

Rating of Value If score is: ___ 2-4 = H ___ 1 = M _X_ 0 = L *Record the rating on the first page*

Wetland name or number A1 & A2 001092006

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	4
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	3
Total for D 4 — Add the points in the boxes above	10

Rating of Site Potential If score is: ___ **12-16 = H** _X_ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	0
Total for D 5 — Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** _X_ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ☐ Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 — Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** _X_ **0 = L** *Record the rating on the first page*

Wetland name or number _____ A1 & A2 001092006

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

____ Aquatic bed	4 structures or more: points = 4	2
__X__ Emergent	3 structures: points = 2	
__X__ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1	
__X__ Forested (areas where trees have > 30% cover)	1 structure: points = 0	
If the unit has a Forested class, check if:		
____ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon		

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____ Permanently flooded or inundated	4 or more types present: points = 3	
__X__ Seasonally flooded or inundated	3 types present: points = 2	
__X__ Occasionally flooded or inundated	2 types present: points = 1	
__X__ Saturated only	1 type present: points = 0	1
____ Permanently flowing stream or river in, or adjacent to, the wetland		
____ Seasonally flowing stream in, or adjacent to, the wetland		
____ **Lake Fringe wetland**	**2 points**	
____ **Freshwater tidal wetland**	**2 points**	

H 1.3. Richness of plant species

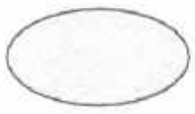
Count the number of plant species in the wetland that cover at least 10 ft^2.

Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

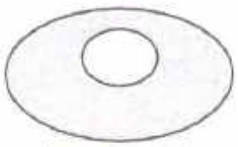
If you counted: > 19 species	points = 2	
5 - 19 species	points = 1	1
< 5 species	points = 0	

H 1.4. Interspersion of habitats

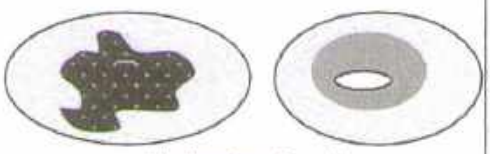
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points



Low = 1 point



Moderate = 2 points

2

All three diagrams in this row are **HIGH** = 3points

Wetland name or number A1 & A2 001092006

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* __X__ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	2
Total for H 1 Add the points in the boxes above	8

Rating of Site Potential If score is: ___15-18 = H __X__ 7-14 = M ___0-6 = L *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 38 + [(% moderate and low intensity land uses)/2] 4 = 42 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 44 + [(% moderate and low intensity land uses)/2] 4 = 48 % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	2
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: __X__ 4-6 = H ___1-3 = M ___< 1 = L *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ☒ It has 3 or more priority habitats within 100 m (see next page) ☒ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☒ It is mapped as a location for an individual WDFW priority species ☒ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☒ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	1

Rating of Value If score is: ___2 = H __X__ 1 = M ___0 = L *Record the rating on the first page*

Wetland name or number A1 & A2 001092006

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: NOTE: This question is independent of the land use between the wetland unit and the priority habitat.

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (full descriptions in WDFW PHS report).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☒ **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (full descriptions in WDFW PHS report p. 158 – see web link above).

☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (full descriptions in WDFW PHS report p. 161 – see web link above).

☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A1 & A2 001092006

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** No – Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** No = **Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = **Category I** No = **Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* If you answer YES you will still need to rate the wetland based on its functions. SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number A1 & A2 00109 2006

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? If you answer YES you will still need to rate the wetland based on its functions. ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** | No = **Not a forested wetland for this section**	Cat. I
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** | No = **Not a wetland in a coastal lagoon**	Cat. I
SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** | No = **Category II**	Cat. II
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? If you answer yes you will still need to rate the wetland based on its habitat functions. In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** | No = **not an interdunal wetland for rating**	Cat I
SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** | No – Go to **SC 6.2**	Cat. II
SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** | No – Go to **SC 6.3**	Cat. III
SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** | No = **Category IV**	Cat. IV
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

Wetland name or number A3 001092006

RATING SUMMARY – Western Washington

Name of wetland (or ID #): A3 ~~001092006~~ Date of site visit: 23-25March 2021

Rated by W. David loggy Loggy Soil & Wetland Consulting Trained by Ecology? __ Yes X No Date of training 11/8-9/20, 2017

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? ___Y X N

NOTE: Form is not complete without the figures requested *(figures can be combined).*

Source of base aerial photo/map Jefferson County & Google Photos, USFW, DRN & WF&W maps

OVERALL WETLAND CATEGORY IV (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

___**Category I** – Total score = 23 - 27

___**Category II** – Total score = 20 - 22

___**Category III** – Total score = 16 - 19

X **Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H (M) L	H (M) L	H (M) L	
Landscape Potential	H M (L)	H M (L)	(H) M L	
Value	H M (L)	H M (L)	H (M) L	TOTAL
Score Based on Ratings	4	4	7	15

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number A3 001092006

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	SEE NOTE
Hydroperiods	D 1.4, H 1.2	SEE NOTE
Location of outlet (*can be added to map of hydroperiods*)	D 1.1, D 4.1	A
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	B
Map of the contributing basin	D 4.3, D 5.3	C
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	D
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	E
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	N/A

Riverine Wetlands

NOTE: HERBACEOUS AND SHRUB WETLAND AREA COULD NOT BE SHOWN BECAUSE OF DENSE TREES COVER OVER THE WETLAND.

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number _ A2 001092006 A2 001092006

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 ~~**YES – the wetland class is Tidal Fringe – go to 1.1**~~

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for Riverine wetlands. If it is Saltwater Tidal Fringe it is an Estuarine wetland and is not scored. This method cannot be used to score functions for estuarine wetlands.

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 ~~**YES – The wetland class is Flats**~~
   If your wetland can be classified as a Flats wetland, use the form for Depressional wetlands.

3. Does the entire wetland unit **meet all** of the following criteria?
   __The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   __At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 ~~**YES – The wetland class is Lake Fringe** (Lacustrine Fringe)~~

4. Does the entire wetland unit **meet all** of the following criteria?
   _x_ The wetland is on a slope (slope can be very gradual),
   _x_ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 ~~**YES – The wetland class is Slope**~~

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number A3 001092006

NO – go to 6 ~~YES – The wetland class is **Riverine**~~

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? This means that any outlet, if present, is higher than the interior of the wetland.

~~NO – go to 7~~ **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 ~~YES – The wetland class is **Depressional**~~

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as Depressional for the rating.

