



RESTORATION PLAN

Corps Reference No. NWS-2019-745

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Berwick Creek Flood Reduction and Restoration

City of Chehalis, Washington

Prepared for

Port of Chehalis

321 Maurin Road

Chehalis, Washington 98532

(360) 748-9365

Prepared by

Ecological Land Services, Inc.

1157 3rd Avenue, Suite 220A • Longview, WA 98632

(360) 578-1371 • Project Number 362.35

SIGNATURES

The information in this report was prepared under the supervision and direction of the undersigned:



Lacey Hoffmann
Biologist



Mara McGrath, PWS
Senior Ecologist

Table of Contents

| | |
|--|----------|
| Introduction | 1 |
| Project Description..... | 1 |
| ENHANCE INSTREAM HABITAT | 2 |
| Place Large Woody Material | 2 |
| Remove Rock Dam | 2 |
| CREATE FLOODPLAIN TERRACES AND ENHANCE HABITAT..... | 2 |
| Create Floodplain Terraces | 2 |
| Place Large Woody Material | 3 |
| ENHANCE WETLAND FUNCTIONS..... | 3 |
| Meander Ditch..... | 3 |
| Place Large Woody Material | 4 |
| Remove Roadbed Fill and Culvert | 4 |
| Enhance Wetland | 4 |
| Install Restoration Signs | 4 |
| Methods | 6 |
| STREAM | 6 |
| WETLAND..... | 6 |
| Plan Description | 7 |
| AVOIDANCE MEASURES | 7 |
| MINIMIZATION MEASURES | 8 |
| RESTORATION MEASURES..... | 8 |
| Goals , Objectives, and Performance Standards | 9 |
| INSTREAM HABITAT ENHANCEMENT..... | 9 |
| Habitat Structure..... | 9 |
| FLOODPLAIN TERRACE CREATION AND HABITAT ENHANCEMENT | 10 |
| Topography | 10 |
| Habitat Structure..... | 10 |
| Vegetative Structure | 10 |
| WETLAND ENHANCEMENT | 11 |
| Ditch Meander Topography and Bank Stability | 11 |
| Habitat Structure..... | 12 |
| Vegetative Structure | 12 |

| | |
|---|-----------|
| Site Identification | 13 |
| Functional Assessment..... | 14 |
| EXISTING CONDITIONS | 14 |
| Berwick Creek In-water Habitat | 14 |
| Riparian Corridor along Berwick Creek | 15 |
| Riverine Wetland South of Berwick Creek | 15 |
| PROPOSED CONDITIONS..... | 16 |
| Berwick Creek In-water Habitat | 16 |
| Riparian Corridor along Berwick Creek | 16 |
| Riverine Wetland South of Berwick Creek | 17 |
| Implementation Plan..... | 20 |
| LARGE WOODY MATERIAL SPECIFICATIONS..... | 24 |
| PLANTING SPECIFICATIONS..... | 24 |
| MAINTENANCE | 27 |
| Monitoring Plan | 28 |
| MONITORING PLOTS | 28 |
| Instream LWM Structures | 28 |
| LWM Logs in North Floodplain Terrace and Ditch Meander..... | 29 |
| Vegetation | 29 |
| Monitoring Report..... | 29 |
| Adaptive Management Plan | 30 |
| Limitations | 30 |
| References | 31 |

LIST OF TABLES

| | | |
|----------|---|----|
| Table 1. | Summary of Restoration Functional Lift to Critical Areas..... | 5 |
| Table 2. | Existing Ditch and Proposed Ditch Meander Area and Wetland Offset | 5 |
| Table 3. | Critical Areas Summary | 6 |
| Table 4. | Performance Standards for Vegetation by Monitored Year..... | 13 |
| Table 5. | Wetland Function Assessment Existing and Post-Restoration Conditions | 20 |
| Table 6. | Specifications for Enhancing Instream Habitat..... | 21 |
| Table 7. | Specifications for Creating Floodplain Terraces and Enhancing Habitat | 22 |

| | | |
|-----------|---|----|
| Table 8. | Specifications for Enhancing Wetland Functions..... | 23 |
| Table 9. | Large Woody Material Structures and Log Quantities..... | 24 |
| Table 10. | Floodplain Terraces Plant Specifications | 25 |
| Table 11. | Wetland Enhancement Area Plant Specifications | 26 |
| Table 12. | Seed Mix Specifications | 27 |

LIST OF SHEETS

| | |
|----------|---|
| Sheet 1 | Vicinity Map |
| Sheet 2 | Existing Conditions |
| Sheet 3 | Plan Overview |
| Sheet 4 | Large Woody Material Structure Detail |
| Sheet 5 | Floodplain Terrace Details |
| Sheet 6 | Floodplain Terrace Large Woody Material Logs Detail |
| Sheet 7 | North and South Floodplain Terrace Cross Section |
| Sheet 8 | Ditch Meander Detail |
| Sheet 9 | Wetland Enhancement Detail |
| Sheet 10 | Wetland Enhancement and Ditch Meander Cross Section |
| Sheet 11 | Roadbed and Culvert Removal Details |
| Sheet 12 | Planting Notes and Details |
| Sheet 13 | Construction Staging and Stockpile Areas |
| Sheet 14 | Construction Notes |
| Sheet 15 | Erosion Control Notes and Typical |

LIST OF APPENDICES

| | |
|------------|--|
| Appendix A | Western Washington Wetland Ratings and Figures |
|------------|--|

Introduction

Ecological Land Services, Inc. (ELS) has completed this restoration plan on behalf of the applicant, the Port of Chehalis, for the Berwick Creek Flood Reduction and Restoration project. This project is a part of a larger, basin-wide effort to improve stream habitat and decrease flooding in the Chehalis River basin. The project is funded by the Chehalis Basin Flood Authority.

The project area, north of Bishop Road in the City of Chehalis, Washington, includes portions of Lewis County tax parcels 017775001000, 017775002000, 017887002000, 017888002001, 017889002003, & 017889002002, within portions of Sections 10 and 15, Township 13 North, Range 2 West of the Willamette Meridian (Sheets 1 and 2). This report describes proposed restoration efforts along with maintenance and monitoring within the project area according to the applicable sections of the City of Chehalis Municipal Code (CMC) *Chapter 17.23, Wetlands* and *Chapter 17.25, Fish and Wildlife Habitat Areas* (2009). Additionally, this restoration plan includes maintenance and monitoring details, as required by the US Army Corps of Engineers (Corps) *Interim NWP User's Guide, under Nationwide Permit 27, Specific Regional Conditions, requirement #4*.

Project Description

The Port is proposing to restore approximately 1,000 linear feet of Berwick Creek to provide additional flood storage, stabilize the stream banks, reduce erosion, slow flow velocity, improve salmonid habitat and refugia, and enhance aquatic, riparian, and wetland habitat functions. Berwick Creek is in the Upper Chehalis watershed (WRIA 23) and has been historically impacted by agricultural, industrial, commercial, and residential land uses for decades.

The proposed project has been planned and designed to resemble an ecological reference, or reference site. The upper reaches of Berwick Creek exhibit more of an intact aquatic and riparian habitat within the Upper Chehalis Watershed. The upper reaches of Berwick Creek have large woody material in-water that add habitat complexity and provide food sources for many species that are eaten by juvenile salmonids. The substrate is more consistent with an undisturbed streambed, consisting of cobbles and small gravels that provide habitat and input of dissolved oxygen into the stream. Because of the presence of riparian vegetation, the streambanks are more stable and are not extremely downcut. This reduces the input of fine sediments into the stream. This riparian habitat has not been heavily impacted by agricultural practices or residential land uses; therefore, there is adequate canopy cover to shade the stream and provide water temperature control. The upper reaches of Berwick Creek also have many riverine wetlands that provide excellent water quality and water quantity functions. By designing this project with the reference site in mind, the Port is proposing to provide better water quality and water quantity functions and improve habitat for juvenile salmonids in the watershed (Cramer 2012).

The proposed restoration is immediately upstream of a culvert replacement and stream enhancement on Berwick Creek, led by Lewis County Public Works (Bishop Road MP 2.839). This project design has taken this into account so as not to potentially impact the culvert replacement due to large woody material floating downstream and clogging the new culvert.

The restoration is centered around three main project elements:

1. Enhance instream habitat;
2. Create floodplain terraces and enhance habitat; and
3. Enhance wetland functions.

The following details each main project element for restoration efforts to Berwick Creek and the Category II wetland (Sheet 3). All project work will be completed during the dry season. No temporary stream diversions will be required to perform the restoration activities.

ENHANCE INSTREAM HABITAT

Place Large Woody Material

The stretch of Berwick Creek within the project area lacks large woody material and other habitat features. Four large woody material (LWM) structures will be placed within Berwick Creek (Sheets 3 and 4). The structures will be anchored landward of the ordinary high water mark (OHWM), with the treetops extending into Berwick Creek and contacting the streambed.

Remove Rock Dam

A small rock dam that was placed by humans will be removed (Sheet 3). These rocks are small enough to be removed by hand so as not to disturb any surrounding vegetation with equipment. The removed rocks will be replaced along the stream banks, where other rocks of the same type are located, to prevent blocking the stream channel. Removing the small rock dam will allow unimpeded passage for juvenile and adult salmonids.

CREATE FLOODPLAIN TERRACES AND ENHANCE HABITAT

Create Floodplain Terraces

The banks of Berwick Creek are extremely downcut and provide little habitat or flood storage due to the stream being disconnected from its floodplain unless it is an extremely high water event. To provide the stream with more bank stability, greater flood storage, and higher quality habitat, the north and south side of Berwick Creek will be terraced landward of the OHWM (Sheets 3, 5-7). Hereafter, the terrace area north of Berwick Creek will be referred to as the *north floodplain terrace*, and the terrace area south of Berwick Creek will be referred to as the *south floodplain terrace*.

Create and Enhance North Floodplain Terrace

For the north floodplain terrace, 116 cubic yards of material over 0.10 acres will be cut to create a two-step terrace (Sheets 3, 5-7). The terracing will begin 5 feet landward from the OHWM and extend to the northwest. No soils below the OHWM will be impacted. Excavated material will be disposed of in an upland location at an offsite Port property. Following excavation, the terrace will be seeded with a native seed mix and enhanced with large woody material and native wetland vegetation following the specifications on Sheets 5-7, and 12. Any mature trees or standing snags present in this area will be avoided during excavation. Temporary construction fencing will be installed along the driplines of the existing Oregon white oaks to avoid impacting the trees during construction.

Create and Enhance South Floodplain Terrace

For the south floodplain terrace, 176 cubic yards of material over 0.17 acres will be cut to create a single terrace (Sheets 3, 5-7). The terracing will begin 5 feet landward of the OHWM and extend southeast. No soils below the OHWM will be impacted. A portion of the area to be included in the south floodplain terrace is an upland within the Category II riverine wetland. This upland was likely historic spoils from ditching of the stream. The upland will be excavated to be approximately 1 foot below elevation of the existing wetland, for a total of 0.06 acres of wetland creation (Sheets 5-7). Excavated material will be disposed of in an upland location at an offsite Port property. Bare soils will be seeded with a native wetland seed mix and enhanced with native wetland vegetation following the specifications on Sheets 5, 7, and 12. Any mature trees or standing snags present in this area will be avoided during excavation.

Place Large Woody Material

Four LWM logs with rootwads attached will be placed in the north floodplain terrace (Sheet 6). These logs will be laid across each other and cabled together to prevent them from moving downstream during high water events. The horizontal logs will provide habitat and will help slow flows during high water events.

ENHANCE WETLAND FUNCTIONS

Meander Ditch

The onsite ditch, identified as Ditch A, flows directly through the southern portion of the project area during highwater events. It provides little-to-no flood storage or off-channel refugia for juvenile salmonids. Ditch A will be meandered throughout Wetland A to create a more natural path and to slow flow and infiltration, thereby supporting wetland hydrology. The meandered ditch will also provide better off-channel refugia and habitat for juvenile salmonids during high water events (Sheets 8-10).

A total of 100 cubic yards of material will be excavated within Wetland A for 740 square feet to create the meandered channel for Ditch A. The new ditch alignment will be approximately 2 feet wide and will run for 370 linear feet and will match the existing Ditch A bed elevation (Sheets 8

and 10). The 0.02 acre (660 square foot) old footprint of Ditch A will be filled with excavated material from the new ditch alignment to match the existing wetland elevation. Bare soils in the filled footprint of Ditch A will be seeded with a native seed mix and planted with willow stakes at the junction between the old and new ditch alignment. These willow stakes will help deflect flow into the newly constructed ditch channel and stabilize the banks. The meandered ditch alignment will be seeded with a native seed mix and ditch banks will be stabilized with willow stakes following the specifications on Sheets 9, 10, and 12.

Overall, with the meandered ditch alignment, there will be no loss of existing wetland or ditch area (Table 2). The 740 square feet of excavation to meander Ditch A through the wetland will be offset by creating wetland through removing a 2,432 square foot upland along Berwick Creek and 431 square feet of roadbed fill in Wetland A. In addition, the old channel of Ditch A will be filled to match existing wetland elevation, resulting in the creation of 660 square feet of wetland from a functioning ditch.

Place Large Woody Material

Two horizontal logs with rootwads attached will be placed along Ditch A where the meandered ditch meets the existing ditch footprint (Sheet 8). The horizontal logs will help direct flow within Ditch A into Berwick Creek and provide habitat and cover for juvenile salmonids.

Remove Roadbed Fill and Culvert

After ditch meandering and all other project elements requiring equipment access into the project area are complete, the existing access road over the culvert will be removed (Sheet 11). A total of 15 cubic yards of roadbed material over 0.01 acres (431 square feet) will be excavated to match the existing wetland elevation. These spoils will either be transported to an offsite Port property or used to fill the old Ditch A channel. The 14-inch culvert will then be removed and disposed of at a licensed disposal facility. The ditch banks will be excavated at a 2:1 slope and the base ditch elevation beneath the culvert will be filled to match existing conditions. All bare soils will be seeded with a native seed mix and the banks will be stabilized with willow stakes to prevent erosion following the specifications on Sheets 11 and 12.

Enhance Wetland

After all project components have been completed or installed, 1.18 acres of Wetland A will be enhanced with native vegetation following the specifications on Sheets 9 and 12.

Install Restoration Signs

Signs identifying the boundary of the project area will be spaced at 100-foot intervals or at an appropriate spacing determined by the Port of Chehalis.

Table 1. Summary of Restoration Functional Lift to Critical Areas

| Critical Area | Restoration Action | Area | Volume | Functional Lift |
|---|--|----------|---------|--|
| Berwick ¹ Creek | Install instream LWM structures | -- | -- | Provide refugia, feeding, and cover for juvenile salmonids, and resting areas for adult salmonids |
| | Remove rock dam | -- | - | Provide unimpeded passage for adult and juvenile salmonids |
| Riparian Habitat and Floodplain | Create north floodplain terrace, place LWM logs, enhance habitat | 0.10 ac. | 116 cy. | Improve flood storage, slow flow velocity during high flows, refugia for juvenile salmonids during high water, enhance habitat |
| Riparian Habitat, Floodplain, & Wetland A | Create south floodplain terrace and enhance habitat | 0.17 ac. | 176 cy. | Improve flood storage, slow flow velocity during high flows, refugia for juvenile salmonids during high water, create and enhance riverine wetland habitat |
| Wetland A | Meander Ditch A (370 lf.) | 740 sf. | 100 cy. | Enhance water quality and quantity control and enhance habitat |
| | Remove roadbed fill and culvert in Ditch A | 431 sf. | 15 cy. | Enhance water quality and quantity control and provide additional off-channel habitat, create wetland |
| | Enhance wetland functions | 1.18 ac. | -- | Enhance riverine wetland habitat through native plantings |

¹No restoration activities will result in impacts below the OHWM of Berwick Creek.

Table 2. Existing Ditch and Proposed Ditch Meander Area and Wetland Offset

| Ditch Area | | | | |
|--|-------------------|-------------------|--------------------------|-------------------|
| | Proposed Ditch A | Existing Ditch A | | Difference |
| Width + Linear Feet | 2 ft. + 370 lf. = | 2 ft. + 330 lf. = | | |
| Area | 740 sf. | 660 sf. | | +80 sf. |
| Wetland Offset for Area Lost by Ditch Meander | | | | |
| | Wetland Creation | | | |
| | Excavate Upland | Remove Roadbed | Regrade Existing Ditch A | |
| Area | 2,432 sf. | 431 sf. | 660 sf. | +3,534 sf. |

Methods

STREAM

Berwick Creek’s OHWM was delineated following *RCW 90.58.030*. Consecutively numbered flagging, identified as OHWM N-1 through N-29 and S-1 through S-29, was placed along the stream’s north and south OHWMs. Gibbs & Olson, Inc. surveyed the OHWM flags in March 2019 (Sheet 2).

WETLAND

One wetland, identified as Wetland A, was delineated within the project area (Table 3; Sheet 2). The top of bank of Ditch A, within Wetland A, was marked with consecutively numbered flags. We followed the Routine Determination Method¹ for delineating the wetland boundary according to the approved federal manual and appropriate regional supplements². Wetlands are regulated as “Waters of the United States” by the U.S. Army Corps of Engineers (Corps), “Waters of the State” by the Washington State Department of Ecology (Ecology), and locally by *CCC Chapter 40.450 Wetland Protection*.

The wetland boundaries extend well outside of the project area; thus, the wetland within the project area was delineated by aerial photo analysis. Vegetation, soil, and hydrology data were collected from eight test plots within the project area to verify the presence and boundaries of the wetland (ELS 2020). Test plot locations were recorded using a hand-held GPS capable of sub-meter accuracy. Soil colors in test plots were evaluated by hue, value, and chroma using the Munsell Soil Color Chart (Munsell 2000). Plant dominance was based on the 50/20 rule (Corps 2010). Gibbs & Olson, Inc. surveyed the topography, Ditches A and B, gravel access road, culvert, and upland within Wetland A in March 2019.

Table 3. Critical Areas Summary

| Critical Area | Area | Ecology ¹ /City Rating ² WDNR ³ / City Type ⁴ | Cowardin Classification ⁵ | HGM Classification | Standard Buffer ⁶ |
|---------------|------------------------------------|--|---|-----------------------|---------------------------------|
| Berwick Creek | -- | Type F / F-B | -- | -- | 100 ft. |
| Wetland A | 1.70 ac. within project area | II | PFOC, PEMC | Riverine, Slope | 100 ft. |

¹ Routine Determination Method examines vegetation, hydrology, and soils to determine if wetlands exist in a given area. By definition, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (40 CFR §230.3).

² U.S. Army Corps of Engineers, *Wetlands Delineation Manual* (Environmental Laboratory 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (2010).

| Critical Area | Area | Ecology ¹ /City Rating ² WDNR ³ / City Type ⁴ | Cowardin Classification ⁵ | HGM Classification | Standard Buffer ⁶ |
|------------------|-------------------------------------|--|---|-----------------------|---------------------------------|
| Oregon White Oak | 2 oaks: 24-in DBH & 36-in DBH | -- | -- | -- | -- |

¹Hruby 2014

⁴CMC 17.25.020

²CMC 17.23.010

⁵Cowardin *et al.* 1979

³WAC 222-16-030

⁶CMC 17.23.030 and CMC 17.25.030

Plan Description

This plan describes a series of restoration measures that will be implemented following the project goals stated in the proceeding section. Per *CMC 17.25.040*, all reasonable measures have been taken to avoid adverse effects on species and habitats. The amount of work proposed is the minimum needed to accomplish the project purpose of restoration. According to *CMC 17.25.040(L)*, clearing and grading is allowed as part of the restoration action if:

1. Grading occurs only during the designated dry season (May 1st through October 1st);
2. Appropriate erosion and sediment control measures shall be used at all times; and
3. The moisture-holding capacity of the topsoil layer shall be maintained by minimizing soil compaction or reestablishing natural soil structure and infiltrative capacity.

The project has been designed to avoid adverse impacts to the critical areas and to follow the above referenced municipal code. Additionally, avoidance and minimization actions have been put in place to protect critical areas even further.

AVOIDANCE MEASURES

The project has been designed to avoid any impacts, fill, or excavation below the OHWM of Berwick Creek. The 1,000 linear feet of stream within the project area is surrounded by agriculture and single-family residences on neighboring properties. To avoid causing the stream to meander and encroach on these properties, the LWM structures will be anchored landward of the OHWM and the treetops will extend below the OHWM to the streambed. The lateral branches that have been retained will create habitat complexity and will slow water velocity causing sediment to fall out of the water column, promoting creation of pool and riffle complexes.

The north bank of Berwick Creek has existing Oregon white oaks, which will be preserved and protected during construction.

This project design has also considered the Bishop Road culvert replacement immediately downstream. To avoid potentially impacting the proposed new culvert, LWM structures will be anchored to avoid large woody material floating downstream and clogging it, potentially resulting in a malfunction and failure.

To avoid impacts to Berwick Creek and Wetland A during the restoration, the following avoidance measures will be implemented:

- Restoration will take place during the dry season when stream flow is at its lowest volume (July 1 through September 30, or as dictated by the Hydraulic Project Approval).
- Stream channel below the OHWM and flow will remain undisturbed.
- Clearing limits for the floodplain terracing will be demarcated with straw wattles to prevent sediment laden water from potentially entering Berwick Creek.
- Construction access and staging and stockpile areas will avoid all critical areas onsite and will be located within uplands as reasonably feasible.
- Best management practices, including straw wattles or similar measures will be utilized to control sedimentation and general ground disturbance.
- If any inadvertent fill is placed within the stream, work will be ceased immediately until the situation is rectified.

MINIMIZATION MEASURES

In addition to the avoidance measures, the following minimization measures will further reduce impacts to Berwick Creek, its associated riparian buffer, and Wetland A, and minimize habitat disruption beyond the extent required to undertake the restoration activities. The minimization measures are as follows:

1. Install temporary construction fencing around the driplines of the Oregon white oaks north of Berwick Creek and as needed around the project area boundary.
2. Design site grading to limit equipment entry into Wetland A to every extent practicable within the critical areas.

RESTORATION MEASURES

The goals of the restoration measures are to provide an overall lift to in-water, riparian, and wetland habitat, as well as provide a lift to water quality and quantity functions for the Upper Chehalis watershed. Restoration measures to achieve these goals include:

1. Enhance Instream Habitat

- Install large woody material structures to provide refugia, feeding, and cover opportunities for juvenile salmonids, and resting areas for adults; and
- Remove rock dam to provide unimpeded passage for adult and juvenile salmonids.

2. Create Floodplain Terraces and Enhance Habitat

- Create the north floodplain terrace to provide additional flood storage and help slow flow velocity during high water events;
- Create the south floodplain terrace to provide additional flood storage and off channel habitat for juvenile salmonids and wetland habitat;

- Place large woody material on the north floodplain terrace to provide habitat and help slow flow velocity during high water events.
- Enhance floodplain terraces with native vegetation to improve riparian habitat.

3. Enhance Wetland Functions

- Meander Ditch A and fill existing channel to enhance hydrologic function of Wetland A;
- Install large woody material within Ditch A to provide habitat and deflect ditch flow;
- Remove existing roadbed fill and culvert as a part of Ditch A meander to improve water quality and quantity and provide off-channel habitat and create wetland habitat; and
- Enhance the Category II wetland with native vegetation to provide an overall lift of water quality, water quantity, and habitat functions of the wetland and stream shading and LWM recruitment in the long-term.

Goals , Objectives, and Performance Standards

The ultimate goals of this flood reduction and restoration project are to model the restoration after the headwaters of Berwick Creek, a less impacted and more intact stream and riparian habitat within the Upper Chehalis Watershed. This project is designed to:

- Improve flood storage along a channelized section of Berwick Creek;
- Improve stream bank stability and reduce erosion;
- Slow flow velocity during high water events;
- Improve instream habitat to provide refugia, feeding and cover opportunities for juvenile salmonids and resting areas for adults;
- Enhance the riparian zone and riverine wetland to achieve greater plant species diversity, structure, and habitat complexity; and
- Improve water quality and quantity within the riverine wetland and provide off-channel habitat.
- Provide stream shading and LWM recruitment in the long-term.

