Drainage Design Report

Habitat for Humanity
Sequim Avenue Development
Sequim, WA

Prepared For:

Habitat for Humanity of Clallam County
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LDC | Surveying Engineering Planning

March 2025

Drainage Design Report

Project Information

Project:	**Habitat for Humanity** **Sequim Avenue Development**
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Reviewing Agency

Jurisdiction:	City of Sequim

Project Representative

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Project Reference:	C22-272

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Drainage Design Report for the Habitat for Humanity Sequim Avenue development has been prepared by me or under my supervision and meets the minimum standards of the City of Sequim 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.

Preliminary

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1. PROJECT OVERVIEW

The following report was prepared for the Habitat for Humanity Sequim Avenue Development in Sequim, WA. This report was prepared to comply with the minimum technical standards and requirements that are set forth in the *2024 Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).*

Project Proponent:	Habitat for Humanity of Clallam County
Parcel Numbers:	033029229020
Total Parcel Area:	6.53 Acres
Current Zoning:	R4-8 – Single Family Residential
Required Permits:	Grading, Utility, Paving, Building, etc.
Site Address:	Not yet assigned
Section, Township, Range:	Section 29, Township 30 N, Range 3 W

The proposed Habitat for Humanity Brownfield Road development project is located on a 6.53-acre parcel. The proposed construction includes the construction of eight (8) town home buildings with four units per building, two (2) triplex buildings with three units per building, five (5) duplex buildings with two units per building, new private road, driveways, sidewalks, stormwater improvements, and utilities. The proposed project will disturb approximately 6.85 acres, 5.91 acres on-site and 0.94 acres off-site. Specifically, the proposed site improvements /construction activities for this project include the following:

- Site preparation, grading, and erosion control activities
- Construction of eight (8) four-unit town home buildings
- Construction of two (2) triplex buildings
- Construction of five (5) duplex buildings
- Construction of private road, driveways, and sidewalks
- Construction/installation of on-site stormwater management BMPs
- Construction of utilities (i.e., gravity sewer, sanitary sewer force main, water main, etc.)

A site vicinity map of the proposed project location is enclosed herein as **Appendix 1**. A worksheet for determining the number of Minimum Requirements for this project per the *2024 SWMMWW* has been prepared and enclosed herein as **Appendix 2**. The proposed project is considered a new development and will create over 5,000 square feet of new plus replaced hard surface areas. Therefore, the project will trigger minimum requirements #1-9 for the new and replaced impervious surfaces and land disturbed.

1.1 SUMMARY OF COMPLIANCE ON-SITE

The stormwater design complies with the 9 minimum requirements as follows:

Minimum Requirement #1 – Preparation of Stormwater Site Plans – The Stormwater Site Plan is prepared per the *2024 SWMMWW*.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention – A pollution prevention plan has been completed and included herein as **Appendix 7** which describes the 13 required elements. Further, an erosion control plan has been prepared and included as part of the preliminary construction plan set in **Appendix 4**.

Minimum Requirement #3 – Source Control of Pollution – BMPs listed below are the minimum required for the site, additional BMPs not listed here may need to be implemented to meet the minimum requirements discussed in the *2024 SWMMWW*.

- S410 BMPs for Correcting Illicit Discharges to Storm Drains
- S453 BMPs for Formation of a Pollution Prevention Team
- S454 BMPs for Preventive Maintenance / Good Housekeeping
- S455 BMPs for Spill Prevention and Cleanup
- S456 BMPs for Employee Training
- S457 BMPS for Inspections
- S458 BMPs for Record Keeping
- S411 BMPs for Landscaping and Lawn/Vegetation Management
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls – Currently, stormwater runoff within the project area appears to sheet flow to the northeast towards the on-site wetland and an existing vegetated ditch along the eastern property line that discharges through a culvert on East Brownfield Road. The stormwater runoff that does not infiltrate as it sheet flows across the parcel or within the on-site wetland will enter the stormwater ditch along East Brownfield Road via the existing culvert. The East Brownfield Road ditch discharges to Bell Creek, a tributary to the Lagoon and the Salish Sea. Additionally, the project parcel uses a French drain system to collect stormwater runoff from the steep slopes along the southern property line. This system outlets to the neighboring eastern parcel to an existing drainage swale that outlets to the existing ditch along East Brownfield Road.

After construction, the stormwater runoff from the proposed impervious surfaces and new pervious surfaces on-site will utilize three infiltration trenches, a detention pond that outlets to the existing culvert, and sheet flow dispersion to the existing wetland. The existing French drain system will be realigned and will continue to discharge to the eastern neighboring parcel as it does today. It is important to note that the realignment will reduce the volume of stormwater runoff utilizing the French drain system, thereby reducing the volume of water discharging to the neighboring parcel. Since the proposed project will utilize infiltration, this project is anticipated to reduce the volume of stormwater runoff entering the existing ditch along East Brownfield Road, thus increasing capacity of the downstream systems. In the case of failure of the infiltration trench located in the roadway, stormwater runoff will exit the system at the lowest catch basin and sheet flow along the private road gutter to the conveyance system that outlets to the detention pond. In the case of failure of the infiltration trenches located in the landscaping, stormwater runoff will exit the system at the lowest catch basin and sheet flow across the parcel towards the on-site wetland. In the case of failure of the detention pond, the stormwater runoff will sheet flow into the ditch located along East Brownfield Road.

Minimum Requirement #5 – On-Site Stormwater Management – In accordance with Minimum Requirement #7, this project is not flow control exempt, triggers Minimum Requirements #1-9, and is located on a parcel greater than 5 acres inside of the UGA. Therefore, the project shall employ the On-Site Stormwater Management BMPs in accordance with List #2 or the LID Performance Standard. The proposed project will utilize BMPs per List #2, see below.

Lawn and Landscaped Areas:

- Per the *2024 SWMMWW* manual, BMP T5.13: Post Construction Soil Quality and Depth will be utilized to the maximum extent practicable. See landscape plans for details.

Roofs:

- **Full Dispersion (BMP T5.30) or Downspout Full Infiltration Systems (BMP T5.10A):** Full dispersion is not feasible for this project site. Full dispersion requires that the site protects at least 65% of the site in a forest or native condition. For this reason alone, this BMP is not feasible. Downspout Full Infiltration Systems are not feasible for this project as the minimum design standards cannot be met. However, a portion of the proposed roof areas can utilize Infiltration Trenches per BMP T7.20. See Section 4 of this report for more information.
- The stormwater runoff from the roof areas that do not utilize the downspout infiltration trenches will be collected and conveyed to the proposed detention pond and discharge to the existing ditch along East Brownfield Road. See Section 4 of this report for more information.

Other Hard Surfaces:

- **Full Dispersion (BMP T5.30):** Full dispersion is not feasible for this project site. Full dispersion requires that the site protects at least 65% of the site in a forest or native condition. For this reason alone, this BMP is not feasible.
- **Permeable Pavement (BMP T5.15):** Permeable Pavement is not feasible for this project due to the fact that enhanced treatment is required.
- **Bioretention (BMP T7.30):** Bioretention is not feasible for this project due to the fact that sufficient storage of the proposed stormwater runoff cannot be provided while meeting the minimum design standards of a maximum 1 foot of ponding depth with a maximum of 3 to 1 side slopes in areas with infiltrative capacity.
- **Sheet Flow Dispersion (BMP T5.12) or Concentrated Flow Dispersion (T5.11):** Dispersion BMPs are not feasible for this project for the reasons mentioned previously.
- The other hard surfaces with this project will utilize infiltration trenches, a detention pond, and outlet to the on-site wetland. See Section 4 of this report for more information.

Minimum Requirement #6: Runoff Treatment: The proposed project will construct more than 5,000 square feet of new pollution generating impervious surface (PGIS). The proposed multifamily residential project will infiltrate stormwater within a quarter mile of a freshwater designated for aquatic life use or that has an existing aquatic life use; therefore, enhanced treatment is required for the pollution generating impervious surfaces. Native soil infiltration with pretreatment meeting the requirements of Site Suitability Criteria 6 (SSC-6) can be utilized to meet the enhanced treatment requirements. For the locations on-site that do not meet SSC-6, enhanced treatment will be provided via a mechanical treatment system to be sized at the time of civil permit submittal. See Section 4 of this report for more information.

Minimum Requirement #7: Flow Control: The proposed project will construct over 10,000 square feet of impervious surface and does not discharge to a flow control exempt water body, therefore flow control is required. Flow control for the project will be provided through the use of underground infiltration trenches and a detention pond. See Section 4 of this report for more information.

Minimum Requirement #8: Wetlands Protection: Land Services Northwest prepared a wetland delineation and critical area assessment, dated March 5th, 2025, for this project. Land Service Northwest identified a

Category IV wetland with a habitat score of 3 on-site and 25-foot buffer. Per Figure I-3.5 of the *2024 SWMMWW*, a Category IV wetland with a habitat score less than 5 that does not provide habitat for rare, endangered, threatened, or sensitive species nor does it contain a breeding population of native amphibians require the following Wetland Protection Levels: General Protection and Protection from Pollutants. To meet the General Protection and Protection from Pollutants requirements, only non-pollution generating surfaces will utilize flow spreaders to disperse stormwater runoff through the wetland buffer. The proposed project will direct an equivalent flow within 0.10 cfs of the predeveloped 100-year peak flow rate.

Minimum Requirement #9: Operation and Maintenance: An operations and maintenance manual has been completed and provided herein as **Appendix 9**.

2. EXISTING CONDITIONS SUMMARY

2.1 EXISTING ON-SITE CONDITIONS

The project parcel is +/- 6.53 acres in size. Topography within the site varies from slopes of 0% up to 23%. The site appears to have been cleared and undeveloped since at least 2005. The parcel is predominantly covered in grass. The project parcel uses a French drain system to collect stormwater runoff from the steep slopes along the southern property line. This system outlets to the neighboring eastern parcel. The stormwater runoff on-site that does not infiltrate will either discharge along the western property line or flow along the vegetated ditch past the French drain discharge point to an existing culvert located on East Brownfield Road. The East Brownfield Road ditch discharges to Bell Creek, a tributary to the Lagoon and the Salish Sea. There are no known flooding problems downstream of the project site. There are no flow control or water quality treatment facilities on the project site. See Figures 1, and 2, Existing Conditions Maps below.



Figure 1: Existing Conditions (2005)



Figure 2: Existing Conditions (2023)

2.1.1 Flood Hazard Zone

The flood hazard areas within this portion of Sequim, Washington are shown on the Federal Emergency Mapping Agency (FEMA) National Flood Insurance Program – Flood Insurance Rate Map (FIRM) No.

5300210530D, revised December 5, 1989. According to the FEMA FIRM, the project parcel is located within Zone C, an area of minimal flooding. See **Appendix 8** for the FEMA FIRM.

2.1.2 On-Site Soils Information

A geotechnical investigation was conducted by Quality Geo NW, LLC (QG) dated September 2023. Three test pits were conducted to a maximum depth of 8.5 feet while one test pit was conducted to a maximum depth of 4 feet. Based on these test pits, QG determined the following on-site soil conditions: topsoil from 0' to 1.0'; sandy silt inferred to be glacial till deposits from 1.0' to 7.0'; and silty gravel with sand inferred to be glacial outwash deposits from 7.0 to 8.5+'. Groundwater was not observed within any of the test pit excavations. Mottling or other signs of seasonal groundwater were also observed.

The soils in TP-1 and TP-2 were tested for their infiltration capacity and treatment capabilities. The soils in TP-1 were calculated to have a maximum long-term design infiltration rate of 0.40 inches per hour, a cation exchange capacity (CEC) of 14.6 meq/100g, and an organic content of 1.7%. An infiltration rate of 0.40 inches per hour was used to size the infiltration pond located near TP-1. The soils in TP-2 were calculated to have a maximum long-term design infiltration rate of 1.86 inches per hour, a CEC of 8.0 meq/100g, and an organic content of 1.0%. An infiltration rate of 1.86 inches per hour was used to size the infiltration trench located within the proposed road, near TP-2. Since the native soils in TP-1 and TP-2 have a cation exchange capacity (CEC) greater than the minimum 5 meq/100 g and organic content greater than or equal to the minimum of 1.0% as required by Site Suitability Criteria 6 – Soil Physical and Chemical Suitability, the on-site soils can be used for treatment.

See **Appendix 5** for the geotechnical report.

3. OFFSITE ANALYSIS REPORT

3.1 QUALITATIVE UPSTREAM ANALYSIS

Currently, it appears that there is no on-site run on from adjacent project areas. Both adjacent streets have a vegetated ditch to collect stormwater runoff. The adjacent eastern parcel is at a lower elevation than the project parcel. The adjacent southern parcel was recently developed with its own on-site stormwater management facilities.

3.2 QUALITATIVE DOWNSTREAM ANALYSIS

After construction, the stormwater runoff from the proposed impervious surfaces and new pervious surfaces on-site will utilize three infiltration trenches, a detention pond that outlets to the existing culvert, and sheet flow dispersion to the existing wetland. The existing French drain system will be realigned and will continue to discharge to the eastern neighboring parcel as it does today. It is important to note that the realignment will reduce the volume of stormwater runoff utilizing the French drain system, thereby reducing the volume of water discharging to the neighboring parcel. Since the proposed project will utilize infiltration, this project is anticipated to reduce the volume of stormwater runoff entering the existing ditch along East Brownfield Road, thus increasing capacity of the downstream systems. In the case of failure of the infiltration trench located in the roadway, stormwater runoff will exit the system at the lowest catch basin and sheet flow along the private road gutter to the conveyance system that outlets to the detention pond. In the case of failure of the infiltration trenches located in the landscaping, stormwater runoff will exit the system at the lowest catch basin and sheet flow across the parcel towards the on-site wetland. In the case of failure of the detention pond, the stormwater runoff will sheet flow into the ditch located along East Brownfield Road.

The stormwater runoff from the areas off-site of the parcel will continue to sheet flow into the ditch along South Sequim Avenue and East Brownfield Road. No adverse impacts to the downstream systems are anticipated.

4. PERMANENT STORMWATER CONTROL PLAN

4.1 SUMMARY SECTION

The proposed project follows the development requirements stated in the *2024 SWMMWW*. Following Figure I-3.1 (See **Appendix 2**), this project classifies as a new development that triggers minimum requirements #1-9. The site does not have 35% or more of existing impervious coverage, and the project will add more than 5,000 square feet of new impervious surfaces. See **Appendix 4** for the proposed stormwater conveyance locations and details. Table 1 and 2 below illustrate the existing and proposed impervious and pervious areas of the disturbed areas (See **Appendix 3** for the basin maps).

Table 1: Land Type Designations Existing vs. Proposed

LAND TYPE DESIGNATIONS	AREA (ACRES)	% OF TOTAL AREA
On-Site Existing Areas	**6.53**	**100**
Impervious	0.00	0
Pervious	6.53	100
On-Site Proposed Areas	**6.53**	**100**
Impervious	2.69	41.2
Pervious	3.84	58.8
Off-Site Existing Areas	**0.94**	**100**
Impervious	0.42	44.7
Pervious	0.52	55.3
Off-Site Proposed Areas	**0.94**	**100**
Impervious	0.56	59.6
Pervious	0.38	40.4

4.1.1 Performance Standards and Goals

Following Figure 2.4.1 – Flow Chart for Determining Requirements for New Development, the project is considered a new development that triggers the use of Minimum Requirements #1-9. The proposed project is a multifamily new development that creates more than 5,000 square feet of pollution generating impervious surfaces and will infiltrate runoff within a quarter mile of a fresh waterbody designated for aquatic life; therefore, enhanced treatment is required per Minimum Requirement #6. The proposed project will add greater than 10,000 square feet of impervious surfaces, therefore Minimum Requirement #7 applies. Per Minimum Requirement #8, the on-site Category IV wetland requires General Protection and Protection from Pollutants.

4.1.2 Water Quality System

The proposed project will construct more than 5,000 square feet of new pollution generating impervious surface (PGIS). The proposed multifamily residential project will infiltrate stormwater within a quarter

mile of a freshwater designated for aquatic life use or that has an existing aquatic life use; therefore, enhanced treatment is required for the pollution generating impervious surfaces.

Per Site Suitability Criteria 6 (SSC-6) – Soil Physical and Chemical Suitability, if native soils have a minimum cation exchange capacity (CEC) of 5 meq/100 g and organic content greater than or equal to the minimum of 1.0%, then the native soils can be used for basic treatment. The native soils that satisfy SSC-6 can be used for enhanced treatment when preceded by a pretreatment facility.

Enhanced treatment will be provided using native soil infiltration with pretreatment where site soils meet SSC-6 and a Modular Wetland System where site soils do not meet SSC-6.

Table 2: Proposed On-Site Treatment Basins

LAND TYPE DESIGNATIONS	AREA (ACRES)
Basin 1	**0.56**
Asphalt	0.20
Concrete	0.10
Pervious	0.26
Basin 2	**0.26**
Asphalt	0.07
Concrete	0.05
Pervious	0.14
Basin 3	**0.92**
Asphalt	0.27
Concrete	0.19
Pervious	0.46
Basin 4	**2.27**
Roof	0.40
Asphalt	0.28
Concrete	0.20
Pervious	1.39

Treatment Basin 1

The proposed surfaces in Treatment Basin 1, shown above in Table 2, will utilize a Contech CDS system for mechanical pretreatment prior to infiltration through the native soils via the proposed infiltration trench. The proposed Contech CDS system will be sized at the time of civil permit submittal. The proposed infiltration trench is located near TP-1. The native soils in TP-1 were calculated to have a CEC of 14.6 meq/100g, and an organic content of 1.7%.

Treatment Basin 2

The proposed surfaces in Treatment Basin 2, shown above in Table 2, will utilize a Contech CDS system for mechanical pretreatment prior to infiltration through the native soils via the proposed infiltration trench. The proposed Contech CDS system will be sized at the time of civil permit submittal. The proposed infiltration trench is located near TP-1. The native soils in TP-1 were calculated to have a CEC of 14.6 meq/100g, and an organic content of 1.7%.

Treatment Basin 3

The proposed surfaces in Treatment Basin 3, shown above in Table 2, will utilize a Contech CDS system for mechanical pretreatment prior to infiltration through the native soils via the proposed infiltration trench. The proposed Contech CDS system will be sized at the time of civil permit submittal. The proposed infiltration trench is located near TP-2. The native soils in TP-2 were calculated to have a CEC of 8.0 meq/100g, and an organic content of 1.0%.

Treatment Basin 4

The proposed surfaces in Treatment Basin 4, shown above in Table 2, will utilize a shallow Contech Modular Wetland System (MWS) prior to detention in the proposed detention pond. The shallow MWS will be sized at the time of civil permit submittal.

4.1.3 Flow Control System

Flow control is required for the proposed project and will be provided through the use of underground infiltration trenches and a detention pond. The infiltration trenches were sized using the Western Washington Hydrology Model (WWHM 2012) while the detention pond was sized using MGS Flood.

Table 3: Proposed On-Site Flow Control Basins

LAND TYPE DESIGNATIONS	AREA (ACRES)
Basin 1	**0.56**
Asphalt	0.20
Concrete	0.10
Pervious	0.26
Basin 2	**0.26**
Asphalt	0.07
Concrete	0.05
Pervious	0.14
Basin 3	**0.92**
Asphalt	0.27
Concrete	0.19
Pervious	0.46
Basin 4	**2.27**
Roof	0.40
Asphalt	0.28
Concrete	0.20
Pervious	1.39
Basin 5	**2.52**
Roof	0.90
Sidewalk	0.03
Pervious	0.84
Wetland + Buffer	0.75

Flow Control Basin 1

Per the geotechnical report, the location of the proposed infiltration trench can be designed with a long-term design infiltration rate of 0.40 inches per hour in the top 1.0 to 8.0 feet of native soil. According to WWHM 2012, the proposed on-site improvements within this basin as shown in Table 3 require an infiltration trench with a bottom area of 1,188 square feet (66 feet x 18 feet) at a total depth of 7 feet, including 1 foot of freeboard, to fully infiltrate all of the stormwater runoff generated by this basin. All of the landscaping areas will be amended per BMP T5.13.

Flow Control Basin 2

Per the geotechnical report, the location of the proposed infiltration trench can be designed with a long-term design infiltration rate of 0.40 inches per hour in the top 1.0 to 8.0 feet of native soil. According to WWHM 2012, the proposed on-site improvements within this basin as shown in Table 3 require an infiltration trench with a bottom area of 636 square feet (106 feet x 6 feet) at a total depth of 5 feet, including 0.5 feet of freeboard, to fully infiltrate all of the stormwater runoff generated by this basin. All of the landscaping areas will be amended per BMP T5.13.

Flow Control Basin 3

Per the geotechnical report, the location of the proposed infiltration trench can be designed with a long-term design infiltration rate of 1.86 inches per hour in the top 7.0 to 8.5 feet of native soil. According to WWHM 2012, the proposed on-site improvements within this basin as shown in Table 3 require an infiltration trench with a bottom area of 1,044 square feet (106 feet x 9.85 feet) at a total depth of 6.5 feet, including 1 foot of freeboard. All of the landscaping areas will be amended per BMP T5.13.

Flow Control Basin 4

Per the geotechnical report, the proposed detention pond is located at Test Pit #4 where no infiltration rate was able to be measured. According to MGS Flood, the proposed on-site improvements within this basin as shown in Table 3 require a detention pond with a minimum bottom area of 5,100 square feet at a total depth of 4 feet, including 1 foot of freeboard, with 2:1 side slopes. All of the landscaping areas will be amended per BMP T5.13.

Flow Control Basin 5

In order to protect the wetland, the proposed areas in Basin 5 will continue to discharge to the wetland. The predeveloped 100-year peak flow discharging to the wetland was 0.78 cfs. After construction, the proposed areas result in a peak 100-year flow of 0.74 cfs. The proposed conditions decrease the 100-year peak flow by 0.04 cfs.

See **Appendix 10** for the WWHM and MGS Flood reports.

It is important to note that the steep slopes along the southern property line behind the proposed wall will utilize the realigned French drain system that outlets approximately halfway between the southern and northern property lines along the eastern property line to the existing drainage swale on the neighboring parcel. This drainage swale outlets to the existing ditch along East Brownfield Road. The realignment of the French drain will reduce the volume of stormwater runoff being collected and conveyed to the neighboring parcel.

The stormwater runoff from the proposed areas off-site improvements will be collected and conveyed to a flow control facility. Further geotechnical investigation is required. The propose flow control facility will be designed at the time of civil permit submittal.

4.1.4 Conveyance System Analysis and Design

All stormwater conveyance systems will be sized to convey the 24-hour 25-year storm within the pipe at the time of civil permit submittal.

5. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (C-SWPPP)

A SWPPP has been completed and included herein as **Appendix 7**.

6. SPECIAL REPORTS AND STUDIES

See **Appendix 5** for the geotechnical report.

Per the wetland delineation and critical assessment report prepared by Land Service Northwest and dated March 2025, unavoidable impacts will occur to 1,531 square feet of the wetland buffer. In order to reduce the effect of these unavoidable impacts, at minimum, the following measures will be utilized: 31,270 square feet of native vegetation will be planted in the wetland and remaining buffer area; untreated runoff and increased runoff flows will be diverted away from the wetland; invasive species will be removed from within the enhancement limits; lights will be directed away from the wetland and its buffer; and pesticides will be limited within 100 feet of the wetland. The proposed mitigation will increase the functionality of the wetland buffer and improve the health of the wetland. See **Appendix 6** for the wetland delineation and critical areas assessment report.

No other special reports or studies were required for this project.

7. OTHER PERMITS

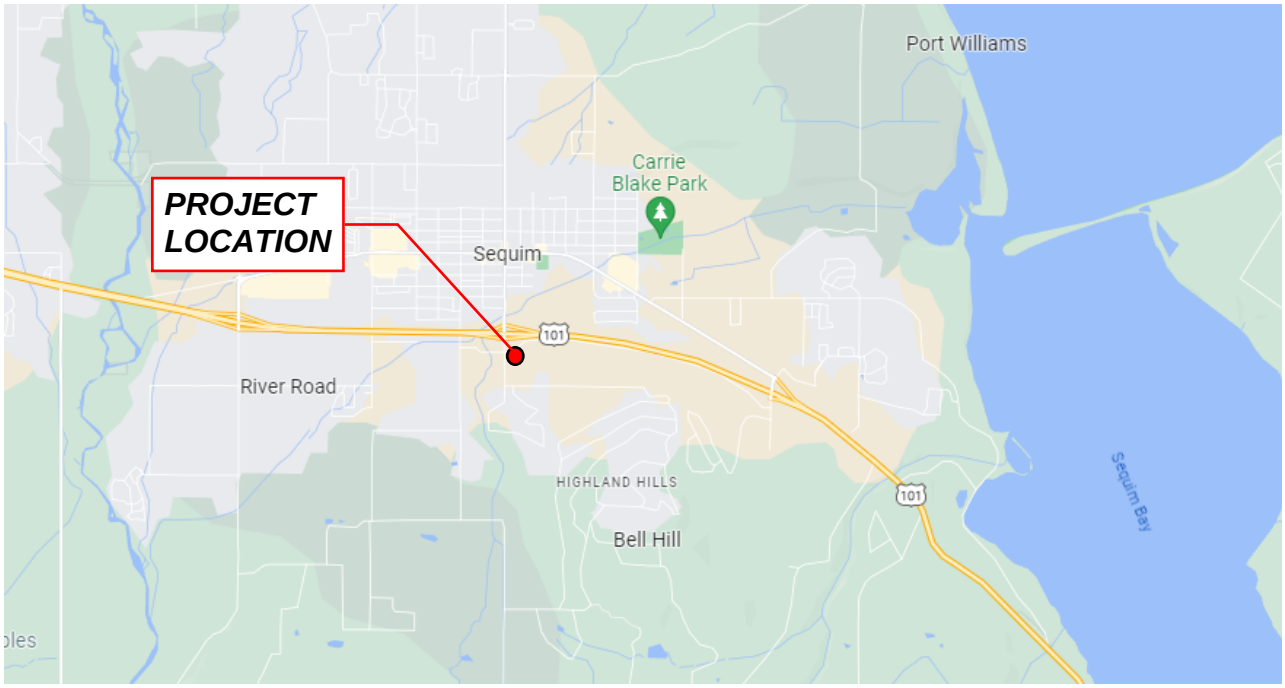
Construction stormwater general permit, utility, paving, building, and grading permits may need to be secured prior to beginning construction activities.

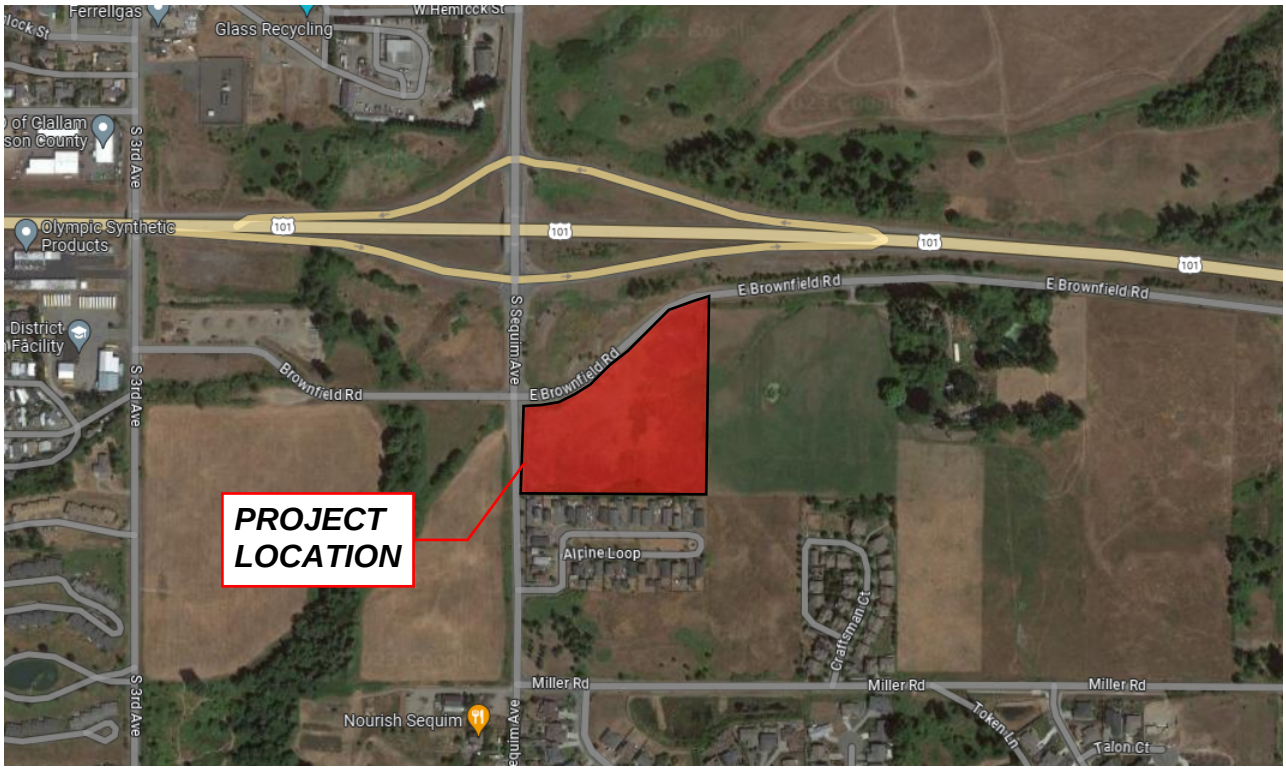
8. OPERATION AND MAINTENANCE MANUAL

Habitat for Humanity of Clallam County will be responsible for maintaining all stormwater facilities on-site. An operation and maintenance manual has been completed and included herein as **Appendix 9**.

END OF STORMWATER SITE PLAN

APPENDIX 1
SITE VICINITY MAP





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APPENDIX 2
DETERMINATION OF MINIMUM REQUIREMENTS WORKSHEET

Figure I-3.1: Flow Chart for Determining Requirements for New Development

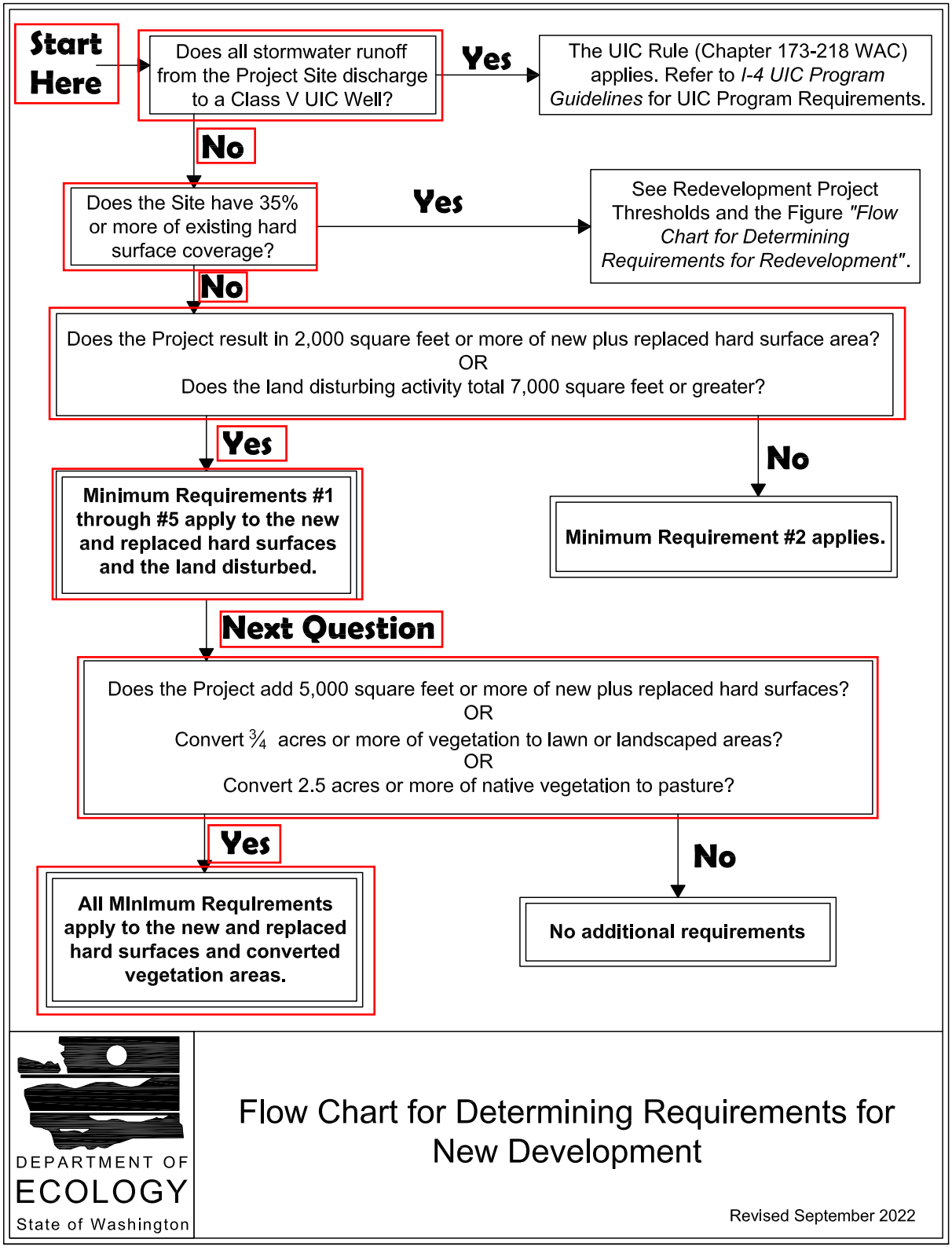


Figure I-3.3: Flow Chart for Determining MR #5 Requirements

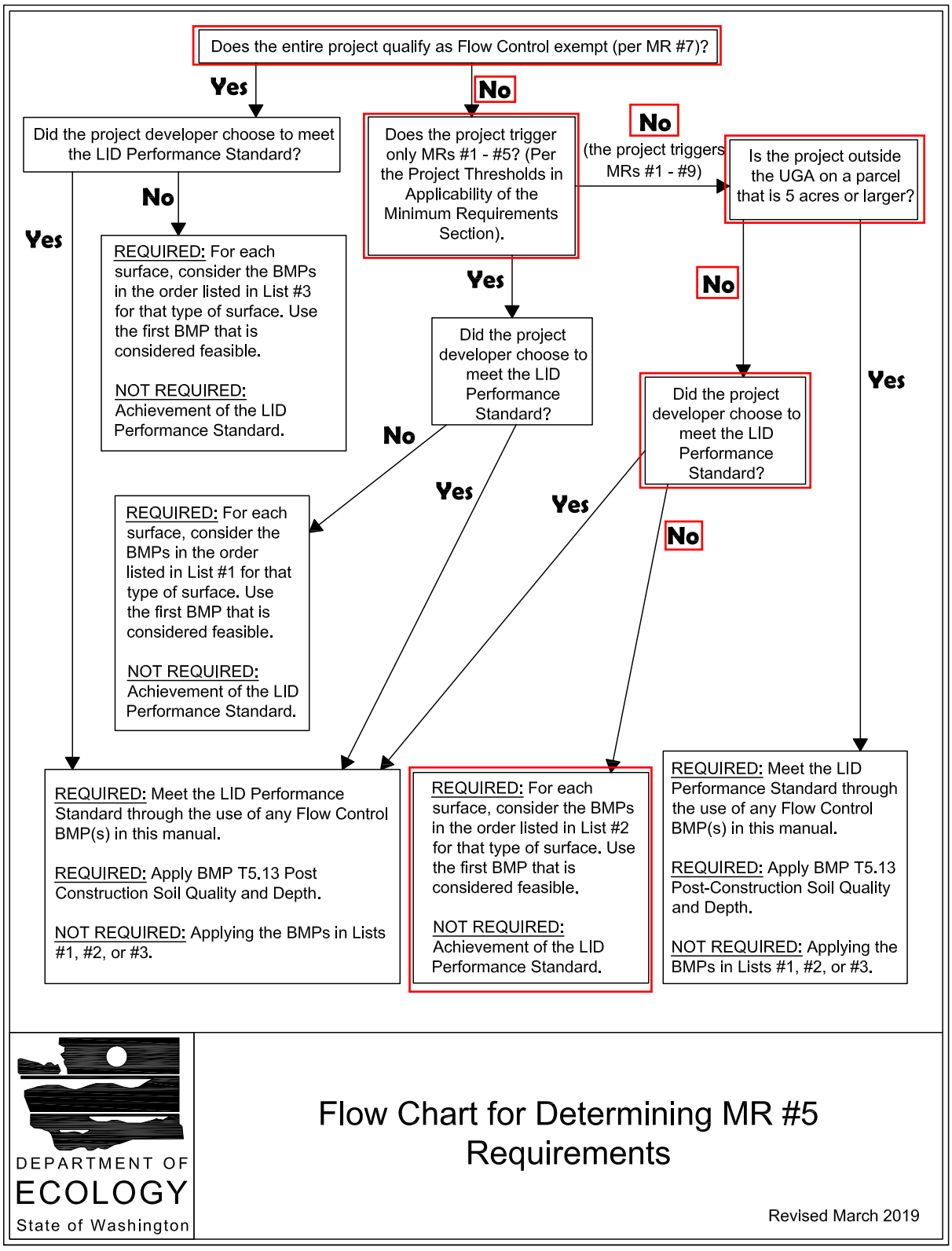
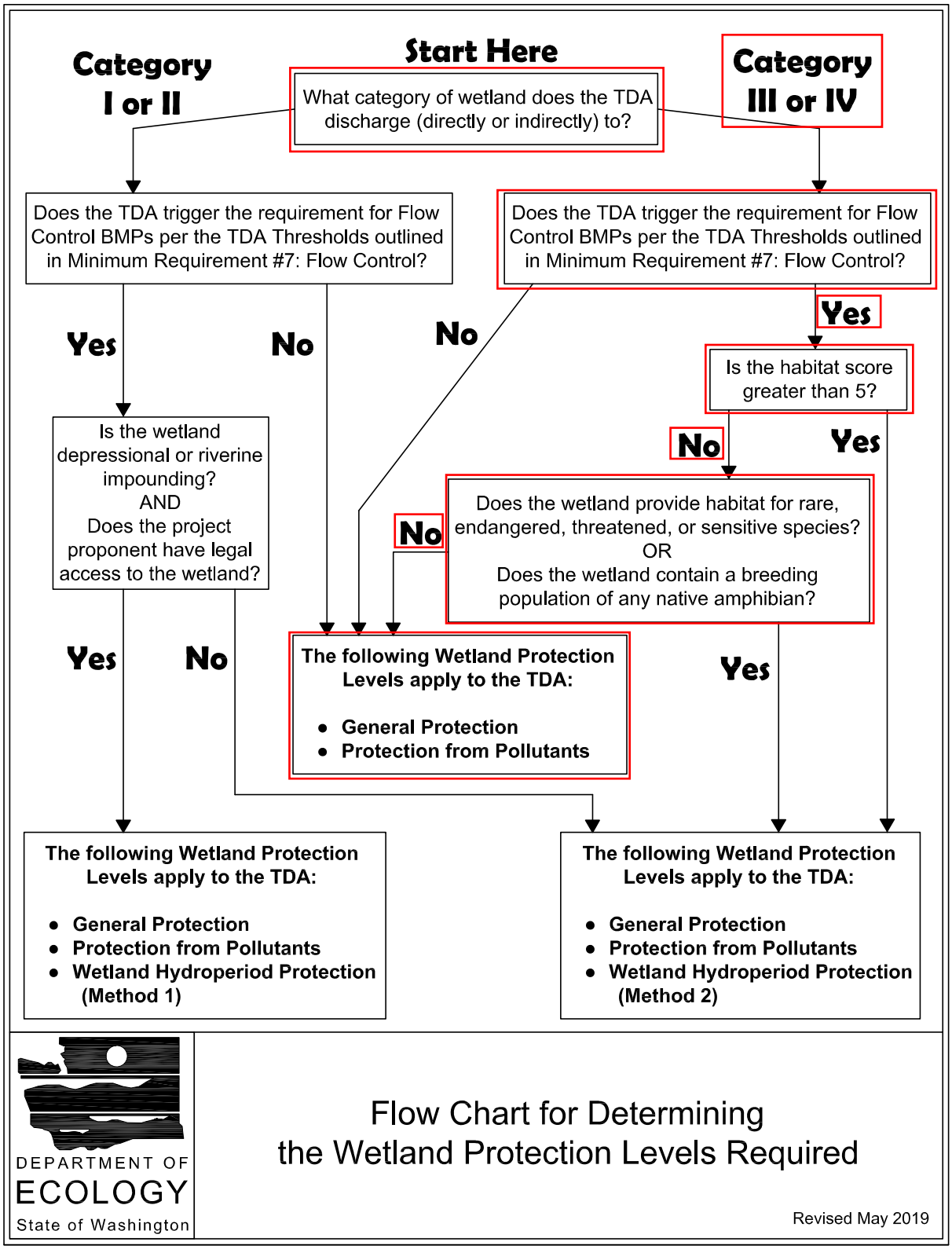
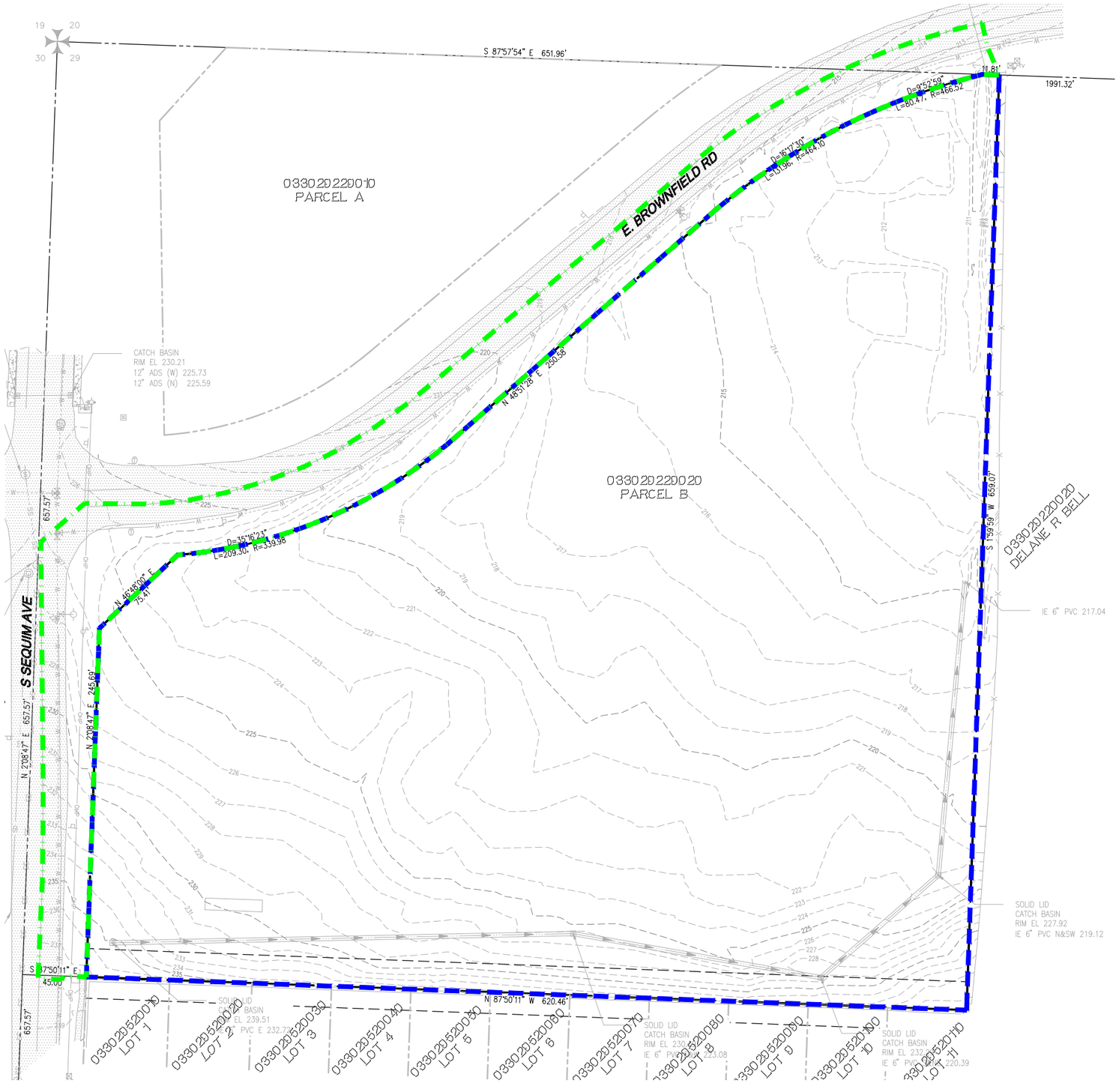
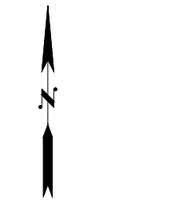


Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements



APPENDIX 3
BASIN MAP EXHIBITS





EXISTING ON-SITE AREAS:

IMPERVIOUS:	***0.00 ACRES***
PERVIOUS:	***6.53 ACRES***
TOTAL:	***6.53 ACRES***

EXISTING OFF-SITE AREAS:

IMPERVIOUS:	***0.42 ACRES***
PERVIOUS:	***0.52 ACRES***
TOTAL:	***0.94 ACRES***

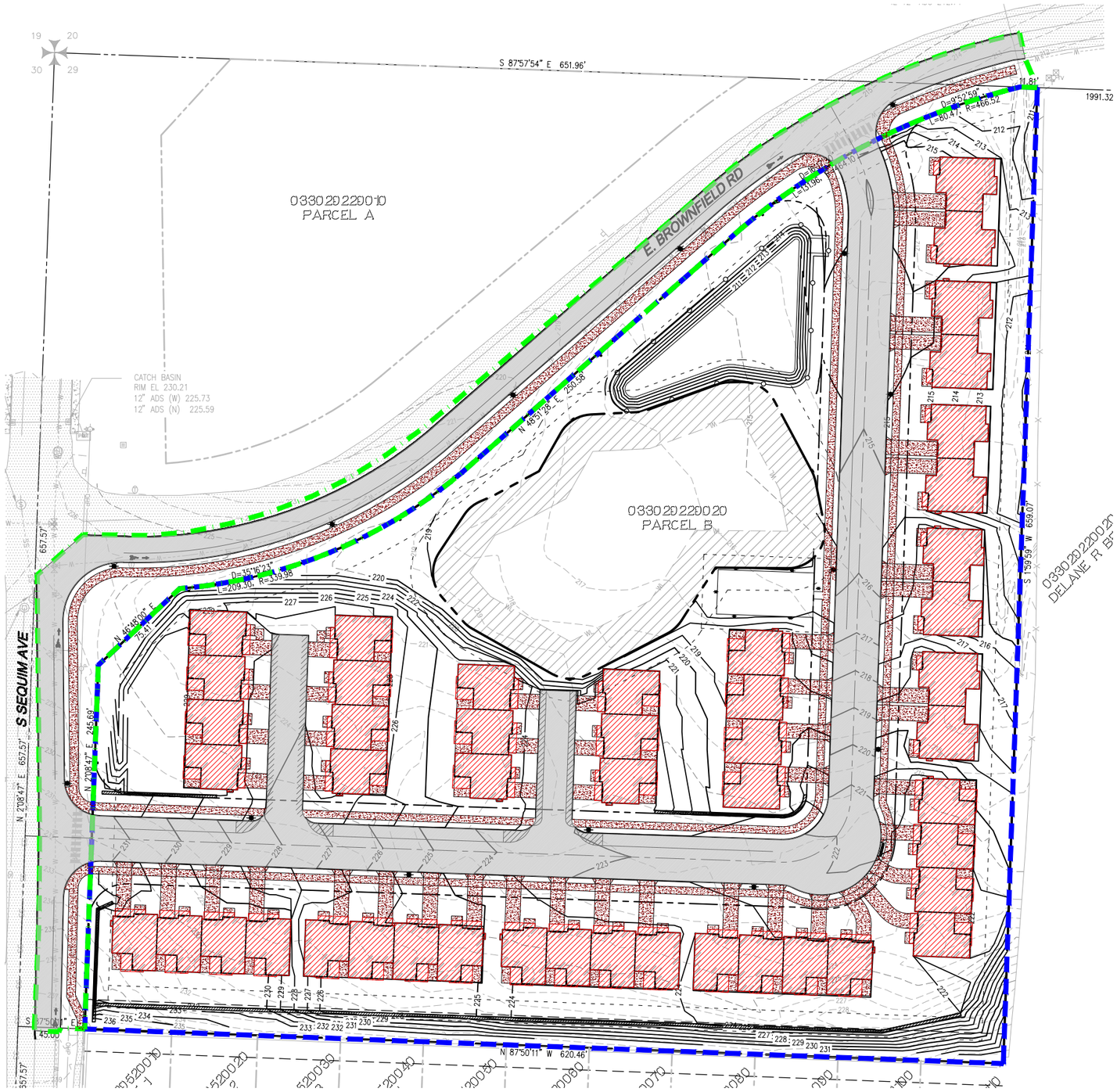
HABITAT FOR HUMANITY OF CLALLAM COUNTY

SEQUIM AVENUE DEVELOPMENT
EXISTING CONDITIONS MAP

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Woodinville Olympia Kent
321 Cleveland Avenue SE, #209
Tumwater, WA 98501
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ISSUE DATE: 03-06-25

Drawing: P:\Civil\2022\C22-272 Habitat for Humanity Brownfield Rd\Drawings\Exhibits\Stormwater\C22-272 Ex.Conditions Map.dwg Plotted: Mar 06, 2025 - 8:31am



N

SCALE: 1" = 40'

40' 0 40' 80'

PROPOSED ON-SITE AREAS:

ROOF:	***1.30 ACRES***
CONCRETE:	***0.57 ACRES***
ASPHALT:	***0.82 ACRES***
PERVIOUS:	***3.84 ACRES***
TOTAL:	***6.53 ACRES***

PROPOSED OFF-SITE AREAS:

CONCRETE:	***0.09 ACRES***
ASPHALT:	***0.47 ACRES***
PERVIOUS:	***0.38 ACRES***
TOTAL:	***0.94 ACRES***

HABITAT FOR HUMANITY OF CLALLAM COUNTY

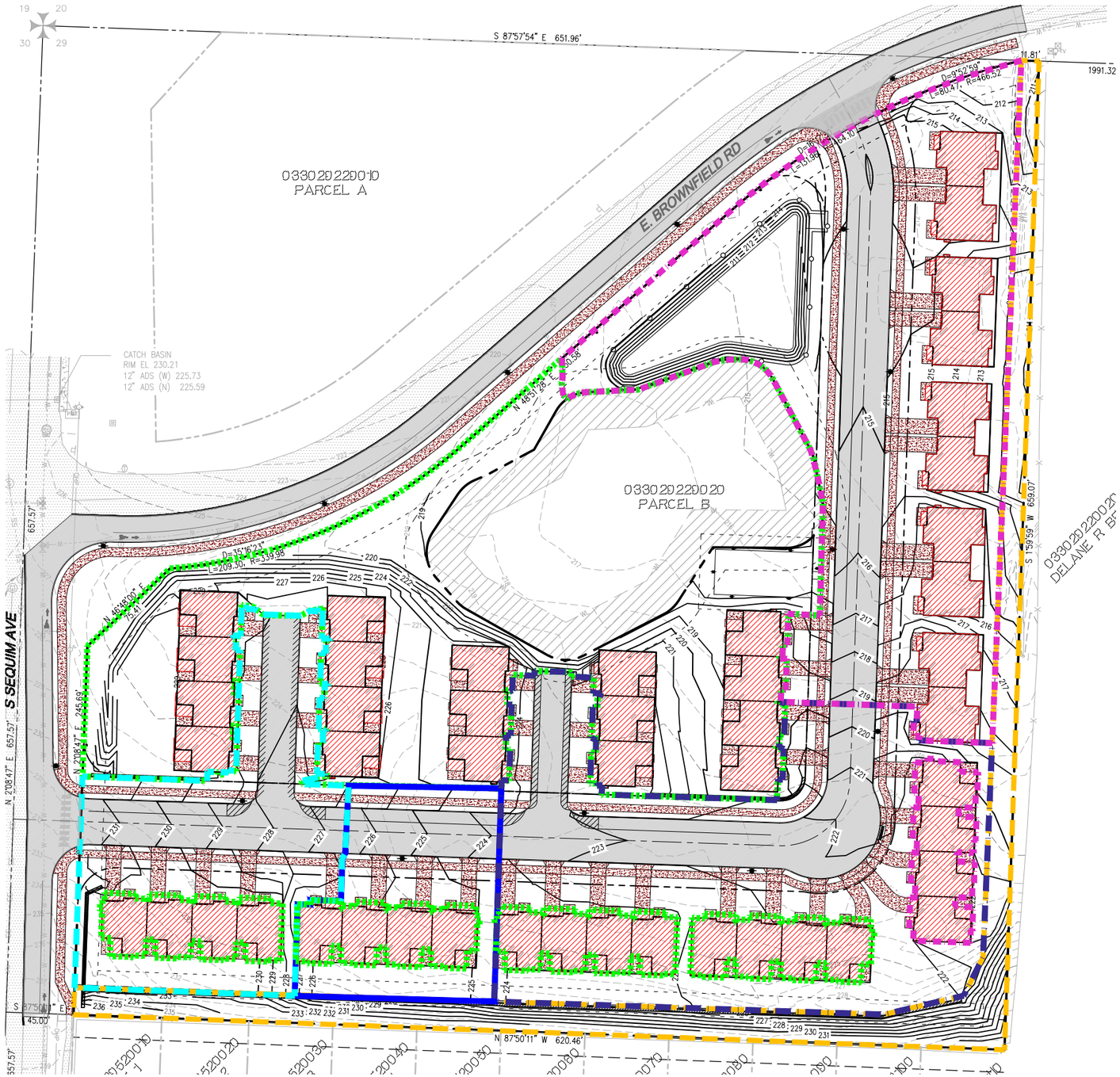
SEQUIM AVENUE DEVELOPMENT
PROPOSED CONDITIONS MAP

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BASIN 1 AREAS:

ASPHALT:	0.20 ACRES
CONCRETE:	0.10 ACRES
PERVIOUS:	0.26 ACRES
TOTAL:	0.56 ACRES

BASIN 2 AREAS:

ASPHALT:	0.07 ACRES
CONCRETE:	0.05 ACRES
PERVIOUS:	0.14 ACRES
TOTAL:	0.26 ACRES

BASIN 3 AREAS:

ASPHALT:	0.27 ACRES
CONCRETE:	0.19 ACRES
PERVIOUS:	0.46 ACRES
TOTAL:	0.92 ACRES

BASIN 4 AREAS:

ROOF:	0.4 ACRES
ASPHALT:	0.28 ACRES
CONCRETE:	0.20 ACRES
PERVIOUS:	1.39 ACRES
TOTAL:	2.27 ACRES

BASIN 5 AREAS:

ROOF:	0.90 ACRES
CONCRETE:	0.03 ACRES
PERVIOUS:	1.59 ACRES
TOTAL:	2.52 ACRES

BASIN 6 AREAS:

PERVIOUS:	0.50 ACRES
TOTAL:	0.50 ACRES

NOTE

BASINS 1 THROUGH 4 WILL RECEIVE WATER QUALITY TREATMENT. BASINS 1 THROUGH 3 WILL UTILIZE A MECHANICAL PRETREATMENT SYSTEM AND INFILTRATION THROUGH THE NATIVE SOILS. BASIN 4 WILL UTILIZE A MECHANICAL ENHANCED TREATMENT SYSTEM.

N

SCALE: 1" = 40'

40' 0 40' 80'

HABITAT FOR HUMANITY OF CLALLAM COUNTY
SEQUIM AVENUE DEVELOPMENT
FLOW CONTROL MAP

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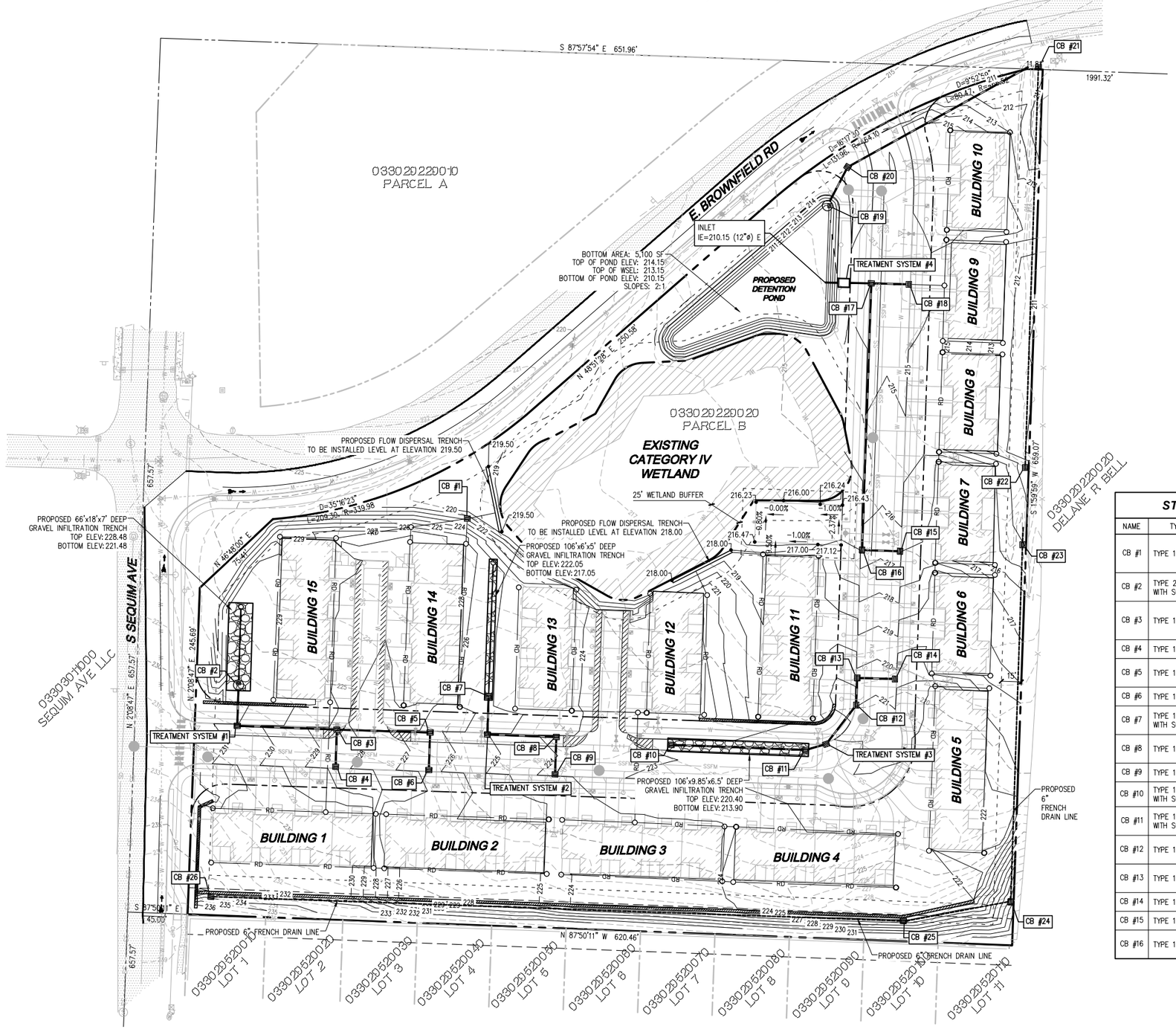
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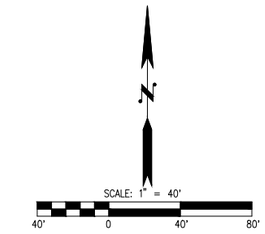
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APPENDIX 4
PRELIMINARY CONSTRUCTION PLANS

A PORTION OF SEC 29, TWN 30 N, RGE 3 W, W.M., CLALLAM COUNTY, WASHINGTON





LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- STORM DRAIN CLEANOUT
- TYPE 1 CATCH BASIN WITH VANED GRATE UNLESS OTHERWISE NOTED
- TYPE 2 CATCH BASIN
- PROPOSED 12" ASTM D3034 SDR35 PVC STORM PIPE, UNLESS OTHERWISE NOTED
- PROPOSED 6" ASTM D3034 SDR35 PVC DRAIN LINE
- PROPOSED GRAVEL INFILTRATION TRENCH
- PROPOSED 6" FRENCH DRAIN LINE

STRUCTURE TABLE

NAME	TYPE	RIM	INVERTS
CB #1	TYPE 1	221.77	IE=219.61 (6" IN) W IE=219.61 (6" OUT) E IE=219.61 (6" IN) S
CB #2	TYPE 2-48"ø WITH SOLID LID	228.48	IE=222.27 (12" IN) S IE=222.27 (6" OUT) N
CB #3	TYPE 1	228.35	IE=222.80 (12" IN) E IE=222.80 (12" OUT) W IE=222.80 (12" OUT) S
CB #4	TYPE 1	228.35	IE=222.94 (12" IN) N
CB #5	TYPE 1	226.29	IE=223.15 (12" IN) S IE=223.15 (12" OUT) W
CB #6	TYPE 1	226.29	IE=223.29 (12" OUT) N
CB #7	TYPE 1 WITH SOLID LID	225.15	IE=220.20 (6" OUT) N IE=220.20 (12" IN) S
CB #8	TYPE 1	223.75	IE=220.61 (12" IN) W IE=220.61 (12" IN) S
CB #9	TYPE 1	223.75	IE=220.75 (12" OUT) N
CB #10	TYPE 1 WITH SOLID LID	222.80	IE=216.77 (12" OUT) E
CB #11	TYPE 1 WITH SOLID LID	222.30	IE=216.77 (12" IN) W IE=216.77 (12" IN) E
CB #12	TYPE 1	220.96	IE=217.04 (12" IN) SW IE=217.04 (12" OUT) N
CB #13	TYPE 1	220.28	IE=217.14 (12" IN) S IE=217.14 (12" IN) E
CB #14	TYPE 1	220.28	IE=217.28 (12" OUT) W
CB #15	TYPE 1	216.51	IE=213.49 (12" OUT) W
CB #16	TYPE 1	216.52	IE=213.35 (12" OUT) N IE=213.35 (12" IN) E

STRUCTURE TABLE

NAME	TYPE	RIM	INVERTS
CB #17	TYPE 1	214.25	IE=210.82 (12" IN) S IE=210.82 (12" OUT) W IE=210.82 (12" IN) E
CB #18	TYPE 1	214.25	IE=210.75 (12" OUT) W IE=210.75 (6" IN) E
CB #19	TYPE 2-48"ø FLOW CONTROL STRUCTURE	213.15	IE=210.15 (12" OUT) NE
CB #20	TYPE 1	210.99	IE=209.96 (12" IN) SW IE=209.96 (12" OUT) NE
CB #21	OVERFLOW DISCHARGE LOCATION. CONNECT TO EX. 12" ADS STORM PIPE	211.51	IE=209.43 (6" IN) S IE=208.93 (12" IN) E IE=208.93 (12" IN) W
CB #22	TYPE 1	212.27	IE=210.94 (6" OUT) N
CB #23	TYPE 1	214.06	IE=211.56 (6" IN) S IE=211.56 (6" IN) N
CB #24	TYPE 1	231.46	IE=223.49 (6" OUT) N IE=223.49 (6" IN) W
CB #25	TYPE 1	226.40	IE=223.90 (6" OUT) E IE=223.90 (6" IN) W
CB #26	TYPE 1	233.67	IE=231.17 (6" OUT) E
TREATMENT SYSTEM #1	PRETREATMENT SYSTEM	230.54	IE=222.42 (12" IN) E IE=222.42 (12" OUT) N
TREATMENT SYSTEM #2	PRETEATMENT SYSTEM	225.03	IE=220.35 (12" OUT) N IE=220.35 (12" OUT) E
TREATMENT SYSTEM #3	PRETREATMENT SYSTEM	222.12	IE=216.85 (12" OUT) W IE=216.85 (12" OUT) NE
TREATMENT SYSTEM #4	ENHANCED TREATMENT SYSTEM	214.96	IE=210.72 (12" IN) E IE=210.22 (12" OUT) W

DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY JAMESTOWN LAND SURVEY IN APRIL 2023. ANY CHANGES TO THE SITE AFTER THIS DATE WILL NOT BE REFLECTED IN THE PLANS. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

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Woodinville | Tumwater | Kent
321 Cleveland Ave SE, #209
Tumwater, WA 98501
T 425.806.1869 F 425.482.2893
www.LDCcorp.com

HABITAT FOR HUMANITY

SEQUIM AVE DEVELOPMENT

GRADING AND DRAINAGE PLAN

TYRELL E. BRAUN
STATE OF WASHINGTON
51055
REGISTERED PROFESSIONAL ENGINEER
07-25

JOB NUMBER:	C22-272
DRAWING NAME:	C22272-CG-01
DESIGNER:	TEB
DRAFTING BY:	ES
DATE:	MARCH 2025
SCALE:	AS NOTED
JURISDICTION:	SEQUIM

CG-01

SHEET 4 OF 6

Drawing: P:\Civil\2022\c22-272 habitat for humanity brownfield rd\Drawings\Construction\C22272-CG-01.dwg Plotted: Mar 05, 2025 - 4:02pm

APPENDIX 5
GEOTECHNICAL REPORT

9/15/2023

Habitat For Humanity of Clallam County
Attn: Colleen Robinson, CEO
728 E Front St (PO Box 1479)
Port Angeles, 98362

c/o: **LDC, Inc**
Tyrell Bradley
321 Cleveland Ave SE
Tumwater, WA 98501

Subject: **Habitat for Humanity - Geotechnical Consultation**
TPN: 033029229020; S. Sequim Ave & E. Brownfield Rd., Sequim, WA
Project Number: QG23-153

Dear Client,

At your request, Quality Geo NW, PLLC (QG) has completed a soils investigation of the above-referenced project. The investigation was performed in accordance with our proposal for professional services.

We would be pleased to continue our role as your geotechnical consultant of record during the project planning and construction phases, as local inspection firms have not been found to be as familiar or reliably experienced with geotechnical design. This may include soil subgrade inspections, periodic review of special inspection reports, or supplemental recommendations if changes occur during construction. We will happily meet with you at your convenience to discuss these and other additional *Time & Materials* services.

