McCallum Rock Site Design

Chehalis, WA

Final Drainage and Erosion Control Report

Fuller Designs Project No. 2076

May 24, 2021

Prepared by:

FULLER DESIGNS

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FINAL DRAINAGE AND EROSION CONTROL REPORT

McCallum Rock Site Design

Chehalis, Washington
May 24, 2021

Project Information

Prepared for: McCallum Rock Drilling
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Reviewing Agency

Jurisdiction: City of Chehalis
Contact: Trent Lougheed, City Engineer

References

2019 Stormwater Management Manual for Western Washington (The 2019 SWMMWW)

Project Engineer

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Contact: Aaron Fuller, PE

"I hereby certify that this Final Drainage and Erosion Control Report for the McCallum Rock Site Design project has been prepared by me or under my supervision and meets minimum standards of Lewis County and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

06/08/2021

12/21/2022

Table of Contents

FINAL DRAINAGE AND EROSION CONTROL REPORT

TABLE OF CONTENTS

SECTION 1 – PROPOSED PROJECT DESCRIPTION

SECTION 2 – EXISTING CONDITONS DESCRIPTION

SECTION 3 – OFFSITE ANALYSIS REPORTS

SECTION 4 – APPLICABLE MINIMUM REQUIREMENTS

SECTION 5 – PERMANENT STORMWATER CONTROL PLAN
- Site Hydrology: Total Runoff Pre and Post Developed Comparison
- Flow Control System Design and Analysis
- Water Quality System Design and Analysis

SECTION 6 – CONSTRUCTION SWPPP
- Project Specific Construction BMPs

SECTION 7 – SPECIAL REPORTS AND STUDIES
- Wetland Report – 1467 Bishop Road
- Wetland Report – 123 Habein Road

SECTION 8 – OPERATION AND MAINTENANCE MANUAL

SECTION 1 – PROPOSED PROJECT DESCRIPTION

Site Address:	1467 Bishop Road, Chehalis, WA 98532 123 Habein Road, Chehalis, WA 98532
Parcel Number(s):	017543003000 & 017539006000
Total Site Area:	1.57 Acres PN 017543003000 (1467 Bishop Road, Chehalis, WA 98532) 6.43 Acres PN 017539006000 123 Habein Road, Chehalis, WA 98532)
Zoning:	UGA – Light Industrial
Sec, Twn, Rge:	Section 4, Township 13N, Range 2W, W.M.

Proposed Improvements
The site is located on Bishop Road and Habien Road approximately 200 feet north from its intersection with Sturdevant Road. This project will remodel the existing residence, pave the front parking area, gravel the back lot, and construct a large shop on the back lot in the 1467 Bishop Road property. The project will also add a new truck wash rack, a fuel station and resurface the back lot area with gravel in the 123 Habein Road property.

A new access roadway will be established to connect the two properties also owned by McCallum Rock Drilling.

Stormwater runoff from the proposed impervious areas will be collected via drainage ditches/trenches and PVC piping, where it will be conveyed to the onsite treatment and attenuation systems, then be discharged to predeveloped discharge points. The attenuation system will be a proposed pond located in the northwest corner of parcel 017539006000.

The properties will be served by:

City of Chehalis	Water and Sanitary Sewer
Lewis County PUD	Electricity
Centurylink & Comast	Telecommunications
Lemay	Refuse & Recycling

The subject project property is completely bordered by general commercial and light industrial zoning.

SECTION 2 – EXISTING CONDITONS DESCRIPTION

The site is composed of two properties, Parcels 017543003000 & 017539006000, located near the intersection of Sturdevant and Bishop Road. Parcel 017543003000 currently fronts Bishop Road. Parcel 017539006000 property currently fronts Habein Road.

Parcel 017543003000 in 1467 Bishop Road has an existing single-family residence and is served by 2 existing driveways. These driveways are gravel and serve as the primary access to the residence. The project area is mainly flat yard area that drains to the north-east corner of the site. Runoff sheet flows north-east off the site to the back lot of Parcel 017539006000.

Parcel 017539006000 in 123 Habein Road has two existing buildings fronting Habien Road. The buildings are served by 5 driveways. An existing paved parking lot and loading dock serve the existing buildings. Roof runoff from the existing buildings sheet flows to the west across the existing parking lot and driveways and onto Habien Road. An existing storm pipe conveys runoff from the loading dock area to the back of the lot. Runoff from the back of the lot sheet flows to the north to an existing storm pipe located in the adjacent property north of the project site. Runoff then flows to natural drainage paths which eventually contribute to an un-named tributary drainage of Dillenbaugh Creek and then to the creek itself.

Project site has an existing single-family residence and three commercial buildings and it is served by existing driveways in Habein Road and Bishop Road. The project area is mainly flat yard area that drains to the north-east corner of the site. Runoff sheet flows north-east off the site to natural drainage paths which eventually contribute to an un-named tributary drainage of Dillenbaugh Creek and then to the creek itself.

Vegetation onsite is consistent with medium to low density residential lots. Grasses and small shrubs are predominant throughout the site. A few larger Oak and Douglas Fir trees still remain onsite.

Soils in the area include Lacamas Silt Loam, Prather Silty Clay Loam and Xerorthents. A soil survey indicates this area is hydraulic group C, D and B which indicate the site is moderate to poorly drained, and has moderate to poor infiltration potential.

The project utilities and improvements will be built in one phase. Driveway extensions and individual site improvements will be constructed as they are needed. The proposed construction schedule would be to start in summer of 2021 and be complete by fall 2021.

SECTION 3 – OFFSITE ANALYSIS REPORTS

The area immediately adjacent to the proposed project properties is:

- West – Bishop road and commercial cemetery
- South – Developed light industrial and gravel yard

- East – Habien Road
- North – Developed light industrial

Properties to the north and east are lower than the project property and do not contribute runoff to the project site. Lots to the south partially contribute runoff to this property. Bishop road to the west contributes runoff to a roadside ditch along the frontage of this property. An existing building in Parcel 017539006000 delineates the easterly basin boundary and discharges roof runoff to an existing parking lot through building downspouts. Runoff from the parking sheet flows to Habein Road,

The proposed project plans to maintain the natural drainage paths by releasing stormwater at natural locations. Storm water coming onto the project from areas to the south are expected to stay in its natural course and no impacts are expected to downstream facilities. Since no impacts are anticipated a further upstream analysis was deemed not necessary. This area has not been flagged as a possible stormwater problem area.

A downstream analysis shows runoff flows to the property north of Parcel 017539006000 where it flows under a Burlington northern railroad spur through culverts to an unnamed drainage. This drainage then flows west where it meets Dillenbaugh Creek and turning north.

SECTION 4 – APPLICABLE MINIMUM REQUIREMENTS

The minimum requirements for stormwater development and redevelopment sites are listed in Volume 1 Section I-3 of the 2019 Washington State Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW). Not all minimum requirements of this section apply to all projects. Determination of applicable minimum requirements is based on section I-3 of the WSDOE SWMMWW.

Based on the thresholds given in figures I-3.1 and I-3.2 of the SWMMWW, the proposed McCallum Rock Site Design project will create more than 5000 square feet of new impervious surface and thus must address all minimum requirements. These requirements as they apply to the project are discussed in more detail below.

Minimum Requirement #1 – Preparation of Drainage Control Plans:

A Stormwater Site Plan has been prepared (see Erosion Control and Drainage Plans).

Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan

A Construction Stormwater Pollution Prevention Plan (SWPPP) has been prepared. See section 7.

Minimum Requirement #3 – Source Control of Pollution

All known, available, and reasonable source control BMPs shall be applied to the project to limit pollutants from encountering stormwater. Construction specific BMP's will be provided during construction (see Section 7 SWPPP for reference).

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

Stormwater leaving the site will be either dispersed toward an existing offsite culvert pipe which ultimately drains to natural drainages or directed toward the eastern roadside ditch of Bishop Road. The same discharge points will be used in both pre and post development. Improvements onsite do not propose to impact natural drainage facilities downstream of the project site.

Minimum Requirement #5 – On-site Stormwater Management

This project is inside the Urban Growth Area (UGA) and is on a site smaller than 5 acres. Therefore, List #2 from Section I-3.4.5 in Volume I of the SWMMWW is applicable.

The proposed Best Management Practice's (BMP's) are as follows:

Lawn and Landscape Areas:

- All disturbed areas not being covered with a hard surface and all new lawn and landscape areas will contain soils meeting the Post-Construction Soil Quality and Depth (BMP T5.13) requirements.

Roof Areas:

- Roof area on the project shall use Downspout Dispersion (T5.10B), or Perforated Stubouts (T5.10C).

Other Hard Surface Areas:

- Stormwater runoff from the new paved and gravel areas will be routed to the proposed onsite stormwater treatment and attenuation systems.

Minimum Requirement #6 – Runoff Treatment

This project proposes to create more than 5000 square feet of pollution-generating hard surface (PGHS) and is subject to this minimum requirement.

A proposed Wetpond will treat runoff from Basin No. 1, 2 and 3 before discharging runoff from the site. The proposed Wetpond is located in the northwest corner of PN 017539006000.

Runoff from Basin No. 1 will sheet flow to the proposed Wetpond.

Runoff from Basin No. 2 will sheet flow and be captured by a perforated PVC pipe drain encased in gravel located along the northerly property boundary of PN 017543003000. This proposed drainage system was modeled as an infiltration trench in WWHM12. Runoff from the perforated pipe encased in gravel will be conveyed to the proposed Wetpond through a proposed 8" PVC pipe.

Runoff from Basin No. 3 is conveyed though the use of catch basins and PVC pipe to the proposed Wetpond.

The proposed Wetpond will be built in accordance with BMP T10.10. Volume sizing calculations for the wetpool cell was established by using the WWHM12 continuous inflow modeling software.

Per SWMMWW Volume V Section V-5.4; the site's design infiltration rate was verified to be 1.3 inches per hour. This rate was utilized when sizing the detention pond and modeling the perforated PVC pipe drain encased in gravel in WWHM12 to account for infiltration within the proposed drainage systems.

The Water Quality (WQ) volume for all Basin No. 1, 2 and 3 was calculated to size the Wetpond cell. Treatment volume for the wetpool cell was calculated by a separate hydrology model. This alternate hydrology model excludes roof areas which do not require treatment. This alternate hydrology model has been included in this report and it is only used for water quality volume calculations. The required WQ volume per WWHM12 model calculations is 0.321 ac-ft. The volume provided in the proposed wetpool cell is 0.363 ac-ft which is more than the required WQ volume.

Minimum Requirement #7 – Flow Control

The development pre and post runoff rates were compared based on existing and proposed land coverage types using the WWHM2012 continuous inflow model. As described above runoff from Basin No. 1, 2 and 3 will flow to the proposed Wetpond. In addition to meeting water quality requirements, the proposed Wetpond will serve as a detention basin. The perforated PVC pipe drain encased in gravel and wetpond pond will infiltrate 21.8% and 78.5% respectively, runoff will be infiltrated directly to groundwater. The remaining runoff will be released from the detention pond to an existing 12" stormwater pipe culvert. Runoff from the detention pond will be slowly released at or below the predeveloped runoff rates.

The proposed pond will include the construction of an outlet structure with orifice openings to control flows from the project site. The proposed detention pond will require an outlet structure with 3 orifice openings. This riser arrangement will release runoff to surface water at or below the pre-developed runoff rates. The detention pond will be built in accordance with BMP D.1. The resulting configuration of the riser system is shown in the drawing details and supported by attached calculations. The total storm event is the 100 year – 24 hour storm event which results in a flow rate of 0.75 cfs.

Minimum Requirement #8 – Wetlands Protection

The thresholds identified in Minimum Requirement #6 – Runoff Treatment, and Minimum Requirement #7 – Flow Control are used to determine the applicability

of this requirement to discharges to wetlands. Since Minimum Requirements #6 and #7 are properly mitigated, Minimum Requirement #8 is considered satisfied.

Minimum Requirement #9 – Operation and Maintenance

Maintenance of storm drainage facilities (wetpond/detention pond, dispersion pads, trenches, risers, etc.) will be the responsibility of the landowner whose property the individual structure is located on. All improvements within Bishop right-of-way (roadside ditches, culverts, etc..) will be maintained by the City of Chehalis. A storm drainage operation and maintenance plan is included in this report. If required by the City of Chehalis, a performance bond or security can be obtained prior to final approval.

SECTION 5 – PERMANENT STORMWATER CONTROL PLAN

This project will utilize Post-Construction Soil Quality and Depth in accordance with BMP T5.13 from Volume I Section I-3.4.5 of the SWMMWW. A pre/post basin flow control analysis, basin map, sub basin water quality analysis, and wetpond/detention pond calculations have been provided in the next few pages.

WWHM2012

PROJECT REPORT

MODEL USED FOR DETENTION POND SIZING CALCULATIONS

General Model Information

Project Name:	Hyrdrology Model
Site Name:	Mccallum Roc
Site Address:	1467 Bishop Road
City:	Chehalis
Report Date:	6/4/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.92
SAT, Pasture, Flat	5.05
Pervious Total	5.97

Impervious Land Use	acre
ROOF TOPS FLAT	0.86
DRIVEWAYS FLAT	0.25
PARKING FLAT	0.08
Impervious Total	1.19
Basin Total	7.16

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.8
DRIVEWAYS FLAT	4.18
Impervious Total	4.98
Basin Total	4.98

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.29
DRIVEWAYS FLAT	1.43
PARKING FLAT	0.14
Impervious Total	1.86
Basin Total	1.86

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	0.25
PARKING MOD	0.06
Impervious Total	0.31
Basin Total	0.31

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 124.05 ft.
Bottom Width: 124.05 ft.
Depth: 4 ft.
Volume at riser head: 1.2313 acre-feet.
Infiltration On
Infiltration rate: 1.3
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 771.214
Total Volume Through Riser (ac-ft.): 211.437
Total Volume Through Facility (ac-ft.): 982.651
Percent Infiltrated: 78.48
Total Precip Applied to Facility: 0
Total Evap From Facility: 5.763
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 3.84 in. Elevation:0 ft.
Orifice 2 Diameter: 3.62 in. Elevation:2.69833333333333 ft.
Orifice 3 Diameter: 2.3 in. Elevation:2.80833333333333 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.353	0.000	0.000	0.000
0.0444	0.354	0.015	0.084	0.465
0.0889	0.356	0.031	0.119	0.467
0.1333	0.357	0.047	0.146	0.469
0.1778	0.359	0.063	0.168	0.471
0.2222	0.360	0.079	0.188	0.473
0.2667	0.362	0.095	0.206	0.475
0.3111	0.364	0.111	0.223	0.477
0.3556	0.365	0.127	0.238	0.479
0.4000	0.367	0.144	0.253	0.481
0.4444	0.368	0.160	0.266	0.483
0.4889	0.370	0.176	0.279	0.485
0.5333	0.371	0.193	0.292	0.487
0.5778	0.373	0.209	0.304	0.489
0.6222	0.374	0.226	0.315	0.491
0.6667	0.376	0.243	0.326	0.493
0.7111	0.378	0.259	0.337	0.495
0.7556	0.379	0.276	0.347	0.497
0.8000	0.381	0.293	0.357	0.499
0.8444	0.382	0.310	0.367	0.501
0.8889	0.384	0.327	0.377	0.503
0.9333	0.385	0.344	0.386	0.505
0.9778	0.387	0.362	0.395	0.507