Wetland name or number A3 001092006

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	3
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*. Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^{1}/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^{1}/_{10}$ of area points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	2
Total for D 1 — Add the points in the boxes above	10

Rating of Site Potential If score is: ___ **12-16 = H** **X** **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? **approved but not actavated** Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 No = 0	0
Total for D 2 — Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 or 4 = H** ___ **1 or 2 = M** **X** **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 — Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** **X** **0 = L** *Record the rating on the first page*

Wetland name or number A3 001092006 6

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	4
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	10

Rating of Site Potential If score is: ___ **12-16 = H** _X_ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	0
Total for D 5 Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 = H** ___ **1 or 2 = M** _X_ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ☐ Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** _X_ **0 = L** *Record the rating on the first page*

Wetland name or number _____ A3 001092006

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

____ Aquatic bed	4 structures or more: points = 4	4
__X__ Emergent	3 structures: points = 2	
__X__ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1	
__X__ Forested (areas where trees have > 30% cover)	1 structure: points = 0	

If the unit has a Forested class, check if:

__X__ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____ Permanently flooded or inundated	4 or more types present: points = 3	
__X__ Seasonally flooded or inundated	3 types present: points = 2	
__X__ Occasionally flooded or inundated	2 types present: points = 1	
__X__ Saturated only	1 type present: points = 0	2
____ Permanently flowing stream or river in, or adjacent to, the wetland		
____ Seasonally flowing stream in, or adjacent to, the wetland		
____ **Lake Fringe wetland**	**2 points**	
____ **Freshwater tidal wetland**	**2 points**	

H 1.3. Richness of plant species

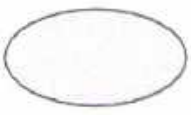
Count the number of plant species in the wetland that cover at least 10 ft^2.

Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

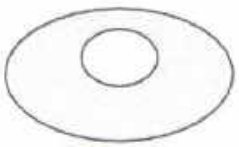
If you counted: > 19 species	points = 2	
5 - 19 species	points = 1	1
< 5 species	points = 0	

H 1.4. Interspersion of habitats

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points



Low = 1 point

Moderate = 2 points

2

All three diagrams in this row are **HIGH** = 3points

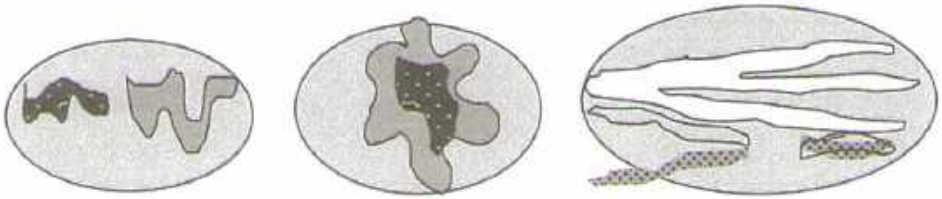


EXHIBIT MAP
SHOWING WETLAND BOUNDARY
WITHIN A.P.N. 001-092-006
WITHIN THE NORTH 1/2, SECTION 9, T. 30 N., R. 1 W., W.M.
JEFFERSON COUNTY, WASHINGTON

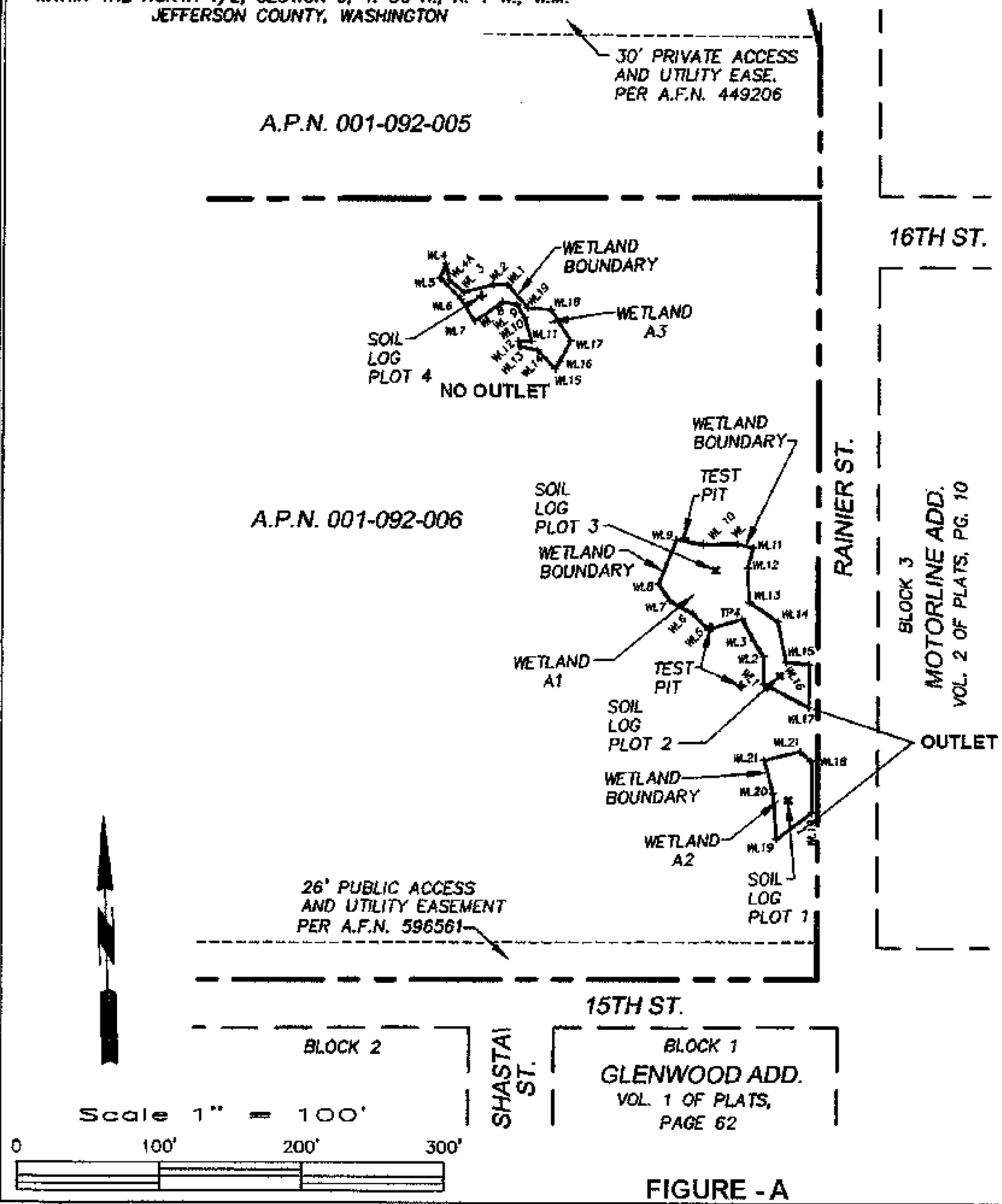
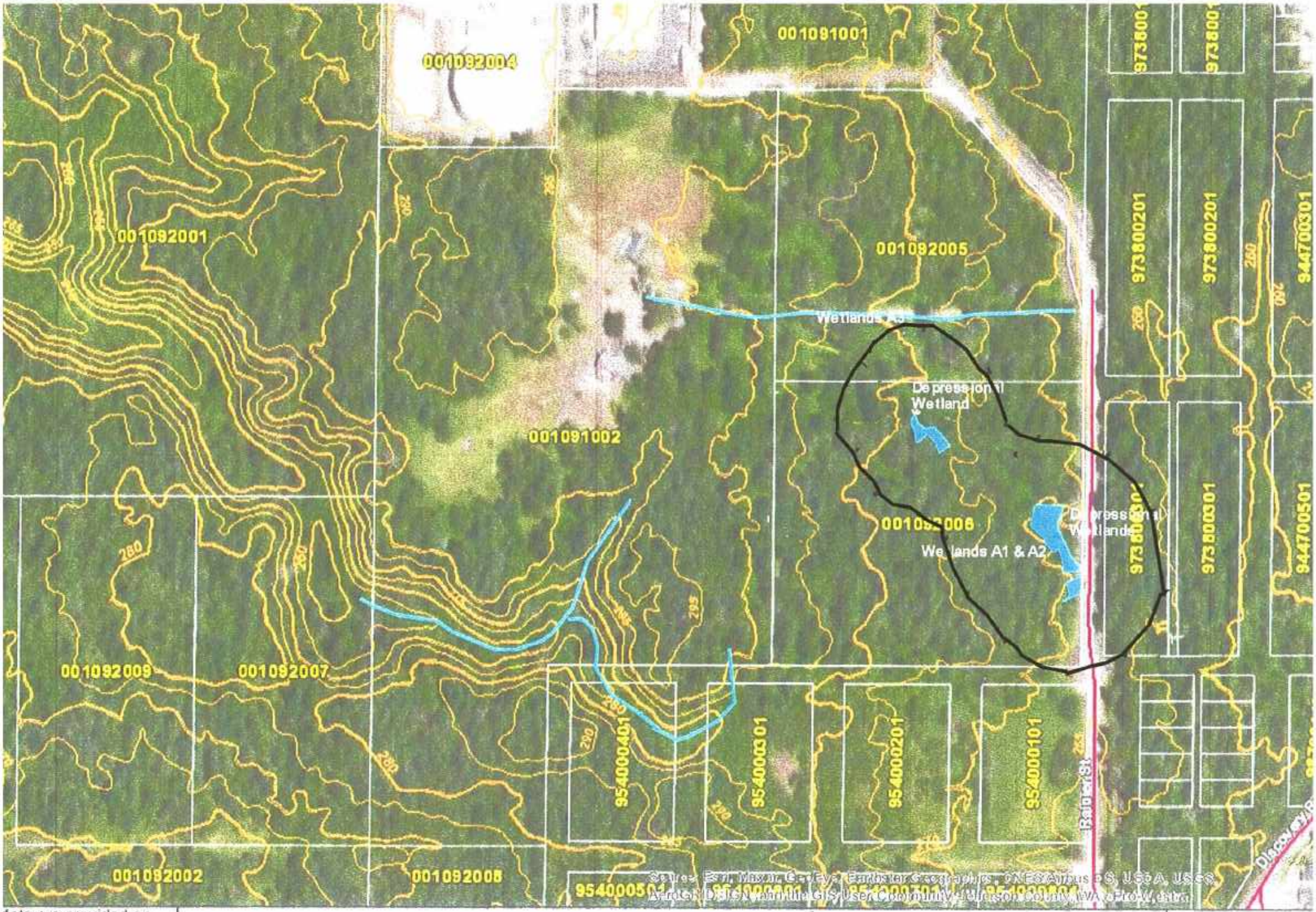