We thank you for the opportunity to be of service on this project and trust this report satisfies your project needs currently. QG wishes you the best while completing the project.

Respectfully Submitted,
Quality Geo NW, PLLC

Luke Preston McCann, L.E.G.
Owner + Principal

Ray Gean II
Staff Geologist/Project Manager

SOILS REPORT

HABITAT FOR HUMANITY GEOTECHNICAL CONSULTATION
TPN: 033029229020; S. SEQUIM AVE & E. BROWNFIELD RD.
SEQUIM, WA

Habitat For Humanity of Clallam County
Attn: Colleen Robinson, CEO
728 E Front St (PO Box 1479)
Port Angeles, 98362

c/o: **LDC, Inc**
Tyrell Bradley
321 Cleveland Ave SE
Tumwater, WA 98501

Prepared by:

Alexander Barnes, G.I.T.
Staff Geologist/Laboratory Supervisor

Approved by:

State of Washington
Engineering Geologist
19110623
Licensed Geologist

9/15/2023

LUKE PRESTON MCCANN

Luke Preston McCann, L.E.G.
Principal Licensed Engineering Geologist

Quality Geo NW, PLLC
Geotechnical Investigation & Engineering Consultation
Phone: 360-878-9750 | Web: qualitygeonw.com
Mail: 4631 Whitman Ln SE, Ste D, Lacey, WA 98513

9/15/2023

QG Project # QG23-153

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1.0 INTRODUCTION

This report presents the findings and recommendations of Quality Geo NW's (QG) soil investigation conducted in support of new site surface improvements.

1.1 PROJECT DESCRIPTION

QG understands the project entails possible new development within a presently undeveloped parcel. QG has been contracted to perform a soils investigation of the proposed site to provide foundation, infiltration, and earthwork recommendations.

1.2 FIELD WORK

Site exploration activities were performed on 8/18/2023. Exploration locations were marked in the field by a QG Staff Geologist with respect to the provided map and cleared for public conductible utilities. Our exploration locations were selected by a QG Staff Geologist prior to fieldwork to provide safest access to relevant soil conditions. The geologist directed the advancement of 4 excavated test pits (TP). The test pits were advanced within the vicinity of the anticipated development footprint areas, to maximum depths of 8.5 feet below present grade (BPG) in general accordance with the specified contract depth.

During explorations, QG logged each soil horizon encountered and field classified them in accordance with the Unified Soil Classification System (USCS). Representative soil samples were collected from each unit, identified according to boring location and depth, placed in plastic bags to protect against moisture loss, and were transported to the soil laboratory for supplemental classification and other tests.

QG advanced 2 Wildcat Dynamic Cone Penetrometer (DCP) tests at representative locations within the vicinity of the proposed development and as conditions permitted. The penetrometer test was terminated upon reaching the equipment's maximum practical extent. During penetrometer advancement, blow counts were recorded in 10-centimeter increments as a thirty-five-pound weight was dropped 15 inches. Blow counts were then converted to resistance (kg/cm2), standard penetration blow counts (N-values), and corresponding soil consistency, with complete results shown on the attached logs.

2.0 EXISTING SITE CONDITIONS

2.1 AREA GEOLOGY

QG reviewed available map publications to assess known geologic conditions and hazards present at the site location. The Washington Geologic Information Portal (WGIP), maintained by the Department of Natural Resources Division of Geology and Earth Resources, provides 1:24,000-scale geologic mapping of the region. The geology of the site location and vicinity consists of Pleistocene continental glacial till (Qgt(v)). The deposits on site are generally described as "Unstratified diamicton of poorly sorted pebbly, clayey, sandy silt with scattered cobbles and sparse boulders; yellowish gray to light-gray and tan; dense to very dense lodgment till. This unit supports near-vertical slopes in bluffs on the east shore of Sequim Bay."

The WGIP Map also offers layers of mapped geohazard conditions within the state. According to the regional-scale interactive map, there are no mapped geohazards or recent deep seated landslide deposits to exist within the vicinity of the parcel. Available LiDAR imagery of the site did not reveal obvious or prominent landslide features within the site as well as within the vicinity.

The United States Department of Agriculture portal (USDA) provides a soil mapping of the region. The soils in the vicinity are mapped as Clallam gravelly sandy loam (12) to the north and Yeary gravelly loam (75) to the south. Clallam gravelly sandy loam soil is formed as hillslopes derived from till deposits. The soil is described as gravelly ashy sandy loam from 0 to 10 inches, very gravelly ashy sandy loam from 10 to 28 inches, and very gravelly sandy loam from 28 to 60 inches. Depth to restrictive feature is 20 to 40 inches to densic material. Capacity of most limiting layer to transmit water (ksat) is listed as very low to moderately low (0.00 to 0.06 in/hr). Depth to water table is about 18 to 36 inches. Yeary gravelly loam soil is formed as hillslopes derived from glaciomarine or glaciolacustrine deposits over till. The soil is described as medial loam from 0 to 7 inches, gravelly clay loam from 7 to 38 inches, and loam from 38 to 60 inches. Depth to restrictive feature is 20 to 40 inches to densic material. Capacity of most limiting layer to transmit water (ksat) is listed as moderately low to moderately high (0.06 to 0.20 in/hr). Depth to water table is about 18 to 36 inches.

2.2 SITE & SURFACE CONDITIONS

The parcel is irregularly shaped with consistent, level topography near the same elevation as the adjacent roads. The site is clear of trees and is vegetated with grasses and shrubs. The site is bordered by S Sequim Ave to the west and E Brownfield Rd to the north. To the east is another undeveloped parcel, and to the south is a residential neighborhood. There are mapped wetlands within the center of the parcel, indicated in site plans provided to QG by the client. There are no

other surface water features on site.

2.3 SOIL LOG

Site soil conditions were generally consistent across the property within all test pits. Representative lab samples were taken from TP-1 and TP-2. A representative soil column is as follows:

- **0' to 1.0' – Topsoil**

  An overriding layer of organic-rich topsoil ranging from 0.25 to 1.0 feet thick is present across the site. This soil is brown and dry, with cobbles measuring up to 12 inches in diameter, and is mottled. Generally, the organics are composed of a thin layer of humus and dense grass roots. The composition of this soil is consistent with sandy silts found beneath the heavy organics.

- **1.0' to 7.0' – Sandy Silt (ML)**

  Beneath the layer of topsoil is a layer of poorly graded gravel. This layer is brown, with no organic content and cobbles up to 12 inches. This soil is mottled. Generally, this soil was found to be in a dense to very dense condition and is inferred to be glacial till deposits.

- **7.0 to 8.5'+ – Silty Gravel with Sand (GM)**

  In TP-2, a layer of very moist gravel was encountered below the sandy silt. This soil is brown to dark gray, contained cobbles to 4 inches in diameter, exhibited some mottling, and had no organics. It was generally dense and is inferred to be glacial outwash deposits below till deposits.

2.4 SURFACE WATER AND GROUNDWATER CONDITIONS

No active surface water features are present on site. Bell Creek is approximately 400 feet to the west of the parcel boundary. Based on well logs made publicly available by the WA Department of Ecology, the regional groundwater table is reported to exist at approximately 40 feet beneath the entire site. Wetland conditions are inferred to be perched surface water during the wet season over dense glacial soils.

QG's scope of work did not include determination or monitoring of seasonal groundwater elevation variations, formal documentation of wet season site conditions, or conclusive measurement of groundwater elevations at depths past the extent feasible for explorations at the time of the field explorations.

3.0 GEOTECHNICAL RECOMMENDATIONS

3.1 SHALLOW FOUNDATION RECOMMENDATIONS

Assuming site preparation is completed as described below, we recommend the following:

- **Subgrade Preparation**

  QG recommends excavating and clearing any loose or organic cover soils, peat soils, uncontrolled fill, including the overriding layer of topsoil where necessary, from areas of proposed pavement construction, down to firm bearing conditions and benching the final bottom of subgrade elevation flat. Excavations should be performed with a smooth blade bucket to limit disturbance of subgrade soils. Vibratory compaction methods are suitable for densification of the non-organic native soils.

  After excavations have been completed to the planned subgrade elevations, but before placing fill or structural elements, the exposed subgrade should be evaluated under the periodic guidance of a QG representative. Any areas that are identified as being soft or yielding during subgrade evaluation should be brought to the attention of the geotechnical engineer. Where over excavation is performed below a structure, the over excavation area should extend beyond the outside of the footing a distance equal to the depth of the over excavation below the footing. The over-excavated areas should be backfilled with properly compacted structural fill.

  The proposed buildings may utilize either stepped or continuous footings with slab-on-grade elements. For continuous footing elements, upon reaching bearing strata, we recommend benching foundation lines flat. Continuous perimeter and strip foundations may be stepped as needed to accommodate variations in final subgrade level. We also recommend maximum steps of 18 inches with spacing of at least 5 feet be constructed unless specified otherwise by the design engineer. Structural fill may then be placed as needed to reestablish final foundation grade.

- **Allowable Bearing Capacity:**

  Up to 1,500 pounds per square foot (psf) for foundations placed on compacted native soil or approved structural fill, placed in accordance with the recommendations of *Section 4.2*. Bearing capacities, at or below 1,500 psf may eliminate the need for additional inspection requirements if approved by the county. The allowable bearing capacity may be increased by 1/3 for transient loading due to wind and seismic events.

- **Minimum Footing Depth:**

  For a shallow perimeter and spread footing system, all exterior footings shall be embedded a minimum of 18 inches and all interior footings shall be embedded a minimum of 12 inches

below the lowest adjacent finished grade, but not less than the depth required by design. However, all footings must also penetrate to the prescribed bearing stratum cited above. Minimum depths are referenced per IBC requirements for frost protection; other design concerns may dictate greater values be applied.

- **Minimum Footing Width:**

  Footings should be proportioned to meet the stated bearing capacity and/or the IBC 2018 (or current) minimum requirements. For a shallow perimeter and spread footing system, continuous strip footings should be a minimum of 16 inches wide and interior or isolated column footings should be a minimum of 24 inches wide.

- **Estimated Settlements:**

  All concrete settles after placement. We estimate that the maximum settlements will be on the order of 0.5 inch, or less, with a differential settlement of ½ inch, or less, over 50 linear feet. Settlement is anticipated to occur soon after the load is applied during construction.

3.1.1 BUILDING SLAB ON GRADE FLOOR

QG anticipates that slab-on-grade floors are planned for the interior of the proposed building. Based on typical construction practices, we assume finished slab grade will be similar to or marginally above present grade for the below recommendations. If floor grades are planned to be substantially raised or lowered from existing grade, QG should be contacted to provide revised or alternative recommendations.

- **Capillary Break:**

  A capillary break will be helpful to maintain a dry slab floor and reduce the potential for floor damage resulting from shallow perched water inundation. To provide a capillary moisture break, a 6-inch thick, properly compacted granular mat consisting of open-graded, free-draining angular aggregate is recommended below floor slabs. To provide additional slab structural support, or to substitute for a structural fill base pad where specified, QG recommends the capillary break should consist of crushed rock all passing the 1-inch sieve and no more than 3 percent (by weight) passing the U.S. No. #4 sieve, compacted in accordance with *Section 4.2.2* of this report.

- **Vapor Barrier:**

  A vapor retarding membrane such as 10 mil polyethylene film should be placed beneath all floor slabs to prevent transmission of moisture where floor coverings may be affected. Care should be taken during construction not to puncture or damage the membrane. To protect the membrane, a layer of sand no more than 2 inches thick may be placed over the membrane if

desired. If excessive relict organic fill material is discovered at any location, additional sealant or more industrial gas barriers may be required to prevent off-gassing of decaying material from infiltrating the new structure. These measures shall be determined by the structural engineer to meet local code requirements as necessary.

- **Structural Design Considerations:**

  QG assumes the design and specifications of slabs will be assessed by the project design engineer. We suggest a minimum unreinforced concrete structural section of 4.0 inches be considered to help protect against cracking and localized settlement, especially where larger equipment or localized loads are anticipated. It is generally recommended that any floor slabs and annular exterior concrete paving subject to vehicular loading be designed to incorporate reinforcing. Additionally, some level of reinforcing, such as a wire mesh may be desirable to prolong slab life due to the overwhelming presence of such poor underlying soils. It should be noted that QG does not express any guarantee or warranty for proposed slab sections.

3.2 INFILTRATION RATE DETERMINATION

QG understands the design of on-site stormwater controls are pending the results of this study to confirm design parameters and interpreted depths to perched seasonal groundwater and restrictive soil features.

3.2.1 GRADATION ANALYSIS METHODS & RESULTS

During test pit excavations for general site investigation, QG additionally collected representative samples of native soil deposits among potential infiltration strata and depths from TP-1 and TP-3 to characterize the local infiltration conditions.

We understand the project will be subject to infiltration design based on the Washington Department of Ecology Stormwater Management Manual for Western Washington (DoE SMMWW). For initial site infiltration characterization within the scope of this study, laboratory gradation analyses were completed including sieve and hydrometer tests for stormwater design characterization and rate determination to supplement field observations. Results of laboratory testing in terms of rate calculation are summarized below.

Laboratory results were interpreted to recommended design inputs in accordance with methods of the City of Lacey 2022 Stormwater Design Manual. Gradation results were applied to the Massmann (2003) equation (1) to calculate Ksat representing the initial saturated hydraulic conductivity.

(1) $\log10(Ksat) = -1.57 + 1.90*D10 + 0.015*D60 - 0.013*D90 - 2.08*ff$

Corrected Ksat values presented below are a product of the initial Ksat and correction factor CFT. For a generalized site-wide design situation, we have applied a site variability factor of CFv = 0.7 along with typical values of CFt = 0.4 (for the Grain Size Method) and CFm = 0.9 (assuming standard influent control).

(2) CFT = CFv x CFt x CFm = 0.7 x 0.4 x 0.9 = 0.25

Results were cross-referenced with test pit logs to determine the validity and suitability of unique materials as an infiltration receptor. Additional reduction factors were applied for practical rate determination based on our professional judgement.

Table 1. Results Of Massmann Analysis

TP #	Sample Depth *(BPG)*	Unit Extent *(ft)*	Soil Type	D10	D60	D90	Fines (%)	Ksat *(in/hr)*	Corrected Ksat *(in/hr)*	LT Design Infiltration Rate*(in/hr)*	Cation Exchange Capacity (meq/100g)	Organic Content %
1	6.0 ft	1.0 ft to 7.0 ft	ML	0.003	0.07	0.65	66.0	1.61	0.40	**0.40**	14.6	1.7
2	7.0ft	7.0 ft to 8.5 ft	GM	0.043	6.69	40.24	17.7	7.45	1.86	**1.86**	8.0	1.0

In-ground infiltration structures are required to maintain a minimum of 5-feet separation from restrictive soil & perched water features. During QG's field investigation no groundwater was encountered. Available well logs do not indicate the potential for shallow ground water, however perched water features were present throughout the site such as mottling in soils and wetland vegetation. The required separation does not appear achievable within the northern portion of the site, however in-ground infiltration structures may be used in the southern portion of the site where gravelly soils were encountered. Infiltration structures must penetrate to depths where the silty gravel soils beneath the dense sandy silts are encountered in order to accommodate higher rates of infiltration for the site.

For in-ground infiltration galleries bearing in the lower gravelly GM soil unit, we recommend a maximum design rate of up to 1.86 inches/hour be considered. If infiltration must occur in the northern portion of the site, we recommend that the client pursue shallow infiltration measures, such as bio swales, rain gardens, pervious pavement, etc. **For shallow infiltrations utilizing treatment media, we recommend a maximum design rate of up to 0.40 inches/hour to be considered.**

QG recommends the facility designer review these results and stated assumptions per reference literature to ensure applicability with the proposed development, level of anticipated controls, and long- term maintenance plan. The designer may make reasonable adjustments to correction factors and the resulting design values based on these criteria to ensure design and operational intent is

met. We recommend that we be contacted if substantial changes to rate determination are considered.

3.2.2 TREATMENT POTENTIAL

Depending on stormwater and runoff sources, some stormwater features, such as rain gardens or pervious pavements may require treatment. Stormwater facilities utilizing native soils as treatment media typically require Cation Exchange Capacities (CEC) of greater than 5 milliequivalents per 100grams (meq/100g) and organic contents greater than 1% (this may vary depending on local code). Soils across the site **do** the minimum standards for treatment potential.

3.2.3 DRAINAGE RECOMMENDATIONS

QG recommends proper drainage controls for stormwater runoff during and after site development to protect the site. The ground surface adjacent to structures should be sloped to drain away at a 5% minimum to prevent ponding of water adjacent to them.

Foundations shall incorporate a wraparound footing drain composed of imported clean granular drain rock. There shall be a perforated drainpipe connected around the perimeter of the footing drain (within the rock) graded to gravity drain to an outfall pipe, to allow any accumulated water to be released to an approved drainage feature or location. The outfall point must be lower in elevation than the lowest point of possible water accumulation in the mat fill, so as to allow any captured water within the mat or crawlspace to completely drain away from the building footprint preventing standing water from accumulating.

QG recommends all stormwater catchments (new or existing) be tightlined (piped) away from structures to an existing catch basin, stormwater system, established channel, or approved outfall to be released using appropriate energy-dissipating features at the outfall to minimize point erosion. Roof and footing drains should be tightlined separately or should be gathered in an appropriately sized catch basin structure and redistributed collectively. If storm drains are incorporated for impervious flatworks (driveways, sidewalks, etc.) collected waters should also be discharged according to the above recommendations.

4.0 CONSTRUCTION RECOMMENDATIONS

4.1 EARTHWORK

4.1.1 GRADING & EXCAVATION

A grading plan was not available to QG at the time of this report. However, based on provided conceptual plans, this study assumes finished site grade will approximate current grade. Therefore, depths referred to in this report are considered roughly equivalent to final depths. Excavations can generally be performed with conventional earthmoving equipment such as bulldozers, scrapers, and excavators.

4.1.2 SUBGRADE EVALUATION & PREPARATION

After excavations have been completed to the planned subgrade elevations, but before placing fill or structural elements, the exposed subgrade should be evaluated under the part-time observation and guidance of a QG representative.

The special inspection firm should continuously evaluate all backfilling. Any areas that are identified as being soft or yielding during subgrade evaluation should be over excavated to a firm and unyielding condition or to the depth determined by the geotechnical engineer. Where over excavation is performed below a structure, the over excavation area should extend beyond the outside of the footing a distance equal to the depth of the over excavation below the footing. The over-excavated areas should be backfilled with properly compacted structural fill.

4.1.3 SITE PREPARATION, EROSION CONTROLL, WET WEATHER

Any silty or organic rich native soils may be moisture-sensitive and become soft and difficult to traverse with construction equipment when wet. During wet weather, the contractor should take measures to protect any exposed soil subgrades, limit construction traffic during earthwork activities, and limit machine use only to areas undergoing active preparation.

Once the geotechnical engineer has approved the subgrade, further measures should be implemented to prevent degradation or disturbance of the subgrade. These measures could include, but are not limited to, placing a layer of crushed rock or lean concrete on the exposed subgrade, or covering the exposed subgrade with a plastic tarp and keeping construction traffic off the subgrade. Once the subgrade has been approved, any disturbance because the subgrade was not protected should be repaired by the contractor at no cost to the owner.

During wet weather, earthen berms or other methods should be used to prevent runoff from draining into excavations. All runoffs should be collected and disposed of properly. Measures may

also be required to reduce the moisture content of on-site soils in the event of wet weather. These measures can include, but are not limited to, air drying and soil amendment, etc.

QG recommends earthwork activities take place during the summer dry season.

4.2 STRUCTURAL FILL MATERIALS AND COMPACTION

4.2.1 MATERIALS

All material placed below structures or pavement areas should be considered structural fill. Excavated native soils may be considered suitable for reuse as structural fill on a case-by-case basis. Imported material can also be used as structural fill. Care should be taken by the earthwork contractor during grading to avoid contaminating stockpiled soils that are planned for reuse as structural fill with native organic materials. Frozen soil is not suitable for use as structural fill. Fill material may not be placed on frozen soil.

Structural fill material shall be free of deleterious materials, have a maximum particle size of 4 inches, and be compactable to the required compaction level. Imported structural fill material should conform to the WSDOT manual Section 9-03.14(1) Gravel Borrow, or an approved alternative import material. Controlled-density fill (CDF) or lean mix concrete can be used as an alternative to structural fill materials, except in areas where free-draining materials are required or specified.

Imported materials utilized for trench back fill shall conform to Section 9-03.19, Trench Backfill, of the most recent edition (at the time of construction) of the State of Washington Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT Standard Specifications)*. Imported materials utilize as grade fill beneath roads shall conform to WSDOT Section 9-03.10, Gravel Base.

Pipe bedding material should conform to the manufacturer's recommendations and be worked around the pipe to provide uniform support. Cobbles exposed in the bottom of utility excavations should be covered with pipe bedding or removed to avoid inducing concentrated stresses on the pipe.

Soils with fines content near or greater than 10% fines content may likely be moisture sensitive and become difficult to use during wet weather. Care should be taken by the earthwork contractor during grading to avoid contaminating stockpiled soils that are planned for reuse as structural fill with native organic materials.

The contractor should submit samples of each of the required earthwork materials to the materials testing lab for evaluation and approval prior to delivery to the site. The samples should be

submitted **at least 5 days prior to their delivery** and sufficiently in advance of the work to allow the contractor to identify alternative sources if the material proves unsatisfactory.

4.2.2 FILL PLACEMENT AND COMPACTION

For lateral and bearing support, structural fill placement below footings shall extend at minimum a distance past each edge of the base of the footing equal to the depth of structural fill placed below the footing [i.e. extending at least a 1H:1V past both the interior and the exterior of the concrete footing].

Prior to placement and compaction, structural fill should be moisture conditioned to within 3 percent of its optimum moisture content. Loose lifts of structural fill shall not exceed 12 inches in thickness. All structural fill shall be compacted to a firm and unyielding condition and to a minimum percent compaction based on its modified Proctor maximum dry density as determined per ASTM D1557. Structural fill placed beneath each of the following shall be compacted to the indicated percent compaction:

- Foundation and Floor Slab Subgrades: 95 Percent
- Pavement Subgrades & wall backfill (upper 2 feet): 95 Percent
- Pavement Subgrades & wall backfill (below 2 feet): 90 Percent
- Utility Trenches (upper 4 feet): 95 Percent
- Utility Trenches (below 4 feet): 90 Percent

A sufficient number of tests should be performed to verify compaction of each lift. The number of tests required will vary depending on the fill material, its moisture condition and the equipment being used. Initially, more frequent tests will be required while the contractor establishes the means and methods required to achieve proper compaction.

Jetting or flooding is not a substitute for mechanical compaction and should not be allowed.

4.3 TEMPORARY EXCAVATIONS AND TRENCHES

All excavations and trenches must comply with applicable local, state, and federal safety regulations. Construction site safety is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing soil type information solely as a service to our client for planning purposes. Under no circumstances should the information be interpreted to mean that QG is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred. The contractor shall be responsible for the safety of personnel working in utility trenches. Given that steep excavations in native soils may be prone to caving, we recommend all utility trenches, but particularly those greater than 4 feet in depth, be supported in

accordance with state and federal safety regulations. Heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed near the top of any excavation.

Temporary excavations and trenches should be protected from the elements by covering them with plastic sheeting or some other similar impermeable material. Sheeting sections should overlap by at least 12 inches and be tightly secured with sandbags, tires, staking, or other means to prevent wind from exposing the soils under the sheeting.

5.0 SPECIAL INSPECTION

The recommendations made in this report assume that an adequate program of tests and observations will be made throughout construction to verify compliance with these recommendations. Testing and observations performed during construction should include, but not necessarily be limited to, the following:

- Geotechnical plan review and engineering consultation as needed prior to construction phase,
- Observations and testing during site preparation, earthwork, structural fill, and pavement section placement,
- Consultation on temporary excavation cutslopes and shoring if needed,
- Consultation as necessary during construction.

QG recommends that we be retained for construction phase soils testing and periodic earthwork observation in accordance with the local code requirements. We also strongly recommend that QG be retained as the project Geotechnical Engineering Firm of Record (GER) during the construction of this project to perform periodic supplementary geotechnical observations and review the special inspectors reports during construction.

Our knowledge of the project site and the design recommendations contained herein will be of great benefit in the event that difficulties arise and either modifications or additional geotechnical engineering recommendations are required or desired. We can also, in a timely fashion observe the actual soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

We would be pleased to meet with you at your convenience to discuss the *Time & Materials* scope and cost for these services.

6.0 LIMITATIONS

Upon acceptance and use of this report, and its interpretations and recommendations, the user shall agree to indemnify and hold harmless QG, including its owners, employees and subcontractors, from any adverse effects resulting from development and occupation of the subject site. Ultimately, it is the owner's choice to develop and live in such an area of possible geohazards (which exist in perpetuity across the earth in one form or another), and therefore the future consequences, both anticipated and unknown, are solely the responsibility of the owner. By using this report for development of the subject property, the owner must accept and understand that it is not possible to fully anticipate all inherent risks of development. The recommendations provided above are intended to reduce (but may not eliminate) such risks.

This report does not represent a construction specification or engineered plan and shall not be used or referenced as such. The information included in this report should be considered supplemental to the requirements contained in the project plans & specifications and should be read in conjunction with the above referenced information. The selected recommendations presented in this report are intended to inform only the specific corresponding subjects. All other requirements of the above-mentioned items remain valid, unless otherwise specified.

Recommendations contained in this report are based on our understanding of the proposed development and construction activities, field observations and explorations, and laboratory test results. It is possible that soil and groundwater conditions could vary and differ between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, or if the scope of the proposed construction changes from that described in this report, QG should be notified immediately in order to review and provide supplemental recommendations.

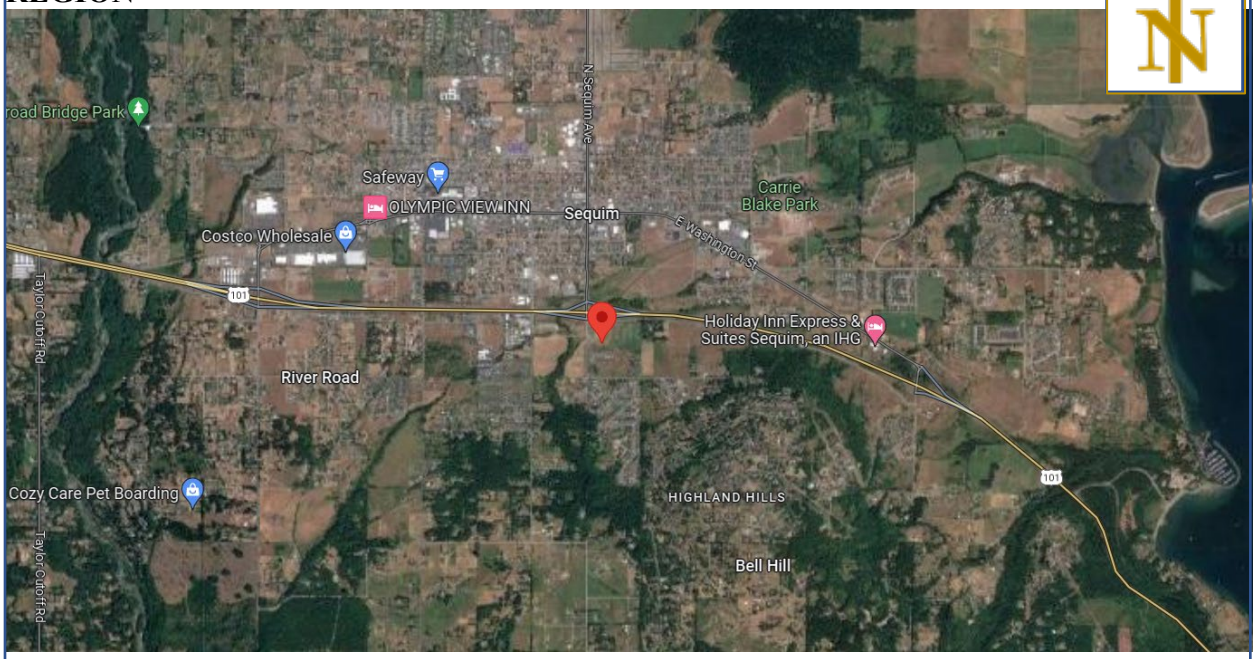
The findings of this study are limited by the level of scope applied. We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the subject region. No warranty, expressed or implied, is made. The recommendations provided in this report assume that an adequate program of tests and observations will be conducted by a WABO approved special inspection firm during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the Client and their design consultants and only for the purposes stated within a reasonable time from its issuance, but in no event later than 18 months from the date of the report. It is the Client's responsibility to ensure that the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. Note that if another firm assumes Geotechnical Engineer of Record responsibilities, they need to review this report and either concur with the findings, conclusions, and recommendations or provide alternate findings, conclusions and recommendations.

Land or facility use, on- and off-site conditions, regulations, or other factors may change over time, and additional work may be required. Based on the intended use of the report, QG may recommend that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release QG from any liability resulting from the use of this report. The Client, the design consultants, and any unauthorized party, agree to defend, indemnify, and hold harmless QG from any claim or liability associated with such unauthorized use or non-compliance. We recommend that QG be given the opportunity to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted. We assume no responsibility for misinterpretation of our recommendations.

Appendix A. Region & Vicinity Maps

REGION

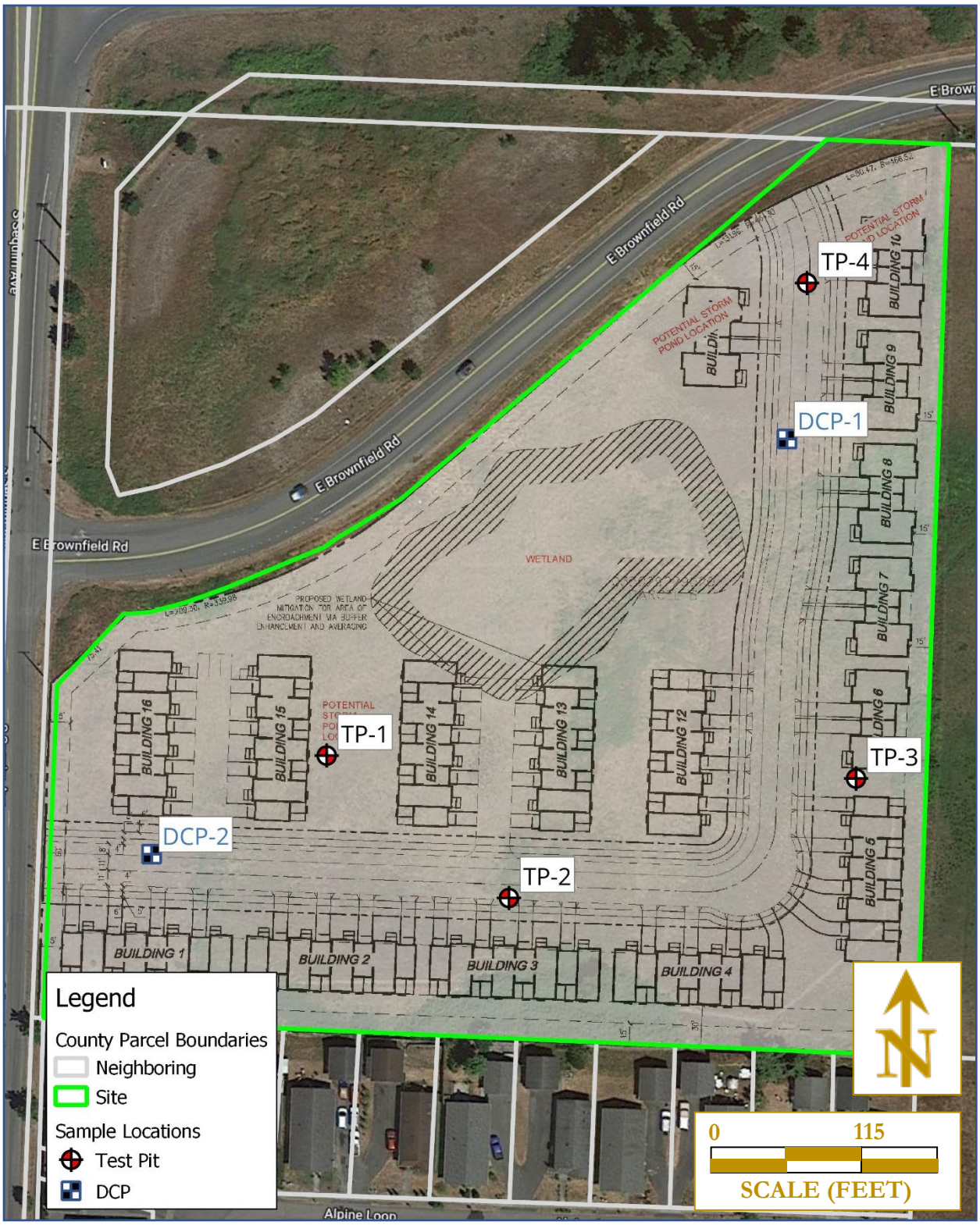


VICINITY



Quality Geo NW, PLLC	**Site Region** Habitat for Humanity Geo	Source: Google Imagery, 2023 **Scale & Locations are approx.** **Not for Construction**	**Figure 1**

Appendix B. Exploration Map



Quality Geo NW, PLLC	**Site Map** Habitat for Humanity Geo	Source: Clallam Co. GIS, 2023 **Scale & Locations are approx.** **Not for Construction**	**Figure 2**

Appendix C. Exploration Logs

Test Pit Log TP-1

PROJECT NUMBER QG23-153
PROJECT NAME Habitat for Humanity Geo
PROJECT LOCATION Sequim, WA

FIELD WORK DATE 8/18/2023
DRILLING METHOD Excavator

BORING LOCATION TPN 033029229020; between proposed Buildings 14 and 15 sites
SURFACE ELEVATION Existing
LOGGED BY AB

COMMENTS

Depth (ft)	Samples	Is Analysed? (y/n)	Graphic Log	USCS	Material Description
0				TS	SANDY SILT (TOPSOIL) Brown, dry to moist, heavy organics (roots), mottled, cobbles to 5" (rounded), medium dense to dense.
0.5				ML	Gravel= 3% Sand= 31% Fines= 66% SANDY SILT Brown, dry to moist, no organics, mottled, cobbles to 5" (rounded), medium dense to dense. Very dense at 7ft. Inferred TILL. Gravel= 3% Sand= 31% Fines= 66%
1					
1.5					
2					
2.5					
3					
3.5					
4					
4.5					
5					
5.5					
6	TP-1@6.0ft	Y			
6.5					
7					Terminated at Contracted Depth No groundwater encountered
7.5					
8					
8.5					

Test Pit Log TP-2

PROJECT NUMBER QG23-153
PROJECT NAME Habitat for Humanity Geo
PROJECT LOCATION Sequim, WA

FIELD WORK DATE 8/18/2023
DRILLING METHOD Excavator

BORING LOCATION TPN 033029229020; near proposed Building 3
SURFACE ELEVATION Existing
LOGGED BY AB

COMMENTS

Depth (ft)	Samples	Is Analysed? (y/n)	Graphic Log	USCS	Material Description
0				TS	SANDY SILT (TOPSOIL) Brown, dry to moist, heavy organics (roots), mottled, cobbles to 9" (rounded), medium dense. Gravel= 3% Sand= 31% Fines= 66%
1				ML	SANDY SILT Brown, dry to moist, no organics, mottled, cobbles to 9" (rounded), medium dense. Inferred TILL. Gravel= 3% Sand= 31% Fines= 66%
6				GM	SILTY GRAVEL with SAND Brown to dark gray, very moist (sheening), cobbles to 4", some mottling, no organics, dense. Gravel= 42% Sand= 40% Fines= 18%
7	TP-2@7ft	Y			
8.5					Terminated at Contracted Depth No groundwater encountered

Test Pit Log TP-3

PROJECT NUMBER QG23-153
PROJECT NAME Habitat for Humanity Geo
PROJECT LOCATION Sequim, WA

FIELD WORK DATE 8/18/2023
DRILLING METHOD Excavator

BORING LOCATION TPN 033029229020; near proposed Building 6
SURFACE ELEVATION Existing
LOGGED BY AB

COMMENTS

Depth (ft)	Samples	Is Analysed? (y/n)	Graphic Log	USCS	Material Description
0				TS	SANDY SILT (TOPSOIL) Brown, dry, heavy organics (roots), mottled, cobbles to 12" (rounded), dense.
0.5				ML	Gravel= 3% Sand= 31% Fines= 66% SANDY SILT Brown, dry to moist, no organics, mottled, cobbles to 12" (abundant, rounded), dense to very dense. Inferred TILL. Gravel= 3% Sand= 31% Fines= 66%
1					
1.5					
2					
2.5					
3					
3.5					
4					
4.5					
5					
5.5					
6					
6.5					Terminated at Contracted Depth No groundwater encountered
7					
7.5					
8					
8.5					

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Test Pit Log TP-4

PROJECT NUMBER QG23-153
PROJECT NAME Habitat for Humanity Geo
PROJECT LOCATION Sequim, WA

FIELD WORK DATE 8/18/2023
DRILLING METHOD Excavator

BORING LOCATION TPN 033029229020; west of proposed Building 10
SURFACE ELEVATION Existing
LOGGED BY AB

COMMENTS

Depth (ft)	Samples	Is Analysed? (y/n)	Graphic Log	USCS	Material Description
0				TS	SANDY SILT (TOPSOIL) Brown, dry, heavy organics (roots), mottled, cobbles to 12" (rounded), very dense.
0.5				ML	Gravel= 3% Sand= 31% Fines= 66%
1					SANDY SILT Brown, dry to moist, no organics, mottled, cobbles to 12" (abundant, rounded), very dense.
1.5					Inferred TILL
2					Gravel= 3% Sand= 31% Fines= 66%
2.5					
3					
3.5					
4					Terminated at Contracted Depth No groundwater encountered
4.5					
5					
5.5					
6					
6.5					
7					
7.5					
8					
8.5					

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WILDCAT DYNAMIC CONE LOG

Quality Geo NW, PLLC
Geotechnical Consultants
Lacey, WA

PROJECT NUMBER: QG23-153
DATE STARTED: 08-18-2023
DATE COMPLETED: 08-18-2023

HOLE #: DCP-1
CREW: AB
PROJECT: Habitat for Humanity Clallum Co. Geo
ADDRESS: TPN: 033029229020; S. Sequim Ave & E. Brownfield Rd., Sequim
LOCATION: Northeast corner of parcel, 100 feet south of TP-4

SURFACE ELEVATION: Existing
WATER ON COMPLETION: No
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
	11	48.8	•••••••••••••	13	MEDIUM DENSE	STIFF
	26	115.4	•••••••••••••••••••••••••••••••	25+	DENSE	HARD
1 ft	29	128.8	•••••••••••••••••••••••••••••••••	25+	DENSE	HARD
	50	222.0	•••	25+	VERY DENSE	HARD
2 ft						
3 ft						
1 m						
4 ft						
5 ft						
6 ft						
2 m						
7 ft						
8 ft						
9 ft						
3 m 10 ft						
11 ft						
12 ft						
4 m 13 ft						

WILDCAT DYNAMIC CONE LOG

Quality Geo NW, PLLC
Geotechnical Consultants
Lacey, WA

PROJECT NUMBER: QG23-153
DATE STARTED: 08-18-2023
DATE COMPLETED: 08-18-2023

HOLE #: DCP-2
CREW: AB
PROJECT: Habitat for Humanity Clallum Co. Geo
ADDRESS: TPN: 033029229020; S. Sequim Ave & E. Brownfield Rd., Sequim
LOCATION: Southwest corner of parcel

SURFACE ELEVATION: Existing
WATER ON COMPLETION: No
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

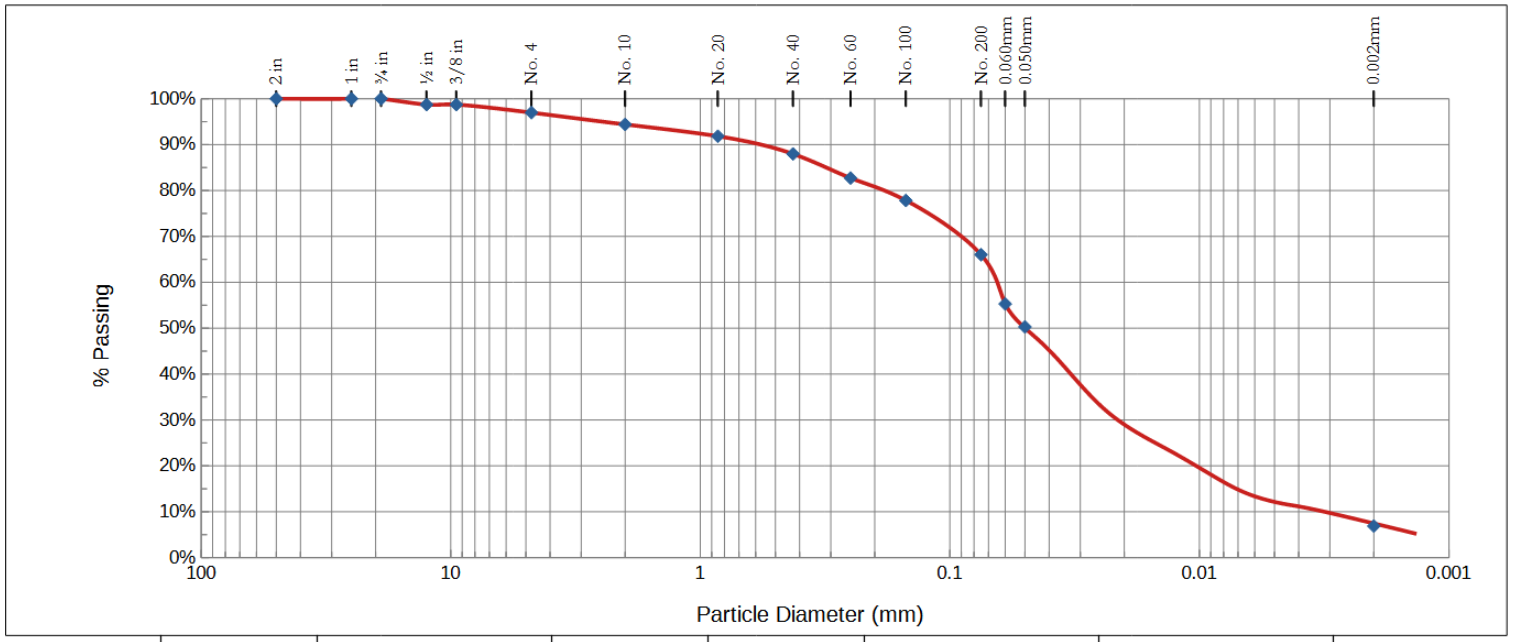
DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	COHESIVE
-	11	48.8		13	MEDIUM DENSE	STIFF
-	19	84.4		24	MEDIUM DENSE	VERY STIFF
- 1 ft	46	204.2		25+	VERY DENSE	HARD
-	50	222.0		25+	VERY DENSE	HARD
-						
- 2 ft						
-						
-						
- 3 ft						
- 1 m						
-						
- 4 ft						
-						
-						
- 5 ft						
-						
-						
- 6 ft						
-						
- 2 m						
- 7 ft						
-						
-						
- 8 ft						
-						
-						
- 9 ft						
-						
-						
- 3 m 10 ft						
-						
-						
-						
- 11 ft						
-						
-						
- 12 ft						
-						
-						
- 4 m 13 ft						

Appendix D. Laboratory Results

SAMPLE ID: TP-1@6ft

☑ Sieve Analysis | ☑ Wet Wash | ☑ Hydrometer | ☑ Atterberg Limits

Project Name:	Habitat for Humanity Cla
Project Number:	QG23-153
Date Collected:	08-18-2023
Date Reported:	08/23/23
Boring ID:	TP-1
Boring Depth:	6ft



USCS Scale	Coarse Gravel		Fine Gravel			Coarse Sand		Medium Sand		Fine Sand			(% of Fines Passing #200 Sieve) Hydrometer Method			Sand Total	Gravel Total
Sieve #	2"	1"	¾"	½"	3/8"	4	10	20	40	60	100	200	0.060	0.050	0.002		
Diameter, mm	50	25	19	12.5	9.5	4.75	2	0.85	0.425	0.25	0.15	0.075					
Retained	0.0%	0.0%	0.0%	1.3%	1.3%	3.0%	5.6%	8.2%	12.0%	17.3%	22.2%	34.0%				**30.9%**	**3.0%**
Passing	100.0%	100.0%	100.0%	98.7%	98.7%	97.0%	94.4%	91.8%	88.0%	82.7%	77.8%	**66.0%**	55.3%	50.3%	6.87%		

Graph Values

D90	0.65				
D60	0.07	**Coefficient of Uniformity:**	3.15	**CEC:**	14.6 meq/100g
D30	0.021	**Coefficient of Gradation:**	2.10	**OM (LOI 360):**	1.7 %
D10	0.003				

Unified Soil Classification System (USCS) Description	
ML	SANDY SILT

Staff Initials: T

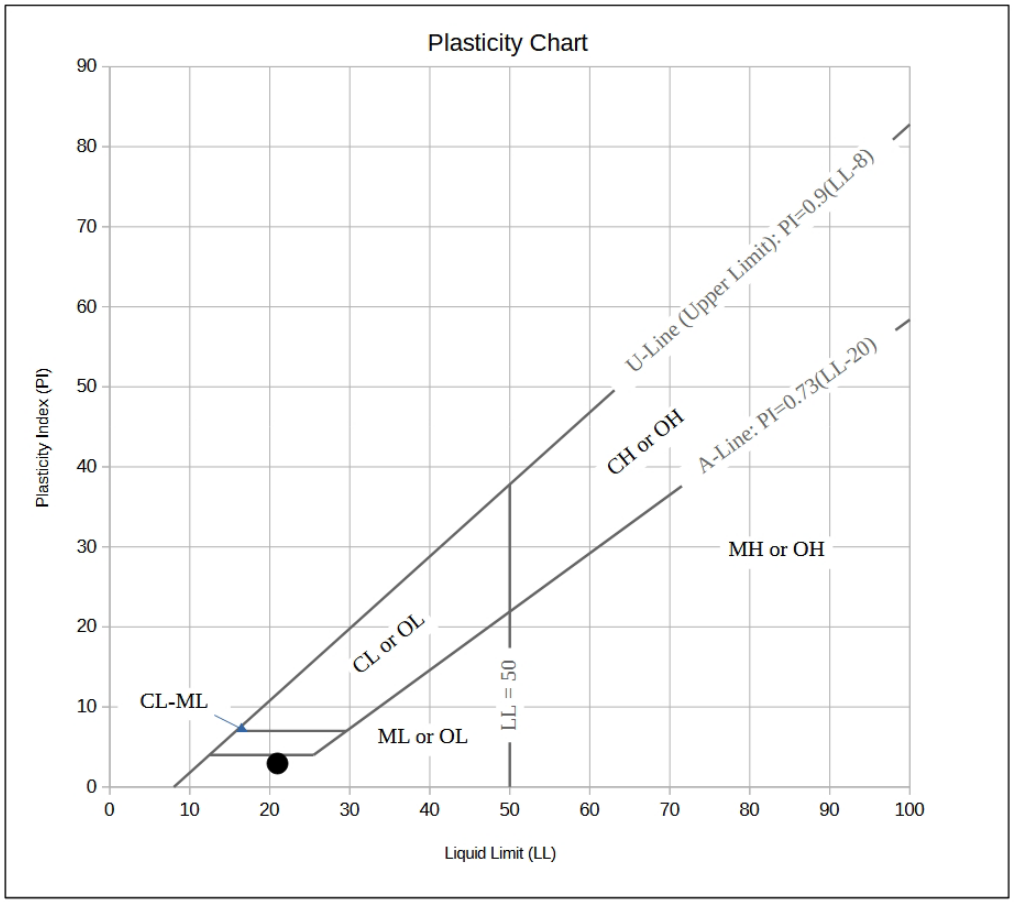
Test Methods: ASTM D6913, ASTM D7928, ASTM D4318

August 23, 2023

Atterberg Limits Report

SAMPLE ID: TP-1@6ft

Project Name:	Habitat for Humanity Cla
Project Number:	QG23-153
Date Collected:	08-18-2023
Date Reported:	08/23/23
Boring ID:	TP-1
Boring Depth:	6ft



Liquid Limit (LL): 21

Plastic Limit (PL): 18

Plasticity Index (PI): 3

P.I. Soil Description Ranges

0	Non-plastic
<7	Slightly plastic
7-17	Medium plastic
>17	Highly plastic

Unified Soil Classification System (USCS) Description
SANDY SILT (ML)

Staff Initials: T

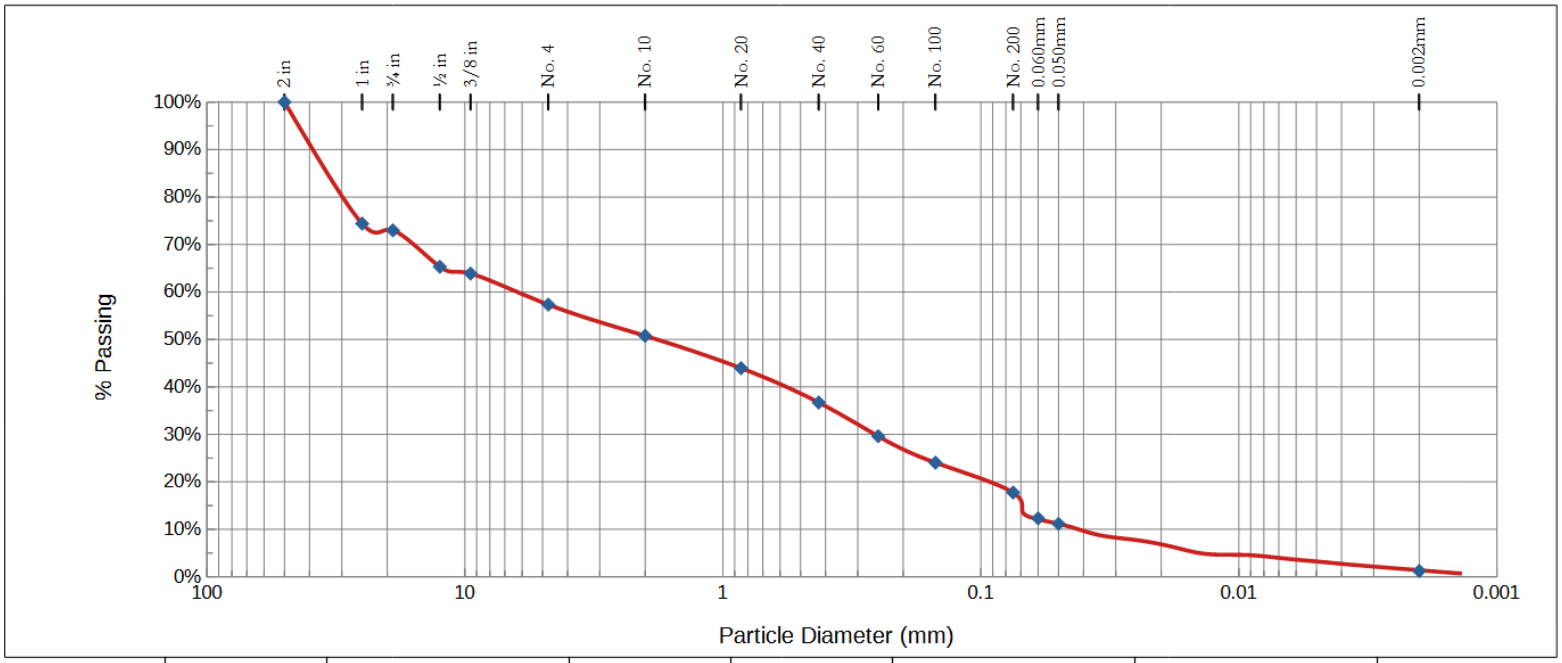
Test Methods: ASTM D6913, ASTM D7928, ASTM D4318

August 23, 2023

SAMPLE ID: TP-2@7ft

☑ Sieve Analysis | ☑ Wet Wash | ☑ Hydrometer | ☐ Atterberg Limits

Project Name:	Habitat for Humanity Cla
Project Number:	QG23-153
Date Collected:	08-18-2023
Date Reported:	08/23/23
Boring ID:	TP-2
Boring Depth:	7ft



USCS Scale	Coarse Gravel		Fine Gravel			Coarse Sand		Medium Sand		Fine Sand			(% of Fines Passing #200 Sieve) Hydrometer Method			Sand Total	Gravel Total
Sieve #	2"	1"	¾"	½"	3/8"	4	10	20	40	60	100	200	0.060	0.050	0.002		
Diameter, mm	50	25	19	12.5	9.5	4.75	2	0.85	0.425	0.25	0.15	0.075					
Retained	0.0%	25.6%	27.0%	34.7%	36.1%	42.7%	49.2%	56.1%	63.3%	70.4%	76.0%	82.3%				**39.6%**	**42.7%**
Passing	100.0%	74.4%	73.0%	65.3%	63.9%	57.3%	50.8%	43.9%	36.7%	29.6%	24.0%	**17.7%**	12.3%	11.2%	1.21%		

Graph Values

D90	40.24				
D60	6.69	**Coefficient of Uniformity:**	25.75	**CEC:**	8.0 meq/100g
D30	0.260	**Coefficient of Gradation:**	0.24	**OM (LOI 360):**	1 %
D10	0.043				

Unified Soil Classification System (USCS) Description	
GM	SILTY GRAVEL with SAND

Staff Initials: T

Test Methods: ASTM D6913, ASTM D7928

August 23, 2023

APPENDIX 6
WETLAND DELINEATION AND CRITICAL AREAS ASSESSMENT REPORT

Habitat for Humanity of Clallam County Multi-Family Residential
Wetland Delineation and Critical Area Assessment
Sequim, WA

Prepared for Habitat for Humanity of Clallam County

March 5, 2025

Land Services Northwest
Alex Callender MS, PWS
120 State Ave NE PMB 190, Olympia, WA, 98501
360.481.4208

Executive Summary

Site Name: Habitat for Humanity Multi-family Development

Site Location: XXXX W. Brownfield Road Sequim, Washington

Acres: 6.66

Parcel Number: 033029229020

Legal description: S2SWNWNW EXC W 30 & EXC S 15' 1/2 INT EA 4.50A SUR V51 P85

Project Staff: Alex Callender, MS, PWS

Field Survey Conducted:

Project Description: The project proposes condominiums consisting of: 8 - fourplex multifamily units, 2 - triplex multifamily units and five duplex multifamily units.

Findings: One regulated wetland was found onsite. The Wetland A was rated as a Category IV wetland with an overall score of 13 and a habitat score of three (LLL). Category IV wetlands with a high intensity land use intensity and a habitat score of three (LLL) typically have buffer of 25 - feet.

There will be a 15-foot structure setback which will be added onto the 25-foot buffer.

Impacts: The project will avoid direct impacts to wetlands streams on and offsite. There will be small unavoidable wetland buffer impacts of 1,531 square feet due to the configuration of the development and availability of proper soils for stormwater facilities.

Mitigation: The applicant will mitigate the buffer encroachment by providing a vegetation enhancement plan over the wetland and the remainder of the buffer that will significantly improve the functions and values of the existing wetland and its buffer by removing invasives and planting native shrubs and trees. The result of this enhancement will be to maintain and even improve the functions and values as measured by our habitat assessment.

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1.0 INTRODUCTION

This report is the result of a critical areas study of the 6.66-acre parcel #033029229020 at XXXX W. Brownfield Rd, Sequim, WA with the legal description of S2SWNWNW EXC W 30 & EXC S 15' 1/2 INT EA 4.50A SUR V51 P85 in Clallam County (**Figure 1**). The purpose of this report is to 1) identify and describe the wetlands or other critical areas on-site and within 315 ft off-site of the property 2) identify impacts to wetlands or critical areas and their buffers, and 3) apply mitigation and conservation measures to off-set any critical areas or buffer impacts.

This report was prepared to satisfy the critical areas review process for forest practices required by the City of Sequim Development Regulations Chapter 18.80 CRITICAL AND ENVIRONMENTALLY SENSITIVE AREAS PROTECTION

The City of Sequim and possibly other agencies that may evaluate impacts to critical areas from the proposed project will be able to utilize information in this report.



Figure 1-Vicinity Map, Parcel #033029229020

2.0 GENERAL DESCRIPTION AND LAND USE

2.1 Historical and Current Land Use

Historically, the property has been a vacant field with some grazing. There are residential lots to the south, Sequim Avenue to the west, West Brownfield Road to the north and pastureland to the east (**Figure 2**). The property is sloped to the north and to the east where there is a berm on the eastern edge of the property. On the eastern side of the berm there is a ditch. The ditch gathers water primarily from onsite and delivers it downhill to the northeast.



Figure 2 - Current Conditions

3.0 METHODOLOGY

3.1 Existing Information Review

Background information on possible wetlands was reviewed prior to field investigations and included the following:

National Wetlands Inventory (NWI) Map, USFWS Shapefile Data (**Appendix B**)

Clallam County Area Soil Survey, Soil Conservation Service (U.S. Department of Agriculture, 1973) National Resource Conservation Service Shapefiles (NRCS Soils Data Mart, 2006) (**Appendix C**)

USGS 7.5 Minute Quadrangle Topographic Maps (**Appendix D**)

Washington Department of Fish and Wildlife Priority Habitats and Species Database and Salmonscape (**Appendix E**)

WA Department of Natural Resources FPAMT (**Appendix F**)

NOAA NOW Precipitation Data (**Appendix G**)

Washington Department of Natural Resources Natural Heritage Database

United States Hydric Soils List (U.S. Department of Agriculture 1991)

City of Sequim Municipal Code

3.2 Analysis of Existing Information

The following existing information was reviewed to gain a better understanding of on-site conditions and its position in the landscape.

National Wetland Inventory (NWI) Map

The National Wetland Inventory (NWI) map (**Appendix B**), developed by the U.S. Fish and Wildlife Service (USFWS), shows a (PEM1C) Palustrine, Emergent Persistent, Seasonally flooded wetland on and offsite to the east and a (R5UBfx) Riverine Unknown Perennial Unconsolidated Bottom Semi permanently flooded wetland offsite to the west in the general position of .

NRCS Soils Map

The Natural Resources Conservation Service (NRCS) has mapped the site (Appendix C) as containing:

- Clallam gravelly sandy loam, 0 to 15 percent slopes
- Yeary gravelly loam, 0 to 15 percent slopes

CLALLAM SERIES

The Clallam series consists of moderately deep to densic materials, moderately well drained soils formed in glacial till over very compact glacial till. These soils are on glaciated hills and have slopes of 0 to 30 percent. The average annual precipitation is about 23 inches and the mean annual temperature is about 48 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, isotic, mesic Oxyaquic Vitrandic Haploxerepts

TYPICAL PEDON: Clallam gravelly ashy sandy loam - forested. (Colors are for moist soil unless otherwise noted. All textures are apparent field textures.)

Oi--0 to 1 inch; slightly decomposed needles, leaves, and twigs.

Oe--1 to 2 inches; moderately decomposed needles, leaves, and twigs.

A--2 to 3 inches; brown (10YR 4/3) gravelly ashy sandy loam, light brownish gray (10YR 6/2) dry; weak fine and very fine granular structure parting to weak very fine subangular blocky; slightly hard, friable, slightly sticky and

nonplastic; many fine and very fine roots; many fine and very fine irregular and tubular pores; 15 percent gravel; strongly acid (pH 5.2); abrupt smooth boundary. (1 to 4 inches thick)

Bw1--3 to 12 inches; brown (10YR 5/3) gravelly ashy sandy loam, light gray (2.5Y 7/2) dry; common medium distinct dark yellowish brown (10YR 4/4) redox concentrations, very pale brown (10YR 7/4) dry; weak fine and very fine subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine and very fine and common medium roots; many fine and very fine irregular and tubular pores; 20 percent gravel and 5 percent cobbles; strongly acid (pH 5.4); clear smooth boundary. (3 to 14 inches thick)

TYPE LOCATION: Clallam County, Washington; 4,000 feet south and 600 feet east of the northwest corner of sec. 24, T. 30 N., R. 5 W. Willamette Meridian.

RANGE IN CHARACTERISTICS:

Depth to densic contact - 20 to 40 inches
Moisture control section - dry 60 to 90 days following the summer solstice
Average annual soil temperature - 49 to 51 degrees F.
Reaction - strongly acid to slightly acid

A horizon -
Value - 3 or 4 moist, 4 to 6 dry
Chroma - 2 to 3 moist and dry
Texture - ashy-SL, ashy-L
Clay content - 3 to 18 percent
Rock fragments - 15 to 35 percent gravel, 0 to 20 percent cobbles, 15 to 35 percent total
Some pedons have an E horizon

Bw horizons -
Hue - 7.5YR to 2.5 Y
Value - 3 to 5 moist, 4 to 7 dry
Chroma - 3 or 4 moist, 2 to 4 dry
Texture - ashy-SL, ashy-L
Clay content - 3 to 18 percent
Rock fragments - 15 to 50 percent gravel, 5 to 20 percent cobbles, 35 to 60 percent total
Some pedons have a C horizon

Cd horizons -
Hue - 7.5YR to 2.5Y
Value - 5 or 6 moist, 4 to 7 dry
Chroma - 2 or 3 moist and dry
Texture - SL, L, FSL
Clay content - 5 to 25 percent
Rock fragments - 15 to 50 percent gravel, 0 to 10 percent cobbles, 15 to 60 percent total

at 20 to 60 inches. Tukey soils average 20 to 30 percent clay in the particle size control section.

GEOGRAPHIC SETTING: Clallam soils are on glaciated hills at elevations of 25 to 1,800 feet. Slopes are 0 to 30 percent. Clallam soils formed in glacial till over very compact dense glacial till. The soils are in a mild marine climate and have cool, dry summers and cool, moist winters. Average annual precipitation is 16 to 30 inches. Average January temperature is about 37 degrees F, average July temperature is about 59 degrees F, and the mean annual temperature is about 48 degrees F. Frost-free season is 160 to 220 days.

DRAINAGE AND PERMEABILITY: Moderately well drained; moderately rapid permeability above the very compact glacial till (A and Bw horizons) and very slow permeability in the very compact glacial till (Cd horizons).

USE AND VEGETATION: Timber production and wildlife are the principal uses. Some areas are used for cropland and pasture. Native vegetation is predominantly Douglas-fir with some western hemlock, grand fir, western redcedar, red alder, and Pacific madrone. Understory species include salal, evergreen huckleberry, red huckleberry, Oregon grape, creambush oceanspray, longtube twinflower, rose, blackberry, western swordfern, and western brackenfern. Principal crops are alfalfa and grass hay, barley, oats, strawberries, raspberries, and pasture.

DISTRIBUTION AND EXTENT: Northeastern Olympic Peninsula and Puget Sound Valleys, Washington; MLRA 2. This series is moderately extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Western part of Puget Sound Basin, Washington, Reconnaissance Soil Survey, 1910

REMARKS: Diagnostic horizons and other features

Ochric epipedon - from 2 to 3 inches
Cambic horizon - from 3 to 30 inches
Densic material - from 30 to 62 inches
Particle size control section - 10 to 30 inches (Bw horizons)

YEARY SERIES

The Yeary series consists of moderately deep, moderately well drained soils that formed in reworked marine sediments over dense, very compact glacial till. These soils are on glaciated uplands and have slopes of 0 to 35 percent. The mean annual precipitation is about 28 inches and the mean annual temperature is about 49 degrees F.

TAXONOMIC CLASS: Fine-loamy, isotic, mesic Andic Oxyaquic Haploxerepts

TYPICAL PEDON: Yeary gravelly medial loam, forested. (Colors are for moist soil unless otherwise noted. All textures are apparent field textures.)

Oi--0 to 1 inch; slightly decomposed needles, leaves and twigs.

Oe--1 to 2 inches; moderately decomposed needles, leaves, and twigs.

A--2 to 9 inches; dark brown (10YR 4/3) gravelly medial loam, very pale brown (10YR 7/3) dry; weak very fine subangular blocky structure and weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine, and common medium roots; many fine and very fine irregular and tubular pores; 15 percent pebbles; moderately acid (pH 6.0); abrupt smooth boundary. (2 to 7 inches thick)

AB--9 to 15 inches; yellowish brown (10YR 5/4) gravelly medial loam, very pale brown (10YR 7/3) dry; few fine distinct yellowish brown (10YR 5/6) redox concentrations, brownish yellow (10YR 6/6) dry; weak fine and very fine angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and very fine roots; common very fine irregular, and few fine and very fine tubular pores; 20 percent gravel; moderately acid (pH 6.0); clear smooth boundary. (5 to 12 inches thick)

Bw1--15 to 21 inches; yellowish brown (10YR 5/4) gravelly clay loam, very pale brown (10YR 7/3) dry; few fine distinct dark yellowish brown (10YR 4/6) redox concentrations, brownish yellow (10YR 6/6) dry; weak very fine, fine, and medium angular blocky structure; hard, firm, moderately sticky and moderately plastic; few fine and very fine roots; common very fine irregular pores and few fine and very fine tubular pores; 20 percent gravel, moderately acid (pH 6.0); clear smooth boundary. (3 to 8 inches thick)

Bw2--21 to 31 inches; yellowish brown (10YR 5/4) gravelly clay loam, very pale brown (10YR 7/3) dry; common medium distinct dark yellowish brown (10YR 4/4) redox concentrations; light yellowish brown (10YR 6/4) dry; moderate medium, fine and very fine angular blocky structure; very hard, firm, moderately sticky and moderately plastic; very few fine and very fine roots; common very fine irregular, and few very fine tubular pores; 15 percent pebbles; moderately acid (pH 5.6); gradual smooth boundary. (6 to 10 inches thick)

TYPE LOCATION: Clallam County, Washington; 100 feet east of Palo Alto Road; 1,700 feet north and 1,700 feet west of the southeast corner of section 16, T.29N., R.3W.

RANGE IN CHARACTERISTICS: Depth to the densic material consisting of very compact glacial till is 20 to 40 inches. The particle size control section is 5 to 20 percent pebbles and cobbles and 18 to 35 percent clay. The mean annual soil temperature is 50 to 53 degrees F. The soil is dry in the moisture control section for 60 to 75 consecutive days following summer solstice. There is a perched water table above the densic layer from January to April; (oxyaquic).