1.0222	0.389	0.379	0.404	0.510
1.0667	0.390	0.396	0.413	0.512
1.1111	0.392	0.414	0.421	0.514
1.1556	0.393	0.431	0.430	0.516
1.2000	0.395	0.449	0.438	0.518
1.2444	0.397	0.466	0.446	0.520
1.2889	0.398	0.484	0.454	0.522
1.3333	0.400	0.502	0.462	0.524
1.3778	0.401	0.519	0.469	0.526
1.4222	0.403	0.537	0.477	0.529
1.4667	0.405	0.555	0.484	0.531
1.5111	0.406	0.573	0.491	0.533
1.5556	0.408	0.591	0.499	0.535
1.6000	0.410	0.610	0.506	0.537
1.6444	0.411	0.628	0.513	0.539
1.6889	0.413	0.646	0.520	0.541
1.7333	0.415	0.665	0.526	0.544
1.7778	0.416	0.683	0.533	0.546
1.8222	0.418	0.702	0.540	0.548
1.8667	0.419	0.720	0.546	0.550
1.9111	0.421	0.739	0.553	0.552
1.9556	0.423	0.758	0.559	0.554
2.0000	0.424	0.777	0.565	0.557
2.0444	0.426	0.796	0.572	0.559
2.0889	0.428	0.815	0.578	0.561
2.1333	0.429	0.834	0.584	0.563
2.1778	0.431	0.853	0.590	0.565
2.2222	0.433	0.872	0.596	0.567
2.2667	0.435	0.891	0.602	0.570
2.3111	0.436	0.911	0.608	0.572
2.3556	0.438	0.930	0.614	0.574
2.4000	0.440	0.950	0.619	0.576
2.4444	0.441	0.969	0.625	0.579
2.4889	0.443	0.989	0.631	0.581
2.5333	0.445	1.009	0.636	0.583
2.5778	0.446	1.028	0.642	0.585
2.6222	0.448	1.048	0.648	0.588
2.6667	0.450	1.068	0.653	0.590
2.7111	0.452	1.088	0.699	0.592
2.7556	0.453	1.108	0.749	0.594
2.8000	0.455	1.129	0.783	0.597
2.8444	0.457	1.149	0.838	0.599
2.8889	0.458	1.169	0.876	0.601
2.9333	0.460	1.190	0.908	0.603
2.9778	0.462	1.210	0.937	0.606
3.0222	0.464	1.231	1.017	0.608
3.0667	0.465	1.251	1.263	0.610
3.1111	0.467	1.272	1.601	0.612
3.1556	0.469	1.293	2.005	0.615
3.2000	0.471	1.314	2.462	0.617
3.2444	0.472	1.335	2.955	0.619
3.2889	0.474	1.356	3.473	0.622
3.3333	0.476	1.377	4.000	0.624
3.3778	0.478	1.398	4.523	0.626
3.4222	0.479	1.420	5.027	0.629
3.4667	0.481	1.441	5.499	0.631
3.5111	0.483	1.462	5.928	0.633
3.5556	0.485	1.484	6.305	0.636

3.6000	0.487	1.506	6.625	0.638
3.6444	0.488	1.527	6.890	0.640
3.6889	0.490	1.549	7.106	0.643
3.7333	0.492	1.571	7.287	0.645
3.7778	0.494	1.593	7.538	0.647
3.8222	0.495	1.615	7.729	0.650
3.8667	0.497	1.637	7.916	0.652
3.9111	0.499	1.659	8.098	0.654
3.9556	0.501	1.681	8.275	0.657
4.0000	0.503	1.704	8.449	0.659
4.0444	0.505	1.726	8.619	0.661

Gravel Trench Bed 1

Bottom Length:	594.00 ft.
Bottom Width:	5.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	3
Pour Space of material for first layer:	0.4
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	1.3
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	59.461
Total Volume Through Riser (ac-ft.):	212.932
Total Volume Through Facility (ac-ft.):	272.393
Percent Infiltrated:	21.83
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height:	0 ft.	
Riser Diameter:	0 in.	
Orifice 1 Diameter:	8 in.	Elevation:0 ft.

Element Flows To:

Outlet 1	Outlet 2
Trapezoidal Pond 1	

Gravel Trench Bed Hydraulic Table

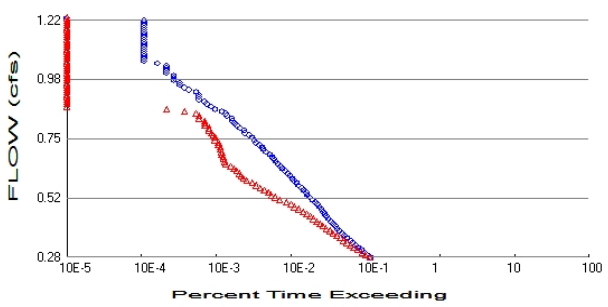
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.068	0.000	0.000	0.000
0.0333	0.068	0.000	0.317	0.089
0.0667	0.068	0.001	0.448	0.089
0.1000	0.068	0.002	0.549	0.089
0.1333	0.068	0.003	0.634	0.089
0.1667	0.068	0.004	0.709	0.089
0.2000	0.068	0.005	0.776	0.089
0.2333	0.068	0.006	0.838	0.089
0.2667	0.068	0.007	0.896	0.089
0.3000	0.068	0.008	0.951	0.089
0.3333	0.068	0.009	1.002	0.089
0.3667	0.068	0.010	1.051	0.089
0.4000	0.068	0.010	1.098	0.089
0.4333	0.068	0.011	1.143	0.089
0.4667	0.068	0.012	1.186	0.089
0.5000	0.068	0.013	1.228	0.089
0.5333	0.068	0.014	1.268	0.089
0.5667	0.068	0.015	1.307	0.089
0.6000	0.068	0.016	1.345	0.089
0.6333	0.068	0.017	1.382	0.089
0.6667	0.068	0.018	1.418	0.089
0.7000	0.068	0.019	1.453	0.089
0.7333	0.068	0.020	1.487	0.089
0.7667	0.068	0.020	1.520	0.089
0.8000	0.068	0.021	1.553	0.089

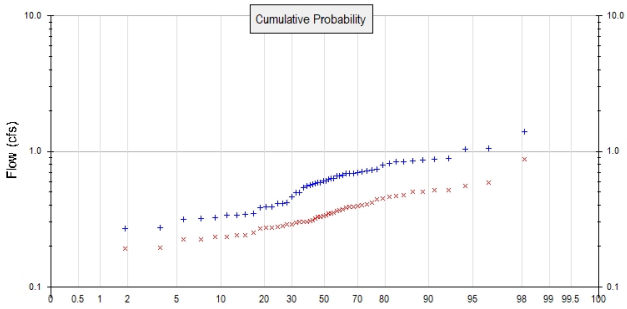
0.8333	0.068	0.022	1.585	0.089
0.8667	0.068	0.023	1.616	0.089
0.9000	0.068	0.024	1.647	0.089
0.9333	0.068	0.025	1.677	0.089
0.9667	0.068	0.026	1.707	0.089
1.0000	0.068	0.027	1.736	0.089
1.0333	0.068	0.028	1.765	0.089
1.0667	0.068	0.029	1.793	0.089
1.1000	0.068	0.030	1.821	0.089
1.1333	0.068	0.030	1.848	0.089
1.1667	0.068	0.031	1.875	0.089
1.2000	0.068	0.032	1.902	0.089
1.2333	0.068	0.033	1.928	0.089
1.2667	0.068	0.034	1.954	0.089
1.3000	0.068	0.035	1.980	0.089
1.3333	0.068	0.036	2.005	0.089
1.3667	0.068	0.037	2.030	0.089
1.4000	0.068	0.038	2.055	0.089
1.4333	0.068	0.039	2.079	0.089
1.4667	0.068	0.040	2.103	0.089
1.5000	0.068	0.040	2.127	0.089
1.5333	0.068	0.041	2.150	0.089
1.5667	0.068	0.042	2.173	0.089
1.6000	0.068	0.043	2.196	0.089
1.6333	0.068	0.044	2.219	0.089
1.6667	0.068	0.045	2.242	0.089
1.7000	0.068	0.046	2.264	0.089
1.7333	0.068	0.047	2.286	0.089
1.7667	0.068	0.048	2.308	0.089
1.8000	0.068	0.049	2.330	0.089
1.8333	0.068	0.050	2.351	0.089
1.8667	0.068	0.050	2.372	0.089
1.9000	0.068	0.051	2.394	0.089
1.9333	0.068	0.052	2.414	0.089
1.9667	0.068	0.053	2.435	0.089
2.0000	0.068	0.054	2.456	0.089
2.0333	0.068	0.055	2.476	0.089
2.0667	0.068	0.056	2.496	0.089
2.1000	0.068	0.057	2.516	0.089
2.1333	0.068	0.058	2.536	0.089
2.1667	0.068	0.059	2.556	0.089
2.2000	0.068	0.060	2.576	0.089
2.2333	0.068	0.060	2.595	0.089
2.2667	0.068	0.061	2.614	0.089
2.3000	0.068	0.062	2.633	0.089
2.3333	0.068	0.063	2.652	0.089
2.3667	0.068	0.064	2.671	0.089
2.4000	0.068	0.065	2.690	0.089
2.4333	0.068	0.066	2.709	0.089
2.4667	0.068	0.067	2.727	0.089
2.5000	0.068	0.068	2.746	0.089
2.5333	0.068	0.069	2.764	0.089
2.5667	0.068	0.070	2.782	0.089
2.6000	0.068	0.070	2.800	0.089
2.6333	0.068	0.071	2.818	0.089
2.6667	0.068	0.072	2.836	0.089
2.7000	0.068	0.073	2.853	0.089
2.7333	0.068	0.074	2.871	0.089

2.7667	0.068	0.075	2.888	0.089
2.8000	0.068	0.076	2.906	0.089
2.8333	0.068	0.077	2.923	0.089
2.8667	0.068	0.078	2.940	0.089
2.9000	0.068	0.079	2.957	0.089
2.9333	0.068	0.080	2.974	0.089
2.9667	0.068	0.080	2.991	0.089
3.0000	0.068	0.081	3.008	0.089

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 5.97
Total Impervious Area: 1.19

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 7.15

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.565095
5 year	0.77935
10 year	0.918627
25 year	1.091715
50 year	1.218702
100 year	1.344171

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.334481
5 year	0.439159
10 year	0.51091
25 year	0.604572
50 year	0.67663
100 year	0.750715

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.631	0.317
1957	0.691	0.506
1958	0.496	0.241
1959	0.415	0.310
1960	0.683	0.408
1961	0.606	0.252
1962	0.321	0.224
1963	0.819	0.516
1964	0.793	0.326
1965	0.838	0.349

1966	0.315	0.224
1967	0.573	0.373
1968	0.389	0.301
1969	0.349	0.190
1970	0.411	0.282
1971	0.495	0.347
1972	1.043	0.420
1973	0.322	0.304
1974	0.630	0.289
1975	0.587	0.233
1976	0.707	0.301
1977	0.586	0.275
1978	0.559	0.381
1979	0.866	0.339
1980	0.390	0.329
1981	0.691	0.370
1982	0.602	0.362
1983	0.720	0.472
1984	0.692	0.332
1985	0.337	0.300
1986	0.728	0.469
1987	1.405	0.450
1988	0.274	0.270
1989	0.418	0.271
1990	0.660	0.553
1991	0.875	0.586
1992	0.385	0.303
1993	0.268	0.195
1994	0.270	0.235
1995	0.463	0.460
1996	0.886	0.400
1997	0.667	0.288
1998	0.833	0.391
1999	0.663	0.387
2000	0.540	0.394
2001	0.338	0.240
2002	0.849	0.520
2003	0.344	0.191
2004	0.579	0.440
2005	0.558	0.274
2006	0.621	0.351
2007	1.050	0.504
2008	0.735	0.875

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.4049	0.8749
2	1.0495	0.5862
3	1.0429	0.5533
4	0.8857	0.5199
5	0.8749	0.5164
6	0.8661	0.5057
7	0.8492	0.5043
8	0.8384	0.4719
9	0.8332	0.4685
10	0.8187	0.4600
11	0.7931	0.4498

12	0.7349	0.4399
13	0.7281	0.4200
14	0.7198	0.4081
15	0.7074	0.4004
16	0.6924	0.3940
17	0.6910	0.3909
18	0.6907	0.3874
19	0.6834	0.3813
20	0.6667	0.3734
21	0.6626	0.3696
22	0.6603	0.3624
23	0.6312	0.3508
24	0.6298	0.3492
25	0.6213	0.3470
26	0.6062	0.3390
27	0.6015	0.3323
28	0.5869	0.3289
29	0.5862	0.3262
30	0.5792	0.3171
31	0.5731	0.3103
32	0.5593	0.3039
33	0.5576	0.3026
34	0.5402	0.3009
35	0.4958	0.3007
36	0.4950	0.2995
37	0.4632	0.2895
38	0.4183	0.2876
39	0.4146	0.2817
40	0.4113	0.2755
41	0.3898	0.2745
42	0.3895	0.2714
43	0.3851	0.2695
44	0.3492	0.2518
45	0.3444	0.2410
46	0.3379	0.2399
47	0.3372	0.2352
48	0.3217	0.2332
49	0.3210	0.2245
50	0.3153	0.2236
51	0.2739	0.1949
52	0.2702	0.1907
53	0.2675	0.1902

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2825	2178	2126	97	Pass
0.2920	1979	1860	93	Pass
0.3015	1800	1667	92	Pass
0.3109	1657	1451	87	Pass
0.3204	1495	1299	86	Pass
0.3298	1364	1163	85	Pass
0.3393	1257	1060	84	Pass
0.3487	1166	945	81	Pass
0.3582	1057	859	81	Pass
0.3677	978	769	78	Pass
0.3771	896	681	76	Pass
0.3866	830	619	74	Pass
0.3960	773	555	71	Pass
0.4055	736	503	68	Pass
0.4149	690	456	66	Pass
0.4244	647	410	63	Pass
0.4338	603	377	62	Pass
0.4433	559	338	60	Pass
0.4528	531	305	57	Pass
0.4622	503	273	54	Pass
0.4717	476	237	49	Pass
0.4811	451	208	46	Pass
0.4906	423	188	44	Pass
0.5000	391	161	41	Pass
0.5095	363	132	36	Pass
0.5190	332	115	34	Pass
0.5284	307	102	33	Pass
0.5379	297	93	31	Pass
0.5473	275	82	29	Pass
0.5568	260	72	27	Pass
0.5662	236	64	27	Pass
0.5757	224	57	25	Pass
0.5851	207	48	23	Pass
0.5946	194	43	22	Pass
0.6041	181	40	22	Pass
0.6135	170	38	22	Pass
0.6230	156	35	22	Pass
0.6324	143	32	22	Pass
0.6419	136	29	21	Pass
0.6513	124	25	20	Pass
0.6608	118	24	20	Pass
0.6702	110	23	20	Pass
0.6797	104	23	22	Pass
0.6892	97	22	22	Pass
0.6986	87	22	25	Pass
0.7081	79	21	26	Pass
0.7175	77	21	27	Pass
0.7270	71	20	28	Pass
0.7364	63	20	31	Pass
0.7459	60	18	30	Pass
0.7554	56	18	32	Pass
0.7648	51	17	33	Pass
0.7743	45	16	35	Pass

0.7837	44	15	34	Pass
0.7932	39	15	38	Pass
0.8026	35	13	37	Pass
0.8121	33	13	39	Pass
0.8215	31	13	41	Pass
0.8310	30	11	36	Pass
0.8405	26	11	42	Pass
0.8499	25	10	40	Pass
0.8594	22	7	31	Pass
0.8688	18	4	22	Pass
0.8783	16	0	0	Pass
0.8877	14	0	0	Pass
0.8972	13	0	0	Pass
0.9067	11	0	0	Pass
0.9161	11	0	0	Pass
0.9256	11	0	0	Pass
0.9350	10	0	0	Pass
0.9445	8	0	0	Pass
0.9539	7	0	0	Pass
0.9634	6	0	0	Pass
0.9728	6	0	0	Pass
0.9823	5	0	0	Pass
0.9918	5	0	0	Pass
1.0012	5	0	0	Pass
1.0107	4	0	0	Pass
1.0201	4	0	0	Pass
1.0296	4	0	0	Pass
1.0390	4	0	0	Pass
1.0485	3	0	0	Pass
1.0579	2	0	0	Pass
1.0674	2	0	0	Pass
1.0769	2	0	0	Pass
1.0863	2	0	0	Pass
1.0958	2	0	0	Pass
1.1052	2	0	0	Pass
1.1147	2	0	0	Pass
1.1241	2	0	0	Pass
1.1336	2	0	0	Pass
1.1431	2	0	0	Pass
1.1525	2	0	0	Pass
1.1620	2	0	0	Pass
1.1714	2	0	0	Pass
1.1809	2	0	0	Pass
1.1903	2	0	0	Pass
1.1998	2	0	0	Pass
1.2092	2	0	0	Pass
1.2187	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.6839 acre-feet
On-line facility target flow:	0.7595 cfs.
Adjusted for 15 min:	0.7595 cfs.
Off-line facility target flow:	0.4316 cfs.
Adjusted for 15 min:	0.4316 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	893.75			☐	81.26			
Gravel Trench Bed 1	☐	247.88			☐	21.83			
Total Volume Infiltrated		1141.63	0.00	0.00		68.36	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