FIGURE - A

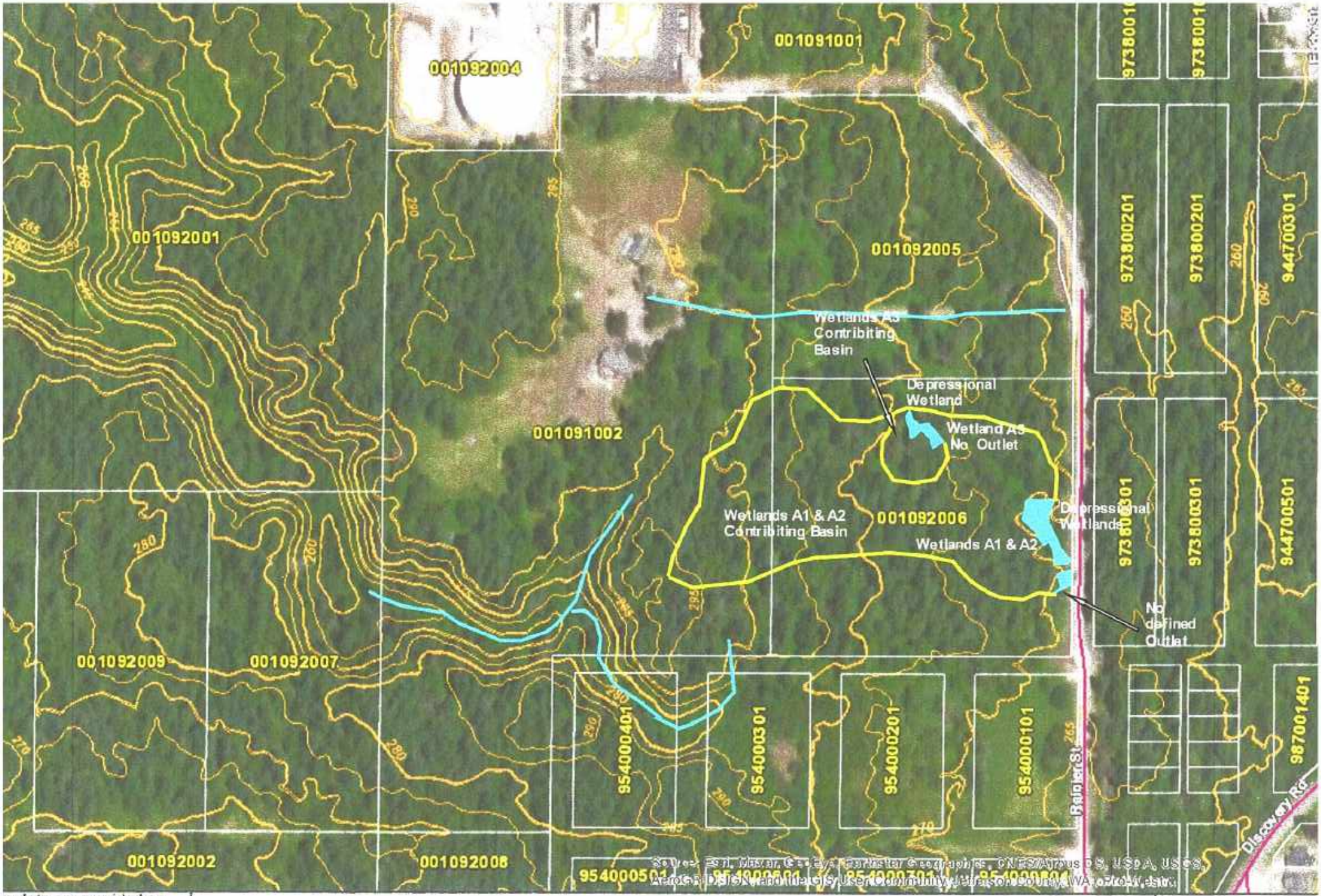
SHEET: 1 of 1	LOGGY SOIL AND WETLAND CONSULTING 534 GOA WAY * PORT ANGELES, WA * 98362 PHONE: (360) 457-3920	TITLE: EXHIBIT MAP SHOWING WETLAND BOUNDARY WITHIN A.P.N. 001-092-006