The A and AB horizon has value of 3 or 4 moist, 6 or 7 dry, and chroma of 2 or 3. This horizon has granular or subangular blocky structure. It is slightly acid or strongly acid. It has bulk density moist of 0.80 to 1.00 g/cc. Acid oxalate aluminum plus one-half the acid oxalate iron is 1.0 to 2.5 percent.

GEOGRAPHIC SETTING: Yeary soils are on glaciated uplands at elevations of 200 to 1,500 feet. Slopes are 0 to 35 percent. They formed in reworked marine sediments over dense very compact glacial till. The soils are in a mild marine climate with cool, dry summers and cool, moist winters. The mean annual precipitation is 20 to 35 inches. The average January temperature is about 37 degrees F.; the average July temperature is about 59 degrees F.; and the mean annual temperature is about 49 degrees F. The frost free season is 160 to 200 days.

DRAINAGE AND PERMEABILITY: Moderately well drained; medium runoff; moderately slow permeability above the densic contact.

USE AND VEGETATION: Timer production, cropland, pasture and wildlife habitat are the principal uses. Native vegetation is predominantly Douglas fir with some grand fir, western red cedar, western hemlock, Pacific madrone and bigleaf maple. The understory species includes salal, oceanspray, red huckleberry, twinflower, Oregon grape, rose, blackberry, western swordfern and bracken fern. Principal crop is grass and legume hay.

SERIES ESTABLISHED: Clallam County, Washington, 1979.

USGS 7.5 Minute Topo Map

The USGS has topographical maps that depict natural and artificial features on the landscape including wetlands. This map shows Bell Creek offsite. (**Appendix D**).

WDFW Priority Habitats and Species Inventory and SalmonScape

The Department of Fish and Wildlife maintains an inventory of priority habitats and species information (**Appendix E**). This database shows a polygon for the Roosevelt elk (Cervus elaphus roosevelti). The area may be grazing habitat for elk as they are known to occur throughout area. It shows the property as part of the Sequim Crucial Winter Range.

The area has no trees to provide thermal refuge which is important tin the wintertime for range, but it does have grasses for gazing.

The Northern spotted owl polygon also occurs within the subject property. This area is a large grassy field which may harbor mice, voles and even some rats which the northern spotted owl may feed upon, but there are no old growth trees to hold them to this site. They are not expected to occur here.

The Department of Fish and Wildlife maintains the Salmonscape database, which provides information on Washington salmonid populations **(Appendix E).** This database does not show the existence of salmon habitat onsite; however it does show (Coho)or species in vicinity of the property across Sequim Avenue in the Bell Creek.

WA Department of Natural Resources FPAMT

The department of Natural Resources has a mapping tool for depicting Stream types for Forest Practices purposes in accordance with WAC 222-16-16 **(Appendix F).** This database shows a Type F stream to the west of the parcel where Bell Creek is located.

NOAA NOW Precipitation Data

NOAA maintains a database that graphs the current precipitation against the wettest, driest, and normal accumulations of record. **(Appendix G)** This data shows that the precipitation since October 1, 2022 has above average rain. This is measured at the Sequim 2 East station which is about a mile east of the subject property.

3.3 Field Investigation

Determination Guidelines

Land Services Northwest based its wetland identification and delineation upon the 1987 Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987) and the regional specificity found in Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0) (USACE, 2010). Generally, as outlined in the manuals, wetlands are distinguished from other landforms by three criteria: 1) hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology.

General Field Guidelines

Plant species were identified according to the taxonomy in *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973), and the wetland status of plant species was assigned according to*: The National Wetland Plant List: 2016* (Lichvar, 2016). Wetland classes were determined by the U.S. Fish and Wildlife Service's system of wetland classification (FGDC, 2013). The wetland determination was based mainly on soils, vegetation, and hydrology characteristics indicative of wetland conditions.

The Corps Manual and Supplement describes soil, vegetation, and hydrological indicators of wetlands. A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper par (National Technical Committee for Hydric Soils, 1994). Anaerobic conditions cause redoximorphic features to develop, which can be evidenced through the observation of mottling or gleying in the soil. Soils are hydric if they match the indicators in the supplement or meet the technical definition.

A soils evaluation was performed to determine if the area contained hydric soils. Additional test plots were sampled to gage possible wetland indicators and characteristics. Soils are normally excavated to 18 inches or more below the surface within a test pit to evaluate soil characteristics and hydrological conditions in both wetland and upland areas. Soil chroma (color) is evaluated using the *Munsell Color Chart* (Munsell Color, 1988).

The COE describe a wetland rating system for plants. Each plant species is assigned a probability of occurrence within wetlands, which is referred to as its wetland status. The wetland plant indicator system is as follows:

Table 1 Indicator Status Ratings

Indicator Status	Abrv.	Definitions - Short Version (ERDC/CRREL TN-12-1)
Obligate	OBL	Almost always occur in wetlands.
Facultative Wetland	FACW	Usually occur in wetlands, but may occur in non-wetlands.
Facultative	FAC	Occur in wetlands and nonwetlands.

Facultative Upland	FACU	Usually occur in non-wetlands, but may occur in wetlands.
Upland	UPL	Almost never occur in wetlands.
		(USACE, 2016)

In general, under the Federal methodology, more than 50 percent of the predominant plant species within a test plot must be rated FAC or wetter (i.e., FACW, OBL) to satisfy the wetland criteria for hydrophytic vegetation. Dominant species are those when ranked comprise 50% of the total or those that have a percent cover greater or equal to 20 percent within the test plot. Only dominant plant species were considered in the data analysis.

If wetland hydrology, including pooling, ponding, and soil saturation, is not clearly evident, hydrological conditions may be observed through surface or soil indicators. Indicators of hydrological conditions include drainage patterns, drift lines, sediment deposition, watermarks, historic records, visual observation of saturated soils, and visual observation of inundation.

3.4 Wetland Study

Field Survey

A wetland reconnaissance was performed on November 17, 2022, to identify wetlands, streams and other critical areas that might be present on the subject property. Observations were made of the general plant communities, wildlife habitats, and the locations of potential streams and wetland areas. Present and past land-use practices were also noted, as were significant geological and hydrological features.

Once likely wetland areas were located, the Routine Onsite Determination Method was used to identify the presence of wetland parameters and to delineate the outer edge of the wetlands using the procedures outlined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). The Routine Onsite Determination Method was used in areas that maintained normal circumstances, were not significantly disturbed, and were not potential problem areas. A formal wetland delineation was performed on November 17, 2022, to flag and document on-site wetlands and to identify and map off-site wetlands within 315 feet of the subject property as we are able.

Test pits were dug on 11/17/2022 (**Figure 3**), to develop a better understanding of soil profiles onsite. Soils were excavated to 18 inches or more below the surface within a test pit to evaluate soil characteristics and hydrological conditions throughout the site. Soil chroma (color) is evaluated using the *Munsell Color Chart* (Munsell Color, 1988). These results were entered in wetland data sheets **(Appendix G).** Since there was no hydrology criteria met in many areas that had hydric soils, a second survey was conducted in February during the growing season in order to verify that

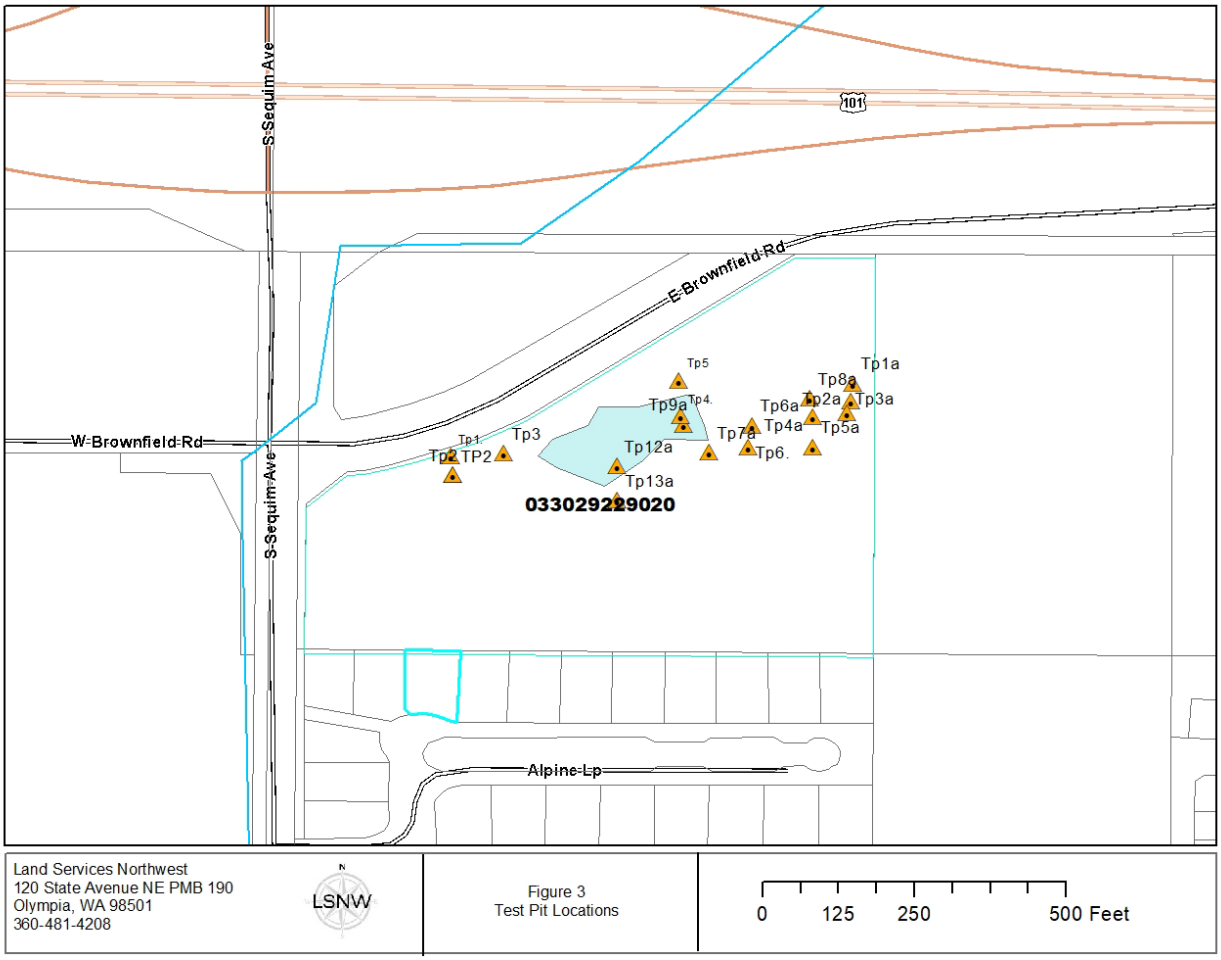


Figure 3 – Test Pit Locations

4.0 RESULTS

4.1 Existing Conditions

The subject property is a rolling parcel with a gentle slope to the north and to the east. The area is grassy pastureland that is now unused. There is a ditch at the eastern end that has a north south orientation, but it does not appear to carry water except maybe during periods of heavy precipitation. There are ditch spoils which effectively cut off the wetland from the offsite ditch that travels through the neighboring pasture.

4.2 Wetlands

One wetland, labeled Wetland A, was identified during the site visit, and formally investigated on November 17, 2022 and later on April 8, 2023 to verify conditions during a wet period.

Wetland A

Wetland A on site is a Palustrine Emergent, Seasonally Flooded wetland. The wetland flows to the north east and meets a ditch. This ditch does not appear to carry much water and percolates on its way to the Brownfield Road on the neighbor's western property edge. The wetland seems to be effectively drained by the ditch.

Plants
Meadow barley, Reed canary grass, Colonial bentgrass, soft rush and slough sedge were dominant vegetation in the wetland.

Soils
Soils in Wetland A are a black 10YR 2-3/1 silt loam underlain by a 10YR 4/2 with 10YR 4/6 redox gravelly loam. The delineation of the wetland area closely follows the topography of the site where the hydric soils are limited to the lower portion of the very gradual hillslope.

Hydrology
It was November and there were some recent rains. No water was found in the test pits, so we went again to check on suspicious areas that had hydric soils but no hydrology. No water was found in many of these suspicious areas. Only where the wetland was mapped did we find water within 12 inches of the surface.

5.0 WETLAND FUNCTIONAL VALUES

5.1 Wetland Functional Analysis Methodology
Wetlands, in general, provide many valuable ecological and social functions, including 1) stormwater storage, 2) groundwater recharge, 3) erosion control, 4) water quality improvement, 5) natural biological support, 6) overall habitat functions, 7) specific habitat functions, and 8) cultural and socioeconomic value.

Several procedures have been developed for assessing the importance and magnitude of functions and include the Washington Functional Assessment Method (WAFAM) Wetland Evaluation Technique, the Hydrogeomorphic Assessment Method the Habitat Evaluation Procedure (HEP), and numerous regional and/or local procedures. However, none of these methods were consistent with the needs of this project.

Wetland functions were also semi-quantitatively assessed using information gathered while performing the ECY Wetland Rating System for Western Washington (Hruby, 2014). The scores from the analysis of the wetland are found in Appendix H. This method is a comprehensive approach requiring substantial data input and assessment of onsite and landscape functions. The descriptions of wetland functions and the factors and parameters considered by that method are very helpful in interpreting the functioning of the subject wetlands and buffer areas. The methodology is scientifically based, in that its application requires a prior understanding of how wetlands function. Advanced experience, training and scientific objectivity of a wetland scientist applying the method is essential for an accurate assessment. Alex Callender has attended and received credit for the training in this method.

5.2 Wetland Functions
Wetland A
Wetland A is a an approximately one-acre mostly disturbed emergent wetland. Wetland A is a slope wetland that is seasonally flooded and saturated.

Water Quality Functions

The wetland has mineral soils and a low slope of approximately 1-2%. Wetland A has some pollution generating land use with Sequim Road above it, but not 10%. Wetland A has dense vegetation and a 303d listed stream across the road from it and within a mile. Wetland A is in a basin with planned TMDL so it rates high for those functions.

Hydrologic Functions

Wetland A does not have dense rigid plants for 90% of its area. Wetland A has more than 25% of its land use in runoff producing land use. We are assuming that there is flooding further downstream, however it has not been named as important for this feature.

Habitat Functions

Wetland A is a moderately large wetland with a common vegetation structure of slough sedge and invasive reed canary grass along its reach. There is only one vegetation class emergent and one hydroperiod of seasonally saturated. The wetland has a large amount of high intensity development and not much undisturbed habitat. There is high intensity development in 1KM and is not more than 50% high intensity. It has little undisturbed accessible habitat, so it rates low for position in the landscape. Wetland A has no snags and logs, or other features , so it rates low for these priority habitat functions.

6.0 REGULATORY CONSIDERATIONS

6.1 City of Sequim Regulations

Wetlands

Wetlands are regulated under SMC Chapter 18.80 CRITICAL AND ENVIRONMENTALLY SENSITIVE AREAS PROTECTION

Wetlands were rated using the Wetland Rating System for Western Washington in accordance with Section F(3).

Wetland A

Wetland A is rated a Category IV wetland with an overall score of 14, and a habitat score of 3(LLL) for Habitat. According to the Table in SMC Development standards. 18.80.070 below, Category IV Wetlands of all types carry a twenty five -foot buffer.

Wetland Rating	Land Use Impact	Buffer
Cat I – Habitat score 20 or more, or estuarine or coastal lagoon	Low	150 ft.
	High	200 ft.
Cat I – Habitat score 19 or less	Low	125 ft.
	High	200 ft.
Cat II – Habitat score 20 or more, or estuarine or coastal lagoon	Low	100 ft.
	High	150 ft.
Cat II – Habitat score 19 or less	Low	65 ft.
	High	100 ft.
Cat III – Habitat score 20 or more	Low	75 ft.
	High	125 ft.
Cat III – Habitat score 19 or less	Low	40 ft.
	High	75 ft.
Cat IV	**All**	**25 ft.**

The following measures are required, as applicable, to receive the buffer widths listed above.

• Outdoor lighting from the development shall be designed and installed to prevent direct casting of light into adjacent wetland areas. Final design shall be reviewed and approved by the department of community development prior to permit issuance.
• Activity that generates noise shall be located away from wetlands. If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source.
• The applicant shall prepare a restrictive covenant, to be placed upon the deed for the property, that prohibits use of pesticides within 150 feet of the delineated on-site wetland area. Proof of the recorded covenant shall be provided to the city prior to permit issuance.
• Surface water management shall be consistent with low impact development (LID) practices as set forth in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the public works department prior to permit issuance.
• Permanent signage on the boundary of a wetland buffer to protect its functions and values. Fencing may be required if requested by the wetland biologist to protect its functions and values. Fencing design shall not interfere with fish and wildlife migration and shall minimize impacts to the wetland and its associated habitat.
• The applicant shall utilize dust control best management practices (BMP) during development activities. Such practices shall be consistent with the manual identified in Chapter 13.104 SMC.
• Surface water from areas adjacent to on-site delineated wetland areas shall be channelized and treated prior to discharge into wetland buffer areas. Surface water treatment shall be consistent with the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• All treated surface water proposed for discharge into any on-site delineated wetland area shall be conveyed in a manner consistent with those practices set forth in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Existing on-site drainage system facilities shall be reviewed by a Washington State licensed engineer to determine their ability to accommodate the increased volume of surface water created by the new development. The facilities shall be modified as necessary with facility design consistent with the direction provided in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Surface water from impervious surfaces and lawns located adjacent to on-site delineated wetland areas shall be channelized and treated prior to discharge into wetland buffer areas. Surface water treatment shall be consistent with those practices contained in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Apply integrated pest management.
• The delineated on-site wetland area shall be placed in a separate tract as prescribed in SMC 18.80.090.

The applicant will utilize these measures to reduce the impacts to wetlands and their buffers

There is a building setback requirement according to SMC Development standards. 18.80.070 F. which states:

6. A building setback line of 15 feet is required from the edge of any wetland buffer. Minor structural intrusions into the area of the building setback may be allowed if the department of community development director or authorized designee determines, supported by objective written evidence, that such intrusions will not negatively impact the wetland. If the wetland buffer is already heavily impacted, building setbacks may be reduced in exchange for buffer enhancement – see SMC 18.80.080.

Drainage facilities may be located within the outer 25% of the wetland buffer in accordance with SMC 18.080.08(E). which states:

E. Drainage Facilities. Category III or IV wetlands and their buffers, and stream buffers, may be altered for use as a public drainage facility; provided, that all requirements of the city stormwater management plan and all other local, state and federal laws are satisfied, and so long as increased and multiple natural resource functions are achievable, and the benefits outweigh any lost resource. The department of community development director may approve public drainage facilities in a buffer only when he/she determines that long-term impacts are minimal or when there are no practicable or reasonable alternatives and mitigation is provided. Drainage facilities shall be limited to the outer 25 percent of a buffer.

18.80.080 Development exceptions.C. states:

Previously Altered Critical Areas or Buffers. If any portion of a critical area or its buffer has been altered from its natural state, the applicant may propose to develop within the altered area pursuant to the following decision criteria:

1. The critical area or buffer was lawfully altered in accordance with the provisions of the city ordinances and any state and federal laws at the time the alteration occurred;

The wetland was altered by agricultural activities (Ditching and haying) long ago and was not in violation of any state or federal laws at the time of the alteration. It has been maintained as pasture land .

2. The alteration has significantly disrupted the natural functions of the critical area or its buffer as determined by a qualified professional;

The wetland rated as a Category IV wetland due to ditching draining and haying of the wetland over time which has altered the diversity, hydrology, and structure of the wetland..

3. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least adverse impact on the critical area and its buffer as determined by a qualified professional;

We are trying to maximize the building units and the enhancement plan will protect the functions and values of the wetland to the greatest extent possible. The stormwater must be maintained on site and to do that we need to have the impacts that we are proposing.

4. The proposal incorporates the development standards of SMC 18.80.070;

We will be using the bmps found in 18.80.070 listed above.

5. The new development will not further degrade the critical area or its buffer as determined by a qualified professional;

We will be providing maintenance and monitoring plan and a habitat assessment to show that the overall functions of the wetland will be maintained and not degraded. There should be a net improvement as proposed in this plan.

6. The proposal is consistent with the purpose and intent of this chapter; and

We believe the proposal is consistent with the purpose of this chapter to maintain critical areas and promote the public interest.

7. The applicant must mitigate and enhance the remaining critical area or buffer. An enhancement plan must be submitted in accordance with the requirements of SMC 18.80.060.

The native plant enhancement and invasive species removal plan is provided in Chapter

6.2 Streams Fish and Wildlife Conservation Areas (FWCA)

Fish and Wildlife conservation areas area defined in code as:

5. Fish and wildlife habitat conservation areas; "fish and wildlife habitat conservation areas" does not include such artificial features or constructs as irrigation delivery systems, irrigation infrastructure, irrigation canals, or drainage ditches that lie within the boundaries of, and are maintained by, a port district or an irrigation district or company;

There exists a ditch at the eastern border of the property just offsite that appears to be a manmade ditch created for the maintenance of uplands for the pasture that is currently under ag activities such as cattle pasturing. This area was not considered as an FWCA in this instance. No impacts are proposed to this area as the buffer of the Ns streams would be a type 5 stream where the following apply.

"Stream types" include categories established as follows:

1. "Type 1" means those streams inventoried as "shorelines of the state" in the city's adopted shoreline master program.

2. "Type 2" means perennial or intermittent streams used by anadromous fish during any stage of life.

3. "Type 3" means perennial or intermittent streams with the potential for anadromous fish use, but which do not currently support anadromous fish because of fish barriers or any other condition that substantially interferes with stream use by anadromous fish.

4. "Type 4" means intermittent or perennial streams that are not Type 1, 2 or 3 that may contain fish other than anadromous fish.

5. "Type 5" means intermittent or perennial streams that are not Type 1, 2, 3, or 4.

Under the criteria, the buffer of the ditch would carry a 25-foot buffer if it were to carry one at all as we maintain that it is a maintained ag ditch as there are ditch spoils right beside the ditch.

Fish and Wildlife Habitat Conservation Areas

In addition, we had mentioned that according to the Department of Fish and Wildlife PHS Mapper, there is critical elk habitat nearby. three management goals are key when managing elk.

1) minimize human activity that would disturb elk,

2) maximize retention of undisturbed vegetation – particularly

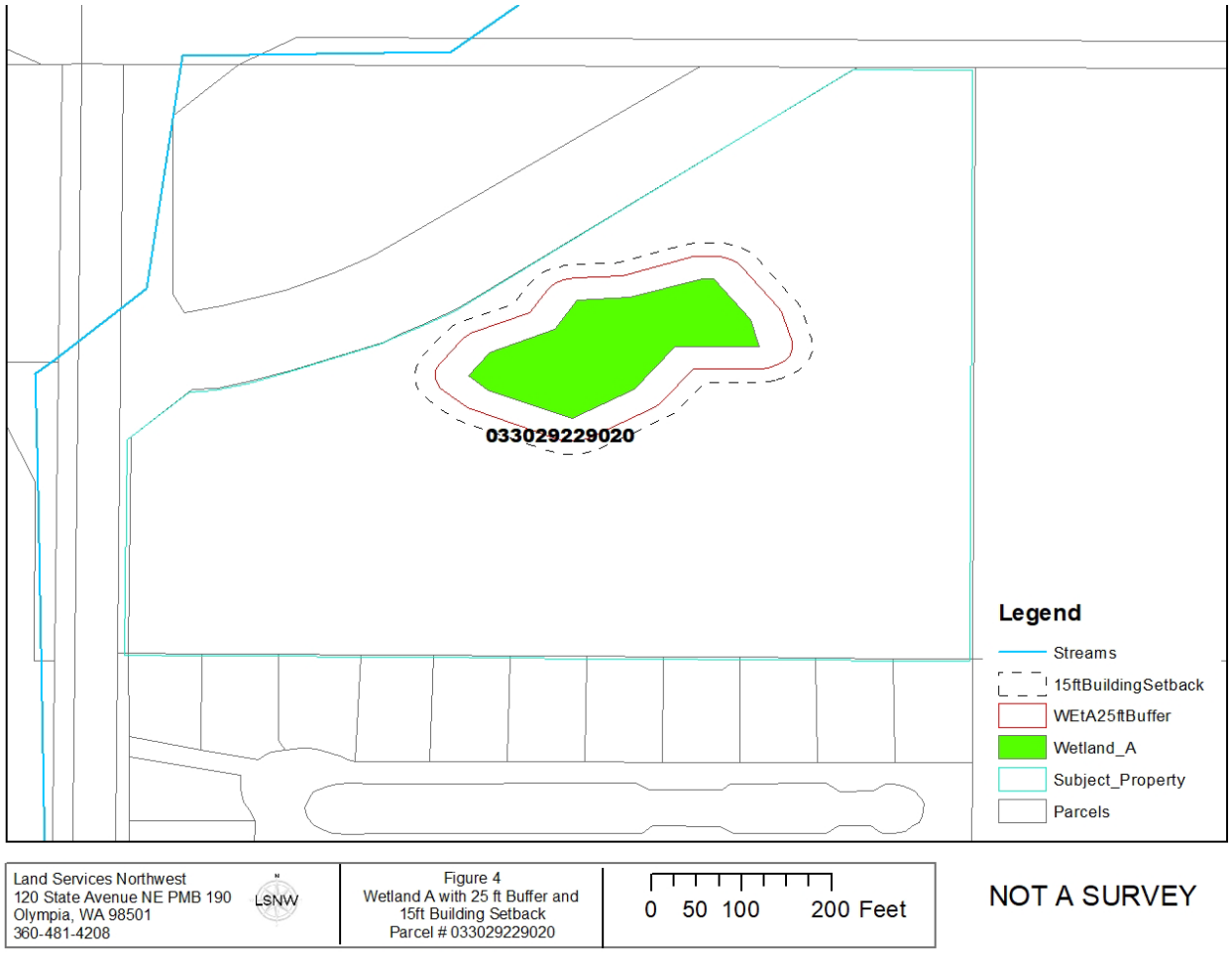
forest cover, and

3) avoid activities that serve to exclude elk.

An additional goal of our review is protecting private property. Any time there is development within elk use areas, there is a potential for elk-related damage. Avoiding or minimizing development activities within winter elk use areas will help avoid future damage to built or introduced features.

Through the openspace design, we have maintained a portion of this parcel to maintain the corridor for these animals to travel unimpeded. No fences over 4 -feet will be used on the parcel. Fencing may be provided around shrubs to prevent browse. There are no forested areas to protect on this site so it is not important for thermal refuge, although they may graze from time to time.

Signage that alerts the community to the importance of elk and not disturbing them will be important to maintain the area.



Insert Figure 4 – Wetlands with 25 -foot Standard Buffer and 15-foot Building Setback

Table 2 - Summary of Wetlands and Streams on or in the Vicinity of the Subject Property

Wetland	Size		Category		Land Use Intensity (	Buffer	Cowardin Class	Comments
	On-site	Off-site (estimated)	City of Sequim	Building Setback/Reduced Setback				
Wetland A[1]	-	~1.1 acre	IV	15 ft/4 ft	High	25	PFOC[1]	No Wetland Buffer Impacts
Offsite Ditch	-	30 linear feet	-			-		No Stream or Buffer Impacts

1. Palustrine , Emergent Seasonally Flooded (or Saturated)

6.2 Corps Regulations

Wetland A flows off site and into the Sequim Bay therefore it would be maintained as a Water of the US and regulated under the Clean Water Act. No impacts are proposed to Wetland A. The offsite ditch may drain across the highway via a ditch and into Sequim Bay and is therefore assumed to be jurisdictional.

6.3 Department of Ecology

Under RCW 90.48, the Washington Department of Ecology (DOE) reserves regulatory authority to regulate “waters of the state” under Section 401 of the Clean Water Act. No wetland impacts are proposed.

7.0 WILDLIFE

Wildlife observed during the field investigations are typical of urban/suburban adapted species (Table 2). The European starling, possum, and other species adapted to urbanization may inhabit or visit the site for food and shelter.

No other Federally-listed, or priority species was observed on the subject property or near the site based on the WDFW Priority Habitats and Species (PHS) and field observations during the reconnaissance and delineation. During the limited duration of the site reconnaissance and delineation, no evidence of the Federally-listed Bald Eagle, Marbled Murrelet, or Spotted Owl was observed on-site.

No Federally-listed salmonid species are known to occur on-site, based on the WDFW SalmonScape database, the WDFW PHS database, and site reconnaissance.

No wildlife was observed on site during the site visit.

8.0 PROPOSED PROJECT

8.1 Description

The applicant proposes he project proposes 48 condominiums consisting of: 8 - fourplex multi-family units, 2 - triplex mult-ifamily units and five duplex multi-family units.

The development will also have a driveway with two parking spaces per unit for each building. In addition, a 60-foot road right of way with a planting strip sidewalks and travel lane will be provided for access to the buildings' driveways. utilities will be provided at the road to include sewer, water, cable, electricity (See Site Plan).

8.2 Development Impacts

No direct impacts to the wetlands are expected. 1,531 square feet of buffer impacts are proposed with native vegetation enhancement mitigation for the remainder of the buffer and wetland.

8.3 Impact Avoidance and Minimization

Impacts will be avoided by maintaining most of the project well outside of the project area. Unavoidable impacts due to stormwater infiltration requirements will result, however, an enhancement plan to maintain the functions and values will be installed which will improve the remainder of the wetland and buffer

Implementing water quality and sedimentation best management practices (BMPs) will act to minimize sedimentation and protect water quality on-site and any bare areas will be planted with a cover crop. Silt fences and straw waddles will be used where necessary. Stormwater will be controlled onsite and treated before discharge and no water will be discharged without treatment. Work will be conducted in the dry when possible and only with responsible construction methods and materials.

Insert Figure 5 - Site Plan

9.0 MITIGATION

9.1 Mitigation Requirements

To improve the overall functions of wetlands, it was determined that unavoidable impacts will occur to 1,531 sq ft the buffers of Wetland A. In accordance with the impact reducing measures found in the Table above and the qualifications found in **SMC** 18.80.080 Development exceptions. C. will be met through this mitigation plan with the following actions

K. Mitigation. For any allowable development exception provided under this section, the associated adverse impacts must be considered unavoidable but mitigable. The applicant must first demonstrate that they have taken the following mitigation sequencing actions:

• Avoiding the impact altogether by not taking a certain action or parts of an action;

The applicant has redesigned the project to the maximum extent possible without giving up the purpose of providing affordable housing for people that need it. This has involved reducing the overall amount of units.

• Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

The applicant has redesigned stormwater and the homes to reduce the impacts to the wetlands. This includes a robust native plant enhancement plan in order to provide functions lost by farm practices on the site.

• Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

We will be restoring the buffers of the wetland with native vegetation in order to maintain functions and values.

• Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

There will be a long-term maintenance and monitoring plan offered with the planned mitigation.

• Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or

We will be compensating at more than 1:1 impacts to native plant enhancement and invasive species removal in the area between the wetland and the proposed development area.

• Monitoring the impact and taking appropriate corrective measures.

The mitigation area will be monitored for 5 years in accordance with the City's maintenance and monitoring guidelines If there is plant mortality or fencing issues the applicant will replant and maintain the overall viability of the plantings. After this five year period the plantings should be self-maintaining.

Mitigation must not be implemented until after city approval of the critical area report and mitigation plan prepared in accordance with subsection (K)(4) of this section.

1. General Requirements. The applicant must develop a mitigation plan that provides for construction, maintenance, monitoring and contingencies of the critical areas compensatory mitigation as required by conditions of approval and consistent with the requirements of this chapter. The mitigation plan must be consistent with subsection (K)(4) of this section. All mitigation sites must have buffers consistent with the buffer requirements of this chapter. Where feasible, mitigation projects must be completed prior to activities that will disturb critical areas. In all other cases, mitigation must be completed immediately following disturbance and prior to use or occupancy of the activity or development. Construction of mitigation projects must be timed to reduce impacts to existing wildlife and vegetation. For mitigation projects that involve creating new wetlands or relocating streams, the director of community development must have the authority to modify the buffer requirements on a case-by-case basis to avoid unduly encumbering neighboring properties.

The applicant has developed a mitigation plan that will target functions that are typically improved with native vegetation which provides multiple ecosystem functions. The biologist has developed this mitigation plan to improve areas that are in need of remedial improvement as shown by the habitat analysis that follows, in addition we will be using the Wetland Rating System answers to key in on important functions identified with this rating.

The project goals are to create a shrub scrub wetland with some forested components to provide shade to the wetland as this wetland eventually drains to the Straits San Juan de Fuca. The are is also there to provide food and screening to the wetland and is designed to allow movement through the site and not hinder elk or other wildlife. A cedar split rail fence will be installed to prevent intrusion of people into the wetland buffer while allowing most wildlife. The mitigation will be completed prior to the occupancy of the buildings.

2. On properties where mitigation is required, prior to issuance of any construction, grading, or building permits, or preliminary approval of a major plat, short plat, or binding site plan, a "critical areas performance bond" or other suitable financial guarantee as approved by the city attorney must be submitted to the department of community development. The amount of the bond or other financial guarantee must be equal to 150 percent of the estimated cost of the mitigation. Such bond or other suitable financial guarantee must not be released until all required mitigation is installed.

The applicant is prepared to provide a bond of 150% of the value of the mitigation plantings and labor until the required mitigation is installed.

3. Monitoring. All mitigation projects must be monitored for a period of five years. Monitoring reports must be submitted annually for the first three years following construction and at least upon the completion of the fifth year to document milestones, successes, problems, and contingency actions of the mitigation. The applicant must deposit an amount equal to 125 percent of the full cost of monitoring with the city before monitoring begins. The city must use such funds to pay for monitoring costs associated with the mitigation project. Once the monitoring has been completed,

the city must refund any remaining funds to the applicant within 60 days of receiving the final monitoring report. The director must have the authority to extend the monitoring period and require additional monitoring reports beyond the initial five-year monitoring period for any project that does not meet the performance standards identified in the mitigation plan, does not provide adequate replacement for the functions and values of the impacted critical area, or otherwise warrants additional monitoring (such as when forested wetlands are restored or created).

The applicant will create monitoring reports twice a year for the first three years in order to make sure that the plantings are surviving and thriving. The reports will be conducted in the spring shortly after budbreak in April to aid in identification of plants reports will follow within a month of the monitoring report. During the spring, the applicant will identify mortality and recommend replacements and management to prevent the mortality in the future. This will be adaptively mab

4. Mitigation Plans. All restoration and compensation projects must follow a mitigation plan prepared by qualified professionals containing, at a minimum, the following components:

a. Baseline Information. Quantitative data must be collected and synthesized for both the impacted critical area and the proposed mitigation site, if different from the impacted critical area, following procedures approved by the department of community development;

The baseline functions and values of the wetland is contained within the Wetland Rating Forms which are part of the Wetland Rating System for Western Washington (Hruby 2014as amended). We have also conducted a site specific study which looks at current functions vs. the expected functions after the installation of the mitigatoin

b. Environmental Goals and Objectives. Goals and objectives describing the purposes of the mitigation measures must be provided, including a description of site selection criteria, identification of target evaluation species and resource functions;

The environmental goals and purpose of the mitigation is to enhance the remaining wetland with the addition of trees and shubs, which are currently absent from the area. The goal is to establish two conifer species and one deciduous tree species. The shrub component will be provide four different flowering and fruiting shrubs.

The objective of the planting is to shade out invasive reed canary grass using trees and shrubs and provide at least four flowing shrubs.

c. Performance Standards. Specific criteria for fulfilling environmental goals and objectives and for beginning remedial action or contingency measures must be provided, including water quality standards, species richness and diversity targets, habitat diversity indices, or other ecological, geological or hydrological criteria;

Performance standard #1` will be the introduction of at least four different shrub species, two conifer species and four shrub species

Performance standard #2 will be to create 80% aerial coverage of the plants to shade out reed canary grass by year 5.

Performance standard # 3 is to screen wildlife by planting a thick edge of shrubs that is between the wetland and the development.

Performance standard #4 is to create two layers of canopies with 30% Forested component and 70% shrub component.

Performance standard # 5 is to maintain less than 20% invasive species coverage

d. Detailed Construction Plan. Written specifications and descriptions of mitigation techniques must be provided, including the proposed construction sequence, accompanied by detailed site diagrams and blueprints that are an integral requirement of any development proposal;

The biologist has created a mitigation plan that has the mapped enhancement area with plant placement to assure that the plants are installed in a proper position for the hydrologic conditions with drier species found on the outside and wetter species found in the outer edge of the buffer.

e. Monitoring Program. A program outlining the approach for assessing a completed project must be provided including descriptions or proposed experimental and control site survey or sampling techniques. A protocol must be included outlining how the monitoring data will be evaluated by agencies that are tracking the progress of the mitigation project. A report must be submitted at least twice yearly documenting milestones, successes, problems and contingency action of the restoration or compensation project. The department of community development director must require that the applicant monitor the project consistent with subsection (K)(3) of this section;

The applicant will provide a monitoring report twice yearly during the spring shortly after bud break to aid in plant identification. During the inspections, they will provide species composition, percent survival, probable cause for issues and replacements provided. They will also make decisions on plant species, growth patterns and account for volunteers found. If a certain species is not thriving or meeting the canopy cover standards etc, an increase in the amount of plants will be provided in order to achieve standards. This may include replacement of larger trees or shrubs.

The area is frequented by deer and elk which are not particularly choosey about what they eat and if the plants are being consumed, fencing or other protections may be developed in order to assure success and ward off the deer, elk or even rodents which have been known to girdle plants. Eventually the brush will be a source of browse when it has become more mature and it expected that the edges may need protection beyond the cedar rail fence.

f. Contingency Plan. A plan must be provided fully identifying potential courses of action and any corrective measures to be taken when monitoring or evaluation indicates project standards are not being met;

As mentioned earlier, if a the plantings or a certain species is not thriving or experiencing excessive mortality, a decision will be made on whether to continue to replace with in kind plants or possibly bigger stock, changing the position in the landscape, substitution of species, pest eradication, and even possibly devise methods to discourage human or animal encroachment. The city will be notified of the possibility of any substantive contingencies before they are applied.

g. Performance and Maintenance Securities. Securities ensuring fulfillment of the mitigation project, monitoring program and any contingency measures must be posted pursuant to SMC 18.80.110.

The applicant will provide the required bonds or an assignment of funds in an escrow to assure the city that they will be provided a successful planting, maintenance and contingency to replace or improve the species choice.

3.2 Integrated Pest Management

We have looked at different pest management plans and Thurston County has developed a great example of Integrated pest management plan. The applicant will use the integrated pest management plan (IPM) methods and utilize management recommendations from the Thurston County Website at https://www.co.thurston.wa.us/health/ehipm/ipm_homeownr.html. The primary objectives of the planting plan is to provide tree and shrub species that will shade and outcompete thereed canary grass which require control; The willow and twinberry will be useful to shade out the existing invasive species. The applicant will use manual mechanical means as the preferred method for removal of invasive species. Reed canary grass will be carefully line cut until the other plants become established. If these methods are found to be ineffective or infeasible, Other more aggressive methods will be considered to include use of popular effective herbicides consistent with the recommended label application rates and conducted during the dry season by licensed applicators. Other species which may require control from time to time will use recommendations from the Clallam County Noxious Weed website and the Homeowner IPM recommendations adopted for the particular purpose.

3.3 Mitigation Functional Analysis

The following planting plan to enhance the buffer will improve wetland functions and improve the overall landscape as well by:

- providing increase roughness
- increasing nutrient uptake of stormwater
- Provide screening for wildlife,
- Provide shade for water quality and habitat,
- Produce food for wildlife
- Provide structure beyond the emergent

Currently, the area that will be impacted is low-functioning pasture near the wetland area. There is a lack of shrub and tree vegetation and the screening that it provides, so this plan will provide an enhanced proper buffer and wetland in the area, where it matters most, between the wetland and the residence. The planting plan will provide species diversity and structure as well as roughness as shown in the previous chapters.

The buffer area is currently used for pasture and some will remain lawn within 15 feet of the house, driveway and garage.

Areas in the wetland and buffer will be planted with wetland and buffer plants, which will not only provide benefits already mentioned but will also become a landscape amenity that combines the practical plantings with aesthetic attributes of our native flora.

The following analysis uses the qualitative scoring values similar to the values developed in the Wetland Rating System for Western Washington. The best available science has found that the resolution of value can only be rated using a qualitative system and maintain a rapid assessment method of less than one day. Therefore, we have examined common buffer functions for wetland protection and other habitats to show the overall expected lift by the enhancement plan from the baseline before the development to after the development and installation of the native plants. It should be noted that the mitigation in some instances may not have a measurable increase in functions, but it should be successful in at least maintaining functions. Since the current state of the area is mostly invasive reed canary grass, it may be necessary to pull weeds from the areas around the plants in order to prevent the grass from choking out the native plants. This will be managed through using an integrated pest management system of least aggressive remediation to most aggressive in order to maintain the site. We will be applying the impact reducing measures from the table below to lower the impacts to the wetlands due to the development and the activities around it in accordance with the CAO.

• Outdoor lighting from the development shall be designed and installed to prevent direct casting of light into adjacent wetland areas. Final design shall be reviewed and approved by the department of community development prior to permit issuance.
• Activity that generates noise shall be located away from wetlands. If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source.
• The applicant shall prepare a restrictive covenant, to be placed upon the deed for the property, that prohibits use of pesticides within 150 feet of the delineated on-site wetland area. Proof of the recorded covenant shall be provided to the city prior to permit issuance.
• Surface water management shall be consistent with low impact development (LID) practices as set forth in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the public works department prior to permit issuance.
• Permanent signage on the boundary of a wetland buffer to protect its functions and values. Fencing may be required if requested by the wetland biologist to protect its functions and values. Fencing design shall not interfere with fish and wildlife migration and shall minimize impacts to the wetland and its associated habitat.
• The applicant shall utilize dust control best management practices (BMP) during development activities. Such practices shall be consistent with the manual identified in Chapter 13.104 SMC.
• Surface water from areas adjacent to on-site delineated wetland areas shall be channelized and treated prior to discharge into wetland buffer areas. Surface water treatment shall be consistent with the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• All treated surface water proposed for discharge into any on-site delineated wetland area shall be conveyed in a manner consistent with those practices set forth in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Existing on-site drainage system facilities shall be reviewed by a Washington State licensed engineer to determine their ability to accommodate the increased volume of surface water created by the new development. The facilities shall be modified as necessary with facility design consistent with the direction

provided in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Surface water from impervious surfaces and lawns located adjacent to on-site delineated wetland areas shall be channelized and treated prior to discharge into wetland buffer areas. Surface water treatment shall be consistent with those practices contained in the manual identified in Chapter 13.104 SMC. Final design shall be reviewed and approved by the city public works department prior to permit issuance.
• Apply integrated pest management.
• The delineated on-site wetland area shall be placed in a separate tract as prescribed in SMC 18.80.090.

Below is the list of functions that was evaluated to effect before and after a successful implementation of this plan.

TABLE 1 – Buffer Functions Comparison Before and After Mitigation

Buffer Perf criteria	Screening	Invasive Species Control	Nutrient uptake	Snags and Logs	Structure	Food Production	Surface roughness	Temperature attenuation	Erosion control
Before mitigating measures	Low	Low	Medium	Low	Low	Medium	Low	Low	Medium
After mitigating measures	High	Medium	Medium	Low	High	High	Medium	Medium	High

3.4 Planting Plan

To provide for a higher functioning wetland, a buffer enhancement and invasive species removal plan was developed to make the remaining buffer and wetland more resilient and diverse and effective. Figure 5 illustrates the placement area which was created to maximize plant performance by placing species in a position in the landscape where they will thrive.

Trees and shrubs will be planted at grade in holes 1.5 times the width of the container or root ball. Mulch will be applied around each tree 2-4 inches deep in a three-foot diameter around the tree with an edge to retain water. Containerized rootbound trees will be cut with sharp shears on the bottom in an x pattern to promote root growth. Four cuts will be made vertically to allow roots to spread. Trees and shrubs will be thoroughly watered in after installation. The whole area will be sheet mulched to prevent weeds from taking hold and to retain water.

3.5 Monitoring Plan

The planting plan will be monitored twice a year for five years following the as – built (Year 0). Monitoring of the performance standards will be provided each spring, shortly after leafing out, to aid in plant identification. A report that communicates the findings will be provided to the City staff a month following the monitoring. The report will contain pictures to allow the City personnel to evaluate site conditions and performance standards. The photos in the report will be taken in four cardinal directions, unless there is a direction that provides a better view. Four photo points that will be

established during the as-built (Year 0). Following the as- built, we will monitor the site in the spring shortly after the growing season commences and Mid October so any weed management can occur prior to the plant senescence. Management of performance deficiencies or maintenance will occur a report will be sent to the city within a month following monitoring and a summary of management actions will be included in the following year's monitoring report to track effectiveness and adaptively manage the site.

3.6 Performance Standards

The performance standards are as follows:

Year 0 an inventory of plants and photo points will be established for monitoring during the monitoring period within 1 month of the installation.

Year 1 -3 will have 100% survival of installed plants. Noxious weeds will be less than 20% aerial coverage.

Dead plants will be replaced in kind unless a replacement is provided as a contingency.

Year 4 and 5 will have a survival rate of 80 percent of the original count. Volunteers can account for 10 percent of the total if present. Noxious weeds such as Himalayan blackberry, Reed canary grass, and other invasives will not have more than 20 percent aerial coverage of the planting area. Japanese knotweed, yellow flag iris, or hogweed will have a zero percent tolerance and be removed or sprayed during the monitoring period using an appropriate herbicide approved for aquatic use by a licensed applicator.

Because of the existence of Reed canary grass, the area will be hand pulled around the plants and remulched if necessary and if this is not aggressive enough, other actions may be considered in the integrated pest management plan.

3.7 Contingency Plans

If the site does not meet performance standards. Contingencies may be developed to adapt to the site-specific conditions. Contingencies may include:

- Increased watering
- Mulching
- Integrated Pest Management
- Microtopography changes
- Species substitution
- Herbivory protection
- Bark wrap

The area is frequented by Elk and the choice of plants were chosen to avoid herbivory issues, but exclusion fencing (Net Tubes) may be necessary until the plants reach maturity. This is not expected to be needed to be a permanent fixture if required. Any contingencies will be developed in conjunction with landscapers, nursery staff, and other experts. The city would be notified in advance of the

contingency plans. No contingencies will be applied without city consent.

Table 2 – Wet Zone #1 (16,565 sq ft)

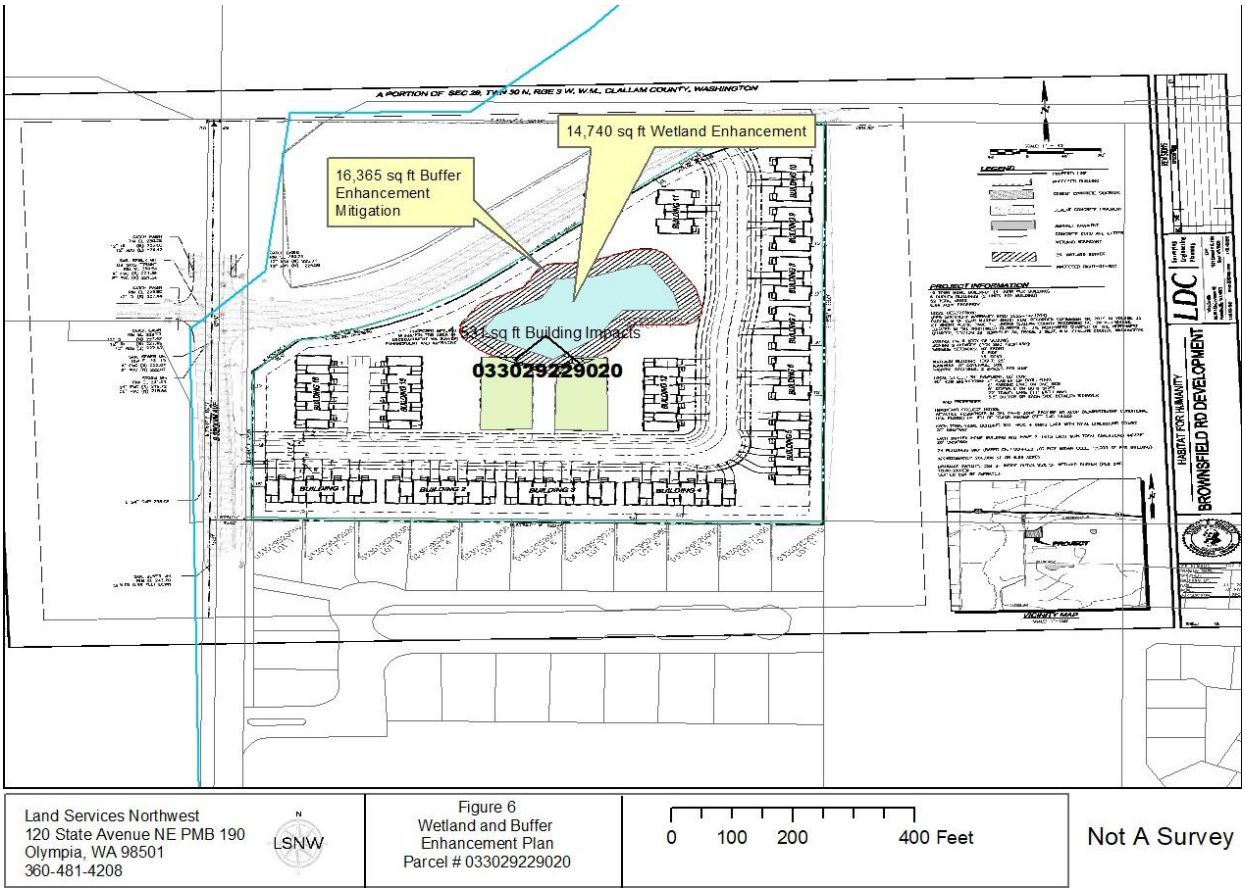
Common Name	Species	Quantity	Spacing	Cost	Total
Sitka willow	*Salix sitchensis*	40	15 ft oc	$10.00	$400.00
Paper birch	*Betula papyrifera*	20	10 ft oc	$10.00	$200.00
Pacific ninebark	*Physocarpa capitatus*	20	8 ft oc	$10.00	$200.00
Twinberry	*Lonicera involucrata*	40	8 ft oc	$10.00	$400.00
Salmonberry	*Rubus spectabilis*	40	8 ft oc	$10.00	$400.00
Nootka rose	*Rosa nutkana*	50	15 ft oc	$5.00	$250.00
Red osier dogwood	*Cornus alba*	20	5 ft oc	$10.00	$200.00
Total		**230**			**$2050.00**

Table 3 - Buffer Mitigation (14,740 sq ft)

Common Name	Species	Quantity	Spacing	Cost	Total
Western red cedar	*Thuja plicata*	20	15 ft oc	$10.00	$200.00
Quaking aspen	*Populus tremuloides*	40	10 ft oc		$400.00
Snowberry	*Symphoricarpos alba*	50	5 ft oc	$10.00	$500.00
Red flowering currant	*Ribes sanguineum*	20	8 ft oc	$10.00	$200.00
Oceanspray	*Holodiscus discolor*	20	8 ft oc	$10.00	200
Total		**130**			**$1,300.00**

Table 4- Total Costs

Labor		$5000.00
Mulch	$100/5 yards	$100.00
Monitoring w/report (5 years)	250.00/yr	$1250.00
Plants and Materials		$2350.00
Total		**$8700.00**



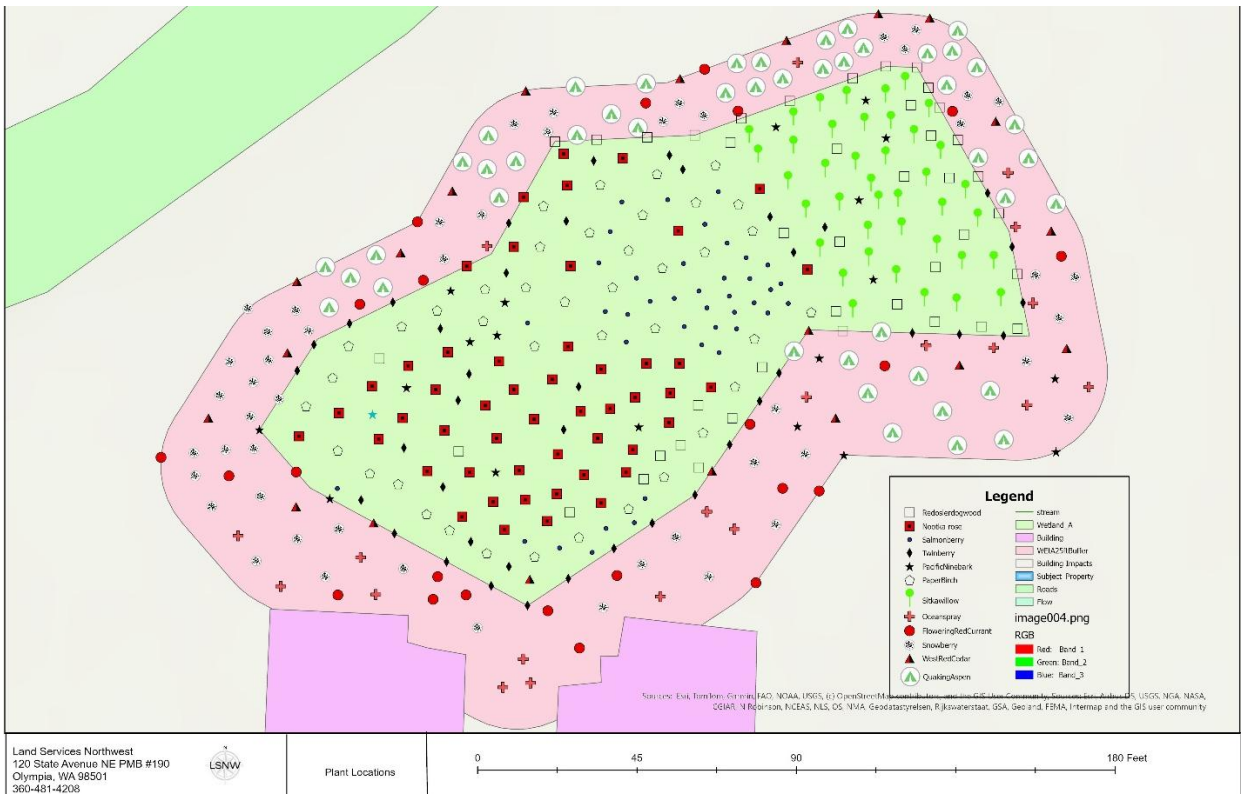


Figure 6 and 6A – Planting Zones and Placements

9.0 SUMMARY AND CONCLUSIONS

One regulated wetland, Wetland A, was identified onsite. This wetland was rated and determined to be a Category IV wetland with a 25-foot buffer and a fifteen foot building setback. Elk habitat was identified on the site as a sensitive fish and wildlife conservation habitat area.

The project is to build condominiums of 8 four-plex units, 2 triplex units, and 5 duplex units, totaling 48 units All of the townhomes, parking, driveways and utilities will be located outside of any wetlands, and there will be mitigation for buffers impacts which should result in no-net-loss of wetland ecological functions. Likewise, an elk habitat management plan was developed to maintain the elk connectivity to other areas and maintain awareness of their special value to the community.

In order to maximize the units and the community benefit, a buffer reduction has been proposed. This is allowed in code as the wetland functions have been degraded due to agricultural practices and a plan to improve wetland functions and values has been developed.

This development should provide affordable housing and coexist with the natural environment and resources that are so important to maintaining the quality of life for the ‘citizens of Sequim.

10.0 LIMITATIONS

This report was created with care and best professional judgment using the currently accepted best available science, but the report is subject to interpretation by local state and federal regulators who have the final regulatory authority on wetlands and other critical area boundary determinations. No outcomes are warranted by this report.

12.0 REFERENCE

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Appendix A - Photographs


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:02 PM
48°4'17.81"N 123°6'4.8"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:02 PM
48°4'17.82"N 123°6'4.81"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:02 PM
48°4'17.84"N 123°6'4.86"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:02 PM
48°4'17.81"N 123°6'4.83"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:02 PM
48°4'17.95"N 123°6'4.75"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 01:35 PM
48°4'17.26"N 123°6'5.66"W
100 Brownfield Rd, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
11.17.2022 02:25 PM
48°4'17.88"N 123°6'1.79"W
100 Brownfield Rd, Sequim, WA 98382, USA

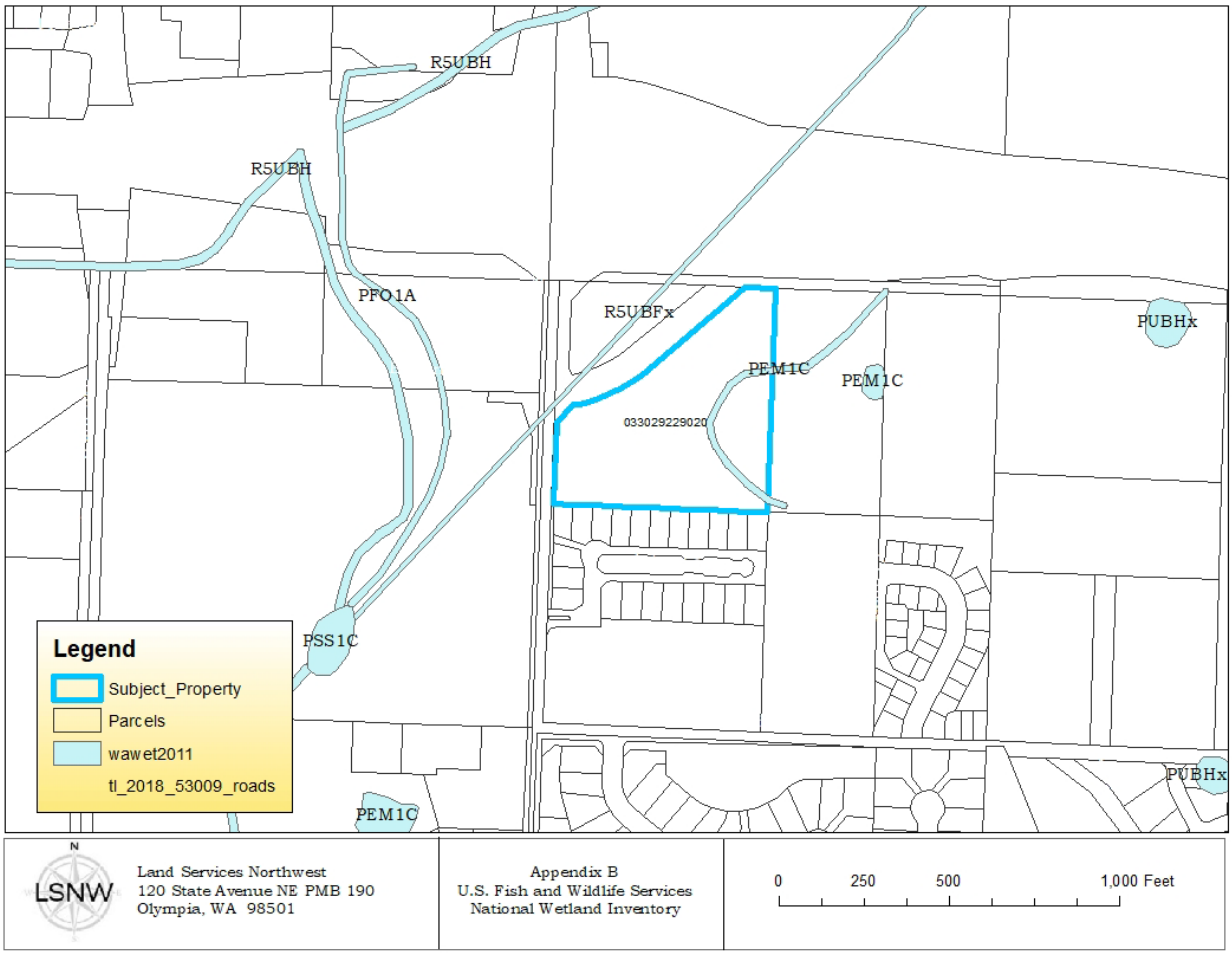

LSNW
Habitat BROWNFIELD RD
11.17.2022 03:09 PM
48°4'16.88"N 123°5'58.82"W
141 Alpine Loop, Sequim, WA 98382, USA


LSNW
Habitat BROWNFIELD RD
Drainage
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141 Alpine Loop, Sequim, WA 98382, USA

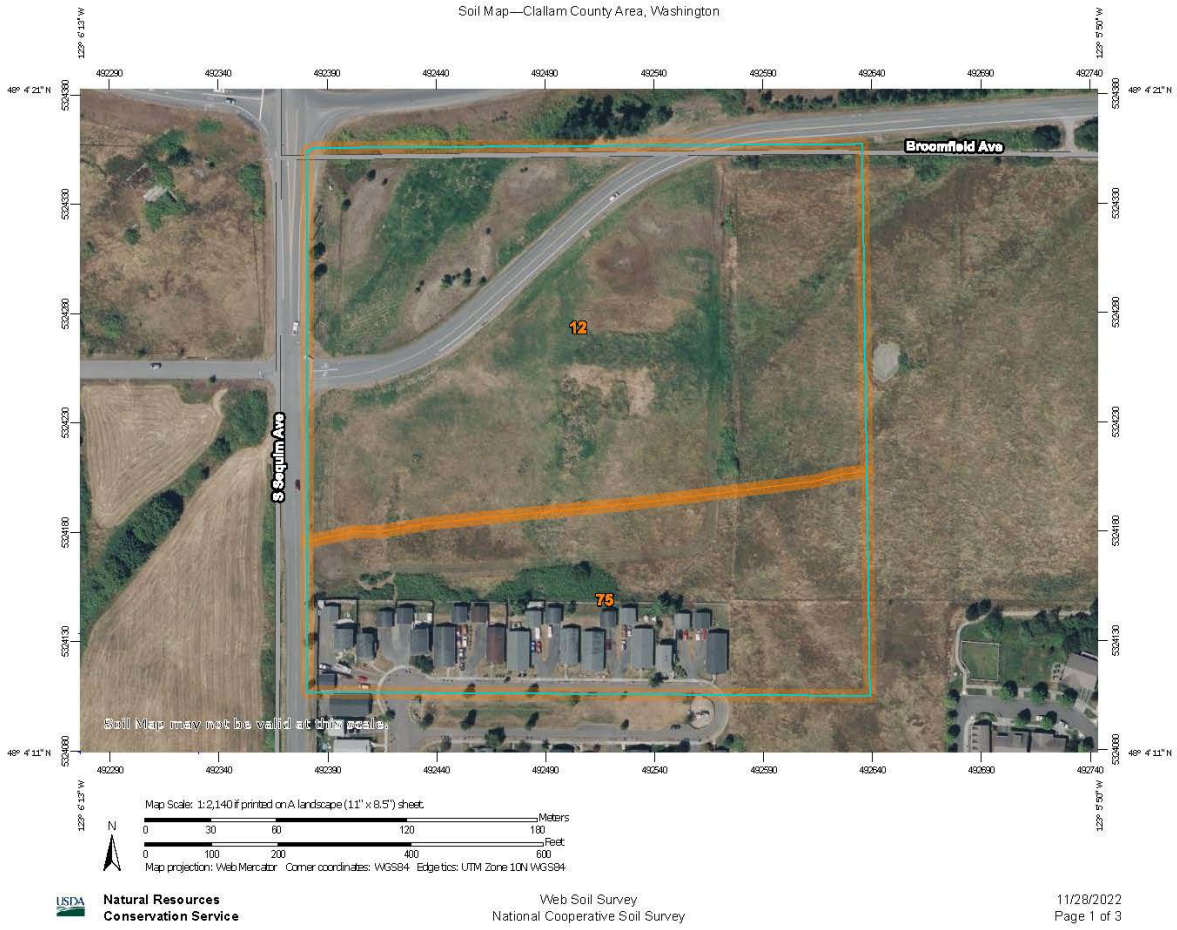

LSNW
Habitat BROWNFIELD RD
Tp1
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LSNW
Habitat BROWNFIELD RD
Tp2
11.17.2022 01:49 PM
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100 Brownfield Rd, Sequim, WA 98382, USA

Appendix B - U.S. Fish and Wildlife Service NWI MAP



Appendix C - Clallam County NRCS Soil Survey Map



Soil Map—Clallam County Area, Washington

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: Clallam County Area, Washington
Survey Area Data: Version 20, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 27, 2020—Jul 28, 2020

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.