POC 2

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

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

WWHM2012

PROJECT REPORT

ALTERNATE MODEL EXCLUDES RUNOFF AREAS AND IT IS ONLY USED TO SIZE WETPOOL VOLUME AREAS

General Model Information

Project Name:	Hyrdrology Model - NO ROOF MODEL
Site Name:	Mccallum Roc
Site Address:	1467 Bishop Road
City:	Chehalis
Report Date:	6/4/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.92
SAT, Pasture, Flat	5.05
Pervious Total	5.97

Impervious Land Use	acre
ROOF TOPS FLAT	0.86
DRIVEWAYS FLAT	0.25
PARKING FLAT	0.08
Impervious Total	1.19
Basin Total	7.16

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.8
DRIVEWAYS FLAT	4.43
PARKING MOD	0.06
Impervious Total	5.29
Basin Total	5.29

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.29
DRIVEWAYS FLAT	1.43
PARKING FLAT	0.14
Impervious Total	1.86
Basin Total	1.86

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	124.05 ft.		
Bottom Width:	124.05 ft.		
Depth:	4 ft.		
Volume at riser head:	1.2313 acre-feet.		
Infiltration On			
Infiltration rate:	1.3		
Infiltration safety factor:	1		
Wetted surface area On			
Total Volume Infiltrated (ac-ft.):		798.112	
Total Volume Through Riser (ac-ft.):		184.031	
Total Volume Through Facility (ac-ft.):		982.143	
Percent Infiltrated:		81.26	
Total Precip Applied to Facility:		0	
Total Evap From Facility:		6.394	
Side slope 1:	3 To 1		
Side slope 2:	3 To 1		
Side slope 3:	3 To 1		
Side slope 4:	3 To 1		
Discharge Structure			
Riser Height:	3 ft.		
Riser Diameter:	18 in.		
Orifice 1 Diameter:	3.84 in.	Elevation:0 ft.	
Orifice 2 Diameter:	3.62 in.	Elevation:2.69833333333333 ft.	
Orifice 3 Diameter:	2.3 in.	Elevation:2.80833333333333 ft.	
Element Flows To:			
Outlet 1	Outlet 2		

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.353	0.000	0.000	0.000
0.0444	0.354	0.015	0.084	0.465
0.0889	0.356	0.031	0.119	0.467
0.1333	0.357	0.047	0.146	0.469
0.1778	0.359	0.063	0.168	0.471
0.2222	0.360	0.079	0.188	0.473
0.2667	0.362	0.095	0.206	0.475
0.3111	0.364	0.111	0.223	0.477
0.3556	0.365	0.127	0.238	0.479
0.4000	0.367	0.144	0.253	0.481
0.4444	0.368	0.160	0.266	0.483
0.4889	0.370	0.176	0.279	0.485
0.5333	0.371	0.193	0.292	0.487
0.5778	0.373	0.209	0.304	0.489
0.6222	0.374	0.226	0.315	0.491
0.6667	0.376	0.243	0.326	0.493
0.7111	0.378	0.259	0.337	0.495
0.7556	0.379	0.276	0.347	0.497
0.8000	0.381	0.293	0.357	0.499
0.8444	0.382	0.310	0.367	0.501
0.8889	0.384	0.327	0.377	0.503
0.9333	0.385	0.344	0.386	0.505
0.9778	0.387	0.362	0.395	0.507

1.0222	0.389	0.379	0.404	0.510
1.0667	0.390	0.396	0.413	0.512
1.1111	0.392	0.414	0.421	0.514
1.1556	0.393	0.431	0.430	0.516
1.2000	0.395	0.449	0.438	0.518
1.2444	0.397	0.466	0.446	0.520
1.2889	0.398	0.484	0.454	0.522
1.3333	0.400	0.502	0.462	0.524
1.3778	0.401	0.519	0.469	0.526
1.4222	0.403	0.537	0.477	0.529
1.4667	0.405	0.555	0.484	0.531
1.5111	0.406	0.573	0.491	0.533
1.5556	0.408	0.591	0.499	0.535
1.6000	0.410	0.610	0.506	0.537
1.6444	0.411	0.628	0.513	0.539
1.6889	0.413	0.646	0.520	0.541
1.7333	0.415	0.665	0.526	0.544
1.7778	0.416	0.683	0.533	0.546
1.8222	0.418	0.702	0.540	0.548
1.8667	0.419	0.720	0.546	0.550
1.9111	0.421	0.739	0.553	0.552
1.9556	0.423	0.758	0.559	0.554
2.0000	0.424	0.777	0.565	0.557
2.0444	0.426	0.796	0.572	0.559
2.0889	0.428	0.815	0.578	0.561
2.1333	0.429	0.834	0.584	0.563
2.1778	0.431	0.853	0.590	0.565
2.2222	0.433	0.872	0.596	0.567
2.2667	0.435	0.891	0.602	0.570
2.3111	0.436	0.911	0.608	0.572
2.3556	0.438	0.930	0.614	0.574
2.4000	0.440	0.950	0.619	0.576
2.4444	0.441	0.969	0.625	0.579
2.4889	0.443	0.989	0.631	0.581
2.5333	0.445	1.009	0.636	0.583
2.5778	0.446	1.028	0.642	0.585
2.6222	0.448	1.048	0.648	0.588
2.6667	0.450	1.068	0.653	0.590
2.7111	0.452	1.088	0.699	0.592
2.7556	0.453	1.108	0.749	0.594
2.8000	0.455	1.129	0.783	0.597
2.8444	0.457	1.149	0.838	0.599
2.8889	0.458	1.169	0.876	0.601
2.9333	0.460	1.190	0.908	0.603
2.9778	0.462	1.210	0.937	0.606
3.0222	0.464	1.231	1.017	0.608
3.0667	0.465	1.251	1.263	0.610
3.1111	0.467	1.272	1.601	0.612
3.1556	0.469	1.293	2.005	0.615
3.2000	0.471	1.314	2.462	0.617
3.2444	0.472	1.335	2.955	0.619
3.2889	0.474	1.356	3.473	0.622
3.3333	0.476	1.377	4.000	0.624
3.3778	0.478	1.398	4.523	0.626
3.4222	0.479	1.420	5.027	0.629
3.4667	0.481	1.441	5.499	0.631
3.5111	0.483	1.462	5.928	0.633
3.5556	0.485	1.484	6.305	0.636

3.6000	0.487	1.506	6.625	0.638
3.6444	0.488	1.527	6.890	0.640
3.6889	0.490	1.549	7.106	0.643
3.7333	0.492	1.571	7.287	0.645
3.7778	0.494	1.593	7.538	0.647
3.8222	0.495	1.615	7.729	0.650
3.8667	0.497	1.637	7.916	0.652
3.9111	0.499	1.659	8.098	0.654
3.9556	0.501	1.681	8.275	0.657
4.0000	0.503	1.704	8.449	0.659
4.0444	0.505	1.726	8.619	0.661

Gravel Trench Bed 1

Bottom Length:	594.00 ft.
Bottom Width:	5.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	3
Pour Space of material for first layer:	0.4
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	1.3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	59.461
Total Volume Through Riser (ac-ft.):	212.932
Total Volume Through Facility (ac-ft.):	272.393
Percent Infiltrated:	21.83
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	0 ft.
Riser Diameter:	0 in.
Orifice 1 Diameter:	8 in. Elevation:0 ft.
Element Flows To:	
Outlet 1	Outlet 2
Trapezoidal Pond 1	

Gravel Trench Bed Hydraulic Table

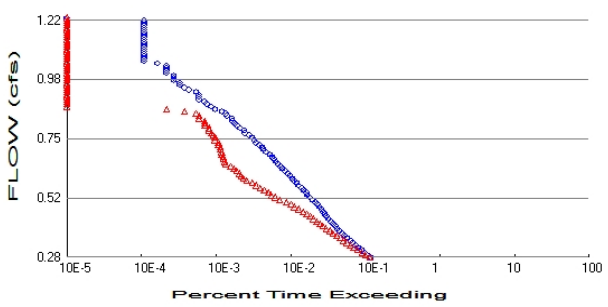
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.068	0.000	0.000	0.000
0.0333	0.068	0.000	0.317	0.089
0.0667	0.068	0.001	0.448	0.089
0.1000	0.068	0.002	0.549	0.089
0.1333	0.068	0.003	0.634	0.089
0.1667	0.068	0.004	0.709	0.089
0.2000	0.068	0.005	0.776	0.089
0.2333	0.068	0.006	0.838	0.089
0.2667	0.068	0.007	0.896	0.089
0.3000	0.068	0.008	0.951	0.089
0.3333	0.068	0.009	1.002	0.089
0.3667	0.068	0.010	1.051	0.089
0.4000	0.068	0.010	1.098	0.089
0.4333	0.068	0.011	1.143	0.089
0.4667	0.068	0.012	1.186	0.089
0.5000	0.068	0.013	1.228	0.089
0.5333	0.068	0.014	1.268	0.089
0.5667	0.068	0.015	1.307	0.089
0.6000	0.068	0.016	1.345	0.089
0.6333	0.068	0.017	1.382	0.089
0.6667	0.068	0.018	1.418	0.089
0.7000	0.068	0.019	1.453	0.089
0.7333	0.068	0.020	1.487	0.089
0.7667	0.068	0.020	1.520	0.089

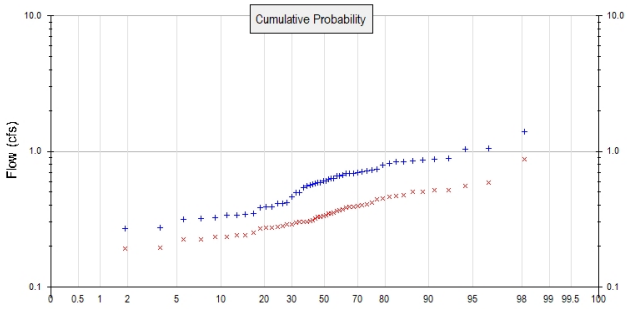
0.8000	0.068	0.021	1.553	0.089
0.8333	0.068	0.022	1.585	0.089
0.8667	0.068	0.023	1.616	0.089
0.9000	0.068	0.024	1.647	0.089
0.9333	0.068	0.025	1.677	0.089
0.9667	0.068	0.026	1.707	0.089
1.0000	0.068	0.027	1.736	0.089
1.0333	0.068	0.028	1.765	0.089
1.0667	0.068	0.029	1.793	0.089
1.1000	0.068	0.030	1.821	0.089
1.1333	0.068	0.030	1.848	0.089
1.1667	0.068	0.031	1.875	0.089
1.2000	0.068	0.032	1.902	0.089
1.2333	0.068	0.033	1.928	0.089
1.2667	0.068	0.034	1.954	0.089
1.3000	0.068	0.035	1.980	0.089
1.3333	0.068	0.036	2.005	0.089
1.3667	0.068	0.037	2.030	0.089
1.4000	0.068	0.038	2.055	0.089
1.4333	0.068	0.039	2.079	0.089
1.4667	0.068	0.040	2.103	0.089
1.5000	0.068	0.040	2.127	0.089
1.5333	0.068	0.041	2.150	0.089
1.5667	0.068	0.042	2.173	0.089
1.6000	0.068	0.043	2.196	0.089
1.6333	0.068	0.044	2.219	0.089
1.6667	0.068	0.045	2.242	0.089
1.7000	0.068	0.046	2.264	0.089
1.7333	0.068	0.047	2.286	0.089
1.7667	0.068	0.048	2.308	0.089
1.8000	0.068	0.049	2.330	0.089
1.8333	0.068	0.050	2.351	0.089
1.8667	0.068	0.050	2.372	0.089
1.9000	0.068	0.051	2.394	0.089
1.9333	0.068	0.052	2.414	0.089
1.9667	0.068	0.053	2.435	0.089
2.0000	0.068	0.054	2.456	0.089
2.0333	0.068	0.055	2.476	0.089
2.0667	0.068	0.056	2.496	0.089
2.1000	0.068	0.057	2.516	0.089
2.1333	0.068	0.058	2.536	0.089
2.1667	0.068	0.059	2.556	0.089
2.2000	0.068	0.060	2.576	0.089
2.2333	0.068	0.060	2.595	0.089
2.2667	0.068	0.061	2.614	0.089
2.3000	0.068	0.062	2.633	0.089
2.3333	0.068	0.063	2.652	0.089
2.3667	0.068	0.064	2.671	0.089
2.4000	0.068	0.065	2.690	0.089
2.4333	0.068	0.066	2.709	0.089
2.4667	0.068	0.067	2.727	0.089
2.5000	0.068	0.068	2.746	0.089
2.5333	0.068	0.069	2.764	0.089
2.5667	0.068	0.070	2.782	0.089
2.6000	0.068	0.070	2.800	0.089
2.6333	0.068	0.071	2.818	0.089
2.6667	0.068	0.072	2.836	0.089
2.7000	0.068	0.073	2.853	0.089

2.7333	0.068	0.074	2.871	0.089
2.7667	0.068	0.075	2.888	0.089
2.8000	0.068	0.076	2.906	0.089
2.8333	0.068	0.077	2.923	0.089
2.8667	0.068	0.078	2.940	0.089
2.9000	0.068	0.079	2.957	0.089
2.9333	0.068	0.080	2.974	0.089
2.9667	0.068	0.080	2.991	0.089
3.0000	0.068	0.081	3.008	0.089

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 5.97
Total Impervious Area: 1.19

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 7.15

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.565095
5 year	0.77935
10 year	0.918627
25 year	1.091715
50 year	1.218702
100 year	1.344171

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.334481
5 year	0.439159
10 year	0.51091
25 year	0.604572
50 year	0.67663
100 year	0.750715

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.631	0.317
1957	0.691	0.506
1958	0.496	0.241
1959	0.415	0.310
1960	0.683	0.408
1961	0.606	0.252
1962	0.321	0.224
1963	0.819	0.516
1964	0.793	0.326
1965	0.838	0.349

1966	0.315	0.224
1967	0.573	0.373
1968	0.389	0.301
1969	0.349	0.190
1970	0.411	0.282
1971	0.495	0.347
1972	1.043	0.420
1973	0.322	0.304
1974	0.630	0.289
1975	0.587	0.233
1976	0.707	0.301
1977	0.586	0.275
1978	0.559	0.381
1979	0.866	0.339
1980	0.390	0.329
1981	0.691	0.370
1982	0.602	0.362
1983	0.720	0.472
1984	0.692	0.332
1985	0.337	0.300
1986	0.728	0.469
1987	1.405	0.450
1988	0.274	0.270
1989	0.418	0.271
1990	0.660	0.553
1991	0.875	0.586
1992	0.385	0.303
1993	0.268	0.195
1994	0.270	0.235
1995	0.463	0.460
1996	0.886	0.400
1997	0.667	0.288
1998	0.833	0.391
1999	0.663	0.387
2000	0.540	0.394
2001	0.338	0.240
2002	0.849	0.520
2003	0.344	0.191
2004	0.579	0.440
2005	0.558	0.274
2006	0.621	0.351
2007	1.050	0.504
2008	0.735	0.875

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	1.4049	0.8749
2	1.0495	0.5862
3	1.0429	0.5533
4	0.8857	0.5199
5	0.8749	0.5164
6	0.8661	0.5057
7	0.8492	0.5043
8	0.8384	0.4719
9	0.8332	0.4685
10	0.8187	0.4600
11	0.7931	0.4498

12	0.7349	0.4399
13	0.7281	0.4200
14	0.7198	0.4081
15	0.7074	0.4004
16	0.6924	0.3940
17	0.6910	0.3909
18	0.6907	0.3874
19	0.6834	0.3813
20	0.6667	0.3734
21	0.6626	0.3696
22	0.6603	0.3624
23	0.6312	0.3508
24	0.6298	0.3492
25	0.6213	0.3470
26	0.6062	0.3390
27	0.6015	0.3323
28	0.5869	0.3289
29	0.5862	0.3262
30	0.5792	0.3171
31	0.5731	0.3103
32	0.5593	0.3039
33	0.5576	0.3026
34	0.5402	0.3009
35	0.4958	0.3007
36	0.4950	0.2995
37	0.4632	0.2895
38	0.4183	0.2876
39	0.4146	0.2817
40	0.4113	0.2755
41	0.3898	0.2745
42	0.3895	0.2714
43	0.3851	0.2695
44	0.3492	0.2518
45	0.3444	0.2410
46	0.3379	0.2399
47	0.3372	0.2352
48	0.3217	0.2332
49	0.3210	0.2245
50	0.3153	0.2236
51	0.2739	0.1949
52	0.2702	0.1907
53	0.2675	0.1902