Jefferson County, WA

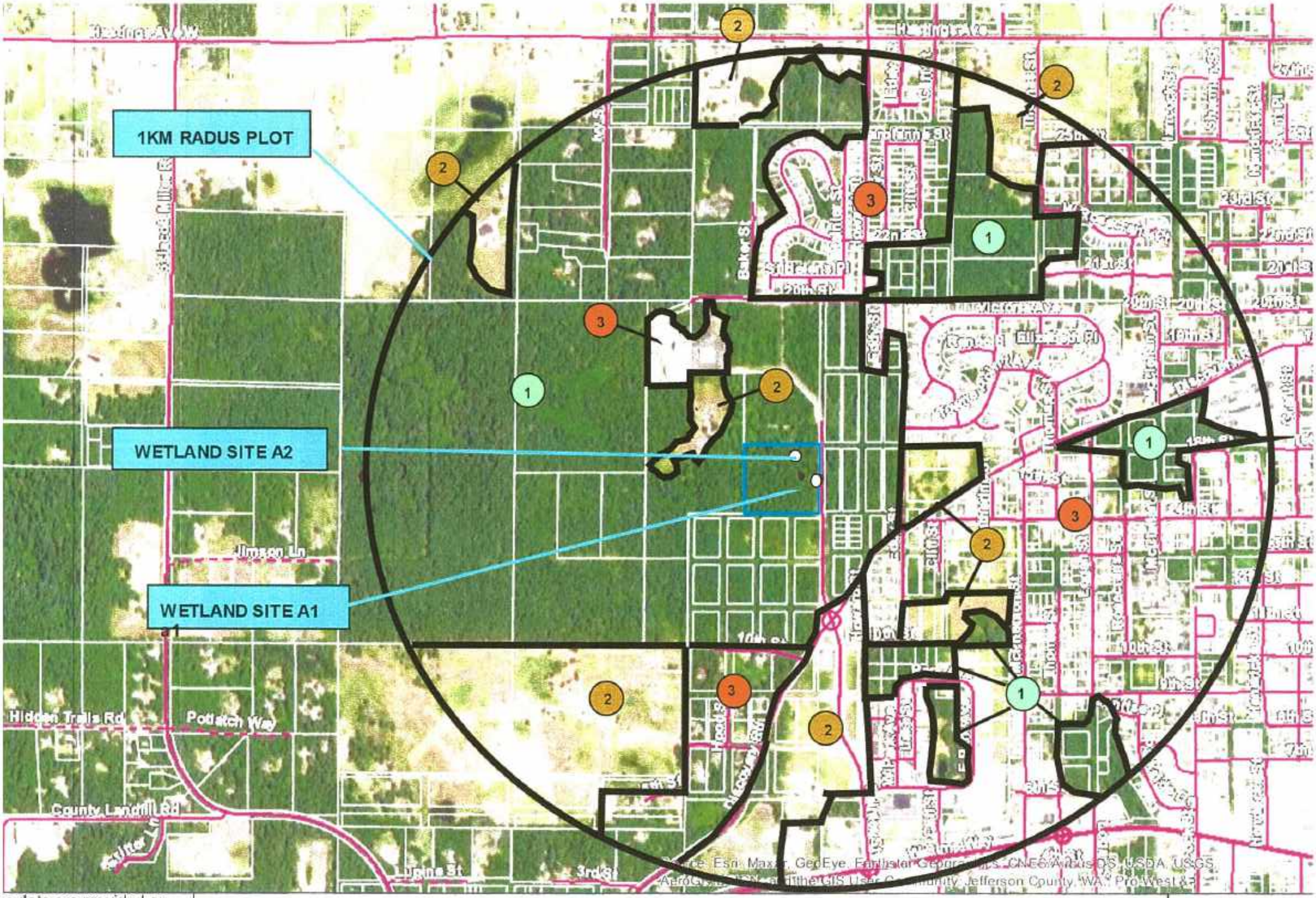
EXHIBIT - B

150 FOOT BUFFER



Jefferson County, WA

EXHIBIT C



e data are provided on
S-IS" basis, without
anty of any type,
essed or implied, including
ot limited to any warranty
their performance,