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

11/28/2022
Page 2 of 3

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Clallam gravelly sandy loam, 0 to 15 percent slopes	10.5	65.7%
75	Yeary gravelly loam, 0 to 15 percent slopes	5.5	34.3%
Totals for Area of Interest		**16.0**	**100.0%**

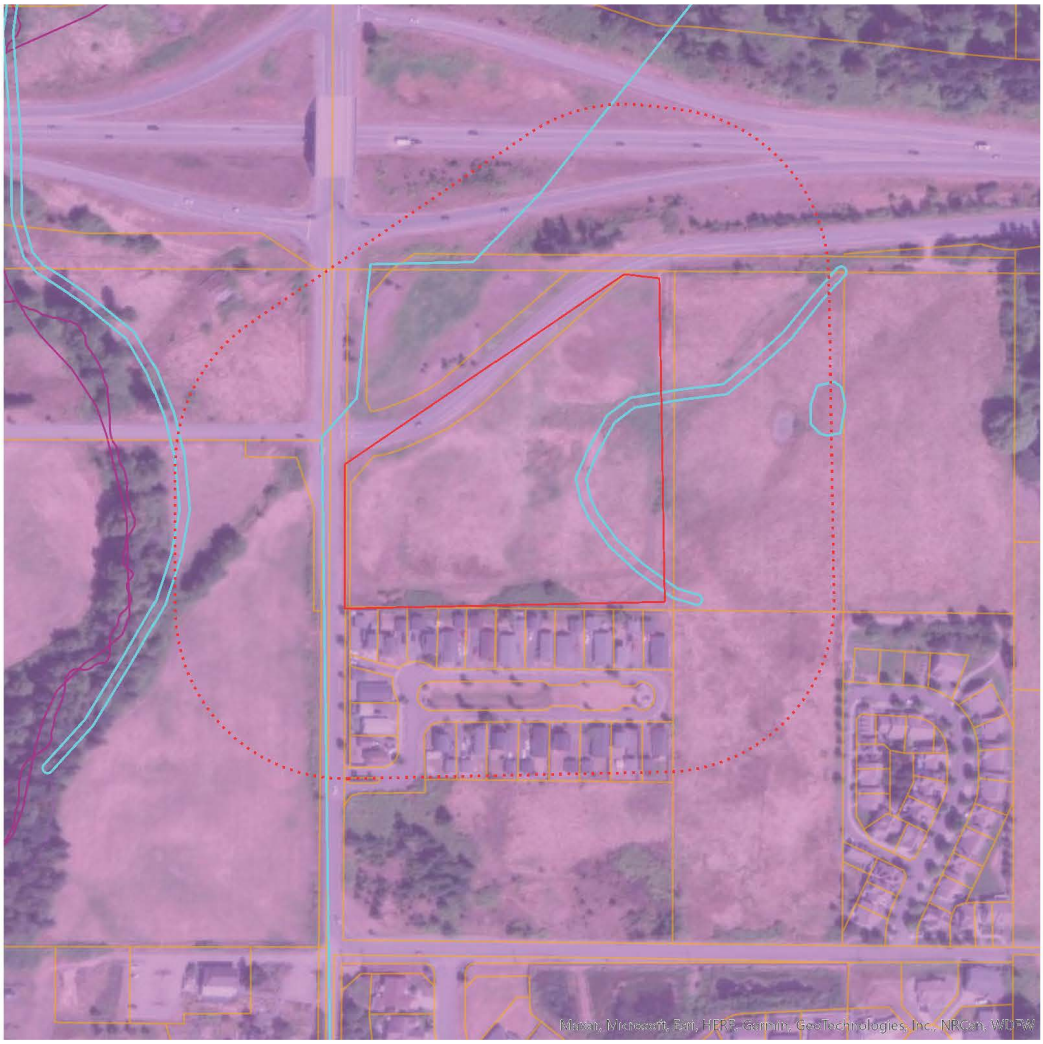
Appendix D-USGS 7.5 Minute Topographic Map



N LSNW Land Services Northwest 120 State Avenue NE PMB 190 Olympia, WA 98501	Appendix D USGS Topo Map	0 375 750 1,500 Feet

Appendix E-WDFW Priority Habitat and Species and Salmonscape

Priority Habitats and Species on the Web



Buffer radius: 330 Feet

Report Date: 11/29/2022

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Coho	N/A	N/A	No
Roosevelt elk	N/A	N/A	No
Freshwater Emergent Wetland	N/A	N/A	No
Freshwater Forested/Shrub Wetland	N/A	N/A	No
Northern Spotted Owl	Threatened	Endangered	Yes

PHS Species/Habitats Details:

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Accuracy	NA
Notes	LLID: 1230844480785, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	56766
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Roosevelt elk	
Scientific Name	*Cervus elaphus roosevelti*
Priority Area	Regular Concentration
Site Name	SEQUIM
Accuracy	General locality
Notes	SEQUIM CRUCIAL WINTER RANGE.
Source Record	918538
Source Dataset	PHSREGION
Source Name	SCHIRATO, GREG WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00614
Geometry Type	Polygons

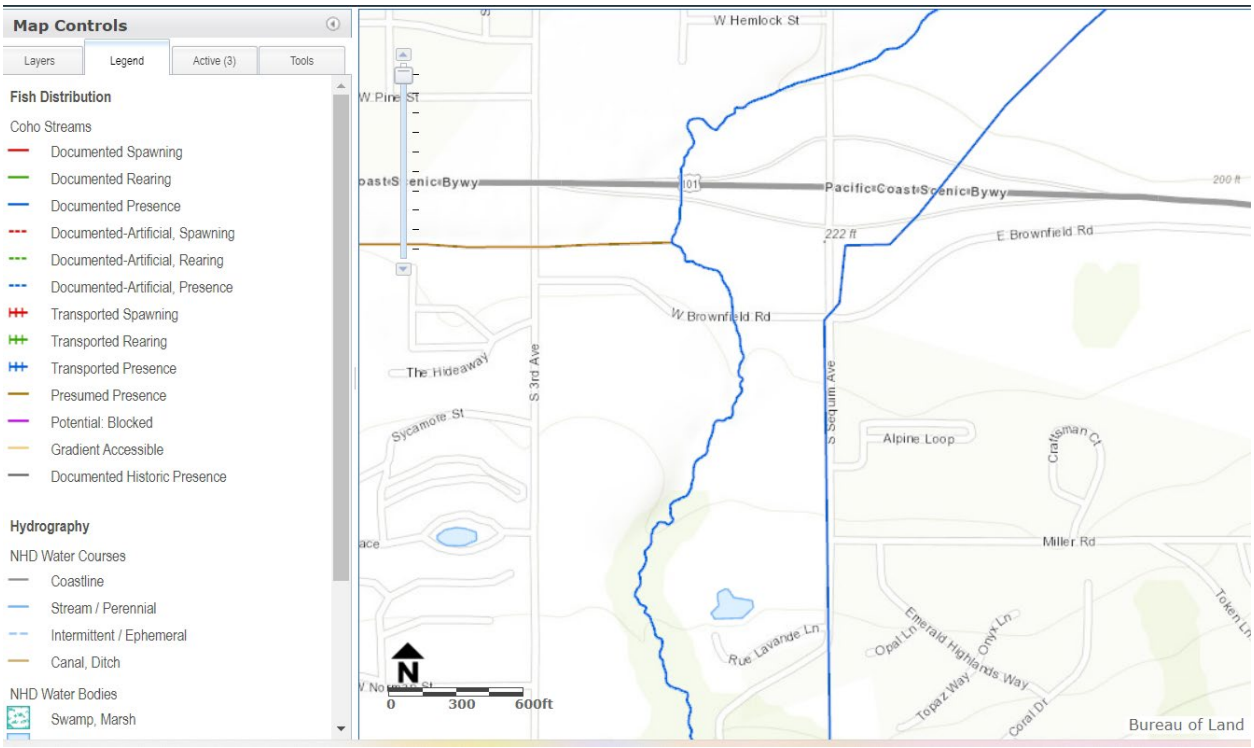
Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS 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

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C
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

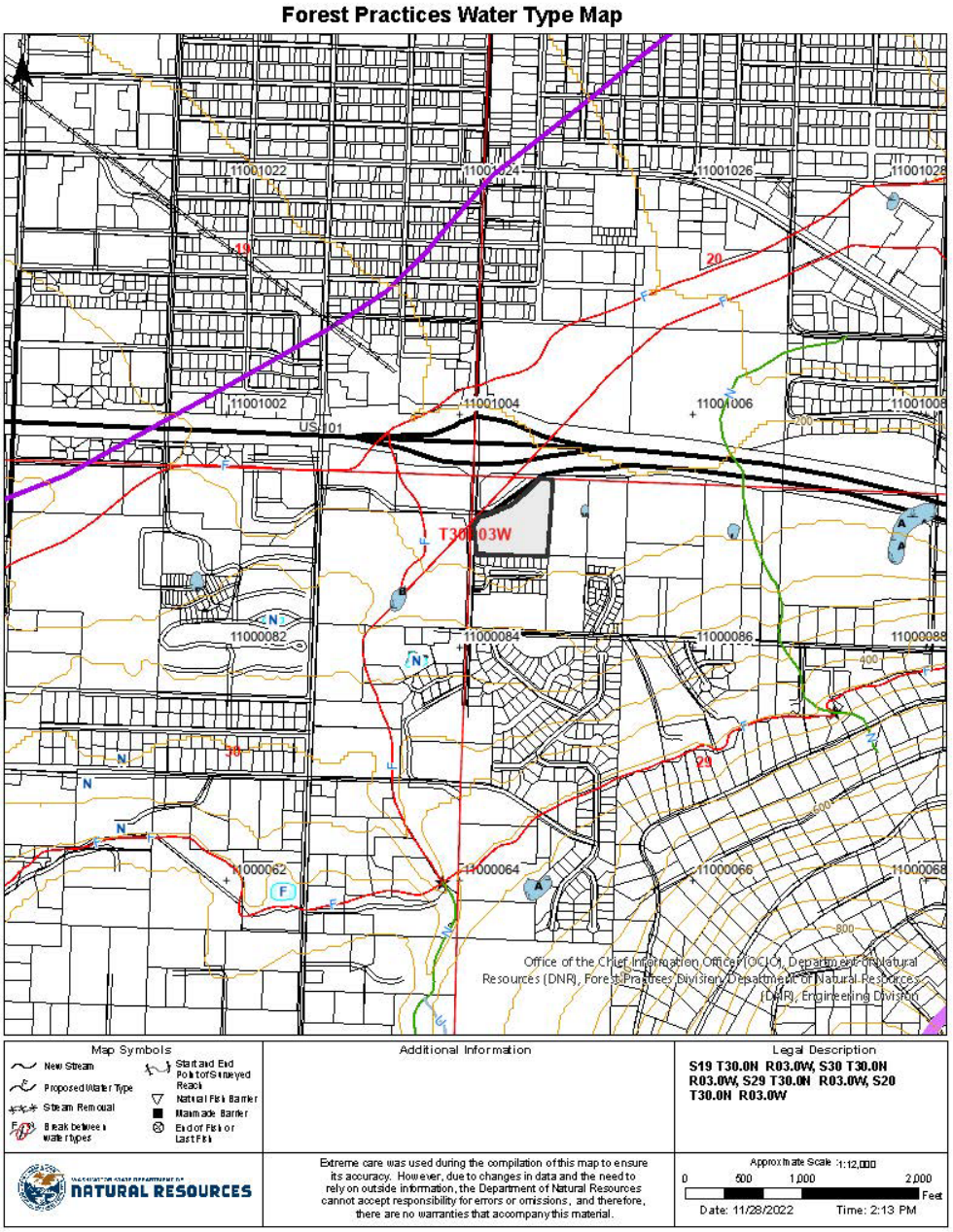
Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFO1A
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing 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

Northern Spotted Owl	
Scientific Name	*Strix occidentalis*
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	Threatened
State Status	Endangered
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

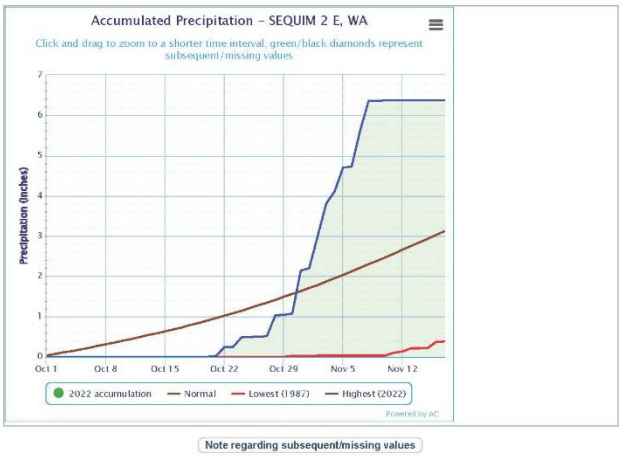
DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents 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 variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.


Map Controls
Layers
Legend
Active (3)
Tools
Fish Distribution
Coho Streams
Documented Spawning
Documented Rearing
Documented Presence
Documented-Artificial, Spawning
Documented-Artificial, Rearing
Documented-Artificial, Presence
Transported Spawning
Transported Rearing
Transported Presence
Presumed Presence
Potential: Blocked
Gradient Accessible
Documented Historic Presence
Hydrography
NHD Water Courses
Coastline
Stream / Perennial
Intermittent / Ephemeral
Canal, Ditch
NHD Water Bodies
Swamp, Marsh
W Hemlock St
W Pine St
Pacific Coast Scenic Bywy
101
200 ft
222 ft
E Brownfield Rd
W Brownfield Rd
The Hideaway
S 3rd Ave
Sycamore St
S Sequim Ave
Alpine Loop
Craftsman Ct
Miller Rd
Rue Lavande Ln
Opal Ln
Emerald Highlands Way
Onyx Ln
Topaz Way
Coral Dr
Token Ln
N
0 300 600ft
Bureau of Land

Appendix F-WA Department of Natural Resources Forest Practices Stream Type Map



Appendix G-NOAA NOW Precipitation DATA



Appendix H-Wetland Data Sheets

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP1
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes	x	No	
Wetland Hydrology Present?	Yes		No	x

Is the Sampled Area within a Wetland? **Yes x No x**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Rubus armeniacus*	5	Y	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	20	Y	FACW
2. *Agrostis capillaris*	30	Y	FAC
3. *Hordeum brachyantherum*	2	N	FACW
4. *Rubus ursinus*	5	N	FACU
5. *Festuca rubra*	35	Y	FAC
6.			
7.			
8.			
9.			
10.			
11.			
	92 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes x No**

Remarks:

SOIL

Sampling Point: TP1

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 %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR3/2	95	10YR3/6	5			Silt loam	
14-18	10YR4/2	90	10YR4/6	10			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks: No hydrology found. Checked again in February.

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP1A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): Concave | Slope (%): 2
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravelly sandy loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	95	Y	FACW
2. *Agrostis capillaris*	5	N	FAC
3. *Sonchus arvensis*			FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No ___

Remarks:

SOIL

Sampling Point: TP

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
0-6	10YR3/1						Silt loam	
6-18	10YR4/2	98	10YR3/6	2			Silt 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)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP2
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x
Hydric Soil Present?	Yes	___	No	x
Wetland Hydrology Present?	Yes	___	No	x

Is the Sampled Area within a Wetland? **Yes** ___ **No** x

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: ___)			
1. *Festuca rubra*	65	Y	FAC
2. *Sonchus arvensis*	35	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	65	x 3 =	195
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	100 (A)		335 (B)

Prevalence Index = B/A = 3.35

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** ___ **No** x

Remarks:

SOIL

Sampling Point: TP2

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
0-8	10YR4/3	100					Silt loam	
8-16	10YR4/2	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP2A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): concave | Slope (%): 2
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravellyy sandy loam | NWI classification: Nine
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No**

Remarks:

SOIL

Sampling Point: TP

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
0-6	10YR3/2	100					Silt loam	
6-18	10YR4/1	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 18

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP3
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes	x	No	
Wetland Hydrology Present?	Yes		No	x

Is the Sampled Area within a Wetland? **Yes** ___ **No** x

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Hordeum brachyantherum*	45	Y	FACW
2. *Agrostis capillaris*	65	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** x **No** ___

Remarks:

SOIL

Sampling Point: TP3

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
0-8	10YR3/2	100					Silt loam	
8-18	10YR5/2	85	10YR5/6	15			Gravelly 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- x Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x 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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks: No hydro found rechecked in February still no hydro.

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP3A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, convex | Slope (%): 2
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravelly sany loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No**

Remarks:

SOIL

Sampling Point: TP

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
0-14	10YR3/1	100					Silt loam	
14-18	10YR4/2	90	10YR4/6	10			Silt 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)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP4
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes	x	No	
Wetland Hydrology Present?	Yes	x	No	

Is the Sampled Area within a Wetland? Yes x No

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	25	Y	FACW
2. *Hordeum brachyantherum*	65	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: TP4

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
0-18	10YR3/1	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- x Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x 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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP4A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): Convex | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? Yes X No

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: X (A)
Total Number of Dominant Species Across All Strata: (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No

Remarks:

SOIL

Sampling Point: TP

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
0-18	10YR2/1	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 15

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP5
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the Sampled Area within a Wetland? **Yes** ___ **No** x

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	35	Y	FACW
2. *Hordeum brachyantherum*	15	Y	FACW
3. *Festuca rubra*	55	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	105 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** x **No** ___

Remarks:

SOIL

Sampling Point: TP5

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
0-14	10YR4/2	100					Gravelly loam	
`14-18	10YR5/2	85	10YR5/6	15			Gravelly 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP5A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): concave | Slope (%): 3
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravelly sandy loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	65	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No ___

Remarks:

SOIL

Sampling Point: TP

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
0-18	10YR3/1							

[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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP6
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes	x	No	
Wetland Hydrology Present?	Yes		No	x

Is the Sampled Area within a Wetland? **Yes** ___ **No** x

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Hordeum brachyantherum*	45	Y	FACW
2. *Phalaris arundinacea*	55	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** x **No** ___

Remarks: Disturbed area

SOIL

Sampling Point: TP6

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
0-10	10YR3/2	100					Silt loam	
10-18	10YR4/2	90	10YR4/6	10			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x **No** ___

Remarks: Hydric soils may be relect. Ditch effective.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks: No hydro found rechecked in February to verify. Area ditched probably drained

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP6A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): Concave | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Callam gravelly sandy loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 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 X No**

Remarks:

SOIL

Sampling Point: TP 6a

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
0-18	10YR3/2	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

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

Remarks:

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

Project/Site: Habitat | City/County: Sequim, Clallam County | Sampling Date: 11.17.11
Applicant/Owner: Habitat for Humanity of Clallam County | State: WA | Sampling Point: TP7
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam n | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	x	No	
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Present?	Yes		No	x

Is the Sampled Area within a Wetland? **Yes** ___ **No** x

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Festuca rubra*	25	Y	FAC
2. *Schedonorus arundinaceus*	25	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** x **No** ___

Remarks:

SOIL

Sampling Point: TP7

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
0-16	10YR4/3	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 x Depth (inches): _____

Water Table Present? Yes ___ No x Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks: No hydro or signs of hydro found.

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP7A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): None | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Callam gravelly sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	75	Y	FACW
2. *Agrostis capillaris*	25	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP 7a

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
0-18	10YR3/1	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP8A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): NOne | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Callam gravelly sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP **8a**

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
0-10	10YR3/2	100					Silt loam	
10-18	10YR42	85	10YR4/6	15			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP9A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallum gravelly sandy loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 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 X No**

Remarks:

SOIL

Sampling Point: TP **9a**

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
0-8	10YR3/1	100					Silt loam	
8-18	10YR4/2	85	10YR4/6	15			Silt 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)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 9

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP10A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravelly sandy loam | NWI classification: NOne
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP **10A**

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
0-14	10YR3/2	100					Silt loam	
14-18	10YR4/2	85	10YR4/6	15			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** **X**

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

Remarks: No hydrology or signs of hydrology

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP11A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): Hill | Local relief (concave, convex, none): None | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Gravelly sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Agrostis capallaris*	65	Y	FAC
2. *Vicia americana*	10	N	FAC
3. *Holcus lanatus*	25	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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 X No**

Remarks:

SOIL

Sampling Point: TP **11a**

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
0-14	10YR4/1	100					Silt loam	
14-18	10YR4/2	85	10YR4/6	15			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 14

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP12A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): hill | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam Gravelly sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Festuca rubra*	15	N	FAC
2. *Phalaris arundinacea*	10	N	FACW
3. *Holcus lanatus*	75	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 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 X No**

Remarks:

SOIL

Sampling Point: TP **12a**

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
0-14	10YR2/1						Clay loam	
14-18	10YR4/2	80	10YR4/6	20			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)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** **X** **No** ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** **X** **No** ____

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP13A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): Hillslope | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam gravelly sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Festuca rubra*	50	Y	FAC
2. *Holcus lanatus*	50	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP 13A

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
0-14	10YR2/1	100					Clay loam	
14-18	10YR4/2	80	10RYR4/6	20			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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP14A
Investigator(s): Alex Callender | Section, Township, Range: 29/30/3W
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): none | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: Clallam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Holcus lanatus*	95	Y	FAC
2. *Festuca rubra*	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP **14a**

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
0-6	10YR2/1	100					Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Project/Site: Habitat for Humanity | City/County: Clallam | Sampling Date: 4/8/2023
Applicant/Owner: | State: WA | Sampling Point: TP15A
Investigator(s): Alex Callender | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): 2 | Lat: | Long: | Datum: Wgs84
Soil Map Unit Name: | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x 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	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** **X**

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Holcus lanatus*	85	Y	FAC
2. *Phalaris arundinacea*	15	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 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** **X** **No** ___

Remarks:

SOIL

Sampling Point: TP **15a**

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
0-6	10YR2/1	100					Silt loam	
6-18	10YR5/2	90	10YR5/8	10			Silt 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 Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ 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** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**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 X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

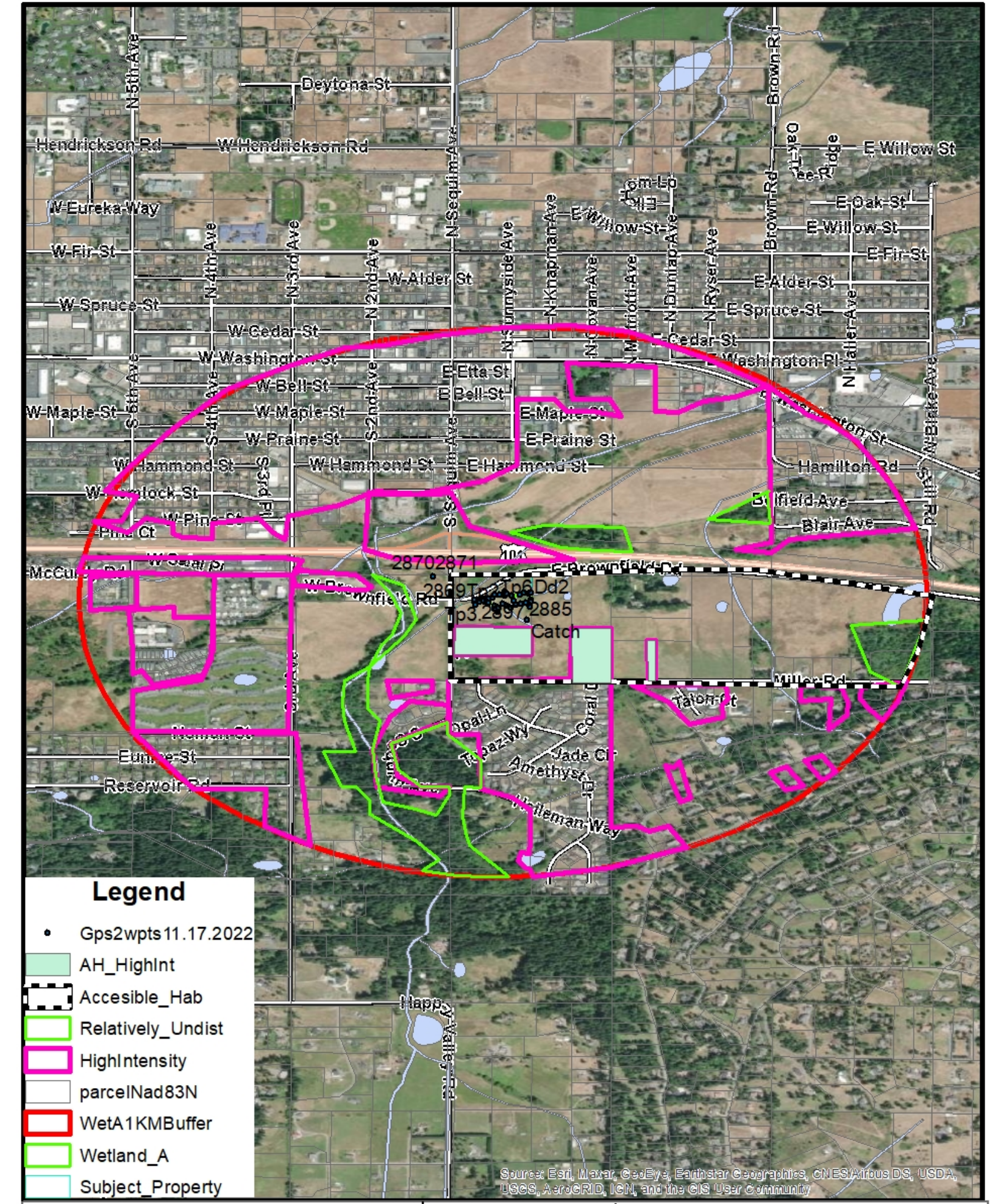
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks: No indicators of hydro found

Appendix I Wetland Rating Form for Western Washington



Land Services Northwest
120 State Avenue NE PMB 190
Olympia, WA 98501
360-481-4208

N
LSNW

1KM Land Use Intensity
Parcel # 033029229020

0 550 1,100 2,200 Feet

Land Use Calculations

	ACRES	%	
1KM	920		
Wetland A	1.1		
1KM-Wetland A	918.9	100	
High Intensity	390	0.424421	42.44205
Relatively Undisturbed	39	0.042442	4.244205
Low Medium Use	489.9	0.533137	53.31374
Accessible Habitat	119	0.129348	
Wetland A	1.1		
Accessible Habitat-Wet A	117.9	0.128306	
RU	7	0.007618	0.76178
Low/Medium LU	100.3	0.109166	10.9166
High Intensity	10.6	0.011522	1.152174



Land Services Northwest
120 State Avenue NE PMB 190
Olympia, WA 98501
360-481-4208

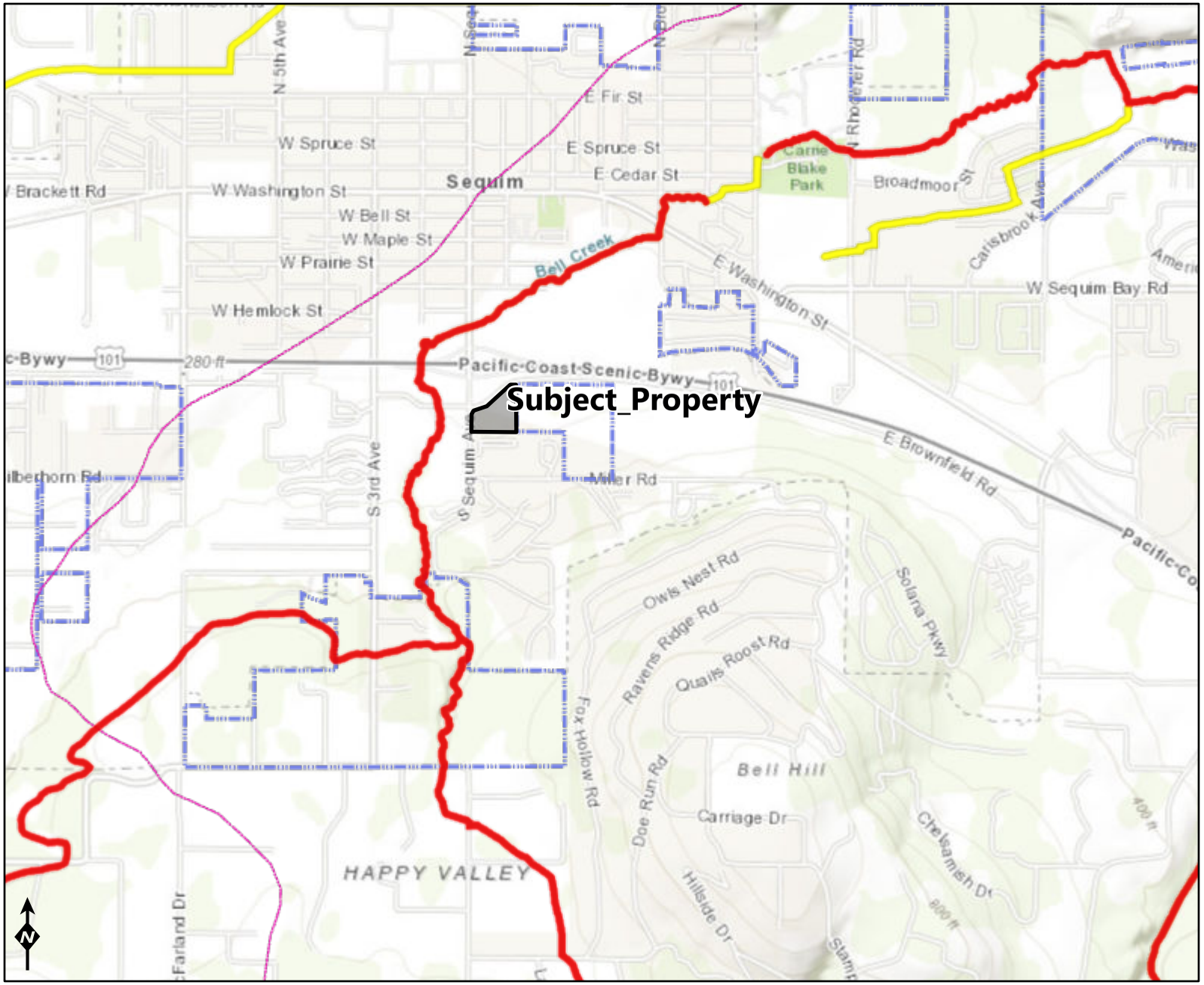
N
LSNW

150ft Land Use
Parcel # 033029229020

0 65 130 260 Feet

January 20, 2023

303d Water Quality Atlas Map



Assessed Water/Sediment

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

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

Urban growth areas
- UGA boundary

Parcels
- Parcel boundary

Subbasins (12 digit HUCs)
- HUC boundary

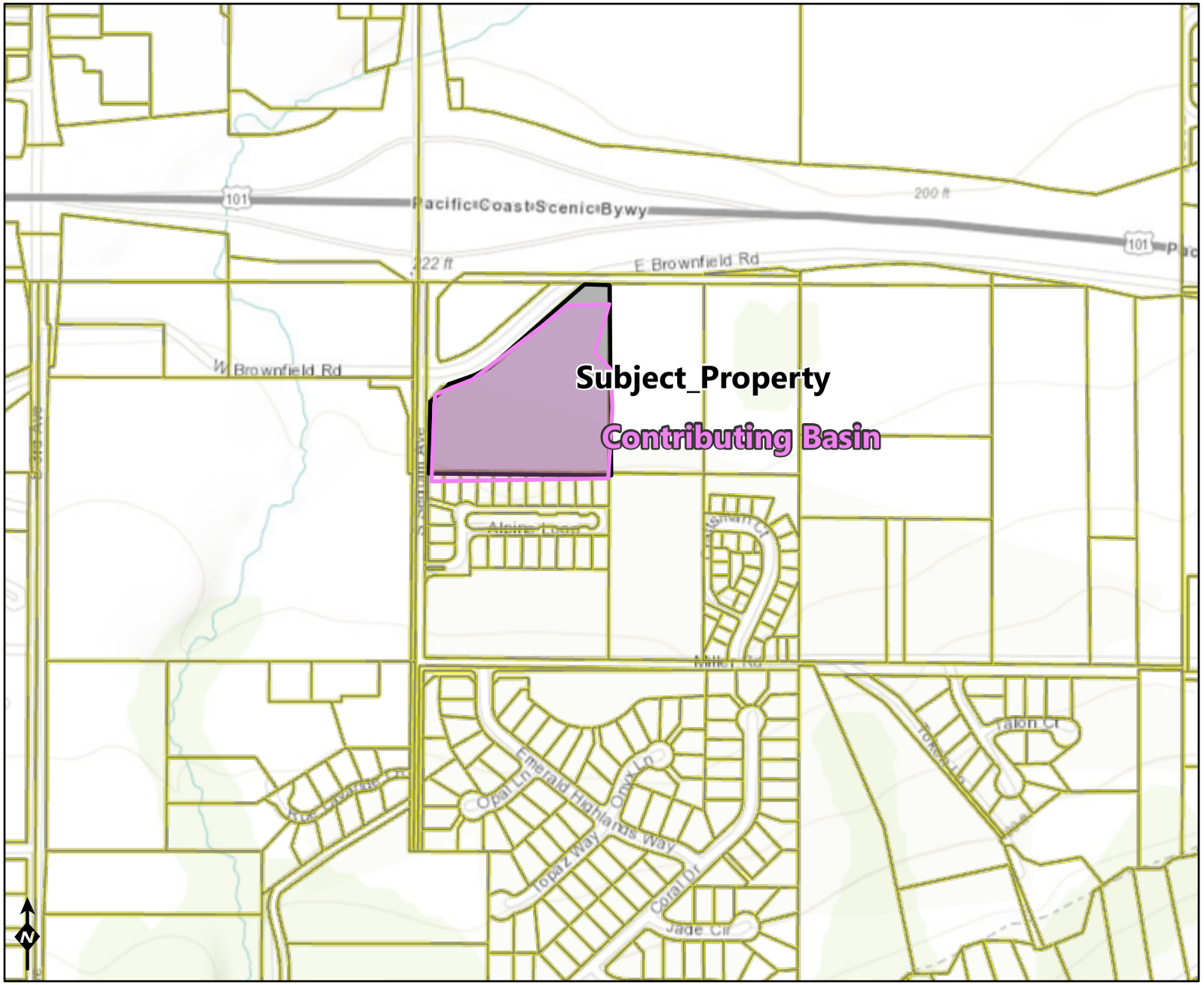
Miles
0 0.23 0.45 0.9

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

DEPARTMENT OF ECOLOGY
State of Washington

February 3, 2023

Contributing Basin



WQ Improvement Projects
- Approved
- In Development

Parcels
- Parcel boundary

Subbasins (12 digit HUCs)
- HUC boundary

Miles
0 0.05 0.1 0.2

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

DEPARTMENT OF ECOLOGY
State of Washington



Land Services Northwest
120 State Avenue NE PMB 190
Olympia, WA 98501
360-481-4208

N
LSNW

Cowardin Class

0 75 150 300 Feet



Land Services Northwest
120 State Avenue NE PMB 190
Olympia, WA 98501
360-481-4208

LSNW

Dense RIGID Vegetation

0 65 130 260 Feet



Land Services Northwest
120 State Avenue NE PMB 190
Olympia, WA 98501
360-481-4208

LSNW

Hydroperiod Classification

0 65 130 260 Feet

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 1122/2022

Rated by Alex Callender Trained by Ecology? ☑ Yes ☐ No Date of training Dec-13

HGM Class used for rating Slope Wetland has multiple HGM classes? ☑ Yes ☐ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).
Source of base aerial photo/map 2018 Geodata

OVERALL WETLAND CATEGORY IV (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

_____ **Category I** - Total score = 23 - 27
_____ **Category II** - Total score = 20 - 22
_____ **Category III** - Total score = 16 - 19
X **Category IV** - Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	List appropriate rating (H, M, L)			
Site Potential	L	L	L	
Landscape Potential	M	L	L	
Value	H	M	L	**Total**
Score Based on Ratings	6	4	3	**13**

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

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

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	Category
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	**X**

Maps and Figures required to answer questions correctly for Western Washington

Depressional Wetlands

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

Riverine Wetlands

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

Lake Fringe Wetlands

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

Slope Wetlands

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

HGM Classification of Wetland in Western Washington

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

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

☑ NO - go to 2 ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

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

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

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

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

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

☑ NO - go to 4 ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

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

☐ NO - go to 5 ☑ **YES** - The wetland class is **Slope**

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

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

☑ NO - go to 6 ☐ **YES** - The wetland class is **Riverine**

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

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

☑ NO - go to 7 ☐ **YES** - The wetland class is **Depressional**

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

☑ NO - go to 8 ☐ **YES** - The wetland class is **Depressional**

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

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

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

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

SLOPE WETLANDS

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

S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: (*a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*) Slope is 1% or less — points = 3 Slope is > 1% - 2% — points = 2 Slope is > 2% - 5% — points = 1 Slope is greater than 5% — points = 0	2
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*): Yes = 3 No = 0	0
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area — points = 6 Dense, uncut, herbaceous plants > ½ of area — points = 3 Dense, woody, plants > ½ of area — points = 2 Dense, uncut, herbaceous plants > ¼ of area — points = 1 Does not meet any of the criteria above for plants — points = 0	3
Total for S 1 — Add the points in the boxes above	**5**

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

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other Sources Yes = 1 No = 0	0
Total for S 2 — Add the points in the boxes above	**1**

Rating of Landscape Potential If score is: ☑ **1 - 2 = M** ☐ **0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	1
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list.* Yes = 1 No = 0	1
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? A*nswer YES if there is a TMDL for the basin in which the unit is found*? Yes = 2 No = 0	2
Total for S 3 — Add the points in the boxes above	**4**

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

SLOPE WETLANDS

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

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows.*	0
Dense, uncut, **rigid** plants cover > 90% of the area of the wetland — points = 1	
All other conditions — points = 0	

Rating of Site Potential If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0	0

Rating of Landscape Potential If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems:	1
The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) — points = 2	
Surface flooding problems are in a sub-basin farther down-gradient — points = 1	
No flooding problems anywhere downstream — points = 0	
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for S 6 — Add the points in the boxes above	**1**

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

NOTES and FIELD OBSERVATIONS:

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

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

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

- ☐ Aquatic bed
- ☑ Emergent
- ☐ Scrub-shrub (areas where shrubs have > 30% cover)
- ☐ Forested (areas where trees have > 30% cover)

4 structures or more: points = 4
3 structures: points = 2
2 structures: points - 1
1 structure: points = 0

If the unit has a Forested class, check if:

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

0

H 1.2. Hydroperiods

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

- ☐ Permanently flooded or inundated
- ☑ Seasonally flooded or inundated
- ☐ Occasionally flooded or inundated
- ☑ Saturated only

4 or more types present: points = 3
3 types present: points = 2
2 types present: points = 1
1 types present: points = 0

- ☐ Permanently flowing stream or river in, or adjacent to, the wetland
- ☐ Seasonally flowing stream in, or adjacent to, the wetland
- ☐ **Lake Fringe wetland** **2 points**
- ☐ **Freshwater tidal wetland** **2 points**

1

H 1.3. Richness of plant species

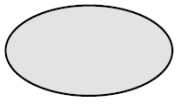
Count the number of plant species in the wetland that cover at least 10 ft^2.
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

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

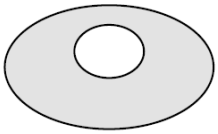
1

H 1.4. Interspersion of habitats

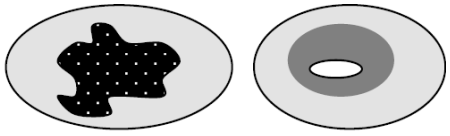
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always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



None = 0 points

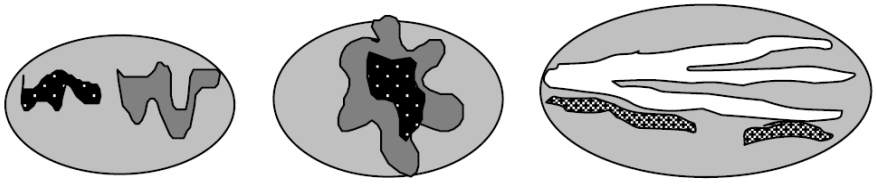


Low = 1 point



Moderate = 2 points

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



0

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☐ Standing snags (dbh > 4 in) within the wetland ☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☑ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	1
Total for H 1 Add the points in the boxes above	**3**

Rating of Site Potential If Score is: ☐ **15 - 18 = H** ☐ **7 - 14 = M** ☑ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 1 % undisturbed habitat + (11 % moderate & low intensity land uses / 2) = 6% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20 - 33% of 1 km Polygon points = 2 10 - 19% of 1 km Polygon points = 1 < 10 % of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 4 % undisturbed habitat + (53 % moderate & low intensity land uses / 2) = 30.5% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches points = 2 Undisturbed habitat 10 - 50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (-2) ≤ 50% of 1km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	**1**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☐ **1 - 3 = M** ☑ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*. Site meets ANY of the following criteria: points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) with in 100m points = 1	0

Site does not meet any of the criteria above	points = 0	

Rating of Value If Score is: ☐ **2 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

WDFW Priority Habitats

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

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

- ☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.
- ☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ☐ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ☐ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ☐ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

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

addressed elsewhere.

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

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

in Table 4 provide more than 30% of the cover under the canopy?

☐ Yes = **Is a Category I bog** ☐ No = **Is not a bog**

SC 4.0. Forested Wetlands

Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.***

☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more.

☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80-200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm).

☐ Yes = **Category I** ☐ No = **Not a forested wetland for this section**

SC 5.0. Wetlands in Coastal Lagoons

Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?

☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks

☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*)

☐ Yes - Go to **SC 5.1** ☐ No = **Not a wetland in a coastal lagoon**

SC 5.1. Does the wetland meet all of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).

☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2)

☐ Yes = **Category I** ☐ No = **Category II**

SC 6.0. Interdunal Wetlands

Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.***

In practical terms that means the following geographic areas:

☐ Long Beach Peninsula: Lands west of SR 103

☐ Grayland-Westport: Lands west of SR 105

☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109

☐ Yes - Go to **SC 6.1** ☐ No = **Not an interdunal wetland for rating**

SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?

☐ Yes = **Category I** ☐ No - Go to **SC 6.2**

SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?

☐ Yes = **Category II** ☐ No - Go to **SC 6.3**

SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?

☐ Yes = **Category III** ☐ No = **Category IV**

Category of wetland based on Special Characteristics

If you answered No for all types, enter "Not Applicable" on Summary Form

APPENDIX 7
CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

Construction Stormwater Pollution Prevention Plan (SWPPP)

Habitat for Humanity
Sequim Avenue Development
Sequim, Washington

LDC | Surveying Engineering Planning

March 2025

Construction SWPPP

Project Information

Project:	**Habitat for Humanity Sequim Avenue Development**
Site Address:	Not yet assigned Sequim, WA
Owner/Applicant:	Habitat for Humanity of Clallam County 728 E Front Street P.O. Box 1479 Port Angeles, WA 98362 Contact Name: Colleen Robinson Contact Email: colleen@habitatclallam.org

Reviewing Agency

Jurisdiction:	City of Sequim

Project Representative

Prepared by:	**LDC, Inc.** 321 Cleveland Ave. SE, Suite 209 Tumwater, WA 98501 425.806.1869
Contact:	Tyrell Bradley, PE TBradley@ldccorp.com
Project Reference:	C22-272

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1. NARRATIVE

1.1 STORMWATER BMPS

The following explains and illustrates the measures to be taken on the site to control erosion and sedimentation problems. The SWPPP is a guideline to follow during construction to prevent erosion and sedimentation. Erosion control measures are not limited to those shown on the TESC plan and in this SWPPP. Measures shall be installed as necessary to meet the Department of Ecology's (DOE) and the City of Sequim's guidelines for stormwater pollution prevention. Further, the SWPPP shall be updated by the contractor as required.

Total Disturbed Area: 6.85 acres

Property Use: R4-8 – Single Family Residential

Parcel Number: 033029229020

Section, Township, Range: Section 29, Township 30 N, Range 3 W, W.M.

1.1.1 *Element #1 – Mark Clearing Limits*

To protect adjacent properties and reduce the area of soil exposed, the limits of the construction will be clearly marked before land-disturbing activities begin. Where possible natural vegetation shall be preserved and the duff layer and native top soil shall remain in place. The following BMP will be implemented where appropriate:

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones
- BMP C103: High Visibility Plastic or Metal Fence
- BMP C233: Silt Fence

1.1.2 *Element #2 – Establish Construction Access*

Access points should be established to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site.

Construction access will be granted off of South Sequim Avenue and East Brownfield Road. Areas used throughout the parcel for construction storage and parking will be moved throughout the parcel depending on the location of the construction being conducted. It is important to note that the contractor shall not damage the existing site conditions that will remain throughout construction.

- BMP C105: Stabilized Construction Entrance
- BMP C106: Wheel Wash

1.1.3 *Element #3 – Control Flow Rates*

Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site. Concentrated flow rates are not anticipated to occur with this project. If conditions change, then the contractor shall update this section of the SWPPPP and implement the following BMPs. If the following BMPs are not shown on the construction plan set, the Owner and the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs:

- BMP C241: Sediment Pond – *To be sized at the time of civil permit submittal*

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements. The contractor shall minimize the amount of exposed soils throughout the construction process.

1.1.4 *Element #4 – Install Sediment Controls*

Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal BMP. Silt fence barriers shall be installed in accordance with BMP C233. In addition, the following BMP's will be implemented where appropriate:

- BMP C233: Silt Fence
- BMP C241: Sediment Pond – *See Element #3 for calculations*

In addition, sediment will be removed from paved areas in and adjacent to work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize wash off of sediments from adjacent streets in runoff.

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMP's (e.g. infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMP's, such as those used for infiltration or biofiltration; however, those BMP's designed to remove solids by settling (wet ponds or detention ponds) can be used. When permanent stormwater BMP's will be used to control sediment discharge, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMP's. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized. Concentrated runoff is not anticipated for this project.

1.1.5 *Element #5 – Stabilize Soils*

All exposed and unworked soils shall be stabilized by application of effective BMP's, which protect the soil from the erosive forces of raindrop impact and flowing water and from wind erosion. From October 01 through April 30 of each calendar year, no soils shall remain exposed and unworked for more than two (2) days. From May 01 to September 30 of each calendar

year, no soils shall remain exposed and unworked for more than seven (7) days. This condition applies to all on-site soils, whether at final grade or not. Additionally, except where approved chemical treatment, full dispersion, or infiltration is practiced, clearing, grading, and other soil disturbing activities are prohibited between November 1 and February 28.

In areas where construction activities have temporarily or permanently ceased, seeding and mulching shall be used in accordance with BMP C120 or C121. Dust control shall be used as needed to prevent wind transport of dust from disturbed soil surfaces and in accordance with BMP C140.

In general, cut slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

- BMP C120: Temporary and Permanent Seeding, or
- BMP C121: Mulching, or
- BMP C122: Nets and Blankets, or
- BMP C123: Plastic Covering, or
- BMP C124: Sodding, or
- BMP C125: Topsoiling, or
- BMP C140: Dust Control

1.1.6 *Element #6 – Protect Slopes*

Slopes shall be constructed in a manner that will minimize erosion. This shall include, but is not limited to: placing excavated material on the uphill side of trenches, collecting drainage at the top of slopes, etc. Slopes will be stabilized as indicated in Element #5 above. In addition, the following BMP's will be implemented where appropriate:

- BMP C123: Plastic Covering
- BMP C130: Surface Roughening

1.1.7 *Element #7 – Protect Drain Inlets*

All storm drain inlets made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

- BMP C220: Storm Drain Inlet Protection

1.1.8 *Element #8 – Stabilize Channels and Outlets*

Channels are not expected to be present on the site during the project. The contractor will update this section of the SWPPP if conditions change. The following BMP's will be implemented where appropriate:

- BMP C209: Outlet Protection

1.1.9 *Element #9 – Control Pollutants*

All pollutants, including waste materials, that occur on-site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater. Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures. No pH-Modifying sources will be present on-site.

Three source control BMP's will apply to this project:

- A Spill Prevention Plan
- Maintenance of Storm Drainage Facilities
- Street Sweeping

In addition, the following BMP's shall be implemented where appropriate:

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage and Containment
- BMP C154: Concrete Washout Area

1.1.10 *Element #10 – Control Dewatering*

Clean, non-turbid de-watering water, as determined by the Certified Professional in Erosion and Sediment Control, can be discharged to systems tributary to state surface waters, provided the de-watering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.

Highly turbid or otherwise contaminated de-watering water, such as from equipment operation shall be handled separately from stormwater at the site. Some disposal options, depending on site constraints, may include: 1) transport off-site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters, 2) on-site treatment using chemical treatment or other suitable treatment technologies such as Baker tanks or approved

equal, or 3) sanitary sewer discharge with local sewer purveyor's approval if there is no other option.

1.1.11 *Element #11 – Maintain BMP's*

All temporary and permanent erosion and sediment control BMP's shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMP's specifications. Visual monitoring of the BMP's will be conducted per the inspection schedule in Section 6.

All temporary erosion and sediment control BMP's shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMP's are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMP's or vegetation shall be permanently stabilized.

- BMP C150: Materials on Hand
- BMP C160: Certified Erosion and Sediment Control Lead

1.1.12 *Element #12 – Manage the Project*

Erosion and sediment control BMP's for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.

In addition, project management will incorporate the key components listed below:

Phasing

Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C162).

Inspection and Monitoring

All BMP's shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:

- Assess the site conditions and construction activities that could impact the quality of stormwater, and

- Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.

Whenever inspection and/or monitoring reveals that the BMP's identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMP's or design changes shall be implemented as soon as possible.

Maintaining an Updated SWPPP

This SWPPP shall be retained on-site or within reasonable access to the site.

The SWPPP shall be modified whenever there is a change in the construction activities that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMP's designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

1.1.13 *Element #13 – Protect Low Impact Development BMPs*

All temporary and permanent erosion and sediment control BMP's shall be maintained and repaired as needed to assure continued performance of their intended function. All maintenance and repairs shall be completed in accordance with the practices, procedures, and materials for each respective BMP. This project will not construct a Low Impact Development BMP. The contractor shall refrain from compacting the existing soils surrounding the project site.

1.2 PROJECT DESCRIPTION

The project is located at the southeast corner of South Sequim Avenue and East Brownfield Road, Sequim, Washington. See Vicinity Map below.

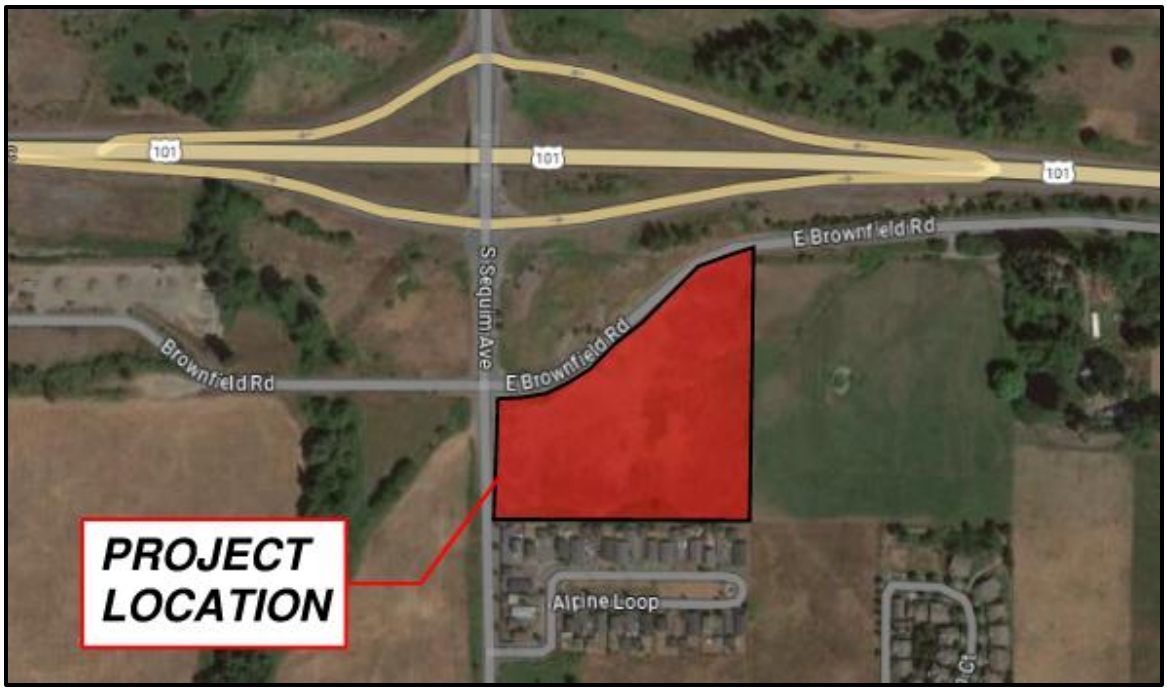


Figure 1) Vicinity Map

The proposed construction includes the construction of eight (8) town home buildings with four units per building, two (2) triplex buildings with three units, and five (5) duplex buildings with two units per building, new private road, driveways, sidewalks, stormwater improvements, and utilities. The proposed project will disturb approximately 6.85 acres, 5.91 acres on-site and 0.94 acres off-site.

1.3 Existing Site Conditions

The project parcel is +/- 6.53 acres in size. Topography within the site varies from slopes of 0% up to 23%. The site appears to have been cleared and undeveloped since at least 2005. The parcel is predominantly covered in grass. The project parcel uses a trench drain system to collect stormwater runoff from the steep slopes along the southern property line. This system outlets to the neighboring eastern parcel. The stormwater runoff on-site that does not infiltrate will either discharge along the western property line or flow along the vegetated ditch past the French drain discharge point to an existing culvert located on East Brownfield Road. There are no known flooding problems downstream of the project site. There are no flow control facilities on the project site.

1.4 Adjacent Areas

The proposed project is bound to the north and west by existing streets, to the south by an existing development, and to the east by a field.

1.5 CRITICAL AREAS

The flood hazard areas within this portion of Sequim, Washington are shown on the Federal Emergency Mapping Agency (FEMA) National Flood Insurance Program – Flood Insurance Rate Map (FIRM) No. 5300210530D, revised December 5, 1989. According to the FEMA FIRM, the project parcel is located within Zone C, an area of minimal flooding. See **Appendix 8** of the Stormwater Site Plan for the FEMA FIRM.

The proposed project is not located within a critical aquifer recharge area per the Clallam County GIS mapper.

1.6 SOIL

A geotechnical investigation was conducted by Quality Geo NW, LLC (QG) dated September 2023. Three test pits were conducted to a maximum depth of 8.5 feet while one test pit was conducted to a maximum depth of 4 feet. Based on these test pits, QG determined the following on-site soil conditions: topsoil from 0' to 1.0'; sandy silt inferred to be glacial till deposits from 1.0' to 7.0'; and silty gravel with sand inferred to be glacial outwash deposits from 7.0 to 8.5+'. Groundwater was not observed within any of the test pit excavations. Mottling or other signs of seasonal groundwater were not observed.

The soils in TP-1 and TP-2 were tested for their infiltration capacity and treatment capabilities. The soils in TP-1 were calculated to have a maximum long-term design infiltration rate of 0.40 inches per hour, a cation exchange capacity (CEC) of 14.6 meq/100g, and an organic content of 1.7%. An infiltration rate of 0.40 inches per hour was used to size the infiltration pond located near TP-1. The soils in TP-2 were calculated to have a maximum long-term design infiltration rate of 1.86 inches per hour, a CEC of 8.0 meq/100g, and an organic content of 1.0%. An infiltration rate of 1.86 inches per hour was used to size the infiltration trench located within the proposed road, near TP-2. Since the native soils in TP-1 and TP-2 have a cation exchange capacity (CEC) greater than the minimum 5 meq/100 g and organic content greater than or equal to the minimum of 1.0% as required by Site Suitability Criteria 6 – Soil Physical and Chemical Suitability, the on-site soils can be used for treatment.

See **Appendix 5** of the Stormwater Site Plan for the geotechnical report.

1.7 POTENTIAL EROSION

Potential on-site erosion control problems are not anticipated at this time. The Certified Professional in Erosion and Sediment Control will be on-site or on-call during construction activities to identify any erosion control problems. If there is a problem, the Certified Professional in Erosion and Sediment Control will promptly authorize the Contractor to initiate corrective measures.

1.8 CONSTRUCTION PHASING

The BMP implementation schedule will be driven by the construction schedule. The key milestones for each segment are as follows:

- **05/30/2025: Dry Season Begins**
- **06/01/2025:** Mobilize equipment on-site
- **06/01/2025:** Mobilize and store all erosion and sediment control (ESC) and soil stabilization products (store Materials On Hand BMP C150)
- **06/01/2025:** Install ESC measures include stormwater management facility if applicable
- **06/01/2025:** Begin implementing soil stabilization and sediment control BMPs throughout the site for the duration of the wet season. Implement Element #12 BMPs and manage site to minimize soil disturbance.
- **06/08/2025:** Site inspections and monitoring conducted weekly and for applicable rain events as detailed in Section 1.13 of this SWPPP
- **06/08/2025:** Begin clearing and grubbing
- **10/01/2025: Wet Season Begins**
- **05/30/2026: Dry Season Begins**
- **06/01/2026:** Construction end, full site cleanup and restoration

1.9 CONSTRUCTION SCHEDULE

Estimated Construction Start Date: June 2025

Estimated Construction End Date: June 2026

1.10 FINANCIAL/OWNERSHIP RESPONSIBILITIES

Habitat for Humanity of Clallam County will be the owner of the site and will have full responsibility financially. If or when a new owner takes over the site, the new owner will have full financial responsibilities for the site.

1.11 ENGINEERING CALCULATIONS

See **Appendix 9** of the Stormwater Site Plan for the WWHM reports.

1.12 POLLUTION PREVENTION TEAM

1.12.1 *Roles and Responsibilities*

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead – Primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.

- Project Engineer – For projects with engineered structures only (sediment pond/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative.

- Emergency Owner Contact – Individual that is the site owner or representative of the site owner to contacted in the case of an emergency.

- Monitoring Personnel – Personnel responsible for conducting water quality monitoring; for most sites this person is also the CESCL.

1.12.2 *Team Members*

Title	Name (s)	Phone Number
Certified Erosion and Sedimentation Control Lead (CESCL)		
General Contractor		
Project Engineer	Tyrell Bradley – LDC, Inc.	360.634.2066
Emergency Owner Contact		
Emergency Ecology Contact	Southwest Regional Office	360.407.6300
Non-Emergency Ecology Contact	Evan Wood	360.706.4599
Monitoring Personnel	See CESCL	

1.13 SITE INSPECTIONS AND MONITORING

Monitoring includes visual inspection, monitoring for water quality parameters of concern and documentation of the inspection and monitoring findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book must be maintained on site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

1.13.1 *Site Inspection*

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a CESCL per BMP C160. The name and contact information for the CESCL is provided in Section 1.12.2 of this SWPPP

Site inspection will occur in all areas disturbed by construction activities and at all potential stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen.

The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of the stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

1.13.2 *Site Inspection Frequency*

Site inspected will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the site inspection frequency will be reduced to once every month.

1.13.3 *Site Inspection Documentation*

The site inspector will record each site inspection using the site log inspection forms provided in **Appendix C**. The site inspection log forms may be separated from this SWPPP document but will be maintained on site or within reasonable access to the site and be made available upon request to Ecology, the local jurisdiction and the Engineer.

1.14 STORMWATER QUALITY MONITORING

1.14.1 *Turbidity*

Turbidity sampling and monitoring will be conducted during the entire construction phase of the project. Samples will be collected weekly at the discharge point nearest the current phase of the project work. If there is no flow at the discharge point, the attempt to sample will be recorded in the site log book and reported to Ecology in the monthly Discharge Monitoring Report (DMR) as "No Discharge". Samples will be analyzed for turbidity using the Hach 2100Q Turbidimeter.

The key benchmark turbidity value is 25 nephelometric turbidity units (NTU) for the downstream receiving water body. If the 25 NTU benchmark is exceeded in any sample collected, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.

2. Assess whether additional BMPs should be implemented, and document modified BMPs in the SWPPP as necessary.

3. Sample discharge daily until the discharge is 25 NTU or lower.

If the turbidity exceeds 250 NTU at any time, the following steps will be conducted:

1. Notify ecology by phone within 24 hours of analysis (see Section 1.12.2 of this SWPPP for contact information).

2. Continue sampling daily until the discharge is 25 NTU or lower. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration and chemical treatment within 24 hours, and implement those additional treatment BMPs as soon as possible, but within a minimum of 7 days.

3. Describe inspection results and remedial actions taken in the site log book and in monthly discharge monitoring reports described in Section 1.15 of this SWPPP.

1.14.2 *pH*

Sampling and monitoring of pH occurs if significant concrete work (> 1,000 cubic yards throughout the life of the project) or use of engineered soils (e.g., cement-treated base) is anticipated. No significant concrete work or engineered soils is planned for this project; therefore, no pH testing will be conducted.

1.15 RECORDKEEPING

1.15.1 *Site Log Book*

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form included in this SWPPP include the required information for the site log book.

1.15.2 *Records Retention*

Records of all monitoring information (site log book, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

1.15.3 *Access to Plans and Records*

All applicable documentation, including but not limited to the SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be provided to Ecology within 14 days of receipt of

written request for the SWPPP from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with the general permit condition S5.G.

1.15.4 *Updating the SWPPP*

In accordance with conditions S3, S4.B, and S.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating of significantly minimizing pollutants in stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

1.16 REPORTING

1.16.1 *Notification of Noncompliance*

If any of the terms and conditions of this permit is not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

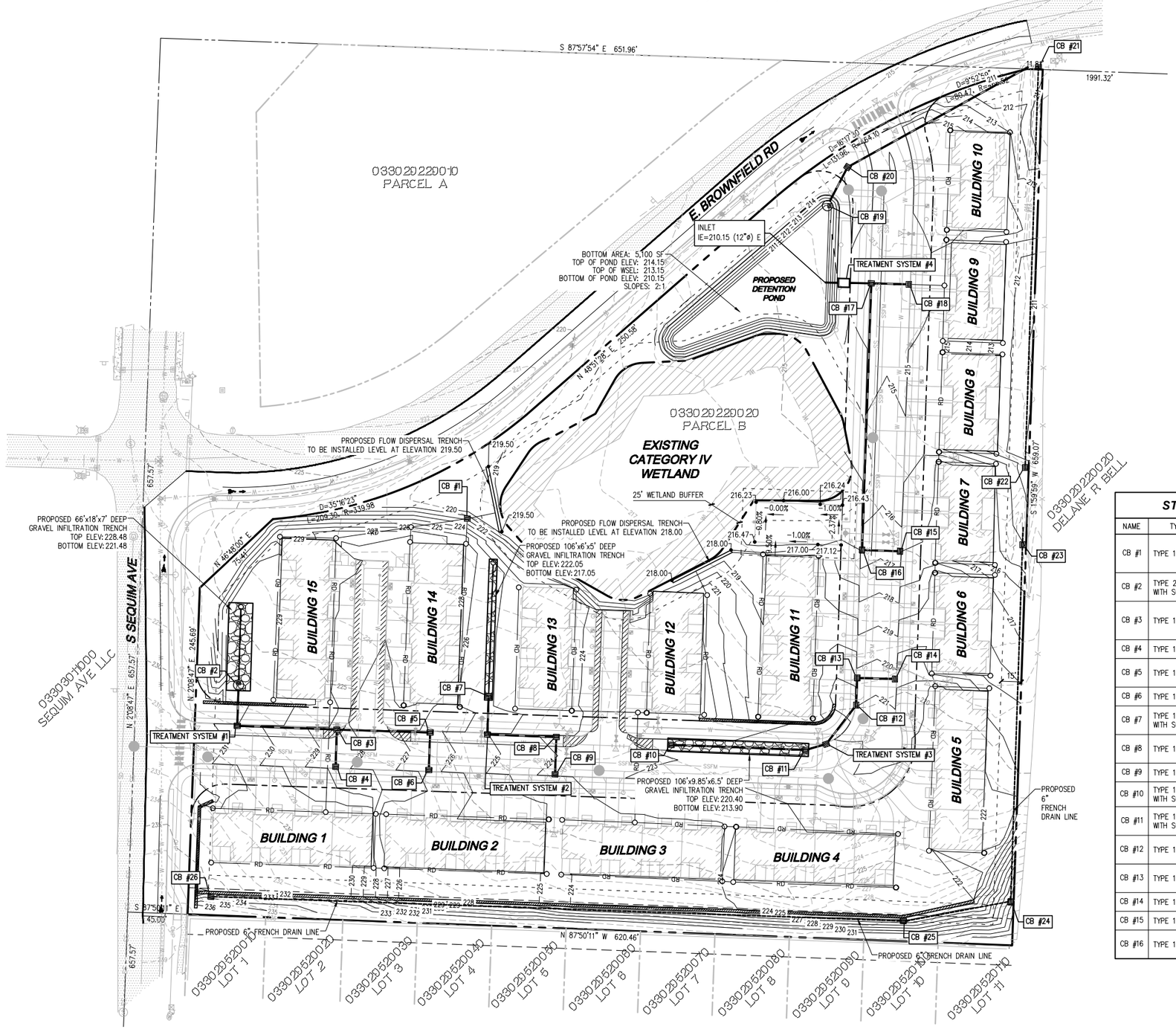
1. Ecology will be immediately notified of the failure to comply.

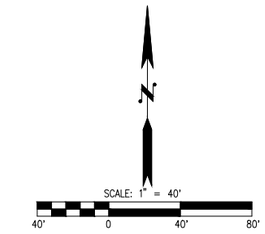
2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and submitted to Ecology within five days of becoming aware of the violation.

3. A detailed report describing the noncompliance will be submitted to Ecology within five days, unless requested earlier by Ecology.