The objectives and performance standards are divided by the three main project elements:

1. Enhance instream habitat;
2. Create floodplain terraces and enhance habitat; and
3. Enhance wetland functions.

INSTREAM HABITAT ENHANCEMENT

Habitat Structure

Objective 1. Improve in-water habitat by installing large woody material structures.

- ▶ *Performance Standard 1a.* Install 4 LWM structures within the stream channel. Anchor the LWM structures landward of the OHWM. The performance standard is completed when the

structures are installed following the specifications on Sheet 4 and documented in the as-built report.

- ▶ *Performance Standard 1b.* Assess structural integrity of LWM structures and anchoring during monitoring period. Document any maintenance, if needed, in annual monitoring reports.
- ▶ *Performance Standard 1c.* Remove all rock from the rock dam by hand and place rocks along the stream banks, where existing rock of the same type is located. The performance standard is complete when the rock dam is removed and is documented in as-built report.

FLOODPLAIN TERRACE CREATION AND HABITAT ENHANCEMENT

Topography

Objective 2. Improve flood storage in the floodplain by excavating terraces in uplands.

- ▶ *Performance Standard 2a.* Excavate a 0.10-acre floodplain terrace north of the stream channel. This performance standard is completed when the excavation is conducted following the specifications on Sheets 5-7 and documented in the as-built report.
- ▶ *Performance Standard 2b.* Excavate a 0.17-acre floodplain terrace, including a 0.06 acre area of created wetland, south of the stream channel. This performance standard is completed when the excavation is conducted following the specifications on Sheets 5-7 and documented in the as-built report.

Habitat Structure

Objective 3. Install large woody material logs to improve habitat complexity.

- ▶ *Performance Standard 3a.* Install and cable together 4 LWM logs, at least 10 inches diameter at breast height (DBH) for 20 feet long, with rootwads attached (minimum 5-foot diameter), on the north floodplain terrace. The performance standard is completed when the LWM logs are installed following the specifications on Sheet 6 and documented in the as-built report.
- ▶ *Performance Standard 3d.* Assess structural integrity of LWM logs and its cabling during monitoring period. Document any maintenance, if needed, in annual monitoring reports.

Vegetative Structure

Objective 4. Establish a diverse, multi-strata, native plant community dominated by a scrub-shrub class. (Vegetation performance standards are listed by year in Table 4.)

- ▶ *Performance Standard 4a.* Plant a native seed mix at a dense seeding rate immediately following excavation to cover exposed soils and control re-growth of invasive plant species. This performance standard is completed when the seed is planted following the specifications on Sheet 12 and the seed composition and seeding rate are documented in the as-built report.
- ▶ *Performance Standard 4b.* In Year 1, planted native trees and shrubs in the floodplain terraces will achieve at least 90 percent survival.

- ▶ *Performance Standard 4c.* In Year 2, planted native trees and shrubs in the floodplain terraces will achieve at least 80 percent survival.
- ▶ *Performance Standard 4d.* In Year 3, planted native trees and shrubs in the floodplain terraces will achieve at least 75 percent survival.
- ▶ *Performance Standard 4e.* In Year 5, the floodplain terraces will have a minimum 30 percent cover by native shrubs and 15 percent cover by native trees.
- ▶ *Performance Standard 4f.* In all years, non-native invasive plant species, except for reed canarygrass, will not exceed 20 percent cover within the floodplain terraces.
- ▶ *Performance Standard 4g.* In all years, non-native invasive plant species infestations covering 200 square feet or more, but not sampled as a part of the monitoring methods, will be documented by species and location, and control measures will be implemented.
- ▶ *Performance Standard 4h.* In all years, state-listed Class A noxious weeds, non-native knotweeds (*Polygonum cuspidatum*, *P. polystachyum*, *P. sachalinense*, and *P. bohemicum*), and English ivy (*Hedera helix*) will be eradicated from the floodplain terraces.

WETLAND ENHANCEMENT

Ditch Meander Topography and Bank Stability

Objective 5. Slow flow velocities by creating a meandering channel for Ditch A with stable banks.
(Vegetation performance standards are listed by year in Table 4.)

- ▶ *Performance Standard 5a.* Excavate an approximately 2-foot wide and 370-linear foot ditch with slopes no steeper than 2:1 within the wetland enhancement area. This performance standard is completed when the excavation for the ditch is completed following the specifications on Sheets 8-10 and documented in the as-built report.
- ▶ *Performance Standard 5b.* Remove existing roadbed fill and culvert. This performance standard is completed when the roadbed fill and culvert are removed following the specifications on Sheet 11 and documented in the as-built report.
- ▶ *Performance Standard 5c.* Fill the old Ditch A channel with excavation spoils. Fill only as high as existing ditch banks to match existing elevation of wetland. This performance standard is completed when the spoils have been placed following the specifications in Sheet 10 and are documented in the as-built report.
- ▶ *Performance Standard 5d.* In Year 1, planted native willows along the new ditch alignment will achieve at least 90 percent survival.
- ▶ *Performance Standard 5e.* In Year 2, planted native willows along the new ditch alignment will achieve at least 80 percent survival.

- ▶ *Performance Standard 5f.* In Year 3, planted native willows along the new ditch alignment will achieve at least 75 percent survival.
- ▶ *Performance Standard 5g.* By Year 5, the native willows along the new ditch alignment will have a minimum 50 percent cover by native shrubs.

Habitat Structure

Objective 6. Improve hydraulics by installing large woody material logs to slow velocity in Ditch A and to improve habitat complexity.

- ▶ *Performance Standard 6a.* Place a minimum of 2 LWM logs, at least 10 inches DBH for 20 feet long, with rootwads attached (minimum 5-foot diameter) along the western end of the meandered ditch. The performance standard is completed when the LWM logs are installed following the specifications on Sheet 8 and documented in the as-built report.
- ▶ *Performance Standard 6b.* Assess structural integrity of LWM logs during monitoring period. Document maintenance, if needed, in annual monitoring reports.

Vegetative Structure

Objective 7. Enhance 1.18 acres of Category II wetland to establish a diverse, multi-strata, native plant community dominated by a scrub-shrub class and capable of providing stream shading and large woody debris for instream recruitment in the long-term. (Vegetation performance standards are listed by year in Table 4.)

- ▶ *Performance Standard 7a.* Spray reed canarygrass with an approved herbicide in the wetland enhancement area prior to planting. The performance standard is completed when the pre-planting weed control is documented in the as-built report.
- ▶ *Performance Standard 7b.* Rip or till wetland enhancement area and plant a native seed mix at a dense seeding rate to cover exposed soils and control re-growth of invasive plant species. This performance standard is completed when the seed is planted following the specifications on Sheet 12 and the seed composition and seeding rate are documented in the as-built report.
- ▶ *Performance Standard 7c.* In Year 1, planted native trees and shrubs in the wetland enhancement area will achieve at least 90 percent survival.
- ▶ *Performance Standard 7d.* In Year 2, planted native trees and shrubs in the wetland enhancement area will achieve at least 80 percent survival.
- ▶ *Performance Standard 7e.* In Year 3, planted native trees and shrubs in the wetland enhancement area will achieve at least 75 percent survival.
- ▶ *Performance Standard 7f.* In Year 5, the wetland enhancement area will have a minimum 30 percent cover by native shrubs and 15 percent cover by native trees.
- ▶ *Performance Standard 7g.* In all years, non-native invasive plant species, except for reed canarygrass, will not exceed 20 percent cover within the wetland enhancement area.

- ▶ *Performance Standard 7h.* In all years, non-native invasive plant species infestations covering 200 square feet or more, but not sampled as a part of the monitoring methods, will be documented by species and location, and control measures will be implemented.
- ▶ *Performance Standard 7i.* In all years, state-listed Class A noxious weeds, non-native knotweeds (*Polygonum cuspidatum*, *P. polystachyum*, *P. sachalinense*, and *P. bohemicum*), and English ivy (*Hedera helix*) will be eradicated from the wetland enhancement area.

Site Identification

Objective 8. Install signs to identify the project area.

- ▶ *Performance Standard 8a.* Install durable, weather-proof signs around the project area stating “Restoration area, please protect its natural conditions” or similar language approved by the Port of Chehalis. Signs will be secured to existing trees or metal t-posts at a minimum of 100-foot intervals or as modified by the Port of Chehalis. The performance standard is completed when the signs are documented in the as-built report.

Table 4. Performance Standards for Vegetation by Monitored Year

| | Percent Survival and Cover | | | |
|--|----------------------------|--------|--------|--------|
| | Year 1 | Year 2 | Year 3 | Year 5 |
| Floodplain Terraces & Wetland Enhancement Area | | | | |
| Tree Strata | | | | |
| Survival | ≥90% | ≥80% | ≥75% | -- |
| Cover ¹ | -- | -- | -- | ≥15% |
| Shrub Strata | | | | |
| Survival | ≥90% | ≥80% | ≥75% | -- |
| Cover ¹ | -- | -- | -- | ≥30% |
| Invasive Plants | | | | |
| Cover of non-native, invasive plants, excluding reed canarygrass | <20% | <20% | <20% | <20% |
| Ditch Meander | | | | |
| Willow Survival | ≥90% | ≥80% | ≥75% | -- |
| Willow Cover ¹ | -- | -- | -- | ≥50% |

¹Includes naturally recruited species

Functional Assessment

EXISTING CONDITIONS

The parcels within the project area that border the stream are owned by the Port of Chehalis and Community Partners (Chehalis Industrial Commission) and two private landowners. The area is within the Urban Growth Area of the City of Chehalis.

The approximately 2.8-acre project area and its surroundings are low lying lands in the Chehalis River Basin and flood extensively during heavy rain events. The topography of the project area has a slight rise in elevation moving upstream from about 244 to 246 feet above sea level. The project area is currently undeveloped and contains barbed-wire fencing along the stream and a wet field (Wetland A), which has been used for hay production. A 14-inch PVC culvert is at the southeast corner of the project area, along a west flowing ditch that is a tributary to Berwick Creek (Ditch A). The culvert spans an old road crossing that provides access to the wetland. Other than the gravel road, culvert, and fencing, the project area lacks structures.

The adjacent properties have residential and industrial uses. The project area is bordered to the north by an undeveloped, industrially owned field and a privately owned single-family residence; to the south by a privately owned single-family residences and a residence owned by Community Partners; and to the east by Rush Road (Sheet 2). Bishop Road is just south of the southern project area.

Berwick Creek In-water Habitat

In the project area, Berwick Creek averages 9.7-feet wide below the OHWM and has perennial flow. The stream flow during a 2-year event totals approximately 104 cubic feet per second based on hydrologic modeling and stream gradient is approximately 0.6 percent on average. Water depth during the dry season ranges from 6 inches to approximately 2 feet in depth. Stream substrate is mainly fine sediments and silt in the northern portion of the project area. The southern stretch of the stream contains mainly riffles over small cobble and some gravels. A small rock dam has been placed in the southern portion of the project area. This small rock dam was placed by humans and, although it does not substantially block hydrology, it can impede the migration of adult salmonids. The stream is channelized and has heavily downcut banks, especially at the southwest bend in the stream where winter flows achieve high velocities and subsequent overbank flows, resulting in bank erosion. Beavers have constructed several dams in the stream channel upstream of the southwest bend, which slow but do not significantly block water flow. Deciduous trees have fallen into the stream where the banks have substantially eroded. The existing trees provide minimal habitat and refugia for juvenile salmonids or resting areas for adults. Some overhanging vegetation is present; however, the vegetation is mainly Himalayan blackberry. Berwick Creek does not have many pool or riffle complexes and lacks diversity for juvenile and adult salmonids.

Riparian Corridor along Berwick Creek

Vegetation

The riparian corridor is narrow and vegetated in patches with shrubs and trees. Overall, within the project area, the riparian corridor only has mature forest canopy immediately along the channel. The understory is a mix of native and non-native herbaceous species and is largely dominated by reed canarygrass. The shrub layer is also a mix of native and non-native species. Himalayan blackberry is prominent; red-osier dogwood and rose are common native shrubs. Where an overstory exists, it is primarily Oregon ash with a few Sitka spruce, Douglas-fir, and cherry.

Soils

The soils are silt loams and silty clay loams with redoximorphic concentrations in the matrix and generally matched the mapped soil series of Lacamas silt loam (NRCS 2020).

Habitat

Deciduous trees have fallen into the stream where the banks have substantially eroded. Trees and native shrubs can provide habitat and feed for wildlife in the vicinity, but woody shrubs are not prevalent along the corridor. The extensive presence of the non-native and invasive reed canarygrass has likely led to suppression of native vegetation, which limits the riparian corridor's use by wildlife.

Riverine Wetland South of Berwick Creek

Vegetation

The wetland south of Berwick Creek is dominated by the non-native and invasive reed canarygrass with patches of soft rush scattered throughout the wetland. There are few shrubs and no trees within the wetland within the project area. The wetland receives overbank flows from Berwick Creek and substantial winter flow from the west flowing ditch (Ditch A).

Soils

The soils are silt loams and silty clay loams with redoximorphic concentrations in the matrix and generally matched the mapped soil series of Lacamas silt loam (NRCS 2020).

Water Quality Functions

Wetland A has a moderate potential to improve water quality because depressions cover more than half of the wetland, and the surface depressions can trap sediments during a flooding event. Herbaceous plants greater than 6 inches in height cover more than 66 percent of the wetland, and this vegetation can help slow surface flows and help drop sediments and pollutants out of the water column (Table 5; Appendix A). The landscape surrounding the wetland has a high potential to support water quality functions because the wetland is located within an incorporated city and urban growth area and the contributing basin is also within an incorporated city or urban growth area. Greater than 10 percent of the contributing basin of the wetland contains tilled fields or

pastures, and greater than 10 percent of the area within 150 feet of the wetland is in land uses that generate pollutants. The water quality improvement provided by the site is highly valuable to society. Berwick Creek is included as part of the Upper Chehalis Fecal Coliform Bacteria total maximum daily load (TMDL).

Hydrologic Functions

Wetland A has a high potential to reduce flooding and erosion because the ratio of the width of the wetland to the width of the stream is high, meaning that the wetland has a large capacity for storing flood waters (Table 5; Appendix A). The landscape has a moderate potential to support the hydrologic functions of the site because the up-gradient watershed includes and incorporated city or urban growth area, and the up-gradient stream is not controlled by dams. The hydrologic functions provided by the wetland to society are highly valuable because the sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources.

Habitat Functions

The wetland has a moderate potential to provide habitat because there are only two Cowardin classes, three hydroperiods, a moderately low richness of plant species, and a low interspersion of habitats (Table 5; Appendix A). Special habitat features within the wetland include evidence of recent beaver activity, and there are at least ¼ acre of thin-stemmed persistent plants or woody branches present in areas that are seasonally inundated. The surrounding landscape has a low potential to support habitat functions of the site. There is extremely limited undisturbed accessible habitat and very low undisturbed habitat within one kilometer of the site. The habitat provided by the site is moderately valuable to society because there are two priority habitats within 100 meters of the wetland: riparian and instream habitat (WDFW 2020).

PROPOSED CONDITIONS

Berwick Creek In-water Habitat

No fill or excavation is proposed below the OHWM of Berwick Creek. A total of four LWM structures will be installed along the banks of the stream, with the treetops extending into the water and contacting the streambed. The treetops will provide shade for the stream and will partially slow flow, creating pools downstream of the wood. The creation of pools will provide some complexity to the linear channel that lacks those features. The LWM structures can also recruit large and small wood that is being transported downstream during high water events. The overhanging LWM will create many beneficial features for adult and juvenile salmonids, including cover, resting areas for adults, and foraging and rearing habitat for juveniles.

Riparian Corridor along Berwick Creek

Vegetation

The vegetation proposed within the project area will consist of native, non-invasive species associated with riparian corridors within southwestern Washington. Non-native, invasive species

will be controlled following the invasive species performance standards (4h and 7i). The trees and shrubs to be installed will provide water quality functions such as slowing surface runoff during high water events allowing hydrology to infiltrate and to drop pollutants out of the water column. The planted vegetation will also provide overwater shading, LWM recruitment, and habitat and a food source for bird species and beaver.

Soils

Soils within the project area will be ripped and tilled to prepare for individual plantings. By breaking up the compacted soil and reed canarygrass root systems, installed plants will have a greater likelihood of survival and will promote infiltration of hydrology into the wetland.

Habitat

Invasive, non-native plants will be controlled chemically or mechanically removed from the project area, and native species associated with southwestern Washington riparian areas will be planted. The proposed multi-strata native trees and shrubs will improve vegetative structure in the wetland field that is dominated by reed canarygrass, which will benefit wildlife habitat and forage opportunities over the long-term. A minimum of 4 horizontal logs at least 10-inches DBH for 20-feet long will be placed as large woody material.

Wildlife

The proposed plan has been designed with specific elements to avoid or minimize impacts to the existing habitat of wildlife species or evidence of species that were observed onsite. The trees and shrubs specified will provide nesting, roosting, and escape habitat for birds (and some mammals). Many of the fruits, seeds, twigs, and leaves of the planted trees and shrubs will provide a food source for birds, mammals, and insects. Willow stakes will be densely planted as a food source to attract beavers in the area. In addition, bees frequent Nootka rose flowers as a nectar source. The native plants and large woody material proposed will benefit all wildlife species common to the area, including insects, amphibians, birds, and mammals.

Riverine Wetland South of Berwick Creek

The wetland conditions are assessed at what is anticipated for the conditions at 10 years following the restoration.

Vegetation

The vegetation proposed within the project area will consist of native, non-invasive species associated with wetlands in southwestern Washington. Non-native, invasive species will be controlled following the invasive species performance standards (7h and 7i). The trees and shrubs to be installed will provide water quality and quantity functions such as slowing surface runoff during flooding events allowing hydrology to infiltrate in the wetland and to drop pollutants out of the water column. The planted vegetation will also provide habitat and a food source for many local bird species and beaver as well. Juvenile salmonids can also access the wetland during high water events. The vegetation installed will provide foraging and cover opportunities.

Soils

Ripping the soils prior to plant install will help promote infiltration of hydrology into the wetland.

Water Quality Functions

Wetland A will still have a moderate potential to improve water quality because the number of surface depressions will remain the same, and these surface depressions will still trap sediments during a flooding event (Table 5; Appendix A). After enhancing the wetland, trees or shrubs specified for the wetland enhancement area will cover about two-thirds of the total wetland area, and this vegetation will help slow surface flows and help drop sediments and pollutants out of the water column. The landscape surrounding the wetland will still have a high potential to support water quality functions because the wetland is located within an incorporated city and urban growth area and the contributing basin is also within an incorporated city or urban growth area. Greater than 10 percent of the contributing basin of the wetland contains tilled fields or pastures, and greater than 10 percent of the area within 150 feet of the wetland is in land uses that generate pollutants. The water quality improvement provided by the site will still be highly valuable to society.

Enhancing the wetland with native shrubs and trees will help slow flood waters and allow pollutants and sediment to settle out of the water column, which will in turn help the water quality input into Berwick Creek. The south floodplain terrace to be excavated is also within Wetland A, resulting in 2,432 square feet of created wetland. The terrace to be excavated will be seeded with a native wetland seed mix and enhanced with native vegetation. The south floodplain terrace will still function as wetland and its aquatic resource type will not change. The terrace will improve water quality functions by slowing surface runoff from surrounding uplands and allowing water to infiltrate to filter out pollutants and sediment.

Hydrologic Functions

Wetland A will still have a high potential to reduce flooding and erosion because the ratio of the width of the wetland to the width of the stream is high (Table 5; Appendix A). The floodplain terrace will help add flood storage to the basin, overall reducing the impacts from flooding, and reducing erosion to the banks of Berwick Creek which are also the wetland boundary onsite. The landscape will still have a moderate potential to support the hydrologic functions of the site because the up-gradient watershed includes an incorporated city or urban growth area, and the up-gradient stream is not controlled by dams. The hydrologic functions provided by the wetland to society will remain highly valuable because the sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources.

The south floodplain terrace will improve hydrologic functions by providing additional flood storage and slowing surface runoff from surrounding uplands and allowing water to infiltrate, supporting wetland hydrology. The hydrogeomorphic class of the wetland will not change as a result of the excavation.

Habitat Functions

The wetland will still have a moderate potential to provide habitat because there will be three Cowardin classes, the number of hydroperiods will remain the same, there will be a rise in richness of plant species, and there will be a moderate interspersion of habitats due to the plantings and installation of LWM (Table 5; Appendix A). Special habitat features added to the wetland include large, downed, woody debris that is greater than 4 inches DBH and over 6 feet long. The surrounding landscape still has a low potential to support habitat functions of the site. The habitat provided by the site could be highly valuable to society because there will be three priority habitats within 100 meters of the wetland. The existing priority habitats are riparian and instream habitat (WDFW 2020). The priority habitat to be installed would be downed logs. (If the downed logs are greater than 12 inches in diameter at the largest end and greater than 20 feet long, then they will qualify as priority habitat.)

Excavating the north and south floodplain terraces will provide valuable off-channel habitat for juvenile salmonids during high water events. The native vegetation will also provide cover and forage opportunities for fish. Meandering Ditch A throughout Wetland A will also provide valuable off-channel habitat for juvenile salmonids. The enhanced ditch bottom will provide foraging and cover for the fish.

Wildlife

The proposed plan has been designed with specific elements to enhance habitat for wildlife species. The trees and shrubs specified will provide nesting, roosting, and escape habitat for birds and some mammals. The shrubs specified to install will provide greater opportunity for egg-laying amphibians within the seasonally flooded portions of the wetland. Many of the fruits, seeds, twigs, and leaves of the planted trees and shrubs will provide a food source for birds, mammals, and insects. In addition, bees frequent Nootka rose flowers as a nectar source. The native plants and large woody material proposed will benefit all wildlife species common to the area, including insects, amphibians, birds, and mammals.

Table 5. Wetland Function Assessment Existing and Post-Restoration Conditions

| Function ¹ | <u>Existing Condition</u> | | <u>Post-Restoration Condition²</u> | |
|--|--------------------------------|--------------------|---|--------------------|
| | Score | Qualitative Rating | Score | Qualitative Rating |
| Water Quality (9 possible points) | 8 | High | 9 | High |
| Water Quantity (9 possible points) | 8 | High | 8 | High |
| Habitat (9 possible points) | 5 | Low | 6 | Medium |
| | 21 points = Category II | | 23 points = Category I | |

¹ Hruby 2014

² Post-restoration condition is estimated at 10 years following installation

Implementation Plan

The implementation plan for each project element is detailed in the following three tables.

1. Enhance instream habitat (Table 6);
2. Create floodplain terraces and enhance habitat (Table 7); and
3. Enhance wetland functions (Table 8).