FIGURE - D

LANDSCAPE POTENTIAL TO IMPACT HABITAT FUNCTIONS OF WETLAND SITE

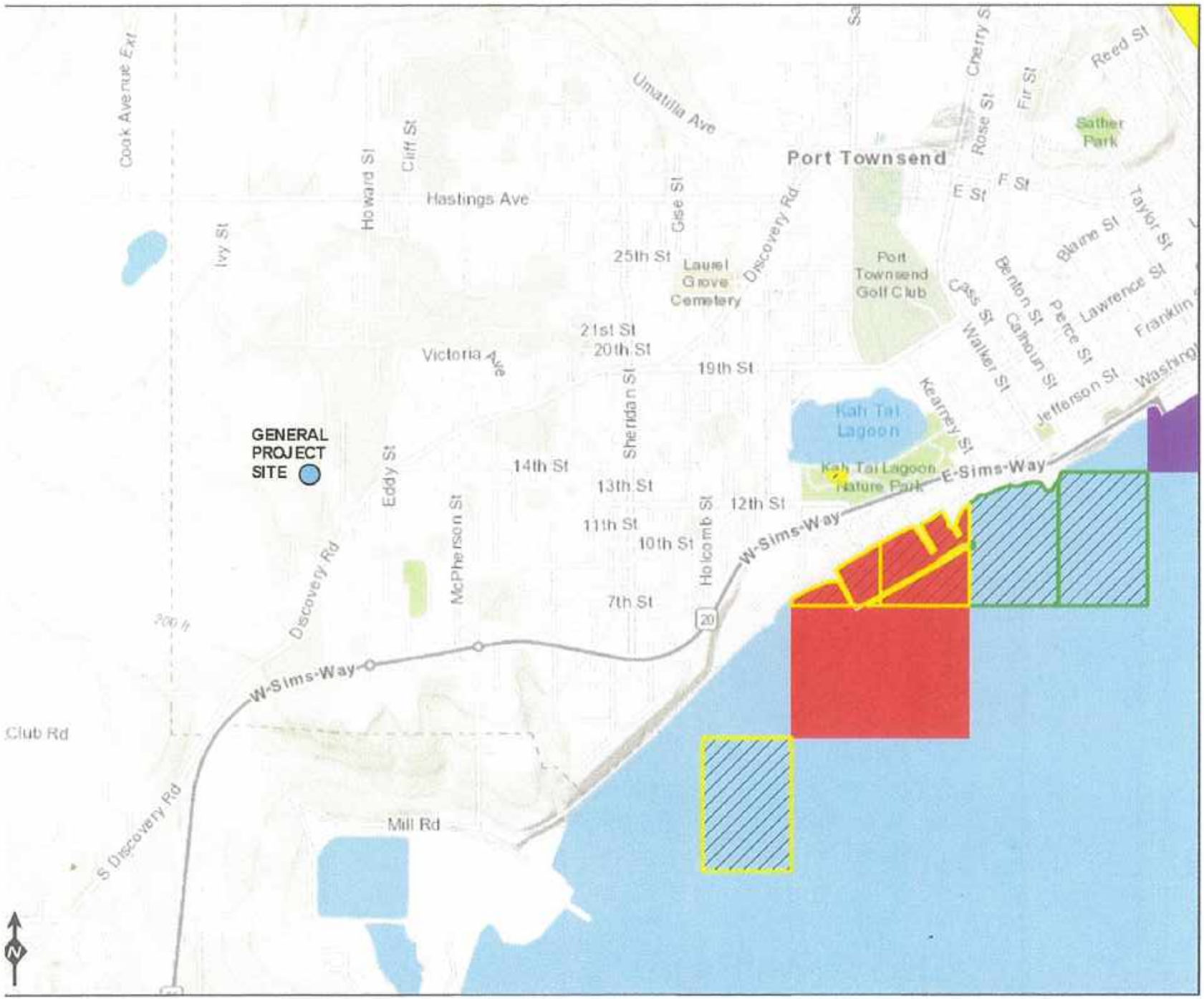
LEGEND

1. RELATIVE UNDISTUBED IMPACTS
2. MODERATE AND LOW INTENSITY IMPACTS
3. HIGH INTENSITY IMPACTS

N

Category 5 - 303d Map

FIGURE E



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

DEPARTMI

Wetland name or number C3 001092006

RATING SUMMARY – Western Washington

Name of wetland (or ID #): C3 001092006 Date of site visit: 24 May 2021

Rated by W. David loggy Loggy Soil & Wetland Consulting Trained by Ecology? __ Yes X No Date of training 11/8-9/20, 2017

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? ___ Y X N

NOTE: Form is not complete without the figures requested *(figures can be combined).*

Source of base aerial photo/map Jefferson County & Google Photos, USFW, DRN & WF&W maps

OVERALL WETLAND CATEGORY III (based on functions X or special characteristics ___)

1. Category of wetland based on FUNCTIONS

___ **Category** I – Total score = 23 - 27

___ **Category** II – Total score = 20 - 22

X **Category** III – Total score = 16 - 19

___ **Category** IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
		Circle the appropriate ratings		
Site Potential	H (M) L	H (M) L	H (M) L	
Landscape Potential	H (M) L	H M (L)	(H) M L	
Value	H M (L)	H M (L)	H (M) L	TOTAL
Score Based on Ratings	5	4	7	16

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number A2 001092006

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	A
Hydroperiods	D 1.4, H 1.2	A
Location of outlet *(can be added to map of hydroperiods)*	D 1.1, D 4.1	A
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	A
Map of the contributing basin	D 4.3, D 5.3	A
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	D
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	E
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	N/A

Riverine Wetlands

NOTE: HERBACEOUS AND SHRUB WETLAND AREA COULD NOT BE SHOWN BECAUSE OF DENSE TREES COVER OVER THE WETLAND.
Rating was done check two other rating of wetland

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number A2 001092006 A2 001092006

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 ~~YES – the wetland class is **Tidal Fringe** – go to 1.1~~

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for Riverine wetlands. If it is Saltwater Tidal Fringe it is an Estuarine wetland and is not scored. This method cannot be used to score functions for estuarine wetlands.

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 ~~YES – The wetland class is **Flats**~~
   If your wetland can be classified as a Flats wetland, use the form for Depressional wetlands.

3. Does the entire wetland unit **meet all** of the following criteria?
   __The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   __At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 ~~YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)~~

4. Does the entire wetland unit **meet all** of the following criteria?
   _x_ The wetland is on a slope (slope can be very gradual),
   _x_ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 ~~YES – The wetland class is **Slope**~~

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number A2 001092006

NO – go to 6 ~~YES – The wetland class is **Riverine**~~

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? This means that any outlet, if present, is higher than the interior of the wetland.

~~NO – go to 7~~ **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 ~~YES – The wetland class is **Depressional**~~

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as Depressional for the rating.

Wetland name or number C3 001092006

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*. Yes = 4 No = 0	4
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	0
Total for D 1 — Add the points in the boxes above	9

Rating of Site Potential If score is: ___ 12-16 = H X 6-11 = M ___ 0-5 = L *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source Grazing Yes = 1 No = 0	1
Total for D 2 — Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ 3 or 4 = H X 1 or 2 = M ___ 0 = L *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 — Add the points in the boxes above	0

Rating of Value If score is: ___ 2-4 = H ___ 1 = M X 0 = L *Record the rating on the first page*

Wetland name or number C3_001092006 6

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	8

Rating of Site Potential If score is: ___ **12-16 = H** _X_ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	0
Total for D 5 Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 = H** ___ **1 or 2 = M** _X_ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ☐ Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** _X_ **0 = L** *Record the rating on the first page*

Wetland name or number _____ C3 001092006

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

____Aquatic bed	4 structures or more: points = 4	4
__X__ Emergent	3 structures: points = 2	
__X__ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1	
__X__ Forested (areas where trees have > 30% cover)	1 structure: points = 0	

If the unit has a Forested class, check if:

__X__ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____Permanently flooded or inundated	4 or more types present: points = 3	
____Seasonally flooded or inundated	3 types present: points = 2	
__X__ Occasionally flooded or inundated	2 types present: points = 1	
____Saturated only	1 type present: points = 0	1
____Permanently flowing stream or river in, or adjacent to, the wetland		
__X__ Seasonally flowing stream in, or adjacent to, the wetland		
____**Lake Fringe wetland**	**2 points**	
____**Freshwater tidal wetland**	**2 points**	

H 1.3. Richness of plant species

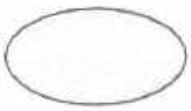
Count the number of plant species in the wetland that cover at least 10 ft^2.

Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

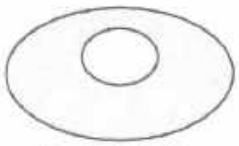
If you counted: > 19 species	points = 2	
5 - 19 species	points = 1	1
< 5 species	points = 0	

H 1.4. Interspersion of habitats

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points



Low = 1 point

Moderate = 2 points

2

All three diagrams in this row are **HIGH** = 3points

Wetland name or number C3 001092006

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* __X__ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). __X__ Standing snags (dbh > 4 in) within the wetland ____ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* __X__ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	2
Total for H 1 — Add the points in the boxes above	8

Rating of Site Potential If score is: ___ 15-18 = H __X__ 7-14 = M ___ 0-6 = L *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 38 + [(% moderate and low intensity land uses)/2] 4 = 42 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon — points = 3 20-33% of 1 km Polygon — points = 2 10-19% of 1 km Polygon — points = 1 < 10% of 1 km Polygon — points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 75 + [(% moderate and low intensity land uses)/2] 7 = 82 % Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10-50% and in 1-3 patches — points = 2 Undisturbed habitat 10-50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	2
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (- 2) ≤ 50% of 1 km Polygon is high intensity — points = 0	0
Total for H 2 — Add the points in the boxes above	5

Rating of Landscape Potential If score is: __X__ 4-6 = H ___ 1-3 = M ___ < 1 = L *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: — points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m — points = 1 Site does not meet any of the criteria above — points = 0	1

Rating of Value If score is: ___ 2 = H __X__ 1 = M ___ 0 = L *Record the rating on the first page*

Wetland name or number C3 001092006

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: NOTE: This question is independent of the land use between the wetland unit and the priority habitat.