APPENDIX A
PRELIMINARY EROSION CONTROL AND GRADING PLANS

A PORTION OF SEC 29, TWN 30 N, RGE 3 W, W.M., CLALLAM COUNTY, WASHINGTON





LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- STORM DRAIN CLEANOUT
- TYPE 1 CATCH BASIN WITH VANED GRATE UNLESS OTHERWISE NOTED
- TYPE 2 CATCH BASIN
- PROPOSED 12" ASTM D3034 SDR35 PVC STORM PIPE, UNLESS OTHERWISE NOTED
- PROPOSED 6" ASTM D3034 SDR35 PVC DRAIN LINE
- PROPOSED GRAVEL INFILTRATION TRENCH
- PROPOSED 6" FRENCH DRAIN LINE

STRUCTURE TABLE

NAME	TYPE	RIM	INVERTS
CB #1	TYPE 1	221.77	IE=219.61 (6" IN) W IE=219.61 (6" OUT) E IE=219.61 (6" IN) S
CB #2	TYPE 2-48"ø WITH SOLID LID	228.48	IE=222.27 (12" IN) S IE=222.27 (6" OUT) N
CB #3	TYPE 1	228.35	IE=222.80 (12" IN) E IE=222.80 (12" OUT) W IE=222.80 (12" OUT) S
CB #4	TYPE 1	228.35	IE=222.94 (12" IN) N
CB #5	TYPE 1	226.29	IE=223.15 (12" IN) S IE=223.15 (12" OUT) W
CB #6	TYPE 1	226.29	IE=223.29 (12" OUT) N
CB #7	TYPE 1 WITH SOLID LID	225.15	IE=220.20 (6" OUT) N IE=220.20 (12" IN) S
CB #8	TYPE 1	223.75	IE=220.61 (12" IN) W IE=220.61 (12" IN) S
CB #9	TYPE 1	223.75	IE=220.75 (12" OUT) N
CB #10	TYPE 1 WITH SOLID LID	222.80	IE=216.77 (12" OUT) E
CB #11	TYPE 1 WITH SOLID LID	222.30	IE=216.77 (12" IN) W IE=216.77 (12" IN) E
CB #12	TYPE 1	220.96	IE=217.04 (12" IN) SW IE=217.04 (12" OUT) N
CB #13	TYPE 1	220.28	IE=217.14 (12" IN) S IE=217.14 (12" IN) E
CB #14	TYPE 1	220.28	IE=217.28 (12" OUT) W
CB #15	TYPE 1	216.51	IE=213.49 (12" OUT) W
CB #16	TYPE 1	216.52	IE=213.35 (12" OUT) N IE=213.35 (12" IN) E

STRUCTURE TABLE

NAME	TYPE	RIM	INVERTS
CB #17	TYPE 1	214.25	IE=210.82 (12" IN) S IE=210.82 (12" OUT) W IE=210.82 (12" IN) E
CB #18	TYPE 1	214.25	IE=210.75 (12" OUT) W IE=210.75 (6" IN) E
CB #19	TYPE 2-48"ø FLOW CONTROL STRUCTURE	213.15	IE=210.15 (12" OUT) NE
CB #20	TYPE 1	210.99	IE=209.96 (12" IN) SW IE=209.96 (12" OUT) NE
CB #21	OVERFLOW DISCHARGE LOCATION. CONNECT TO EX. 12" ADS STORM PIPE	211.51	IE=209.43 (6" IN) S IE=208.93 (12" IN) E IE=208.93 (12" IN) W
CB #22	TYPE 1	212.27	IE=210.94 (6" OUT) N
CB #23	TYPE 1	214.06	IE=211.56 (6" IN) S IE=211.56 (6" IN) N
CB #24	TYPE 1	231.46	IE=223.49 (6" OUT) N IE=223.49 (6" IN) W
CB #25	TYPE 1	226.40	IE=223.90 (6" OUT) E IE=223.90 (6" IN) W
CB #26	TYPE 1	233.67	IE=231.17 (6" OUT) E
TREATMENT SYSTEM #1	PRETREATMENT SYSTEM	230.54	IE=222.42 (12" IN) E IE=222.42 (12" OUT) N
TREATMENT SYSTEM #2	PRETEATMENT SYSTEM	225.03	IE=220.35 (12" OUT) N IE=220.35 (12" OUT) E
TREATMENT SYSTEM #3	PRETREATMENT SYSTEM	222.12	IE=216.85 (12" OUT) W IE=216.85 (12" OUT) NE
TREATMENT SYSTEM #4	ENHANCED TREATMENT SYSTEM	214.96	IE=210.72 (12" IN) E IE=210.22 (12" OUT) W

DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY JAMESTOWN LAND SURVEY IN APRIL 2023. ANY CHANGES TO THE SITE AFTER THIS DATE WILL NOT BE REFLECTED IN THE PLANS. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

LDC | Surveying Engineering Planning
Woodinville | Tumwater | Kent
321 Cleveland Ave SE, #209
Tumwater, WA 98501
T 425.806.1869 F 425.482.2893
www.LDCcorp.com

HABITAT FOR HUMANITY

SEQUIM AVE DEVELOPMENT

GRADING AND DRAINAGE PLAN

TYRELL E. BRAUN
STATE OF WASHINGTON
51055
REGISTERED PROFESSIONAL ENGINEER
07-25

JOB NUMBER:	C22-272
DRAWING NAME:	C22272-CG-01
DESIGNER:	TEB
DRAFTING BY:	ES
DATE:	MARCH 2025
SCALE:	AS NOTED
JURISDICTION:	SEQUIM

CG-01

SHEET 4 OF 6

Drawing: P:\Civil\2022\c22-272 habitat for humanity brownfield rd\Drawings\Construction\C22272-CG-01.dwg Plotted: Mar 05, 2025 - 4:02pm

APPENDIX B
CONSTRUCTION BMPS

Table II-4.1: Construction Stormwater BMPs by SWPPP Element (continued)

Construction Stormwater BMP	Construction SWPPP Element #												
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13
II-2.2 Element 2: Establish Construction Access													
II-2.3 Element 3: Control Flow Rates													
II-2.4 Element 4: Install Sediment Controls													
II-2.5 Element 5: Stabilize Soils													
II-2.6 Element 6: Protect Slopes													
II-2.7 Element 7: Protect Storm Drain Inlets													
II-2.8 Element 8: Stabilize Channels and Outlets													
II-2.9 Element 9: Control Pollutants													
II-2.10 Element 10: Control Dewatering													
II-2.11 Element 11: Maintain BMPs													
II-2.12 Element 12: Manage the Project													
II-2.13 Element 13: Protect Infiltration BMPs													

II-4.2 Construction Source Control BMPs

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural (or existing) vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50% of all rain that falls during a storm. Up to 20% to 30% of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by the local jurisdiction.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local jurisdictions may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. The tile system should be laid out on the original grade leading from a drywell around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

  Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.
- *Excavations* - Protect trees and other plants when excavating for drainfields and power, water, and/or sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:
  - Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
  - Backfill the trench as soon as possible.
  - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western red cedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

If tree roots have been exposed or injured, “prune” cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (e.g. fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

Buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zone BMPs to protect natural swales and they can incorporate them into the natural landscaping of an area.

Do not use critical area buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

The types of buffer zones can change the level of protection required as shown below:

- Designated Critical Area Buffers - buffers that protect Critical Areas, as defined by the Washington State Growth Management Act, and are established and managed by the local

permitting authority. These should not be disturbed and must protected with sediment control BMPs to prevent impacts. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

- Vegetative Buffer Zones - areas that may be identified in undisturbed vegetation areas or managed vegetation areas that are outside any Designated Critical Area Buffer. They may be utilized to provide an additional sediment control area and/or reduce runoff velocities. If being used for preservation of natural vegetation, they should be arranged in clumps or strips. They can be used to protect natural swales and incorporated into the natural landscaping area.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by burying and smothering vegetation.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately. Remove all materials located in the buffer area that may impede the ability of the vegetation to act as a filter.

BMP C103: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

- Restrict clearing to approved limits.
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
- Limit construction traffic to designated construction entrances, exits, or internal roads.
- Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High-visibility plastic fence shall be composed of a high-density polyethylene (HDPE) material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 lbs/ft using the ASTM D4595 testing method.

If appropriate, install fabric silt fence in accordance with BMP C233: Silt Fence to act as high-visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Access

Purpose

Stabilized construction accesses are established to reduce the amount of sediment transported onto paved roads outside the project site by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for project sites.

Conditions of Use

Construction accesses shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential subdivision construction sites, provide a stabilized construction access for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized accesses not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

- See Figure II-4.1: Stabilized Construction Access for details. Note: the 100' minimum length of the access shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').
- Construct stabilized construction accesses with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction access stabilization because these products raise pH levels in stormwater and concrete discharge to waters of the State is prohibited.
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the standards listed in Table II-4.2: Stabilized Construction Access Geotextile Standards.

Table II-4.2: Stabilized Construction Access Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	No. 20 to No. 45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized access. Also consider the installation of excess concrete as a stabilized access. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction access.
- Whenever possible, the access shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction accesses should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction access must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Alternative Material Specification

WSDOT has raised safety concerns about the quarry spall rock specified above. WSDOT observes that the 4-inch to 8-inch rock sizes can become trapped between dually truck tires, and then released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the stabilized construction access remains effective. To remain effective, the BMP must prevent sediment from migrating off site. To date, there has been no performance testing to verify operation of this new specification. Local jurisdictions may use the alternative specification, but must perform increased off-site inspection if they use, or allow others to use, it.

Stabilized construction accesses may use material that meets the requirements of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Section 9-03.9(1) (WSDOT, 2016) for ballast except for the following special requirements.

The grading and quality requirements are listed in Table II-4.3: Stabilized Construction Access Alternative Material Requirements.

Table II-4.3: Stabilized Construction Access Alternative Material Requirements

Sieve Size	Percent Passing
2½″	99 to 100
2″	65 to 100
¾″	40 to 80
No. 4	5 max.
No. 100	0 to 2
% Fracture	75 min.

Notes:

1. All percentages are by weight.
2. The sand equivalent value and dust ratio requirements do not apply.
3. The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.

Maintenance Standards

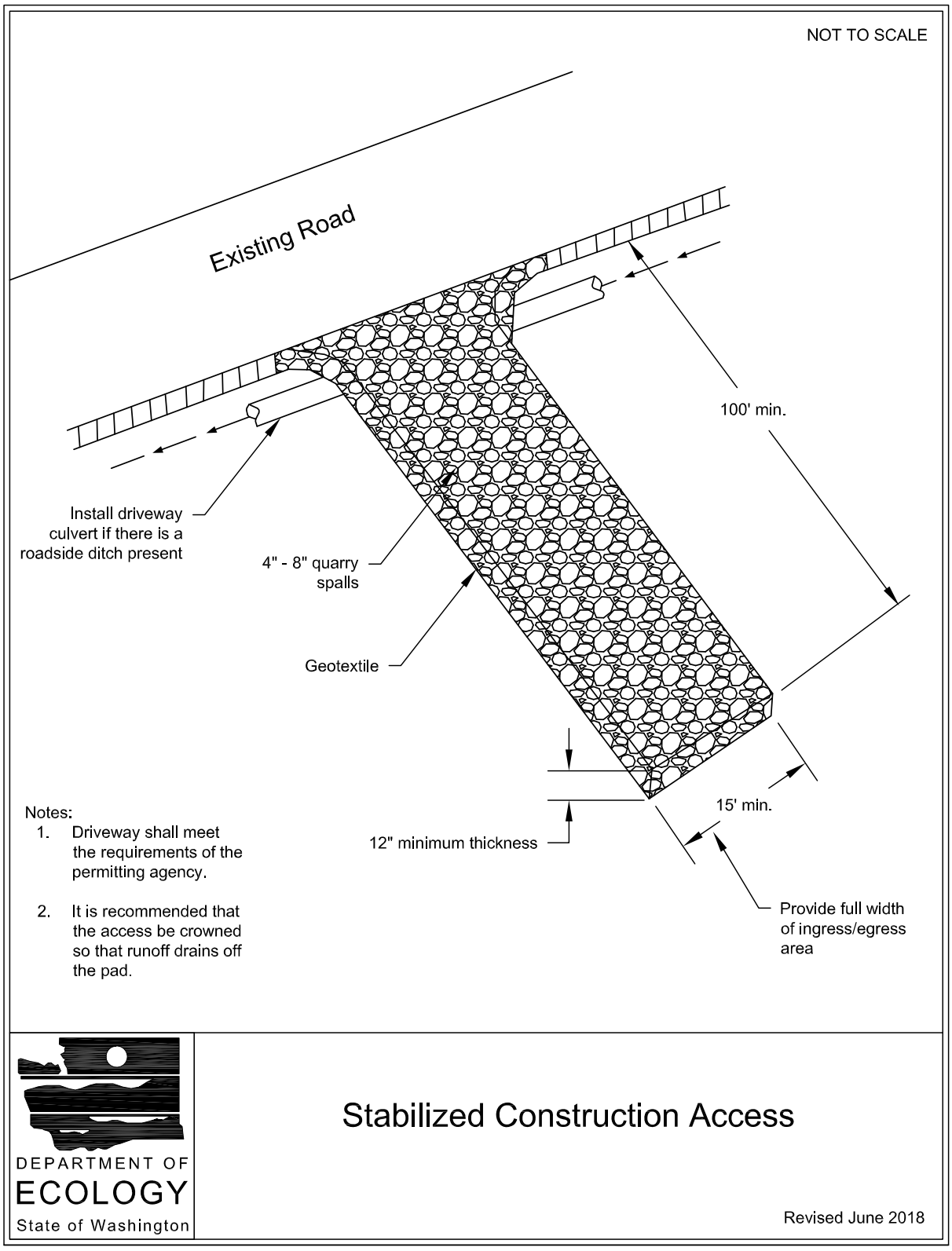
Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the access is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions

of the access, or the installation of BMP C106: Wheel Wash.

- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction access(es), BMP C103: High-Visibility Fence shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Figure II-4.1: Stabilized Construction Access



Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105: Stabilized Construction Access is not preventing sediment from being tracked off site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Wheel wash wastewater is not stormwater. It is commonly called process water, and must be discharged to a separate on-site treatment system that prevents discharge to waters of the State, or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto BMP C105: Stabilized Construction Access. In order to achieve this, BMP C105: Stabilized Construction Access may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

Suggested details are shown in Figure II-4.2: Wheel Wash. The local permitting authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base

material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 12-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 to 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water. PAM use shall be reviewed and approved by the local permitting authority. Discharge of PAM may be a basis for penalties per RCW 90.48.080.

Maintenance Standards

The wheel wash should start out each day with fresh water.

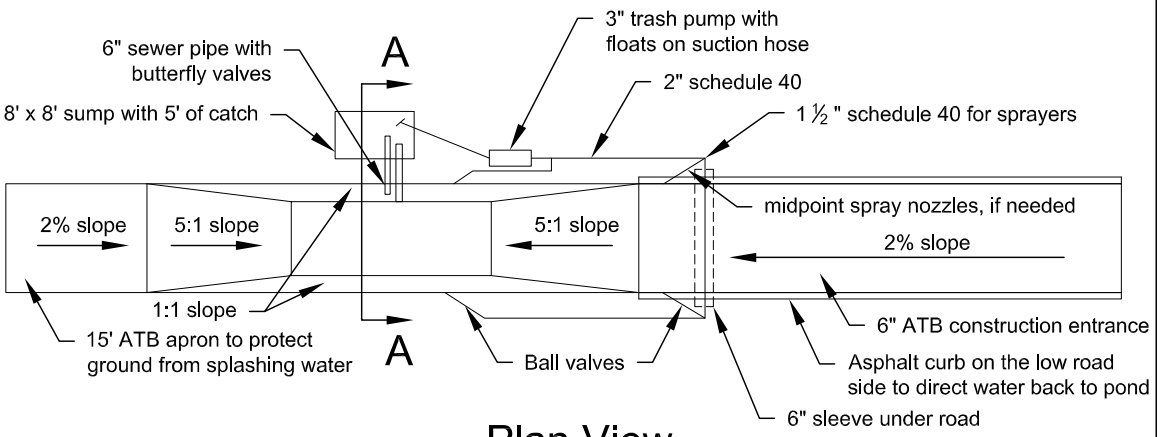
The wheel wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10 to 20 trucks per hour are expected, the wheel wash water will need to be changed more often.

Approved as Functionally Equivalent

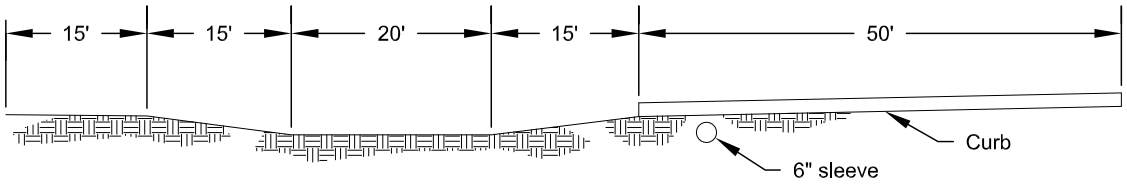
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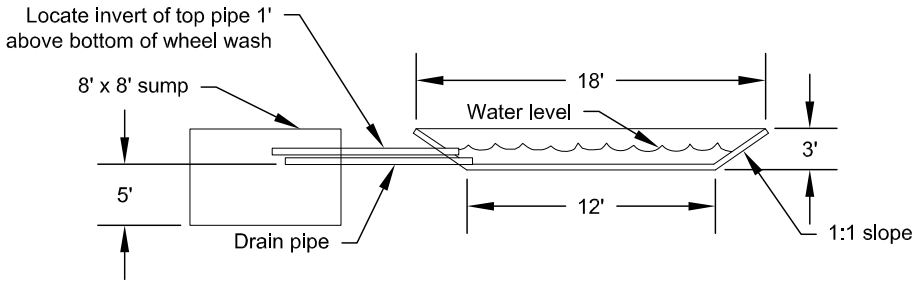
Figure II-4.2: Wheel Wash



Plan View



Elevation View



Section A-A

Notes:
1. Build 8' x 8' sump to accomodate cleaning by trackhoe.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Wheel Wash

Revised June 2016

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days. See II-2.5 Element 5: Stabilize Soils for specific timelines for stabilizing exposed soils.
- See Table II-4.4: Seeding Windows in Western Washington (continued) for appropriate seeding windows.
- Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See BMP T5.13: Post-Construction Soil Quality and Depth.

Table II-4.4: Seeding Windows in Western Washington

Month	Seeding Recommendations
January	Seeding requires a cover of mulch or an erosion control blanket until 75% grass cover is established
February	
March	

Table II-4.4: Seeding Windows in Western Washington (continued)

Month	Seeding Recommendations
April	Optimum seeding window
May	
June	
July	Seeding requires irrigation until 75% grass cover is established
August	
September	Optimum seeding window
October	Seeding requires a cover of mulch or an erosion control blanket until 75 percent grass cover is established
November	
December	

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over the top of hydroseed. Before allowing water to flow in vegetated channels, establish a 75% vegetation cover. If vegetated channels cannot be established by seed before water flow, install sod or prevegetated mats in the channel bottom over top of hydromulch and erosion control blankets.
- Confirm the installation of all required stormwater control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre (lb/acre) of mulch with 3% tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only, and not landscaping, may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Vegetation establishment can be enhanced by one of the following two approaches:
    - Approach 1: Enhance vegetation establishment by dividing the hydromulch operation into two phases:

        - Phase 1 – Install all seed and fertilizer with 25% to 30% mulch and tackifier onto the soil in the first lift.
        - Phase 2 – Install the remaining mulch and tackifier over the first lift.
    - Approach 2: Vegetation can also be enhanced by:
        - Installing the mulch, seed, fertilizer, and tackifier in one lift;
        - Spreading or blowing straw over the top of the hydromulch at a rate of about 800 to 1,000 lb/acre; or
        - Holding straw in place with a standard tackifier.

    Both of these approaches (Approach 1 and Approach 2) will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

    - Irrigation,
    - Reapplication of mulch, and
    - Repair of failed slope surfaces.

    Either of these approaches can use standard hydromulch (1,500 lb/acre minimum) and BFM/mechanically bonded fiber matrix (MBFM) (3,000 lb/acre minimum).

- Seed may be installed by hand if it is:
    - Temporary and covered by straw, mulch, or topsoil; or
    - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- Consult the local suppliers and/or the local conservation district for their recommendations for appropriate seed mixes and application rates. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic.
- In addition to meeting erosion control functions and not hindering maintenance operations, selection of long-lived, successional growth native vegetation that can compete against or exclude weeds and grow with minimal maintenance after plant establishment is preferred. Provide diversity to the greatest extent possible and plan for a succession of flowering times to improve pollinator habitat.
- The seed mixes listed in Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued) include recommended mixes for both temporary and permanent seeding. Alternative seed mixes approved by the local jurisdiction may also be used.
- Apply the mixes in Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued), with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.

Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85
Redtop bentgrass	*Agrostis alba* or *Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix				

Table II-4.5: Temporary and Permanent Seed Mixes for Western Washington (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple, single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall receive soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches, complete the rototilling process in multiple lifts, or prepare the soil amendments per the specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer needed is recommended. This will prevent the overapplication of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
- In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre.
- Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
- There are numerous products available to take the place of chemical fertilizers, including several with seaweed extracts that are beneficial to soil microbes and organisms. If 100% cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes, use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre with approximately 10% tackifier. Achieve a minimum of 95% soil coverage during application. Numerous products are available commercially. Most products require 24-36 hours to cure before rainfall, and cannot be installed on wet or saturated soils. Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.
- Install products per manufacturer's instructions.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include the following:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

- Reseed any seeded areas that fail to establish at least 75% cover (100% cover for areas that receive sheet or concentrated flows) of all seeded areas after 3 months of active growth following germination during the growing season. If reseeding is ineffective, use an alternate method, such as sodding, mulching, or nets/blankets. If winter weather prevents

adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

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BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There are a variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

For seeded areas, mulch may be made up of 100 percent:

- Cottonseed meal;
- Fibers made of wood, recycled cellulose, hemp, or kenaf;

- Compost;
- Or blends of these.

Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers.

Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Recycled cellulose may contain polychlorinated biphenyl (PCBs). Ecology recommends that products should be evaluated for PCBs prior to use.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

Any mulch or tackifier product used shall be installed per the manufacturer's instructions.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table II-4.7: Mulch Standards and Guidelines (continued). Consult with the local supplier or the local conservation district for their recommendations. Increase the application rate until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "Compost" is selected, it should be a coarse compost that meets the size gradations listed in Table II-4.6: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B found in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Table II-4.6: Size Gradations of Compost as Mulch Material

Sieve Size	Percent Passing
3"	100%
1"	90% - 100%
3/4"	70% - 100%
1/4"	40% - 100%

Table II-4.7: Mulch Standards and Guidelines

Mulch Material	Guideline	Description
Straw	**Quality Stand-**	Air-dried; free from undesirable seed and coarse material.

Table II-4.7: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
	ards	
	Application Rates	2" to 3" thick; 5 bales per 1,000 sf or 2 to 3 tons per acre
	Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas, straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier because even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species, and it has no significant long-term benefits. Straw should only be used if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	Quality Standards	No growth inhibiting factors.
	Application Rates	Approx. 35-45 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre
	Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.
Compost	Quality Standards	No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs per cubic yard)
	Remarks	More effective control can be obtained by increasing thickness to 3". Compost makes an excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125: Topsoiling / Composting or BMP T5.13: Post-Construction Soil Quality and Depth. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use compost near wetlands if biosolids are included. Do not use compost near phosphorous impaired water bodies.
Chipped Site Vegetation	Quality Standards	Gradations from fines to 6 inches in length for texture, variation, and interlocking properties. Include a mix of various sizes so that the

Table II-4.7: Mulch Standards and Guidelines (continued)

Mulch Material	Guideline	Description
		average size is between 2 and 4 inches.
	Application Rates	2" thick minimum.
	Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approximately 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If permanent seeding or planting is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. Note: Thick application of this material over existing grass, herbaceous species, and some groundcovers could smother and kill vegetation.
Wood-Based Mulch	**Quality Standards**	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
	Application Rates	2" thick minimum; approximately 100 tons per acre (approximately 750 lbs. per cubic yard).
	Remarks	This material is often called "wood straw" or "hog fuel". The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	**Quality Standards**	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.
	Application Rates	2" thick minimum.
	Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95% of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between 1/16 and 0.5 inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. See specification 9-14.4(4) from the *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2016)

Maintenance Standards

The thickness of the mulch cover must be maintained.

Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage systems during high flows.

Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (e.g. coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control netting and blankets shall be made of natural plant fibers unaltered by synthetic materials.

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap.

Disadvantages of nets and blankets include:

- Surface preparation is required.
- On slopes steeper than 2.5H:1V, net and blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000 - $6,000 per acre installed.

Advantages of nets and blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training

- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of nets and blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

An alternative to nets and blankets in some limited conditions is BMP C202: Riprap Channel Lining. Ensure that BMP C202: Riprap Channel Lining is appropriate before using it as a substitute for nets and blankets.

Design and Installation Specifications

- See Figure II-4.3: Channel Installation (Clackamas County et al., 2008) and Figure II-4.4: Slope Installation for typical orientation and installation of nets and blankets used in channels and as slope protection. Note: these are typical only; all nets and blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Install nets and blankets on slopes per the following steps:
    1. Complete final grade and track walk up and down the slope. Soils should be raked and uniform prior to installing nets or blankets. To be effective, nets and blankets must have good adhesion to the soil.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the net/blanket into the small trench and staple approximately every 18 inches.

       NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the net/blanket slowly down the slope as the installer walks backward.

       NOTE: The net/blanket rests against the installer's legs. Staples are installed as the net/blanket is unrolled. It is critical that the proper staple pattern is used for the net/blanket being installed. The net/blanket is not to be allowed to roll down the slope on its own as this stretches the net/blanket, making it impossible to maintain soil contact. In addition, no one is allowed to walk on the net/blanket after it is in place.
    6. If the net/blanket is not long enough to cover the entire slope length, the trailing edge of the upper net/blanket should overlap the leading edge of the lower net/blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.

- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the designer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available in WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* Division 8-01 and Division 9-14 (WSDOT, 2016).
- Use jute matting in conjunction with mulch (BMP C121: Mulching). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- 100 percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning it breaks down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

Figure II-4.3: Channel Installation

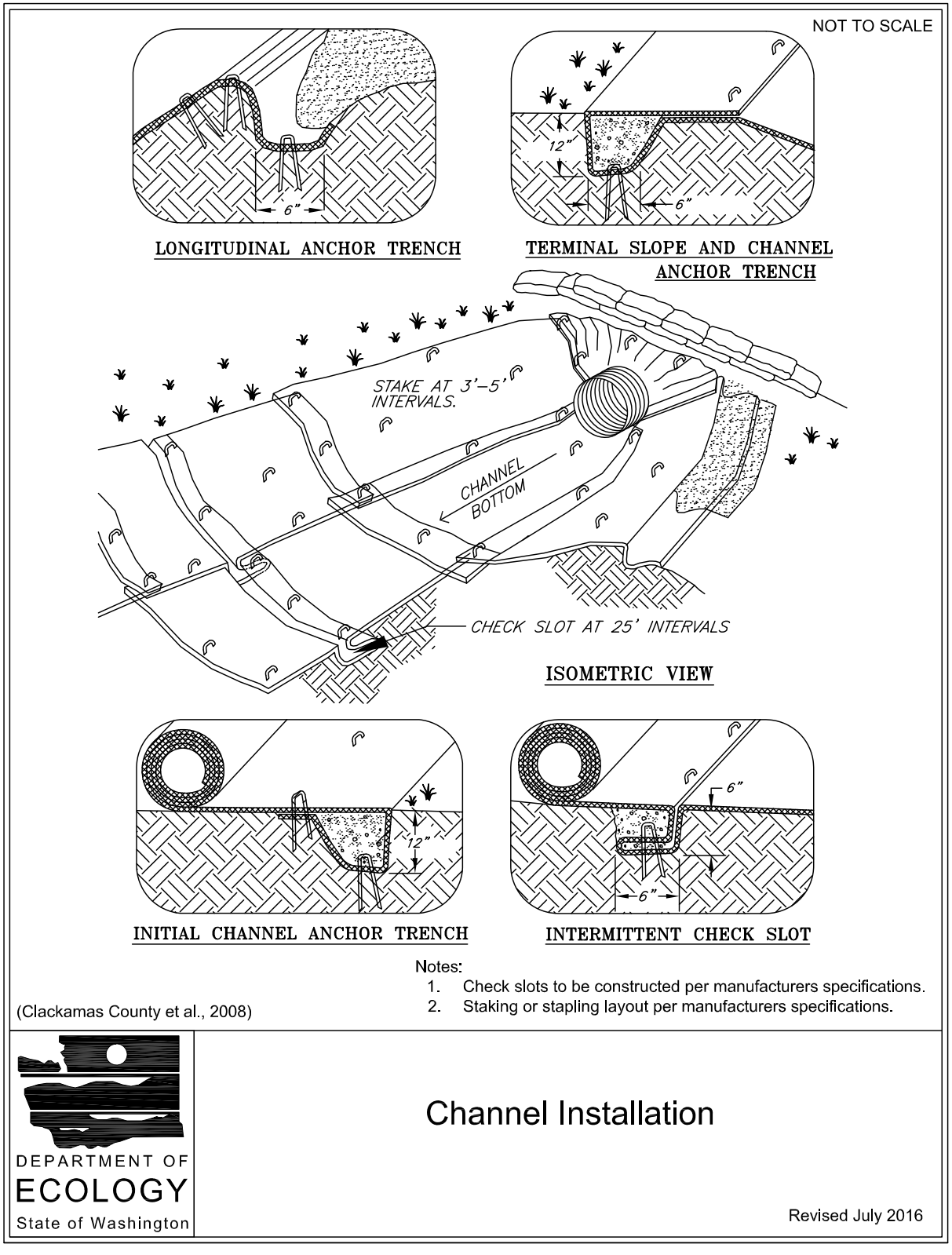
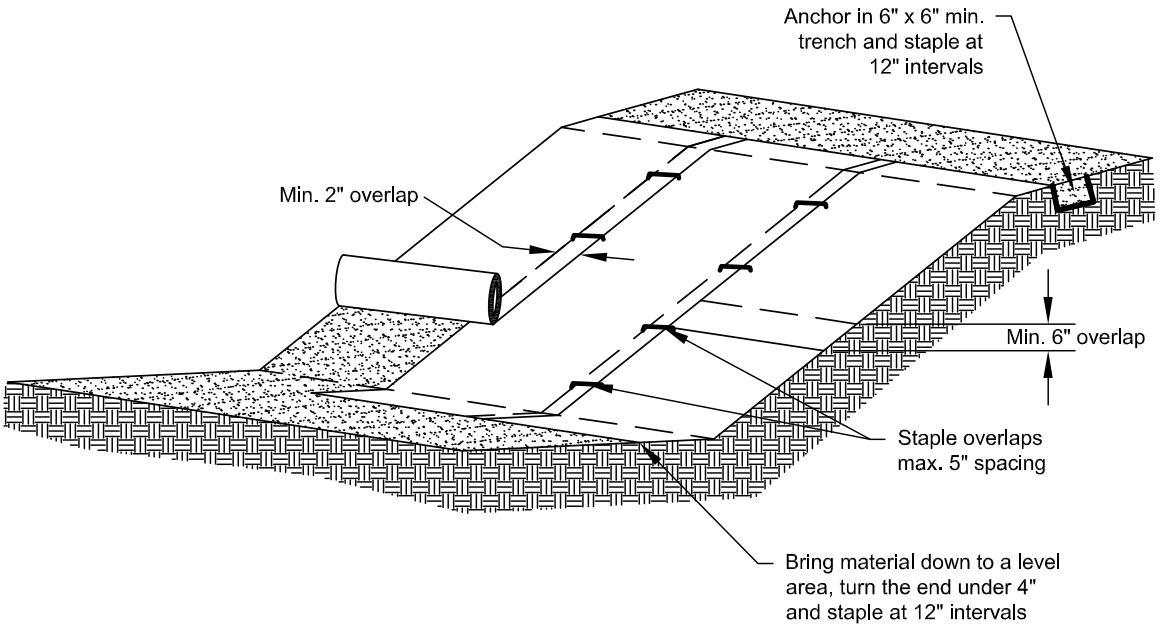


Figure II-4.4: Slope Installation



Notes:

1. Slope surface shall be smooth before placement for proper soil contact.
2. Stapling pattern as per manufacturer's recommendations.
3. Do not stretch blankets/mattings tight - allow the rolls to mold to any irregularities.
4. For slopes less than 3H:1V, rolls may be placed in horizontal strips.
5. If there is a berm at the top of the slope, anchor upslope of the berm.
6. Lime, fertilize, and seed before installation. Planting of shrubs, trees, etc. should occur after installation.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Slope Installation

Revised June 2016

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. However, the relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for applications greater than six months.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- Although the plastic material is inexpensive to purchase, the cost of installation, maintenance, removal, and disposal add to the total costs of this BMP.
- Whenever plastic is used to protect slopes, install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    - Temporary ditch liner.
    - Pond liner in temporary sediment pond.
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    - Emergency slope protection during heavy rains.
    - Temporary drainpipe (“elephant trunk”) used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down the slope, not across the slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
    3. Provide a minimum of 8-inch overlap at the seams.
    4. On long or wide slopes, or slopes subject to wind, tape all seams.
    5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
    6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
    7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil, which causes extreme erosion.
    8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 6 mil.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C124: Sodding

Purpose

The purpose of sodding is to establish turf for immediate erosion protection and to stabilize drainage paths where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, have a uniform thickness (approximately 1-inch thick), and have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

1. Shape and smooth the surface to final grade in accordance with the approved grading plan. Consider any areas (such as swales) that need to be overexcavated below design elevation to allow room for placing soil amendment and sod.
2. Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than ten percent or the permeability is less than 0.6 inches per hour. See Ecology's Compost web page for further information:

   https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials/Managing-organics-compost
3. Fertilize according to the sod supplier's recommendations.
4. Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
5. Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
6. Roll the sodded area and irrigate.
7. When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy ground cover. If it is impossible to establish a healthy ground cover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket (BMP C122: Nets and Blankets).

BMP C125: Topsoiling / Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, or BMP C124: Sodding.

Implementation of this BMP may meet the post-construction requirements of BMP T5.13: Post-Construction Soil Quality and Depth.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer, and/or pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetative health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.

- Beware of where the topsoil comes from, and what vegetation was on site before disturbance. Invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhizae are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhizae products when using off-site topsoil.

Design and Installation Specifications

Meet the following requirements for disturbed areas where topsoil will be applied (e.g. for disturbed areas that will be developed as lawn or other landscape):

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
    - A minimum depth of 8 inches. Scarify subsoils below the topsoil layer at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or re-structuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system. The decision to either layer topsoil over a subgrade or incorporate topsoil into the underlying layer may vary depending on the planting specified.
    - A minimum organic content of 10% dry weight in planting beds, and 5% organic matter content in turf areas. Incorporate organic amendments to a minimum 8 inch depth except where tree roots or other natural features limit the depth of incorporation.
    - A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
    - If blended topsoil is imported, then fines should be limited to 25% passing through a 200 sieve.
- Mulch planting beds with 2 inches of organic material
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments. When using the option of incorporating amendments to meet the organic content requirement, use compost that meets the compost specification for Bioretention (See BMP T7.30: Bioretention), with the exception that the compost may have up to 35% biosolids or manure.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.

- Take care when applying topsoil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to promote bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.
- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and/or clay loam). Avoid areas of natural groundwater recharge.
- Stripping shall be confined to the immediate construction area. A 4 to 6 inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Reapply stockpiled topsoil to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.
- Stockpiling of topsoil shall occur in the following manner:
    - Side slopes of the stockpile shall not exceed 2H:1V.
    - Between October 1 and April 30:
        - An interceptor dike with gravel outlet and silt fence shall surround all topsoil stockpiles.
        - Within 2 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
    - Between May 1 and September 30:
        - An interceptor dike with gravel outlet and silt fence shall surround all topsoil stockpiles if the stockpile will remain in place for a longer period of time than active construction grading.
        - Within 7 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- When native topsoil is to be stockpiled and reused, the following should apply to ensure that the mycorrhizal bacteria, earthworms, and other beneficial organisms will not be destroyed:

- Reinstall topsoil within 4 to 6 weeks.
- Do not allow the saturation of topsoil with water.
- Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection

Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion.

Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body. Stormwater runoff from areas where PAM has been applied shall pass through BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary) (depending on the size of the drainage area) prior to discharging to surface waters.

PAM use shall be reviewed and approved by the local jurisdiction.

Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- In staging areas.
- In balanced cut and fill earthwork.

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, into drainage systems, and into surface waters.

Conditions of Use

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or off-site impacts to roadways, drainage systems, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, refer to BMP C105: Stabilized Construction Access and BMP C106: Wheel Wash.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local jurisdictions may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to the increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may reduce the quantity of water needed for dust control.

  Note that the application rate specified here applies to this BMP, and is not the same application rate that is specified in BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection, but the downstream protections still apply.

  Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body. PAM use shall

be reviewed and approved by the local permitting authority and discharge of PAM may be a basis for penalties per RCW 90.48.080.

- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP. See the following website for more information:

  https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Techniques that can be used for unpaved roads and lots include:
  - Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
  - Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
  - Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
  - Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
  - Encourage the use of alternate, paved routes, if available.
  - Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
  - Limit dust-generating work on windy days.
  - Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy rains. Having these materials on-site reduces the time needed to replace existing or implement new BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel “T” posts.
- Materials should be stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or project proponent could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

- Clear plastic, 6 mil
- Drainpipe, 6 or 8 inch diameter
- Sandbags, filled
- Straw bales for mulching
- Quarry spalls
- Washed gravel
- Geotextile fabric
- Catch basin inserts
- Steel "T" posts
- Silt fence material
- Straw wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel “T” posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154: Concrete Washout Area for information on concrete washout areas.
    - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.

- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
    - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and have a high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created by sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate groundwater or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening, or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose of process water in a manner that does not violate groundwater or surface water quality standards.
- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuum trucks.

BMP C153: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

Use at construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., polyacrylamide)
- Fertilizers, pesticides, and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (October 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.

- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days.
- Secondary containment facilities shall be covered at all times, except when in active use.
- Keep material storage areas clean, organized, and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1 - Water resistant nylon bag
    - 3 - Oil absorbent socks 3”x 4’
    - 2 - Oil absorbent socks 3”x 10’
    - 12 - Oil absorbent pads 17”x19”
    - 1 - Pair splash resistant goggles
    - 3 - Pairs nitrile gloves
    - 10 - Disposable bags with ties
    - Instructions

Maintenance Standards

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Re-stock spill kit materials as needed.

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants from concrete waste to stormwater by conducting washout off-site, or performing on-site washout in a designated area.

Conditions of Use

Concrete washout areas are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete truck drums are washed on-site.

  Note that auxiliary concrete truck components (e.g. chutes and hoses) and small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheel-barrows) may be washed into formed areas awaiting concrete pour.

At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.

Design and Installation Specifications

Implementation

- Perform washout of concrete truck drums at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete onto non-formed areas, or into storm drains, open ditches, streets, or streams.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas as allowed above.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.
- Concrete washout areas shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.

- Arrange for the contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each concrete washout area to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate concrete washout areas at least 50 feet from sensitive areas such as storm drains, open ditches, water bodies, or wetlands.
- Allow convenient access to the concrete washout area for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access the concrete washout area, prevent track-out with a pad of rock or quarry spalls (see BMP C105: Stabilized Construction Access). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of concrete washout areas you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, concrete washout areas should be placed in multiple locations for ease of use by concrete truck drivers.

Concrete Truck Washout Procedures

- Washout of concrete truck drums shall be performed in designated concrete washout areas only.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated concrete washout areas or properly disposed of off-site.

Concrete Washout Area Installation

- Concrete washout areas should be constructed as shown in the figures below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
- Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Lath and flagging should be commercial type.
- Liner seams shall be installed in accordance with manufacturers' recommendations.

- Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout areas are in place prior to the commencement of concrete work.
- Once concrete wastes are washed into the designated washout area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.
- During periods of concrete work, inspect the concrete washout areas daily to verify continued performance.
    - Check overall condition and performance.
    - Check remaining capacity (% full).
    - If using self-installed concrete washout areas, verify plastic liners are intact and sidewalls are not damaged.
    - If using prefabricated containers, check for leaks.
- Maintain the concrete washout areas to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Concrete washout areas must be cleaned, or new concrete washout areas must be constructed and ready for use once the concrete washout area is 75% full.
- If the concrete washout area is nearing capacity, vacuum and dispose of the waste material in an approved manner.
    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
    - Do not discharge to the sanitary sewer without local approval.
    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.
    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from a self-installed concrete washout area, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Concrete Washout Areas

- When concrete washout areas are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct concrete washout areas shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the concrete washout areas shall be backfilled, repaired, and stabilized to prevent erosion.

Figure II-4.7: Concrete Washout Area with Wood Planks

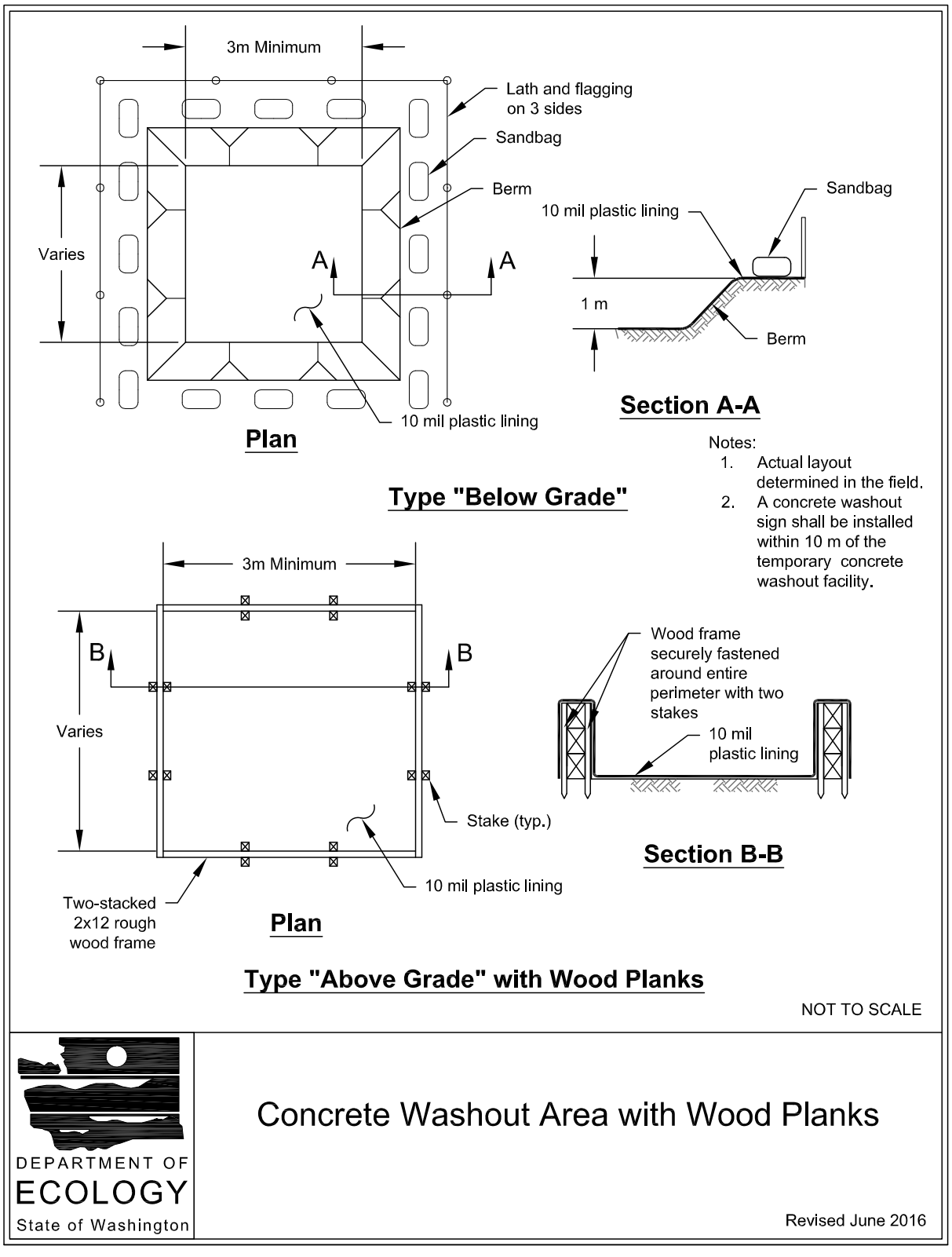


Figure II-4.8: Concrete Washout Area with Straw Bales

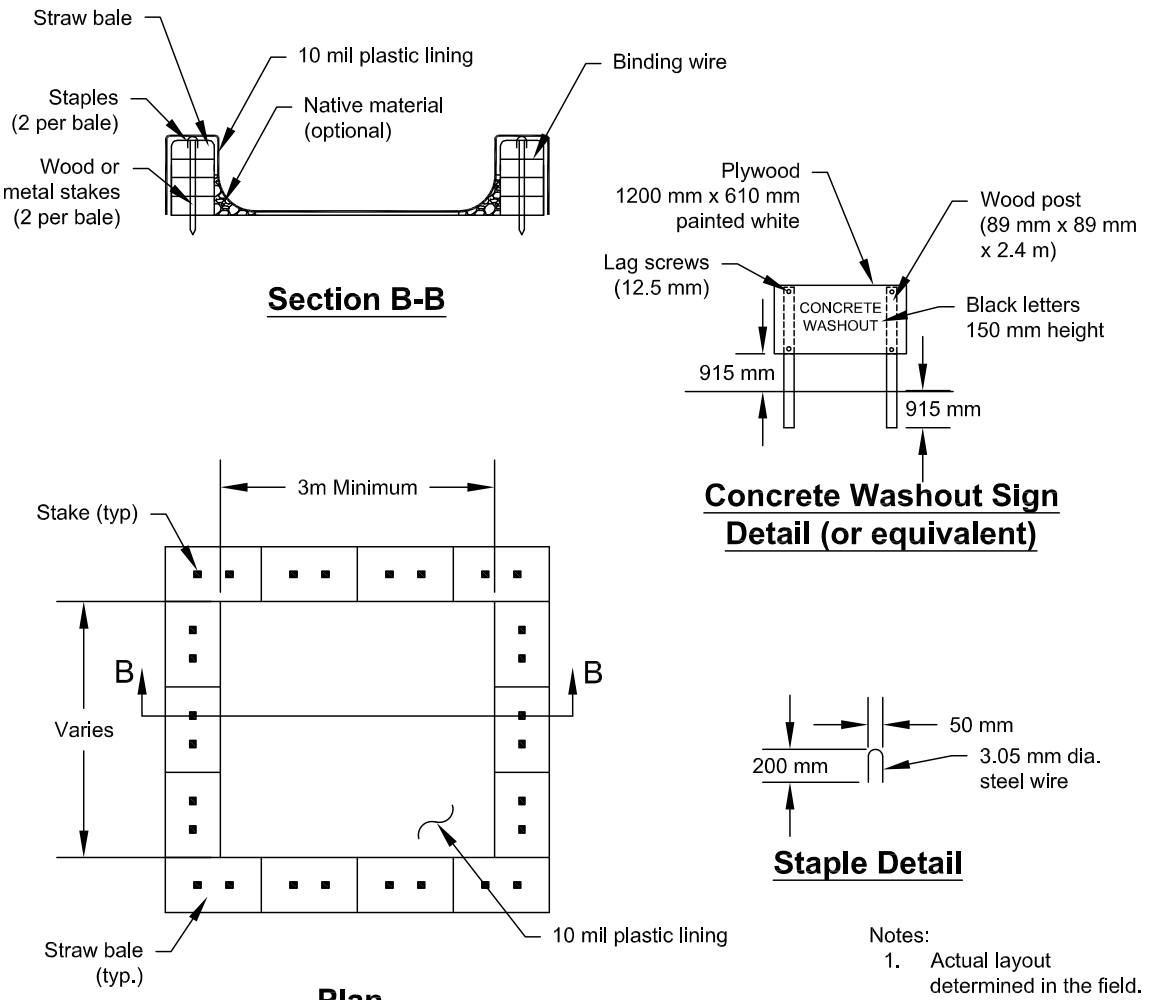
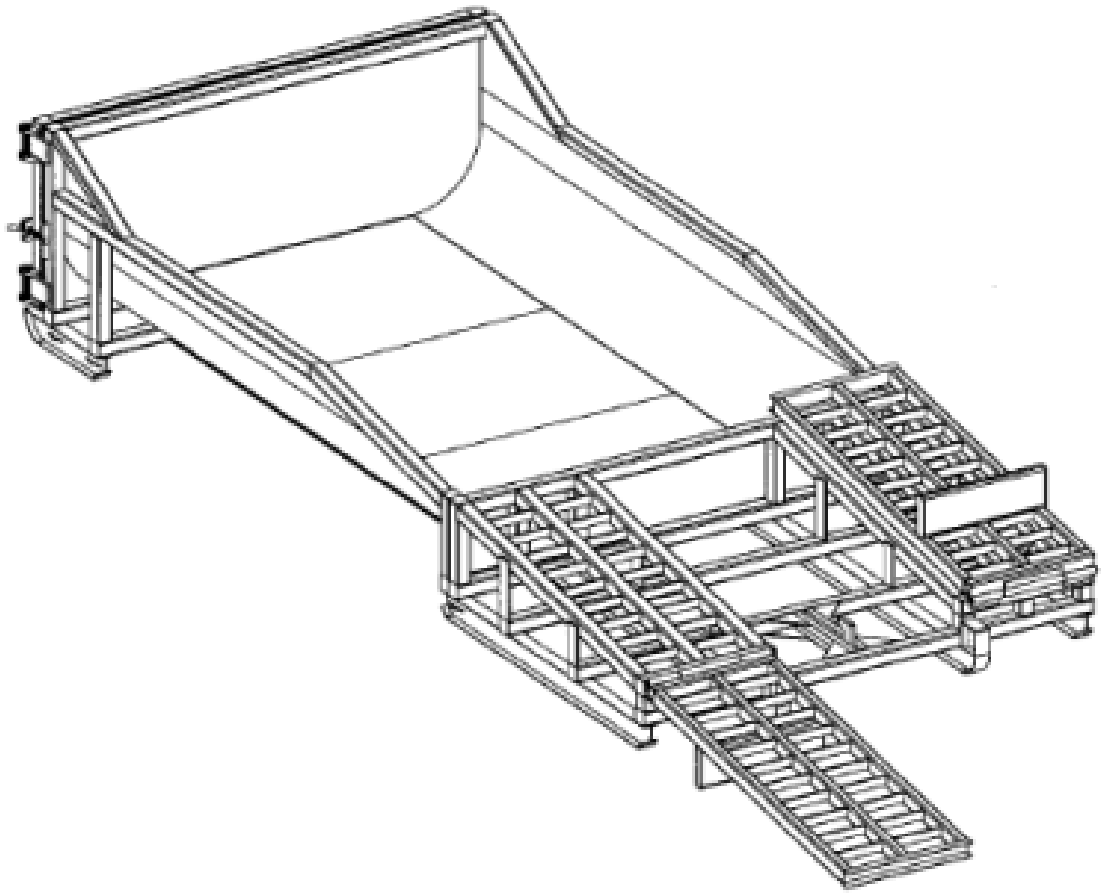


Figure II-4.9: Prefabricated Concrete Washout Container with Ramp



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State of Washington

Prefabricated Concrete Washout Container with Ramp

Revised June 2016

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC) and water quality protection. The designated person shall be responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements. Construction sites one acre or larger that discharge to waters of the State must designate a Certified Erosion and Sediment Control Lead (CESCL) as the responsible representative.

Conditions of Use

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections.

The CESCL shall:

- Have a current certificate proving attendance in an ESC training course that meets the minimum ESC training and certification requirements established by Ecology.

  Ecology has provided the minimum requirements for CESCL course training, as well as a list of ESC training and certification providers at:

  https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Certified-erosion-sediment-control

  OR

- Be a Certified Professional in Erosion and Sediment Control (CPESC). For additional information go to:

  http://www.envirocertintl.org/cpesc/

Specifications

- CESCL certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or project proponent and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL. See II-3 Construction Stormwater Pollution Prevention Plans (Construction SWPPPs).
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region, but must be on site whenever earthwork activities are occurring that could generate release of turbid water.

- Duties and responsibilities of the CESCL shall include, but are not limited to, the following:
    - Maintaining a permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
    - Directing BMP installation, inspection, maintenance, modification, and removal.
    - Updating all project drawings and the Construction SWPPP with changes made.
    - Completing any sampling requirements including reporting results using electronic Discharge Monitoring Reports (WebDMR).
    - Facilitating, participating in, and taking corrective actions resulting from inspections performed by outside agencies or the owner.
    - Keeping daily logs and inspection reports. Inspection reports should include:
        - Inspection date/time.
        - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
        - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
        - Any water quality monitoring performed during inspection.
        - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
        - A summary or list of all BMPs implemented, including observations of all ESC structures or practices. The following shall be noted:
            1. Locations of BMPs inspected.
            2. Locations of BMPs that need maintenance.
            3. Locations of BMPs that failed to operate as designed or intended.
            4. Locations of where additional or different BMPs are required.

BMP C162: Scheduling

Purpose

Sequencing a construction project can reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sediment control (ESC) measures planned for the

project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of ground cover leaves a site vulnerable to erosion. Construction sequencing that limits land clearing, provides timely installation of ESC BMPs, and restores protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

II-4.3 Construction Runoff BMPs

BMP C200: Interceptor Dike and Swale

Purpose

Provide a dike of compacted soil or a swale at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Use an interceptor dike or swale where runoff from an exposed site or disturbed slope must be conveyed to an erosion control BMP that can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering the disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct it to a sediment trapping BMP (e.g. BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary)).

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Steep grades require channel protection and check dams.

- The leading edge of the TSD must be secured with rocks, sandbags, or a small key slot and staples.
- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4%. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance Standards

- Inspect TSDs for performance and sediment accumulation during and after each rainfall that produces runoff. Remove sediment when it reaches one half the height of the TSD.
- Anticipate submergence and deposition above the TSD and erosion from high flows around the edges of the TSD. Immediately repair any damage or any undercutting of the TSD.

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of Use

Use outlet protection at the outlets of all ponds, pipes, ditches, or other conveyances that discharge to a natural or constructed drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

- The receiving channel at the outlet of a pipe shall be protected from erosion by lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1 foot above the maximum tailwater elevation, or 1 foot above the crown, whichever is higher. For pipes larger than 18 inches in diameter, the outlet protection lining of the channel shall be four times the diameter of the outlet pipe.
- Standard wingwalls, tapered outlets, and paved channels should also be considered when appropriate for permanent culvert outlet protection (WSDOT, 2015).
- BMP C122: Nets and Blankets or BMP C202: Riprap Channel Lining provide suitable options for lining materials.
- With low flows, BMP C201: Grass-Lined Channels can be an effective alternative for lining material.
- The following guidelines shall be used for outlet protection with riprap:
  - If the discharge velocity at the outlet is less than 5 fps, use 2-inch to 8-inch riprap. Minimum thickness is 1 foot.

- For a 5 to 10 fps discharge velocity at the outlet, use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
- For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), use an engineered energy dissipator.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion. See BMP C122: Nets and Blankets.

- Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife. See I-2.14 Hydraulic Project Approvals.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipator if sediment builds up.

BMP C220: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-4.11: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to plug and require a high frequency of maintenance. Limit contributing drainage areas for an individual inlet to one acre or less. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table II-4.11: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved / Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth of 1 to 2 feet as measured from the crest of the inlet structure.
- Side slopes of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.

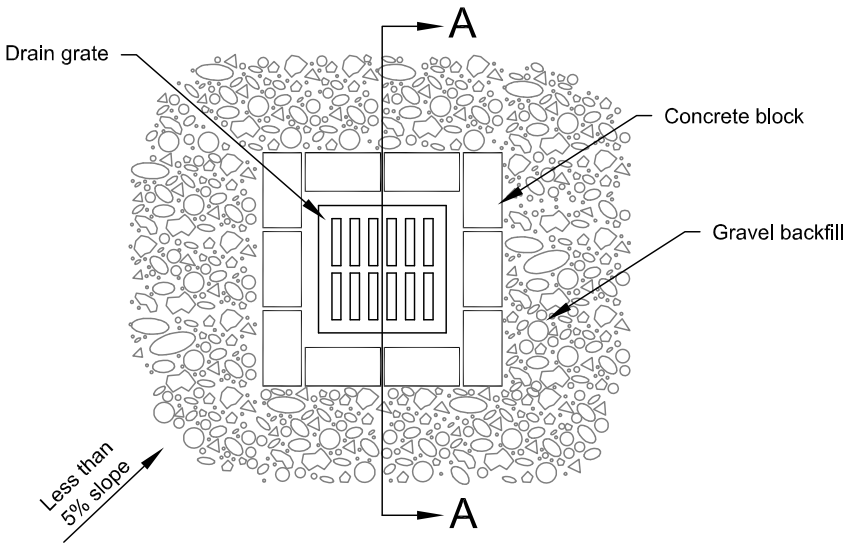
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

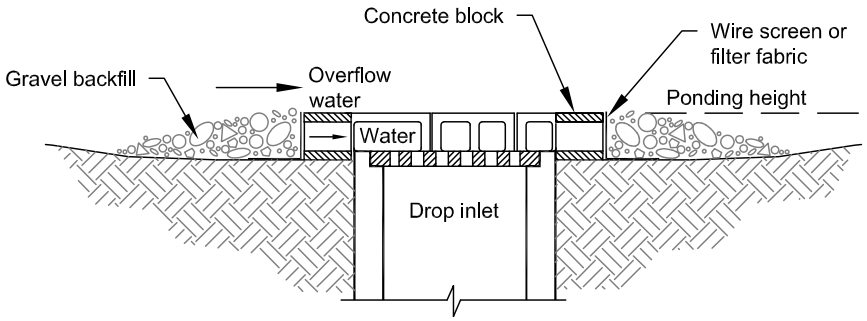
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-4.17: Block and Gravel Filter. Design and installation specifications for block and gravel filters include:

- Provide a height of 1 to 2 feet above the inlet.
- Recess the first row of blocks 2-inches into the ground for stability.
- Support subsequent courses by placing a pressure treated wood (2x4) through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with 0.5-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot wide level rock area between the gravel berm and the inlet.
    - Use rocks 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel 0.5 to 0.75 inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-4.17: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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State of Washington

Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with 0.5 inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide at least a 12-inch depth of aggregate over the entire inlet opening and extend at least 18-inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection with Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

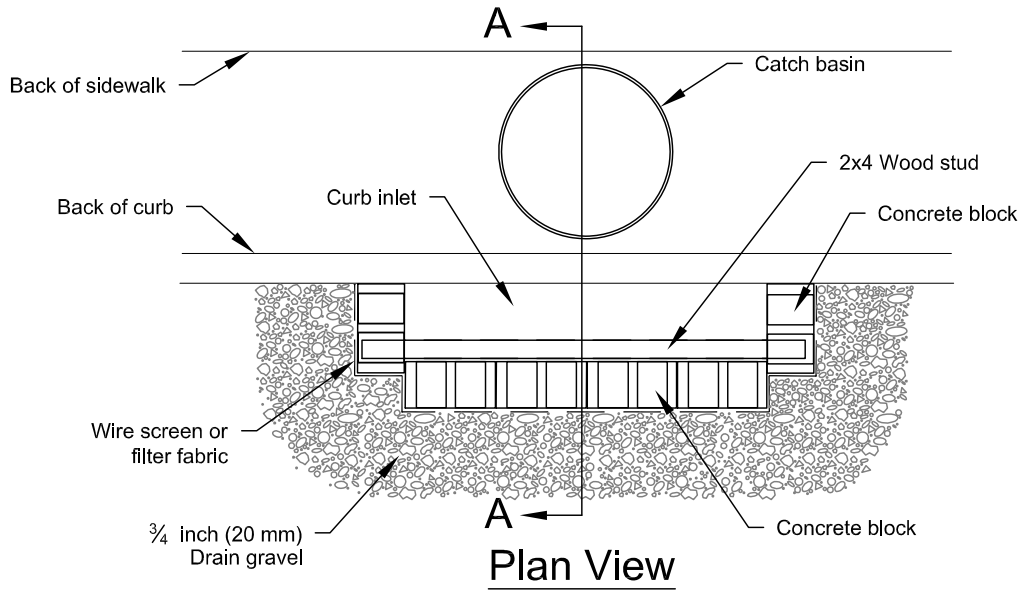
- Use wire mesh with 0.5 inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

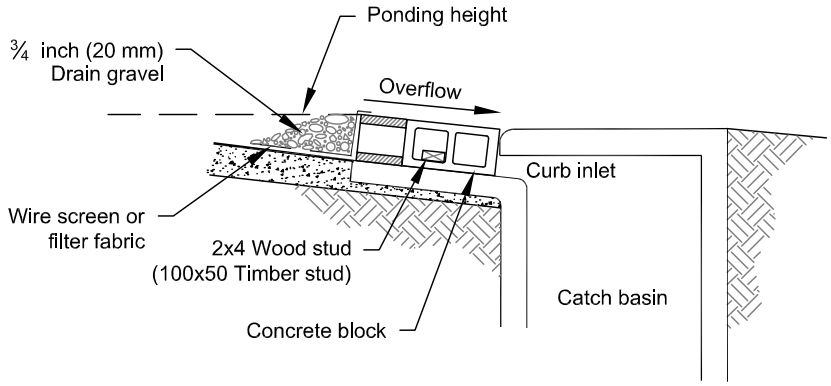
Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-4.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with 0.5 inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Figure II-4.18: Block and Gravel Curb Inlet Protection



Plan View



Section A-A

Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Block and Gravel Curb Inlet Protection

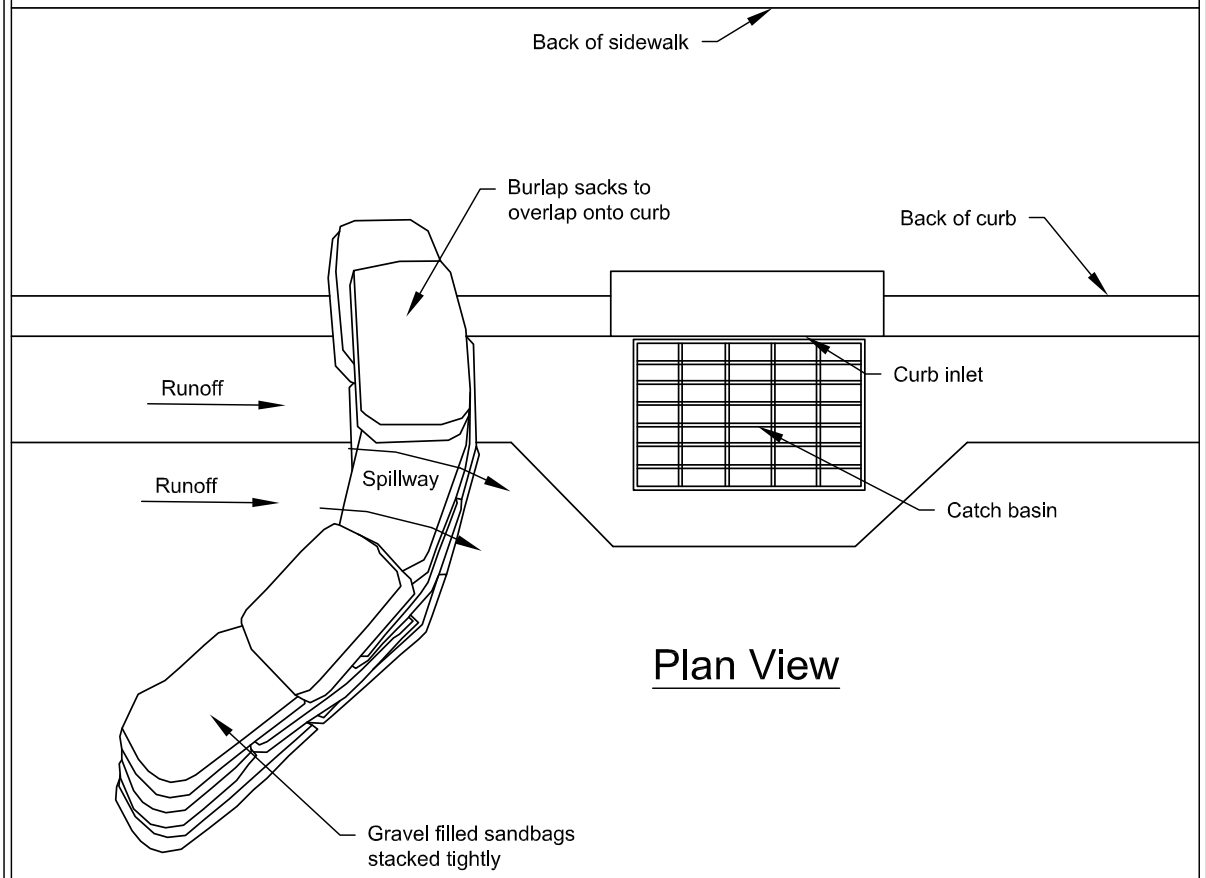
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Curb and Gutter Sediment Barrier

A curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-4.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barriers include:

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

Figure II-4.19: Curb and Gutter Barrier



Notes:

1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven 'geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Curb and Gutter Barrier

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Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull away the rocks from the inlet and clean or replace. An alternative approach would be to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C231: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of disturbed areas that are less than one-quarter acre.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be directed to a sediment trapping BMP. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than by a sediment trapping BMP, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height: 2 feet (minimum) to 5 feet (maximum).
- Width: 5 feet at base (minimum) to 15 feet (maximum).