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2825	2178	2126	97	Pass
0.2920	1979	1860	93	Pass
0.3015	1800	1667	92	Pass
0.3109	1657	1451	87	Pass
0.3204	1495	1299	86	Pass
0.3298	1364	1163	85	Pass
0.3393	1257	1060	84	Pass
0.3487	1166	945	81	Pass
0.3582	1057	859	81	Pass
0.3677	978	769	78	Pass
0.3771	896	681	76	Pass
0.3866	830	619	74	Pass
0.3960	773	555	71	Pass
0.4055	736	503	68	Pass
0.4149	690	456	66	Pass
0.4244	647	410	63	Pass
0.4338	603	377	62	Pass
0.4433	559	338	60	Pass
0.4528	531	305	57	Pass
0.4622	503	273	54	Pass
0.4717	476	237	49	Pass
0.4811	451	208	46	Pass
0.4906	423	188	44	Pass
0.5000	391	161	41	Pass
0.5095	363	132	36	Pass
0.5190	332	115	34	Pass
0.5284	307	102	33	Pass
0.5379	297	93	31	Pass
0.5473	275	82	29	Pass
0.5568	260	72	27	Pass
0.5662	236	64	27	Pass
0.5757	224	57	25	Pass
0.5851	207	48	23	Pass
0.5946	194	43	22	Pass
0.6041	181	40	22	Pass
0.6135	170	38	22	Pass
0.6230	156	35	22	Pass
0.6324	143	32	22	Pass
0.6419	136	29	21	Pass
0.6513	124	25	20	Pass
0.6608	118	24	20	Pass
0.6702	110	23	20	Pass
0.6797	104	23	22	Pass
0.6892	97	22	22	Pass
0.6986	87	22	25	Pass
0.7081	79	21	26	Pass
0.7175	77	21	27	Pass
0.7270	71	20	28	Pass
0.7364	63	20	31	Pass
0.7459	60	18	30	Pass
0.7554	56	18	32	Pass
0.7648	51	17	33	Pass
0.7743	45	16	35	Pass

0.7837	44	15	34	Pass
0.7932	39	15	38	Pass
0.8026	35	13	37	Pass
0.8121	33	13	39	Pass
0.8215	31	13	41	Pass
0.8310	30	11	36	Pass
0.8405	26	11	42	Pass
0.8499	25	10	40	Pass
0.8594	22	7	31	Pass
0.8688	18	4	22	Pass
0.8783	16	0	0	Pass
0.8877	14	0	0	Pass
0.8972	13	0	0	Pass
0.9067	11	0	0	Pass
0.9161	11	0	0	Pass
0.9256	11	0	0	Pass
0.9350	10	0	0	Pass
0.9445	8	0	0	Pass
0.9539	7	0	0	Pass
0.9634	6	0	0	Pass
0.9728	6	0	0	Pass
0.9823	5	0	0	Pass
0.9918	5	0	0	Pass
1.0012	5	0	0	Pass
1.0107	4	0	0	Pass
1.0201	4	0	0	Pass
1.0296	4	0	0	Pass
1.0390	4	0	0	Pass
1.0485	3	0	0	Pass
1.0579	2	0	0	Pass
1.0674	2	0	0	Pass
1.0769	2	0	0	Pass
1.0863	2	0	0	Pass
1.0958	2	0	0	Pass
1.1052	2	0	0	Pass
1.1147	2	0	0	Pass
1.1241	2	0	0	Pass
1.1336	2	0	0	Pass
1.1431	2	0	0	Pass
1.1525	2	0	0	Pass
1.1620	2	0	0	Pass
1.1714	2	0	0	Pass
1.1809	2	0	0	Pass
1.1903	2	0	0	Pass
1.1998	2	0	0	Pass
1.2092	2	0	0	Pass
1.2187	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.3214 acre-feet
On-line facility target flow:	0.2795 cfs.
Adjusted for 15 min:	0.2795 cfs.
Off-line facility target flow:	0.1589 cfs.
Adjusted for 15 min:	0.1589 cfs.

LID Report

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

POC 2

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

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

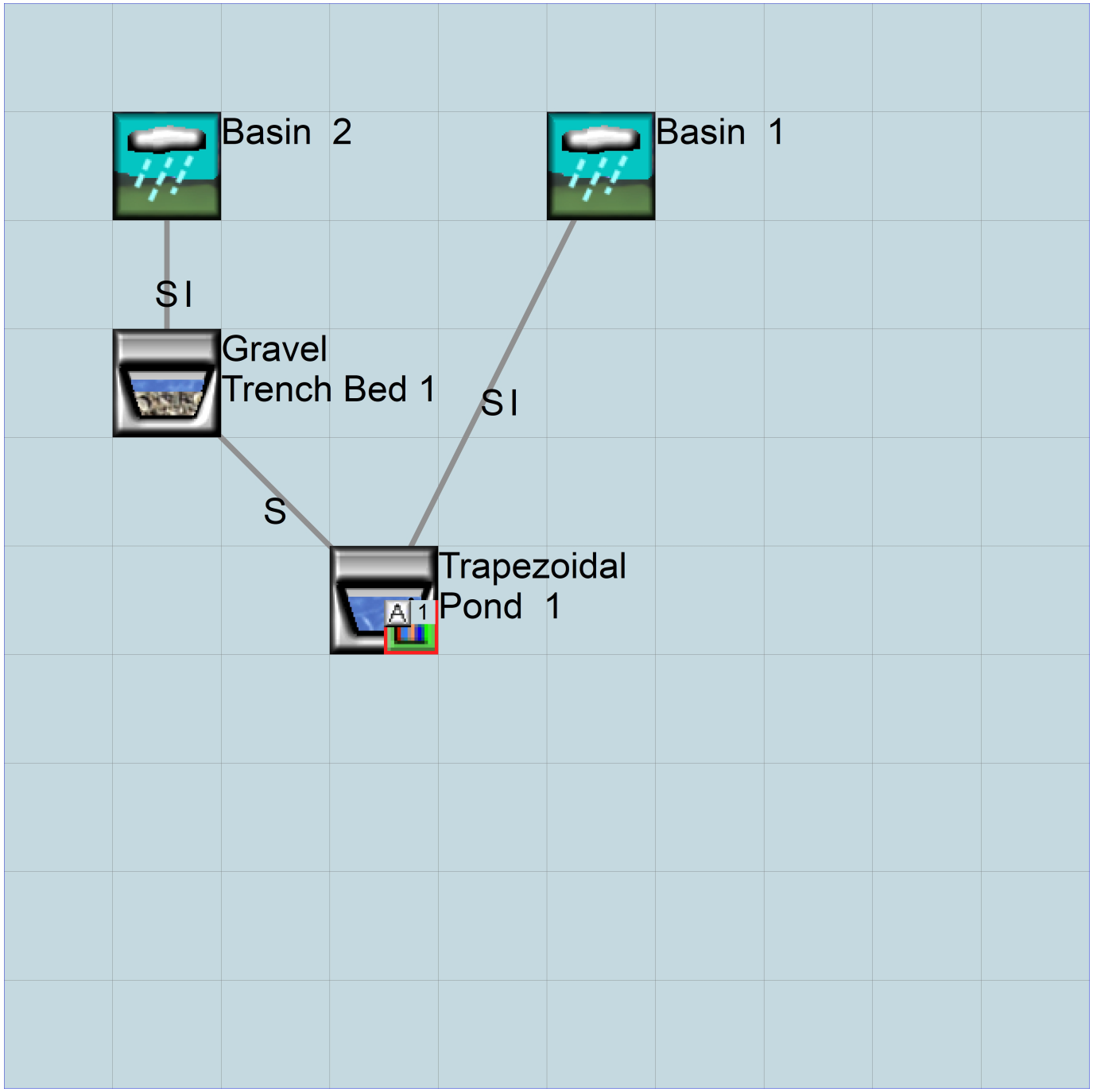
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

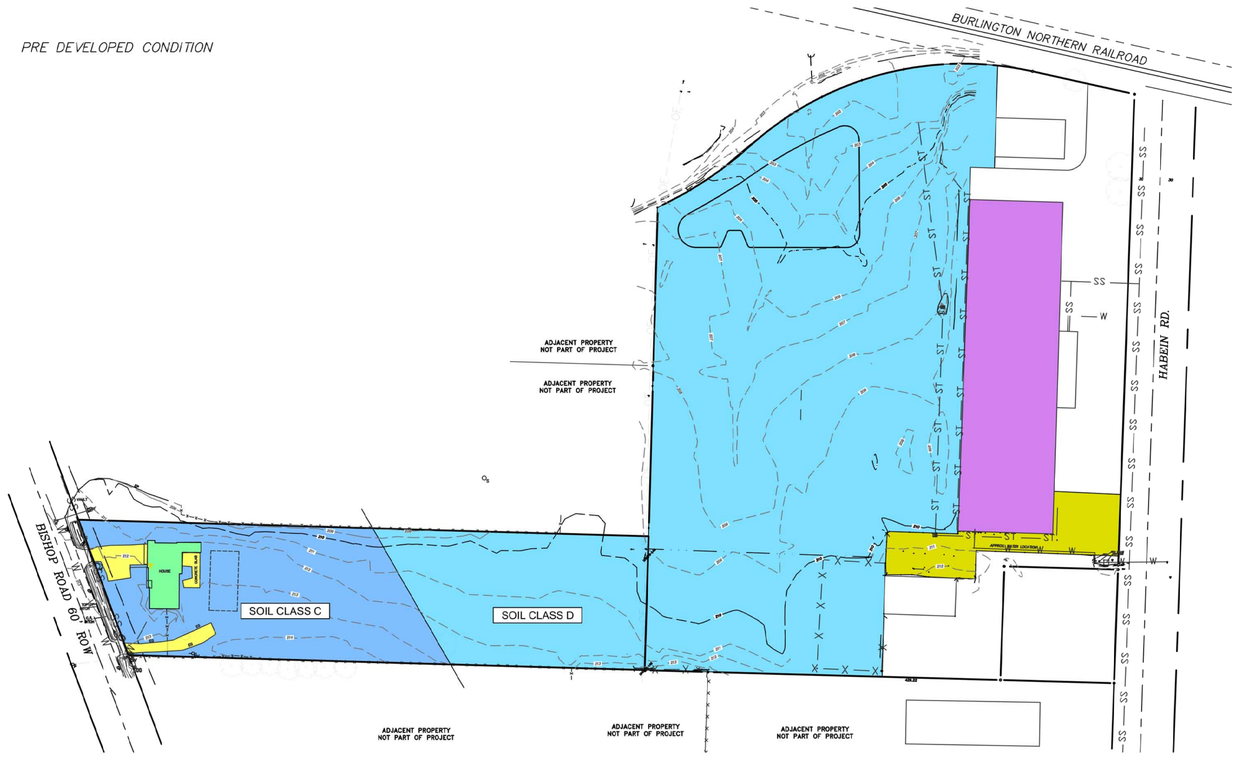
Appendix
Predeveloped Schematic

Mitigated Schematic



SECTION 04 TOWNSHIP 13N RANGE 02W

PRE DEVELOPED CONDITION



PRE DEVELOPED CONDITION

BASIN

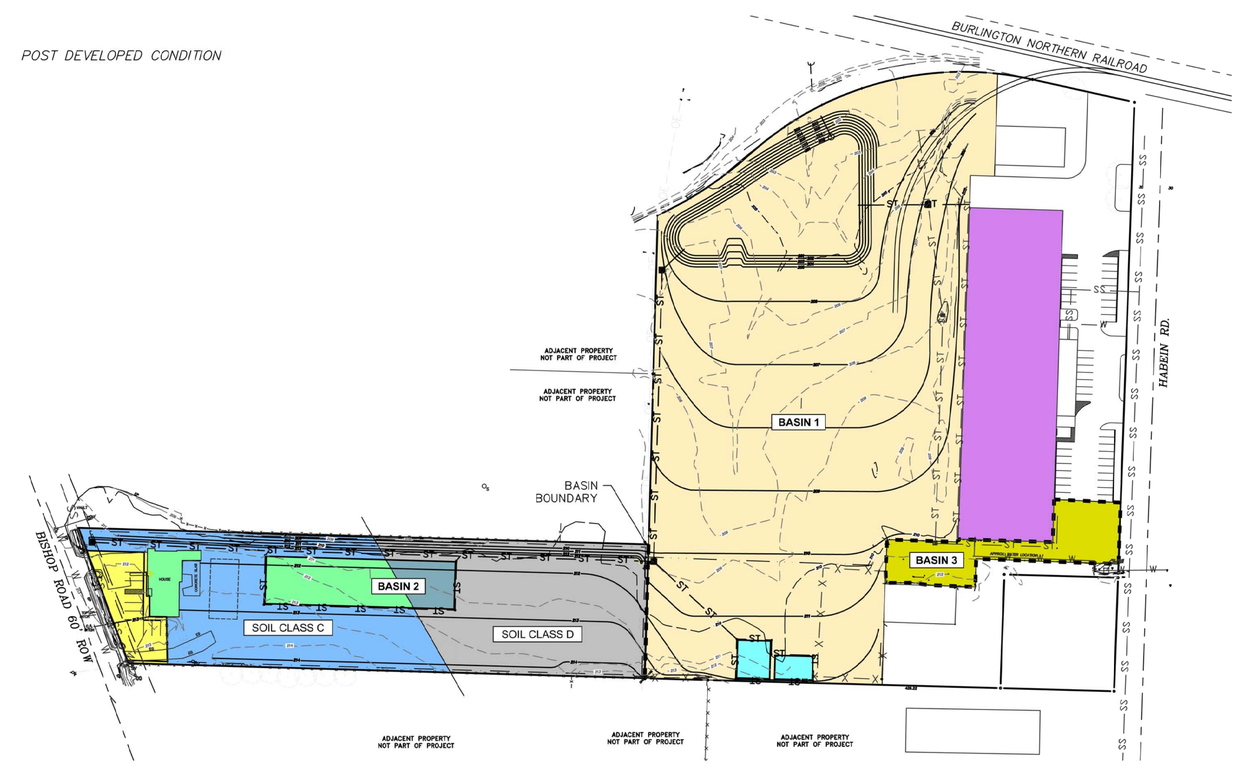
	ROOFS, SOIL C	= 0.060 AC
	PARKING, SOIL C	= 0.075 AC
	PASTURE, SOIL C	= 0.921 AC
	ROOFS, SOIL D	= 0.800 AC
	PASTURE, SOIL D	= 5.046 AC
	DRIVEWAY, SOIL D	= 0.245 AC
	TOTAL AREA	= 7.147 AC

N

0' 40' 80' 160'

SCALE: 1" = 80'

POST DEVELOPED CONDITION



POST DEVELOPED CONDITION

BASIN 1

	ROOFS, SOIL D	= 0.800 AC
	GRAVEL/DRIVEWAY, SOIL D	= 4.182 AC
	PARKING, SOIL D	= 0.060 AC
	TOTAL AREA BASIN 1	= 5.042 AC

BASIN 2

	ROOFS, SOIL C	= 0.223 AC
	PARKING, SOIL C	= 0.138 AC
	GRAVEL/DRIVEWAY, SOIL C	= 0.694 AC
	ROOFS, SOIL D	= 0.067 AC
	GRAVEL/DRIVEWAY, SOIL D	= 0.738 AC
	TOTAL AREA BASIN 2	= 1.860 AC

BASIN 3

	DRIVEWAY, SOIL D	= 0.245 AC
	TOTAL AREA BASIN 3	= 0.245 AC
	TOTAL AREA BASIN 1+2+3	= 7.147 AC

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: BASIN MAP - PRE AND POST DEVELOPED

SCALE: 1"=80' | DATE: 5/24/21 | DRAWN: PM | CHECKED: AF

PROJECT NAME: 123 HABEIN RD

FULLER DESIGNS
645 SE PROSPECT STREET
CHEHALIS, WA 98532
520-840-3599

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	05/24/21

BSN

1 OF 1

SECTION 6 – CONSTRUCTION SWPPP

This project is required to prepare a construction Storm Water Pollution Prevention Plan in accordance with Minimum Requirement #2 and must be prepared in accordance with Volume II chapter 2 and Chapter 3 of the SWMMWW.

This drainage and erosion control report is intended to supplement the construction SWPPP by utilizing other sections in this report to cover required narrative elements. Also, the construction and erosion control plans supplied for the project are to act as the required drawing component of the construction SWPPP.