Table 6. Specifications for Enhancing Instream Habitat

| Restoration Feature/Action | Quantity | Site Preparation | Specifications | | Installation |
|---------------------------------|------------------|--|--|--|---|
| Location → Berwick Creek | | | | | |
| Place LWM structures | 4 structures | <ul style="list-style-type: none"> Install temporary construction fencing along the boundary of the project area as needed. | Instream Horizontal Habitat Logs (2 per structure = 8 total) <ul style="list-style-type: none"> Be locally sourced, native trees; At least 10-inches diameter for at least 20 feet in length; With rootwads retained (minimum 5-foot diameter); With lateral branches retained as feasible; Of hard to medium decay, and; With cut ends rough cut, mashed, or ripped. | Instream Vertical Anchor Logs (2 per structure = 8 total) <ul style="list-style-type: none"> Be locally sourced, native trees; At least 10-inches diameter for at least 20 feet in length; With lateral branches retained as feasible; Of hard to medium decay, and; With cut ends rough cut, mashed, or ripped. | <ul style="list-style-type: none"> At minimum, a construction oversight will be present during the initiation of installation. Follow construction notes on Sheet 14 and erosion control measures on Sheet 15. Install the log structure according to the specifications on Sheet 4. The distance between the anchor logs will depend on the angle that the horizontal habitat logs can be placed so the tops (or cut ends) will still reach the stream bed, so they will need to be laid out first to determine distancing of anchor log placement; Drive the two vertical anchor logs into the ground a minimum of 10 feet; Ensure the tops of the anchor logs are mashed or ripped when finished; Lay the first horizontal habitat log with the top (or cut end) of the tree flush with the stream bed facing slightly in a downstream direction; Attach the horizontal habitat log to the upstream anchor log using cable or rod and bolt; Lay the second horizontal habitat log with the top (or cut end) of the tree flush with the stream bed facing slightly in an upstream direction; Ensure the two horizontal habitat logs are lying across each other; Attach the second horizontal log to the downstream anchor log using cable or rod and bolt; and After the horizontal habitat logs are attached to their anchor logs, attach the two logs together with a cable approximately 6 feet from the cut end. Mulch any bare soils immediately after structures are installed with certified weed-free hay or straw. |
| Remove rock dam | 1 | <ul style="list-style-type: none"> None required | <ul style="list-style-type: none"> No specifications available. | | <ul style="list-style-type: none"> Remove all rock within the OHWM of Berwick Creek by hand. Limit entry into the stream to prevent sedimentation. Replace rocks along the OHWM on streambanks where rocks of the same type are currently located. |
| Install restoration signs | To be determined | <ul style="list-style-type: none"> None required | <ul style="list-style-type: none"> Restoration area signs will be durable and weather-proof and will state “Restoration area, please protect its natural condition”, or similar language approved by the Port of Chehalis. Signs will be placed on existing trees or on metal t-posts. | | <ul style="list-style-type: none"> Install durable, plastic project area signs around the project area at a minimum of 100-foot intervals or as modified by Port of Chehalis. |

Table 7. Specifications for Creating Floodplain Terraces and Enhancing Habitat

| Restoration Feature/Action | Quantity | Site Preparation | Specifications | Installation |
|---|---|--|---|---|
| Location → Berwick Creek Riparian Habitat, Floodplain, and Wetland A | | | | |
| Create floodplain terraces | 0.10 ac. (North Terrace) 0.17 ac. (South Terrace) | <ul style="list-style-type: none"> Install temporary construction fencing around the driplines of the Oregon white oak north of the stream, east of the north floodplain terrace. Install straw wattles with stakes around the boundaries of the floodplain terraces as feasible. Mechanically remove existing non-native species, namely Himalayan blackberry and reed canarygrass within the floodplain terraces. | <ul style="list-style-type: none"> Grading occurs shall only during the designated dry season (May 1st through October 1st); The moisture-holding capacity of the topsoil layer shall be maintained by minimizing soil compaction or reestablishing natural soil structure and infiltrative capacity. Limit equipment footprint and access to one haul road into the wetland and one staging area for the excavator. Excavated soils will be dumped directly into a dump truck and transported offsite to an upland location owned by the Port. | <ul style="list-style-type: none"> At minimum, a construction oversight will be present during the initiation of installation. Follow construction notes on Sheet 14 and erosion control measures on Sheet 15. Excavate two terraces with approximately 1-foot elevation change between the lower and upper terrace following the specification on Sheets 5 and 7. Stockpile soils in staging and stockpile areas identified on Sheet 13, if needed. Immediately following excavation, seed bare soils with native seed mix according to the specifications on Sheet 12. Leave straw wattles along the OHWM in place until seed mix has begun to establish. |
| Place LWM logs | 4 logs | <ul style="list-style-type: none"> None required | <ul style="list-style-type: none"> Be locally sourced, native trees; At least 10-inches diameter for at least 20 feet in length; With rootwads retained (minimum 5-foot diameter); With lateral branches retained as feasible; Of hard to medium decay, and; With cut ends rough cut, mashed, or ripped. | <ul style="list-style-type: none"> Install the LWM logs per the specifications on Sheet 6. Place the first LWM log with rootwad facing upstream and cut end facing downstream; Place the rootwad of the second log over the cut end of the first installed log; Cable the first and second LWM logs together; Continue in a downstream direction with the third log, lying the rootwad over the cut end of the second log; Cable the second and third LWM logs together; Continue in a downstream direction for the fourth log, lying the rootwad over the cut end of the second log; and Cable the third and fourth LWM logs together. |
| Enhance with native plants | 0.10 ac. (North Terrace) + 0.17 ac. (South Terrace) = 0.27 ac. | <ul style="list-style-type: none"> As necessary, selectively apply an approved herbicide approximately 3 times before starting construction, spaced over several week intervals, to control regrowth of invasive plants. Rip or till soils as necessary to loosen soils in preparation for planting. | <ul style="list-style-type: none"> Plant the native trees and shrubs during the late fall to early spring (October-March) at the spacing identified on Sheet 5. Group the plants in uneven patches dominated by a single species, with patches interspersed among one another. All plant materials will be kept cool and moist prior to installation. All plant materials will have well developed roots and sturdy stems, with an appropriate root to shoot ratio. No damaged or desiccated roots or diseased plants will be accepted. The contractor will be responsible for inspecting the live stakes prior to and during planting and rejecting unacceptable plant materials. Live stakes will be a minimum of 4-feet long and ¼- to 1-inch diameter. Live stakes will be installed within 1 to 2 days of cutting. | <p>Bareroot/Containerized Stock</p> <ul style="list-style-type: none"> Dig the receiving hole several inches wider and deeper than the size of the root system. Position the planted species' root collar so that they are at or slightly above the level of the surrounding soil to allow for settling. Backfill the hole with soil. Gently compact the soil around the planted species to eliminate air spaces. Install tree shelters as needed. Install herbivore deterrent as needed. Irrigate all newly installed plants as site and weather conditions warrant. <p>Live Stake Stock</p> <ul style="list-style-type: none"> Live stakes will be planted with a metal bar ("dibble stick") or push live stake into soft soil so 1/3 of the cutting is in the ground. Insert the live stake into the ground with lateral buds facing upwards. Unplanted live stakes will be properly stored at the end of each planting day to prevent desiccation. |

Table 8. Specifications for Enhancing Wetland Functions

| Restoration Feature/Action | Quantity | Site Preparation | Specifications | Installation |
|------------------------------------|--------------------|--|---|--|
| Location→ Wetland A | | | | |
| Meander Ditch A | 370 lf. 740 sf. | <ul style="list-style-type: none"> Physically demarcate ditch excavation area with fluorescently painted wood stakes or similar. | <ul style="list-style-type: none"> Grading occurs shall only during the designated dry season (May 1st through October 1st); The moisture-holding capacity of the topsoil layer shall be maintained by minimizing soil compaction or reestablishing natural soil structure and infiltrative capacity. Excavated spoils will be dumped directly into a dump truck and transported offsite to an upland location owned by the Port or used to fill the old Ditch A channel. | <ul style="list-style-type: none"> At minimum, a construction oversight will be present during the initiation of installation. Follow construction notes on Sheet 14 and erosion control measures on Sheet 15. Excavate a 2-ft wide by 370-linear ft meandering channel following the specifications on Sheet 8-10. Backfill the Ditch A’s existing footprint to match existing wetland elevation. Stockpile any extra soil in staging and stockpile areas identified on Sheet 13, if needed. Immediately following excavation, seed bare soils with native seed mix according to the specifications on Sheet 12. Densely plant 3-foot wide corridor along ditch banks with live willow stakes. |
| Place LWM logs | 2 logs | <ul style="list-style-type: none"> None required | <ul style="list-style-type: none"> Be locally sourced, native trees; At least 10-inches diameter for at least 20 feet in length; With rootwads retained (minimum 5-foot diameter); With lateral branches retained as feasible; Of hard to medium decay; and, With cut ends rough cut, mashed, or ripped. | <ul style="list-style-type: none"> Install LWM logs following the specifications on Sheet 8. Place the first LWM log with rootwad facing upstream (of Ditch A); Place the second LWM log downstream of the first log, with rootwad facing upstream; Ensure the cut end of the first log and the rootwad of the second log overlap a minimum of 6 feet; and Logs do not need to be cabled together. |
| Remove roadbed fill and culvert | 431 sf. | <ul style="list-style-type: none"> Physically demarcate roadbed excavation area with fluorescently painted wood stakes or similar. | <ul style="list-style-type: none"> Remove existing culvert and roadbed fill when all work within the project area requiring heavy equipment is completed. Excavated spoils will be dumped directly into a dump truck and transported offsite to an upland location owned by the Port or used to fill the old Ditch A channel. The culvert will be transported off-site to a licensed disposal facility. | <ul style="list-style-type: none"> At minimum, a construction oversight will be present during the initiation of installation. Follow specifications on Sheet 8 and erosion control measures on Sheet 15. Excavate the ditch banks at a 2:1 slope and fill the base ditch elevation beneath the culvert to match existing conditions. Seed bare soils with native seed mix following specifications on Sheet 12. Stabilize banks with willow stakes. |
| Enhance wetland with native plants | 1.18 ac. | <ul style="list-style-type: none"> Mechanically remove existing non-native species, namely Himalayan blackberry and reed canarygrass within the wetland enhancement area. Selectively apply an approved herbicide, by hand, approximately 3 times before starting construction, spaced over several week intervals, to control regrowth of invasive plants. Rip or till soils as necessary to loosen soils in preparation for planting. | <ul style="list-style-type: none"> Plant the native trees and shrubs during the late fall to early spring (October-March) at the spacing identified on Sheet 9. Group the plants in uneven patches dominated by a single species, with patches interspersed among one another. All plant materials will be kept cool and moist prior to installation. All plant materials will have well developed roots and sturdy stems, with an appropriate root to shoot ratio. No damaged or desiccated roots or diseased plants will be accepted. The contractor will be responsible for inspecting the live stakes prior to and during planting and rejecting unacceptable plant materials. Live stakes will be a minimum of 4-feet long and ¼- to 1-inch diameter. Live stakes will be installed within 1 to 2 days of cutting. | <p>Bareroot/Containerized Stock</p> <ul style="list-style-type: none"> Dig the receiving hole several inches wider and deeper than the size of the root system. Position the planted species’ root collar so that they are at or slightly above the level of the surrounding soil to allow for settling. Backfill the hole with soil. Gently compact the soil around the planted species to eliminate air spaces. Install tree shelters as needed. Install herbivore deterrent as needed. Irrigate all newly installed plants as site and weather conditions warrant. <p>Live Stake Stock</p> <ul style="list-style-type: none"> Live stakes will be planted with a metal bar (“dibble stick”) or push live stake into soft soil so 1/3 of the cutting is in the ground. Insert the live stake into the ground with lateral buds facing upwards. Unplanted live stakes will be properly stored at the end of each planting day to prevent desiccation. |

LARGE WOODY MATERIAL SPECIFICATIONS

The summary of log quantities and sheets with the log specifications is as follows:

Table 9. Large Woody Material Structures and Log Quantities

| | Large Woody Material | Notes | Log Specifications |
|--|----------------------|--|--------------------|
| Instream Habitat | 4 Structures | 2 horizontal logs with rootwads attached per structure = 8 total logs 2 vertical anchor logs with no rootwads attached per structure = 8 total logs | Sheet 4 |
| North Floodplain Terrace | 4 Logs | Logs with rootwads attached. Logs to be cabled. | Sheet 6 |
| Ditch Meander (Wetland Enhancement Area) | 2 Logs | Logs with rootwads attached. Logs not cabled. | Sheet 8 |

PLANTING SPECIFICATIONS

The following tables detail the plant specifications for the containerized plants, live stakes, and seed mix:

1. Floodplain terraces (Table 10 and 12)
2. Riverine wetland (Table 11 and 12)

The native trees and shrubs will be installed in the floodplain terraces and wetland enhancement area during the late fall to early spring when the plants are dormant, and the soil moisture conditions are favorable for planting. The trees and shrubs are intended to create a multi-strata native plant community that provides stream shading, large woody debris recruitment, wildlife habitat over the long-term.

The following equipment may be used to prepare and install plants: brush hog, weed eater, tractor, rototiller, tree shovel, garden shovel, and power auger. Heavy equipment will avoid the drip zone of preserved and planted trees and shrubs to prevent soil compaction.

Table 10. Floodplain Terraces Plant Specifications

| Species | Spacing (ft on center) | Size | Quantity | |
|--|---------------------------|-----------------------|-----------------------------|-----------------------------|
| | | | North Terrace (0.10 ac.) | South Terrace (0.17 ac.) |
| Tree Stratum | | | | |
| Bigleaf maple <i>(Acer macrophyllum, FACU)</i> | 10 | Min 1 gal | 5 | - |
| Red alder <i>(Alnus rubra, FAC)</i> | 10 | Min 1 gal | 5 | 15 |
| Oregon ash <i>(Fraxinus latifolia, FACW)</i> | 10 | Min 1 gal | 10 | 20 |
| Oregon white oak <i>(Quercus garryana, FACU)</i> | 14 | Min 1 gal | 5 | - |
| | | | 25 | 35 |
| | | Total Trees | | 60 |
| Shrub Stratum | | | | |
| Tall understory | | | | |
| Black hawthorn <i>(Crataegus douglasii, FAC)</i> | 5 | Min 1 gal | 10 | 20 |
| Pacific ninebark <i>(Physocarpus capitatus, FACW)</i> | 5 | Min 1 gal | 10 | 20 |
| Sitka willow <i>(Salix sitchensis, FACW)</i> | 5 | Min 4-foot live stake | 25 | 50 |
| Mid-understory | | | | |
| Red-osier dogwood <i>(Cornus sericea, FACW)</i> | 5 | Min 1 gal | 20 | 40 |
| Black twinberry <i>(Lonicera involucrata, FACW)</i> | | Min 1 gal | 25 | 40 |
| Nootka rose <i>(Rosa nutkana, FAC)</i> | 5 | Min 1 gal | 25 | 40 |
| Common snowberry <i>(Symphoricarpos albus, FACU)</i> | 5 | Min 1 gal | 10 | - |
| | | | 125 | 210 |
| | | Total Shrubs | | 335 |

Table 11. Wetland Enhancement Area Plant Specifications

| Species | Spacing (feet on center) | Size | Quantity (1.18 ac.) |
|--|------------------------------------|-----------------------|-------------------------------|
| Tree Stratum | | | |
| Red alder (<i>Alnus rubra</i> , FAC) | 10 | Min 1 gal | 100 |
| Oregon ash (<i>Fraxinus latifolia</i> , FACW) | 10 | Min 1 gal | 125 |
| | | Total Trees | 225 |
| Shrub Stratum | | | |
| Tall understory | | | |
| Black hawthorn (<i>Crataegus douglasii</i> , FAC) | 5 | Min 1 gal | 125 |
| Pacific ninebark (<i>Physocarpus capitatus</i> , FACW) | 5 | Min 1 gal | 125 |
| Sitka willow (<i>Salix sitchensis</i> , FACW) | 5 | Min 4-foot live stake | 350 |
| Mid-understory | | | |
| Red-osier dogwood (<i>Cornus sericea</i> , FACW) | 5 | Min 1 gal | 250 |
| Black twinberry (<i>Lonicera involucrata</i> , FACW) | | Min 1 gal | 250 |
| Nootka rose (<i>Rosa nutkana</i> , FAC) | 5 | Min 1 gal | 250 |
| | | Total Shrubs | 1,350 |
| Ditch A Meander | | | |
| Sitka willow (<i>Salix sitchensis</i> , FACW) | 3 | Min 4-foot live stake | 300 |

Table 12. Seed Mix Specifications

| Seed Mix | Composition ¹ | Location | Application Rate | Area | Total Quantity |
|--------------------------|---|---|------------------|----------|----------------|
| Native Upland Grass Mix | 30% Blue wildrye 30% Meadow barley 10% Roemer's rescue 10% Spike bentgrass 10% Tufted hairgrass 10% Red fescue | North Floodplain Terrace | 15-25 lbs./ac. | 0.10 ac. | 1.5-2.5 lbs. |
| Native Wetland Grass Mix | 40% Western mannagrass 30% American sloughgrass 20% Meadow barley 10% Short-awn Foxtail | South Floodplain Terrace (0.17 ac.) & Wetland Enhancement Area (1.18 ac.) | 15-25 lbs./ac. | 1.35 ac. | 20-34 lbs. |

¹ River Refuge Seed Company, LLC is the recommended source for native seed. The seed composition may be adjusted by the project biologist.

MAINTENANCE

The planted trees and shrubs will be maintained as often as necessary to ensure that the specified performance standards are met. The maintenance includes the following:

- Inspect the plantings at least once annually, or more often as appropriate, and maintain to achieve the performance standards specified in the subsection titled *Goals, Objectives, & Performance Standards*.
- Irrigate planted trees and shrubs during the dry season for the first 2 to 3 years after planting as needed. Adjust as necessary based on site and weather conditions.
- Remove competing vegetation from around the base of plant species during first 2 to 3 years after planting and as needed thereafter.
- Inspect tree shelters to ensure they are upright, stable, and likely to remain so for another year. Ensure that the terminal shoot of the planted species is not ensnared in the wall of the tree shelter. Remove tree shelters when species is robust enough to withstand browse or shelter is impeding growth.
- Replace dead or failed plants to meet the minimum annual performance standards (Table 4). Replaced plants will be installed as described for the original installation.

Minor corrective actions will be undertaken as necessary as a part of routine maintenance and will be documented in the subsequent monitoring report. Corrective actions include, but are not limited to, the following:

- Replant trees or shrubs.
- Repair damaged limbs or prune dead branches.
- Substitute the anti-herbivore device, such as installing a different type of tree shelter or using herbivore deterrent.

Monitoring Plan

This plan establishes a 5-year monitoring plan with quantitative performance standards. The monitoring will commence the first growing season after the mitigation areas are completed and extend for a 5-year period, in years 1, 2, 3, and 5. An as-built, describing the construction and installation, will be included in the Year 1 monitoring report.

The goal of the monitoring will be to determine if the previously stated performance standards are being met (Table 4). Reports in years 1, 2, 3, and 5 will be submitted to the City of Chehalis by February 1st following each monitored year.

MONITORING PLOTS

During the first annual monitoring event, 6 LWM inspection checks and 4 vegetation monitoring plots will be established and conducted as follows:

Large Woody Material Inspections Checks

- 4 LWM inspection checks, one at each of the LWM instream structures
- 2 LWM inspection checks, one of the north floodplain terrace LWM logs and one of the Ditch A meander LWM logs

Vegetation Monitoring Plots

- 1 vegetation plot in the north floodplain terrace
- 1 vegetation plot in the south floodplain terrace
- 2 vegetation plots on the wetland enhancement area

The inspection checks for the LWM structures and LWM log plots will be numbered on paper for identification purposes. The vegetation monitoring plots will be staked with metal t-posts and identification tags. All LWM inspection and vegetation monitoring plot locations will be identified by GPS and placed on an as-built site map that will accompany the monitoring reports. Permanent photo points will be established at each LWM inspection and vegetation monitoring plot and directions documented on the site map.

Instream LWM Structures

To assess the condition of the four LWM structures in Berwick Creek, the following will be conducted each monitoring year:

1. Visually assess the structural integrity of the horizontal and anchor logs
2. Assess the natural recruitment of additional LWM to the logs during high flows
3. Count the number of logs present (confirm four per structure)
4. Provide photos from permanent photo points to document condition of the logs
5. Provide photos of and describe the in-water habitat in the immediate vicinity of each structure

LWM Logs in North Floodplain Terrace and Ditch Meander

To assess the condition of the four LWM logs in the north floodplain terrace and the two LWM logs in the ditch meander in the wetland enhancement area. The following will be conducted each monitoring year:

1. Visually assess the LWM and document if it has moved
2. Assess the natural recruitment of additional LWM to the logs during high flows
3. Provide photos from permanent photo points to document condition of the logs

Vegetation

To assess the status of the vegetation within the floodplain terraces and wetland enhancement areas, the vegetation monitoring will measure the following:

1. Total density of planted native trees and shrubs (to determine survival rate) within a 15-foot radius from the metal t-post
2. Percent aerial cover of planted and naturally recruiting native trees and shrubs within a 15-foot radius from the metal t-post
3. Percent aerial cover of naturally occurring herbaceous plants within a 5-foot radius from the metal t-post
4. Percent aerial cover of non-native, invasive plants within a 15-foot radius from the metal t-post
5. Change in the plant community over time (documented at each designated photo point)

Monitoring Report

The annual monitoring reports will contain at least the following:

- Location map and as-built figures and revised plant quantity table as needed
- Historic description of project, including dates of plant installation, current year of monitoring, and restatement of performance standards
- Description of monitoring methods
- Assessment of integrity of LWM structures, including horizontal logs and anchors, and LWM logs
- Documentation of plant survival, cover, and overall development within the floodplain terrace and wetland enhancement area
- Assessment of non-native, invasive plant species and recommendations for management
- Assessment of site hydrology and soils, only if they appear to be limiting plant survival
- Observations of wildlife, including, insects, amphibians, birds, mammals, and aquatic species
- Photographs from permanent photo points, whose location and direction will be identified on an as-built figure
- Summary of maintenance and adaptive management measures proposed for the next season and completed for the past season

Adaptive Management Plan

If the performance standards are not met by the third year of monitoring, or at an earlier time if necessary, an adaptive management plan will be developed and implemented. All adaptive management actions will be undertaken only after consulting and gaining approval from the City of Chehalis. The Applicant (or Successor as assigned) will complete an adaptive management plan that describes 1) the need for adaptive management, 2) proposed actions, 3) time-frame for completing actions, and 4) any additional maintenance and monitoring, if necessary.

If a catastrophic failure of the instream LWM structures occurs or other LWM onsite floats downstream to the culvert beneath Bishop road and effects the integrity of the culvert, the Applicant (or Successor as assigned) will be responsible for removing the LWM. If any LWM is mobilized onsite and ends up in a location that is suitable and will not impact or result in the failure of any manmade structures, the LWM will be left as-is and will be inspected after flooding events by the Applicant for any changes.

Limitations

ELS bases this report's determinations on standard scientific methodology and best professional judgment. In our opinion, local, state, and federal regulatory agencies should agree with our determinations. However, the information contained in this report should be considered preliminary and used at your own risk until it has been approved in writing by the appropriate regulatory agencies. ELS is not responsible for the impacts of any changes in environmental standards, practices, or regulations after the date of this report.