BMP C233: Silt Fence

Purpose

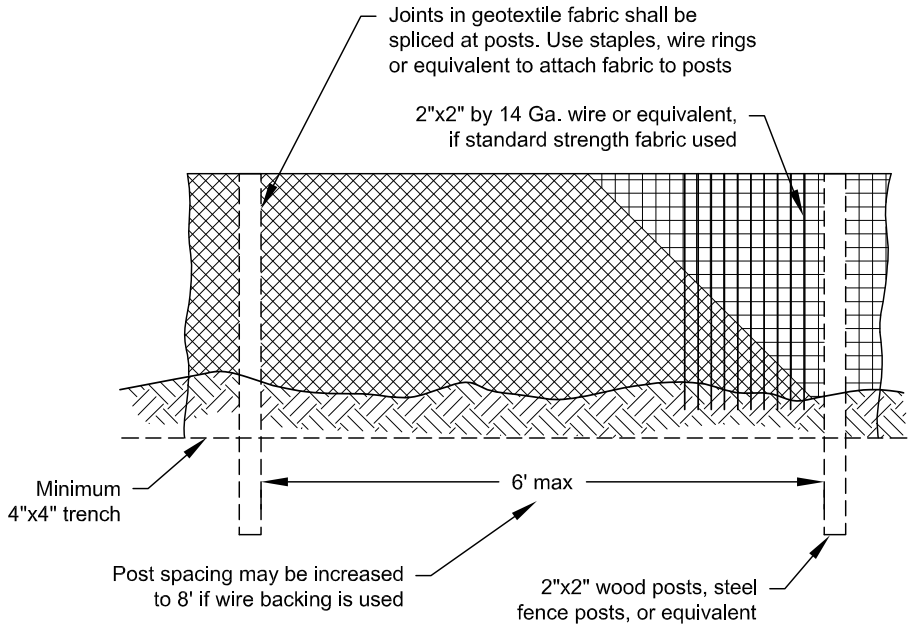
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

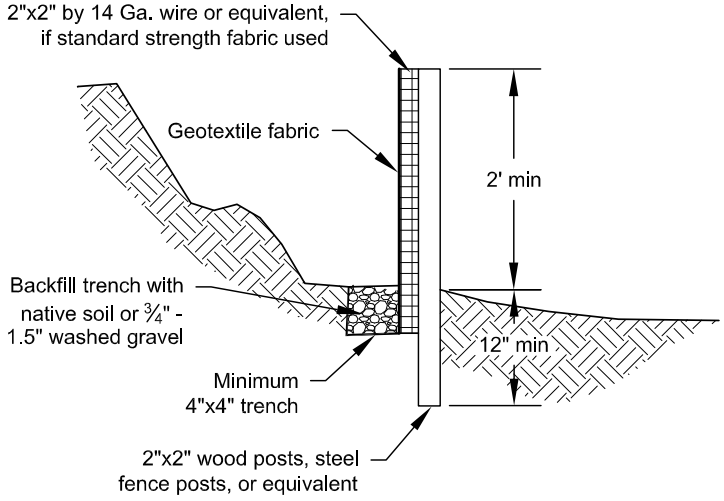
Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Figure II-4.22: Silt Fence





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Silt Fence

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Design and Installation Specifications

- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- Use geotextile fabric that meets the following standards. All geotextile properties listed below are minimum average roll values (i.e. the test result for any sampled roll in a lot shall meet or exceed the values shown in Table II-4.12: Geotextile Fabric Standards for Silt Fence):

Table II-4.12: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- 100% biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-4.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

    1. The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans.

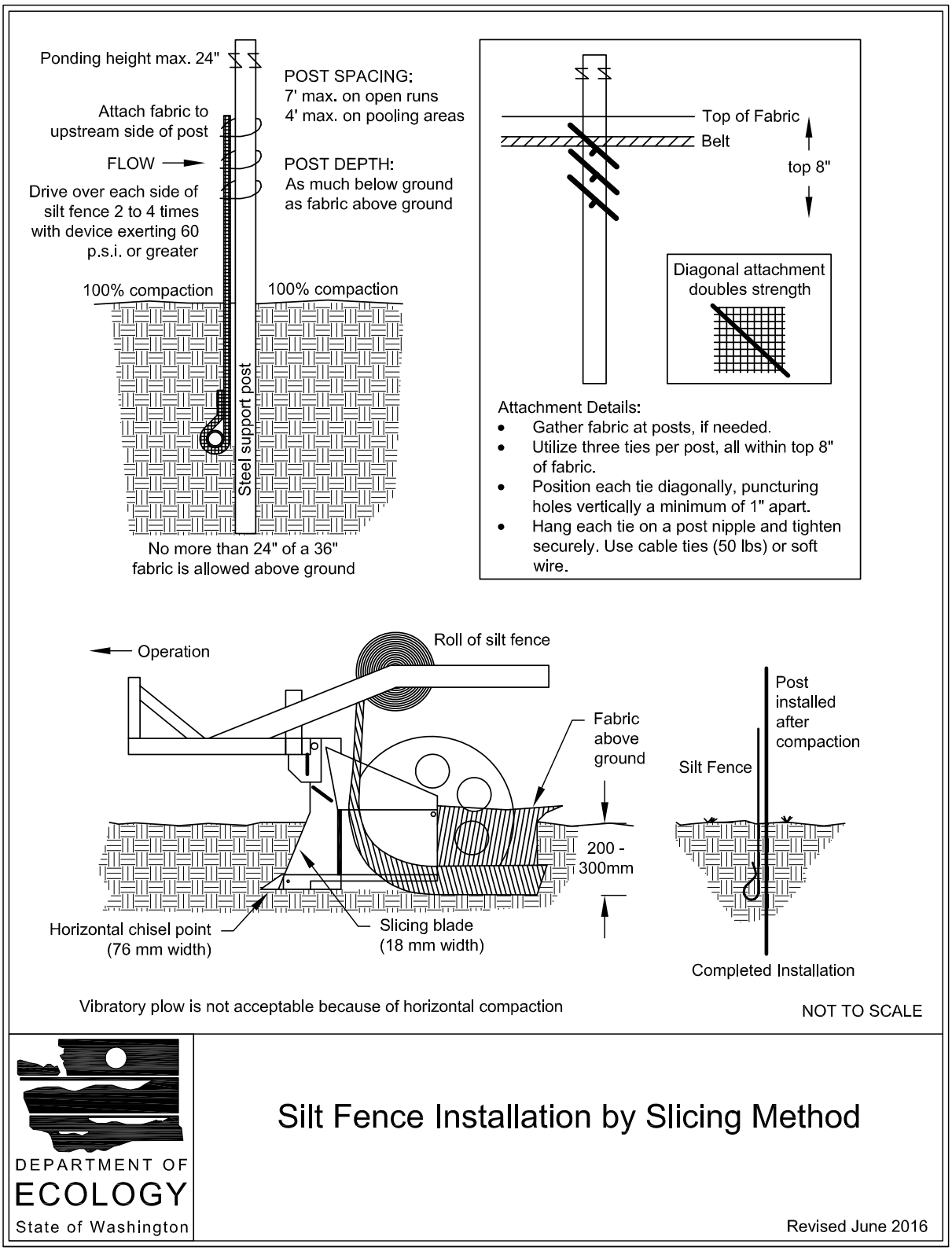
2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
3. The silt fence shall have a 2-foot min. and a 2.5-feet max. height above the original ground surface.
4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
5. Attach the geotextile fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.
6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the geotextile fabric up-slope of the mesh.
7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.
8. Bury the bottom of the geotextile fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.
9. Drive or place the silt fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of one of the following:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.

- Other steel posts having equivalent strength and bending resistance to the post sizes listed above.

11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.
    - Check dams shall be approximately 1 foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-4.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:
    1. The base of both end posts must be at least 2 to 4 inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.
    3. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6 inches of the geotextile fabric around the end posts and secure with 3 ties.
    7. No more than 24 inches of a 36 inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck the fabric deeper into the ground if necessary.

Figure II-4.23: Silt Fence Installation by Slicing Method



Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment trapping BMP.
- Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C234: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to BMP C241: Sediment Pond (Temporary) or other sediment trapping BMP. The only circumstance in which overland flow can be treated solely by a vegetated strip, rather than by a sediment trapping BMP, is when the following criteria are met (see Table II-4.13: Contributing Drainage Area for Vegetated Strips):

Table II-4.13: Contributing Drainage Area for Vegetated Strips

Average Contributing Area Slope	Average Contributing Area Percent Slope	Maximum Contributing Area Flowpath Length
1.5H : 1V or flatter	67% or flatter	100 feet
2H : 1V or flatter	50% or flatter	115 feet
4H : 1V or flatter	25% or flatter	150 feet
6H : 1V or flatter	16.7% or flatter	200 feet
10H : 1V or flatter	10% or flatter	250 feet

BMP C241: Sediment Pond (Temporary)

Purpose

Sediment ponds are temporary ponds used during construction to remove sediment from runoff originating from disturbed areas of the project site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use

- Use a sediment pond where the contributing drainage area to the pond is 3 acres or more. Ponds must be used in conjunction with other Construction Stormwater BMPs to reduce the amount of sediment flowing into the pond. For drainage areas smaller than 3 acres, use the guidance in BMP C240: Sediment Trap.
- Do not install sediment ponds on sites where failure of the BMP would result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment ponds are attractive to children and can be dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, show the type of fence and its location on the drawings in the Construction SWPPP.
- Sediment ponds that can impound 10 acre-ft (435,600 cu-ft, or 3.26 million gallons) or more are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC). See BMP D.1: Detention Ponds for more information regarding dam safety considerations for detention ponds.
- Projects that are constructing permanent Flow Control BMPs or Runoff Treatment BMPs that use ponding for treatment may use the rough-graded or final-graded permanent BMP footprint for the temporary sediment pond. When permanent BMP footprints are used as temporary sediment ponds, the surface area requirement of the temporary sediment pond must be met. If the surface area requirement of the sediment pond is larger than the surface area of the permanent BMP, then the sediment pond shall be enlarged beyond the permanent BMP footprint to comply with the surface area requirement.

  The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the temporary sediment pond from the surface or by pumping. Alternatively, the permanent control structure may be used if it is temporarily modified by plugging any outlet holes below the riser. The permanent control structure must be installed as part of the permanent BMP after the site is fully stabilized.

Design and Installation Specifications

General

- See Figure II-4.28: Sediment Pond Plan View, Figure II-4.29: Sediment Pond Cross Section, and Figure II-4.30: Sediment Pond Riser Detail for details.

- Use of permanent infiltration BMP footprints for temporary sediment ponds during construction tends to clog the soils and reduce their capacity to infiltrate. If permanent infiltration BMP footprints are used, the sides and bottom of the temporary sediment pond must only be rough excavated to a minimum of 2 feet above final grade of the permanent infiltration BMP. Final grading of the permanent infiltration BMP shall occur only when all contributing drainage areas are fully stabilized. Any proposed permanent pretreatment BMP prior to the infiltration BMP should be fully constructed and used with the temporary sediment pond to help prevent clogging of the soils.

  See II-2.13 Element 13: Protect Infiltration BMPs for more information about protecting permanent infiltration BMPs.

- The pond shall be divided into two roughly equal volume cells by a permeable divider that will reduce turbulence while allowing movement of water between the cells. The divider shall be at least one-half the height of the riser, and at least one foot below the top of the riser. Wire-backed, 2 to 3 foot high, high strength geotextile fabric supported by treated 4x4s can be used as a divider. Alternatively, staked straw bales wrapped with geotextile fabric may be used. If the pond is more than 6 feet deep, a different divider design must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent erosion under and around the divider.
- The most common structural failure of sediment ponds is caused by piping. Piping refers to two phenomena:

  1. Water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and,
  2. Water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.

  The most critical construction practices to prevent piping are:

  - Tight connections between the riser and outlet pipe, and other pipe connections.
  - Adequate anchoring of the riser.
  - Proper soil compaction of the embankment and riser footing.
  - Proper construction of anti-seep devices.

Sediment Pond Geometry

To determine the sediment pond geometry, first calculate the design surface area (SA) of the pond, measured at the top of the riser pipe. Use the following equation:

$$SA = 2 \times Q_2/0.00096$$

or

2,080 square feet per cfs of inflow

where:

SA = design surface area of the pond (sf)

Q_2 = Peak volumetric flow rate (cfs)

See BMP C240: Sediment Trap for more information on the above equation.

The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area SA (from the equation above) at the top of the riser.
- Minimum 3.5 foot depth from the top of the riser to the bottom of the pond.
- Maximum 3H:1V interior side slopes and maximum 2H:1V exterior slopes. The interior slopes can be increased to a maximum of 2H:1V if fencing is provided at or above the maximum water surface.
- One foot of freeboard between the top of the riser and the crest of the emergency spillway.
- Flat bottom.
- Minimum 1 foot deep spillway.
- Length-to-width ratio between 3:1 and 6:1.

Sediment Pond Discharge

The outlet for the pond consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing drainage area for a 100-year storm. If, due to site conditions and basin geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. Base the runoff calculations on the site conditions during construction. The flow through the dewatering orifice cannot be utilized when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

The principal spillway designed by the procedures described below will result in some reduction in the peak rate of runoff. However, the design will not control the discharge flow rates to the extent required to comply with I-3.4.7 MR7: Flow Control. The size of the contributing basin, the expected life of the construction project, the anticipated downstream effects, and the anticipated weather conditions during construction should be considered to determine the need for additional discharge control.

Principal Spillway: Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the peak volumetric flow rate using a 15-minute time step from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Use Figure II-4.31: Riser Inflow Curves to determine the riser diameter.

To aid in determining sediment depth, 1 foot intervals shall be prominently marked on the riser.

Emergency Overflow Spillway: Size the emergency overflow spillway for the peak volumetric flow rate using a 10-minute time step from a Type 1A, 100-year, 24-hour frequency storm for the

developed condition. See BMP D.1: Detention Ponds for additional guidance for Emergency Overflow Spillway design

Dewatering Orifice: Size the dewatering orifice(s) (minimum 1-inch diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

$$A_o = \frac{A_s * (2h)^{0.5}}{0.6 * 3600 * T * g^{0.5}}$$

where:

A_o = orifice area (square feet)

A_s = pond surface area (square feet)

h = head of water above orifice (height of riser in feet)

T = dewatering time (24 hours)

g = acceleration of gravity (32.2 feet/second^2)

Convert the orifice area (in square feet) to the orifice diameter D (in inches):

$$D = 24 \times \sqrt{\frac{A_o}{\pi}} = 13.54 \times \sqrt{A_o}$$

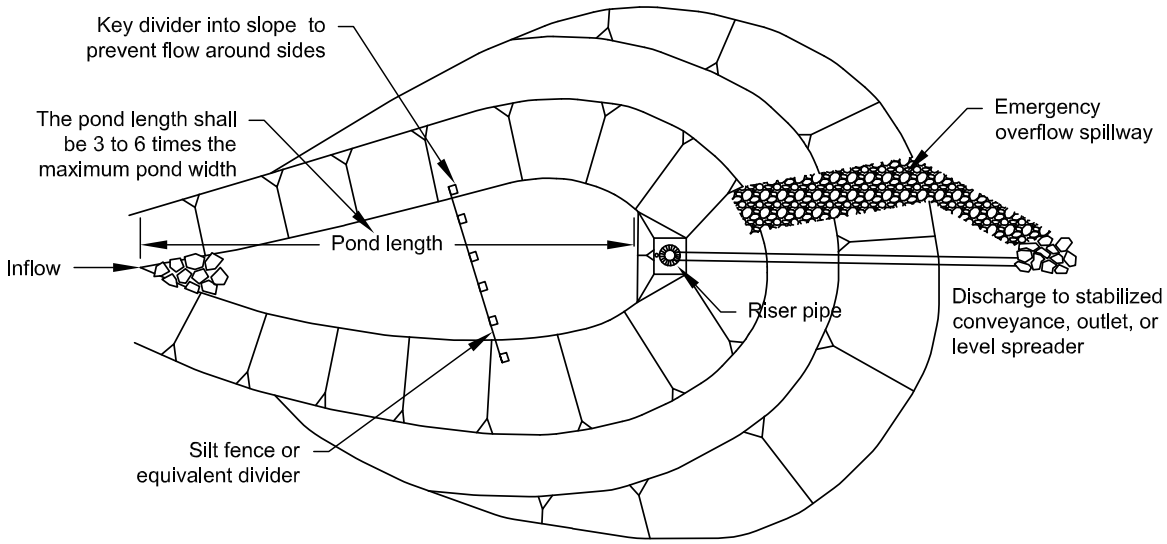
where:

D = orifice diameter (inches)

A_o = orifice area (sf)

The vertical, perforated tubing connected to the dewatering orifice must be at least 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

Figure II-4.28: Sediment Pond Plan View



Note: Pond may be formed by berm or by partial or complete excavation

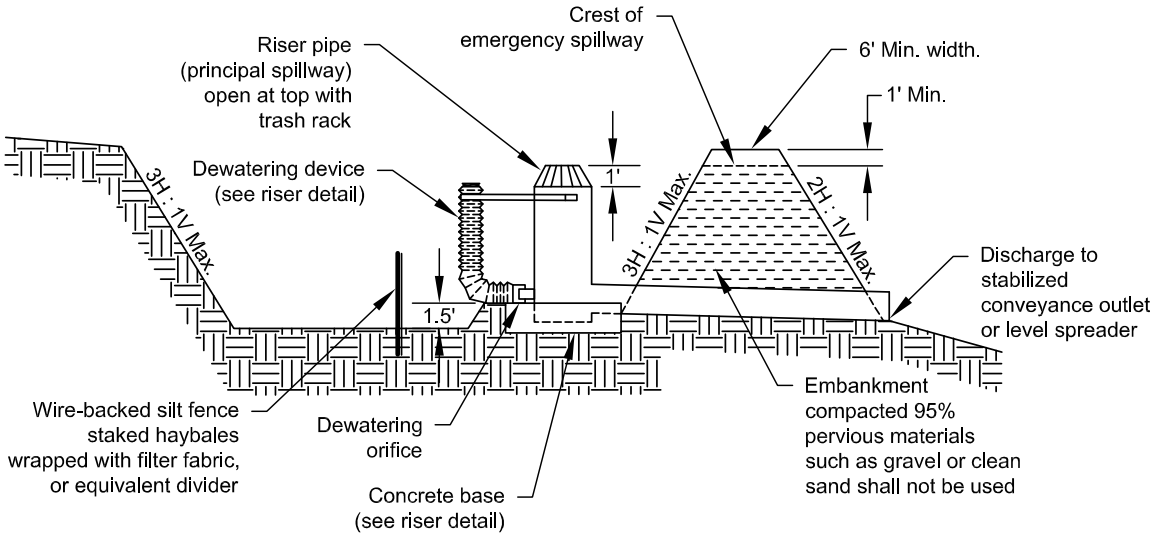
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Sediment Pond Plan View

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Figure II-4.29: Sediment Pond Cross Section



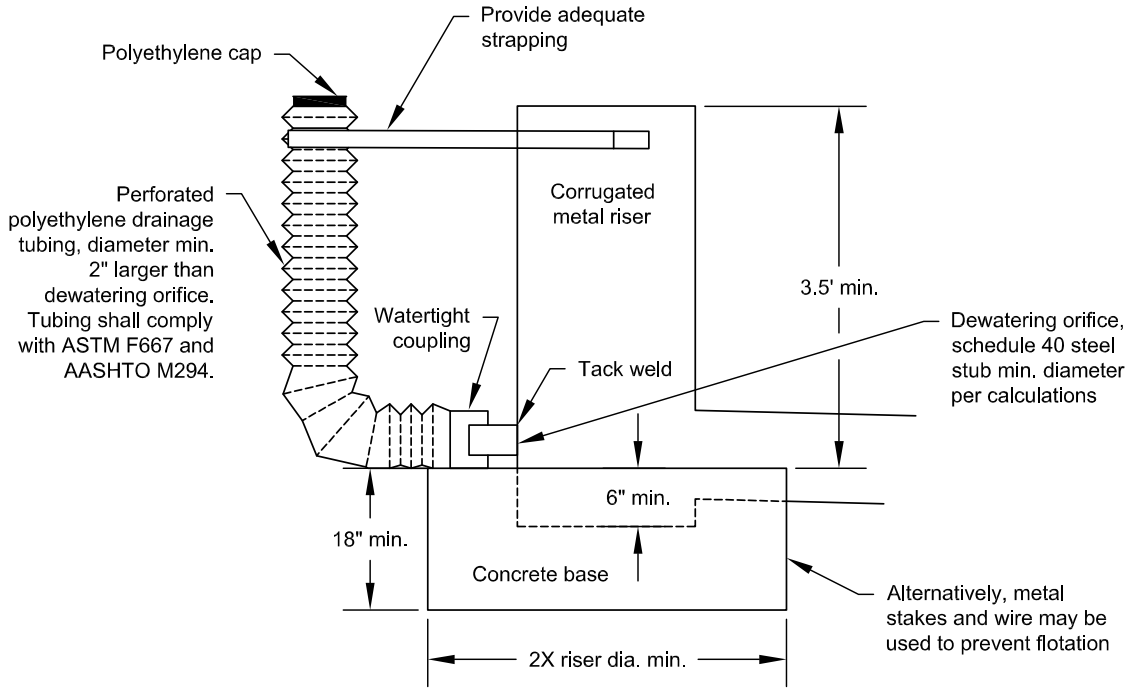
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Sediment Pond Cross Section

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Figure II-4.30: Sediment Pond Riser Detail



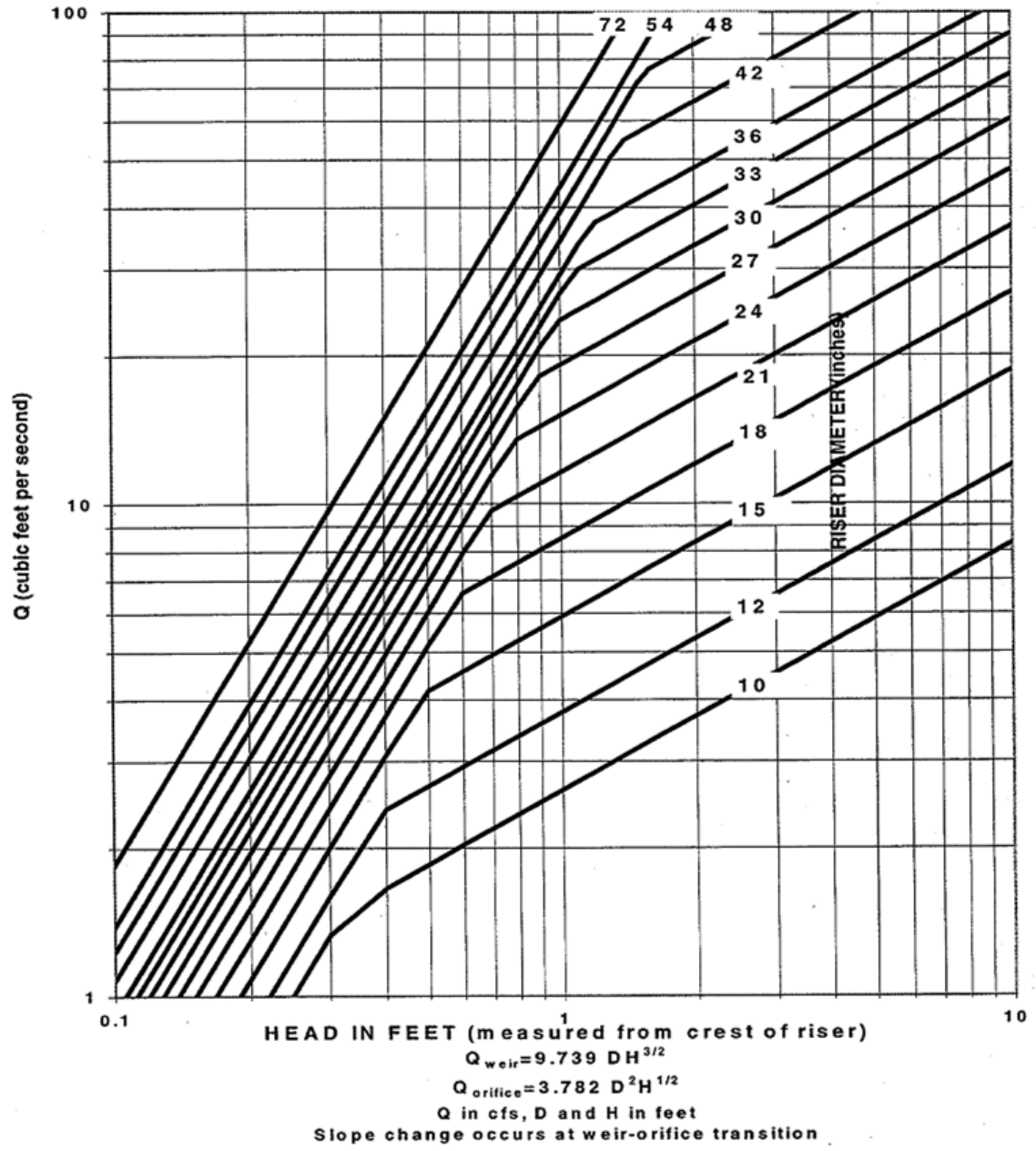
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Sediment Pond Riser Detail

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Figure II-4.31: Riser Inflow Curves



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Riser Inflow Curves

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Maintenance Standards

- Remove sediment from the pond when it reaches 1 foot in depth.
- Repair any damage to the pond embankments or slopes.

BMP C250: Construction Stormwater Chemical Treatment

Purpose

This BMP applies when using chemicals to treat turbidity in stormwater by either batch or flow-through chemical treatment.

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. BMP C241: Sediment Pond (Temporary) is effective at removing larger particulate matter by gravity settling, but is ineffective at removing smaller particulates such as clay and fine silt. Traditional Construction Stormwater BMPs may not be adequate to ensure compliance with the water quality standards for turbidity in the receiving water.

Chemical treatment can reliably provide exceptional reductions of turbidity and associated pollutants. Chemical treatment may be required to meet turbidity stormwater discharge requirements, especially when construction proceeds through the wet season.

Conditions of Use

Formal written approval from Ecology is required for the use of chemical treatment, regardless of site size. See Ecology's Request for Chemical Treatment form at the following web address:

https://fortress.wa.gov/ecy/publications/SummaryPages/ecy070258.html

The Local Permitting Authority may also require review and approval. When authorized, the chemical treatment systems must be included in the Construction Stormwater Pollution Prevention Plan (SWPPP).

Chemically treated stormwater discharged from construction sites must be nontoxic to aquatic organisms. The Chemical Technology Assessment Protocol - Ecology (CTAPE) must be used to evaluate chemicals proposed for stormwater treatment. Only chemicals approved by Ecology under the CTAPE may be used for stormwater treatment. The approved chemicals, their allowable application techniques (batch treatment or flow-through treatment), allowable application rates, and conditions of use can be found at Ecology's Emerging Technologies website:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Background on Chemical Treatment Systems

Coagulation and flocculation have been used for over a century to treat water. The use of coagulation and flocculation to treat stormwater is a very recent application. Experience with the

APPENDIX C
SITE INSPECTION FORMS (AND SITE LOG)

Stormwater/Erosion Control Inspection Form								
DATE:			TIME:			CONTACT:		
SITE:						ACRES:		
LOCATION:								
WEATHER:								
PERMIT ON SITE			PERMIT NO.					
SWPPP ON SITE			CONTRACTOR:					
Best Management Practices in the SWPPP:								
Control BMPs	In Plan	Properly installed	Treatment BMPs	In Plan		Properly Installed		Other:
Preserv Nat Veg			Intercept Dike/Swale					
Buffer Zones			Grass Lines Swales					
High Vis Fence			Channel Lining					
Stake & Wire Fence			Water bars					
Stabilized Entrance			Pipe Slope Drains					
Wheel Wash			Subsurface Drains					
Road/Pk Area Stable			Level Spreader					
Temp/Perm Seeding			Check Dams					
Mulching			Triangular Silt Dike					
Nets/Blankets			Outlet Protection					
Plastic Covering			Sto Drain Inlet Protec					
Sodding			Straw Bale Barrier					
Topsoiling			Brush Barrier					
Polyacrylamides			Gravel Filter Berm					
Surface roughing			Silt Fence					
Gradient Terraces			Vegetated Strip					
Dust Control			Straw Wattles					
Materials On Hand			Sediment trap					
Concrete Handling			Temp Sed Pond					
Sawcut & Surface			SW Chem Treatment					
Erosion Control Lead			SW Filtration					
Pay Erosion Work			Is the site stabilized?		Partially			
Scheduling			Turbid Water is being discharged?					
Small Project			Receiving Water:					
Water Quality Samples Taken?			Results:	pH	TUR	CON	TEM	Other:
Sample ID:			LOC:					
Sample ID:			LOC:					
Sample ID:			LOC:					
This site is IN/OUT of compliance with the terms of the SWPPP & Permit.								
Summary of remedial action(if needed):								
I certify under penalty of law that this report is true, accurate and complete, to the best of my knowledge and belief.								
Name:			Title:					
Signature:								

APPENDIX D
CONSTRUCTION STORMWATER GENERAL PERMIT

Issuance Date: November 18, 2020
Effective Date: January 1, 2021
Expiration Date: December 31, 2025

CONSTRUCTION STORMWATER GENERAL PERMIT

National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity

State of Washington
Department of Ecology
Olympia, Washington 98504

In compliance with the provisions of
Chapter 90.48 Revised Code of Washington
(State of Washington Water Pollution Control Act)
and
Title 33 United States Code, Section 1251 et seq.
The Federal Water Pollution Control Act (The Clean Water Act)

Until this permit expires, is modified, or revoked, Permittees that have properly obtained coverage under this general permit are authorized to discharge in accordance with the special and general conditions that follow.



Vincent McGowan, P.E.
Water Quality Program Manager
Washington State Department of Ecology

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SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions within this permit for additional submittal requirements. Appendix A provides a list of definitions. Appendix B provides a list of acronyms.

Table 1 Summary of Required Submittals

Permit Section	Submittal	Frequency	First Submittal Date
S5.A and S8	High Turbidity/Transparency Phone Reporting	As Necessary	Within 24 hours
S5.B	Discharge Monitoring Report	Monthly*	Within 15 days following the end of each month
S5.F and S8	Noncompliance Notification – Telephone Notification	As necessary	Within 24 hours
S5.F	Noncompliance Notification – Written Report	As necessary	Within 5 Days of non-compliance
S9.D	Request for Chemical Treatment Form	As necessary	Written approval from Ecology is required prior to using chemical treatment (with the exception of dry ice, CO_2 or food grade vinegar to adjust pH)
G2	Notice of Change in Authorization	As necessary	
G6	Permit Application for Substantive Changes to the Discharge	As necessary	
G8	Application for Permit Renewal	1/permit cycle	No later than 180 days before expiration
S2.A	Notice of Permit Transfer	As necessary	
G19	Notice of Planned Changes	As necessary	
G21	Reporting Anticipated Non-compliance	As necessary	

NOTE: *Permittees must submit electronic Discharge Monitoring Reports (DMRs) to the Washington State Department of Ecology monthly, regardless of site discharge, for the full duration of permit coverage. Refer to Section S5.B of this General Permit for more specific information regarding DMRs.

Table 2 Summary of Required On-site Documentation

Document Title	Permit Conditions
Permit Coverage Letter	See Conditions S2, S5
Construction Stormwater General Permit (CSWGP)	See Conditions S2, S5
Site Log Book	See Conditions S4, S5
Stormwater Pollution Prevention Plan (SWPPP)	See Conditions S5, S9
Site Map	See Conditions S5, S9

SPECIAL CONDITIONS

S1. PERMIT COVERAGE

A. Permit Area

This Construction Stormwater General Permit (CSWGP) covers all areas of Washington State, except for federal operators and Indian Country as specified in Special Condition S1.E.3 and 4.

B. Operators Required to Seek Coverage Under this General Permit

1. Operators of the following construction activities are required to seek coverage under this CSWGP:

    a. Clearing, grading and/or excavation that results in the disturbance of one or more acres (including off-site disturbance acreage related to construction-support activity as authorized in S1.C.2) and discharges stormwater to surface waters of the State; and clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more and discharge stormwater to surface waters of the State.

        i. This category includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, and discharge to surface waters of the State (that is, forest practices that prepare a site for construction activities); and

    b. Any size construction activity discharging stormwater to waters of the State that the Washington State Department of Ecology (Ecology):

        i. Determines to be a significant contributor of pollutants to waters of the State of Washington.

        ii. Reasonably expects to cause a violation of any water quality standard.

2. Operators of the following activities are not required to seek coverage under this CSWGP (unless specifically required under Special Condition S1.B.1.b, above):

    a. Construction activities that discharge all stormwater and non-stormwater to groundwater, sanitary sewer, or combined sewer, and have no point source discharge to either surface water or a storm sewer system that drains to surface waters of the State.

    b. Construction activities covered under an Erosivity Waiver (Special Condition S1.F).

    c. Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

C. Authorized Discharges

1. ***Stormwater Associated with Construction Activity.*** Subject to compliance with the terms and conditions of this permit, Permittees are authorized to discharge stormwater associated with construction activity to surface waters of the State or to a storm sewer system that drains to surface waters of the State. (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.)

2. ***Stormwater Associated with Construction Support Activity.*** This permit also authorizes stormwater discharge from support activities related to the permitted construction site (for example, an on-site portable rock crusher, off-site equipment staging yards, material storage areas, borrow areas, etc.) provided:

    a. The support activity relates directly to the permitted construction site that is required to have an NPDES permit; and

    b. The support activity is not a commercial operation serving multiple unrelated construction projects, and does not operate beyond the completion of the construction activity; and

    c. Appropriate controls and measures are identified in the Stormwater Pollution Prevention Plan (SWPPP) for the discharges from the support activity areas.

3. ***Non-Stormwater Discharges.*** The categories and sources of non-stormwater discharges identified below are authorized conditionally, provided the discharge is consistent with the terms and conditions of this permit:

    a. Discharges from fire-fighting activities.

    b. Fire hydrant system flushing.

    c. Potable water, including uncontaminated water line flushing.

    d. Hydrostatic test water.

    e. Uncontaminated air conditioning or compressor condensate.

    f. Uncontaminated groundwater or spring water.

    g. Uncontaminated excavation dewatering water (in accordance with S9.D.10).

    h. Uncontaminated discharges from foundation or footing drains.

    i. Uncontaminated or potable water used to control dust. Permittees must minimize the amount of dust control water used.

    j. Routine external building wash down that does not use detergents.

    k. Landscape irrigation water.

The SWPPP must adequately address all authorized non-stormwater discharges, except for discharges from fire-fighting activities, and must comply with Special Condition S3. At a minimum, discharges from potable water (including water line flushing), fire hydrant system flushing, and pipeline hydrostatic test water must undergo the following: dechlorination to a concentration of 0.1 parts per million (ppm) or less, and pH adjustment to within 6.5 – 8.5 standard units (su), if necessary.

D. Prohibited Discharges

The following discharges to waters of the State, including groundwater, are prohibited:

1. Concrete wastewater

2. Wastewater from washout and clean-up of stucco, paint, form release oils, curing compounds and other construction materials.

3. Process wastewater as defined by 40 Code of Federal Regulations (CFR) 122.2 (See Appendix A of this permit).

4. Slurry materials and waste from shaft drilling, including process wastewater from shaft drilling for construction of building, road, and bridge foundations unless managed according to Special Condition S9.D.9.j.

5. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.

6. Soaps or solvents used in vehicle and equipment washing.

7. Wheel wash wastewater, unless managed according to Special Condition S9.D.9.

8. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed according to Special Condition S9.D.10.

E. Limits on Coverage

Ecology may require any discharger to apply for and obtain coverage under an individual permit or another more specific general permit. Such alternative coverage will be required when Ecology determines that this CSWGP does not provide adequate assurance that water quality will be protected, or there is a reasonable potential for the project to cause or contribute to a violation of water quality standards.

The following stormwater discharges are not covered by this permit:

1. Post-construction stormwater discharges that originate from the site after completion of construction activities and the site has undergone final stabilization.

2. Non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance, from which there is natural runoff as excluded in 40 CFR Subpart 122.

3. Stormwater from any federal operator.

4. Stormwater from facilities located on ***Indian Country*** as defined in 18 U.S.C.§1151, except portions of the Puyallup Reservation as noted below.

   Indian Country includes:

   a. All land within any Indian Reservation notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation.

   b. All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

   c. All off-reservation federal trust lands held for Native American Tribes.

Puyallup Exception: Following the *Puyallup Tribes of Indians Land Settlement Act of 1989*, 25 U.S.C. §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.

5. Stormwater from any site covered under an existing NPDES individual permit in which stormwater management and/or treatment requirements are included for all stormwater discharges associated with construction activity.

6. Stormwater from a site where an applicable Total Maximum Daily Load (TMDL) requirement specifically precludes or prohibits discharges from construction activity.

F. Erosivity Waiver

Construction site operators may qualify for an Erosivity Waiver from the CSWGP if the following conditions are met:

1. The site will result in the disturbance of fewer than five (5) acres and the site is not a portion of a common plan of development or sale that will disturb five (5) acres or greater.

2. Calculation of Erosivity "R" Factor and Regional Timeframe:

    a. The project's calculated rainfall erosivity factor ("R" Factor) must be less than five (5) during the period of construction activity, (See the CSWGP homepage http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html for a link to the EPA's calculator and step by step instructions on computing the "R" Factor in the *EPA Erosivity Waiver Fact Sheet*). The period of construction activity starts when the land is first disturbed and ends with final stabilization. In addition:

    b. The entire period of construction activity must fall within the following timeframes:

        i. For sites west of the Cascades Crest: June 15 – September 15.

        ii. For sites east of the Cascades Crest, excluding the Central Basin: June 15 – October 15.

        iii. For sites east of the Cascades Crest, within the Central Basin: no timeframe restrictions apply. The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches. For a map of the Central Basin (Average Annual Precipitation Region 2), refer to: http://www.ecy.wa.gov/programs/wq/stormwater/construction/resourcesguidance.html.

3. Construction site operators must submit a complete Erosivity Waiver certification form at least one week before disturbing the land. Certification must include statements that the operator will:

    a. Comply with applicable local stormwater requirements; and

    b. Implement appropriate erosion and sediment control BMPs to prevent violations of water quality standards.

4. This waiver is not available for facilities declared significant contributors of pollutants as defined in Special Condition S1.B.1.b or for any size construction activity that could

reasonably expect to cause a violation of any water quality standard as defined in Special Condition S1.B.1.b.ii.

5. This waiver does not apply to construction activities which include non-stormwater discharges listed in Special Condition S1.C.3.

6. If construction activity extends beyond the certified waiver period for any reason, the operator must either:

    a. Recalculate the rainfall erosivity "R" factor using the original start date and a new projected ending date and, if the "R" factor is still under 5 *and* the entire project falls within the applicable regional timeframe in Special Condition S1.F.2.b, complete and submit an amended waiver certification form before the original waiver expires; *or*

    b. Submit a complete permit application to Ecology in accordance with Special Condition S2.A and B before the end of the certified waiver period.

S2. APPLICATION REQUIREMENTS

A. Permit Application Forms

1. *Notice of Intent Form*

a. Operators of new or previously unpermitted construction activities must submit a complete and accurate permit application (Notice of Intent, or NOI) to Ecology.

b. Operators must apply using the electronic application form (NOI) available on Ecology's website (http://ecy.wa.gov/programs/wq/stormwater/construction/index.html). Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

> Department of Ecology
> Water Quality Program - Construction Stormwater
> PO Box 47696
> Olympia, Washington 98504-7696

c. The operator must submit the NOI at least 60 days before discharging stormwater from construction activities and must submit it prior to the date of the first public notice (See Special Condition S2.B, below, for details). The 30-day public comment period begins on the publication date of the second public notice. Unless Ecology responds to the complete application in writing, coverage under the general permit will automatically commence on the 31st day following receipt by Ecology of a *completed* NOI, or the issuance date of this permit, whichever is later; unless Ecology specifies a later date in writing as required by WAC173-226-200(2). See S8.B for Limits on Coverage for New Discharges to TMDL or 303(d)-Listed Waters.

d. If an applicant intends to use a Best Management Practice (BMP) selected on the basis of Special Condition S9.C.4 ("demonstrably equivalent" BMPs), the applicant must notify Ecology of its selection as part of the NOI. In the event the applicant selects BMPs after submission of the NOI, the applicant must provide notice of the

selection of an equivalent BMP to Ecology at least 60 days before intended use of the equivalent BMP.

e. Applicants must notify Ecology if they are aware of contaminated soils and/or groundwater associated with the construction activity. Provide detailed information with the NOI (as known and readily available) on the nature and extent of the contamination (concentrations, locations, and depth), as well as pollution prevention and/or treatment BMPs proposed to control the discharge of soil and/or groundwater contaminants in stormwater. Examples of such detail may include, but are not limited to:

   i. List or table of all known contaminants with laboratory test results showing concentration and depth,

   ii. Map with sample locations,

   iii. Related portions of the Stormwater Pollution Prevention Plan (SWPPP) that address the management of contaminated and potentially contaminated construction stormwater and dewatering water,

   iv. Dewatering plan and/or dewatering contingency plan.

2. ***Transfer of Coverage Form***

The Permittee can transfer current coverage under this permit to one or more new operators, including operators of sites within a Common Plan of Development, provided:

   i. The Permittee submits a complete Transfer of Coverage Form to Ecology, signed by the current and new discharger and containing a specific date for transfer of permit responsibility, coverage and liability (including any Administrative Orders associated with the permit); and

   ii. Ecology does not notify the current discharger and new discharger of intent to revoke coverage under the general permit. If this notice is not given, the transfer is effective on the date specified in the written agreement.

When a current discharger (Permittee) transfers a portion of a permitted site, the current discharger must also indicate the remaining permitted acreage after the transfer. Transfers do not require public notice.

3. ***Modification of Coverage Form***

Permittees must notify Ecology regarding any changes to the information provided on the NOI by submitting an Update/Modification of Permit Coverage form in accordance with General Conditions G6 and G19. Examples of such changes include, but are not limited to:

   i. Changes to the Permittee's mailing address,

   ii. Changes to the on-site contact person information, and

   iii. Changes to the area/acreage affected by construction activity.

B. Public Notice

For new or previously unpermitted construction activities, the applicant must publish a public notice at least one time each week for two consecutive weeks, at least 7 days apart, in a newspaper with general circulation in the county where the construction is to take place. The notice must be run after the NOI has been submitted and must contain:

1. A statement that "*The applicant is seeking coverage under the Washington State Department of Ecology's Construction Stormwater NPDES and State Waste Discharge General Permit*."
2. The name, address, and location of the construction site.
3. The name and address of the applicant.
4. The type of construction activity that will result in a discharge (for example, residential construction, commercial construction, etc.), and the total number of acres to be disturbed over the lifetime of the project.
5. The name of the receiving water(s) (that is, the surface water(s) to which the site will discharge), or, if the discharge is through a storm sewer system, the name of the operator of the system and the receiving water(s) the system discharges to.
6. The statement: *Any persons desiring to present their views to the Washington State Department of Ecology regarding this application, or interested in Ecology's action on this application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173-201A-320. Comments can be submitted to: Department of Ecology, PO Box 47696, Olympia, Washington 98504-7696 Attn: Water Quality Program, Construction Stormwater*.

S3. COMPLIANCE WITH STANDARDS

A. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), groundwater quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the Federal water quality criteria applicable to Washington. (40 CFR Part 131.45) Discharges that are not in compliance with these standards are prohibited.

B. Prior to the discharge of stormwater and non-stormwater to waters of the State, the Permittee must apply All Known, Available, and Reasonable methods of prevention, control, and Treatment (AKART). This includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

C. Ecology presumes that a Permittee complies with water quality standards unless discharge monitoring data or other site-specific information demonstrates that a discharge causes or contributes to a violation of water quality standards, when the Permittee complies with the following conditions. The Permittee must fully:

1. Comply with all permit conditions, including; planning, sampling, monitoring, reporting, and recordkeeping conditions.

2. Implement stormwater BMPs contained in stormwater management manuals published or approved by Ecology, or BMPs that are demonstrably equivalent to BMPs contained in stormwater management manuals published or approved by Ecology, including the proper selection, implementation, and maintenance of all applicable and appropriate BMPs for on-site pollution control. (For purposes of this section, the stormwater manuals listed in Appendix 10 of the *Phase I Municipal Stormwater Permit* are approved by Ecology.)

D. Where construction sites also discharge to groundwater, the groundwater discharges must also meet the terms and conditions of this CSWGP. Permittees who discharge to groundwater through an injection well must also comply with any applicable requirements of the Underground Injection Control (UIC) regulations, Chapter 173-218 WAC.

S4. MONITORING REQUIREMENTS, BENCHMARKS, AND REPORTING TRIGGERS

A. Site Log Book

The Permittee must maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements, including the installation and maintenance of BMPs, site inspections, and stormwater monitoring.

B. Site Inspections

Construction sites one (1) acre or larger that discharge stormwater to surface waters of the State must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Sites less than one (1) acre may have a person without CESCL certification conduct inspections. (See Special Conditions S4.B.3 and B.4, below, for detailed requirements of the Permittee's CESCL.)

Site inspections must include all areas disturbed by construction activities, all BMPs, and all stormwater discharge points under the Permittee's operational control.

1. The Permittee must have staff knowledgeable in the principles and practices of erosion and sediment control. The CESCL (sites one acre or more) or inspector (sites less than one acre) must have the skills to assess the:

    a. Site conditions and construction activities that could impact the quality of stormwater; and

    b. Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. The SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times. The CESCL (sites one (1) acre or more) must obtain this certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology. (See BMP C160 in the manual, referred to in Special Condition S9.C.1 and 2.)

2. The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. BMP effectiveness must be evaluated to

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, the Permittee must correct the problems identified, by:

a. Reviewing the SWPPP for compliance with Special Condition S9 and making appropriate revisions within 7 days of the inspection.

b. Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs, within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.

c. Documenting BMP implementation and maintenance in the site log book.

3. 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 (1) day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one (1) inspection is required that week.) Inspection frequency may be reduced to once every calendar month for inactive sites that are temporarily stabilized.

4. The Permittee must summarize the results of each inspection in an inspection report or checklist and enter the report/checklist into, or attach it to, the site log book. At a minimum, each inspection report or checklist must include:

   a. Inspection date and time.

   b. Weather information.

   c. The general conditions during inspection.

   d. The approximate amount of precipitation since the last inspection.

   e. The approximate amount of precipitation within the last 24 hours.

   f. A summary or list of all implemented BMPs, including observations of all erosion/sediment control structures or practices.

   g. A description of:

      i. BMPs inspected (including location).

      ii. BMPs that need maintenance and why.

      iii. BMPs that failed to operate as designed or intended, and

      iv. Where additional or different BMPs are needed, and why.

   h. A description of stormwater discharged from the site. The Permittee must note the presence of suspended sediment, turbidity, discoloration, and oil sheen, as applicable.

i. Any water quality monitoring performed during inspection.

j. General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made following the inspection.

k. An implementation schedule for the remedial actions that the Permittee plans to take if the site inspection indicates that the site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.

l. A summary report of the inspection.

m. The name, title, and signature of the person conducting the site inspection, a phone number or other reliable method to reach this person, and the following statement: *I certify that this report is true, accurate, and complete to the best of my knowledge and belief.*

Table 3 Summary of Primary Monitoring Requirements

Size of Soil Disturbance[1]	Weekly Site Inspections	Weekly Sampling w/ Turbidity Meter	Weekly Sampling w/ Transparency Tube	Weekly pH Sampling[2]	CESCL Required for Inspections?
Sites that disturb less than 1 acre, but are part of a larger Common Plan of Development	Required	Not Required	Not Required	Not Required	No
Sites that disturb 1 acre or more, but fewer than 5 acres	Required	Sampling Required – either method[3]		Required	Yes
Sites that disturb 5 acres or more	Required	Required	Not Required[4]	Required	Yes

[1] Soil disturbance is calculated by adding together all areas that will be affected by construction activity. Construction activity means clearing, grading, excavation, and any other activity that disturbs the surface of the land, including ingress/egress from the site.

[2] If construction activity results in the disturbance of 1 acre or more, and involves significant concrete work (1,000 cubic yards of concrete or recycled concrete placed or poured over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer stormwater collection system that drains to other surface waters of the State, the Permittee must conduct pH sampling in accordance with Special Condition S4.D.

[3] Sites with one or more acres, but fewer than 5 acres of soil disturbance, must conduct turbidity or transparency sampling in accordance with Special Condition S4.C.4.a or b.

[4] Sites equal to or greater than 5 acres of soil disturbance must conduct turbidity sampling using a turbidity meter in accordance with Special Condition S4.C.4.a.

C. Turbidity/Transparency Sampling Requirements

1. Sampling Methods

    a. If construction activity involves the disturbance of five (5) acres or more, the Permittee must conduct turbidity sampling per Special Condition S4.C.4.a, below.

    b. If construction activity involves one (1) acre or more but fewer than five (5) acres of soil disturbance, the Permittee must conduct either transparency sampling *or* turbidity sampling per Special Condition S4.C.4.a or b, below.

2. Sampling Frequency

    a. The Permittee must sample all discharge points at least once every calendar week when stormwater (or authorized non-stormwater) discharges from the site or enters any on-site surface waters of the state (for example, a creek running through a site); sampling is not required on sites that disturb less than an acre.

    b. Samples must be representative of the flow and characteristics of the discharge.

    c. Sampling is not required when there is no discharge during a calendar week.

    d. Sampling is not required outside of normal working hours or during unsafe conditions.

    e. If the Permittee is unable to sample during a monitoring period, the Permittee must include a brief explanation in the monthly Discharge Monitoring Report (DMR).

    f. Sampling is not required before construction activity begins.

    g. The Permittee may reduce the sampling frequency for temporarily stabilized, inactive sites to once every calendar month.

3. Sampling Locations

    a. Sampling is required at all points where stormwater associated with construction activity (or authorized non-stormwater) is discharged off site, including where it enters any on-site surface waters of the state (for example, a creek running through a site).

    b. The Permittee may discontinue sampling at discharge points that drain areas of the project that are fully stabilized to prevent erosion.

    c. The Permittee must identify all sampling point(s) in the SWPPP and on the site map and clearly mark these points in the field with a flag, tape, stake or other visible marker.

    d. Sampling is not required for discharge that is sent directly to sanitary or combined sewer systems.

    e. The Permittee may discontinue sampling at discharge points in areas of the project where the Permittee no longer has operational control of the construction activity.

4. Sampling and Analysis Methods

   a. The Permittee performs turbidity analysis with a calibrated turbidity meter (turbidimeter) either on site or at an accredited lab. The Permittee must record the results in the site log book in nephelometric turbidity units (NTUs).

   b. The Permittee performs transparency analysis on site with a 1¾ inch diameter, 60 centimeter (cm)-long transparency tube. The Permittee will record the results in the site log book in centimeters (cm).

Table 4 Monitoring and Reporting Requirements

Parameter	Unit	Analytical Method	Sampling Frequency	Benchmark Value
Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs
Transparency	Cm	Manufacturer instructions, or Ecology guidance	Weekly, if discharging	33 cm

5. Turbidity/Transparency Benchmark Values and Reporting Triggers

   The benchmark value for turbidity is 25 NTUs. The benchmark value for transparency is 33 centimeters (cm). Note: Benchmark values do not apply to discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus; these discharges are subject to a numeric effluent limit for turbidity. Refer to Special Condition S8 for more information and follow S5.F – Noncompliance Notification for reporting requirements applicable to discharges which exceed the numeric effluent limit for turbidity.

   a. Turbidity 26 – 249 NTUs, or Transparency 32 – 7 cm:

      If the discharge turbidity is 26 to 249 NTUs; or if discharge transparency is 32 to 7 cm, the Permittee must:

      i. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs, and no later than 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

      ii. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.

      iii. Document BMP implementation and maintenance in the site log book.

   b. Turbidity 250 NTUs or greater, or Transparency 6 cm or less:

      If a discharge point's turbidity is 250 NTUs or greater, or if discharge transparency is less than or equal to 6 cm, the Permittee must complete the reporting and adaptive

management process described below. For discharges which are subject to a numeric effluent limit for turbidity, see S5.F – Noncompliance Notification.

i. Within 24 hours, telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) number (or through Ecology's Water Quality Permitting Portal [WQWebPortal] – Permit Submittals when the form is available), in accordance with Special Condition S5.A.

- **Central Region** (Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton): (509) 575-2490
- **Eastern Region** (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
- **Northwest Region** (Kitsap, Snohomish, Island, King, San Juan, Skagit, Whatcom): (425) 649-7000
- **Southwest Region** (Grays Harbor, Lewis, Mason, Thurston, Pierce, Clark, Cowlitz, Skamania, Wahkiakum, Clallam, Jefferson, Pacific): (360) 407-6300

These numbers and a link to the ERTS reporting page are also listed at the following website: http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html.

ii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

iii. Sample discharges daily until:

a) Turbidity is 25 NTUs (or lower); or

b) Transparency is 33 cm (or greater); or

c) The Permittee has demonstrated compliance with the water quality standard for turbidity:

1) No more than 5 NTUs over background turbidity, if background is less than 50 NTUs, or

2) No more than 10% over background turbidity, if background is 50 NTUs or greater; or

*Note: background turbidity in the receiving water must be measured immediately upstream (upgradient) or outside of the area of influence of the discharge.

d) The discharge stops or is eliminated.

iv. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within seven (7) days of the date the discharge exceeded the benchmark.

v. Document BMP implementation and maintenance in the site log book.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with permit benchmarks.

D. pH Sampling Requirements – Significant Concrete Work or Engineered Soils

If construction activity results in the disturbance of 1 acre or more, *and* involves significant concrete work (significant concrete work means greater than 1000 cubic yards placed or poured concrete or recycled concrete used over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer system that drains to surface waters of the State, the Permittee must conduct pH sampling as set forth below. Note: In addition, discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for high pH are subject to a numeric effluent limit for pH; refer to Special Condition S8.

1. The Permittee must perform pH analysis on site with a calibrated pH meter, pH test kit, or wide range pH indicator paper. The Permittee must record pH sampling results in the site log book.

2. During the applicable pH monitoring period defined below, the Permittee must obtain a representative sample of stormwater and conduct pH analysis at least once per week.

    a. For sites with significant concrete work, the Permittee must begin the pH sampling period when the concrete is first placed or poured and exposed to precipitation, and continue weekly throughout and after the concrete placement, pour and curing period, until stormwater pH is in the range of 6.5 to 8.5 (su).

    b. For sites with recycled concrete where monitoring is required, the Permittee must begin the weekly pH sampling period when the recycled concrete is first exposed to precipitation and must continue until the recycled concrete is fully stabilized with the stormwater pH in the range of 6.5 to 8.5 (su).

    c. For sites with engineered soils, the Permittee must begin the pH sampling period when the soil amendments are first exposed to precipitation and must continue until the area of engineered soils is fully stabilized.

3. The Permittee must sample pH in the sediment trap/pond(s) or other locations that receive stormwater runoff from the area of significant concrete work or engineered soils before the stormwater discharges to surface waters.

4. The benchmark value for pH is 8.5 standard units. Anytime sampling indicates that pH is 8.5 or greater, the Permittee must either:

    a. Prevent the high pH water (8.5 or above) from entering storm sewer systems or surface waters of the state; *or*

    b. If necessary, adjust or neutralize the high pH water until it is in the range of pH 6.5 to 8.5 (su) using an appropriate treatment BMP such as carbon dioxide (CO_2) sparging, dry ice or food grade vinegar. The Permittee must obtain written approval from Ecology before using any form of chemical treatment other than CO_2 sparging, dry ice or food grade vinegar.

S5. REPORTING AND RECORDKEEPING REQUIREMENTS

A. High Turbidity Reporting

Anytime sampling performed in accordance with Special Condition S4.C indicates turbidity has reached the 250 NTUs or more (or transparency less than or equal to 6 cm), high turbidity reporting level, the Permittee must notify Ecology within 24 hours of analysis either by calling the applicable Ecology Region's Environmental Report Tracking System (ERTS) number by phone or by submitting an electronic ERTS report (through Ecology's Water Quality Permitting Portal (WQWebPortal) – Permit Submittals when the form is available). See the CSWGP website for links to ERTS and the WQWebPortal. (http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html) Also, see phone numbers in Special Condition S4.C.5.b.i.

B. Discharge Monitoring Reports (DMRs)

Permittees required to conduct water quality sampling in accordance with Special Conditions S4.C (Turbidity/Transparency), S4.D (pH), S8 (303[d]/TMDL sampling), and/or G12 (Additional Sampling) must submit the results to Ecology.

Permittees must submit monitoring data using Ecology's WQWebDMR web application accessed through Ecology's Water Quality Permitting Portal.

Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper copy DMR at:

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

Permittees who obtain a waiver not to use WQWebDMR must use the forms provided to them by Ecology; submittals must be mailed to the address above. Permittees must submit DMR forms to be received by Ecology within 15 days following the end of each month.

If there was no discharge during a given monitoring period, all Permittees must submit a DMR as required with "no discharge" entered in place of the monitoring results. DMRs are required for the full duration of permit coverage (from the first full month following the effective date of permit coverage up until Ecology has approved termination of the coverage). For more information, contact Ecology staff using information provided at the following website: www.ecy.wa.gov/programs/wq/permits/paris/contacts.html.

C. Records Retention

The Permittee must retain records of all monitoring information (site log book, sampling results, inspection reports/checklists, etc.), Stormwater Pollution Prevention Plan, copy of the permit coverage letter (including Transfer of Coverage documentation) and any other documentation of compliance with permit requirements for the entire life of the construction project and for a minimum of five (5) years following the termination of permit coverage. Such information must include all calibration and maintenance records, and records of all data used to complete the application for this permit. This period of retention must be extended during

the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

D. Recording Results

For each measurement or sample taken, the Permittee must record the following information:

1. Date, place, method, and time of sampling or measurement.
2. The first and last name of the individual who performed the sampling or measurement.
3. The date(s) the analyses were performed.
4. The first and last name of the individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

E. Additional Monitoring by the Permittee

If the Permittee samples or monitors any pollutant more frequently than required by this permit using test procedures specified by Special Condition S4 of this permit, the sampling results for this monitoring must be included in the calculation and reporting of the data submitted in the Permittee's DMR.

F. Noncompliance Notification

In the event the Permittee is unable to comply with any part of the terms and conditions of this permit, and the resulting noncompliance may cause a threat to human health or the environment (such as but not limited to spills or fuels or other materials, catastrophic pond or slope failure, and discharges that violate water quality standards), or exceed numeric effluent limitations (see S8 – Discharges to 303(d) or TMDL Waterbodies), the Permittee must, upon becoming aware of the circumstance:

1. Notify Ecology within 24 hours of the failure to comply by calling the applicable Regional office ERTS phone number (refer to Special Condition S4.C.5.b.i, or go to https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue to find contact information for the regional offices.)
2. Immediately take action to prevent the discharge/pollution, or otherwise stop or correct the noncompliance, and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to Ecology within five (5) days of becoming aware of the violation (See S5.F.3, below, for details on submitting results in a report).
3. Submit a detailed written report to Ecology within five (5) days of the time the Permittee becomes aware of the circumstances, unless requested earlier by Ecology. The report must be submitted using Ecology's Water Quality Permitting Portal (WQWebPortal) – Permit Submittals, unless a waiver from electronic reporting has been granted according to S5.B. The report must contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Permittee must report any unanticipated bypass and/or upset that exceeds any effluent limit in the permit in accordance with the 24-hour reporting requirement contained in 40 C.F.R. 122.41(l)(6).

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply. Upon request of the Permittee, Ecology may waive the requirement for a written report on a case-by-case basis, if the immediate notification is received by Ecology within 24 hours.

G. Access to Plans and Records

1. The Permittee must retain the following permit documentation (plans and records) on site, or within reasonable access to the site, for use by the operator or for on-site review by Ecology or the local jurisdiction:

    a. General Permit

    b. Permit Coverage Letter

    c. Stormwater Pollution Prevention Plan (SWPPP)

    d. Site Log Book

    e. Erosivity Waiver (if applicable)

2. The Permittee must address written requests for plans and records listed above (Special Condition S5.G.1) as follows:

    a. The Permittee must provide a copy of plans and records to Ecology within 14 days of receipt of a written request from Ecology.

    b. The Permittee must provide a copy of plans and records to the public when requested in writing. Upon receiving a written request from the public for the Permittee's plans and records, the Permittee must either:

        i. Provide a copy of the plans and records to the requester within 14 days of a receipt of the written request; *or*

        ii. Notify the requester within 10 days of receipt of the written request of the location and times within normal business hours when the plans and records may be viewed; and provide access to the plans and records within 14 days of receipt of the written request; *or*

            Within 14 days of receipt of the written request, the Permittee may submit a copy of the plans and records to Ecology for viewing and/or copying by the requester at an Ecology office, or a mutually agreed location. If plans and records are viewed and/or copied at a location other than at an Ecology office, the Permittee will provide reasonable access to copying services for which a reasonable fee may be charged. The Permittee must notify the requester within 10 days of receipt of the request where the plans and records may be viewed and/or copied.

S6. PERMIT FEES

The Permittee must pay permit fees assessed by Ecology. Fees for stormwater discharges covered under this permit are established by Chapter 173-224 WAC. Ecology continues to assess permit fees until the permit is terminated in accordance with Special Condition S10 or revoked in accordance with General Condition G5.

S7. SOLID AND LIQUID WASTE DISPOSAL

The Permittee must handle and dispose of solid and liquid wastes generated by construction activity, such as demolition debris, construction materials, contaminated materials, and waste materials from maintenance activities, including liquids and solids from cleaning catch basins and other stormwater facilities, in accordance with:

A. Special Condition S3, Compliance with Standards.

B. WAC 173-216-110.

C. Other applicable regulations.

S8. DISCHARGES TO 303(d) OR TMDL WATERBODIES

A. Sampling and Numeric Effluent Limits For Certain Discharges to 303(d)-Listed Water Bodies

1. Permittees who discharge to segments of water bodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorus, must conduct water quality sampling according to the requirements of this section, and Special Conditions S4.C.2.b-f and S4.C.3.b-d, and must comply with the applicable numeric effluent limitations in S8.C and S8.D.

2. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current listing by Ecology of impaired waters (Category 5) that exists on January 1, 2021, or the date when the operator's complete permit application is received by Ecology, whichever is later.

B. Limits on Coverage for New Discharges to TMDL or 303(d)-Listed Waters

Construction sites that discharge to a TMDL or 303(d)-listed waterbody are not eligible for coverage under this permit *unless* the operator:

1. Prevents exposing stormwater to pollutants for which the waterbody is impaired, and retains documentation in the SWPPP that details procedures taken to prevent exposure on site; *or*

2. Documents that the pollutants for which the waterbody is impaired are not present at the site, and retains documentation of this finding within the SWPPP; *or*

3. Provides Ecology with data indicating the discharge is not expected to cause or contribute to an exceedance of a water quality standard, and retains such data on site with the SWPPP. The operator must provide data and other technical information to Ecology that sufficiently demonstrate:

    a. For discharges to waters without an EPA-approved or -established TMDL, that the discharge of the pollutant for which the water is impaired will meet in-stream water quality criteria at the point of discharge to the waterbody; *or*

    b. For discharges to waters with an EPA-approved or -established TMDL, that there is sufficient remaining wasteload allocation in the TMDL to allow construction stormwater discharge and that existing dischargers to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with water quality standards.

    Operators of construction sites are eligible for coverage under this permit only after Ecology makes an affirmative determination that the *discharge will not cause or contribute to the existing impairment or exceed the TMDL.*

C. Sampling and Numeric Effluent Limits for Discharges to Water Bodies on the 303(d) List for Turbidity, Fine Sediment, or Phosphorus

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus must conduct turbidity sampling in accordance with Special Condition S4.C.2 and comply with either of the numeric effluent limits noted in Table 5 below.

2. As an alternative to the 25 NTUs effluent limit noted in Table 5 below (applied at the point where stormwater [or authorized non-stormwater] is discharged off-site), Permittees may choose to comply with the surface water quality standard for turbidity. The standard is: no more than 5 NTUs over background turbidity when the background turbidity is 50 NTUs or less, or no more than a 10% increase in turbidity when the background turbidity is more than 50 NTUs. In order to use the water quality standard requirement, the sampling must take place at the following locations:

    a. Background turbidity in the 303(d)-listed receiving water immediately upstream (upgradient) or outside the area of influence of the discharge.

    b. Turbidity at the point of discharge into the 303(d)-listed receiving water, inside the area of influence of the discharge**.**

3. Discharges that exceed the numeric effluent limit for turbidity constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit must sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

Table 5 Turbidity, Fine Sediment & Phosphorus Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled	Unit	Analytical Method	Sampling Frequency	Numeric Effluent Limit[1]
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130	Weekly, if discharging	25 NTUs, at the point where stormwater is discharged from the site; ***OR*** In compliance with the surface water quality standard for turbidity (S8.C.2.a)

[1] Permittees subject to a numeric effluent limit for turbidity may, at their discretion, choose either numeric effluent limitation based on site-specific considerations including, but not limited to, safety, access and convenience.

D. Discharges to Water Bodies on the 303(d) List for High pH

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for high pH must conduct pH sampling in accordance with the table below, and comply with the numeric effluent limit of pH 6.5 to 8.5 su (Table 6).

Table 6 pH Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled/Units	Analytical Method	Sampling Frequency	Numeric Effluent Limit
High pH	pH /Standard Units	pH meter	Weekly, if discharging	In the range of 6.5 – 8.5 su

2. At the Permittee's discretion, compliance with the limit shall be assessed at one of the following locations:

   a. Directly in the 303(d)-listed waterbody segment, inside the immediate area of influence of the discharge; *or*

   b. Alternatively, the Permittee may measure pH at the point where the discharge leaves the construction site, rather than in the receiving water.

3. Discharges that exceed the numeric effluent limit for pH (outside the range of 6.5 – 8.5 su) constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit must sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

E. Sampling and Limits for Sites Discharging to Waters Covered by a TMDL or another Pollution Control Plan

1. Discharges to a waterbody that is subject to a Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus must be consistent with the TMDL. Refer to http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/TMDLbyWria.html for more information on TMDLs.

    a. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges must be consistent with any specific waste load allocations or requirements established by the applicable TMDL.

        i. The Permittee must sample discharges weekly, unless otherwise specified by the TMDL, to evaluate compliance with the specific waste load allocations or requirements.

        ii. Analytical methods used to meet the monitoring requirements must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136.

        iii. Turbidity and pH methods need not be accredited or registered unless conducted at a laboratory which must otherwise be accredited or registered.

    b. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but has not identified specific requirements, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    c. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    d. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

S9. STORMWATER POLLUTION PREVENTION PLAN

The Permittee must prepare and properly implement an adequate Stormwater Pollution Prevention Plan (SWPPP) for construction activity in accordance with the requirements of this permit beginning with initial soil disturbance and until final stabilization.

A. The Permittee's SWPPP must meet the following objectives:

1. To identify best management practices (BMPs) which prevent erosion and sedimentation, and to reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. To prevent violations of surface water quality, groundwater quality, or sediment management standards.

3. To control peak volumetric flow rates and velocities of stormwater discharges.

B. General Requirements

1. The SWPPP must include a narrative and drawings. All BMPs must be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative must include documentation to explain and justify the pollution prevention decisions made for the project. Documentation must include:

    a. Information about existing site conditions (topography, drainage, soils, vegetation, etc.).

    b. Potential erosion problem areas.

    c. The 13 elements of a SWPPP in Special Condition S9.D.1-13, including BMPs used to address each element.

    d. Construction phasing/sequence and general BMP implementation schedule.

    e. The actions to be taken if BMP performance goals are not achieved—for example, a contingency plan for additional treatment and/or storage of stormwater that would violate the water quality standards if discharged.

    f. Engineering calculations for ponds, treatment systems, and any other designed structures. When a treatment system requires engineering calculations, these calculations must be included in the SWPPP. Engineering calculations do not need to be included in the SWPPP for treatment systems that do not require such calculations.

2. The Permittee must modify the SWPPP if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The Permittee must then:

    a. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the inspection or investigation.

    b. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than 10 days from the inspection or investigation. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.

    c. Document BMP implementation and maintenance in the site log book.

    The Permittee must modify the SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

C. Stormwater Best Management Practices (BMPs)

BMPs must be consistent with:

1. *Stormwater Management Manual for Western Washington* (most current approved edition at the time this permit was issued), for sites west of the crest of the Cascade Mountains; *or*

2. *Stormwater Management Manual for Eastern Washington* (most current approved edition at the time this permit was issued), for sites east of the crest of the Cascade Mountains; *or*

3. Revisions to the manuals listed in Special Condition S9.C.1 & 2, or other stormwater management guidance documents or manuals which provide an equivalent level of pollution prevention, that are approved by Ecology and incorporated into this permit in accordance with the permit modification requirements of WAC 173-226-230; *or*

4. Documentation in the SWPPP that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable stormwater management manuals, including:

    a. The technical basis for the selection of all stormwater BMPs (scientific, technical studies, and/or modeling) that support the performance claims for the BMPs being selected.

    b. An assessment of how the selected BMP will satisfy AKART requirements and the applicable federal technology-based treatment requirements under 40 CFR part 125.3.

D. SWPPP – Narrative Contents and Requirements

The Permittee must include each of the 13 elements below in Special Condition S9.D.1-13 in the narrative of the SWPPP and implement them unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP.