Intended BMPs which should be used during construction include but are not limited to:

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones
- BMP C103: High Visibility Fence
- BMP C105: Stabilized Construction Entrance / Exit
- BMP C106: Wheel Wash
- BMP C120: Temporary and Permanent Seeding
- BMP C123: Plastic Covering
- BMP C125: Topsoiling / Composting
- BMP C140: Dust Control
- BMP C153: Material Delivery, Storage and Containment
- BMP C160: Certified Erosion and Sediment Control Lead
- BMP C162: Scheduling
- BMP C209: Outlet Protection
- BMP C233: Silt Fence

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

FOR

McCallum Rock Site Design

1467 Bishop Road & 123 Habein Road

Chehalis, WA 98532

Prepared by:

FULLER DESIGNS

1101 Kresky Ave
Centralia, Wa 98531
(360)807-4420

General Requirements

Clearing and grading activities for this project shall be permitted only to the approved site development plan. These clearing and grading areas were established to preserve sensitive areas, native growth protection easements, and tree retention areas. These areas are delineated on the site plans and shall be marked on the development site.

The SWPPP shall be implemented beginning with initial land disturbance and until final stabilization. Sediment and Erosion control BMPs shall be consistent with the BMPs contained in chapters 2 and 3 of Volume II of the SWMMWW.

Seasonal Work Limitations - From October 15 through April 1, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters.
2. Limitations on activities and the extent of disturbed areas.
3. Proposed erosion and sediment control measures.

Project Requirements - Construction SWPPP Elements

In most cases, all the following elements shall apply and be implemented throughout construction. Self-contained sites (discharges only to groundwater) must comply with all elements except for Element 3: Control Flow Rates.

Element 1: Preserve Vegetation/Mark Clearing Limits

- Before beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas, and trees that are to be preserved within the construction area.
- Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

Element 2: Establish Construction Access

- Limit construction vehicle access and exit to one route, if possible.
- Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto public roads.
- Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
- If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pick up and transport the sediment to a controlled sediment disposal area.
- Conduct street washing only after sediment is removed in accordance with the above bullet.

- Control street wash wastewater by pumping back on-site, or otherwise prevent it from discharging into systems tributary to waters of the State.

Element 3: Control Flow Rates

- Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.
- Where necessary to comply with the bullet above, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (e.g. impervious surfaces).
- If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase.

Element 4: Install Sediment Controls

- Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants.
- Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.
- Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
- Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP but must meet the flow control performance standard in Element #3, bullet #1.
- Locate BMPs intended to trap sediment on-site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
- Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Element 5: Stabilize Soils

- Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base early on areas to be paved, and dust control.
- Control stormwater volume and velocity within the site to minimize soil erosion.
- Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
- Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
    - During the dry season (April 2 – October 14): 7 days

    - During the wet season (October 15 - April 1): 2 days
    - Note that projects performing work under a NPDES Construction Stormwater General Permit issued by Ecology will have more restrictive time periods.
- Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
- Stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways and drainage channels.
- Minimize the amount of soil exposed during construction activity.
- Minimize the disturbance of steep slopes.
- Minimize soil compaction and, unless infeasible, preserve topsoil.

Element 6: Protect Slopes

- Design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).
- Divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
- At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.
- Place excavated material on the uphill side of trenches, consistent with safety and space considerations.
- Place check dams at regular intervals within constructed channels that are cut down a slope.

Element 7: Protect Drain Inlets

- Protect all storm drain inlets made operable during construction so that stormwater runoff shall not enter the conveyance system without first being filtered or treated to remove sediment.
- Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Element 8: Stabilize Channels and Outlets

- Design, construct, and stabilize all on-site conveyance channels.
- Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches at the outlets of all conveyance systems.

Element 9: Control Pollutants

- Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants.

- Handle and dispose of all pollutants, including waste materials and demolition debris that occur on-site in a manner that does not cause contamination of stormwater.
- Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest take within the containment structure. Double-walled tanks do not require additional secondary containment.
- Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland application, or to the sanitary sewer, with local sewer district approval.
- Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
- Use BMPs to prevent contamination of stormwater runoff by pH modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.
- Adjust the pH of stormwater if necessary to prevent violations of water quality standards.
- Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on-site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited.
- Obtain written approval from Ecology before using chemical treatment other than CO2 or dry ice to adjust pH.

Element 10: Control De-Watering

- Discharge foundation, vault, and trench de-watering water, which has similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond.
- Discharge clean, non-turbid de-watering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.
- Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.
- Other treatment or disposal options may include:
    1. Infiltration.

2. Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
3. Ecology-approved on-site chemical treatment or other suitable treatment technologies.
4. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
5. Use of a sedimentation bag that discharges to a ditch or swale for small volumes of localized dewatering.

Element 11: Maintain BMPs

- Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.
- Remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

Element 12: Manage the Project

- Phase development projects to the maximum degree practicable and consider seasonal work limitations.
- Inspection and monitoring – Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Projects regulated under the Construction Stormwater General Permit must conduct site inspections and monitoring in accordance with Special Condition S4 of the Construction Stormwater General Permit.
- Maintaining an updated construction SWPPP – Maintain, update, and implement the SWPPP.
- Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites disturbing less than one acre may have a CESCL or a person without CESCL certification conduct inspections. By the initiation of construction, the SWPPP must identify the CESCL or inspector, who must be present onsite or on-call at all times.
- The CESCL or inspector (project sites less than one acre) must have the skills to assess the:
    - Site conditions and construction activities that could impact the quality of stormwater.
    - Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
- The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.
- Based on the results of the inspection, construction site operators must correct the problems identified by:
    - Reviewing the SWPPP for compliance with the 13 construction SWPPP elements and making appropriate revisions within seven (7) calendar days of the inspection.
- Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems not

later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, the construction site operator may request an extension within the initial 10day response period.

- Documenting BMP implementation and maintenance in the site log book (sites larger than 1 acre).
- The CESCL or inspector must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The CESCL or inspector may reduce the inspection frequency for temporary stabilized, inactive sites to once every calendar month.

Element 13: Protect Low Impact Development BMPs

- Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.
- Prevent compacting Bioretention and rain garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.
- Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer’s procedures.
- Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

SECTION 7 – SPECIAL REPORTS AND STUDIES

Wetland studies were performed on the project by Environmental Design, LLC, which evaluated the presence of wetlands on the property. This study concluded wetlands did not exist on the property. This report is included below.

Wetland Report

Prepared For: Gregg Johnson

Site Address: 1467 Bishop Road, Chehalis

Tax Parcel Number: 017543003000

Date: December 14, 2017

Prepared By:
Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street, Centralia, WA 98531
(360) 219-3343

Table of Contents

Introduction **3**

Site Description **3**

Methodology **3**

Observation **4**
Vegetation 4
Soils 4
Hydrology 5
Wildlife 5
Topography 5

Surrounding Wetlands and Impacts 5

Conclusions 6

References **7**

Appendix A: Wetland Maps
Figure 1: Site Location Map
Figure 2: Site Map and Test Plot Locations
Figure 3: NRCS Soil Map
Figure 4: National Wetlands Inventory Map
Figure 5: Lewis County Critical Areas Map
Figure 6: DNR Stream Map
Figure 7: Fish and Wildlife PHS Map

Appendix B: Site Pictures

Appendix C: Test Plot Data Forms

Introduction:

Environmental Design, LLC conducted a Wetland Study on November 15, 2017 to determine if wetland habitat is present on the property located 1467 Bishop Road in Chehalis. The site is currently used as residential. The client is proposing to sell the property and has asked for this report in order to conclude the sale.

In order to conduct a thorough review of the site to determine if wetlands are present on the site several resources were reviewed. The project started by pulling research and reviewing the research from several sources. After review of the research it was noted that wetlands were mapped on the site. A site visit was then conducted in order to test in areas for wetland habitat. Since the site has been primarily used and maintained as vacant land, test sites were completed in areas where vegetation, elevation or other characteristics changed that indicated a possible presence of wetland habitat.

Site Description:

The site is located at 1467 Bishop Road in Chehalis, Washington. The site is identified by Lewis County by the parcel number 017543003000. The site is located in Section 04 of Township 13 North, Range 02 West. The property is about 1.58 acres in size and is relatively flat. According to the research pulled hydric soils and wetlands are mapped on the site and in the surrounding areas.

The area around the site is primarily residential and commercial land with mapped areas of hydric soils and wetlands located throughout the sites.

Methodology:

A site visit was conducted on November 15, 2017 where Environmental Design walked the property and tested in various areas where vegetation seemed to have changed or where wetland habitat could be present. The site is consistent with the hydrology, vegetation, and soils at each test plot location.

Environmental Design, LLC completed the wetland study of this site by using the Routine Determination Method according to the 1987 U.S. Army Corp of Engineers Wetland Delineation Manual and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region.

In order to complete this method first research was conducted by pulling information and maps from the National Wetland Inventory website, the Lewis County Website, the NRCS website to find out what the soils were and also further information was pulled from the Department of Natural Resources

website. After reviewing the research a site visit was conducted and areas were tested where vegetation, elevation, or the soil may have changed.

When using the Routine Approach, a wetland area must meet three specific parameters. These three parameters are hydrology, vegetation and hydric soils. Hydrology can be difficult to assess because it may or may not be present, depending on the time of year. Vegetation and soils are important to assess if there has been hydrology present in the past. If the site meets the hydrology, vegetative and hydric soil parameters then the site is considered a wetland. If one parameter is not met then the area is not considered a wetland.

Observations:

Vegetation:

Wetland Vegetation has been classified into indicator statuses of how likely the plant is to be found in a wetland habitat. The indicator status of each plant species can be found on the data forms. The different indicator statuses are listed below:

- Obligate Wetland (OBL) – highly likely to be in a natural wetland environment
- Facultative Wetland (FACW) –most likely to be present in a natural wetland environment
- Facultative (FAC) – can be present in both a natural wetland and non-wetland environment
- Facultative Upland (FACU) –may be present in a natural wetland, but most likely to be seen in non-wetland conditions
- Obligate Upland (UPL) – most likely to occur in non-wetland conditions
- No Indicator – the plant does not have enough data to determine the indicator status yet

The site has been maintained as residential land and is primarily vegetated with a variety of yard grasses, apple trees, Douglas Fir, blackberries and oak trees.

The surrounding areas are similar in vegetation.

Soils:

The site is mapped as Prather Silty Clay Loam and as Lacamas Silt Loam Series according to the U.S.D.A Natural Resources Conservation Service *Soil Survey of Lewis County, Washington (1980).* The Reed Silt Loam series is listed on the hydric soils list produced by the U.S.D.A Natural Resources Conservation. The areas where test plots were conducted, the soil appeared to be consistent with the profile of the mapped series.

The NRCS describes the Lacamas Silt Loam series as a very deep, poorly drained soil located on broad plains, terraces and bottom lands. In a typical profile, the upper portion of the surface layer extends to a depth of about 7

inches and is very dark grayish brown silt loam. The lower portion of the surface layer is mottled, dark grayish brown and grayish brown silt loam extending to a depth of about 10 inches. The subsoil is mottled, olive gray silty clay for the upper 19 inches and the lower portion is mottled, olive gray clay extending to a depth of 60 inches or more.

The NRCS describes the Prather Silty Clay Loam series is described as a very deep moderately drained soil that can be found on broad till plains and terraces. In a representative profile, the surface is generally covered with a mat of partially decomposed organic litter about 2 inches thick. The upper part of the surface layer is very dark brown silty clay loam that extends about 7 inches. The lower portion of the surface layer about 7 inches thick and is a dark brown silty clay loam. The following 12 inches of the subsoil is dark brown silty clay and the next 25 inches is mottled, dark brown silty clay and yellowish brown clay. The substratum of the profile extends to a depth of 60 inches or more and is mottled, dark reddish brown, gray and brown clay.

The soil appeared to be poorly drained in the test plot locations. The soil was evaluated to a depth of about 16-20 inches at each test plot location. The soils did meet the criteria for wetland habitat. See Appendix C for the Test Plot Data Form.

Hydrology:

The site appears to be moderately well drained throughout most of the year. Some ponding was present on site; however, that was due to the heavy rain event at the time. The area around the site had been reviewed by Environmental Design earlier in the year and the area did not have evidence of hydrology. See Appendix C for the Test Plot Data Form.

Wildlife:

The area is not shown to have any priority species listed on the Priority Habitat Species Map produced by Fish and Wildlife. The vegetation surrounding the agricultural fields does provide great habitat for amphibians, birds and other mammals, as well as a sound barrier from surrounding activities.

Topography:

The topography at the site is relatively flat with a slope of between 0-5%.

Surrounding Wetlands and Impacts:

The National Wetlands Inventory (NWI) map and other maps do depict mapped wetlands within the area. It needs to be noted that the NWI maps and GeoData Center needs to be used cautiously as they compile general wetland data.

Environmental Design did not find wetland habitat located on the site or within 300 feet of the project.

Environmental Design conducted a further site investigation by site visit and by the use of mapping resources to determine if any wetland buffers or habitats would impact the client's project.

Conclusions:

Environmental Design, LLC concludes that wetland habitat is not located on the site.

References:

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Lewis County. Critical Areas Map. Online map. https://fortress.wa.gov/lewisco/home/.

Soil Conservation Service. 1995. Hydric Soils for Washington. Online document: http://www.statlab.iastate.edy:80/soils/hydric/wa/html.

Soil Conservation Service. 1980. Soil Survey of Lewis County, Washington. U.S. Department of Agriculture, Washington DC.

Soil Conservation Service. 1990. Soil Survey of Thurston County, Washington. U.S. Department of Agriculture, Washington DC.

U.S Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), ed. J. S. Wakeley, R.W. Lichvar, and C. V. Noble. ERDC / EL TR-103. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Washington State Department of Ecology. 1997. Washington State Wetlands Identification and Delineation Manual. Publication # 96-94. Olympia, Washington.

Washington State Department of Ecology. 2004. Washington State Wetlands Rating System: Western Washington Revised. Publ. # 04-06-025. Olympia, Washington.

Washington Department of Fish and Wildlife. Priority Habitat Species (PHS) Database. (August 2014)

The determination of this wetland was completed by Environmental Design, LLC. The determination of this wetland is based on scientific method and our best professional judgment. Environmental Design, LLC agrees that the conclusion should agree with the local, state, and federal regulatory agencies.

Completed By:

Becky Rieger
Wetland Specialist

Appendix A:

Wetland Maps

Google Maps

1467 Bishop Rd

Figure 1: Site Location Map

1467 Bishop Rd

Chehalis, WA 98532

THE PROPERTY LINES IN THIS MAP ARE APPROXIMATE AND ARE NOT INTENDED TO BE USED AS A SURVEY.