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (full descriptions in WDFW PHS report).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☒ **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (full descriptions in WDFW PHS report p. 158 – see web link above).

☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (full descriptions in WDFW PHS report p. 161 – see web link above).

☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number C3_091092006

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** **No= Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☒ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) ☒ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☒ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** **No – Go to SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** **No = Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** **No = Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = **Category I** **No = Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* If you answer YES you will still need to rate the wetland based on its functions. SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** **No – Go to SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** **No = Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number C3 001092006

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? If you answer YES you will still need to rate the wetland based on its functions. ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** | No = **Not a forested wetland for this section**	Cat. I
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☒ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** | No = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	Cat. I Cat. II
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? If you answer yes you will still need to rate the wetland based on its habitat functions. In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** | No = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	Cat I Cat. II Cat. III Cat. IV
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

Wetland name or number A3 001092006

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* __X__ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	2
Total for H 1 Add the points in the boxes above	8

Rating of Site Potential If score is: ___ 15-18 = H __X__ 7-14 = M ___ 0-6 = L *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 38 + [(% moderate and low intensity land uses)/2] 4 = 42 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 75 + [(% moderate and low intensity land uses)/2] 7 = 82 % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	2
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: __X__ 4-6 = H ___ 1-3 = M ___ < 1 = L *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ☒ It has 3 or more priority habitats within 100 m (see next page) ☒ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☒ It is mapped as a location for an individual WDFW priority species ☒ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☒ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	1

Rating of Value If score is: ___ 2 = H __X__ 1 = M ___ 0 = L *Record the rating on the first page*

Wetland name or number A3_001092006

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: NOTE: This question is independent of the land use between the wetland unit and the priority habitat.

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☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A3_001092006

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** **No= Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) ☐ At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** **No – Go to SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** **No = Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** **No = Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = **Category I** **No = Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* If you answer YES you will still need to rate the wetland based on its functions. SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** **No – Go to SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** **No = Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number A3 001092006

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? If you answer YES you will still need to rate the wetland based on its functions. ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** | No = **Not a forested wetland for this section**	Cat. I
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** | No = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	Cat. I Cat. II
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? If you answer yes you will still need to rate the wetland based on its habitat functions. In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** | No = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	Cat I Cat. II Cat. III Cat. IV
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

Wetland name or number A1 & A2 001092006

RATING SUMMARY – Western Washington

Name of wetland (or ID #): A1 & A2 001092006 Date of site visit: 7 april 2021

Rated by W. David loggy Loggy Soil & Wetland Consulting Trained by Ecology? __ Yes X No Date of training 8/11-9/20, 2017

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? ___ Y X N

NOTE: Form is not complete without the figures requested *(figures can be combined).*

Source of base aerial photo/map Jefferson County & Google Photos, USFW, DRN & WF&W maps

OVERALL WETLAND CATEGORY III (based on functions X or special characteristics ___)

1. Category of wetland based on FUNCTIONS

___ **Category I** – Total score = 23 - 27

___ **Category II** – Total score = 20 - 22

X **Category III** – Total score = 16 - 19

___ **Category IV** – Total score = 9 - 15

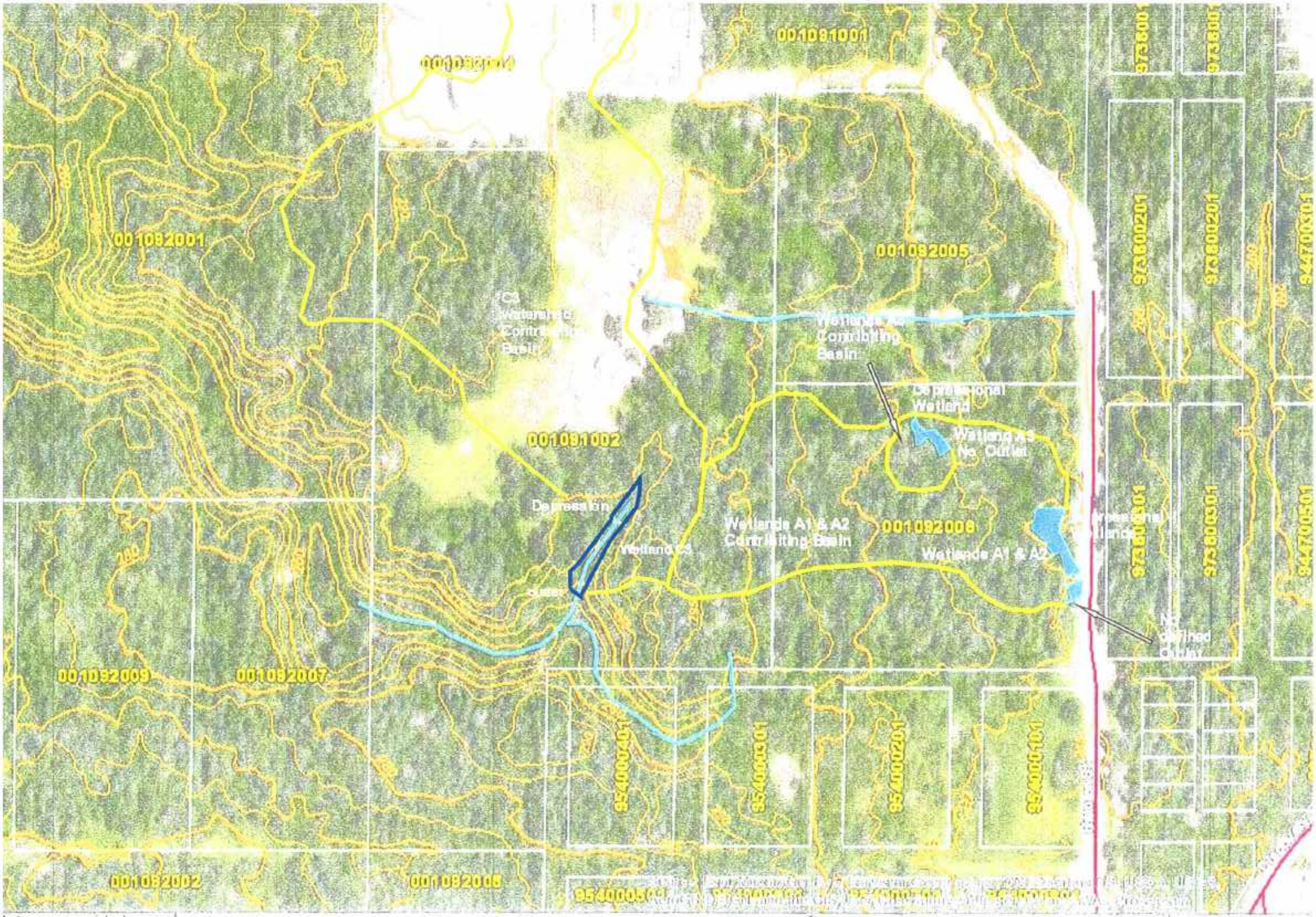
FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	(H) M L	H (M) L	H (M) L	
Landscape Potential	H (M) L	H (M) L	(H) M L	
Value	H M (L)	H M (L)	H (M) L	TOTAL
Score Based on Ratings	6	5	7	18