1. Preserve Vegetation/Mark Clearing Limits

    a. Before beginning land-disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.

    b. Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

2. Establish Construction Access

    a. Limit construction vehicle access and exit to one route, if possible.

    b. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.

    c. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.

    d. 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 pickup and transport of the sediment to a controlled sediment disposal area.

    e. Conduct street washing only after sediment removal in accordance with Special Condition S9.D.2.d.

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

3. Control Flow Rates

    a. Protect properties and waterways downstream of construction 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, as required by local plan approval authority.

    b. Where necessary to comply with Special Condition S9.D.3.a, construct stormwater infiltration or detention BMPs as one of the first steps in grading. Assure that detention BMPs function properly before constructing site improvements (for example, impervious surfaces).

    c. If permanent infiltration ponds are used for flow control during construction, protect these facilities from sedimentation during the construction phase.

4. Install Sediment Controls

    The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must:

    a. Construct sediment control BMPs (sediment ponds, traps, filters, infiltration facilities, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.

    b. 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.

    c. 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 of Special Condition S9.D.3.a.

    d. 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.

    e. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.

    f. 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.

5. Stabilize Soils

    a. The Permittee must 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 on areas to be paved, and dust control.

b. The Permittee must control stormwater volume and velocity within the site to minimize soil erosion.

c. The Permittee must 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.

d. Depending on the geographic location of the project, the Permittee must not allow soils to remain exposed and unworked for more than the time periods set forth below to prevent erosion.

West of the Cascade Mountains Crest
During the dry season (May 1 - September 30): 7 days
During the wet season (October 1 - April 30): 2 days

East of the Cascade Mountains Crest, except for Central Basin*
During the dry season (July 1 - September 30): 10 days
During the wet season (October 1 - June 30): 5 days

The Central Basin*, East of the Cascade Mountains Crest
During the dry Season (July 1 - September 30): 30 days
During the wet season (October 1 - June 30): 15 days

***Note: The Central Basin** is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches.

e. The Permittee must stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.

f. The Permittee must stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

g. The Permittee must minimize the amount of soil exposed during construction activity.

h. The Permittee must minimize the disturbance of steep slopes.

i. The Permittee must minimize soil compaction and, unless infeasible, preserve topsoil.

6. Protect Slopes

a. The Permittee must 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).

b. The Permittee must divert off-site stormwater (run-on) or groundwater 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.

c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.

i. West of the Cascade Mountains Crest: Temporary pipe slope drains must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Temporary pipe slope drains must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

d. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.

e. Place check dams at regular intervals within constructed channels that are cut down a slope.

7. Protect Drain Inlets

a. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

b. 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).

8. Stabilize Channels and Outlets

a. Design, construct and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:

i. West of the Cascade Mountains Crest: Channels must handle the peak 10-minute flow rate from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the WWHM to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Channels must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

b. 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.

9. Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The Permittee must:

a. 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.

b. 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. Minimize storage of hazardous materials on-site. Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers. 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 of the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.

c. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

d. 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 land application, or to the sanitary sewer with local sewer district approval.

e. 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.

f. 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, recycled concrete stockpiles, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. (Also refer to the definition for "concrete wastewater" in Appendix A – Definitions.)

g. Adjust the pH of stormwater or authorized non-stormwater if necessary to prevent an exceedance of groundwater and/or surface water quality standards.

h. Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete truck drums onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or groundwater. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to groundwater or surface waters of the State is

prohibited. At no time shall concrete be washed off into the footprint of an area where an infiltration BMP will be installed.

i. Obtain written approval from Ecology before using any chemical treatment, with the exception of CO_2, dry ice or food grade vinegar, to adjust pH.

j. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

10. Control Dewatering

a. Permittees must discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff at the site, in conjunction with BMPs to reduce sedimentation before discharge to a sediment trap or sediment pond.

b. Permittees may discharge clean, non-turbid dewatering water, such as well-point groundwater, to systems tributary to, or directly into surface waters of the State, as specified in Special Condition S9.D.8, provided the dewatering 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.

c. Other dewatering treatment or disposal options may include:

i. Infiltration

ii. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.

iii. Ecology-approved on-site chemical treatment or other suitable treatment technologies (See S9.D.9.i, regarding chemical treatment written approval).

iv. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.

v. Use of a sedimentation bag with discharge to a ditch or swale for small volumes of localized dewatering.

d. Permittees must handle highly turbid or contaminated dewatering water separately from stormwater.

11. Maintain BMPs

a. Permittees must 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.

b. Permittees must 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.

12. Manage the Project

    a. Phase development projects to the maximum degree practicable and take into account seasonal work limitations.

    b. Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with Special Condition S4.

    c. Maintain, update, and implement the SWPPP in accordance with Special Conditions S3, S4, and S9.

13. Protect Low Impact Development (LID) BMPs

    The primary purpose of on-site LID Stormwater Management is to reduce the disruption of the natural site hydrology through infiltration. LID BMPs are permanent facilities.

    a. Permittees must protect all LID BMPs (including, but not limited to, Bioretention and Rain Garden facilities) 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 facilities. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the facility must include removal of sediment and any sediment-laden bioretention/ rain garden soils, and replacing the removed soils with soils meeting the design specification.

    b. Permittees must maintain the infiltration capabilities of LID BMPs by protecting against compaction by construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

    c. Permittees must 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.

    d. Permittees must clean permeable pavements fouled with sediments or no longer passing an initial infiltration test using local stormwater manual methodology or the manufacturer's procedures.

    e. Permittees must keep all heavy equipment off existing soils under LID BMPs that have been excavated to final grade to retain the infiltration rate of the soils.

E. SWPPP – Map Contents and Requirements

The Permittee's SWPPP must also include a vicinity map or general location map (for example, a USGS quadrangle map, a portion of a county or city map, or other appropriate map) with enough detail to identify the location of the construction site and receiving waters within one mile of the site.

The SWPPP must also include a legible site map (or maps) showing the entire construction site. The following features must be identified, unless not applicable due to site conditions.

1. The direction of north, property lines, and existing structures and roads.

2. Cut and fill slopes indicating the top and bottom of slope catch lines.

3. Approximate slopes, contours, and direction of stormwater flow before and after major grading activities.

4. Areas of soil disturbance and areas that will not be disturbed.

5. Locations of structural and nonstructural controls (BMPs) identified in the SWPPP.

6. Locations of off-site material, stockpiles, waste storage, borrow areas, and vehicle/equipment storage areas.

7. Locations of all surface water bodies, including wetlands.

8. Locations where stormwater or non-stormwater discharges off-site and/or to a surface waterbody, including wetlands.

9. Location of water quality sampling station(s), if sampling is required by state or local permitting authority.

10. Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

11. Location or proposed location of LID facilities.

S10. NOTICE OF TERMINATION

Partial terminations of permit coverage are not authorized.

A. The site is eligible for termination of coverage when it has met any of the following conditions:

1. The site has undergone final stabilization, the Permittee has removed all temporary BMPs (except biodegradable BMPs clearly manufactured with the intention for the material to be left in place and not interfere with maintenance or land use), and all stormwater discharges associated with construction activity have been eliminated; *or*

2. All portions of the site that have not undergone final stabilization per Special Condition S10.A.1 have been sold and/or transferred (per Special Condition S2.A), and the Permittee no longer has operational control of the construction activity; *or*

3. For residential construction only, the Permittee has completed temporary stabilization and the homeowners have taken possession of the residences.

B. When the site is eligible for termination, the Permittee must submit a complete and accurate Notice of Termination (NOT) form, signed in accordance with General Condition G2, to:

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

When an electronic termination form is available, the Permittee may choose to submit a complete and accurate Notice of Termination (NOT) form through the Water Quality Permitting Portal rather than mailing a hardcopy as noted above.

The termination is effective on the 31st calendar day following the date Ecology receives a complete NOT form, unless Ecology notifies the Permittee that termination request is denied because the Permittee has not met the eligibility requirements in Special Condition S10.A.

Permittees are required to comply with all conditions and effluent limitations in the permit until the permit has been terminated.

Permittees transferring the property to a new property owner or operator/Permittee are required to complete and submit the Notice of Transfer form to Ecology, but are not required to submit a Notice of Termination form for this type of transaction.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this general permit must be consistent with the terms and conditions of this general permit. Any discharge of any pollutant more frequent than or at a level in excess of that identified and authorized by the general permit must constitute a violation of the terms and conditions of this permit.

G2. SIGNATORY REQUIREMENTS

A. All permit applications must bear a certification of correctness to be signed:

1. In the case of corporations, by a responsible corporate officer.
2. In the case of a partnership, by a general partner of a partnership.
3. In the case of sole proprietorship, by the proprietor.
4. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

B. All reports required by this permit and other information requested by Ecology (including NOIs, NOTs, and Transfer of Coverage forms) must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to Ecology.
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

C. Changes to authorization. If an authorization under paragraph G2.B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G2.B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section must make the following certification:

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G3. RIGHT OF INSPECTION AND ENTRY

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records are kept under the terms and conditions of this permit.

B. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.

C. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G4. GENERAL PERMIT MODIFICATION AND REVOCATION

This permit may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. When a change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this permit.

B. When effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of dischargers covered under this permit.

C. When a water quality management plan containing requirements applicable to the category of dischargers covered under this permit is approved, or

D. When information is obtained that indicates cumulative effects on the environment from dischargers covered under this permit are unacceptable.

G5. REVOCATION OF COVERAGE UNDER THE PERMIT

Pursuant to Chapter 43.21B RCW and Chapter 173-226 WAC, the Director may terminate coverage for any discharger under this permit for cause. Cases where coverage may be terminated include, but are not limited to, the following:

A. Violation of any term or condition of this permit.

B. Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts.

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

D. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

E. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations.

F. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC.

G. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.

The Director may require any discharger under this permit to apply for and obtain coverage under an individual permit or another more specific general permit. Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within ninety (90) days from the time of revocation and is submitted along with a complete individual permit application form.

G6. REPORTING A CAUSE FOR MODIFICATION

The Permittee must submit a new application, or a supplement to the previous application, whenever a material change to the construction activity or in the quantity or type of discharge is anticipated which is not specifically authorized by this permit. This application must be submitted at least sixty (60) days prior to any proposed changes. Filing a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G7. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit will be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G8. DUTY TO REAPPLY

The Permittee must apply for permit renewal at least 180 days prior to the specified expiration date of this permit. The Permittee must reapply using the electronic application form (NOI) available on Ecology's website. Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper NOI.

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

G9. REMOVED SUBSTANCE

The Permittee must not re-suspend or reintroduce collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to the final effluent stream for discharge to state waters.

G10. DUTY TO PROVIDE INFORMATION

The Permittee must submit to Ecology, within a reasonable time, all information that Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology, upon request, copies of records required to be kept by this permit [40 CFR 122.41(h)].

G11. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment at the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G14. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Special Condition S5.F, and; 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G15. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G16. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G17. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G18. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or imprisonment of not more than four (4) years, or both.

G19. REPORTING PLANNED CHANGES

The Permittee must, as soon as possible, give notice to Ecology of planned physical alterations, modifications or additions to the permitted construction activity. The Permittee should be aware that, depending on the nature and size of the changes to the original permit, a new public notice and other permit process requirements may be required. Changes in activities that require reporting to Ecology include those that will result in:

A. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

B. A significant change in the nature or an increase in quantity of pollutants discharged, including but not limited to: a 20% or greater increase in acreage disturbed by construction activity.

C. A change in or addition of surface water(s) receiving stormwater or non-stormwater from the construction activity.

D. A change in the construction plans and/or activity that affects the Permittee's monitoring requirements in Special Condition S4.

Following such notice, permit coverage may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G20. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to Ecology, it must promptly submit such facts or information.

G21. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee must give advance notice to Ecology by submission of a new application or supplement thereto at least forty-five (45) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of

operation and degradation of effluent quality, must be scheduled during non-critical water quality periods and carried out in a manner approved by Ecology.

G22. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT

Any discharger authorized by this permit may request to be excluded from coverage under the general permit by applying for an individual permit. The discharger must submit to the Director an application as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. These reasons will fully document how an individual permit will apply to the applicant in a way that the general permit cannot. Ecology may make specific requests for information to support the request. The Director will either issue an individual permit or deny the request with a statement explaining the reason for the denial. When an individual permit is issued to a discharger otherwise subject to the construction stormwater general permit, the applicability of the construction stormwater general permit to that Permittee is automatically terminated on the effective date of the individual permit.

G23. APPEALS

A. The terms and conditions of this general permit, as they apply to the appropriate class of dischargers, are subject to appeal by any person within 30 days of issuance of this general permit, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this general permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. Consideration of an appeal of general permit coverage of an individual discharger is limited to the general permit's applicability or nonapplicability to that individual discharger.

C. The appeal of general permit coverage of an individual discharger does not affect any other dischargers covered under this general permit. If the terms and conditions of this general permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

G24. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

G25. BYPASS PROHIBITED

A. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited for stormwater events below the design criteria for stormwater management. Ecology may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, 3 or 4) is applicable.

1. Bypass of stormwater is consistent with the design criteria and part of an approved management practice in the applicable stormwater management manual.

2. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health.

3. Bypass of stormwater is unavoidable, unanticipated, and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

   c. Ecology is properly notified of the bypass as required in Special Condition S5.F of this permit.

4. A planned action that would cause bypass of stormwater and has the potential to result in noncompliance of this permit during a storm event.

   The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

   a. A description of the bypass and its cause

   b. An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.

   c. A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

   d. The minimum and maximum duration of bypass under each alternative.

   e. A recommendation as to the preferred alternative for conducting the bypass.

   f. The projected date of bypass initiation.

   g. A statement of compliance with SEPA.

   h. A request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated.

   i. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

5. For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above must be considered during

preparation of the Stormwater Pollution Prevention Plan (SWPPP) and must be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

Ecology will consider the following before issuing an administrative order for this type bypass:

a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve, conditionally approve, or deny the request. The public must be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under RCW 90.48.120.

B. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

APPENDIX A – DEFINITIONS

AKART is an acronym for "**A**ll **K**nown, **A**vailable, and **R**easonable methods of prevention, control, and **T**reatment." AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants and controlling pollution associated with a discharge.

Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which was completed and approved by EPA before January 1, 2021, or before the date the operator's complete permit application is received by Ecology, whichever is later. TMDLs completed after a complete permit application is received by Ecology become applicable to the Permittee only if they are imposed through an administrative order by Ecology, or through a modification of permit coverage.

Applicant means an *operator* seeking coverage under this permit.

Benchmark means a pollutant concentration used as a permit threshold, below which a pollutant is considered unlikely to cause a water quality violation, and above which it may. When pollutant concentrations exceed benchmarks, corrective action requirements take effect. Benchmark values are not water quality standards and are not numeric effluent limitations; they are indicator values.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control stormwater associated with construction activity, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Buffer means an area designated by a local jurisdiction that is contiguous to and intended to protect a sensitive area.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Calendar Day A period of 24 consecutive hours starting at 12:00 midnight and ending the following 12:00 midnight.

Calendar Week (same as **Week**) means a period of seven consecutive days starting at 12:01 a.m. (0:01 hours) on Sunday.

Certified Erosion and Sediment Control Lead (CESCL) means a person who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (See BMP C160 in the SWMM).

Chemical Treatment means the addition of chemicals to stormwater and/or authorized non-stormwater prior to filtration and discharge to surface waters.

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, and 97-117; USC 1251 et seq.

Combined Sewer means a sewer which has been designed to serve as a sanitary sewer and a storm sewer, and into which inflow is allowed by local ordinance.

Common Plan of Development or Sale means a site where multiple separate and distinct construction activities may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include: 1) phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a development where lots are sold to separate builders); 2) a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development; 3) projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility; and 4) linear projects such as roads, pipelines, or utilities. If the project is part of a common plan of development or sale, the disturbed area of the entire plan must be used in determining permit requirements.

Composite Sample means a mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increases while maintaining a constant time interval between the aliquots.

Concrete Wastewater means any water used in the production, pouring and/or clean-up of concrete or concrete products, and any water used to cut, grind, wash, or otherwise modify concrete or concrete products. Examples include water used for or resulting from concrete truck/mixer/pumper/tool/chute rinsing or washing, concrete saw cutting and surfacing (sawing, coring, grinding, roughening, hydro-demolition, bridge and road surfacing). When stormwater comingles with concrete wastewater, the resulting water is considered concrete wastewater and must be managed to prevent discharge to waters of the State, including groundwater.

Construction Activity means land disturbing operations including clearing, grading or excavation which disturbs the surface of the land (including off-site disturbance acreage related to construction-support activity). Such activities may include road construction, construction of residential houses, office buildings, or industrial buildings, site preparation, soil compaction, movement and stockpiling of topsoils, and demolition activity.

Construction Support Activity means off-site acreage that will be disturbed as a direct result of the construction project and will discharge stormwater. For example, off-site equipment staging yards, material storage areas, borrow areas, and parking areas.

Contaminant means any hazardous substance that does not occur naturally or occurs at greater than natural background levels. See definition of “hazardous substance” and WAC 173-340-200.

Contaminated soil means soil which contains contaminants, pollutants, or hazardous substances that do not occur naturally or occur at levels greater than natural background.

Contaminated groundwater means groundwater which contains contaminants, pollutants, or hazardous substances that do not occur naturally or occur at levels greater than natural background.

Demonstrably Equivalent means that the technical basis for the selection of all stormwater BMPs is documented within a SWPPP, including:

1. The method and reasons for choosing the stormwater BMPs selected.
2. The pollutant removal performance expected from the BMPs selected.

3. The technical basis supporting the performance claims for the BMPs selected, including any available data concerning field performance of the BMPs selected.
4. An assessment of how the selected BMPs will comply with state water quality standards.
5. An assessment of how the selected BMPs will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment (AKART).

Department means the Washington State Department of Ecology.

Detention means the temporary storage of stormwater to improve quality and/or to reduce the mass flow rate of discharge.

Dewatering means the act of pumping groundwater or stormwater away from an active construction site.

Director means the Director of the Washington State Department of Ecology or his/her authorized representative.

Discharger means an owner or operator of any facility or activity subject to regulation under Chapter 90.48 RCW or the Federal Clean Water Act.

Domestic Wastewater means water carrying human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such groundwater infiltration or surface waters as may be present.

Ecology means the Washington State Department of Ecology.

Engineered Soils means the use of soil amendments including, but not limited, to Portland cement treated base (CTB), cement kiln dust (CKD), or fly ash to achieve certain desirable soil characteristics.

Equivalent BMPs means operational, source control, treatment, or innovative BMPs which result in equal or better quality of stormwater discharge to surface water or to groundwater than BMPs selected from the SWMM.

Erosion means the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Erosion and Sediment Control BMPs means BMPs intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, sediment traps, and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs.

Federal Operator is an entity that meets the definition of "Operator" in this permit and is either any department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal government of the United States, or another entity, such as a private contractor, performing construction activity for any such department, agency, or instrumentality.

Final Stabilization (same as **fully stabilized** or **full stabilization**) means the completion of all soil disturbing activities at the site and the establishment of permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See the applicable Stormwater Management Manual for more information on vegetative cover expectations and equivalent permanent stabilization measures.

Groundwater means water in a saturated zone or stratum beneath the land surface or a surface waterbody.

Hazardous Substance means any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (5) and (6), or any dangerous or extremely dangerous waste as designated by rule under chapter 70.105 RCW; any hazardous sub-stance as defined in RCW 70.105.010(14) or any hazardous substance as defined by rule under chapter 70.105 RCW; any substance that, on the effective date of this section, is a hazardous substance under section 101(14) of the federal cleanup law, 42U.S.C., Sec. 9601(14); petroleum or petroleum products; and any substance or category of substances, including solid waste decomposition products, determined by the director by rule to present a threat to human health or the environment if released into the environment. The term hazardous substance does not include any of the following when contained in an underground storage tank from which there is not a release: crude oil or any fraction thereof or petroleum, if the tank is in compliance with all applicable federal, state, and local law.

Injection Well means a well that is used for the subsurface emplacement of fluids. (See **Well**.)

Jurisdiction means a political unit such as a city, town or county; incorporated for local self-government.

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the State from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington State Department of Ecology.

Notice of Intent (NOI) means the application for, or a request for coverage under this general permit pursuant to WAC 173-226-200.

Notice of Termination (NOT) means a request for termination of coverage under this general permit as specified by Special Condition S10 of this permit.

Operator means any party associated with a construction project that meets either of the following two criteria:

- The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Permittee means individual or entity that receives notice of coverage under this general permit.

pH means a liquid's measure of acidity or alkalinity. A pH of 7 is defined as neutral. Large variations above or below this value are considered harmful to most aquatic life.

pH Monitoring Period means the time period in which the pH of stormwater runoff from a site must be tested a minimum of once every seven days to determine if stormwater pH is between 6.5 and 8.5.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, and container from which pollutants are or may be discharged to surface waters of the State. This term does not include return flows from irrigated agriculture. (See the Fact Sheet for further explanation)

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste. This term does not include sewage from vessels within the meaning of section 312 of the CWA, nor does it include dredged or fill material discharged in accordance with a permit issued under section 404 of the CWA.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of waters of the State; including change in temperature, taste, color, turbidity, or odor of the waters; or such discharge of any liquid, gaseous, solid, radioactive or other substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish or other aquatic life.

Process Wastewater means any non-stormwater which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. If stormwater commingles with process wastewater, the commingled water is considered process wastewater.

Receiving Water means the waterbody at the point of discharge. If the discharge is to a storm sewer system, either surface or subsurface, the receiving water is the waterbody to which the storm system discharges. Systems designed primarily for other purposes such as for groundwater drainage, redirecting stream natural flows, or for conveyance of irrigation water/return flows that coincidentally convey stormwater are considered the receiving water.

Representative means a stormwater or wastewater sample which represents the flow and characteristics of the discharge. Representative samples may be a grab sample, a time-proportionate *composite sample*, or a flow proportionate sample. Ecology's Construction Stormwater Monitoring Manual provides guidance on representative sampling.

Responsible Corporate Officer for the purpose of signatory authority means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sanitary Sewer means a sewer which is designed to convey domestic wastewater.

Sediment means the fragmented material that originates from the weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Sedimentation means the depositing or formation of sediment.

Sensitive Area means a waterbody, wetland, stream, aquifer recharge area, or channel migration zone.

SEPA (State Environmental Policy Act) means the Washington State Law, RCW 43.21C.020, intended to prevent or eliminate damage to the environment.

Significant Amount means an amount of a pollutant in a discharge that is amenable to available and reasonable methods of prevention or treatment; or an amount of a pollutant that has a reasonable potential to cause a violation of surface or groundwater quality or sediment management standards.

Significant Concrete Work means greater than 1000 cubic yards placed or poured concrete or recycled concrete used over the life of a project.

Significant Contributor of Pollutants means a facility determined by Ecology to be a contributor of a significant amount(s) of a pollutant(s) to waters of the State of Washington.

Site means the land or water area where any "facility or activity" is physically located or conducted.

Source Control BMPs means physical, structural or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater. A few examples of source control BMPs are erosion control practices, maintenance of stormwater facilities, constructing roofs over storage and working areas, and directing wash water and similar discharges to the sanitary sewer or a dead end sump.

Stabilization means the application of appropriate BMPs to prevent the erosion of soils, such as, temporary and permanent seeding, vegetative covers, mulching and matting, plastic covering and sodding. See also the definition of Erosion and Sediment Control BMPs.

Storm Drain means any drain which drains directly into a *storm sewer system*, usually found along roadways or in parking lots.

Storm Sewer System means a means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains designed or used for collecting or conveying stormwater. This does not include systems which are part of *a combined sewer* or Publicly Owned Treatment Works (POTW), as defined at 40 CFR 122.2.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface waterbody, or a constructed infiltration facility.

Stormwater Management Manual (SWMM) or **Manual** means the technical Manual published by Ecology for use by local governments that contain descriptions of and design criteria for BMPs to prevent, control, or treat pollutants in stormwater.

Stormwater Pollution Prevention Plan (SWPPP) means a documented plan to implement measures to identify, prevent, and control the contamination of point source discharges of stormwater.

Surface Waters of the State includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Temporary Stabilization means the exposed ground surface has been covered with appropriate materials to provide temporary stabilization of the surface from water or wind erosion. Materials include, but are not limited to, mulch, riprap, erosion control mats or blankets and temporary cover crops. Seeding alone is not considered stabilization. Temporary stabilization is not a substitute for the more permanent “final stabilization.”

Total Maximum Daily Load (TMDL) means a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet state water quality standards. Percentages of the total maximum daily load are allocated to the various pollutant sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The TMDL calculations must include a "margin of safety" to ensure that the waterbody can be protected in case there are unforeseen events or unknown sources of the pollutant. The calculation must also account for seasonable variation in water quality.

Transfer of Coverage (TOC) means a request for transfer of coverage under this general permit as specified by Special Condition S2.A of this permit.

Treatment BMPs means BMPs that are intended to remove pollutants from stormwater. A few examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

Transparency means a measurement of water clarity in centimeters (cm), using a 60 cm transparency tube. The transparency tube is used to estimate the relative clarity or transparency of water by noting the depth at which a black and white Secchi disc becomes visible when water is released from a value in the bottom of the tube. A transparency tube is sometimes referred to as a “turbidity tube.”

Turbidity means the clarity of water expressed as nephelometric turbidity units (NTUs) and measured with a calibrated turbidimeter.

Uncontaminated means free from any contaminant. See definition of “contaminant” and WAC 173-340-200.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Waste Load Allocation (WLA) means the portion of a receiving water’s loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality based effluent limitation (40 CFR 130.2[h]).

Water-Only Based Shaft Drilling is a shaft drilling process that uses water only and no additives are involved in the drilling of shafts for construction of building, road, or bridge foundations.

Water Quality means the chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose.

Waters of the State includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the State" as defined in Chapter 90.48 RCW, which include lakes, rivers, ponds, streams, inland waters, underground waters, salt

waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Well means a bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension. (See **Injection Well**.)

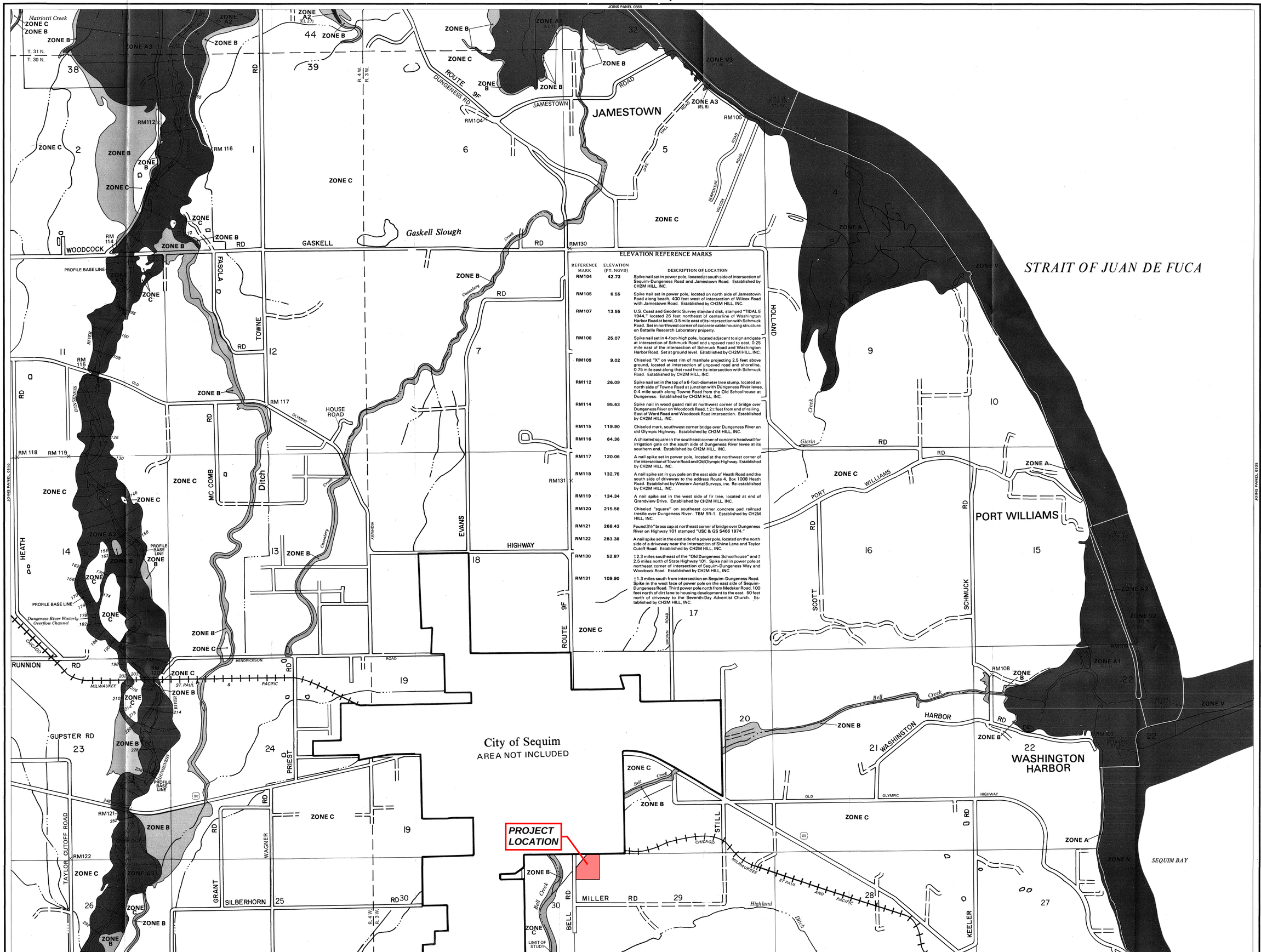
Wheel Wash Wastewater means any water used in, or resulting from the operation of, a tire bath or wheel wash (BMP C106: Wheel Wash), or other structure or practice that uses water to physically remove mud and debris from vehicles leaving a construction site and prevent track-out onto roads. When stormwater comingles with wheel wash wastewater, the resulting water is considered wheel wash wastewater and must be managed according to Special Condition S9.D.9.

APPENDIX B – ACRONYMS

AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
BMP	Best Management Practice
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CKD	Cement Kiln Dust
cm	Centimeters
CPD	Common Plan of Development
CTB	Cement-Treated Base
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
FR	Federal Register
LID	Low Impact Development
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SWMM	Stormwater Management Manual
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality
WWHM	Western Washington Hydrology Model

APPENDIX 8
FEMA FLOOD INSURANCE MAP

JOINS PANEL 0365



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM104	42.73	Spike nail set in power pole, located at south side of intersection of Sequim-Dungeness Road and Jamestown Road. Established by CH2M HILL, INC.
RM105	6.55	Spike nail set in power pole, located on north side of Jamestown Road along beach, 400 feet west of intersection of Wilcox Road with Jamestown Road. Established by CH2M HILL, INC.
RM107	13.55	U.S. Coast and Geodetic Survey standard disk, stamped "TIDAL 5 1944," located 26 feet northeast of centerline of Washington Harbor Road at bend, 0.5 mile east of its intersection with Schmuck Road. Set in northwest corner of concrete cable housing structure on Battelle Research Laboratory property.
RM108	25.07	Spike nail set in 4-foot-high pole, located adjacent to sign and gate at intersection of Schmuck Road and unpaved road to east, 0.25 mile east of the intersection of Schmuck Road and Washington Harbor Road. Set at ground level. Established by CH2M HILL, INC.
RM109	9.02	Chiseled "X" on west rim of manhole projecting 2.5 feet above ground, located at intersection of unpaved road and shoreline, 0.75 mile east along that road from its intersection with Schmuck Road. Established by CH2M HILL, INC.
RM112	26.09	Spike nail set in the top of a 6-foot-diameter tree stump, located on north side of Towne Road at junction with Dungeness River levee, 0.4 mile south along Towne Road from the Old Schoolhouse at Dungeness. Established by CH2M HILL, INC.
RM114	95.63	Spike nail in wood guard rail at northwest corner of bridge over Dungeness River on Woodcock Road, ±2± feet from end of railing. East of Ward Road and Woodcock Road intersection. Established by CH2M HILL, INC.
RM115	119.90	Chiseled mark, southwest corner bridge over Dungeness River on old Olympic Highway. Established by CH2M HILL, INC.
RM116	64.36	A chiseled square in the southeast corner of concrete headwall for irrigation gate on the south side of Dungeness River levee at its southern end. Established by CH2M HILL, INC.
RM117	120.06	A nail spike set in power pole, located at the northwest corner of the intersection of Towne Road and Old Olympic Highway. Established by CH2M HILL, INC.
RM118	132.75	A nail spike set in guy pole on the east side of Heath Road and the south side of driveway to the address Route 4, Box 1008 Heath Road. Established by Western Aerial Surveys, Inc. Re-established by CH2M HILL, INC.
RM119	134.34	A nail spike set in the west side of fir tree, located at end of Grandview Drive. Established by CH2M HILL, INC.
RM120	215.58	Chiseled "square" on southeast corner concrete pad railroad trestle over Dungeness River. TBM RR-1. Established by CH2M HILL, INC.
RM121	268.43	Found 3½" brass cap at northeast corner of bridge over Dungeness River on Highway 101 stamped "USC & GS S466 1974."
RM122	283.38	A nail spike set in the east side of a power pole, located on the north side of a driveway near the intersection of Shine Lane and Taylor Cutoff Road. Established by CH2M HILL, INC.
RM130	52.87	±2.3 miles southeast of the "Old Dungeness Schoolhouse" and ± 2.5 miles north of State Highway 101. Spike nail in power pole at northeast corner of intersection of Sequim-Dungeness Way and Woodcock Road. Established by CH2M HILL, INC.
RM131	109.90	±1.3 miles south from intersection on Sequim-Dungeness Road. Spike in the west face of power pole on the east side of Sequim-Dungeness Road. Third power pole north from Medsker Road, 100 feet north of dirt lane to housing development to the east. 50 feet north of driveway to the Seventh-Day Adventist Church. Established by CH2M HILL, INC.

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations
100-Year Flood Boundary
500-Year Flood Boundary

ZONE B
ZONE A1
ZONE A3
ZONE B

Base Flood Elevation Line With Elevation In Feet** — 513
Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)
Elevation Reference Mark — RM7×
Zone D Boundary
River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, A0, A99, V, V1-30 AND VE.

Certain areas not in the Special Flood Hazard Areas (zones A and V) may be protected by flood control structures.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

For adjoining map panels, see separately printed Index to Map Panels.

INITIAL IDENTIFICATION:
JANUARY 24, 1975
FLOOD HAZARD BOUNDARY MAP REVISIONS:
APRIL 4, 1978

FLOOD INSURANCE RATE MAP EFFECTIVE:
NOVEMBER 5, 1980
FLOOD INSURANCE RATE MAP REVISIONS:

Map revised February 16, 1983 to change corporate limits, flood boundaries, and zone designations.

Map revised December 5, 1989 to update corporate limits, to decrease base flood elevations, to increase base flood elevations, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to update roads and road names, to reflect updated topographic information and to change floodway.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CLALLAM COUNTY, WASHINGTON (UNINCORPORATED AREAS)

PANEL 530 OF 725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
530021 0530 D

MAP REVISED:
DECEMBER 5, 1989

Federal Emergency Management Agency

APPENDIX 9
OPERATIONS AND MAINTENANCE MANUAL

Operation and Maintenance Manual

Habitat for Humanity
Sequim Avenue Development
Sequim, WA

Parcels:
033029229020

Prepared By:
LDC, Inc.
321 Cleveland Ave SE, Ste 209
Tumwater, WA 98501
425.806.1869

March 2025

LDC | Surveying Engineering Planning

OPERATION AND MAINTENANCE MANUAL
HABITAT FOR HUMANITY SEQUIM AVENUE DEVELOPMENT
NOT YET ASSIGNED
PARCEL NUMBERS: 033029229020

SECTION 1: PROJECT DESCRIPTION

Description of Drainage System and Facilities serving the site:
The proposed improvements are included in seven stormwater basins, six on-site and one off-site. Stormwater runoff from Basins 1, 2, and 3 will be collected and conveyed through a pretreatment system to be sized at the time of civil permit submittal before being conveyed to the proposed infiltration trenches. Stormwater runoff from Basin 4 will be collected and conveyed to an enhanced treatment system to be sized at the time of civil permit submittal before being conveyed to the proposed detention pond that outlets to the existing culvert in East Brownfield Road. Stormwater runoff from Basin 5 does not require treatment and will disperse through the on-site wetland buffer via two flow dispersal trenches. Stormwater runoff from Basin 6 will utilize the realigned French drain system that collects stormwater runoff from the steep slopes along the southern property line and outlet to the existing French drain outlet at the approximate midpoint of the eastern property line. The stormwater runoff from Basin 7 includes all of the off-site improvements. These areas will utilize the existing conveyance ditches that run along South Sequim Avenue and East Brownfield Road. All of the landscaping areas will be amended per BMP T5.13.

Typical maintenance of the stormwater system includes removing debris from catch basin grates and the detention pond, and removing sediment from pipes, catch basins, treatment systems, infiltration trenches, and detention pond. The drawings of the stormwater facilities are found in **Appendix 4** of the Stormwater Site Plan. See **Appendix 3** of the Stormwater Site Plan for a Basin Map Exhibits.

SECTION 2: MAINTENANCE IMPORTANCE AND INTENT

Intent:
The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include:

- Maintain designed stormwater infiltration capacity
- Maintain designed stormwater detention/retention volume
- Maintain ability to safely convey design stormwater flows

- Maintain ability to treat stormwater runoff quality
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems
- Clearly identify systems so they can be protected
- Keep maintenance costs low
- Prevent large-scale or expensive stormwater system failures
- Prevent water quality violations or damage to downstream properties

The intent of this section and manual is to pass on to the responsible party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

SECTION 3: RESPONSIBLE PARTIES

Owner Information:

Habitat for Humanity Clallam County will be responsible for maintaining the stormwater facilities. The stormwater facilities maintenance plan will be kept in safe and well-known place and will be made available for inspection to the City upon request. See the general requirements below regarding frequency of inspections.

SECTION 4: FACILITIES REQUIRING MAINTENANCE

General Requirements:

1. Maintenance Required – all stormwater facilities shall be maintained in accordance with this maintenance program, the drainage report for the **Habitat for Humanity Sequim Avenue Development**, and the most current version of the City of Sequim Design Standards.

2. Minimum Standards – the following are the minimum standards for the maintenance of this project's stormwater facilities.

a. Facilities shall be inspected annually and cleared of debris, sediment, and vegetation when they affect the functionality and/or design capacity of the facility.
b. Landscape and lawn/turf areas shall be inspected quarterly and mowed and replanted as necessary. Clippings are to be removed and properly disposed of.
c. Where lack of maintenance is causing or contributing to a water quality problem, immediate action shall be taken to correct the problem. Within one month, after initial recognition of the problem, a City of Sequim inspector may revisit the facility to assure that the problem has been rectified at his or her convenience.

3. Disposal of Waste from Maintenance Activities – disposal of waste from maintenance activities shall be conducted in accordance with City of Sequim's waste disposal standards.

4. Compliance – property owners are responsible for the maintenance, operation, or repair of stormwater drainage systems, and project installed BMPs. Property owners shall maintain, operate, and repair these facilities in accordance with the requirements of this maintenance

program, the drainage report, and the most current edition of the Department of Ecology Stormwater Management Manual for Western Washington.

SECTION 5: MAINTENANCE INSTRUCTIONS

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the City, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the city.

Inspection Program:

1. Inspection – it will be the responsibility of the Owner to complete the necessary stormwater inspection tasks stated herein and prepare the inspection reports that will be submitted to the City of Sequim. Inspection reports shall be submitted annually or at the City of Sequim's request.

2. Records – the Owner shall keep records of the following;

   a. As-built plans and locations of installed stormwater facilities.
   b. Findings of fact from any exemption granted by the City of Sequim.
   c. Operation and maintenance requirements and records of inspection maintenance actions and frequencies
   d. Declaration of Covenant associated with the maintenance and operation of stormwater facilities.
   e. Any pertinent engineering reports.

It is important to keep the catch basins, infiltration systems, and detention system free of debris and sediment, because if they get clogged the stormwater system will fail and will not meet flow control standards. Maintenance activities for the conveyance pipes, the catch basins, infiltration trenches, and detention pond include but are not limited to the actions listed in **Appendix A**. Once the mechanical treatment systems are designed, their maintenance activities will be added to **Appendix A**.

SECTION 6: VEGETATION MAINTENANCE

Refer to the landscape plans for the planting schedule of the project site.

SECTION 7: POLLUTION SOURCE CONTROL MEASURES

1. Avoid the activity or reduce its occurrence:

If possible, avoid the activity or do it less frequently. Is there a substitute process or a different material available to get the job done? Can a larger run of a process be performed at one time, thus reducing the number of times per week or month it needs to be repeated? For instance, raw materials could be delivered close to the time of use instead of being stockpiled and exposed to the weather. Perhaps the site could avoid one solvent-washing step altogether. Apply lawn care chemicals following directions and only as needed. Many lawns are excessively fertilized. Do not apply herbicides right before it rains. Ecology or the Clallam County Department of Public Health and Social Services can provide pollution prevention assistance.

2. Move activities under shelter:

Sometimes it is fairly easy to move an activity indoors out of the weather. The benefits of this are twofold; preventing runoff contamination, and providing for easier, more controlled cleanup if a spill occurs. An example would be unloading and storing barrels of chemicals inside a garage area instead of doing it outside. Please be aware that moving storage areas indoors may require installation of fire suppression equipment or other building modifications as required by the International Building Code (IBC), the International Fire Code or local ordinances.

3. Clean up spills quickly:

Promptly contain and clean up solid and liquid pollutant leaks and spills on any exposed soil, vegetation, or paved area. Commercial spill kits are available, but readily available absorbents such as kitty litter also work well in many cases. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.

4. Use less material:

Don’t buy or use more material than you really need. This not only helps keep potential disposal, storage, and pollution problems to a minimum, but will probably save money, too.

5. Use the least toxic materials available:

Investigate the use of materials that are less toxic than what is used now. Perhaps a caustic-type detergent or a solvent could be replaced with a more environmentally friendly product. Such a change might allow the site to discharge process water to the sanitary sewer instead of paying for expensive disposal. Remember that even if using a biodegradable product, nothing but uncontaminated water is allowed to enter the stormwater drainage system.

6. Create and maintain vegetated areas near activity locations:

Vegetation of various kinds can help filter pollutants out of stormwater, so it is advisable to route stormwater through vegetated areas located near the activity. For instance, many parking lots contain grassy islands, typically formed in a “hump.” By creating those islands as

depressions instead of humps, they can be used to treat runoff from the parking lot or roof. Also, don't forget the erosion control benefits of vegetation at a site.

7. Locate activities as far as possible from surface drainage paths:
Activities located as far as possible from known drainage paths, ditches, streams, other water bodies, and storm drains will be less likely to pollute, since it will take longer for material to reach the drainage feature. This gives more time to react to a spill, or if it is a "housekeeping" issue, may protect the local waters long enough for you to clean up the area around the activity. Don't forget that groundwater protection is important throughout the region, no matter where the activity is located, so the actions taken on your site on a day-to-day basis are always important, even in dry weather.

8. Maintain stormwater drainage systems
Pollutants can concentrate over time in storm drainage structures such as catch basins, ditches, and storm drains. When a large storm event occurs, it can mobilize these pollutants and carry them to receiving waters. Develop and implement maintenance practices, inspections, and schedules for treatment facilities (e.g., detention ponds, oil/water separators, vegetated swales). Clean oils, debris, sludge, etc., from all BMP systems regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems, to prevent the contamination of stormwater. Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills. Also repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater. Requirements for cleaning stormwater facilities are discussed in Volume IV of the 2019 Ecology Manual, specifically BMP S417. Maintenance standards can be found in Appendix V-A: BMP Maintenance Tables.

9. Reduce, reuse, and recycle as much as possible
Always look for ways to recycle instead of just disposing. This can save money as well as keep both hazardous and non-hazardous materials out of the landfills. Learn more about other businesses that have made process changes allowing recycling of chemicals by calling Ecology at 1-800-RECYCLE and requesting publications No. 92-45 and No. 90-22. Another unique recycling opportunity for businesses is available through the Industrial Materials Exchange. This free service acts as a waste or surplus "matchmaker," helping one company's waste become another company's asset. For instance, waste vegetable oil can become biofuel for another business. Call Industrial Materials Exchange at (206) 625-6232 to list potentially usable solid or chemical waste in their publication.

10. Be an advocate for stormwater pollution prevention
Help friends, neighbors, and business associates find ways to reduce stormwater pollution in their activities. Most people want clean water and do not pollute intentionally. Share your ideas and the BMPs in this chapter to get them thinking about how their everyday activities effect water quality.

11. Report problems
We all must do our part to protect water, fish, wildlife, and our own health by implementing proper BMPs, and reporting water quality problems that we observe. Contact your jurisdiction about the department that should be contacted in case of a spill. You may also contact Ecology's Southwest Regional Office at (360) 407-6300.

12. Provide oversight and training
Assign one or more individuals at your place of business to be responsible for stormwater pollution control. Hold regular meetings to review the overall operation of BMPs. Establish responsibilities for inspections, operation and maintenance (O&M), documentation, and availability for emergency situations. Train all team members in the operation, maintenance, and inspection of BMPs and reporting procedures.

13. Dust control
Sweep paved material handling and storage areas regularly as needed, to collect and dispose of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water.

14. Eliminate illicit connections
An illicit connection is formally defined in the City's NPDES Municipal Stormwater Permit, but generally includes any connection to the city stormwater system that is not intended, permitted, or used for collecting and conveying stormwater. A common problem with the stormwater drainage system for most communities is the existence of illicit connections of wastewater to the storm drainage system. Wastewater other than stormwater runoff, such as wash water, must be discharged to a wastewater collection system, and may not be discharged to a storm drainage system (the storm drainage system does not drain to a wastewater treatment plant). Many businesses and residences have internal building drains, sump overflows, process wastewater discharges, and even sanitary sewer and septic system pipes that were connected to the nearby storm drainage system in the past as a matter of course. All businesses and residences must examine their plumbing systems to determine if illicit connections exist. Any time it is found that toilets, sinks, appliances, showers and bathtubs, floor drains, industrial process waters, and/or other indoor activities are connected to the stormwater drainage system, these connections must be immediately rerouted to the sanitary or septic system, holding tanks, or a process treatment system.

15. Dispose of waste properly
Every business and residence in the city must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally four options for disposal depending on the type of materials. These options include:

- Sanitary sewer and septic systems
- Recycling facilities
- Municipal solid waste disposal facilities
- Hazardous waste treatment, storage, and disposal facilities

APPENDIX A
MAINTENANCE CHECKLISTS

Inspection and Maintenance Requirements for Detention Ponds

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General	Trash & debris	• Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. • If less than threshold, remove trash and debris 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 the 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			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General (cont.)	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			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General (cont.)	Tree growth and hazard trees	• Tree growth does not allow maintenance 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 civil engineer should be consulted to resolve source of erosion.			

Inspection and Maintenance Requirements for Detention Ponds

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
Storage area	Sediment accumulation	• Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inlets or outlets of the facility.	• Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.			
	Liner damage (if applicable)	• Liner is visible and has more than three 1/4-inch holes in it.	• Liner repaired or replaced. • Liner is fully covered.			
Pond berms (dikes)	Settlement	• 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. • A licensed civil engineer should be consulted to determine the source of the settlement.	• Dike is built back to the design elevation.			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
Pond berms (dikes) (cont.)	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 and berms over 4 feet in height	Excessive 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 civil engineer 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.			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
Emergency overflow/ spillway	Missing rock	• 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.	• Rocks and pad depth are restored to design standards. *Rip-rap on inside slopes need not be replaced.*			
	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 civil engineer should be consulted to resolve source of erosion.			

Inspection and Maintenance Requirements for Control Structure/ Flow Restrictor

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
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 securely attached to wall and outlet pipe.			
		• Structure is not in upright position (allow up to 10% from plumb).	• Structure in correct position.			
		• Connections to outlet pipe are not watertight and show signs of rust.	• Connections to outlet pipe are water tight. • Structure repaired or replaced and works as designed.			
		• Any holes--other than designed holes--in the structure.	• Structure has no holes other than designed holes.			

Inspection and Maintenance Requirements for Control Structure/ Flow Restrictor

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
Cleanout gate	Damaged or missing cleanout gate	• Cleanout gate is not watertight or is missing.	• Gate is watertight and works as designed.			
		• Gate cannot be moved up and down by one maintenance person.	• Gate moves up and down easily and is watertight.			
		• Chain/rod leading to gate is missing or damaged.	• Chain is in place and works as designed.			
		• Gate is rusted over 50% of its surface area.	• Gate is repaired or replaced to meet design standards.			
Orifice plate	Damaged or missing orifice plate	• 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 to orifice plate	• Any trash, debris, sediment, or vegetation blocking the plate.	• Plate is free of all obstructions and works as designed.			
Overflow pipe	Obstructions to overflow pipe	• 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	Refer to Closed Detention Systems (Tanks/Vaults) maintenance checklist					
Catch basin	Refer to Catch Basin maintenance checklist					

Inspection and Maintenance Requirements for Infiltration Drainline

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General	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			
	Sediment accumulation in drainline	• Water ponding in infiltration area after rainfall ceases and appropriate time has been allowed for infiltration.	• Sediment is removed and/or facility is jetted/cleaned so that infiltration system works according to design.			
	Pre-settling facility / sump filled with sediment and/or debris	• 6 inches or designed maximum depth of sediment.	• Sediment is removed.			

Inspection and Maintenance Requirements for Trench Drains

CITY OF SEQUIM

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General	Trash & debris	• Trash and debris inside grate, especially if near outlet.	• Trash and debris cleared from drain.			
	Vegetation	• Vegetation growing in the drain. • Any evidence of poisonous or noxious weeds as defined by State or local regulations.	• No vegetation, or danger of poisonous vegetation where maintenance personnel might normally be.			
	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			
	Sediment accumulation	• Sediment in trench and water ponding inside trench after rainfall ceases and appropriate time allowed for infiltration. *A percolation test of facility indicates it is working at 90% of its designed capabilities. Test every 2 to 5 years.*	• Sediment is removed and/or facility is cleaned so that infiltration system works according to design.			

Inspection and Maintenance for Catch Basins

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General	Trash & debris	• Trash or debris which is located immediately in front of the catch basin opening or is blocking inlet capacity of the basin by more than 10%.	• No trash or debris located immediately in front of catch basin or on grate opening.			
		• 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.	• No trash or debris in the catch basin.			
		• Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	• Inlet and outlet pipes free of trash or debris.			
		• Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	• No dead animals or vegetation present within the catch basin.			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General (cont.)	Sediment	• Sediment 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.	• Top slab is free of holes and cracks.			
		• 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	• 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.	• Basin replaced or repaired to design standards.			
		• 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.	• Pipe is regrouted and secure at basin wall.			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
General (cont.)	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.	• No vegetation blocking opening to basin.			
		• Vegetation growing in inlet/ outlet pipe joints that is more than six inches tall and less than six inches apart.	• No vegetation or root growth present.			
	Contaminants and pollution	• Any evidence of oil, gasoline, contaminants or other pollutants. *Coordinate removal/cleanup with local water quality response agency*.	• No pollution present			
Catch basin cover	Cover not in place	• Cover is missing or only partially in place. Any open catch basin requires maintenance.	• Catch basin cover is closed			
	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.			

Maintenance Checklist

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance Is Performed	Satisfactory	Unsatisfactory	Comments
Catch basin cover (cont.)	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 grates	• Grate missing or broken member(s) of the grate.	• Grate is in place and meets design standards.			

APPENDIX 10
DESIGN CALCULATIONS AND COMPUTATIONS

WWHM2012

PROJECT REPORT

FLOW CONTROL

BASIN 1

General Model Information

WWHM2012 Project Name: C22-272 Infiltration Gallery 1

Site Name:	C22-272 H4H Brownfield
Site Address:	
City:	Sequim
Report Date:	10/16/2024
Gage:	Port Angelis
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

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Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.56
Pervious Total	0.56
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.56

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

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Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.26
Pervious Total	0.26

Impervious Land Use	acre
ROADS FLAT	0.2
SIDEWALKS FLAT	0.09
Impervious Total	0.29
Basin Total	0.55

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Gravel Trench Bed 1	Gravel Trench Bed 1	

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Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	66.00 ft.
Bottom Width:	18.00 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:	7
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:	0.4
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	23.212
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	23.212
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	6 ft.
Riser Diameter:	10 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

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Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.027	0.000	0.000	0.000
0.0778	0.027	0.000	0.000	0.011
0.1556	0.027	0.001	0.000	0.011
0.2333	0.027	0.002	0.000	0.011
0.3111	0.027	0.003	0.000	0.011
0.3889	0.027	0.004	0.000	0.011
0.4667	0.027	0.005	0.000	0.011
0.5444	0.027	0.005	0.000	0.011
0.6222	0.027	0.006	0.000	0.011
0.7000	0.027	0.007	0.000	0.011
0.7778	0.027	0.008	0.000	0.011
0.8556	0.027	0.009	0.000	0.011
0.9333	0.027	0.010	0.000	0.011
1.0111	0.027	0.011	0.000	0.011
1.0889	0.027	0.011	0.000	0.011
1.1667	0.027	0.012	0.000	0.011
1.2444	0.027	0.013	0.000	0.011
1.3222	0.027	0.014	0.000	0.011
1.4000	0.027	0.015	0.000	0.011
1.4778	0.027	0.016	0.000	0.011
1.5556	0.027	0.017	0.000	0.011
1.6333	0.027	0.017	0.000	0.011

1.7111	0.027	0.018	0.000	0.011
1.7889	0.027	0.019	0.000	0.011
1.8667	0.027	0.020	0.000	0.011
1.9444	0.027	0.021	0.000	0.011
2.0222	0.027	0.022	0.000	0.011
2.1000	0.027	0.022	0.000	0.011
2.1778	0.027	0.023	0.000	0.011
2.2556	0.027	0.024	0.000	0.011
2.3333	0.027	0.025	0.000	0.011
2.4111	0.027	0.026	0.000	0.011
2.4889	0.027	0.027	0.000	0.011
2.5667	0.027	0.028	0.000	0.011
2.6444	0.027	0.028	0.000	0.011
2.7222	0.027	0.029	0.000	0.011
2.8000	0.027	0.030	0.000	0.011
2.8778	0.027	0.031	0.000	0.011
2.9556	0.027	0.032	0.000	0.011
3.0333	0.027	0.033	0.000	0.011
3.1111	0.027	0.033	0.000	0.011
3.1889	0.027	0.034	0.000	0.011
3.2667	0.027	0.035	0.000	0.011
3.3444	0.027	0.036	0.000	0.011
3.4222	0.027	0.037	0.000	0.011
3.5000	0.027	0.038	0.000	0.011
3.5778	0.027	0.039	0.000	0.011
3.6556	0.027	0.039	0.000	0.011
3.7333	0.027	0.040	0.000	0.011
3.8111	0.027	0.041	0.000	0.011
3.8889	0.027	0.042	0.000	0.011
3.9667	0.027	0.043	0.000	0.011
4.0444	0.027	0.044	0.000	0.011
4.1222	0.027	0.045	0.000	0.011
4.2000	0.027	0.045	0.000	0.011
4.2778	0.027	0.046	0.000	0.011
4.3556	0.027	0.047	0.000	0.011
4.4333	0.027	0.048	0.000	0.011
4.5111	0.027	0.049	0.000	0.011
4.5889	0.027	0.050	0.000	0.011
4.6667	0.027	0.050	0.000	0.011
4.7444	0.027	0.051	0.000	0.011
4.8222	0.027	0.052	0.000	0.011
4.9000	0.027	0.053	0.000	0.011
4.9778	0.027	0.054	0.000	0.011
5.0556	0.027	0.055	0.000	0.011
5.1333	0.027	0.056	0.000	0.011
5.2111	0.027	0.056	0.000	0.011
5.2889	0.027	0.057	0.000	0.011
5.3667	0.027	0.058	0.000	0.011
5.4444	0.027	0.059	0.000	0.011
5.5222	0.027	0.060	0.000	0.011
5.6000	0.027	0.061	0.000	0.011
5.6778	0.027	0.061	0.000	0.011
5.7556	0.027	0.062	0.000	0.011
5.8333	0.027	0.063	0.000	0.011
5.9111	0.027	0.064	0.000	0.011
5.9889	0.027	0.065	0.000	0.011
6.0667	0.027	0.066	0.151	0.011
6.1444	0.027	0.067	0.471	0.011

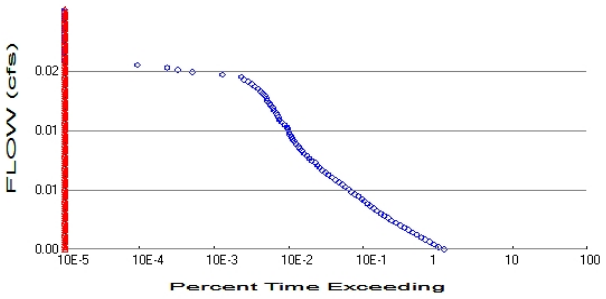
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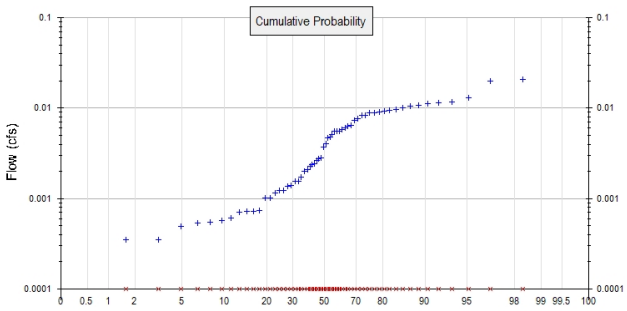
6.2222	0.027	0.067	0.835	0.011
6.3000	0.027	0.068	1.145	0.011
6.3778	0.027	0.069	1.337	0.011
6.4556	0.027	0.070	1.476	0.011
6.5333	0.027	0.071	1.597	0.011
6.6111	0.027	0.072	1.709	0.011
6.6889	0.027	0.073	1.815	0.011
6.7667	0.027	0.073	1.915	0.011
6.8444	0.027	0.074	2.009	0.011
6.9222	0.027	0.075	2.100	0.011
7.0000	0.027	0.076	2.187	0.011

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Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.56
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.26
Total Impervious Area: 0.29

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.003168
5 year	0.008107
10 year	0.01269
25 year	0.019828
50 year	0.026013
100 year	0.032845

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.001	0.000
1950	0.006	0.000
1951	0.004	0.000
1952	0.001	0.000
1953	0.001	0.000
1954	0.011	0.000
1955	0.011	0.000
1956	0.004	0.000
1957	0.006	0.000
1958	0.001	0.000

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1959	0.006	0.000
1960	0.010	0.000
1961	0.012	0.000
1962	0.001	0.000
1963	0.002	0.000
1964	0.003	0.000
1965	0.001	0.000
1966	0.001	0.000
1967	0.011	0.000
1968	0.002	0.000
1969	0.001	0.000
1970	0.001	0.000
1971	0.009	0.000
1972	0.013	0.000
1973	0.002	0.000
1974	0.001	0.000
1975	0.002	0.000
1976	0.003	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.006	0.000
1981	0.005	0.000
1982	0.009	0.000
1983	0.008	0.000
1984	0.002	0.000
1985	0.008	0.000
1986	0.020	0.000
1987	0.007	0.000
1988	0.003	0.000
1989	0.002	0.000
1990	0.005	0.000
1991	0.009	0.000
1992	0.011	0.000
1993	0.001	0.000
1994	0.000	0.000
1995	0.001	0.000
1996	0.005	0.000
1997	0.006	0.000
1998	0.001	0.000
1999	0.021	0.000
2000	0.006	0.000
2001	0.001	0.000
2002	0.008	0.000
2003	0.006	0.000
2004	0.009	0.000
2005	0.001	0.000
2006	0.010	0.000
2007	0.010	0.000
2008	0.002	0.000
2009	0.002	0.000

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0206	0.0000
2	0.0200	0.0000
3	0.0130	0.0000

4	0.0118	0.0000
5	0.0114	0.0000
6	0.0113	0.0000
7	0.0107	0.0000
8	0.0106	0.0000
9	0.0101	0.0000
10	0.0097	0.0000
11	0.0096	0.0000
12	0.0093	0.0000
13	0.0090	0.0000
14	0.0089	0.0000
15	0.0088	0.0000
16	0.0084	0.0000
17	0.0084	0.0000
18	0.0077	0.0000
19	0.0073	0.0000
20	0.0065	0.0000
21	0.0064	0.0000
22	0.0060	0.0000
23	0.0058	0.0000
24	0.0056	0.0000
25	0.0056	0.0000
26	0.0055	0.0000
27	0.0051	0.0000
28	0.0048	0.0000
29	0.0047	0.0000
30	0.0040	0.0000
31	0.0037	0.0000
32	0.0028	0.0000
33	0.0028	0.0000
34	0.0026	0.0000
35	0.0024	0.0000
36	0.0024	0.0000
37	0.0023	0.0000
38	0.0021	0.0000
39	0.0020	0.0000
40	0.0017	0.0000
41	0.0016	0.0000
42	0.0015	0.0000
43	0.0014	0.0000
44	0.0014	0.0000
45	0.0012	0.0000
46	0.0012	0.0000
47	0.0012	0.0000
48	0.0010	0.0000
49	0.0010	0.0000
50	0.0007	0.0000
51	0.0007	0.0000
52	0.0007	0.0000
53	0.0007	0.0000
54	0.0006	0.0000
55	0.0006	0.0000
56	0.0005	0.0000
57	0.0005	0.0000
58	0.0005	0.0000
59	0.0004	0.0000
60	0.0003	0.0000
61	0.0001	0.0000

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0016	25667	0	0	Pass
0.0018	21988	0	0	Pass
0.0021	18914	0	0	Pass
0.0023	16433	0	0	Pass
0.0026	14442	0	0	Pass
0.0028	12684	0	0	Pass
0.0031	11144	0	0	Pass
0.0033	9854	0	0	Pass
0.0036	8656	0	0	Pass
0.0038	7584	0	0	Pass
0.0041	6654	0	0	Pass
0.0043	5846	0	0	Pass
0.0045	5142	0	0	Pass
0.0048	4573	0	0	Pass
0.0050	4094	0	0	Pass
0.0053	3679	0	0	Pass
0.0055	3292	0	0	Pass
0.0058	2956	0	0	Pass
0.0060	2659	0	0	Pass
0.0063	2423	0	0	Pass
0.0065	2222	0	0	Pass
0.0068	2038	0	0	Pass
0.0070	1847	0	0	Pass
0.0073	1645	0	0	Pass
0.0075	1486	0	0	Pass
0.0078	1359	0	0	Pass
0.0080	1238	0	0	Pass
0.0082	1122	0	0	Pass
0.0085	997	0	0	Pass
0.0087	902	0	0	Pass
0.0090	816	0	0	Pass
0.0092	721	0	0	Pass
0.0095	661	0	0	Pass
0.0097	603	0	0	Pass
0.0100	559	0	0	Pass
0.0102	519	0	0	Pass
0.0105	484	0	0	Pass
0.0107	433	0	0	Pass
0.0110	402	0	0	Pass
0.0112	376	0	0	Pass
0.0115	342	0	0	Pass
0.0117	323	0	0	Pass
0.0119	303	0	0	Pass
0.0122	288	0	0	Pass
0.0124	267	0	0	Pass
0.0127	250	0	0	Pass
0.0129	239	0	0	Pass
0.0132	231	0	0	Pass
0.0134	222	0	0	Pass
0.0137	217	0	0	Pass
0.0139	210	0	0	Pass
0.0142	203	0	0	Pass
0.0144	188	0	0	Pass

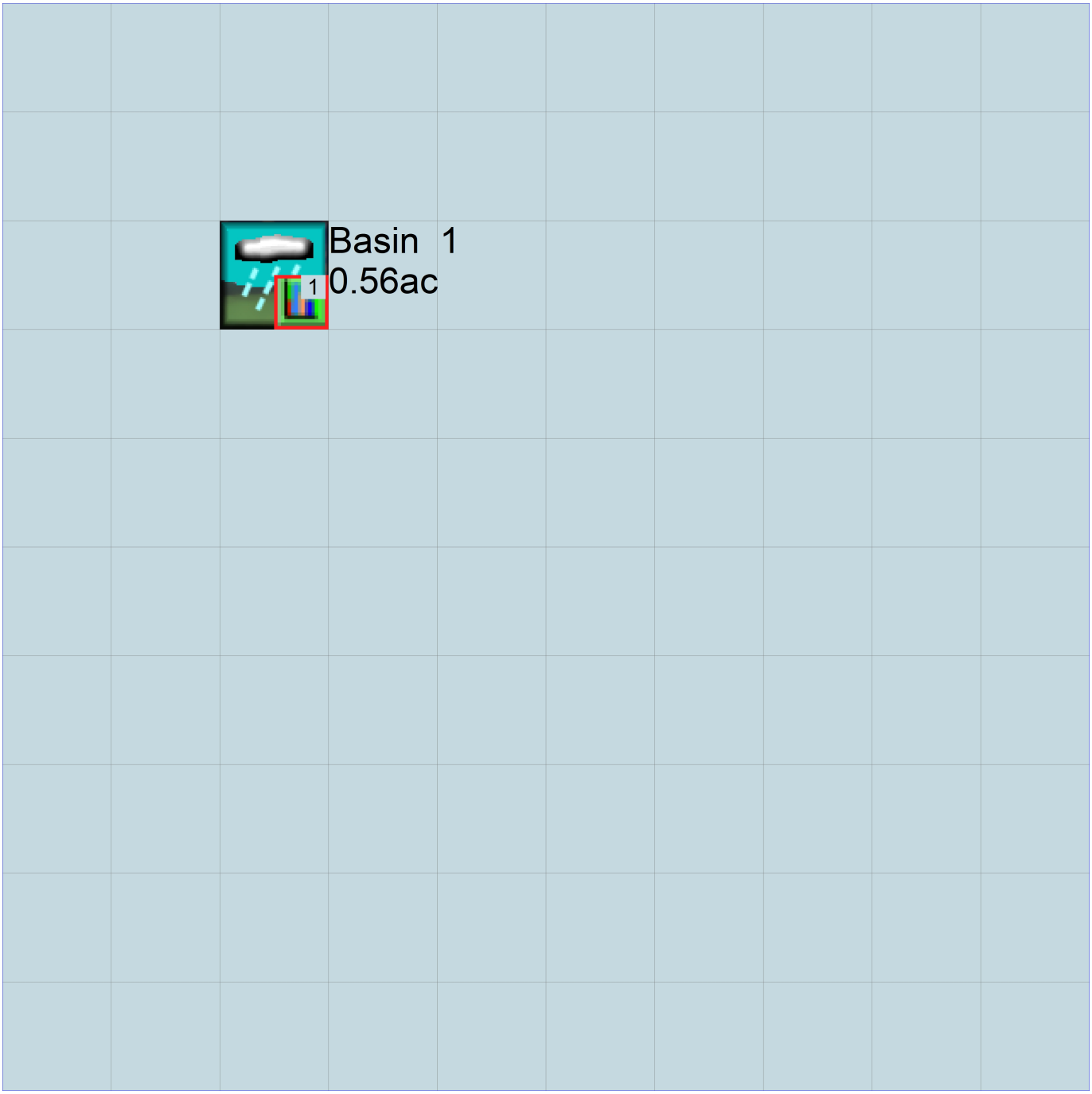
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0.0147	173	0	0	Pass
0.0149	162	0	0	Pass
0.0152	155	0	0	Pass
0.0154	150	0	0	Pass
0.0156	146	0	0	Pass
0.0159	137	0	0	Pass
0.0161	130	0	0	Pass
0.0164	122	0	0	Pass
0.0166	118	0	0	Pass
0.0169	111	0	0	Pass
0.0171	108	0	0	Pass
0.0174	102	0	0	Pass
0.0176	95	0	0	Pass
0.0179	90	0	0	Pass
0.0181	83	0	0	Pass
0.0184	76	0	0	Pass
0.0186	68	0	0	Pass
0.0189	61	0	0	Pass
0.0191	54	0	0	Pass
0.0194	50	0	0	Pass
0.0196	28	0	0	Pass
0.0198	11	0	0	Pass
0.0201	7	0	0	Pass
0.0203	5	0	0	Pass
0.0206	2	0	0	Pass
0.0208	0	0	0	Pass
0.0211	0	0	0	Pass
0.0213	0	0	0	Pass
0.0216	0	0	0	Pass
0.0218	0	0	0	Pass
0.0221	0	0	0	Pass
0.0223	0	0	0	Pass
0.0226	0	0	0	Pass
0.0228	0	0	0	Pass
0.0231	0	0	0	Pass
0.0233	0	0	0	Pass
0.0235	0	0	0	Pass
0.0238	0	0	0	Pass
0.0240	0	0	0	Pass
0.0243	0	0	0	Pass
0.0245	0	0	0	Pass
0.0248	0	0	0	Pass
0.0250	0	0	0	Pass
0.0253	0	0	0	Pass
0.0255	0	0	0	Pass
0.0258	0	0	0	Pass
0.0260	0	0	0	Pass