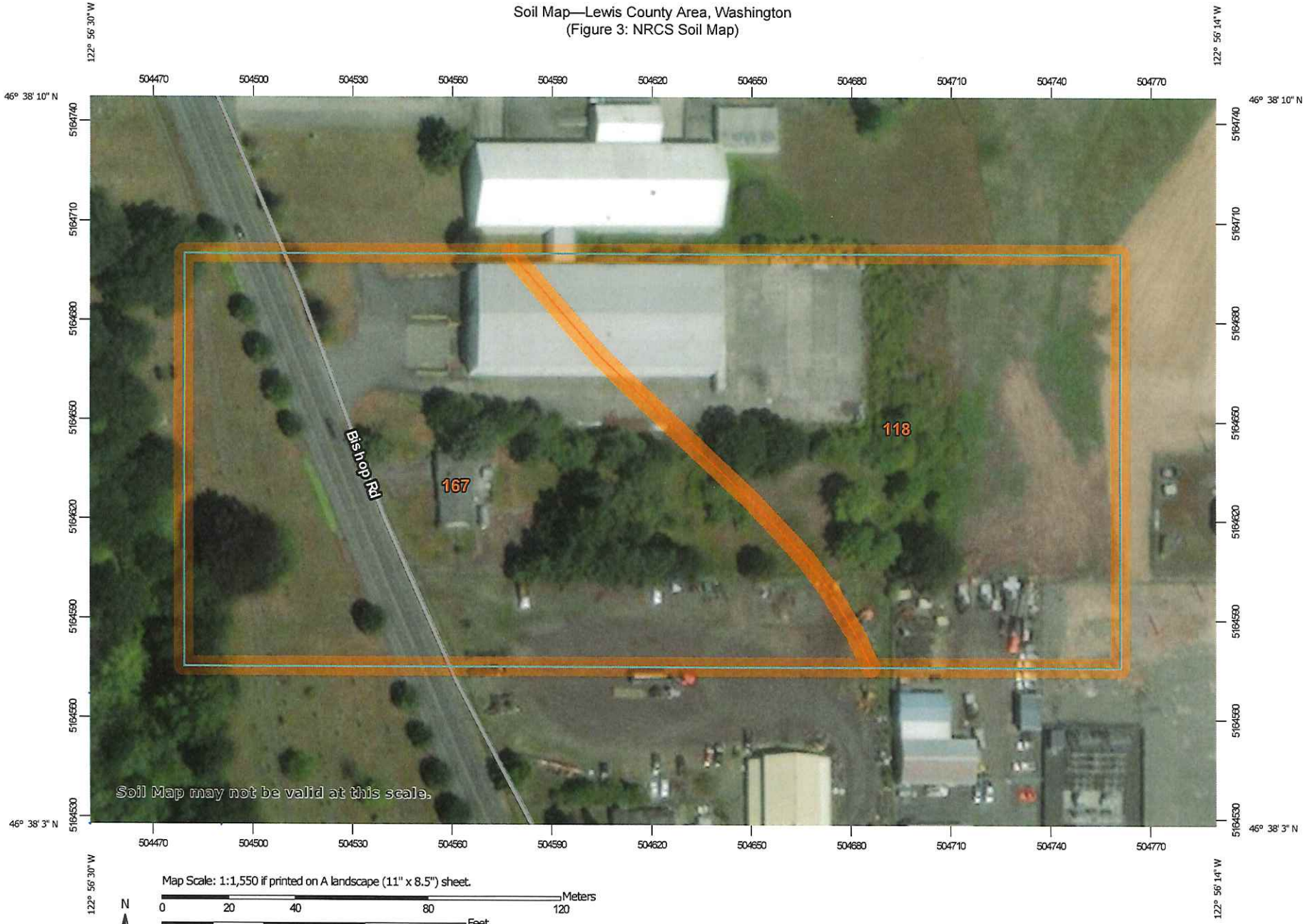
N

FIGURE 2: SITE MAP
TEST PLOT LOCATIONS

Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street
Centralia, Wa. 98531
(360) 219-3343

CLIENT NAME:	GREGG JOHNSON	SITE ADDRESS:	1467 BISHOP ROAD	JOB NUMBER:	2017-188
MAILING ADDRESS:	593 COAL CREEK ROAD		CHEHALIS, WA	DATE:	12/14/2017
	CHEHALIS, WA 98532	PARCEL NUMBER:	017543003000	DRAFTED BY:	BJR
PHONE NUMBER:	360-266-7368	SEC-TWN-RNG:	04/13N-02W	REVIEWED BY:	BJR

Soil Map—Lewis County Area, Washington
(Figure 3: NRCS Soil Map)



Map Scale: 1:1,550 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 16, Nov 9, 2017

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

Date(s) aerial images were photographed: Mar 29, 2016—Oct 10, 2016

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
118	Lacamas silt loam, 0 to 3 percent slopes	3.9	44.4%
167	Prather silty clay loam, 0 to 5 percent slopes	4.8	55.6%
Totals for Area of Interest		**8.7**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

Figure 4: NWI Map

December 14, 2017

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

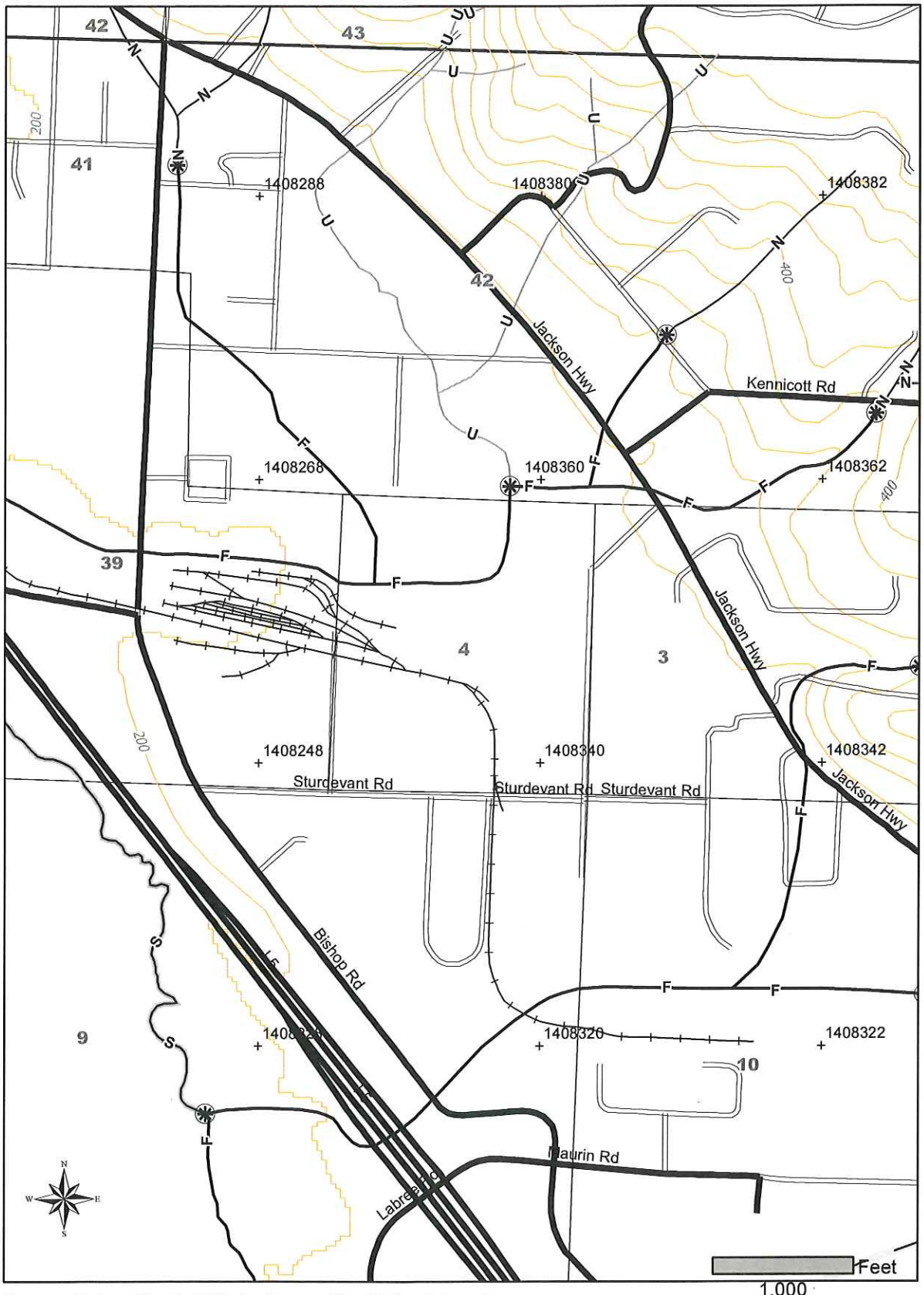
Figure 5: Lewis County Critical Area Map


Legend
Highlighted Feature
Tax Parcels
Sections
Twp-Rge
State Routes
County Rds
City Streets
USFS Routes
Private Rds
Railroads
Streams
Water Bodies
Wetlands
Hydric Soils
Cities
Urban Reserves
Federal Lands
Gifford Pinchot Natl Forest
Goat Rocks Wilderness
Mount Baker - Snoqualmie Natl Forest
Mount Rainier Natl Park
Mount St Helens Natl Volcanic Monument
Tatoosh Wilderness
William O Douglas Wilderness
2013 Aerial PICT

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 13 NORTH HALF 0, RANGE 02 WEST (W.M.) HALF 0, SECTION 4

Application #: _____



Please use the legend from the FPA Instruction or provide a list of symbols used.

Date: 12/14/2017 Time: 2:09:53 PM
NAD 83
Contour Interval: 40 Feet

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PRIORITY HABITATS AND SPECIES REPORT

SOURCE DATASET: PHSPlusPublic
REPORT DATE: 12/14/2017 2.11

Query ID: P171214141035

Common Name Scientific Name Notes	Site Name Source Dataset Source Record Source Date	Priority Area Occurrence Type More Information (URL) Mgmt Recommendations	Accuracy	Federal Status State Status PHS Listing Status	Sensitive Data Resolution	Source Entity Geometry Type
Freshwater Emergent	N/A NWIWetlands	Aquatic Habitat Aquatic habitat http://www.ecy.wa.	NA	N/A N/A PHS Listed	N AS MAPPED	US Fish and Wildlife Service Polygons

DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necesssary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to vraition caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

WDFW Test Map

December 14, 2017

PHS Report Clip Area

PT

LN

POLY

AS MAPPED

SECTION

QTR-TWP

TOWNSHIP

1:19,842

0 0.15 0.3 0.6 mi

0 0.275 0.55 1.1 km

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix B:

Site Pictures

View the site

View the site

View the site

View the site

View the site

View the site

Appendix C:

Test Plot Data Forms

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 1467 Bishop Road **City/County:** Chehalis / Lewis **Sampling Date:** 15-Nov-17

Applicant/Owner: Gregg Johnson **State:** Washington **Sampling Point:** **WTP 1**

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas Silt Loam / Prather Silty Clay Loam **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Rosa nutkana	10	☐ 9.1%	FAC
2. Spiraea douglasii	40	☑ 36.4%	FACW
3. Poa annua	60	☑ 54.5%	FAC
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	110	= Total Cover	
Herb Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	20	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	20	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	40	x 2 =	80	
FAC species	70	x 3 =	210	
FACU species	20	x 4 =	80	
UPL species	0	x 5 =	0	
Column Totals:	130	(A)	370	(B)

Prevalence Index = B/A = 2.846

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic 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, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Vegetatation does meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 1

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR	4/4	100						Silty Clay Loam	
12-19	10YR	4/4	90	10YR	6/4	10	C	M	Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. 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 Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Seasonal High Water Table

Depth (inches): 12"

Hydric Soil Present? Yes ◉ No ○

Remarks:

Soil appears to be hydric

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 on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does appear to be present

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 1467 Bishop Road **City/County:** Chehalis / Lewis **Sampling Date:** 15-Nov-17

Applicant/Owner: Gregg Johnson **State:** Washington **Sampling Point:** WTP 2

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas Silt Loam / Prather Silty Clay Loam **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Quercus alba	40	☑ 100.0%	FACU
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Poa annua	100	☑ 100.0%	FAC
2.		☐ 0.0%	
3.		☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	100	= Total Cover	
Herb Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	20	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	20	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	100	x 3 =	300	
FACU species	60	x 4 =	240	
UPL species	0	x 5 =	0	
Column Totals:	160	(A)	540	(B)

Prevalence Index = B/A = 3.375

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic 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, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetatation does not meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 2

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR	4/4	100						Silty Clay Loam	
12-19	10YR	4/4	90	10YR	6/4	10	C	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, 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 Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Seasonal High Water Table

Depth (inches): 12"

Hydric Soil Present? Yes ◉ No ○

Remarks:

Soil appears to be hydric

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 on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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): ____

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches): ____

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does appear to be present

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 1467 Bishop Road **City/County:** Chehalis / Lewis **Sampling Date:** 15-Nov-17

Applicant/Owner: Gregg Johnson **State:** Washington **Sampling Point:** WTP 3

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Lacamas Silt Loam / Prather Silty Clay Loam **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1. Pseudotsuga menziesii	40	☑ 100.0%	FACU
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Poa annua	100	☑ 100.0%	FAC
2.		☐ 0.0%	
3.		☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	100	= Total Cover	
Herb Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Rubus ursinus	20	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	20	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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Percent of dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	160 (A)		540 (B)

Prevalence Index = B/A = 3.375

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic 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, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetatation does not meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 3

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR	4/4	100						Silty Clay Loam	
12-19	10YR	4/4	90	10YR	6/4	10	C	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

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

- ☐ Histosol (A1)
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- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☑ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Seasonal High Water Table

Depth (inches): 12"

Hydric Soil Present? Yes ◉ No ○

Remarks:

Soil appears to be hydric

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 on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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):	
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does appear to be present

Wetland Report

Prepared For: Port of Chehalis

Site Address: 123 Habein Road, Chehalis

Tax Parcel Number: 017539006000

Date: November 17, 2020

Prepared By:
Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street, Centralia, WA 98531
(360) 219-3343

Table of Contents

Introduction **3**

Site Description **3**

Methodology **3**

Observation **4**
Vegetation 4
Soils 4
Hydrology 5
Wildlife 5
Topography 5

Surrounding Wetlands and Impacts 5

Conclusions 6

References **7**

Appendix A: Wetland Maps
Figure 1: Site Location Map
Figure 2: Site Map and Test Plot Locations
Figure 3: NRCS Soil Map
Figure 4: National Wetlands Inventory Map
Figure 5: Lewis County Critical Areas Map
Figure 6: DNR Stream Map
Figure 7: Fish and Wildlife PHS Map

Appendix B: Site Pictures

Appendix C: Test Plot Data Forms

Introduction:

Environmental Design, LLC conducted a Wetland Study on November 13, 2020 to determine if wetland habitat is present on the property located 123 Habein Road in Chehalis. The site is currently used as industrial land and will remain being used as industrial land.

In order to conduct a thorough review of the site to determine if wetlands are present on the site several resources were reviewed. The project started by pulling research and reviewing the research from several sources. After review of the research it was noted that wetlands were mapped on the site. A site visit was then conducted in order to test in areas for wetland habitat. Since the site has been primarily used and maintained as residential use, test sites were completed in areas where vegetation, elevation or other characteristics changed that indicated a possible presence of wetland habitat.

Site Description:

The site is located at 123 Habein Road in Chehalis, Washington. The site is identified by Lewis County by the parcel number 01739006000. The site is located in Section 04 of Township 13 North, Range 02 West. The property is about 6.43 acres in size and is relatively flat. The site is currently and will remained being used as industrial property. According to the research pulled wetlands are mapped on the site and in the surrounding areas.

The area around the site is primarily industrial area with mapped wetlands and hydric soils located throughout the sites.

Methodology:

A site visit was conducted on November 17, 2020 where Environmental Design walked the property and tested in various areas where vegetation seemed to have changed or where wetland habitat could be present. The site is consistent with the hydrology, vegetation, and soils at each test plot location.

Environmental Design, LLC completed the wetland study of this site by using the Routine Determination Method according to the 1987 U.S. Army Corp of Engineers Wetland Delineation Manual and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region.

In order to complete this method first research was conducted by pulling information and maps from the National Wetland Inventory website, the Lewis County Website, the NRCS website to find out what the soils were and also further information was pulled from the Department of Natural Resources

website. After reviewing the research a site visit was conducted and areas were tested where vegetation, elevation, or the soil may have changed.

When using the Routine Approach, a wetland area must meet three specific parameters. These three parameters are hydrology, vegetation and hydric soils. Hydrology can be difficult to assess because it may or may not be present, depending on the time of year. Vegetation and soils are important to assess if there has been hydrology present in the past. If the site meets the hydrology, vegetative and hydric soil parameters then the site is considered a wetland. If one parameter is not met then the area is not considered a wetland.

Observations:

Vegetation:

Wetland Vegetation has been classified into indicator statuses of how likely the plant is to be found in a wetland habitat. The indicator status of each plant species can be found on the data forms. The different indicator statuses are listed below:

- Obligate Wetland (OBL) – highly likely to be in a natural wetland environment
- Facultative Wetland (FACW) –most likely to be present in a natural wetland environment
- Facultative (FAC) – can be present in both a natural wetland and non-wetland environment
- Facultative Upland (FACU) –may be present in a natural wetland, but most likely to be seen in non-wetland conditions
- Obligate Upland (UPL) – most likely to occur in non-wetland conditions
- No Indicator – the plant does not have enough data to determine the indicator status yet

The site is primarily vegetated with field grass varieties, Oxeye Daisies, Cats Ear and Canadian Thistle.

The surrounding areas are similar in vegetation.

Soils:

The site is mapped as Lacamas Silt Loam and Prather Silty Clay Loam according to the U.S.D.A Natural Resources Conservation Service *Soil Survey of Lewis County, Washington (1980)*. The Lacamas series is listed on the hydric soils list produced by the U.S.D.A Natural Resources Conservation. The areas where test plots were conducted, the soil appeared to be consistent with the profile of the Newberg Fine Sandy Loam series.

The NRCS describes the Lacamas Silt Loam series as a very deep, poorly drained soil located on broad plains, terraces and bottom lands. In a typical profile, the upper portion of the surface layer extends to a depth of about 7

inches and is very dark grayish brown silt loam. The lower portion of the surface layer is mottled, dark grayish brown and grayish brown silt loam extending to a depth of about 10 inches. The subsoil is mottled, olive gray silty clay for the upper 19 inches and the lower portion is mottled, olive gray clay extending to a depth of 60 inches or more.