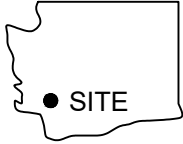
References

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Sheets

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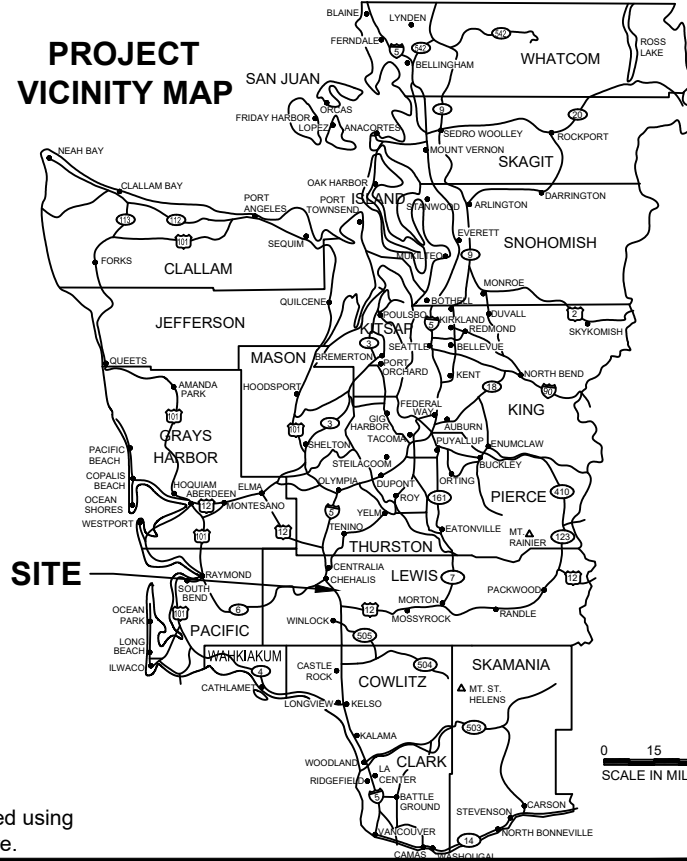
WASHINGTON



LATITUDE: 46.6192°
LONGITUDE: -122.9113°

LOCATION MAP

PROJECT VICINITY MAP



| | | | | | |
|---|----|----|----|---|----|
| R | | 2 | | W | |
| | | 8 | 10 | | |
| T | 13 | | 10 | | |
| | | | 15 | | |
| N | | 31 | | | 36 |

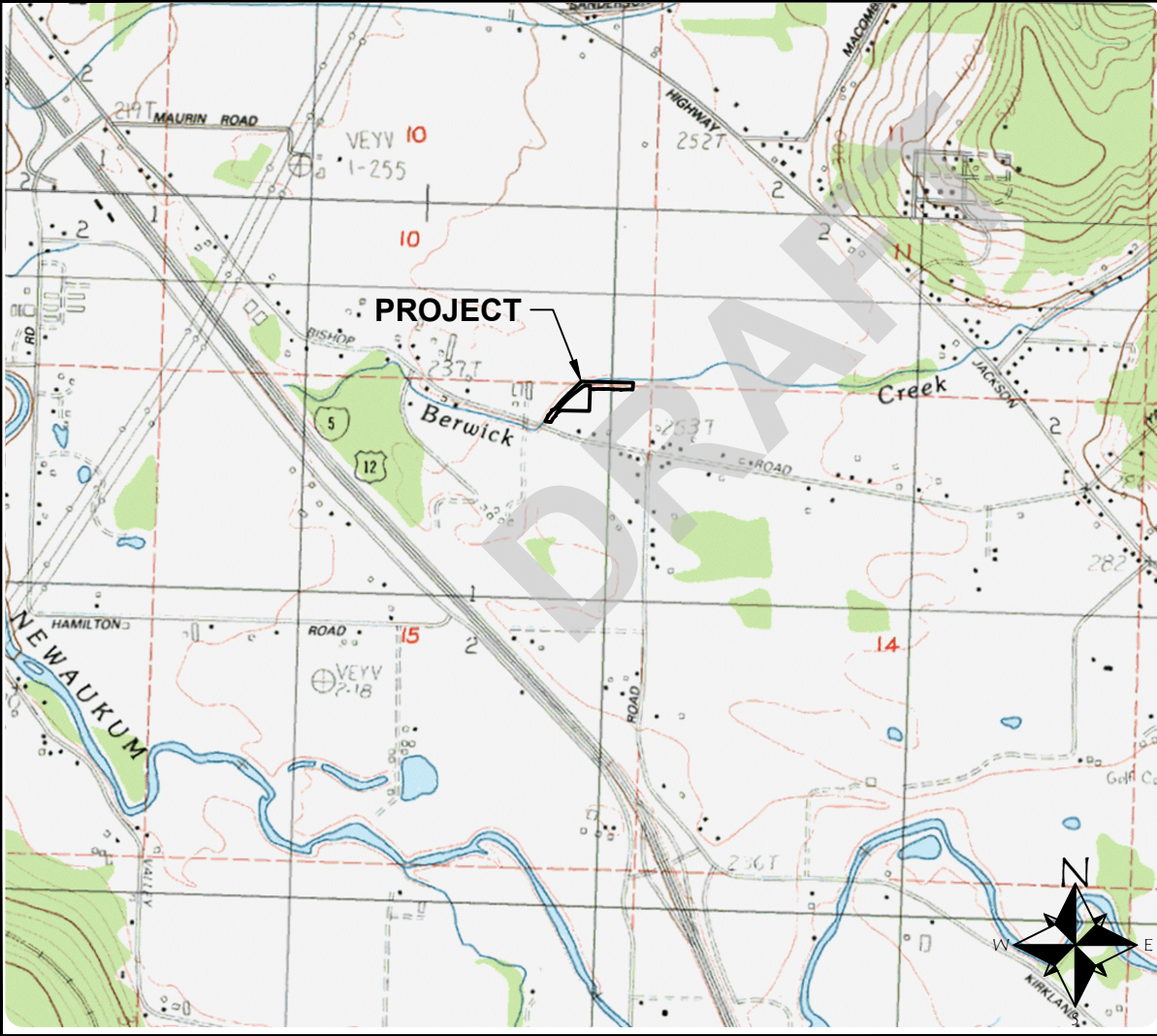
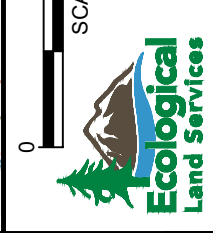
NOTE:
USGS topographic quadrangle map reproduced using MAPTECH Inc., Terrain Navigator Pro software.

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS
NEAR: CHEHALIS
COUNTY: LEWIS
STATE: WA
SHEET 1 OF 15
DATE: 4/23/20

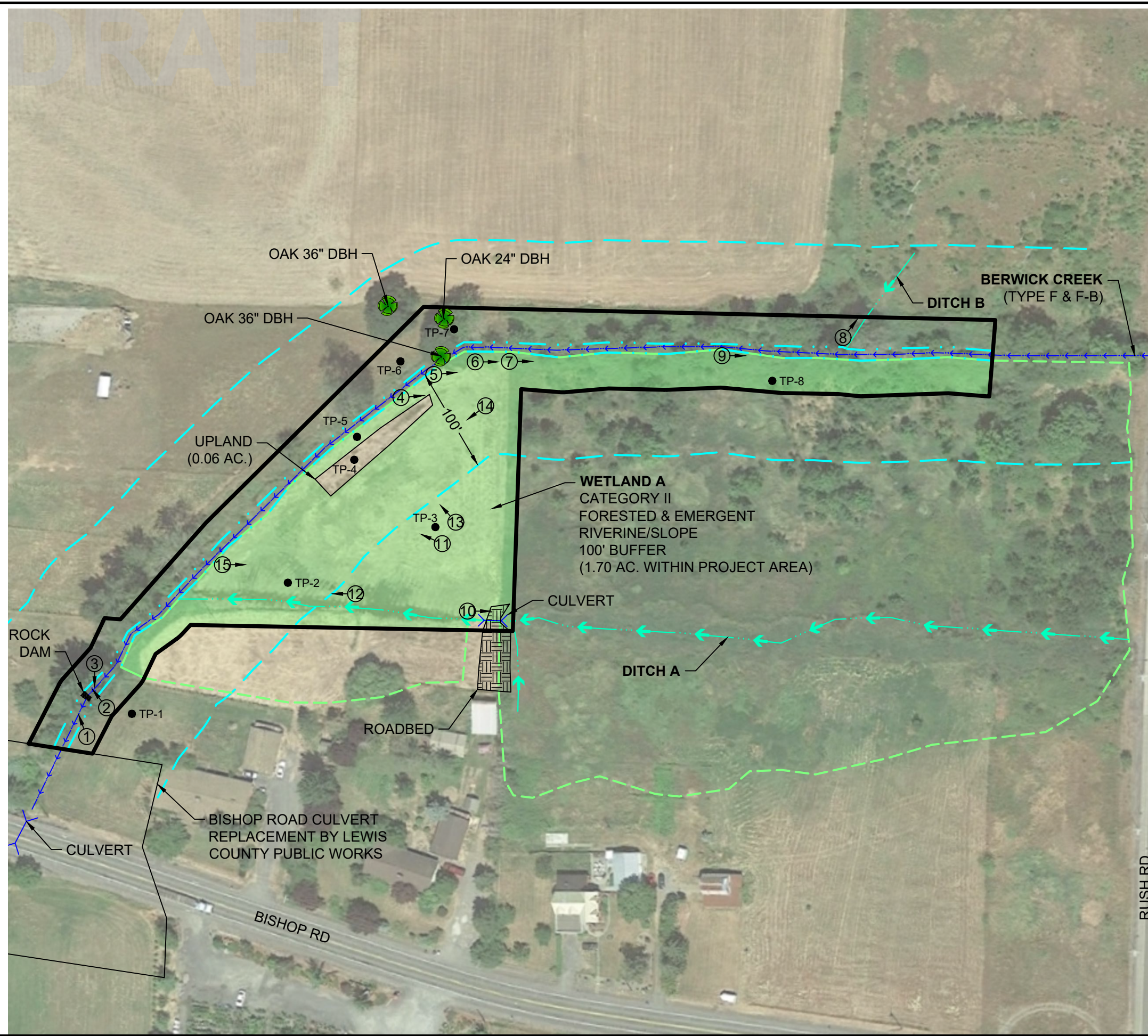
VICINITY MAP
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
SITE LOCATION ADDRESS: 1861 BISHOP ROAD CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



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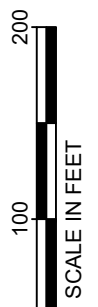
LEGEND:

- PROJECT AREA (2.79 AC.)
- WETLAND BOUNDARY
- APPROXIMATE WETLAND BOUNDARY (7.29 AC.)
- ← STREAM WITH FLOW DIRECTION
- ← DITCH WITH FLOW DIRECTION
- OHWM
- STREAM BUFFER
- X CULVERT
- OREGON WHITE OAK
- TP-1 TEST PLOT
- 1 PHOTOPOINT

NOTE(S):

1. AERIAL FROM GOOGLE EARTH™.
2. ECOLOGICAL LAND SERVICES INC. BIOLOGISTS DELINEATED THE STREAM AND WETLAND BOUNDARIES ON MARCH 25, 2019 AND FEBRUARY 18, 2020.
3. GIBBS & OLSON INC. SURVEYED THE STREAM AND WETLANDS FLAGS IN MARCH 2019.
4. STREAM TYPING AND BUFFER WIDTH ARE ACCORDING TO CMC 17.25.020 AND 17.25.030.
5. WETLAND CLASSIFICATION AND BUFFER WIDTHS ARE ACCORDING TO CMC 17.23.010 AND CMC 17.23.030.

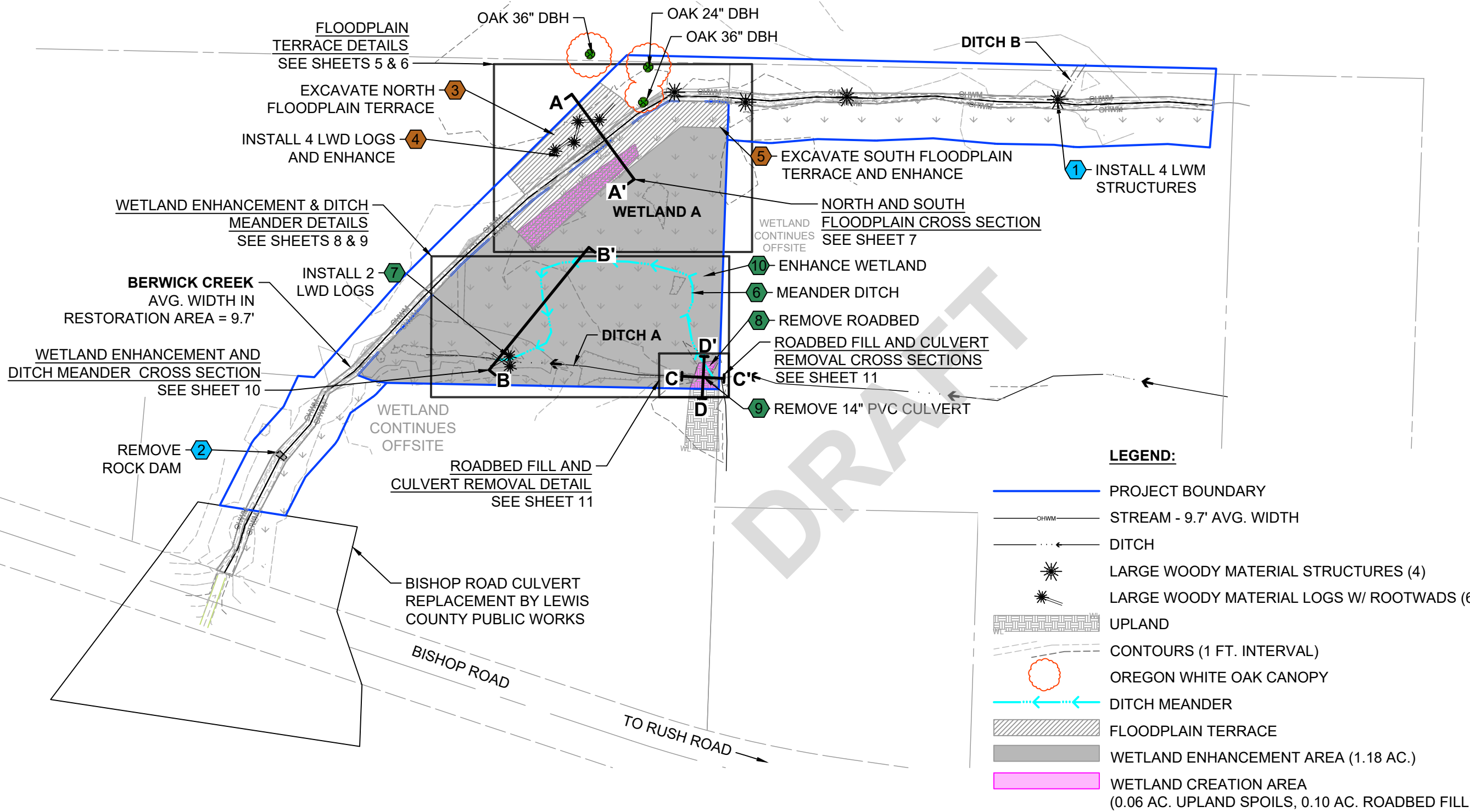
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|--|--|---|
| <p>PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS NEAR: CHEHALIS COUNTY: LEWIS STATE: WA SHEET 2 OF 15 DATE: 4/22/20</p> | <p>EXISTING CONDITIONS APPLICANT: PORT OF CHEHALIS PROJECT NAME: BERWICK CK. RESTORATION PROJECT REFERENCE #: NOT YET ASSIGNED SITE LOCATION ADDRESS: 1861 BISHOP ROAD CHEHALIS, WA</p> | <p>PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT DATUM: NAD83 ADJACENT PROPERTY OWNERS:</p> |
|--|--|---|



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 Longview, WA 98632
 Phone: (360) 578-1371



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LEGEND:

- PROJECT BOUNDARY
- STREAM - 9.7' AVG. WIDTH
- DITCH
- LARGE WOODY MATERIAL STRUCTURES (4)
- LARGE WOODY MATERIAL LOGS W/ ROOTWADS (6)
- UPLAND
- CONTOURS (1 FT. INTERVAL)
- OREGON WHITE OAK CANOPY
- DITCH MEANDER
- FLOODPLAIN TERRACE
- WETLAND ENHANCEMENT AREA (1.18 AC.)
- WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.10 AC. ROADBED FILL)

CONSTRUCTION NOTES:

INSTREAM HABITAT ENHANCEMENT

- INSTALL FOUR (4) LARGE WOODY MATERIAL (LWM) STRUCTURES
- REMOVE ROCK DAM

FLOODPLAIN TERRACE CREATION AND ENHANCEMENT

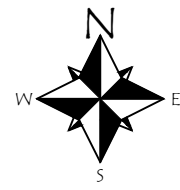
- EXCAVATE NORTH FLOODPLAIN TERRACE (0.10 AC.)
- INSTALL FOUR (4) LWM LOGS WITH ROOTWADS AND ENHANCE WITH NATIVE PLANTS
- EXCAVATE SOUTH FLOODPLAIN TERRACE AND ENHANCE WITH NATIVE PLANTS (0.17 AC.)

WETLAND ENHANCEMENT

- MEANDER DITCH A (370 LINEAR FEET)
- INSTALL TWO (2) LWM LOGS WITH ROOTWADS ALONG DITCH MEANDER
- REMOVE ROADBED (0.10 ACRES/431 SF.)
- REMOVE CULVERT
- ENHANCE WETLAND WITH NATIVE PLANTS (1.18 ACRES)

NOTE(S):

- 1. BASE MAP FROM GIBBS & OLSON.



1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT

RESTORATION AND WETLAND CREATION/ENHANCEMENT

APPLICANT: PORT OF CHEHALIS

PROJECT NAME: BERWICK CK. RESTORATION PROJECT

REFERENCE #: NOT YET ASSIGNED

DATE: NAD83

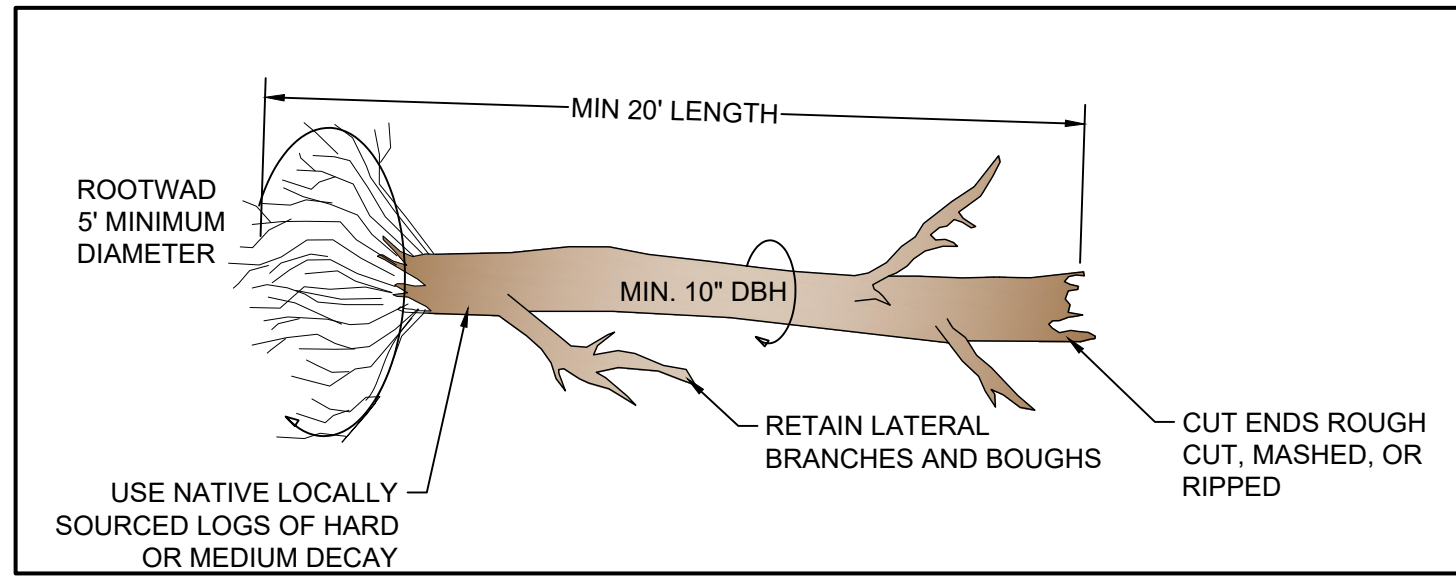
ADJACENT PROPERTY OWNERS:

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS NEAR: CHEHALIS COUNTY: LEWIS STATE: WA SHEET 3 OF 15 DATE: 4/23/20

PLAN OVERVIEW

SITE LOCATION ADDRESS:
1861 BISHOP ROAD
CHEHALIS, WA

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LARGE WOODY MATERIAL HORIZONTAL LOG DETAIL

N.T.S.

SPECIFICATIONS FOR INSTREAM HORIZONTAL HABITAT LOGS

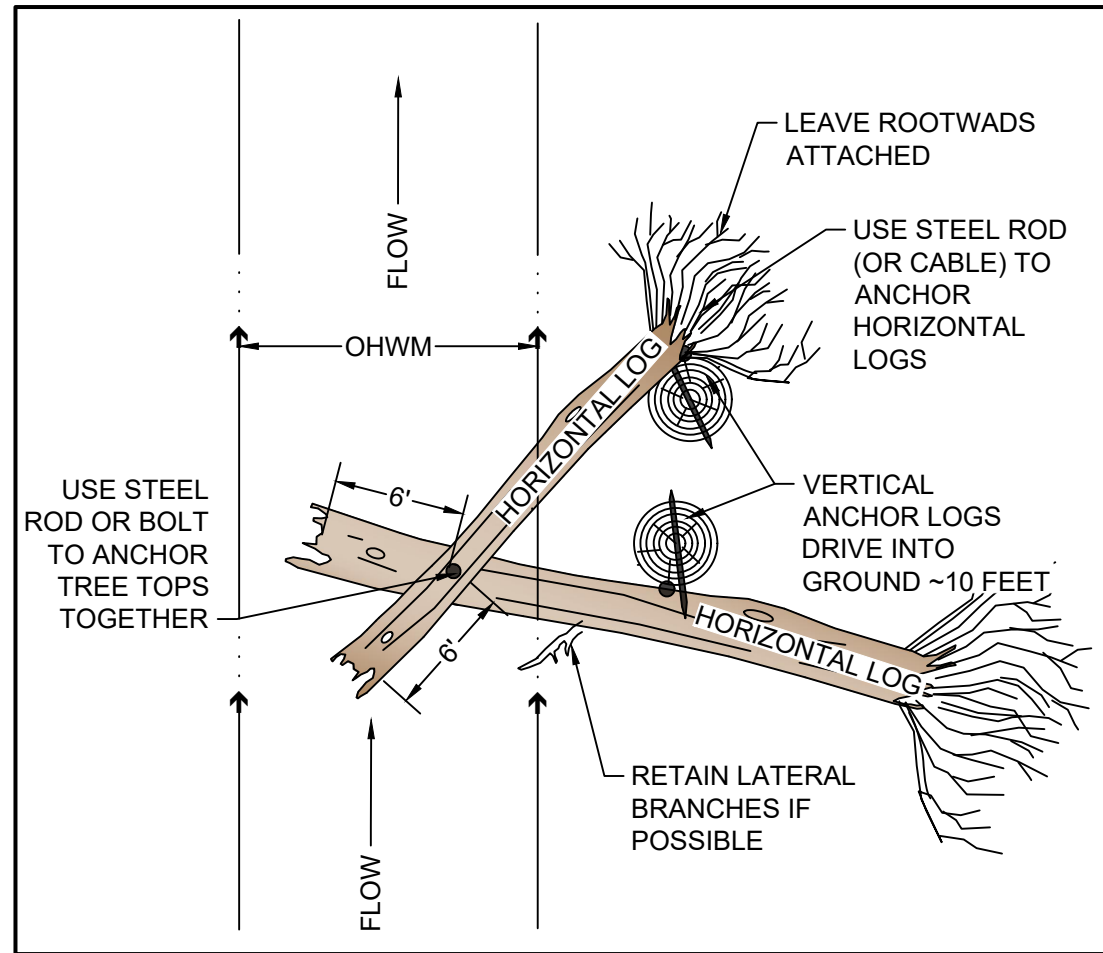
- A. BE LOCALLY SOURCED, NATIVE TREES;
- B. AT LEAST 10-INCHES DIAMETER FOR AT LEAST 20 FEET IN LENGTH;
- C. WITH ROOTWADS RETAINED (MINIMUM 5-FOOT DIAMETER);
- D. WITH LATERAL BRANCHES RETAINED AS FEASIBLE;
- E. OF HARD TO MEDIUM DECAY, AND;
- F. WITH CUT ENDS ROUGH CUT, MASHED, OR RIPPED.

SPECIFICATIONS FOR INSTREAM VERTICAL ANCHOR LOGS

- A. BE LOCALLY SOURCED, NATIVE TREES;
- B. AT LEAST 10-INCHES DIAMETER FOR AT LEAST 20 FEET IN LENGTH;
- C. WITH LATERAL BRANCHES RETAINED AS FEASIBLE;
- D. OF HARD TO MEDIUM DECAY, AND;
- E. WITH CUT ENDS ROUGH CUT, MASHED, OR RIPPED.