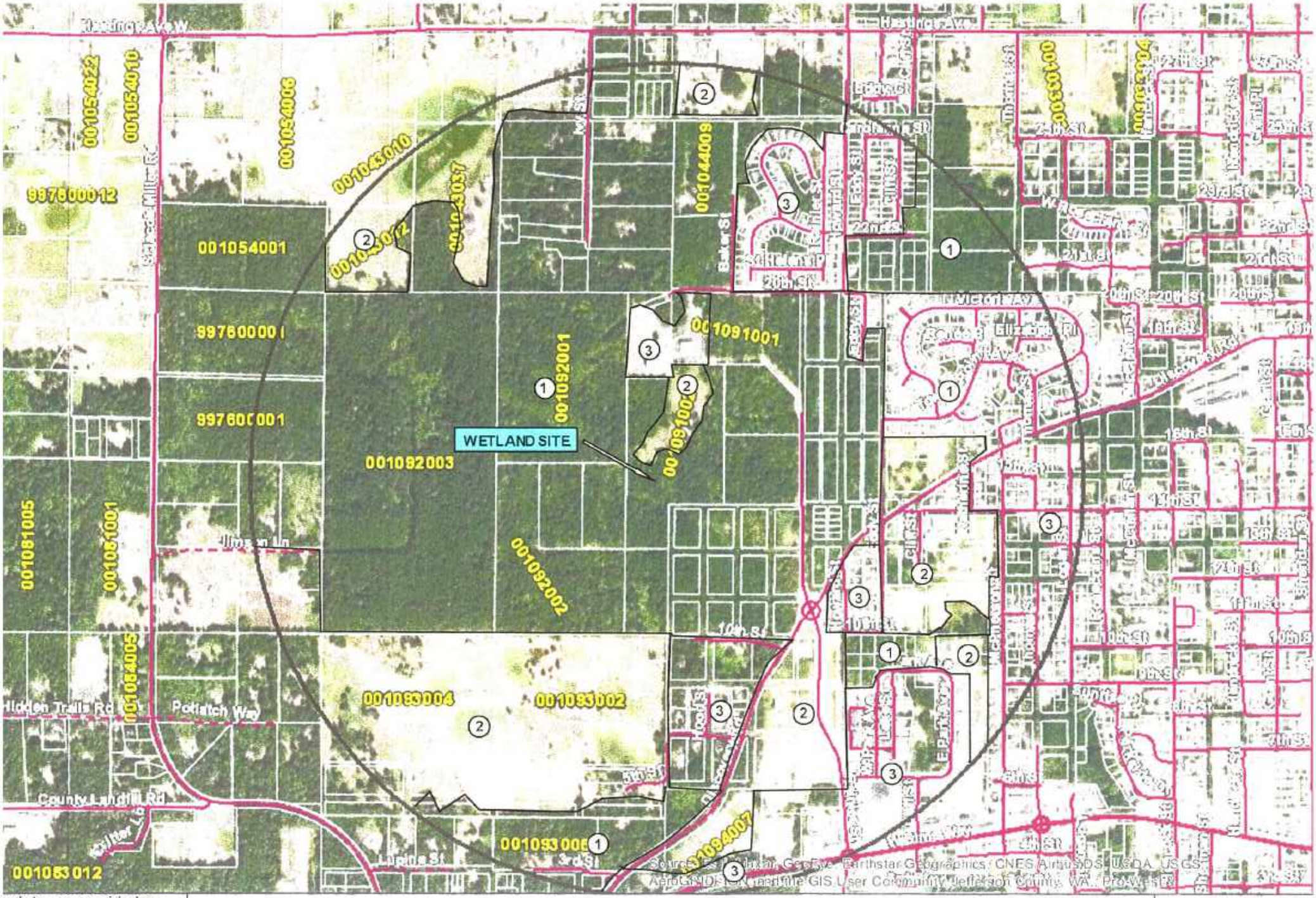
Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A





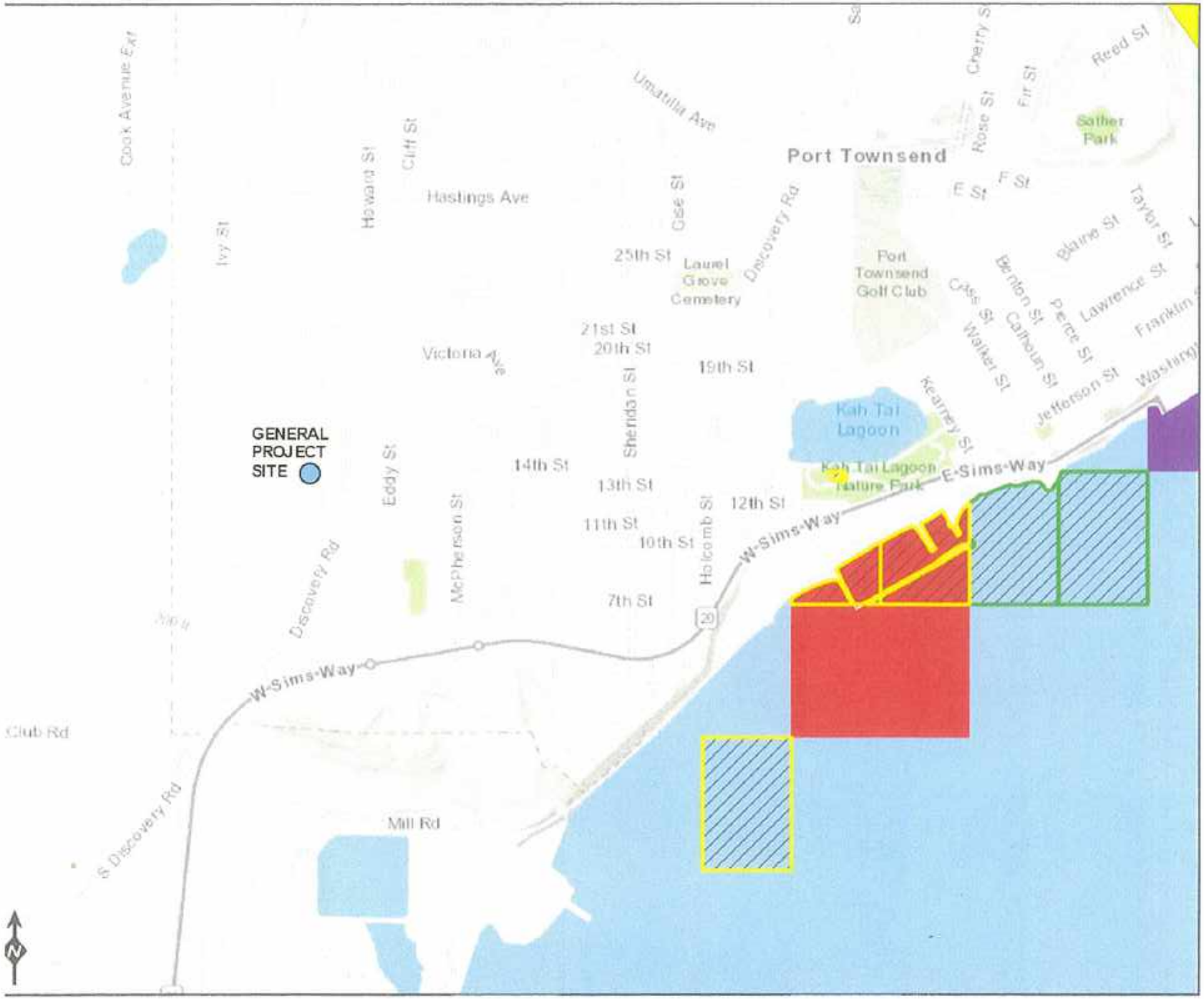
e data are provided on
S-IS" basis, without
nty of any type,
ssed or implied, including
ot limited to any warranty
their performance,