The NRCS describes the Prather Silty Clay Loam series is described as a very deep moderately drained soil that can be found on broad till plains and terraces. In a representative profile, the surface is generally covered with a mat of partially decomposed organic litter about 2 inches thick. The upper part of the surface layer is very dark brown silty clay loam that extends about 7 inches. The lower portion of the surface layer about 7 inches thick and is a dark brown silty clay loam. The following 12 inches of the subsoil is dark brown silty clay and the next 25 inches is mottled, dark brown silty clay and yellowish brown clay. The substratum of the profile extends to a depth of 60 inches or more and is mottled, dark reddish brown, gray and brown clay.

The soil appeared to be well drained in the upland areas and not so well drained in the lower test plot locations. The soil was evaluated to a depth of about 16-20 inches at each test plot location. See Appendix C for the Test Plot Data Form.

Hydrology:

The site appears to be well drained; however, evidence of hydrology was present in the lower area. See Appendix C for the Test Plot Data Form.

Wildlife:

The area is shown not to have species listed on the Priority Habitat Species Map produced by Fish and Wildlife. The vegetation surrounding the agricultural fields does provide great habitat for amphibians, birds and other mammals, as well as a sound barrier from surrounding activities.

Topography:

The topography at the site is relatively flat with slopes measuring between 0 to 3%.

Surrounding Wetlands and Impacts:

The National Wetlands Inventory (NWI) map and other maps do depict mapped wetlands within the area. It needs to be noted that the NWI maps and GeoData Center needs to be used cautiously as they compile general wetland data.

Environmental Design did not find wetland habitat located on the site within 300 feet of the parcel. Environmental Design conducted a further site investigation by site visit and by the use of mapping resources to determine if any wetland buffers or habitats would impact the client's project.

Conclusions:

Environmental Design, LLC concludes that wetland habitat is not present on the site or within 300 feet of the parcel.

References:

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Lewis County. Critical Areas Map. Online map. https://fortress.wa.gov/lewisco/home/.

Soil Conservation Service. 1995. Hydric Soils for Washington. Online document: http://www.statlab.iastate.edy:80/soils/hydric/wa/html.

Soil Conservation Service. 1980. Soil Survey of Lewis County, Washington. U.S. Department of Agriculture, Washington DC.

Soil Conservation Service. 1990. Soil Survey of Thurston County, Washington. U.S. Department of Agriculture, Washington DC.

U.S Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0), ed. J. S. Wakeley, R.W. Lichvar, and C. V. Noble. ERDC / EL TR-103. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Washington State Department of Ecology. 1997. Washington State Wetlands Identification and Delineation Manual. Publication # 96-94. Olympia, Washington.

Washington State Department of Ecology. 2004. Washington State Wetlands Rating System: Western Washington Revised. Publ. # 04-06-025. Olympia, Washington.

Washington Department of Fish and Wildlife. Priority Habitat Species (PHS) Database. (August 2014)

The determination of this wetland was completed by Environmental Design, LLC. The determination of this wetland is based on scientific method and our best professional judgment. Environmental Design, LLC agrees that the conclusion should agree with the local, state, and federal regulatory agencies.

Completed By:

Becky Rieger
Wetland Specialist

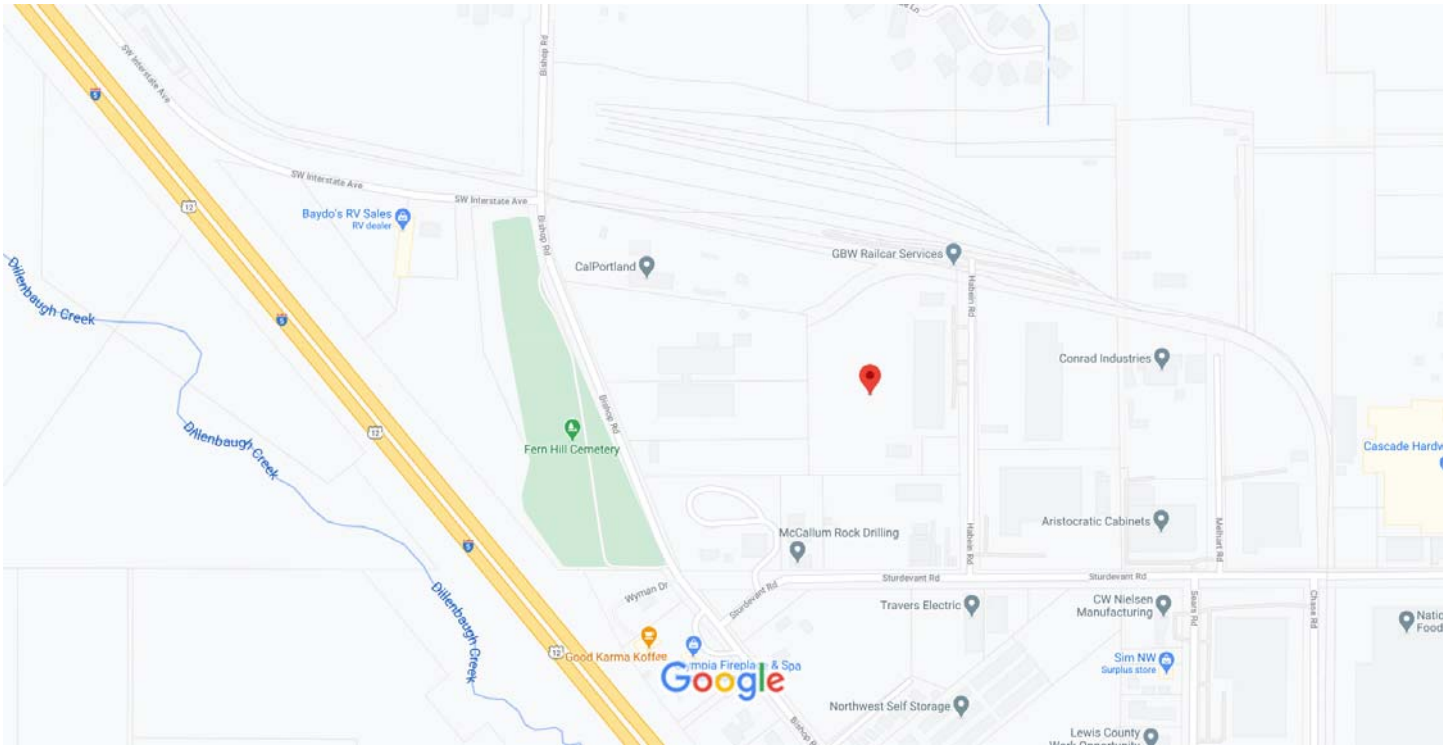
Appendix A:

Wetland Maps

Google Maps

123 Habein Rd

Figure 1: Site Location Map



123 Habein Rd

Chehalis, WA 98532

Directions Save Nearby Send to your phone Share

At this location

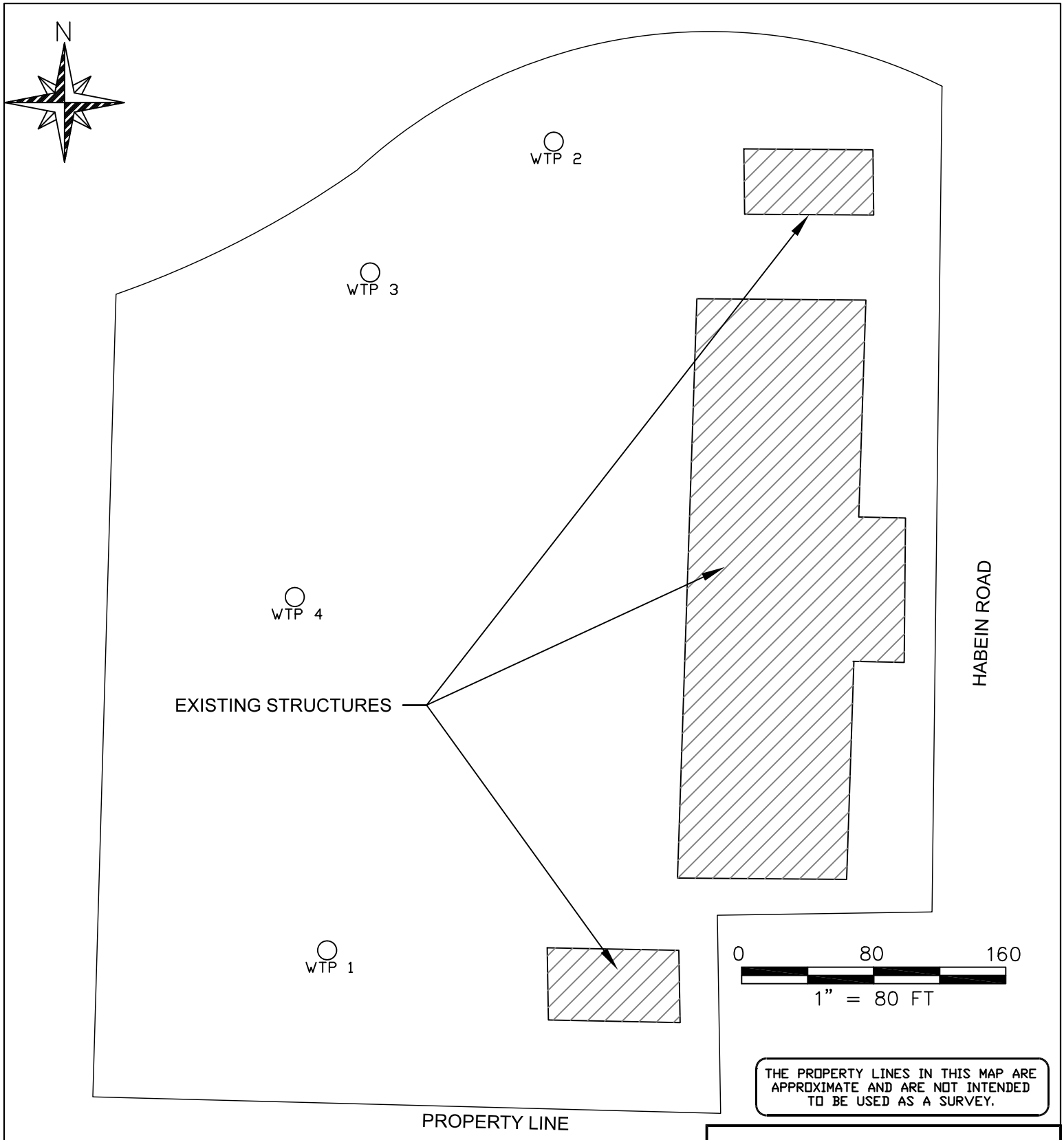
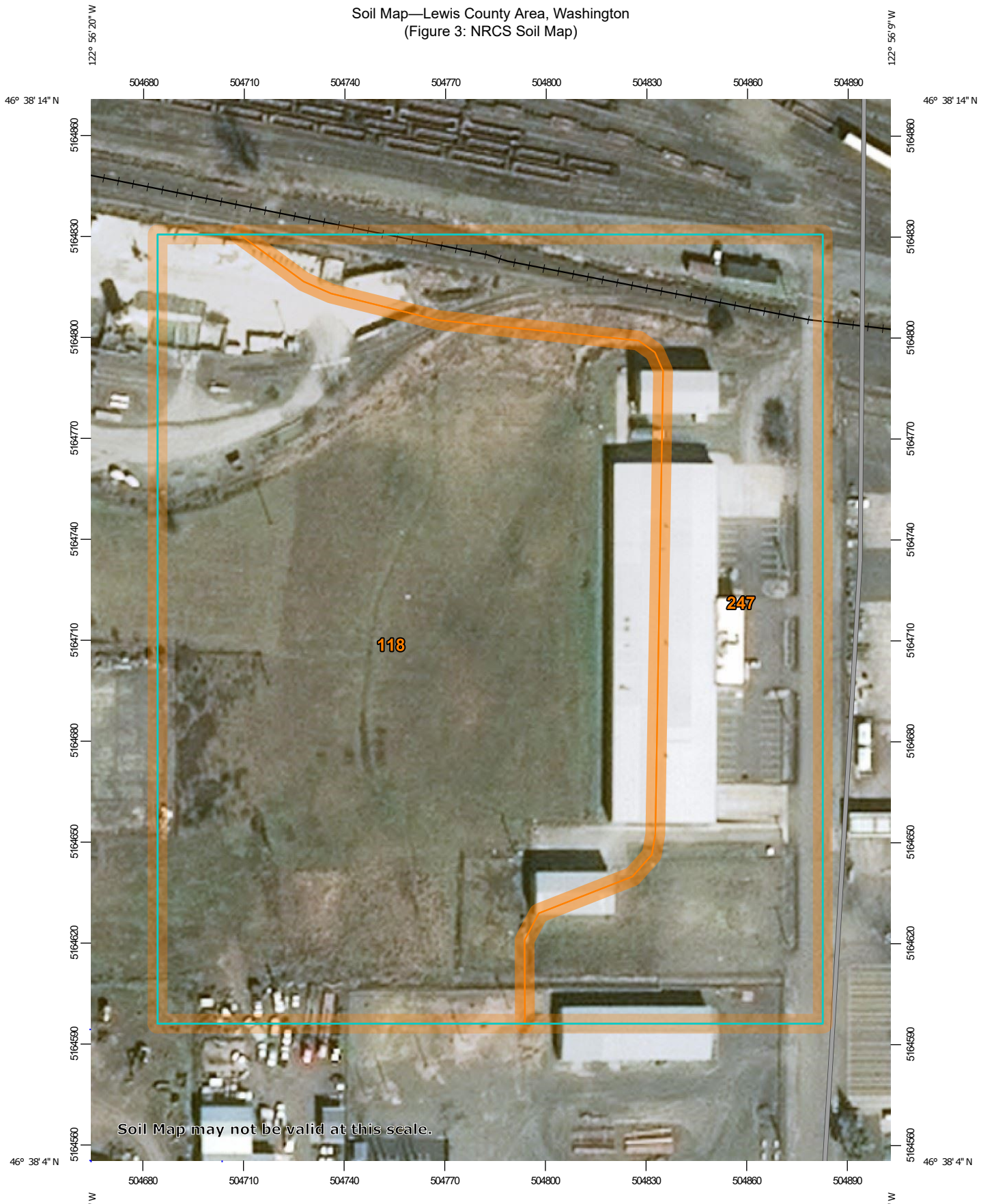


FIGURE 2: SITE MAP
TEST PLOT LOCATIONS

Environmental Design, LLC.
Septic Design • Wetlands • Mapping
901 L Street
Centralia, Wa. 98531
(360) 219-3343

CLIENT NAME:	PORT OF CHEHALIS	SITE ADDRESS:	123 HABEIN ROAD	JOB NUMBER:	2020-309
MAILING ADDRESS:	321 MAURIN RD		CHEHALIS, WA	DATE:	11/17/2020
	CHEHALIS, WA 98532	PARCEL NUMBER:	017539006000	DRAFTED BY:	BJR
PHONE NUMBER:	----	SEC-TWN-RNG:	04-13N-02W	REVIEWED BY:	BJR



Map Scale: 1:1,540 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 20, 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: Mar 30, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
118	Lacamas silt loam, 0 to 3 percent slopes	7.6	65.9%
247	Xerorthents, spoils	3.9	34.1%
Totals for Area of Interest		**11.5**	**100.0%**