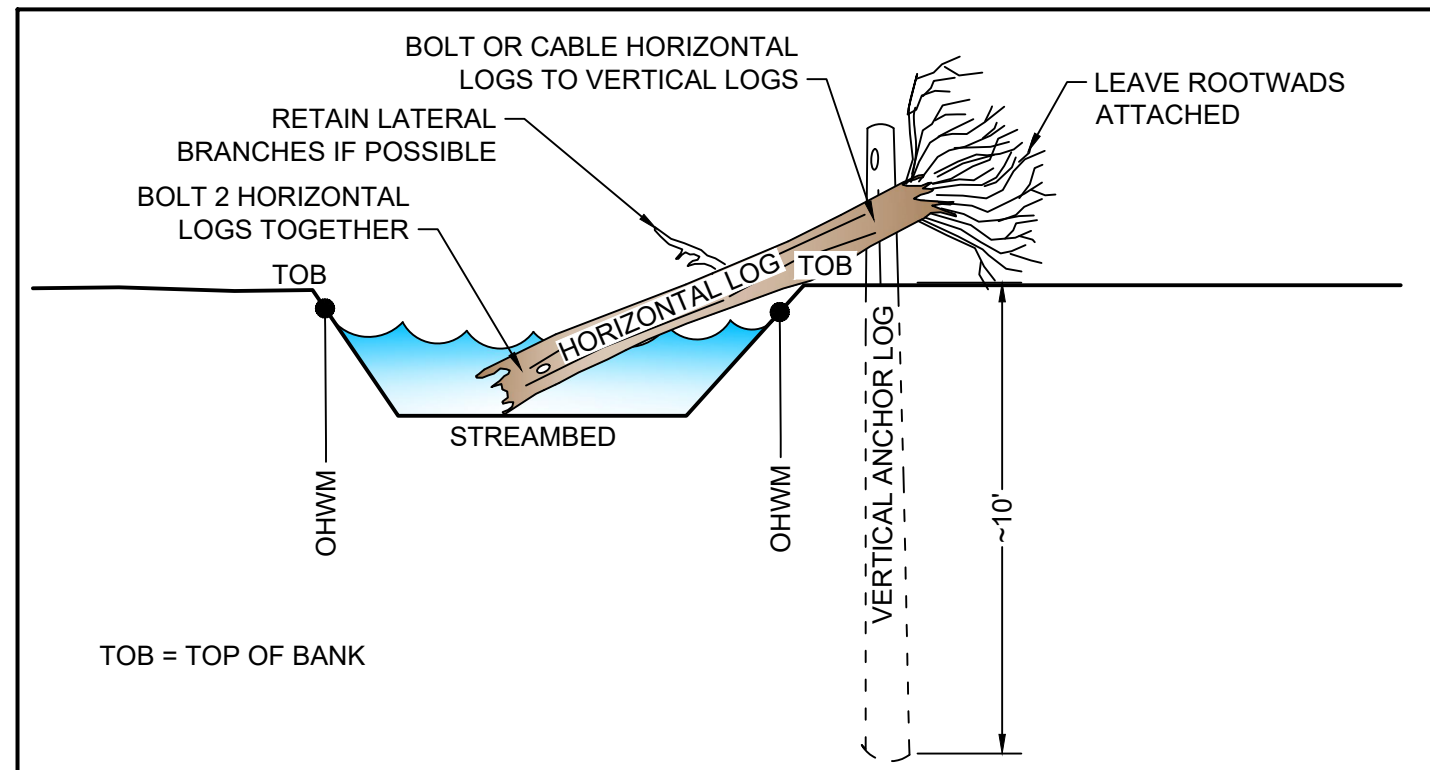
INSTALLATION

- A. THE DISTANCE BETWEEN THE ANCHOR LOGS WILL DEPEND ON THE ANGLE IN WHICH THE HORIZONTAL HABITAT LOGS CAN BE PLACED SO THE TOPS (OR CUT ENDS) WILL STILL REACH THE STREAM BED, SO THEY WILL NEED TO BE LAID OUT FIRST TO DETERMINE DISTANCING OF ANCHOR LOG PLACEMENT;
- B. DRIVE THE TWO VERTICAL ANCHOR LOGS INTO THE GROUND A MINIMUM OF 10 FEET;
- C. ENSURE THE TOPS OF THE ANCHOR LOGS ARE MASHED OR RIPPED WHEN FINISHED;
- D. LAY THE FIRST HORIZONTAL HABITAT LOG WITH THE TOP (OR CUT END) OF THE TREE FLUSH WITH THE STREAM BED FACING SLIGHTLY IN A DOWNSTREAM DIRECTION;
- E. ATTACH THE HORIZONTAL HABITAT LOG TO THE UPSTREAM ANCHOR LOG USING CABLE OR ROD AND BOLT;
- F. LAY THE SECOND HORIZONTAL HABITAT LOG WITH THE TOP (OR CUT END) OF THE TREE FLUSH WITH THE STREAM BED FACING SLIGHTLY IN AN UPSTREAM DIRECTION;
- G. ENSURE THE TWO HORIZONTAL HABITAT LOGS ARE LYING ACROSS EACH OTHER;
- H. ATTACH THE SECOND HORIZONTAL LOG TO THE DOWNSTREAM ANCHOR LOG USING CABLE OR ROD AND BOLT; AND
- I. AFTER THE HORIZONTAL HABITAT LOGS ARE ATTACHED TO THEIR ANCHOR LOGS, ATTACH THE TWO LOGS TOGETHER WITH A CABLE APPROXIMATELY 6 FEET DOWN FROM THE CUT END.
- J. MULCH ANY BARE SOILS IMMEDIATELY AFTER STRUCTURES ARE INSTALLED WITH CERTIFIED WEED-FREE HAY OR STRAW.



LARGE WOODY MATERIAL STRUCTURE PLAN VIEW DETAIL

N.T.S.



LARGE WOODY MATERIAL STRUCTURE SECTION DETAIL

N.T.S.

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS
 NEAR: CHEHALIS COUNTY: LEWIS STATE: WA
 SHEET 4 OF 15
 DATE: 4/23/20

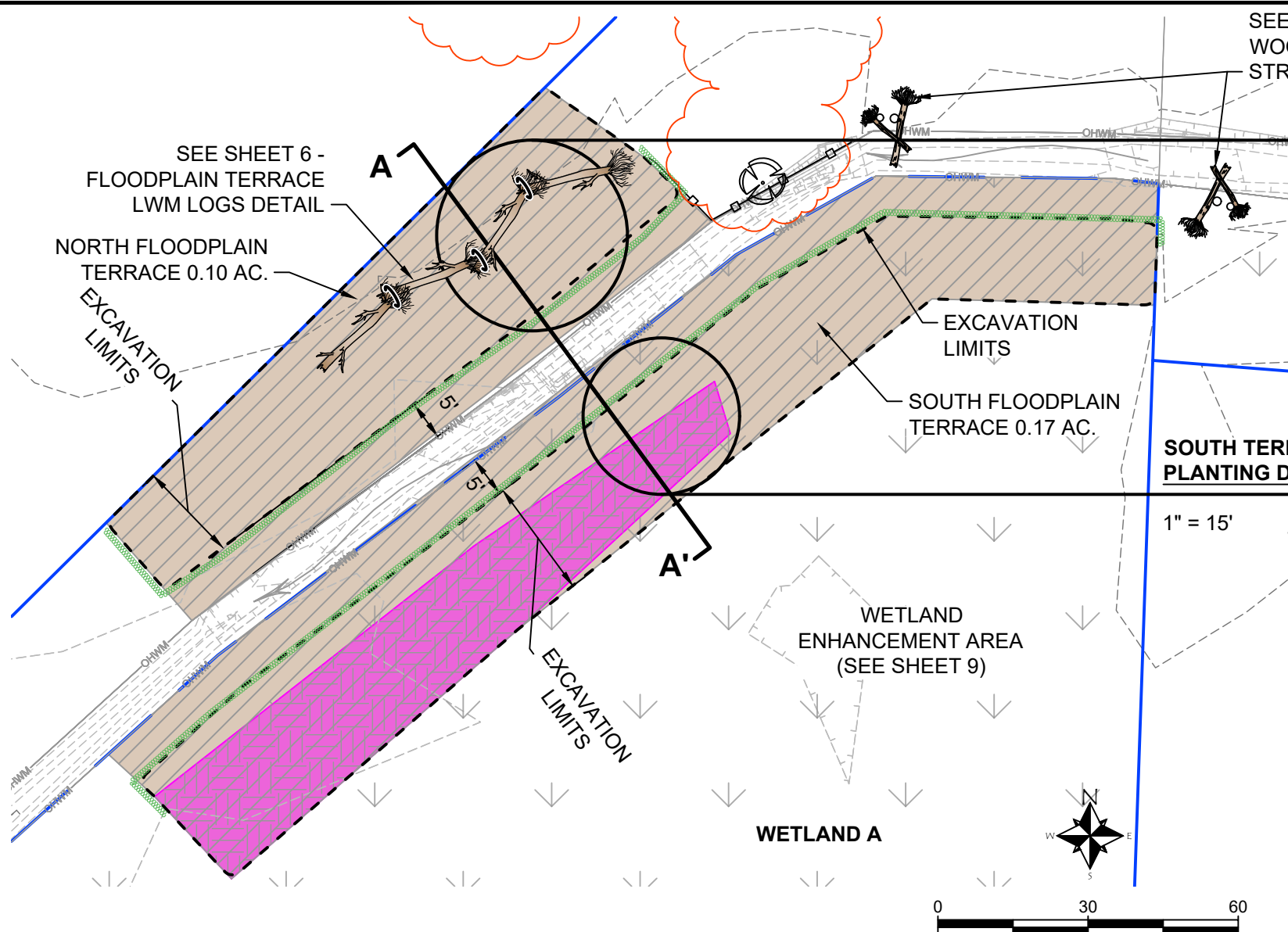
LARGE WOODY MATERIAL STRUCTURE DETAIL
 APPLICANT: PORT OF CHEHALIS
 PROJECT NAME: BERWICK CK. RESTORATION PROJECT
 REFERENCE #: NOT YET ASSIGNED
 SITE LOCATION ADDRESS: 1861 BISHOP ROAD CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
 DATUM: NAD83
 ADJACENT PROPERTY OWNERS:

1157 3rd Ave., Suite 220A
 Longview, WA 98632
 Phone: (360) 578-1371

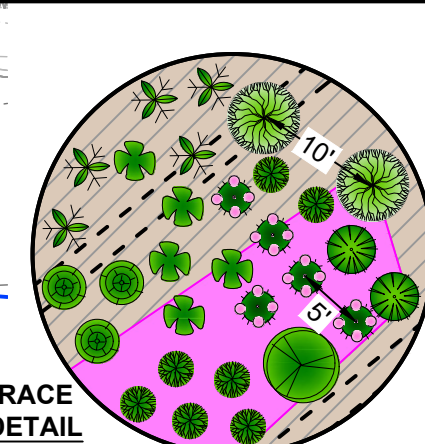


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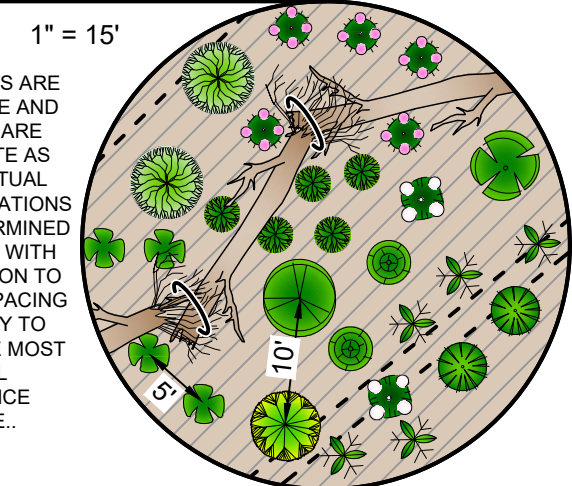


LEGEND:

- PROJECT BOUNDARY
- STREAM
- FLOODPLAIN TERRACE
- UPLAND
- WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.10 AC. ROADBED FILL)
- EXISTING CONTOURS (1 FT. INTERVAL)
- LARGE WOODY MATERIAL LOG (SEE SHEET 6 FOR DETAILS)
- LARGE WOODY MATERIAL STRUCTURE (SEE SHEET 4 FOR DETAILS)
- FLOODPLAIN TERRACE TOPOGRAPHICAL BREAK
- EXISTING OREGON WHITE OAK
- OREGON WHITE OAK DRIPLINE
- TEMPORARY CONSTRUCTION FENCE
- STRAW WATTLE LOCATIONS



NORTH TERRACE PLANTING DETAIL



Floodplain Terraces Plant Specifications

| Species | Spacing (ft on center) | Size | Quantity | |
|---|------------------------|-----------------------|-------------------------|-------------------------|
| | | | North Terrace (0.10 ac) | South Terrace (0.17 ac) |
| Tree Stratum | | | | |
| Bigleaf maple (<i>Acer macrophyllum</i> , FACU) | 10 | Min 1 gal | 5 | - |
| Red alder (<i>Alnus rubra</i> , FAC) | 10 | Min 1 gal | 5 | 15 |
| Oregon ash (<i>Fraxinus latifolia</i> , FACW) | 10 | Min 1 gal | 10 | 20 |
| Oregon white oak (<i>Quercus garryana</i> , FACU) | 14 | Min 1 gal | 5 | - |
| | | | 25 | 35 |
| Total Trees | | | 60 | |
| Shrub Stratum | | | | |
| Tall understory | | | | |
| Black hawthorn (<i>Crataegus douglasii</i> , FAC) | 5 | Min 1 gal | 10 | 20 |
| Pacific ninebark (<i>Physocarpus capitatus</i> , FACW) | 5 | Min 1 gal | 10 | 20 |
| Sitka willow (<i>Salix sitchensis</i> , FACW) | 5 | Min 4-foot live stake | 25 | 50 |
| Mid-understory | | | | |
| Red-osier dogwood (<i>Cornus sericea</i> , FACW) | 5 | Min 1 gal | 20 | 40 |
| Black twinberry (<i>Lonicera involucrata</i> , FACW) | | Min 1 gal | 25 | 40 |
| Nootka rose (<i>Rosa nutkana</i> , FAC) | 5 | Min 1 gal | 25 | 40 |
| Common snowberry (<i>Symphoricarpos albus</i> , FACU) | 5 | Min 1 gal | 10 | - |
| | | | 125 | 210 |
| Total Shrubs | | | 335 | |

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE
IN BERWICK CREEK & WETLANDS
NEAR: CHEHALIS **STATE: WA**
COUNTY: LEWIS
SHEET 5 OF 15
DATE: 4/23/20

FLOODPLAIN TERRACE DETAILS
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
SITE LOCATION ADDRESS:
1861 BISHOP ROAD
CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

1157 3rd Ave., Suite 220A
 Longview, WA 98632
 Phone: (360) 578-1371



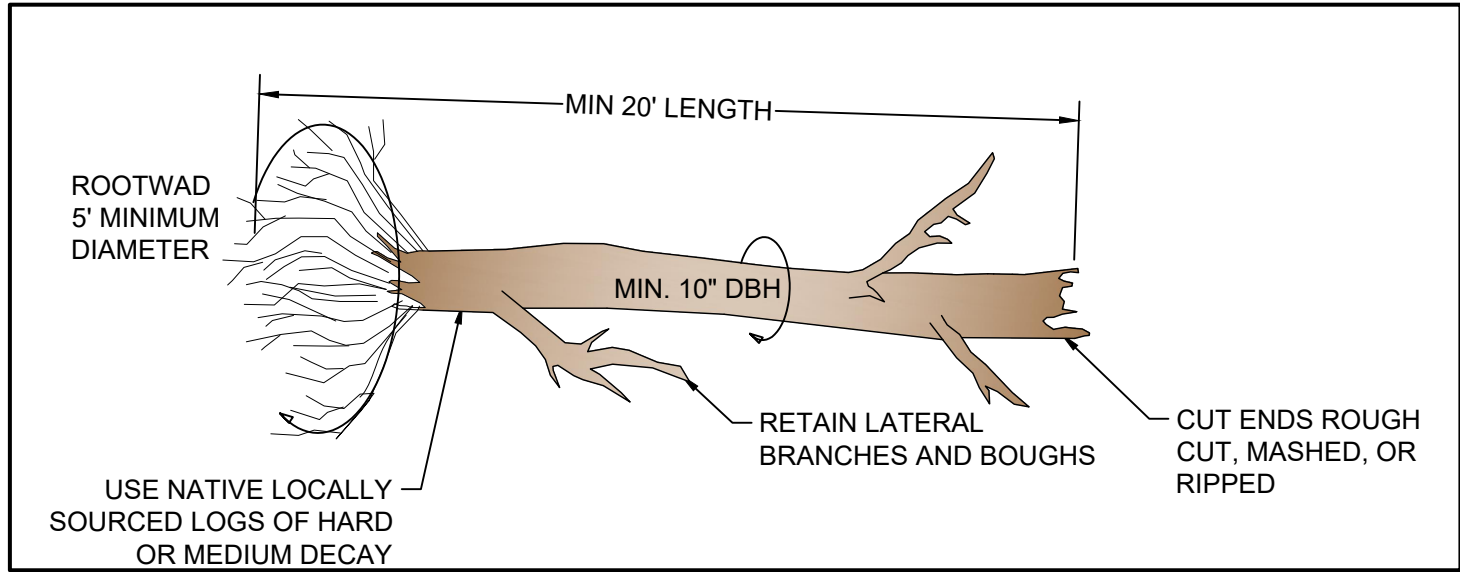
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SPECIFICATIONS FOR NORTH FLOODPLAIN TERRACE LARGE WOODY MATERIAL LOGS

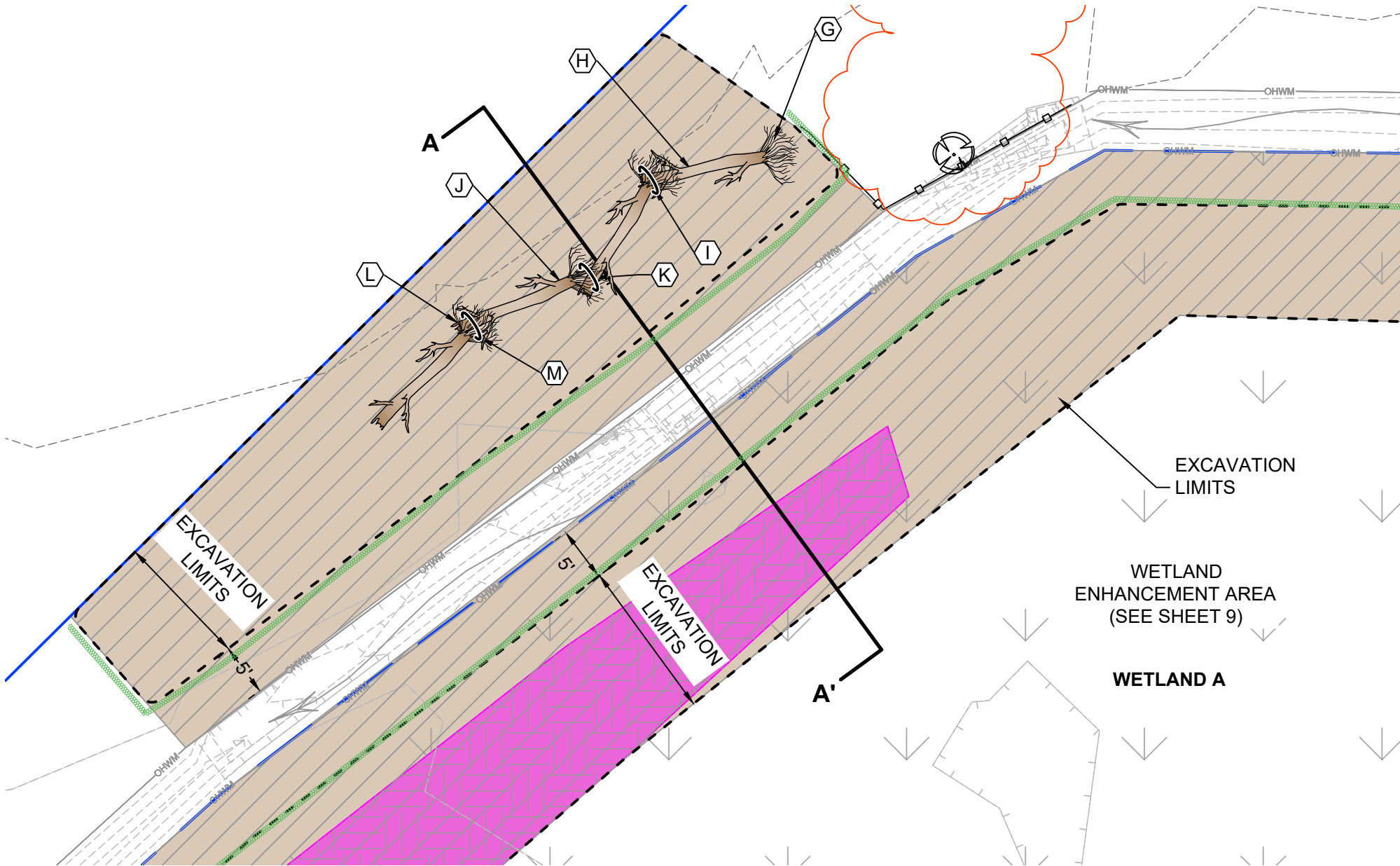
- A. BE LOCALLY SOURCED, NATIVE TREES;
- B. AT LEAST 10-INCHES DIAMETER FOR AT LEAST 20 FEET IN LENGTH;
- C. WITH ROOTWADS RETAINED (MINIMUM 5-FOOT DIAMETER);
- D. WITH LATERAL BRANCHES RETAINED AS FEASIBLE;
- E. OF HARD TO MEDIUM DECAY, AND;
- F. WITH CUT ENDS ROUGH CUT, MASHED, OR RIPPED.

INSTALLATION

- G. PLACE THE FIRST LOG OF LWM WITH ROOTWAD FACING UPSTREAM AND CUT END FACING DOWNSTREAM;
- H. PLACE THE ROOTWAD OF THE SECOND LOG OVER THE CUT END OF THE FIRST INSTALLED LOG;
- I. CABLE THE FIRST AND SECOND LWM LOGS TOGETHER;
- J. CONTINUE IN A DOWNSTREAM DIRECTION WITH THE THIRD LOG, LYING THE ROOTWAD OVER THE CUT END OF THE SECOND LOG;
- K. CABLE THE SECOND AND THIRD LWM LOGS TOGETHER;
- L. CONTINUE IN A DOWNSTREAM DIRECTION FOR THE FOURTH LOG, LYING THE ROOTWAD OVER THE CUT END OF THE THIRD LOG; AND
- M. CABLE THE THIRD AND FOURTH LWM LOGS TOGETHER.



LARGE WOODY MATERIAL HORIZONTAL LOG DETAIL
N.T.S.