Jefferson County, WA
FIGURE D

(1) UNDISTURED HABITAT. (2) MODERATELY ACCESSABLE HABITAT (3) HIGHLY DISTURBED SITES

Category 5 - 303d Map

FIGURE E



Assessed Water/Sedim

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

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

DEPARTMI

Wetland name or number Wetland D

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland D Date of site visit: 24 May 2021

Rated by W. David loggy Loggy Soil & Wetland Consulting Trained by Ecology? __ Yes X No Date of training 11/8-9/20, 2017

HGM Class used for rating DEPRESSION Wetland has multiple HGM classes? ___Y X N

NOTE: Form is not complete without the figures requested *(figures can be combined).*

Source of base aerial photo/map Jefferson County & Google Photos, USFW, DRN & WF&W maps

OVERALL WETLAND CATEGORY III (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

___Category I – Total score = 23 - 27

___Category II – Total score = 20 - 22

X Category III – Total score = 16 - 19

___Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H (M) L	H (M) L	H (M) L	
Landscape Potential	H (M) L	H (M) L	(H) M L	
Value	H M (L)	H M (L)	H (M) L	TOTAL
Score Based on Ratings	5	5	7	17

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number Wetland D

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	SEE NOTE
Hydroperiods	D 1.4, H 1.2	SEE NOTE
Location of outlet *(can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	N/A

Riverine Wetlands

NOTE: HERBACEOUS AND SHRUB WETLAND AREA COULD NOT BE SHOWN BECAUSE OF DENSE TREES COVER OVER THE WETLAND.
1. Rating was done check two other rating of wetland

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number 1 Wetland D

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 ~~**YES – the wetland class is Tidal Fringe – go to 1.1**~~

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for Riverine wetlands. If it is Saltwater Tidal Fringe it is an Estuarine wetland and is not scored. This method cannot be used to score functions for estuarine wetlands.

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 ~~**YES – The wetland class is Flats**~~
   If your wetland can be classified as a Flats wetland, use the form for Depressional wetlands.

3. Does the entire wetland unit **meet all** of the following criteria?
   __The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   __At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 ~~**YES – The wetland class is Lake Fringe** (Lacustrine Fringe)~~

4. Does the entire wetland unit **meet all** of the following criteria?
   _x_ The wetland is on a slope (slope can be very gradual),
   _x_ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 ~~**YES – The wetland class is Slope**~~

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number Wetland D

NO – go to 6 ~~YES – The wetland class is **Riverine**~~

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? This means that any outlet, if present, is higher than the interior of the wetland.

~~NO – go to 7~~ **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 ~~YES – The wetland class is **Depressional**~~

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as Depressional for the rating.

Wetland name or number Wetland D

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*. Yes = 4 No = 0	4
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	3
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	0
Total for D 1 — Add the points in the boxes above	9

Rating of Site Potential If score is: ___ **12-16 = H** __X__ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source_____ Yes = 1 No = 0	0
Total for D 2 — Add the points in the boxes above	0

Rating of Landscape Potential If score is: ___ **3 or 4 = H** ___ **1 or 2 = M** __X__ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	0
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	0
Total for D 3 — Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** __X__ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland D

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	0
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	8

Rating of Site Potential If score is: ___ **12-16 = H** _X_ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	0
Total for D 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** _X_ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ☐ Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** _X_ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland D

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	0
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	8

Rating of Site Potential If score is: ___ **12-16 = H** _X_ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	0
Total for D 5 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 = H** _X_ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ☐ Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** _X_ **0 = L** *Record the rating on the first page*

Wetland name or number Wetland D

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* ____Aquatic bed — 4 structures or more: points = 4 __X__Emergent — 3 structures: points = 2 __X__Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 __X__Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* __X__The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	4
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____Permanently flooded or inundated — 4 or more types present: points = 3 __X__Seasonally flooded or inundated — 3 types present: points = 2 __X__Occasionally flooded or inundated — 2 types present: points = 1 __X__Saturated only — 1 type present: points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland ____**Lake Fringe wetland** — **2 points** ____**Freshwater tidal wetland** — **2 points**	1
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points — **Low** = 1 point — **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	2

Wetland name or number Wetland D

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* __X__At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* __X__Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	4
Total for H 1 Add the points in the boxes above	12

Rating of Site Potential If score is: ___**15-18 = H** __X__**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 38 + [(% moderate and low intensity land uses)/2] 4 = 42 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 75 + [(% moderate and low intensity land uses)/2] 7 = 82 % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	3
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	5

Rating of Landscape Potential If score is: __X__**4-6 = H** ___**1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 ☒ It has 3 or more priority habitats within 100 m (see next page) ☒ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☒ It is mapped as a location for an individual WDFW priority species ☒ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☒ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	1

Rating of Value If score is: ___**2 = H** __X__**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number Wetland D

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: NOTE: This question is independent of the land use between the wetland unit and the priority habitat.

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (full descriptions in WDFW PHS report).

☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

☒ **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (full descriptions in WDFW PHS report p. 158 – see web link above).

☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (full descriptions in WDFW PHS report p. 161 – see web link above).

☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☒ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number Wetland D

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☒ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) ☒ At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☒ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** No – Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** No = **Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = **Category I** No = **Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* If you answer YES you will still need to rate the wetland based on its functions. SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number Wetland D

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? If you answer YES you will still need to rate the wetland based on its functions. ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** No = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☑ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** No = **Not a wetland in a coastal lagoon**	**Cat. I**
SC 5.1. Does the wetland meet all of the following three conditions? ☑ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☑ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☑ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? If you answer yes you will still need to rate the wetland based on its habitat functions. In practical terms that means the following geographic areas: ☑ Long Beach Peninsula: Lands west of SR 103 ☑ Grayland-Westport: Lands west of SR 105 ☑ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** No = **not an interdunal wetland for rating**	**Cat I**
SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2**	**Cat. II**
SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3**	**Cat. III**
SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

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APPENDIX E - DECLARATION OF COVENANT FOR PRIVATELY MAINTAINED FACILITIES

A Declaration of Covenant for privately maintained facilities will be provided following completion and acceptance of construction only.