U.S. Fish and Wildlife Service
National Wetlands Inventory

Figure 4: NWI Map

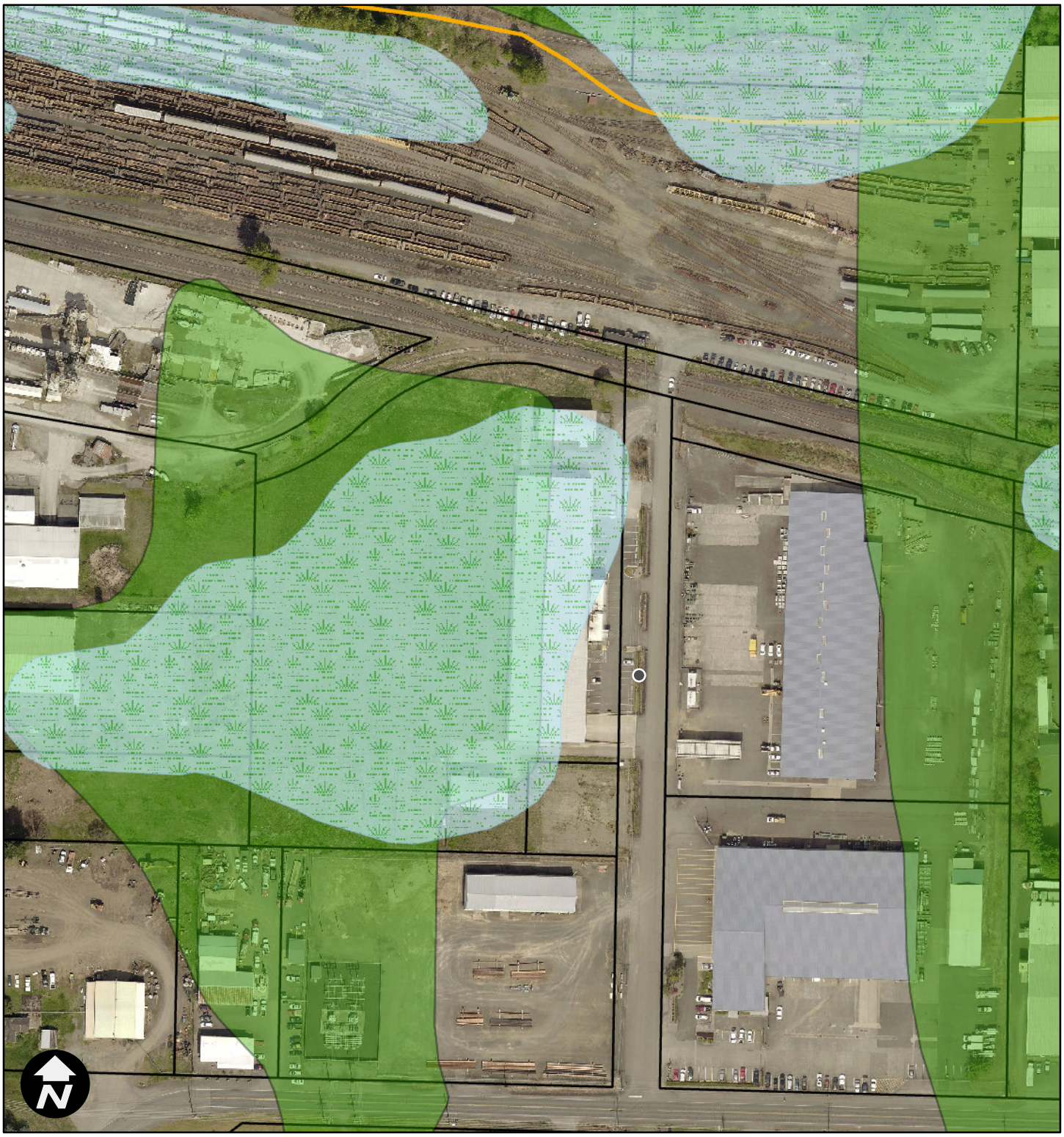
November 17, 2020

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Figure 5: Lewis County Critical Area Map



11/17/2020, 3:16:47 PM

1:2,257

- Wetlands
- Hydric Soils
- Shoreline Residential
- High Intensity
- Parcels

0 100 200 400 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

Shoreline Environments

- Aquatic
- Natural
- Rural or Urban Conservancy

Stream Buffers

- Shoreline 150'
- Fish 150'
- Non-Fish 75'

LEWIS COUNTY — est. 1845 —

Lewis County G.I.S.

Priority Habitats and Species on the Web

Report Date: 11/17/2020, Parcel ID: 017539006000

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Generalized Location
Freshwater Emergent Wetland	N/A	N/A	No
Big brown bat	N/A	N/A	Yes

PHS Species/Habitats Details:

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: PALUSTRINE - NWI Code: PEMC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Big brown bat	
Scientific Name	*Eptesicus fuscus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release (360-902-2543) for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	N
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

Appendix B:

Site Pictures

View of the Site

View of Site

View of the site

Appendix C:

Test Plot Data Forms

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 123 Habein Road **City/County:** Chehalis / Lewis **Sampling Date:** 13-Nov-20

Applicant/Owner: Port of Chehalis **State:** Washington **Sampling Point:** WTP 1

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Leucanthemum vulgare	20	☑ 22.2%	FACU
2. Holcus lanatus	40	☑ 44.4%	FAC
3. Poa annua	30	☑ 33.3%	FAC
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	90	= Total Cover	
Herb Stratum (Plot size:)			
1. Hypochaeris radicata	30	☑ 100.0%	FACU
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	30	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	0	**x 2 =**	0
FAC species	70	**x 3 =**	210
FACU species	50	**x 4 =**	200
UPL species	0	**x 5 =**	0
Column Totals:	120	**(A)**	410 **(B)**

Prevalence Index = B/A = 3.417

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic 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, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetatation does not meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-21	10YR 4/3						Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. 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 Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]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:

Soil does not appear to be hydric

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 on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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):	
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does not appear to be present

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 123 Habein Road **City/County:** Chehalis / Lewis **Sampling Date:** 13-Nov-20

Applicant/Owner: Port of Chehalis **State:** Washington **Sampling Point:** WTP 2

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Leucanthemum vulgare	20	☑ 22.2%	FACU
2. Holcus lanatus	40	☑ 44.4%	FAC
3. Poa annua	30	☑ 33.3%	FAC
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	90	= Total Cover	
Herb Stratum (Plot size:)			
1. Hypochaeris radicata	30	☑ 100.0%	FACU
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	30	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

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Total % Cover of:		Multiply by:	
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Column Totals:	120	**(A)**	410 **(B)**

Prevalence Index = B/A = 3.417

Hydrophytic Vegetation Indicators:

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- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetatation does not meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 2

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR	6/1	80	10YR	6/6	20	C	M	Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. 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 Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]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:

Soil does appear to be hydric

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)
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- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
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- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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):	
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does not appear to be present

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: 123 Habein Road **City/County:** Chehalis / Lewis **Sampling Date:** 13-Nov-20

Applicant/Owner: Port of Chehalis **State:** Washington **Sampling Point:** WTP 3

Investigator(s): Becky Rieger **Section, Township, Range:** S 04 T 13 N R 02 W

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR): **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: **NWI classification:** PEMC

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:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Leucanthemum vulgare	20	☑ 22.2%	FACU
2. Holcus lanatus	40	☑ 44.4%	FAC
3. Poa annua	30	☑ 33.3%	FAC
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	90	= Total Cover	
Herb Stratum (Plot size:)			
1. Hypochaeris radicata	30	☑ 100.0%	FACU
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	30	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	**x 1 =**	0
FACW species	0	**x 2 =**	0
FAC species	70	**x 3 =**	210
FACU species	50	**x 4 =**	200
UPL species	0	**x 5 =**	0
Column Totals:	120	**(A)**	410 **(B)**

Prevalence Index = B/A = 3.417

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic 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, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
Vegetatation does not meet criteria

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WTP 3

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR	6/1	80	10YR	6/6	20	C	M	Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. 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 Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in 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]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:

Soil does appear to be hydric

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 on 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 (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 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):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does not appear to be present

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Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

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Hydric Soil Present?	Yes ○	No ◉	
Wetland Hydrology Present?	Yes ○	No ◉	

Remarks:
Site does not meet criteria

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
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Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

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

Aerial Photos / Previous Inspections

Remarks:

Hydrology does not appear to be present

Credentials

Becky Rieger

Home Address:
901 L Street
Centralia, WA 98531
Phone: (360) 219-3343

Education

Associates Degree in Arts
Centralia Community College — Centralia, Washington
Date of Graduation: June 2007

Associates Degree in Applied Science
Major in Geographic Information Systems
Grays Harbor Community College — Aberdeen, Washington
Date of Graduation: June 2002

Continuing Education / Awards / Organizations

Coastal Training Program
- Certificate in Using the Revised Wetland Rating System (2014)
- Certificate in Identifying Hydric Soils (2012)
- Certificate in Using the Revised Wetland Rating System (2007)

Oregon State University (2006)
- Certificate in Soil Identification

Portland State University Wetland Program (2006)
- Certificate in Wetland Delineation Course
- Certificate in Advanced Hydric Soils and Hydrology Course
- Certificate in Hydrophytic Vegetation Identification Coarse

Licensed On-Site Wastewater Designer (2009-Current) License # 5100369

Olympia Master Builders
- Lewis County Chapter Vice President
- Olympia Master Builders Associate Vice President

Washington On-Site Sewage Association
- SW Washington Designer Rep. (2018 – Current)

Professional Experience

Licensed Designer / Wetland Specialist / Owner May 5, 2010 - Current
Environmental Design, LLC
- Complete Site and Soil Evaluations, Site Consultations, Topography Field Work
- Complete Septic Designs and mapping projects using MicroSurvey
- Complete Wetland and other Critical Area Reports per regulations in multiple jurisdictions
- Perform presentations to educate people about wetlands and septic systems

Assistant Designer / Certified Wetland Specialist Feb. 24, 2005 – Oct. 30, 2007
Goode & Associates Supervisor: Jeannie Yackley
- Complete designs of on-site wastewater designs for county submittal
- Communicate with county regulators, installers, and clients
- Conduct wetland determinations, delineations, mitigations and consultations
- Research projects, apply for permits, and conduct final inspections on installed septic systems
- Perform presentations to educate people about wetlands and septic systems

Maintenance Agreement

Fuller Designs Project No. 2076

May 18, 2021

Prepared by:

FULLER DESIGNS

1101 Kresky Ave, Centralia, WA 98531 (360) 807-4420

AFTER RECORDING RETURN TO:

_____

_____

_____

PLEASE PRINT OR TYPE ALL INFORMATION

DOCUMENT TITLE(S) (OR TRANSACTIONS CONTAINED THEREIN):

Stormwater Maintenance Agreement

REFERENCE NUMBER(S) OF DOCUMENTS ASSIGNED/RELEASED:

_____

GRANTOR/BORROWER (LAST NAME FIRST, FIRST NAME AND INITIALS):

Ramon Coronel

_____

ADDITIONAL NAMES LISTED ON PAGE N/A OF DOCUMENT.

GRANTEE/ASSIGNEE/BENEFICIARY (LAST NAME FIRST, FIRST NAME AND INITIALS):

City of Chehalis

_____

ADDITIONAL NAMES LISTED ON PAGE N/A OF DOCUMENT.

LEGAL DESCRIPTION (ABBREVIATED: I.E. LOT, BLOCK, PLAT OR SECTION, TOWNSHIP, RANGE)

Section 04, Township 13N, Range 02W PT L JOHNSON DLC LY S R/R R/W N STURDEVANT RD & W HABEIN RD

Section 04, Township 13N, Range 02W PT L JONHSON DLC LY E BISHOP RD & N STURDEVANT RD

COMPLETE LEGAL DESCRIPTION IS LISTED ON PAGE N/A OF DOCUMENT.

ASSESSOR'S TAX PARCEL NUMBER(S)

017543003000 & 017539006000

THE AUDITOR/RECORDER WILL RELY ON THE INFORMATION PROVIDED ON THIS FORM. THE STAFF WILL NOT READ THE DOCUMENT TO VERIFY THE ACCURACY OR COMPLETENESS OF THE INDEXING INFORMATION PROVIDED HEREIN.

Parcel Number(s): 017543003000 & 017539006000
Project Name: McCallum Rock Site Design
Address: 1467 Bishop Road, Chehalis, WA 98532
123 Habein Road, Chehalis, WA 98532

THIS AGREEMENT, made this _____ day of _____, 20__, by and between Angie Boggs , hereinafter referred to as the "Owners(s)" of the following property and Lewis County hereinafter referred to as the "County".

WITNESSETH, that

WHEREAS, Owner has submitted for approval by County a permit application and Site Plan for the construction and installation of stormwater management facilities pursuant to County Code chapter 15.45; and

WHEREAS, the County Code requires, as a condition of permit approval, a maintenance agreement between the County and the Owner ensuring the Owner constructs and maintains the stormwater facilities identified in the Site Plan.

THEREFORE, the Owner of certain real property, with full authority to execute deeds, mortgages, other covenants, do hereby covenant with the County and agree as follows:

1. Owner shall construct and install stormwater management facilities as depicted and shown on the Record Drawings for the above referenced parcel number(s)

2. Owner shall continuously maintain the stormwater management facilities as shown on the Site Plan in good working order and as specified in the maintenance schedule.

3. Owner hereby grants County, its authorized agents and employees, to enter onto the Property to inspect the stormwater facilities pursuant to Chapter 15.45 of the County Code.

4. In the event Owner fails to maintain the stormwater management facilities as shown on the Site Plan in good working order acceptable to the County, the County may enter the Property and take whatever steps deemed necessary and appropriate to maintain (including repair or replace) said stormwater facilities. It is expressly understood and agreed that the County is under no obligation to maintain or repair or replace said facilities, and in no event shall this Agreement be construed to impose such an obligation on the County.

5. In the event that the County performs work of any nature pursuant to section 4 of this agreement or expends any funds in performance of such work for labor, equipment, supplies or materials, Owner shall reimburse County for all reasonable costs incurred. Owner, its executors, administrators, assigns, heirs, and any other successors in interest, shall reimburse County for all costs within thirty (30) days of Owner's receipt of written

demand by the County for reasonable costs incurred, including but not limited to attorney fees, collection costs, and interest at the statutory rate.

6. It is the intent of this Agreement to ensure the continuous and proper maintenance of stormwater management facilities by the Owner, its heirs, successors and assigns; provided, however, that this Agreement shall not be deemed to create or affect any additional liability of any party for damage alleged to result from or caused by stormwater management.

7. Owner, its executors, administrators, assigns, and any other successors in interest, shall indemnify and hold the County, its agents and employees harmless from any and all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against County, its agents or employees, from the construction, presence, existence, or maintenance, of the stormwater management facilities by Owner.

8. This Agreement shall be recorded among the land records of Lewis County, Washington, and shall constitute a covenant running with the land, and shall be binding upon Owner, its administrators, executors, assigns, heirs, and any other successor in interest.

_____
Name (Signature)

_____
Name (Print)

_____
Title

_____
Date

State of Washington

County of _____

I certify that I know or have satisfactory evidence that _____ (name of person) is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument and acknowledged it to be (his/her) free and voluntary act for the uses and purposes mentioned in the instrument.

Dated:_____

(Seal or stamp)

_____
Signature

_____
Title

My appointment expires:_____

Operation and Maintenance Manual

Fuller Designs Project No. CD- 2076

May 24, 2021

Prepared by:

1101 Kresky Ave, Centralia, WA 98531 (360) 807-4420

SECTION 8 – OPERATION AND MAINTENANCE MANUAL

The Following pages contain maintenance needs for most of the components that are part of your drainage system, as well as components that you may not have. Let us know if there are any components that are missing from these pages. Ignore the requirements that do not apply to your system. You should plan to complete a checklist for all system components on the following schedule

1. Monthly from November through April
2. Once in late summer (preferably September).
3. After any major storm (use 1" of precipitation in 24 hours) for any items marked "S".

Using photocopies of these pages, check off the items you looked for after each inspection. Add comments on issues found and actions taken. Keep these records in your files. These files will be needed to write your annual report if required. Some items may not need to be looked at every time an inspection is done. Use the suggest frequency at the left of each item as a guideline for your inspection.

You may call the jurisdiction for technical assistance. Please do not hesitate to call, especially if you are unsure whether a situation you have discovered may be a developing issue.

Table V-A.1: Maintenance Standards - Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance and inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g.,rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.

If you are unsure whether a problem exists, contact a professional engineer.

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

If you are unsure whether a problem exists, contact a professional engineer.

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.
		(A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Piping	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway	Rock Missing	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

If you are unsure whether a problem exists, contact a professional engineer.

Table V-A.4: Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)
Catch Basin	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

If you are unsure whether a problem exists, contact a professional engineer.

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

If you are unsure whether a problem exists, contact a professional engineer.

Table V-A.11: Maintenance Standards - Wetponds

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Water level	First cell is empty, doesn't hold water.	Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.
	Trash and Debris	Accumulation that exceeds 1 CF per 1000-SF of pond area.	Trash and debris removed from pond.
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.	No clogging or blockage in the inlet and outlet piping.
	Sediment Accumulation in Pond Bottom	Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.	Sediment removed from pond bottom.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil removed from water using oil-absorbent pads or vactor truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, that exceeds 6-inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.	Dike/berm is repaired to specifications.
	Internal Berm	Berm dividing cells should be level.	Berm surface is leveled so that water flows evenly over entire length of berm.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to specifications.

If you are unsure whether a problem exists, contact a professional engineer.