LEGEND:

- PROJECT BOUNDARY
- STREAM
- FLOODPLAIN TERRACE
- UPLAND
- EXISTING CONTOURS (1 FT. INTERVAL)
- WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.10 AC. ROADBED FILL)
- FLOODPLAIN TERRACE EXCAVATION LIMITS
- EXISTING OREGON WHITE OAK
- OREGON WHITE OAK DRIPLINE
- TEMPORARY CONSTRUCTION FENCE
- STRAW WATTLE LOCATIONS

0 20 40
SCALE IN FEET

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE
IN BERWICK CREEK & WETLANDS
NEAR: CHEHALIS
COUNTY: LEWIS STATE: WA
SHEET 6 OF 15
DATE: 4/23/20

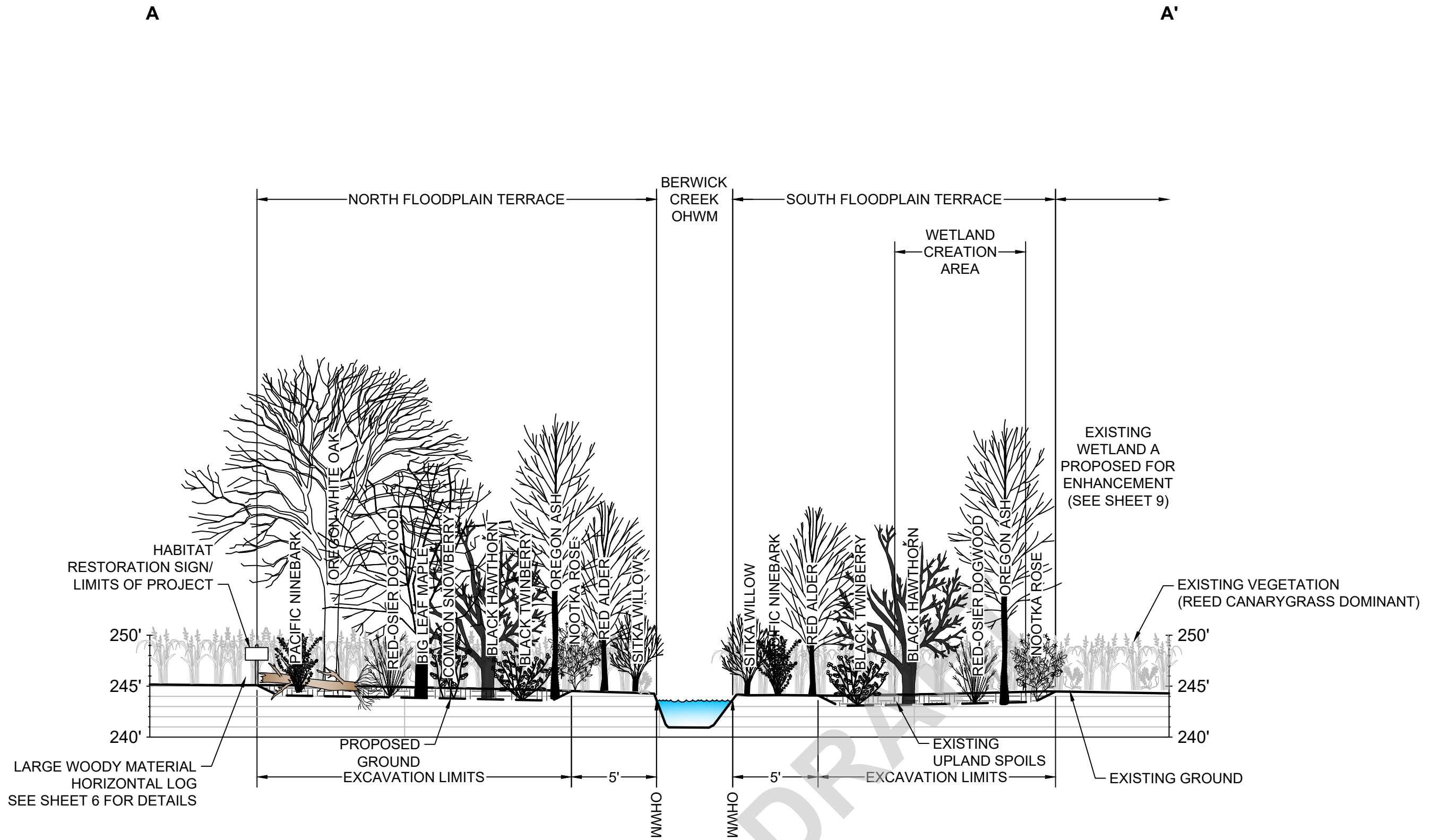
FLOODPLAIN TERRACE LWM LOGS DETAIL
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
SITE LOCATION ADDRESS:
1861 BISHOP ROAD
CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



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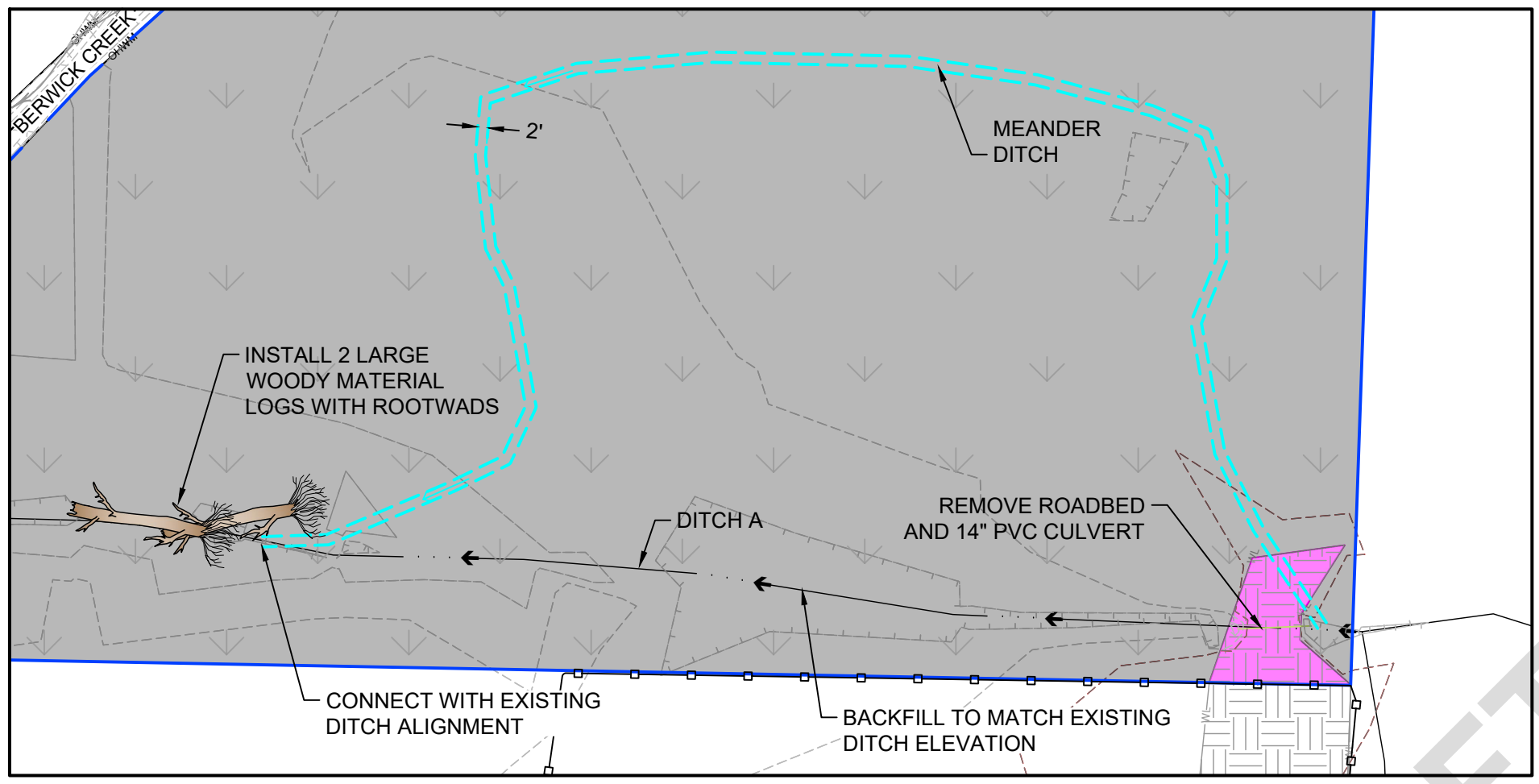
| | | |
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| <p>PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT DATUM: NAD83 ADJACENT PROPERTY OWNERS:</p> | <p>NORTH & SOUTH FLOODPLAIN CROSS SECTION A-A' APPLICANT: PORT OF CHEHALIS PROJECT NAME: BERWICK CK. RESTORATION PROJECT REFERENCE #: NOT YET ASSIGNED SITE LOCATION ADDRESS: 1861 BISHOP ROAD CHEHALIS, WA</p> | <p>PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS NEAR: CHEHALIS COUNTY: LEWIS STATE: WA SHEET 7 OF 15 DATE: 4/23/20</p> |
|---|--|--|

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0 10 20
 CROSS SECTION SCALE
 HORIZONTAL SCALE IN FEET
 VERTICAL EXAGGERATION = 1X

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LEGEND:

- PROJECT BOUNDARY
- STREAM
- UPLAND
- EXISTING CONTOURS (1 FT. INTERVAL)
- DITCH MEANDER (370 LF.)
- LARGE WOODY MATERIAL LOG WITH ROOTWAD (2)
- WETLAND ENHANCEMENT AREA (1.18 AC.)
- WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.01 AC. ROADBED FILL)
- TEMPORARY CONSTRUCTION FENCE

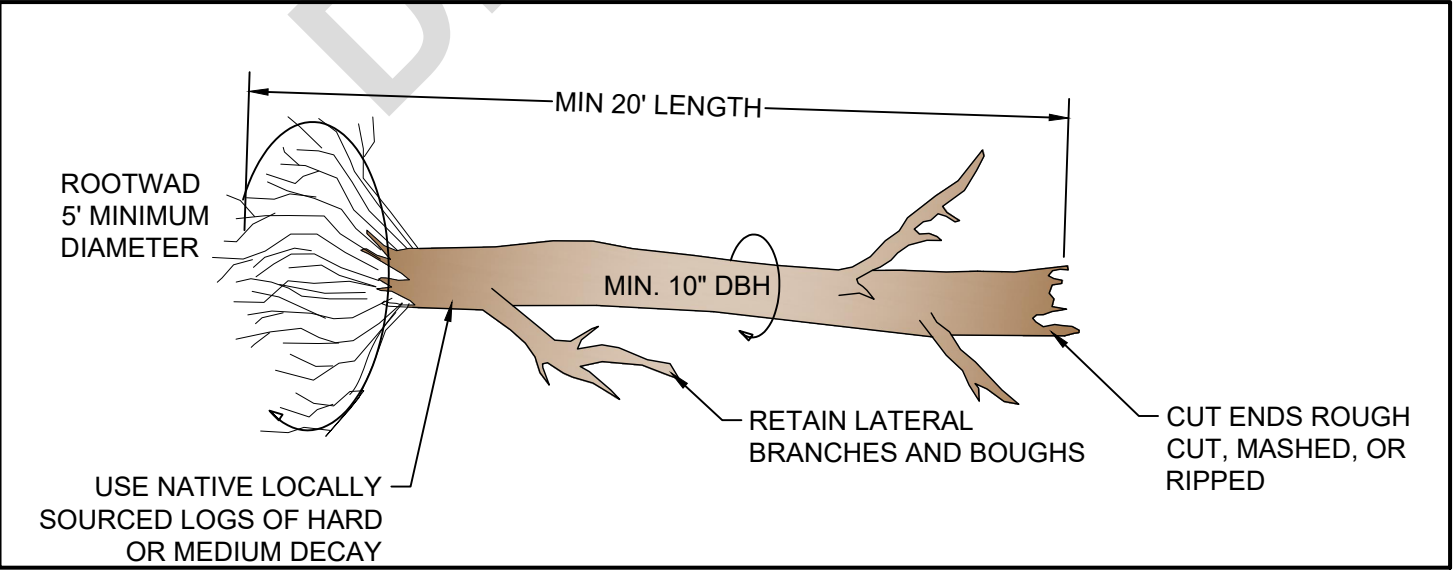
SPECIFICATIONS FOR DITCH MEANDER

(WETLAND ENHANCEMENT AREA) LARGE WOODY MATERIAL

- A. BE LOCALLY SOURCED, NATIVE TREES;
- B. AT LEAST 10-INCHES DIAMETER FOR AT LEAST 20 FEET IN LENGTH;
- C. WITH ROOTWADS RETAINED (MINIMUM 5-FOOT DIAMETER);
- D. WITH LATERAL BRANCHES RETAINED AS FEASIBLE;
- E. OF HARD TO MEDIUM DECAY, AND;
- F. WITH CUT ENDS ROUGH CUT, MASHED, OR RIPPED.

INSTALLATION

- G. PLACE THE FIRST LWM LOG WITH ROOTWAD FACING UPSTREAM (OF DITCH A);
- H. PLACE THE SECOND LWM LOG DOWNSTREAM OF THE FIRST LOG, WITH ROOTWAD FACING UPSTREAM;
- I. ENSURE THE CUT END OF THE FIRST LOG AND THE ROOTWAD OF THE SECOND LOG OVERLAP A MINIMUM OF 6 FEET; AND
- J. LOGS DO NOT NEED TO BE CABLED TOGETHER.



LARGE WOODY MATERIAL HORIZONTAL LOG DETAIL
N.T.S.

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS
NEAR: CHEHALIS
COUNTY: LEWIS STATE: WA
SHEET 8 OF 15
DATE: 4/23/20

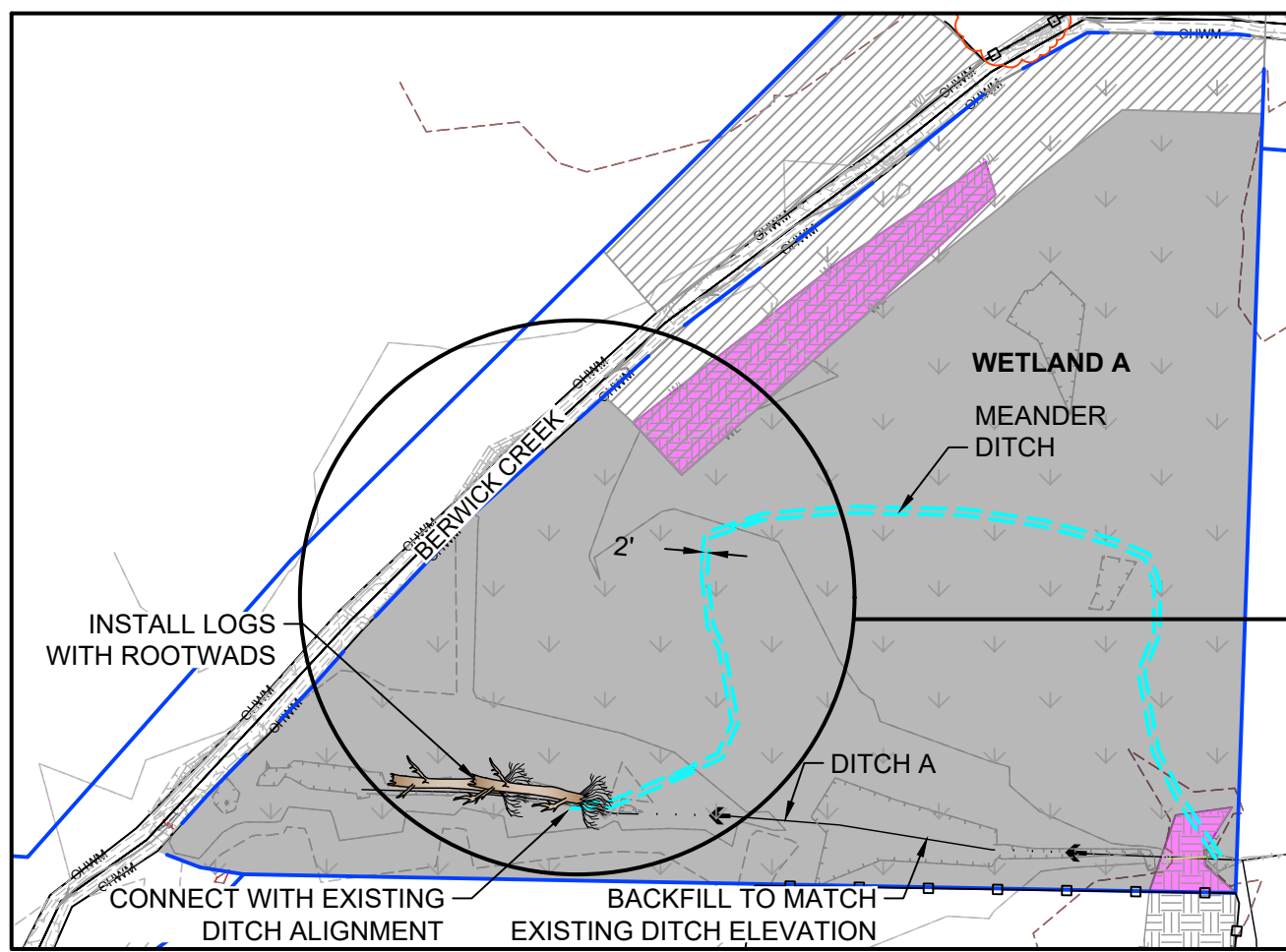
DITCH MEANDER DETAIL
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
SITE LOCATION ADDRESS:
1861 BISHOP ROAD
CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

60
30
0
SCALE IN FEET

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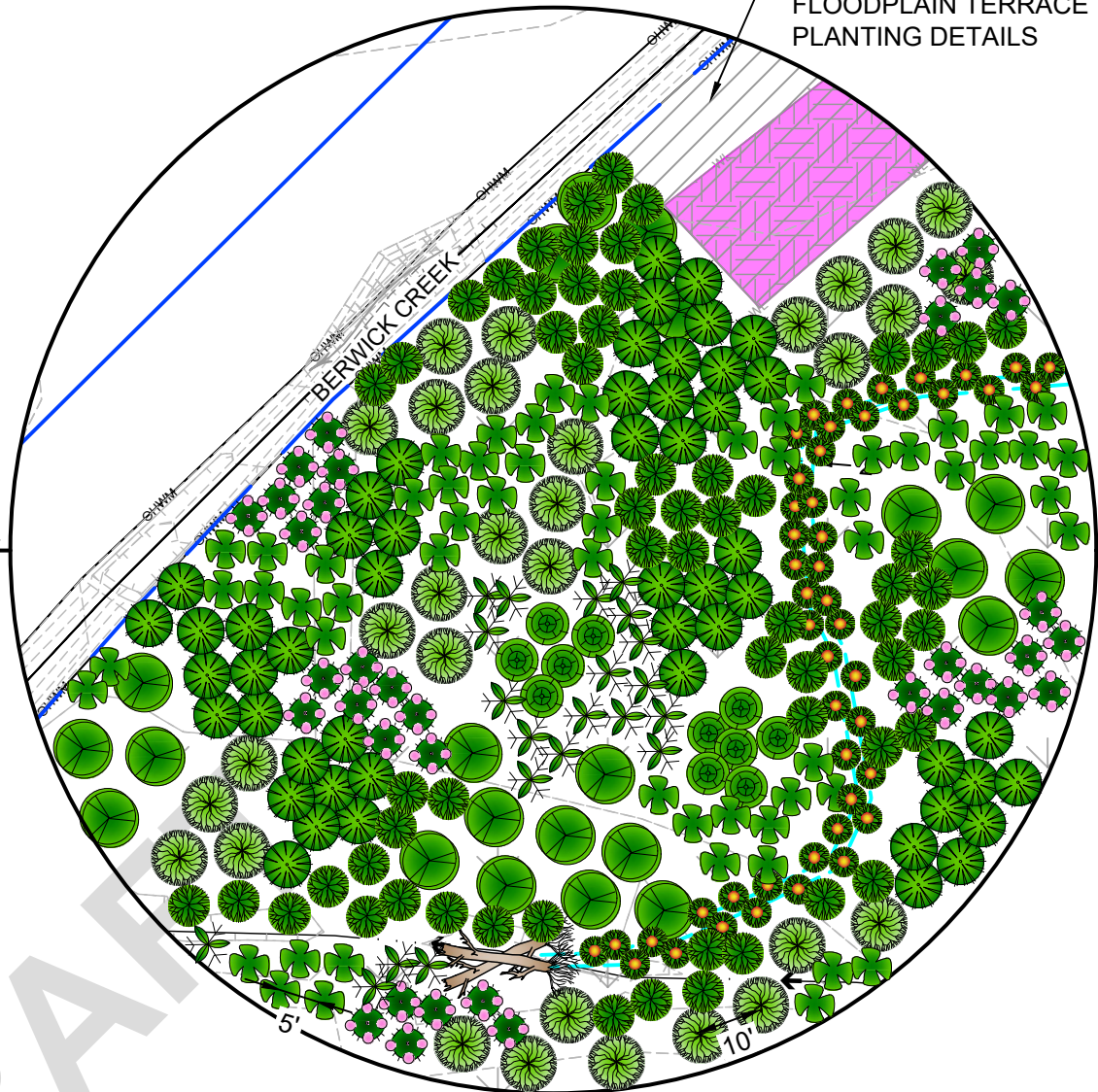


Wetland Enhancement Area Plant Specifications

SCALE IN FEET

WETLAND ENHANCEMENT PLANTING DETAIL

1" = 30'



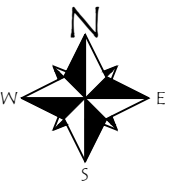
| Species | Spacing (feet on center) | Size | Quantity (1.18 ac) |
|--|--------------------------|-----------------------|--------------------|
| Tree Stratum | | | |
| Red alder (<i>Alnus rubra</i> , FAC) | 10 | Min 1 gal | 100 |
| Oregon ash (<i>Fraxinus latifolia</i> , FACW) | 10 | Min 1 gal | 125 |
| Total Trees | | | 225 |
| Shrub Stratum | | | |
| Tall understory | | | |
| Black hawthorn (<i>Crataegus douglasii</i> , FAC) | 5 | Min 1 gal | 125 |
| Pacific ninebark (<i>Physocarpus capitatus</i> , FACW) | 5 | Min 1 gal | 125 |
| Sitka willow (<i>Salix sitchensis</i> , FACW) | 5 | Min 4-foot live stake | 350 |
| Mid-understory | | | |
| Red-osier dogwood (<i>Cornus sericea</i> , FACW) | 5 | Min 1 gal | 250 |
| Black twinberry (<i>Lonicera involucrata</i> , FACW) | 5 | Min 1 gal | 250 |
| Nootka rose (<i>Rosa nutkana</i> , FAC) | 5 | Min 1 gal | 250 |
| Total Shrubs | | | 1,350 |
| Ditch A Meander | | | |
| Sitka willow (<i>Salix sitchensis</i> , FACW) | 3 | Min 4-foot live stake | 300 |

NOTES:

- NON-NATIVE, INVASIVE PLANTS (REED CANARYGRASS, HIMALAYAN BLACKBERRY, AND JAPANESE KNOTWEED) TO BE CONTROLLED BEFORE PLANT INSTALLATION.
- PLANTS ARE NOT TO SCALE AND LOCATIONS ARE APPROXIMATE AS SHOWN. ACTUAL PLANTING LOCATIONS WILL BE DETERMINED IN THE FIELD, WITH CONSIDERATION TO THE LISTED SPACING AND DENSITY TO PRODUCE THE MOST NATURAL APPEARANCE POSSIBLE.