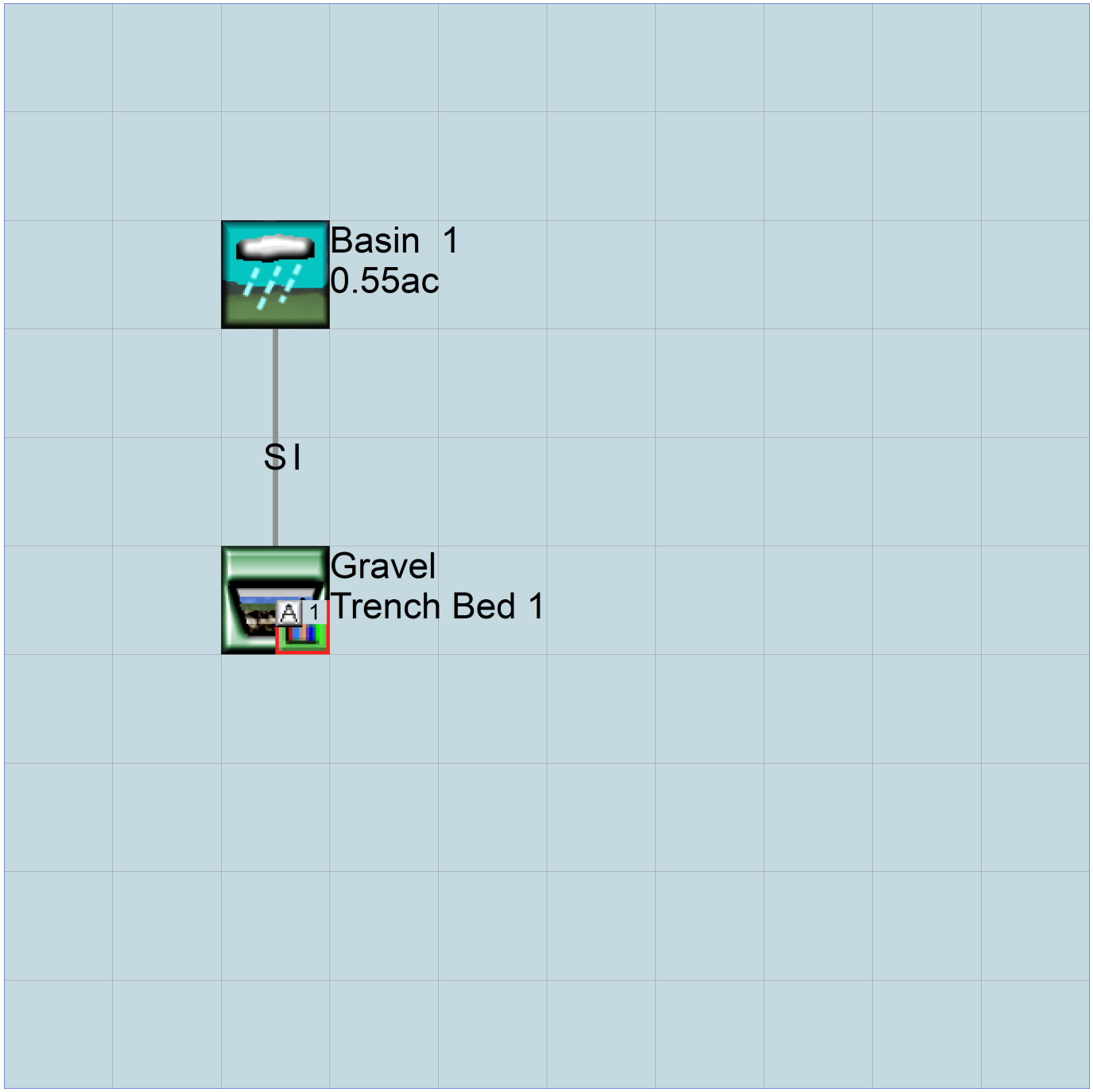
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Appendix

Predeveloped Schematic



Mitigated Schematic



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WWHM2012

PROJECT REPORT

FLOW CONTROL

BASIN 2

General Model Information

WWHM2012 Project Name: C22-272 Infiltration Gallery 2

Site Name:	C22-272 H4H Brownfield
Site Address:	
City:	Sequim
Report Date:	10/16/2024
Gage:	Port Angelis
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

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Landuse Basin Data

Predeveloped Land Use

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.26
Pervious Total	0.26
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.26

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

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Mitigated Land Use

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.14
Pervious Total	0.14

Impervious Land Use	acre
ROADS FLAT	0.07
SIDEWALKS FLAT	0.05
Impervious Total	0.12
Basin Total	0.26

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Gravel Trench Bed 2	Gravel Trench Bed 2	

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Mitigated Routing

Gravel Trench Bed 2

Bottom Length:	106.00 ft.
Bottom Width:	6.00 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:	5
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:	0.4
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	9.905
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	9.905
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	4.5 ft.
Riser Diameter:	10 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

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Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.014	0.000	0.000	0.000
0.0556	0.014	0.000	0.000	0.005
0.1111	0.014	0.000	0.000	0.005
0.1667	0.014	0.001	0.000	0.005
0.2222	0.014	0.001	0.000	0.005
0.2778	0.014	0.001	0.000	0.005
0.3333	0.014	0.001	0.000	0.005
0.3889	0.014	0.002	0.000	0.005
0.4444	0.014	0.002	0.000	0.005
0.5000	0.014	0.002	0.000	0.005
0.5556	0.014	0.003	0.000	0.005
0.6111	0.014	0.003	0.000	0.005
0.6667	0.014	0.003	0.000	0.005
0.7222	0.014	0.004	0.000	0.005
0.7778	0.014	0.004	0.000	0.005
0.8333	0.014	0.004	0.000	0.005
0.8889	0.014	0.005	0.000	0.005
0.9444	0.014	0.005	0.000	0.005
1.0000	0.014	0.005	0.000	0.005
1.0556	0.014	0.006	0.000	0.005
1.1111	0.014	0.006	0.000	0.005
1.1667	0.014	0.006	0.000	0.005

1.2222	0.014	0.007	0.000	0.005
1.2778	0.014	0.007	0.000	0.005
1.3333	0.014	0.007	0.000	0.005
1.3889	0.014	0.008	0.000	0.005
1.4444	0.014	0.008	0.000	0.005
1.5000	0.014	0.008	0.000	0.005
1.5556	0.014	0.009	0.000	0.005
1.6111	0.014	0.009	0.000	0.005
1.6667	0.014	0.009	0.000	0.005
1.7222	0.014	0.010	0.000	0.005
1.7778	0.014	0.010	0.000	0.005
1.8333	0.014	0.010	0.000	0.005
1.8889	0.014	0.011	0.000	0.005
1.9444	0.014	0.011	0.000	0.005
2.0000	0.014	0.011	0.000	0.005
2.0556	0.014	0.012	0.000	0.005
2.1111	0.014	0.012	0.000	0.005
2.1667	0.014	0.012	0.000	0.005
2.2222	0.014	0.013	0.000	0.005
2.2778	0.014	0.013	0.000	0.005
2.3333	0.014	0.013	0.000	0.005
2.3889	0.014	0.014	0.000	0.005
2.4444	0.014	0.014	0.000	0.005
2.5000	0.014	0.014	0.000	0.005
2.5556	0.014	0.014	0.000	0.005
2.6111	0.014	0.015	0.000	0.005
2.6667	0.014	0.015	0.000	0.005
2.7222	0.014	0.015	0.000	0.005
2.7778	0.014	0.016	0.000	0.005
2.8333	0.014	0.016	0.000	0.005
2.8889	0.014	0.016	0.000	0.005
2.9444	0.014	0.017	0.000	0.005
3.0000	0.014	0.017	0.000	0.005
3.0556	0.014	0.017	0.000	0.005
3.1111	0.014	0.018	0.000	0.005
3.1667	0.014	0.018	0.000	0.005
3.2222	0.014	0.018	0.000	0.005
3.2778	0.014	0.019	0.000	0.005
3.3333	0.014	0.019	0.000	0.005
3.3889	0.014	0.019	0.000	0.005
3.4444	0.014	0.020	0.000	0.005
3.5000	0.014	0.020	0.000	0.005
3.5556	0.014	0.020	0.000	0.005
3.6111	0.014	0.021	0.000	0.005
3.6667	0.014	0.021	0.000	0.005
3.7222	0.014	0.021	0.000	0.005
3.7778	0.014	0.022	0.000	0.005
3.8333	0.014	0.022	0.000	0.005
3.8889	0.014	0.022	0.000	0.005
3.9444	0.014	0.023	0.000	0.005
4.0000	0.014	0.023	0.000	0.005
4.0556	0.014	0.023	0.000	0.005
4.1111	0.014	0.024	0.000	0.005
4.1667	0.014	0.024	0.000	0.005
4.2222	0.014	0.024	0.000	0.005
4.2778	0.014	0.025	0.000	0.005
4.3333	0.014	0.025	0.000	0.005
4.3889	0.014	0.025	0.000	0.005

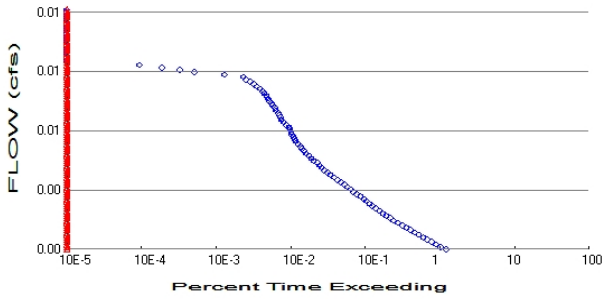
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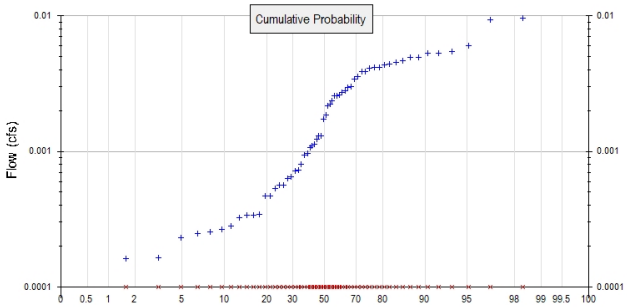
4.4444	0.014	0.026	0.000	0.005
4.5000	0.014	0.026	0.000	0.005
4.5556	0.014	0.026	0.115	0.005
4.6111	0.014	0.026	0.323	0.005
4.6667	0.014	0.027	0.575	0.005
4.7222	0.014	0.027	0.835	0.005
4.7778	0.014	0.027	1.067	0.005
4.8333	0.014	0.028	1.242	0.005
4.8889	0.014	0.028	1.355	0.005
4.9444	0.014	0.028	1.458	0.005
5.0000	0.014	0.029	1.546	0.005

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Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.26
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.14
Total Impervious Area: 0.12

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.001471
5 year	0.003764
10 year	0.005892
25 year	0.009206
50 year	0.012078
100 year	0.01525

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.001	0.000
1950	0.003	0.000
1951	0.002	0.000
1952	0.000	0.000
1953	0.001	0.000
1954	0.005	0.000
1955	0.005	0.000
1956	0.002	0.000
1957	0.003	0.000
1958	0.000	0.000

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1959	0.003	0.000
1960	0.004	0.000
1961	0.005	0.000
1962	0.000	0.000
1963	0.001	0.000
1964	0.001	0.000
1965	0.001	0.000
1966	0.001	0.000
1967	0.005	0.000
1968	0.001	0.000
1969	0.000	0.000
1970	0.000	0.000
1971	0.004	0.000
1972	0.006	0.000
1973	0.001	0.000
1974	0.001	0.000
1975	0.001	0.000
1976	0.001	0.000
1977	0.000	0.000
1978	0.000	0.000
1979	0.000	0.000
1980	0.003	0.000
1981	0.002	0.000
1982	0.004	0.000
1983	0.004	0.000
1984	0.001	0.000
1985	0.004	0.000
1986	0.009	0.000
1987	0.003	0.000
1988	0.001	0.000
1989	0.001	0.000
1990	0.002	0.000
1991	0.004	0.000
1992	0.005	0.000
1993	0.000	0.000
1994	0.000	0.000
1995	0.000	0.000
1996	0.002	0.000
1997	0.003	0.000
1998	0.000	0.000
1999	0.010	0.000
2000	0.003	0.000
2001	0.000	0.000
2002	0.004	0.000
2003	0.003	0.000
2004	0.004	0.000
2005	0.000	0.000
2006	0.005	0.000
2007	0.005	0.000
2008	0.001	0.000
2009	0.001	0.000

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0096	0.0000
2	0.0093	0.0000
3	0.0061	0.0000

4	0.0055	0.0000
5	0.0053	0.0000
6	0.0053	0.0000
7	0.0050	0.0000
8	0.0049	0.0000
9	0.0047	0.0000
10	0.0045	0.0000
11	0.0044	0.0000
12	0.0043	0.0000
13	0.0042	0.0000
14	0.0041	0.0000
15	0.0041	0.0000
16	0.0039	0.0000
17	0.0039	0.0000
18	0.0036	0.0000
19	0.0034	0.0000
20	0.0030	0.0000
21	0.0030	0.0000
22	0.0028	0.0000
23	0.0027	0.0000
24	0.0026	0.0000
25	0.0026	0.0000
26	0.0026	0.0000
27	0.0024	0.0000
28	0.0022	0.0000
29	0.0022	0.0000
30	0.0019	0.0000
31	0.0017	0.0000
32	0.0013	0.0000
33	0.0013	0.0000
34	0.0012	0.0000
35	0.0011	0.0000
36	0.0011	0.0000
37	0.0011	0.0000
38	0.0010	0.0000
39	0.0009	0.0000
40	0.0008	0.0000
41	0.0007	0.0000
42	0.0007	0.0000
43	0.0006	0.0000
44	0.0006	0.0000
45	0.0006	0.0000
46	0.0006	0.0000
47	0.0005	0.0000
48	0.0005	0.0000
49	0.0005	0.0000
50	0.0003	0.0000
51	0.0003	0.0000
52	0.0003	0.0000
53	0.0003	0.0000
54	0.0003	0.0000
55	0.0003	0.0000
56	0.0003	0.0000
57	0.0002	0.0000
58	0.0002	0.0000
59	0.0002	0.0000
60	0.0002	0.0000
61	0.0001	0.0000

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0007	25667	0	0	Pass
0.0009	21966	0	0	Pass
0.0010	18925	0	0	Pass
0.0011	16433	0	0	Pass
0.0012	14457	0	0	Pass
0.0013	12684	0	0	Pass
0.0014	11150	0	0	Pass
0.0015	9854	0	0	Pass
0.0017	8654	0	0	Pass
0.0018	7587	0	0	Pass
0.0019	6652	0	0	Pass
0.0020	5852	0	0	Pass
0.0021	5142	0	0	Pass
0.0022	4575	0	0	Pass
0.0023	4094	0	0	Pass
0.0025	3677	0	0	Pass
0.0026	3294	0	0	Pass
0.0027	2954	0	0	Pass
0.0028	2659	0	0	Pass
0.0029	2423	0	0	Pass
0.0030	2222	0	0	Pass
0.0031	2038	0	0	Pass
0.0033	1845	0	0	Pass
0.0034	1645	0	0	Pass
0.0035	1486	0	0	Pass
0.0036	1359	0	0	Pass
0.0037	1237	0	0	Pass
0.0038	1124	0	0	Pass
0.0039	997	0	0	Pass
0.0041	901	0	0	Pass
0.0042	816	0	0	Pass
0.0043	721	0	0	Pass
0.0044	661	0	0	Pass
0.0045	604	0	0	Pass
0.0046	559	0	0	Pass
0.0047	519	0	0	Pass
0.0049	482	0	0	Pass
0.0050	432	0	0	Pass
0.0051	402	0	0	Pass
0.0052	376	0	0	Pass
0.0053	342	0	0	Pass
0.0054	323	0	0	Pass
0.0055	303	0	0	Pass
0.0057	287	0	0	Pass
0.0058	267	0	0	Pass
0.0059	248	0	0	Pass
0.0060	239	0	0	Pass
0.0061	231	0	0	Pass
0.0062	222	0	0	Pass
0.0063	216	0	0	Pass
0.0065	210	0	0	Pass
0.0066	203	0	0	Pass
0.0067	187	0	0	Pass

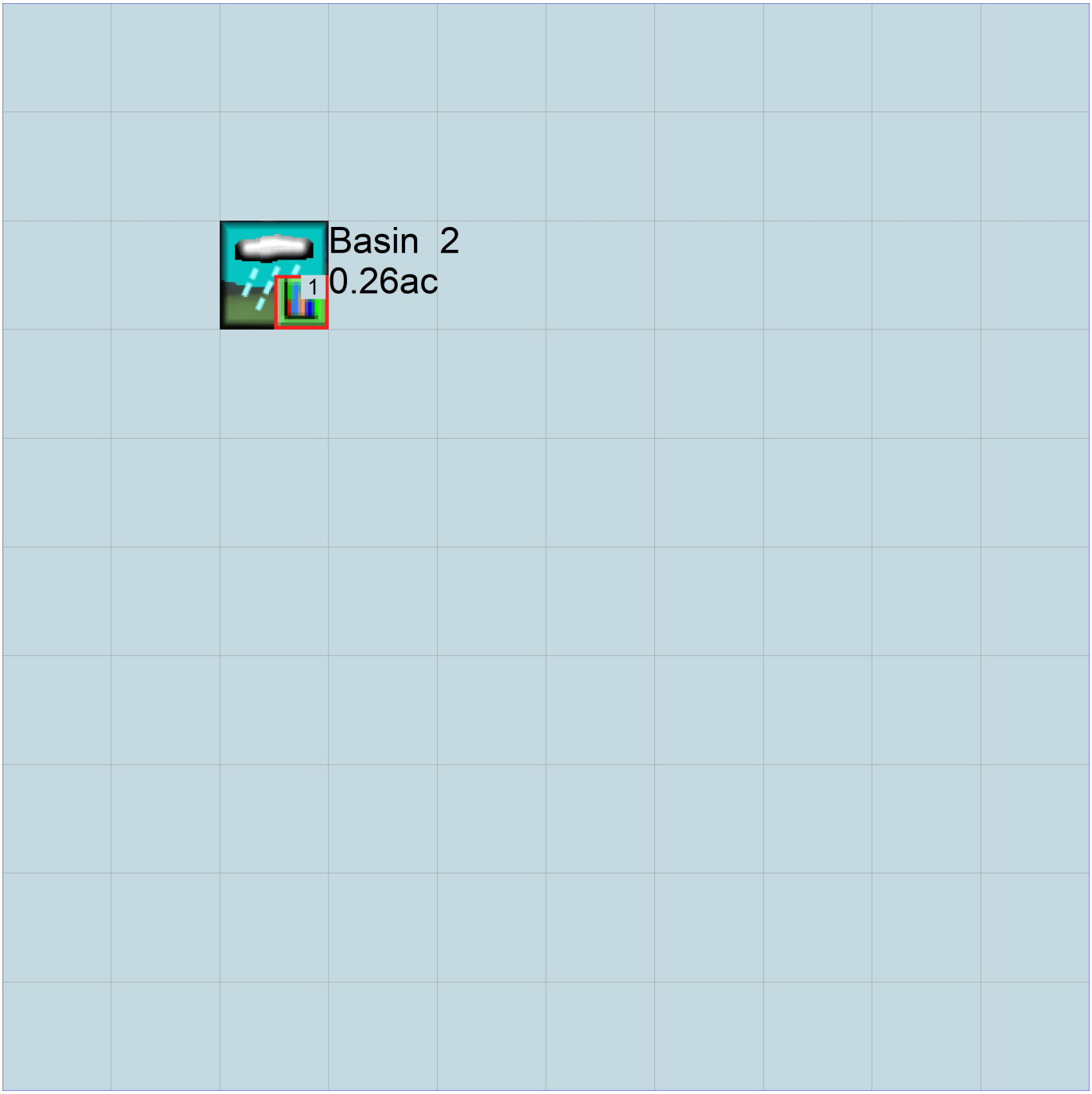
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0.0068	173	0	0	Pass
0.0069	162	0	0	Pass
0.0070	155	0	0	Pass
0.0072	150	0	0	Pass
0.0073	145	0	0	Pass
0.0074	136	0	0	Pass
0.0075	130	0	0	Pass
0.0076	122	0	0	Pass
0.0077	117	0	0	Pass
0.0078	111	0	0	Pass
0.0080	107	0	0	Pass
0.0081	101	0	0	Pass
0.0082	94	0	0	Pass
0.0083	90	0	0	Pass
0.0084	83	0	0	Pass
0.0085	76	0	0	Pass
0.0086	68	0	0	Pass
0.0088	61	0	0	Pass
0.0089	54	0	0	Pass
0.0090	50	0	0	Pass
0.0091	28	0	0	Pass
0.0092	11	0	0	Pass
0.0093	7	0	0	Pass
0.0094	4	0	0	Pass
0.0096	2	0	0	Pass
0.0097	0	0	0	Pass
0.0098	0	0	0	Pass
0.0099	0	0	0	Pass
0.0100	0	0	0	Pass
0.0101	0	0	0	Pass
0.0102	0	0	0	Pass
0.0104	0	0	0	Pass
0.0105	0	0	0	Pass
0.0106	0	0	0	Pass
0.0107	0	0	0	Pass
0.0108	0	0	0	Pass
0.0109	0	0	0	Pass
0.0110	0	0	0	Pass
0.0112	0	0	0	Pass
0.0113	0	0	0	Pass
0.0114	0	0	0	Pass
0.0115	0	0	0	Pass
0.0116	0	0	0	Pass
0.0117	0	0	0	Pass
0.0118	0	0	0	Pass
0.0120	0	0	0	Pass
0.0121	0	0	0	Pass

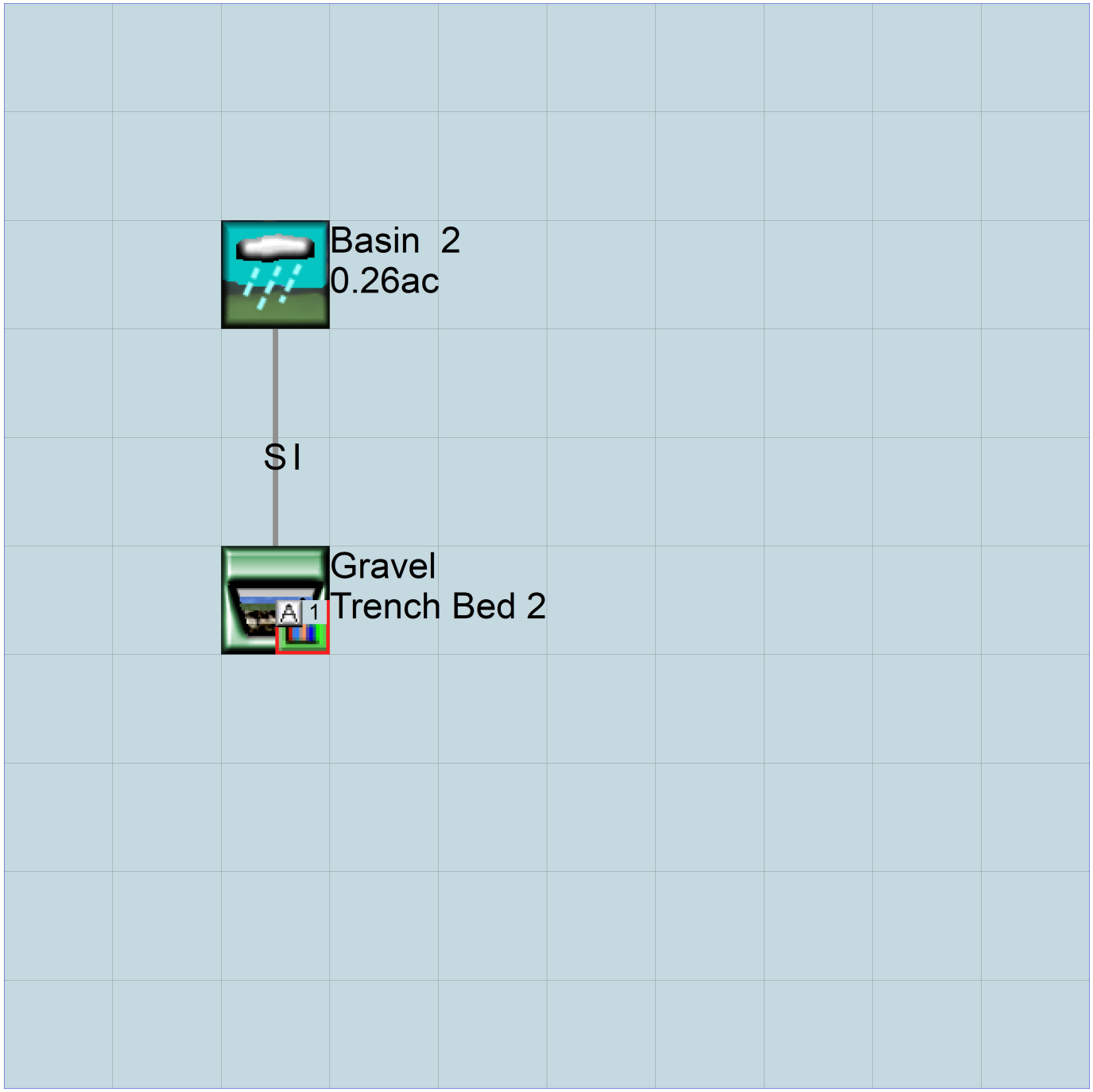
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Appendix

Predeveloped Schematic



Mitigated Schematic



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WWHM2012

PROJECT REPORT

FLOW CONTROL

BASIN 3

General Model Information

WWHM2012 Project Name: C22-272 Infiltration Gallery 3

Site Name:	C22-272 H4H Brownfield
Site Address:	
City:	Sequim
Report Date:	10/16/2024
Gage:	Port Angelis
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

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Landuse Basin Data

Predeveloped Land Use

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.92
Pervious Total	0.92
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

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Mitigated Land Use

Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.46
Pervious Total	0.46

Impervious Land Use	acre
ROADS FLAT	0.27
SIDEWALKS FLAT	0.19
Impervious Total	0.46
Basin Total	0.92

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Gravel Trench Bed 3	Gravel Trench Bed 3	

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Mitigated Routing

Gravel Trench Bed 3

Bottom Length:	106.00 ft.
Bottom Width:	9.85 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:	6.5
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:	1.86
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	37.249
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	37.249
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	5.5 ft.
Riser Diameter:	10 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

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Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.024	0.000	0.000	0.000
0.0722	0.024	0.000	0.000	0.045
0.1444	0.024	0.001	0.000	0.045
0.2167	0.024	0.002	0.000	0.045
0.2889	0.024	0.002	0.000	0.045
0.3611	0.024	0.003	0.000	0.045
0.4333	0.024	0.004	0.000	0.045
0.5056	0.024	0.004	0.000	0.045
0.5778	0.024	0.005	0.000	0.045
0.6500	0.024	0.006	0.000	0.045
0.7222	0.024	0.006	0.000	0.045
0.7944	0.024	0.007	0.000	0.045
0.8667	0.024	0.008	0.000	0.045
0.9389	0.024	0.009	0.000	0.045
1.0111	0.024	0.009	0.000	0.045
1.0833	0.024	0.010	0.000	0.045
1.1556	0.024	0.011	0.000	0.045
1.2278	0.024	0.011	0.000	0.045
1.3000	0.024	0.012	0.000	0.045
1.3722	0.024	0.013	0.000	0.045
1.4444	0.024	0.013	0.000	0.045
1.5167	0.024	0.014	0.000	0.045

1.5889	0.024	0.015	0.000	0.045
1.6611	0.024	0.015	0.000	0.045
1.7333	0.024	0.016	0.000	0.045
1.8056	0.024	0.017	0.000	0.045
1.8778	0.024	0.018	0.000	0.045
1.9500	0.024	0.018	0.000	0.045
2.0222	0.024	0.019	0.000	0.045
2.0944	0.024	0.020	0.000	0.045
2.1667	0.024	0.020	0.000	0.045
2.2389	0.024	0.021	0.000	0.045
2.3111	0.024	0.022	0.000	0.045
2.3833	0.024	0.022	0.000	0.045
2.4556	0.024	0.023	0.000	0.045
2.5278	0.024	0.024	0.000	0.045
2.6000	0.024	0.024	0.000	0.045
2.6722	0.024	0.025	0.000	0.045
2.7444	0.024	0.026	0.000	0.045
2.8167	0.024	0.027	0.000	0.045
2.8889	0.024	0.027	0.000	0.045
2.9611	0.024	0.028	0.000	0.045
3.0333	0.024	0.029	0.000	0.045
3.1056	0.024	0.029	0.000	0.045
3.1778	0.024	0.030	0.000	0.045
3.2500	0.024	0.031	0.000	0.045
3.3222	0.024	0.031	0.000	0.045
3.3944	0.024	0.032	0.000	0.045
3.4667	0.024	0.033	0.000	0.045
3.5389	0.024	0.033	0.000	0.045
3.6111	0.024	0.034	0.000	0.045
3.6833	0.024	0.035	0.000	0.045
3.7556	0.024	0.036	0.000	0.045
3.8278	0.024	0.036	0.000	0.045
3.9000	0.024	0.037	0.000	0.045
3.9722	0.024	0.038	0.000	0.045
4.0444	0.024	0.038	0.000	0.045
4.1167	0.024	0.039	0.000	0.045
4.1889	0.024	0.040	0.000	0.045
4.2611	0.024	0.040	0.000	0.045
4.3333	0.024	0.041	0.000	0.045
4.4056	0.024	0.042	0.000	0.045
4.4778	0.024	0.042	0.000	0.045
4.5500	0.024	0.043	0.000	0.045
4.6222	0.024	0.044	0.000	0.045
4.6944	0.024	0.045	0.000	0.045
4.7667	0.024	0.045	0.000	0.045
4.8389	0.024	0.046	0.000	0.045
4.9111	0.024	0.047	0.000	0.045
4.9833	0.024	0.047	0.000	0.045
5.0556	0.024	0.048	0.000	0.045
5.1278	0.024	0.049	0.000	0.045
5.2000	0.024	0.049	0.000	0.045
5.2722	0.024	0.050	0.000	0.045
5.3444	0.024	0.051	0.000	0.045
5.4167	0.024	0.051	0.000	0.045
5.4889	0.024	0.052	0.000	0.045
5.5611	0.024	0.053	0.133	0.045
5.6333	0.024	0.054	0.420	0.045
5.7056	0.024	0.054	0.758	0.045

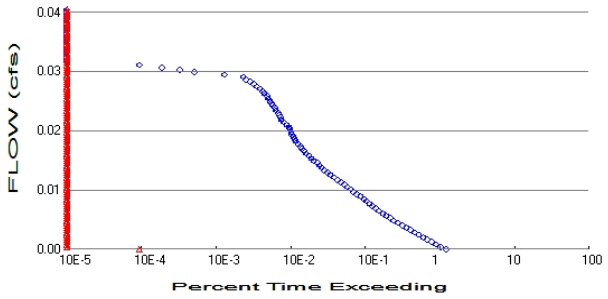
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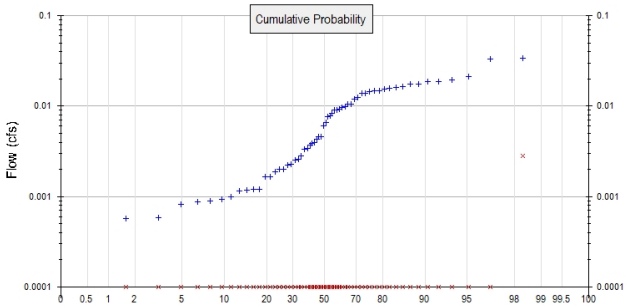
5.7778	0.024	0.055	1.067	0.045
5.8500	0.024	0.056	1.282	0.045
5.9222	0.024	0.056	1.421	0.045
5.9944	0.024	0.057	1.538	0.045
6.0667	0.024	0.058	1.646	0.045
6.1389	0.024	0.058	1.748	0.045
6.2111	0.024	0.059	1.844	0.045
6.2833	0.024	0.060	1.935	0.045
6.3556	0.024	0.060	2.023	0.045
6.4278	0.024	0.061	2.106	0.045
6.5000	0.024	0.062	2.187	0.045

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Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.92
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.46
Total Impervious Area: 0.46

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.005205
5 year	0.013319
10 year	0.020847
25 year	0.032575
50 year	0.042736
100 year	0.05396

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.002	0.000
1950	0.009	0.000
1951	0.007	0.000
1952	0.001	0.000
1953	0.002	0.000
1954	0.019	0.000
1955	0.017	0.000
1956	0.006	0.000
1957	0.011	0.000
1958	0.002	0.000

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1959	0.010	0.000
1960	0.016	0.000
1961	0.019	0.000
1962	0.001	0.000
1963	0.004	0.000
1964	0.005	0.000
1965	0.002	0.000
1966	0.002	0.000
1967	0.019	0.000
1968	0.003	0.000
1969	0.001	0.000
1970	0.001	0.000
1971	0.015	0.000
1972	0.021	0.000
1973	0.003	0.000
1974	0.002	0.000
1975	0.004	0.000
1976	0.005	0.000
1977	0.001	0.000
1978	0.001	0.000
1979	0.001	0.000
1980	0.010	0.000
1981	0.008	0.000
1982	0.015	0.000
1983	0.014	0.000
1984	0.003	0.000
1985	0.014	0.000
1986	0.033	0.003
1987	0.012	0.000
1988	0.004	0.000
1989	0.004	0.000
1990	0.008	0.000
1991	0.015	0.000
1992	0.018	0.000
1993	0.001	0.000
1994	0.000	0.000
1995	0.002	0.000
1996	0.008	0.000
1997	0.009	0.000
1998	0.001	0.000
1999	0.034	0.000
2000	0.010	0.000
2001	0.001	0.000
2002	0.013	0.000
2003	0.009	0.000
2004	0.014	0.000
2005	0.001	0.000
2006	0.017	0.000
2007	0.016	0.000
2008	0.003	0.000
2009	0.003	0.000

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0339	0.0028
2	0.0329	0.0000
3	0.0214	0.0000

4	0.0194	0.0000
5	0.0187	0.0000
6	0.0186	0.0000
7	0.0176	0.0000
8	0.0174	0.0000
9	0.0166	0.0000
10	0.0160	0.0000
11	0.0157	0.0000
12	0.0153	0.0000
13	0.0148	0.0000
14	0.0147	0.0000
15	0.0145	0.0000
16	0.0138	0.0000
17	0.0138	0.0000
18	0.0126	0.0000
19	0.0120	0.0000
20	0.0106	0.0000
21	0.0105	0.0000
22	0.0099	0.0000
23	0.0096	0.0000
24	0.0092	0.0000
25	0.0091	0.0000
26	0.0091	0.0000
27	0.0084	0.0000
28	0.0079	0.0000
29	0.0077	0.0000
30	0.0066	0.0000
31	0.0061	0.0000
32	0.0046	0.0000
33	0.0046	0.0000
34	0.0043	0.0000
35	0.0040	0.0000
36	0.0039	0.0000
37	0.0037	0.0000
38	0.0034	0.0000
39	0.0033	0.0000
40	0.0028	0.0000
41	0.0026	0.0000
42	0.0025	0.0000
43	0.0023	0.0000
44	0.0022	0.0000
45	0.0020	0.0000
46	0.0020	0.0000
47	0.0019	0.0000
48	0.0017	0.0000
49	0.0016	0.0000
50	0.0012	0.0000
51	0.0012	0.0000
52	0.0012	0.0000
53	0.0012	0.0000
54	0.0010	0.0000
55	0.0009	0.0000
56	0.0009	0.0000
57	0.0009	0.0000
58	0.0008	0.0000
59	0.0006	0.0000
60	0.0006	0.0000
61	0.0002	0.0000

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Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0026	25667	2	0	Pass
0.0030	21966	0	0	Pass
0.0034	18912	0	0	Pass
0.0038	16433	0	0	Pass
0.0042	14442	0	0	Pass
0.0046	12677	0	0	Pass
0.0050	11141	0	0	Pass
0.0054	9852	0	0	Pass
0.0058	8656	0	0	Pass
0.0063	7580	0	0	Pass
0.0067	6652	0	0	Pass
0.0071	5846	0	0	Pass
0.0075	5142	0	0	Pass
0.0079	4567	0	0	Pass
0.0083	4094	0	0	Pass
0.0087	3679	0	0	Pass
0.0091	3292	0	0	Pass
0.0095	2954	0	0	Pass
0.0099	2656	0	0	Pass
0.0103	2423	0	0	Pass
0.0107	2222	0	0	Pass
0.0111	2042	0	0	Pass
0.0115	1847	0	0	Pass
0.0119	1645	0	0	Pass
0.0123	1487	0	0	Pass
0.0127	1362	0	0	Pass
0.0131	1238	0	0	Pass
0.0135	1124	0	0	Pass
0.0140	998	0	0	Pass
0.0144	902	0	0	Pass
0.0148	816	0	0	Pass
0.0152	723	0	0	Pass
0.0156	663	0	0	Pass
0.0160	603	0	0	Pass
0.0164	559	0	0	Pass
0.0168	519	0	0	Pass
0.0172	483	0	0	Pass
0.0176	432	0	0	Pass
0.0180	403	0	0	Pass
0.0184	376	0	0	Pass
0.0188	342	0	0	Pass
0.0192	323	0	0	Pass
0.0196	303	0	0	Pass
0.0200	288	0	0	Pass
0.0204	267	0	0	Pass
0.0208	249	0	0	Pass
0.0213	239	0	0	Pass
0.0217	231	0	0	Pass
0.0221	222	0	0	Pass
0.0225	217	0	0	Pass
0.0229	210	0	0	Pass
0.0233	203	0	0	Pass
0.0237	188	0	0	Pass

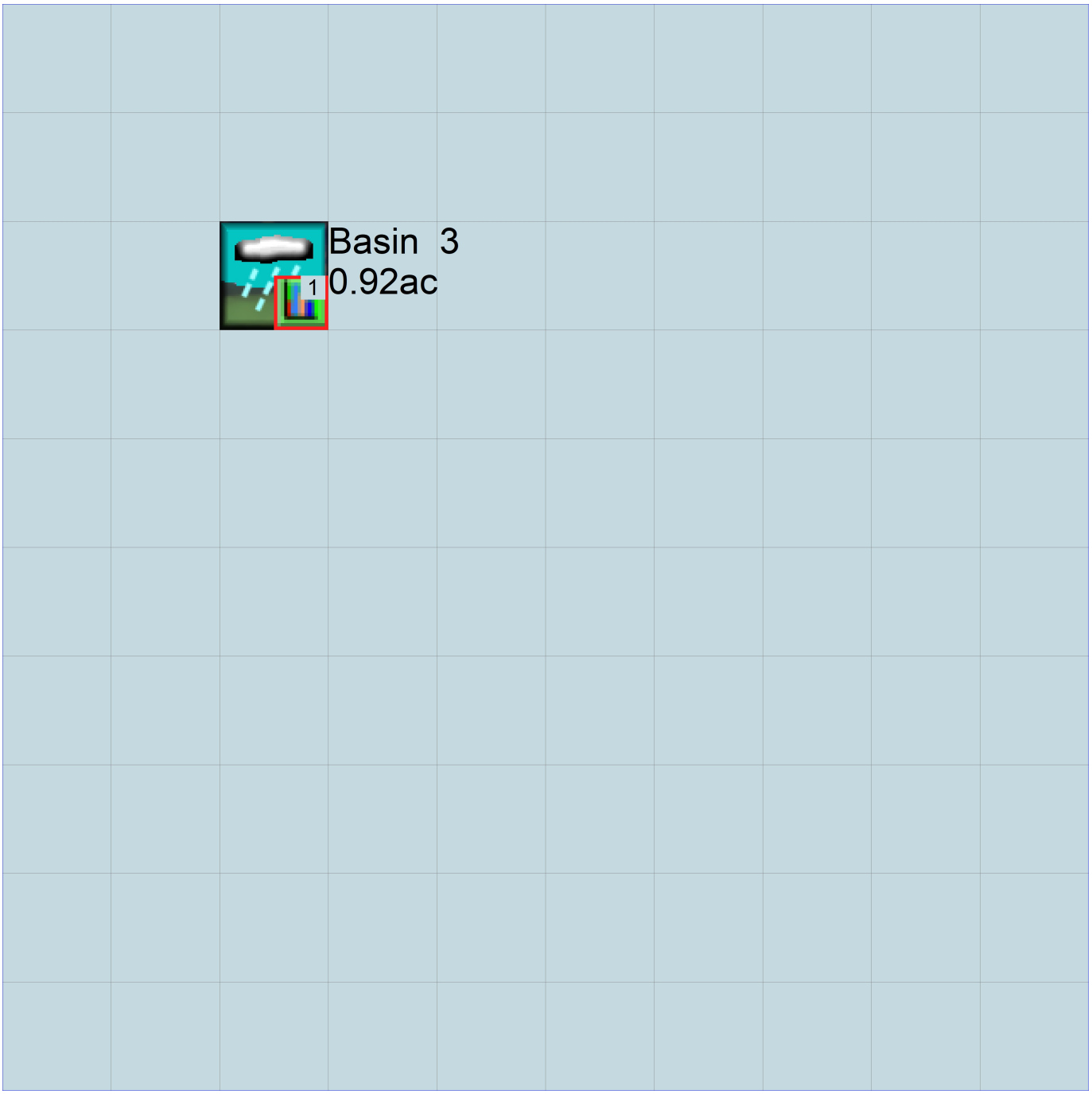
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0.0241	173	0	0	Pass
0.0245	162	0	0	Pass
0.0249	155	0	0	Pass
0.0253	150	0	0	Pass
0.0257	146	0	0	Pass
0.0261	136	0	0	Pass
0.0265	130	0	0	Pass
0.0269	122	0	0	Pass
0.0273	117	0	0	Pass
0.0277	112	0	0	Pass
0.0281	107	0	0	Pass
0.0285	102	0	0	Pass
0.0290	94	0	0	Pass
0.0294	90	0	0	Pass
0.0298	83	0	0	Pass
0.0302	76	0	0	Pass
0.0306	68	0	0	Pass
0.0310	61	0	0	Pass
0.0314	54	0	0	Pass
0.0318	50	0	0	Pass
0.0322	28	0	0	Pass
0.0326	11	0	0	Pass
0.0330	7	0	0	Pass
0.0334	4	0	0	Pass
0.0338	2	0	0	Pass
0.0342	0	0	0	Pass
0.0346	0	0	0	Pass
0.0350	0	0	0	Pass
0.0354	0	0	0	Pass
0.0358	0	0	0	Pass
0.0362	0	0	0	Pass
0.0367	0	0	0	Pass
0.0371	0	0	0	Pass
0.0375	0	0	0	Pass
0.0379	0	0	0	Pass
0.0383	0	0	0	Pass
0.0387	0	0	0	Pass
0.0391	0	0	0	Pass
0.0395	0	0	0	Pass
0.0399	0	0	0	Pass
0.0403	0	0	0	Pass
0.0407	0	0	0	Pass
0.0411	0	0	0	Pass
0.0415	0	0	0	Pass
0.0419	0	0	0	Pass
0.0423	0	0	0	Pass
0.0427	0	0	0	Pass

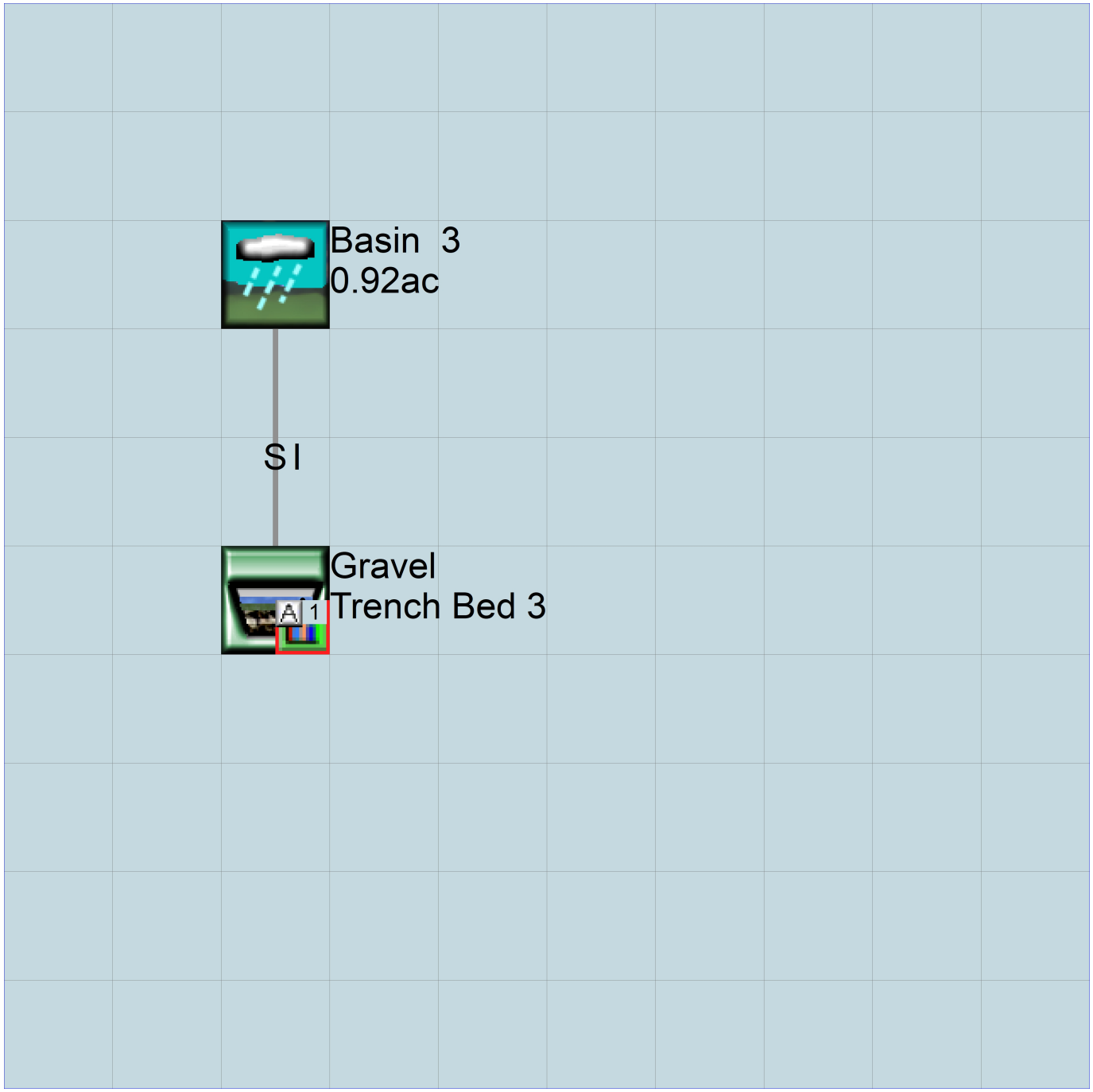
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Appendix

Predeveloped Schematic



Mitigated Schematic



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FLOW CONTROL
BASIN 4

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.59
Program License Number: 201510005
Project Simulation Performed on: 10/15/2024 2:34 PM
Report Generation Date: 10/15/2024 2:34 PM

Input File Name: C22-272 H4H Sequim Detention Pond 2024-1015.fld
Project Name: H4H Sequim
Analysis Title:
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 2
Precipitation Station : 95003605 Puget West 36 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951036 Puget West 36 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** **WATERSHED DEFINITION** **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	2.270	2.270
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	2.270	2.270

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Forest, Flat 2.270

Subbasin Total 2.270

----------SCENARIO: POSTDEVELOPED

Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
C, Pasture, Flat	1.390
ROADS/FLAT	0.280
ROOF TOPS/FLAT	0.400
SIDEWALKS/FLAT	0.200
Subbasin Total	2.270

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 0

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Detention Pond
Link Type: Structure
Downstream Link: None

Prismatic Pond Option Used

Pond Floor Elevation (ft)	:	100.00
Riser Crest Elevation (ft)	:	103.00
Max Pond Elevation (ft)	:	104.00
Storage Depth (ft)	:	3.00
Pond Bottom Length (ft)	:	100.0
Pond Bottom Width (ft)	:	51.0
Pond Side Slopes (ft/ft)	:	Z1= 3.00 Z2= 3.00 Z3= 3.00 Z4= 3.00
Bottom Area (sq-ft)	:	5100.
Area at Riser Crest El (sq-ft)	:	8,142.
(acres)	:	0.187
Volume at Riser Crest (cu-ft)	:	19,701.
(ac-ft)	:	0.452
Area at Max Elevation (sq-ft)	:	9300.
(acres)	:	0.213
Vol at Max Elevation (cu-ft)	:	28,416.
(ac-ft)	:	0.652

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.020
Riser Crest Elevation : 103.00 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.00
Diameter (in) : 0.86
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 101.60
Length (in) : 0.29
Height (in) : 17.60
Orientation : Vertical
Elbow : No

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

********** Link: Detention Pond ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.877
1.11-Year	100.969
1.25-Year	101.175
2.00-Year	101.774
3.33-Year	102.008
5-Year	102.152
10-Year	102.483
25-Year	102.694
50-Year	102.856
100-Year	102.973

*************Groundwater Recharge Summary ***************

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin 1	347.575
Total:	347.575

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin 1	200.619
Link: Detention Pond	0.000
Total:	200.619

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 2.200 ac-ft/year, Post Developed: 1.270 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 0

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Detention Pond **********

Basic Wet Pond Volume (91% Exceedance): 6017. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 9025. cu-ft

2-Year Discharge Rate : 0.031 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.13 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.07 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 494.72
Inflow Volume Including PPT-Evap (ac-ft): 494.72
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 494.71
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Link: Detention Pond

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	5.205E-02	2-Year	3.096E-02
5-Year	8.031E-02	5-Year	5.492E-02
10-Year	0.104	10-Year	8.359E-02
25-Year	0.124	25-Year	0.105
50-Year	0.142	50-Year	0.122
100-Year	0.147	100-Year	0.136
200-Year	0.160	200-Year	0.137
500-Year	0.177	500-Year	0.139

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-9.4%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-9.4%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	8.8%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	16.7%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

WWHM2012

PROJECT REPORT

FLOW CONTROL

BASIN 5

General Model Information

WWHM2012 Project Name: C22-272 Wetland Discharge

Site Name:	C22-272 H4H Brownfield
Site Address:	
City:	Sequim
Report Date:	10/16/2024
Gage:	Port Angelis
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2024/06/28
Version:	4.3.1

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

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Landuse Basin Data

Predeveloped Land Use

Basin 5

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	3.77
C, Lawn, Steep	0.66
Pervious Total	4.43
Impervious Land Use	acre
Impervious Total	0
Basin Total	4.43

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

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Mitigated Land Use

Basin 5

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	0.75
C, Pasture, Flat	0.84
Pervious Total	1.59

Impervious Land Use	acre
ROOF TOPS FLAT	0.9
SIDEWALKS FLAT	0.03
Impervious Total	0.93
Basin Total	2.52

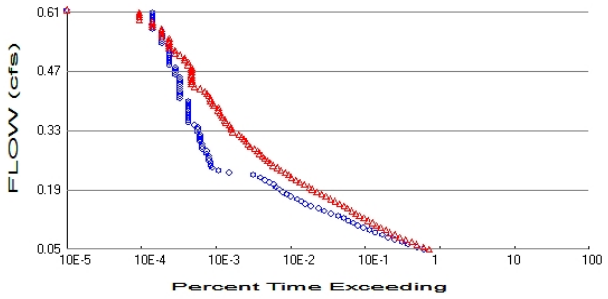
Element Flow Componants:

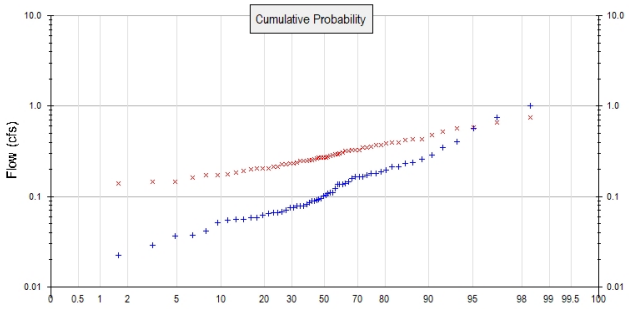
Surface	Interflow	Groundwater
Componant Flows To:		
POC 1	POC 1	

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Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 4.43
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.59
Total Impervious Area: 0.93

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.106176
5 year	0.211138
10 year	0.307068
25 year	0.4632
50 year	0.608009
100 year	0.779953

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.273916
5 year	0.382957
10 year	0.461354
25 year	0.567549
50 year	0.651911
100 year	0.740837

Peak 100-year flow rate to the wetland is decreased by 0.04 cfs.

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Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.179	0.375
1950	0.093	0.245
1951	0.076	0.484
1952	0.037	0.171
1953	0.058	0.393
1954	0.401	0.428
1955	0.215	0.324
1956	0.096	0.240
1957	0.107	0.231
1958	0.056	0.272

1959	0.110	0.350
1960	0.160	0.309
1961	0.194	0.284
1962	0.079	0.213
1963	0.086	0.262
1964	0.285	0.519
1965	0.088	0.191
1966	0.122	0.204
1967	0.167	0.296
1968	0.051	0.252
1969	0.056	0.233
1970	0.071	0.346
1971	1.005	0.754
1972	0.347	0.371
1973	0.144	0.271
1974	0.066	0.138
1975	0.076	0.357
1976	0.137	0.330
1977	0.059	0.202
1978	0.029	0.203
1979	0.037	0.425
1980	0.165	0.226
1981	0.211	0.430
1982	0.187	0.398
1983	0.137	0.291
1984	0.064	0.199
1985	0.568	0.574
1986	0.258	0.321
1987	0.104	0.587
1988	0.102	0.247
1989	0.068	0.253
1990	0.078	0.294
1991	0.179	0.324
1992	0.140	0.268
1993	0.063	0.160
1994	0.012	0.144
1995	0.041	0.139
1996	0.089	0.177
1997	0.234	0.259
1998	0.022	0.226
1999	0.238	0.300
2000	0.110	0.384
2001	0.055	0.146
2002	0.172	0.276
2003	0.092	0.184
2004	0.164	0.270
2005	0.083	0.322
2006	0.137	0.246
2007	0.752	0.665
2008	0.066	0.211
2009	0.078	0.173

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

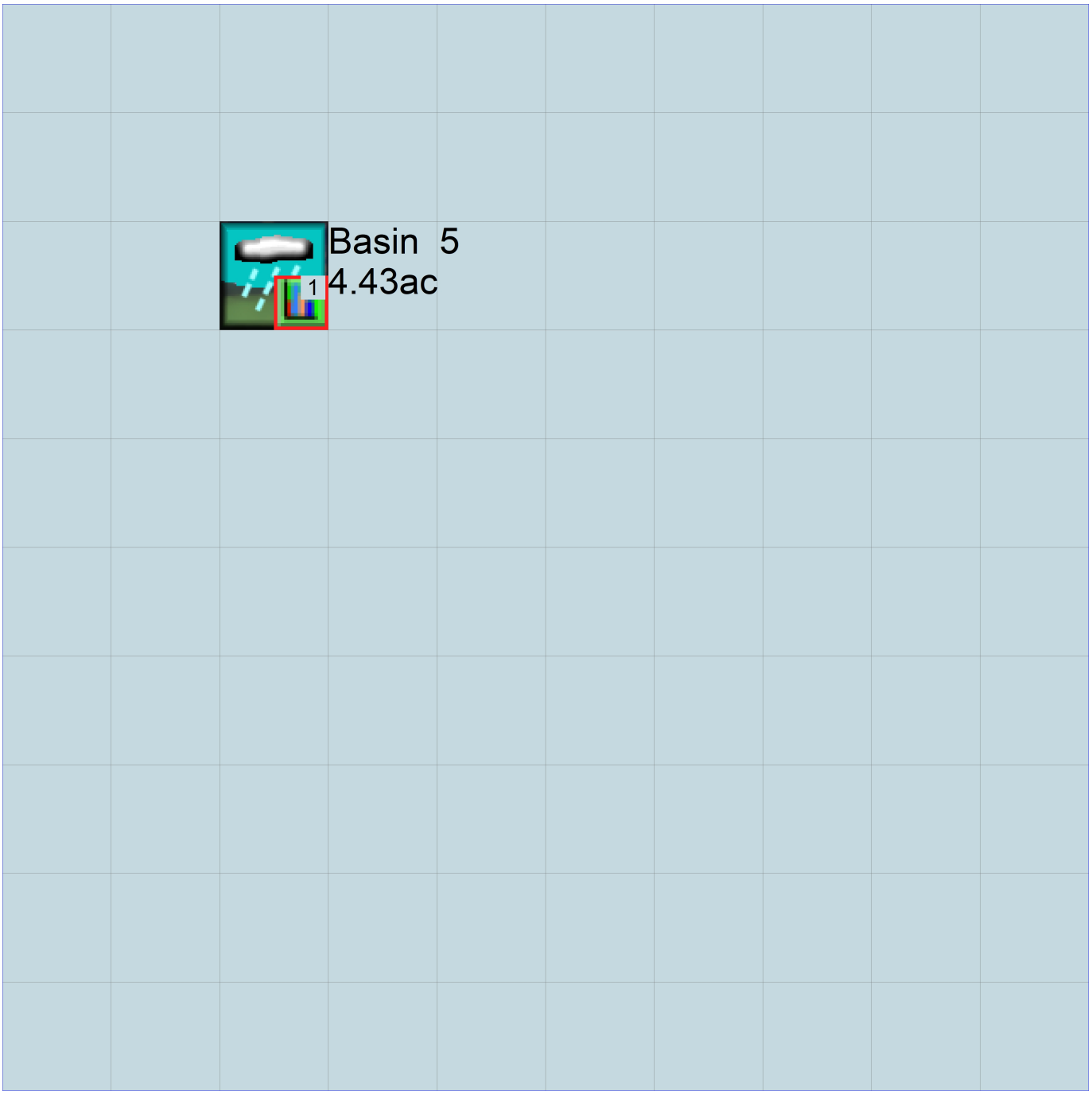
Rank	Predeveloped	Mitigated
1	1.0050	0.7539
2	0.7518	0.6654
3	0.5680	0.5866

4	0.4007	0.5735
5	0.3474	0.5188
6	0.2855	0.4837
7	0.2580	0.4299
8	0.2382	0.4279
9	0.2340	0.4249
10	0.2146	0.3984
11	0.2113	0.3935
12	0.1943	0.3839
13	0.1873	0.3754
14	0.1794	0.3714
15	0.1789	0.3568
16	0.1722	0.3498
17	0.1665	0.3456
18	0.1653	0.3296
19	0.1638	0.3242
20	0.1600	0.3240
21	0.1443	0.3224
22	0.1401	0.3208
23	0.1372	0.3086
24	0.1370	0.2996
25	0.1370	0.2956
26	0.1218	0.2944
27	0.1104	0.2905
28	0.1096	0.2843
29	0.1069	0.2756
30	0.1036	0.2724
31	0.1021	0.2705
32	0.0957	0.2696
33	0.0932	0.2680
34	0.0918	0.2622
35	0.0888	0.2591
36	0.0885	0.2525
37	0.0855	0.2523
38	0.0827	0.2474
39	0.0788	0.2462
40	0.0778	0.2452
41	0.0777	0.2395
42	0.0757	0.2328
43	0.0755	0.2314
44	0.0712	0.2264
45	0.0680	0.2258
46	0.0657	0.2133
47	0.0656	0.2112
48	0.0643	0.2038
49	0.0627	0.2026
50	0.0586	0.2023
51	0.0582	0.1992
52	0.0564	0.1911
53	0.0563	0.1842
54	0.0547	0.1775
55	0.0511	0.1731
56	0.0414	0.1711
57	0.0373	0.1602
58	0.0369	0.1456
59	0.0289	0.1441
60	0.0222	0.1389
61	0.0121	0.1377

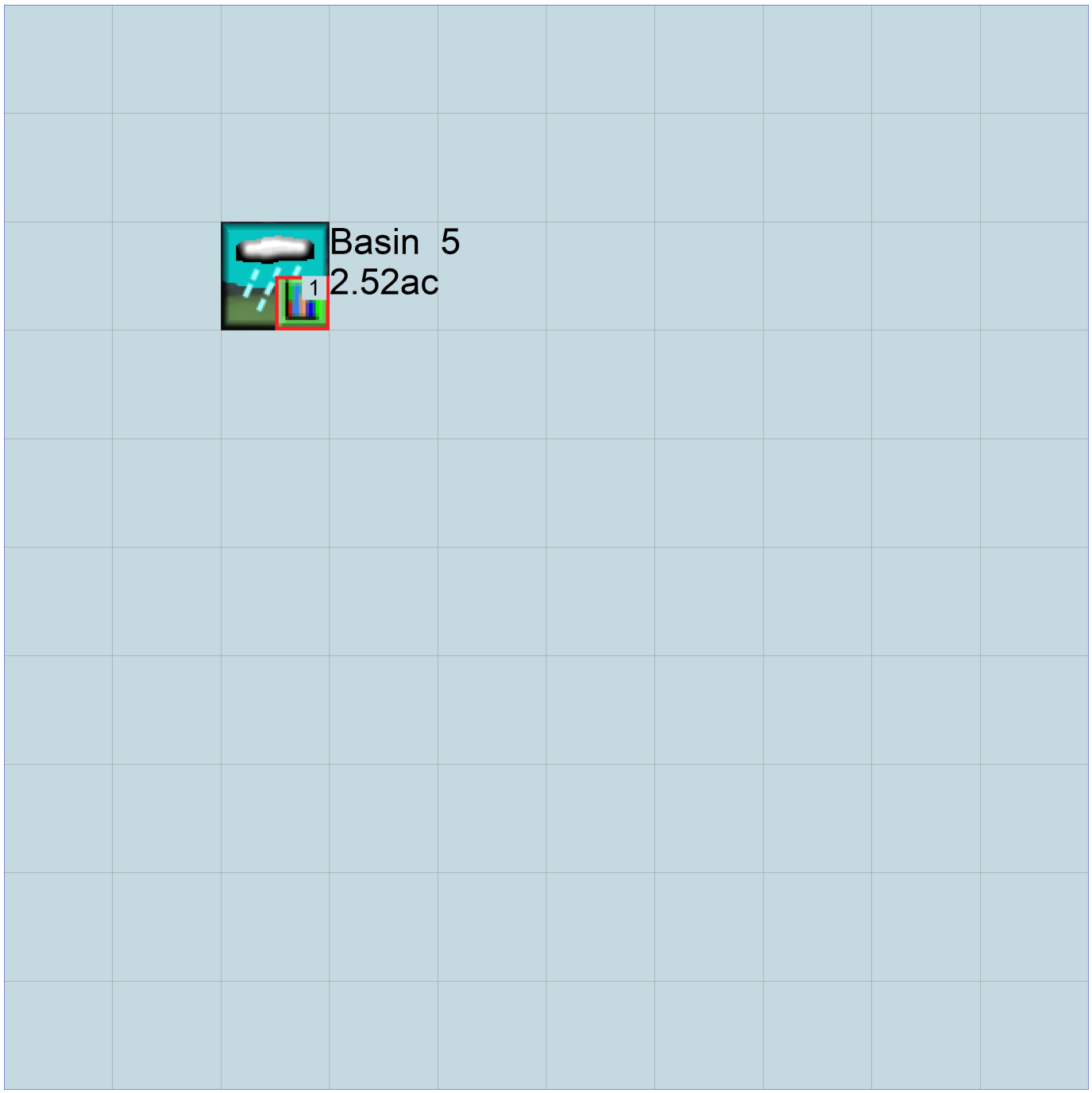
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Appendix

Predeveloped Schematic



Mitigated Schematic



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