LEGEND:

- PROJECT BOUNDARY
- STREAM
- UPLAND
- EXISTING CONTOURS (1 FT. INTERVAL)
- DITCH MEANDER (370 LF.)
- LARGE WOODY MATERIAL LOG WITH ROOTWAD (2)
- WETLAND ENHANCEMENT AREA (1.18 AC.)
- FLOODPLAIN TERRACE
- WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.10 AC. ROADBED FILL)



PROPOSED-STREAM RES. AND WET CREAT/ENHANCE IN BERWICK CREEK & WETLANDS
NEAR: CHEHALIS COUNTY: LEWIS STATE: WA
SHEET 9 OF 15 DATE: 4/23/20

WETLAND ENHANCEMENT DETAIL
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
ADJACENT PROPERTY OWNERS: SITE LOCATION ADDRESS: 1861 BISHOP ROAD CHEHALIS, WA

PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83

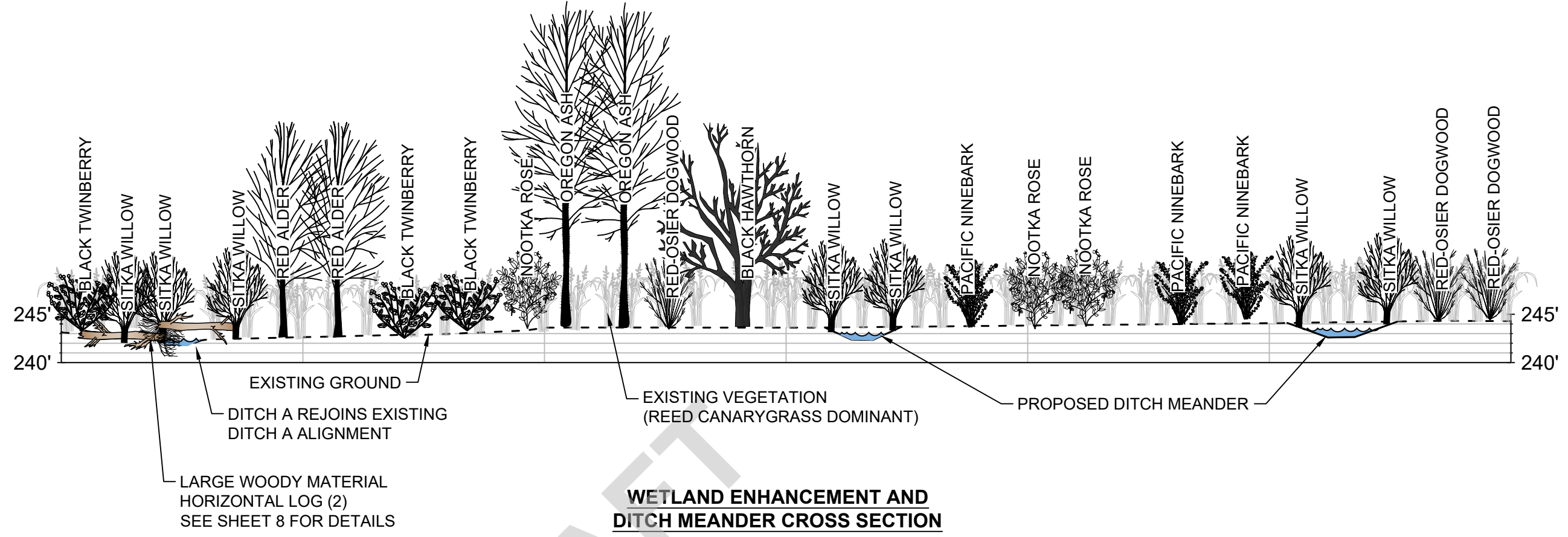
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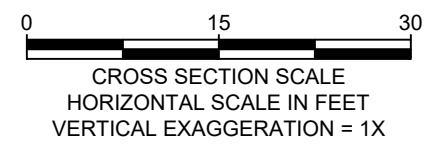
B
DOWNSTREAM

B'
UPSTREAM



**WETLAND ENHANCEMENT AND
DITCH MEANDER CROSS SECTION**

DRAFT

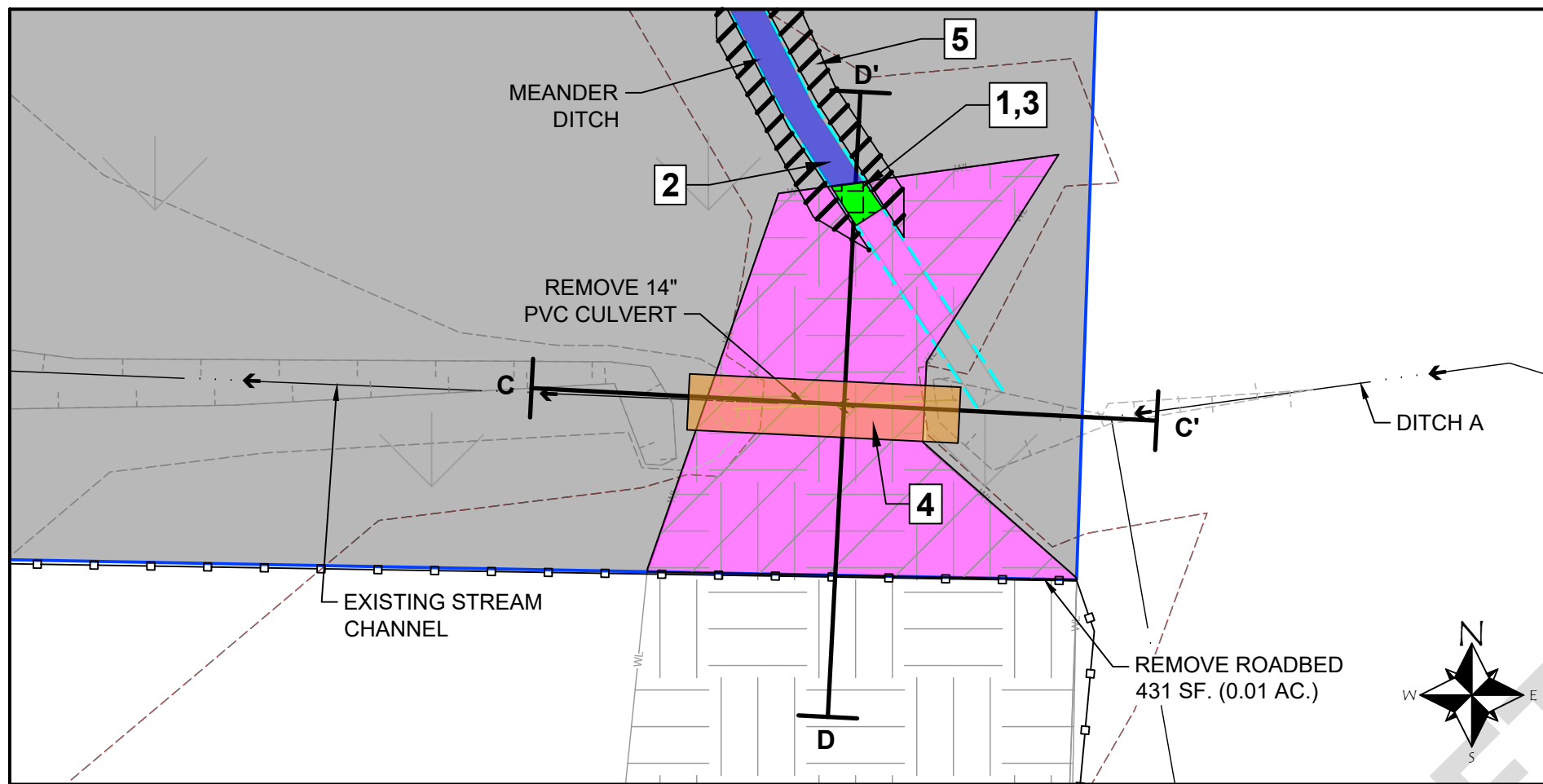


| | | |
|---|--|---|
| <p>PURPOSE: Stream restoration and wetland creation/enhancement DATUM: NAD83 ADJACENT PROPERTY OWNERS:</p> | <p>WETLAND ENHANCEMENT AND DITCH MEANDER CROSS SECTION APPLICANT: Port of Chehalis PROJECT NAME: Berwick Ck. Restoration Project REFERENCE #: Not Yet Assigned SITE LOCATION ADDRESS: 1861 Bishop Road Chehalis, WA</p> | <p>PROPOSED: Stream res. and wet creat/enhance IN Berwick Creek & wetlands NEAR: Chehalis COUNTY: Lewis STATE: WA SHEET 10 OF 15 DATE: 4/23/20</p> |
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Phone: (360) 578-1371



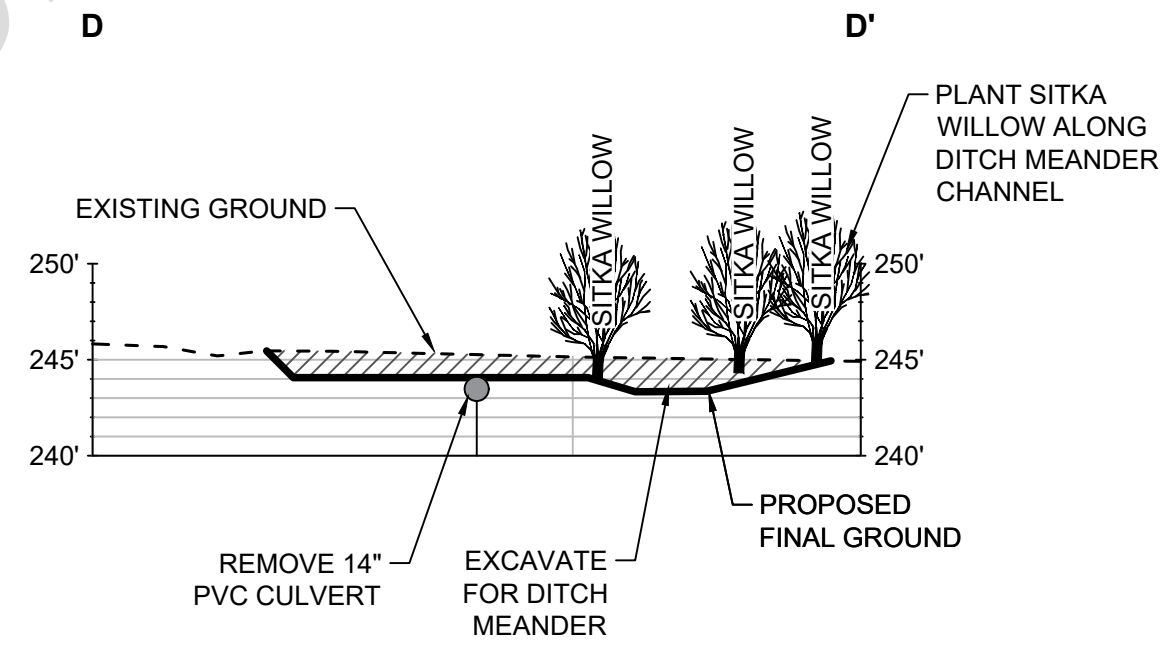
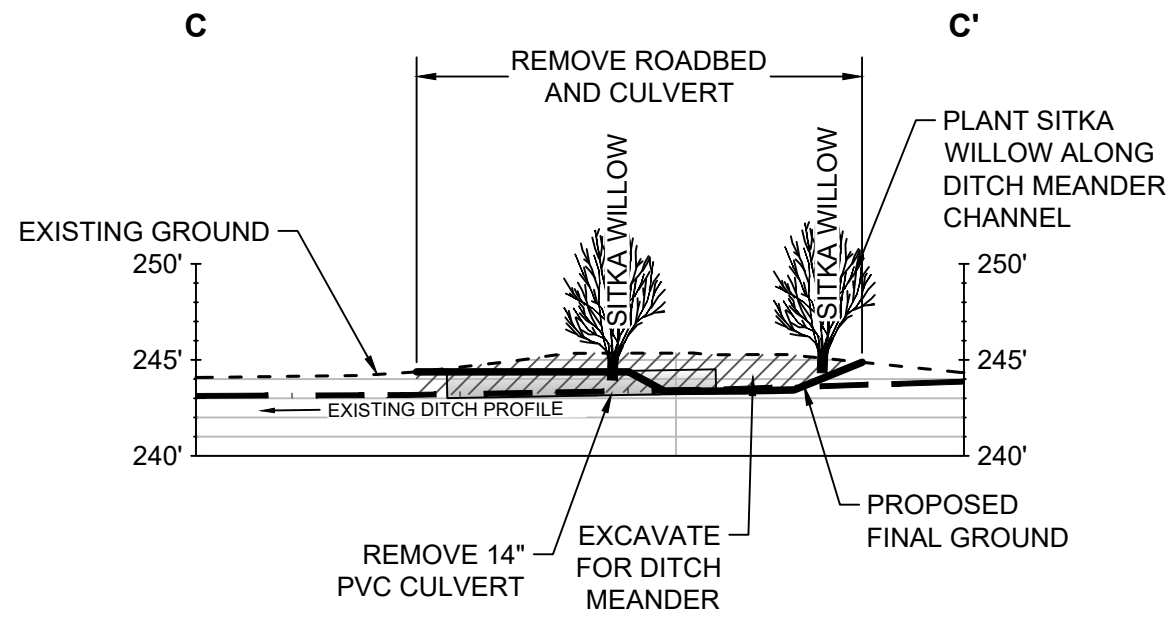
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- LEGEND:**
- PROJECT BOUNDARY
 - STREAM
 - EXISTING ROADBED FILL
 - EXISTING 14" PVC CULVERT
 - EXISTING CONTOURS (1 FT. INTERVAL)
 - DITCH MEANDER
 - WETLAND ENHANCEMENT AREA (1.18 AC.)
 - WETLAND CREATION AREA (0.06 AC. UPLAND SPOILS, 0.10 AC. ROADBED FILL)
 - TEMPORARY CONSTRUCTION FENCE

ROADBED AND CULVERT REMOVAL EXCAVATION DETAILS:

1. WHEN REMOVING EXISTING ROADBED FILL LEAVE 2- TO 3-FOOT EARTHEN BERM OF UNDISTURBED SOIL BETWEEN THE UPSTREAM END OF THE DITCH MEANDER CHANNEL AND THE EXISTING CHANNEL TO ENSURE FLOW WILL REMAIN IN THE OLD DITCH CHANNEL UNTIL NEW DITCHBED IS CONSTRUCTED.
2. EXCAVATE NEW DITCH CHANNEL.
3. WHEN ALL NEW DITCHBED ELEMENTS ARE INSTALLED, EXCAVATE THE 2- TO 3-FOOT EARTHEN BERM OF UNDISTURBED SOIL ON THE UPSTREAM END OF THE WORK AREA, SO DITCH FLOW WILL ENTER THE NEW DITCH CHANNEL.
4. WHEN ALL FLOW IS IN THE NEW DITCH CHANNEL, FILL THE OLD CHANNEL WITH SPOILS FROM PREVIOUS EXCAVATION OF NEW DITCH CHANNEL.
5. SEED BARE SOILS WITH NATIVE SEED MIX AND PLANT WILLOW ALONG BANKS.



PURPOSE: Stream restoration and wetland creation/enhancement

APPLICANT: Port of Chehalis

PROJECT NAME: Berwick Ck. Restoration Project

DATE: NAD83

ADJACENT PROPERTY OWNERS: SITE LOCATION ADDRESS: 1861 Bishop Road, Chehalis, WA

ROADBED AND CULVERT REMOVAL DETAIL BROPOSED: Stream res. and wet creat/enhance IN Berwick Creek & wetlands

NEAR: Chehalis

COUNTY: Lewis

STATE: WA

SHEET 11 OF 15

DATE: 4/23/20

SCALE IN FEET

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PLANTING NOTES

THE CONTRACTOR SHALL INSTALL PLANTINGS ACCORDING TO THESE PLANS.
 THE CONTRACTOR SHALL CONDUCT A FIELD VISIT WITH THE APPLICANT AND APPLICANT'S REPRESENTATIVE/CONSTRUCTION OVERSIGHT PRIOR TO PLANTINGS.
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPLICANT OR APPLICANT'S REPRESENTATIVE/CONSTRUCTION OVERSIGHT IF ANY PART OF THE PLAN CANNOT BE FOLLOWED DUE TO SITE CONDITIONS.
 THE CONTRACTOR SHALL USE A SEED MIX IN THE NORTH AND SOUTH FLOODPLAIN TERRACES AND WETLAND ENHANCEMENT AREA PER THE SPECIFICATIONS SHOWN BELOW.
 ALL PLANTS SHALL BE GROWN FOR THE PLANTING ZONE OF THE PROJECT AREA.
 PLANT SUBSTITUTIONS ARE ALLOWED WITH APPROVAL BY THE APPLICANT OR APPLICANT'S REPRESENTATIVE/ CONSTRUCTION OVERSIGHT.
 THE CONTRACTOR SHALL ENSURE THAT PLANT MATERIALS WILL BE KEPT COOL AND MOIST PRIOR TO INSTALLATION.
 THE CONTRACTOR SHALL ONLY INSTALL PLANT MATERIALS THAT HAVE A WELL DEVELOPED ROOTS AND STURDY STEMS, WITH AN APPROPRIATE ROOT TO SHOOT RATIO.
 THE CONTRACTOR SHALL REJECT ANY DAMAGED OR DESICCATED ROOTS OR DISEASED PLANTS.
 THE CONTRACTOR WILL BE RESPONSIBLE FOR INSPECTING THE LIVE STAKES PRIOR TO AND DURING PLANTING AND REJECTING UNACCEPTABLE PLANT MATERIALS.
 THE LIVE STAKES WILL BE A MINIMUM OF 4 FEET LONG AND ¼- TO 1-INCH DIAMETER.
 THE LIVE STAKES WILL BE INSTALLED WITHIN 1 TO 2 DAYS OF CUTTING.
 THE CONTRACTOR SHALL PLANT THE PLANTS SO THAT THEY ARE GROUPED IN UNEVEN PATCHES DOMINATED BY A SINGLE SPECIES, WITH PATCHES INTERSPERSED AMONG ONE ANOTHER.

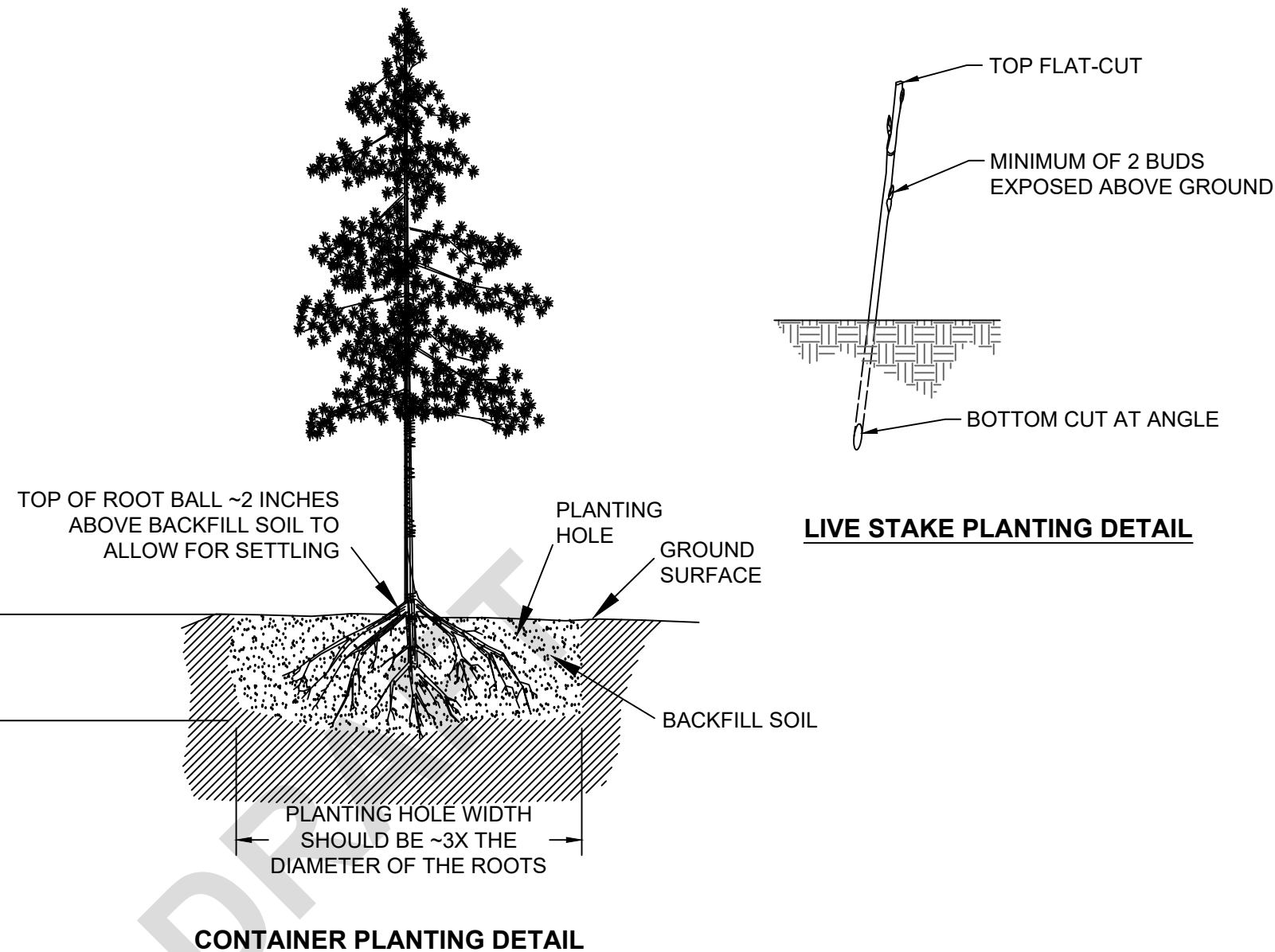
PLANT CONTAINERIZED TREES AND SHRUBS

THE CONTRACTOR SHALL DIG THE RECEIVING HOLE SEVERAL INCHES WIDER AND DEEPER THAN THE SIZE OF THE ROOT SYSTEM.
 THE CONTRACTOR SHALL POSITION THE PLANTED SPECIES' ROOT COLLAR SO THAT THEY ARE AT OR SLIGHTLY ABOVE THE LEVEL OF THE SURROUNDING SOIL TO ALLOW FOR SETTLING, BACKFILL THE HOLE WITH SOIL, AND COMPACT THE SOIL AROUND THE PLANTED SPECIES TO ELIMINATE AIR SPACES.
 THE CONTRACTOR SHALL INSTALL TREE SHELTERS AS NEEDED.
 THE CONTRACTOR SHALL APPLY HERBIVORE DETERRENT AS NEEDED.
 THE CONTRACTOR SHALL IRRIGATE ALL NEWLY INSTALLED PLANTS AS SITE AND WEATHER CONDITIONS WARRANT.

PLANT LIVE STAKES

THE CONTRACTOR SHALL PLANT LIVE STAKES WITH A METAL BAR OR PUSH CUTTING INTO SOFT SOIL SO 1/3 OF THE LIVE STAKE IS BELOW THE GROUND SURFACE WITH LATERAL BUDS FACING UPWARDS.
 THE CONTRACTOR SHALL ENSURE THAT UNPLANTED LIVE STAKES ARE PROPERLY STORED AT THE END OF EACH PLANTING DAY TO PREVENT DESICCATION.

PLANTING HOLE DEPTH SHOULD BE LESS THAN THE HEIGHT OF THE ROOTS BY ~2 INCHES



Seed Mix Specifications

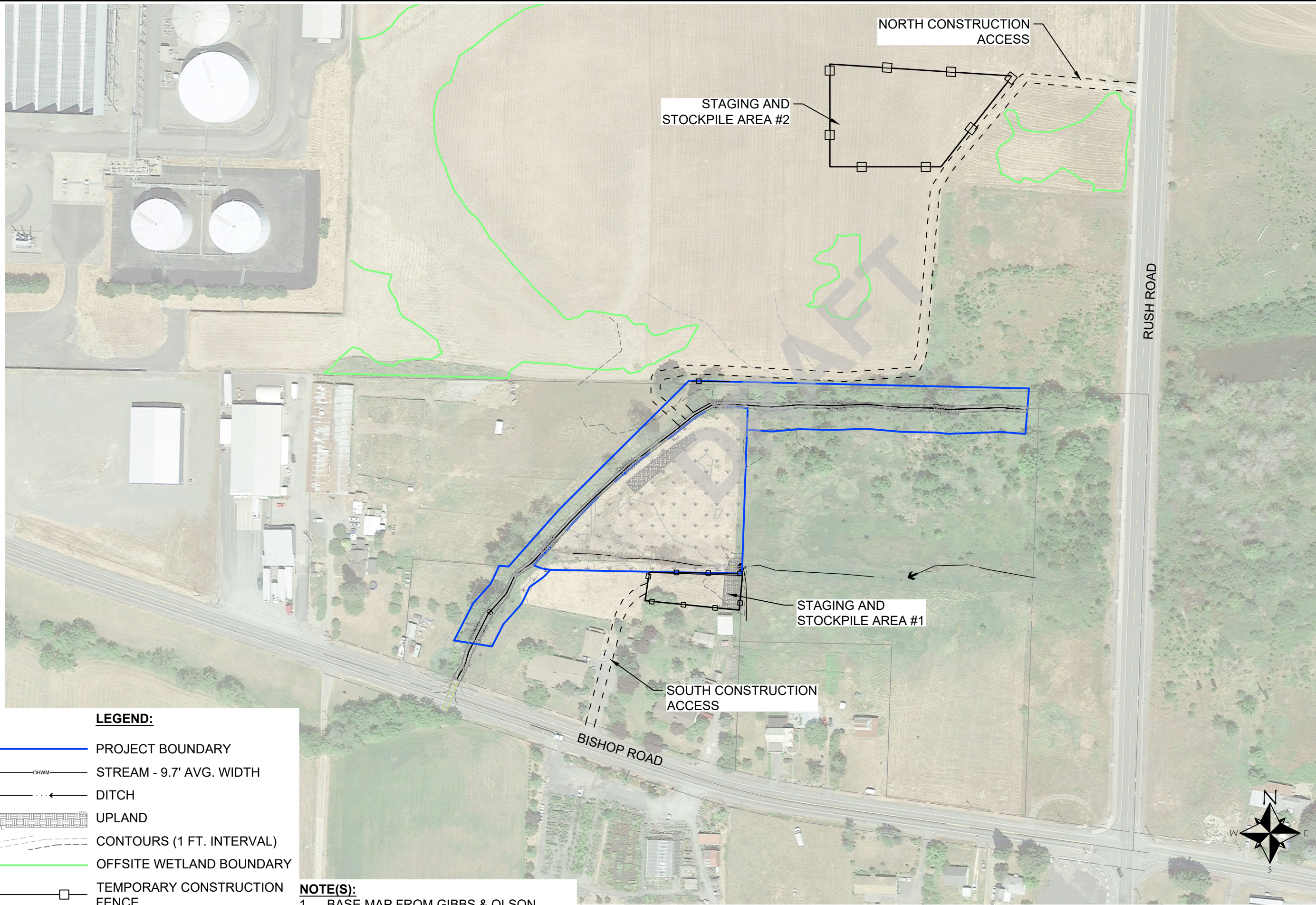
| Seed Mix | Composition ¹ | Location | Application Rate | Area | Total Quantity |
|--------------------------|---|---|------------------|---------|----------------|
| Native Upland Grass Mix | 30% Blue wildrye 30% Meadow barley 10% Roemer's rescue 10% Spike bentgrass 10% Tufted hairgrass 10% Red fescue | North Floodplain Terrace | 15-25 lbs./ac | 0.10 ac | 1.5-2.5 lbs. |
| Native Wetland Grass Mix | 40% Western mangrass 30% American sloughgrass 20% Meadow barley 10% Short-awn Foxtail | South Floodplain Terrace (0.17 ac) & Wetland Enhancement Area (1.18 ac) | 15-25 lbs./ac | 1.35 ac | 20-34 lbs. |

¹ River Refuge Seed Company, LLC is the recommended source for native seed. The seed composition may be adjusted by the project biologist.

PURPOSE: Stream restoration and wetland creation/enhancement
ADJACENT PROPERTY OWNERS: NAD83
DATE: NAD83
APPLICANT: Port of Chehalis
PROJECT NAME: Berwick Ck. Restoration Project
REFERENCE #: Not Yet Assigned
PROPOSED: Stream res. and wet creat/enhance IN Berwick Creek & wetlands
NEAR: Chehalis
COUNTY: Lewis
STATE: WA
SHEET 12 OF 15
DATE: 4/23/20

1157 3rd Ave., Suite 220A
 Longview, WA 98632
 Phone: (360) 578-1371



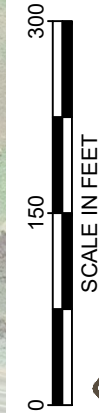


LEGEND:

- PROJECT BOUNDARY
- STREAM - 9.7' AVG. WIDTH
- DITCH
- UPLAND
- CONTOURS (1 FT. INTERVAL)
- OFFSITE WETLAND BOUNDARY
- TEMPORARY CONSTRUCTION FENCE

NOTE(S):

1. BASE MAP FROM GIBBS & OLSON.



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PURPOSE: STREAM RESTORATION AND WETLAND CREATION/ENHANCEMENT
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

CONSTRUCTION STAGING AND STOCKPILE AREAS
APPLICANT: PORT OF CHEHALIS
PROJECT NAME: BERWICK CK. RESTORATION PROJECT
REFERENCE #: NOT YET ASSIGNED
SITE LOCATION ADDRESS:
 1861 BISHOP ROAD
 CHEHALIS, WA

PROPOSED: STREAM RES. AND WET CREAT/ENHANCE
IN: BERWICK CREEK & WETLANDS
NEAR: CHEHALIS
COUNTY: LEWIS
STATE: WA
SHEET 13 OF 15
DATE: 4/23/20

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GENERAL

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH THE APPLICANT AND APPLICANT'S REPRESENTATIVE/CONSTRUCTION OVERSIGHT PRIOR TO BEGINNING INSTALLATION ON THE INWATER STRUCTURES, FLOODPLAIN TERRACES, DITCH MEANDER, AND ROADBED FILL/CULVERT REMOVAL.
IN CASE OF DISCREPANCY BETWEEN NOTES, LOCAL REGULATIONS, OR OTHER CONTRACT DOCUMENTATION, THE CONTRACTOR SHALL OBTAIN DIRECTION FROM THE APPLICANT.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO BEGINNING CONSTRUCTION.
THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGE OR DESTROYED UTILITIES. THE CONTRACTOR SHALL PROVIDE EQUIPMENT OR LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO COST TO THE APPLICANT.

WDFW IN-WATER WORK

IN-WATER WORK SHALL OCCUR DURING THE PERMITTED IN-WATER WORK PERIOD AS DIRECTED BY THE HYDRAULIC PROJECT APPROVAL.

WATERS OF THE U.S.

THE WETLAND BOUNDARY AND ORDINARY HIGH WATER MARK OF BERWICK CREEK WERE DELINEATED BY ECOLOGICAL LAND SERVICES, INC. BIOLOGISTS AND SURVEYED BY GIBBS & OLSON, INC. SURVEYORS IN MARCH 2019. THE WETLAND BOUNDARY DOES NOT REPRESENT JURISDICTIONAL BOUNDARIES. THE U.S. ARMY CORPS OF ENGINEERS AND THE WASHINGTON STATE DEPARTMENT OF ECOLOGY HOLD THE FINAL AUTHORITY IN DETERMINING JURISDICTIONAL BOUNDARIES IN WASHINGTON STATE.

CULTURAL RESOURCES INADVERTENT DISCOVERY

IF UNANTICIPATED ARCHAEOLOGICAL RESOURCES ARE ENCOUNTERED DURING CONSTRUCTION, ALL GROUND-DISTURBING ACTIVITIES NEAR THE FIND(S) SHOULD BE HALTED AND DAHP PROMPTLY NOTIFIED. IF GROUND-DISTURBING ACTIVITIES ENCOUNTER HUMAN SKELETAL REMAINS DURING CONSTRUCTION, THEN ALL ACTIVITY THAT MAY CAUSE FURTHER DISTURBANCE TO THOSE REMAINS MUST CEASE. THE AREA OF THE FIND WILL BE SECURED AND PROTECTED FROM FURTHER DISTURBANCE UNTIL THE STATE PROVIDES NOTICE TO PROCEED.

LIVE TREES

THE CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL TEMPORARY CONSTRUCTION FENCING AROUND THE DRIPLINES OF THE OREGON WHITE OAK TREES NORTH OF THE STREAM.
ALL TREES NOT MARKED FOR REMOVAL SHALL BE PRESERVED AND UNDISTURBED. CONSTRUCTION ACTIVITY SHALL NOT DEBARK OR DAMAGE LIVE TREES AND WILL STAY OUT OF DRIPLINES OF ALL EXISTING TREES TO BE PRESERVED.

CONSTRUCTION ACCESS

ALL EQUIPMENT, MATERIALS, AND PERSONNEL SHALL REMAIN WITHIN THE PROJECT AREA LIMITS.
THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING REQUIRED TRAFFIC CONTROL MEASURES INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS.
THE CONTRACTOR SHALL KEEP THE PROJECT AREA IN A NEAT AND CLEAN CONDITION FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.
THIS PROJECT IS IN PROXIMITY TO SINGLE-FAMILY RESIDENCES AND THE CONTRACTOR SHALL FOLLOW WORK HOURS SPECIFIED BY THE APPLICANT.
WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION SHALL BE CUT TO GROUND LEVEL (NOT GRUBBED).

CONSTRUCTION DEMARCATION

THE CONTRACTOR IS RESPONSIBLE FOR MARKING EQUIPMENT ENTRY AND EXIT LOCATIONS, STAGING AND STOCKPILE AREAS, PROJECT LIMITS, DRIPLINES OF OREGON WHITE OAKS, GRADING STAKES, AND ELEVATION CONTROL POINTS.
THE CONTRACTOR SHALL MEET WITH THE APPLICANT AND APPLICANT'S REPRESENTATIVE/CONSTRUCTION OVERSIGHT TO CHECK STAKING PRIOR TO MOBILIZATION OR EQUIPMENT OR MATERIALS ONTO THE SITE.
SOME FIELD ADJUSTMENTS TO THE LINES AND GRADES ARE TO BE EXPECTED. LOCATION, ALIGNMENT, AND ELEVATION OF LWM STRUCTURES AND LWM LOGS ARE SUBJECT TO ADJUSTMENT BASED ON FIELD CONDITIONS AND MATERIAL SIZE.

STAGING AND STOCKPILE AREAS

THE STAGING AND STOCKPILE AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) SHALL BE 150 FEET OR MORE FROM ANY NATURAL WATERBODY OR WETLAND AND LOCATED IN A MATTER THAT WILL PRECLUDE EROSION INTO OR CONTAMINATION OF THE STREAM OR WETLAND.
EXCAVATED MATERIALS SHALL BE STOCKPILED IN AN APPROVED LOCATION WITHIN THE STAGING AND STOCKPILE AREAS.
AT COMPLETION OF WORK, REMAINING MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT AREA. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR OBTAINING ANY PERMITS AND FEES REQUIRED FOR LEGAL DISPOSAL.

EQUIPMENT

MECHANIZED EQUIPMENT AND VEHICLES SHALL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT, E.G. MINIMALLY SIZED LOW PRESSURE TIRES, MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES, TEMPORARY MATS OR PLATES WITHIN WET AREAS OR SENSITIVE SOILS). ALL VEHICLES AND OTHER EQUIPMENT SHALL BE:
STORED, FUELED, AND MAINTAINED IN STAGING AND STOCKPILE AREAS PLACED 150 FEET OR MORE FROM ANY NATURAL WATERBODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA.
BIODEGRADABLE LUBRICANTS AND FLUIDS SHALL BE USED IN EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL.
INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AND STOCKPILE AREAS.

INVASIVE SPECIES CONTROL

THE FOLLOWING MEASURES WILL BE FOLLOWED TO AVOID INTRODUCTION OF NON-NATIVE, INVASIVE PLANTS INTO THE PROJECT AREA:
PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
ANY EQUIPMENT TO BE USED IN OR NEAR THE WATER WILL BE INSPECTED FOR INVASIVE AQUATIC SPECIES.

SPILL PREVENTION, CONTROL, AND COUNTER MEASURES

THE CONTRACTOR SHALL ADHERE TO THE FOLLOWING MEASURES:
WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
SPILL CONTAINMENT KITS, INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL, WILL BE AVAILABLE AT THE WORK SITE.
WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
ANY WASTE LIQUIDS GENERATED AT THE STAGING AND STOCKPILE AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPULIN, UNTIL THE LIQUIDS CAN BE PROPERLY TRANSPORTED TO AN APPROVED DISPOSAL FACILITY.
VEGETABLE BASED HYDRAULIC FLUIDS (BIODEGRADABLE OIL) WILL BE USED IN ANY VEHICLE THAT WILL BE OPERATED NEAR WATER.

PROPOSED: Stream res. and wet creat/enhance
IN Berwick Creek & wetlands
NEAR: Chehalis
COUNTY: Lewis
STATE: WA
SHEET 14 OF 15
DATE: 4/23/20

CONSTRUCTION NOTES
APPLICANT: Port of Chehalis
PROJECT NAME: Berwick Ck. Restoration Project
REFERENCE #: Not Yet Assigned
SITE LOCATION ADDRESS:
1861 Bishop Road
Chehalis, WA

PURPOSE: Stream restoration and wetland creation/enhancement
DATUM: NAD83
ADJACENT PROPERTY OWNERS:

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



4/23/2020 3:34 PM C:\Users\jennifer\Box\ELSIWALL\Lewis\County\362-Port of Chehalis\362-35-Berwick Creek Restoration Plan\362-35-Figures\362-35_RES.dwg Jennifer

EROSION/SEDIMENTATION CONTROL (ESC)

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING (AT CONTRACTOR'S EXPENSE) AND MAINTAINING ALL NECESSARY EROSION CONTROL TO COMPLY WITH FACILITIES APPLIABLE EROSION CONTROL REGULATIONS AND TO MAINTAIN CLEAN ACCESS ROUTES.

THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED AT NO ADDITIONAL COST FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.

THE RECOMMENDATIONS FOR AN ESC PLAN WILL PROVIDE GUIDELINES FOR THE CONTRACTOR TO DEVELOP AND IMPLEMENT AND ESC PLAN. THE CONTRACTOR'S ESC PLAN SHALL BE SUBMITTED TO THE APPLICANT PRIOR TO MOBILIZATION.

IMPLEMENTATION OF AN ESC PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED.

THE ESC FACILITIES ARE TO BE CONSTRUCTED PRIOR TO CLEARING AND GRADING AND IN SUCH A MANNER TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER A NATURAL WATERBODY.

THE BOUNDARIES OF THE PROJECT AREA SHOWN ON THIS PLAN SHALL BE CLEARLY DEMARCATED IN THE FIELD PRIOR TO CONSTRUCTION. "DURING THE CONSTRUCTION, NO DISTURBANCE BEYOND THE DEMARCATED BOUNDARY SHALL BE PERMITTED. THE DEMARCATION SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.

THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.

ALL ESC FACILITIES SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL ESC FACILITIES SHALL BE INSPECTED DAILY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES PER 24 HOUR PERIOD AND AFTER EVENTS EXCEEDING 24 HOURS IN DURATION.

STABILIZED CONSTRUCTION ACCESS AND ADDITIONAL MEASURES MAY BE REQUIRED AND SHALL BE MAINTAINED DURING THE DURATION OF THE PROJECT AT THE CONTRACTOR'S EXPENSE.

STABILIZE SOILS AND PROTECT SLOPES

FROM MAY 1 THROUGH SEPTEMBER 30, ALL EXPOSED SOILS SHALL BE PROTECTION FROM EROSION BY MULCHING WITH CERTIFIED WEED-FREE HAY OR STRAW, PLASTIC SHEETING, OR APPROVED MEASURES WITHIN 7 DAYS OF GRADING.

FROM OCTOBER 1 THROUGH APRIL 30, ALL EXPOSED SOILS MUST BE PROTECTED WITHIN 3 DAYS OF GRADING.

SOILS SHALL BE STABILIZED BEFORE A WORK SHUTDOWN, HOLIDAY, OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST.

SOILS STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES.

MULCH AS SOON AS PRACTICAL ALL DISTURBED AREAS NOT INDICATED IN THE CONTRACT DOCUMENTS.

HAY OR STRAW MULCH MUST BE CERTIFIED WEED-FREE.

AFTER FINAL SITE STABILIZATION

ALL TEMPORARY EROSION AND SEDIMENTAL CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MBPS ARE NO LONGER NEEDED.

TRAPPED SEDIMENT SHALL BE REMOVED FROM THE SITE OR INCORPORATED INTO FINISHED GRADING.

DISTURBED SOIL AREAS SHALL BE PERMANENTLY STABILIZED.

DUST CONTROL

THE CONTRACTOR SHALL CONTROL DUST FOR THE DURATION OF THE PROJECT.

CONTROL MEASURES SHALL FOLLOW APPLICABLE REGULATIONS AND MAY INCLUDE WATERING, MULCH, AND SLOWING VEHICLE SPEEDS.

STRAW WATTLE

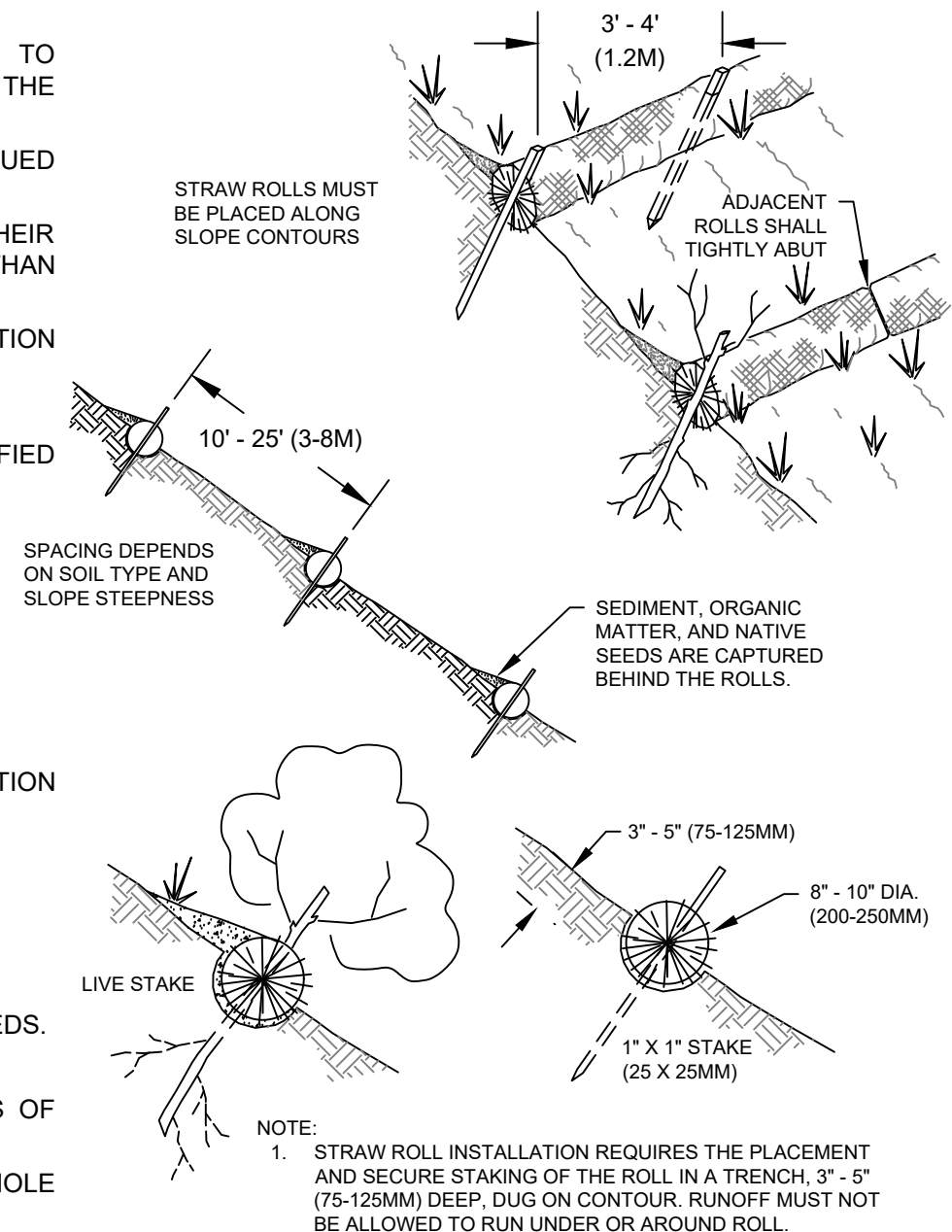
INSERT WATTLE WITHIN TRENCH SO THAT NO GAP EXISTS BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHALL BE TIGHTLY ABUTTED SO THAT NO OPENING EXISTS FOR WATER OR SEDIMENT TO PASS THROUGH.

WOOD STAKES SHALL BE USED TO FASTEN THE WATTLES TO THE SOIL. A STRAIGHT METAL BAR CAN BE USED TO DRIVE A PILOT HOLE THROUGH THE WATTLE AND INTO THE SOIL.

PAIRS OF WOOD STAKES SHALL BE PLACED 6 INCHES FROM THE WATTLE END AND ANGLED SUCH THAT ONE STAKE IS PERPENDICULAR TO GRADE AND ONE IS AT A 45 ANGLE TO GRADE. WOOD STAKE PAIRS SHALL BE SPACED AT 2-FOOT CENTERS LEAVING LESS THAN 1 TO 2 INCHES OF STAKE EXPOSED ABOVE THE WATTLE.

AT TERMINAL ENDS OF WATTLES, EXCAVATE MINIMUM 2-FOOT DEEP KEY TRENCH AND BURRY A MINIMUM 4-FOOT OF WATTLE END.

ANY WATTLE DAMAGED DURING PLACEMENT SHALL BE REPLACED AS NECESSARY.



STRAW WATTLE DETAIL
NOT TO SCALE

| | |
|--|---|
| PURPOSE: Stream restoration and wetland creation/enhancement DATUM: NAD83 ADJACENT PROPERTY OWNERS: | EROSION CONTROL NOTES AND TYPICALS PROPOSED: Stream res. and wet creat/enhance APPLICANT: Port of Chehalis PROJECT NAME: Berwick Ck. Restoration Project REFERENCE #: Not Yet Assigned SITE LOCATION ADDRESS: 1861 Bishop Road Chehalis, WA |
| | NEAR: Chehalis COUNTY: Lewis STATE: WA SHEET 15 OF 15 DATE: 4/23/20 |

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



Appendix A | Western Washington Wetland Ratings and Figures

Wetland Rating - Existing Condition

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A -Existing Condition Date of site visit: 3-25-2019

Rated by M. McGrath Trained by Ecology? Yes X No Date of training 3-2019

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

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

Source of base aerial photo/map Google Earth

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

1. Category of wetland based on FUNCTIONS

 Category I – Total score = 23 – 27

X **Category II** – Total score = 20 – 22

 Category III – Total score = 16 – 19

 Category IV – Total score = 9 – 15

| FUNCTION | Improving Water Quality | | | Hydrologic | | | Habitat | | | |
|-------------------------------|---------------------------------------|----------|---|------------|----------|---|----------|----------|----------|-----------|
| | <i>Circle the appropriate ratings</i> | | | | | | | | | |
| Site Potential | H | M | L | H | M | L | H | M | L | |
| Landscape Potential | H | M | L | H | M | L | H | M | L | |
| Value | H | M | L | H | M | L | H | M | L | |
| Score Based on Ratings | 8 | | | 8 | | | 5 | | | 21 |

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

9 = H,H,H

8 = H,H,M

7 = H,H,L

7 = H,M,M

6 = H,M,L

6 = M,M,M

5 = H,L,L

5 = M,M,L

4 = M,L,L

3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

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

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 (<i>can be added to map of hydroperiods</i>) | D 1.1, D 4.1 | |
| Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>) | 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 Figures to be prepared after pre-application meeting.

| Map of: | To answer questions: | Figure # |
|---|----------------------|----------|
| Cowardin plant classes | H 1.1, H 1.4 | 8 |
| Hydroperiods | H 1.2 | 8 |
| Ponded depressions | R 1.1 | 8 |
| Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>) | R 2.4 | 8 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 8 |
| Width of unit vs. width of stream (<i>can be added to another figure</i>) | R 4.1 | 8 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 10 |
| 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 | 9 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 11 |
| Screen capture of list of TMDLs for WRIA in which unit is found (from web) | R 3.2, R 3.3 | 11 |

Lake Fringe Wetlands

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

Slope Wetlands

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

HGM Classification of Wetlands in Western Washington

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

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

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

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

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

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

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

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

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

4. Does the entire wetland unit **meet all** of the following criteria?
 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.*

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS**Water Quality Functions** - Indicators that the site functions to improve water quality

| | | |
|---|--|-----------|
| R 1.0. Does the site have the potential to improve water quality? | | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: | | |
| Depressions cover $> \frac{3}{4}$ area of wetland | points = 8 | 4 |
| Depressions cover $> \frac{1}{2}$ area of wetland | points = 4 | |
| Depressions present but cover $< \frac{1}{2}$ area of wetland | points = 2 | |
| No depressions present | points = 0 | |
| R 1.2. Structure of plants in the wetland (areas with $>90\%$ cover at person height, not Cowardin classes) | | |
| Trees or shrubs $> \frac{2}{3}$ area of the wetland | points = 8 | 6 |
| Trees or shrubs $> \frac{1}{3}$ area of the wetland | points = 6 | |
| Herbaceous plants (> 6 in high) $> \frac{2}{3}$ area of the wetland | points = 6 | |
| Herbaceous plants (> 6 in high) $> \frac{1}{3}$ area of the wetland | points = 3 | |
| Trees, shrubs, and ungrazed herbaceous $< \frac{1}{3}$ area of the wetland | points = 0 | |
| Total for R 1 | Add the points in the boxes above | 10 |

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

| | | |
|--|--|----------|
| R 2.0. Does the landscape have the potential to support the water quality function of the site? | | |
| R 2.1. Is the wetland within an incorporated city or within its UGA? | Yes = 2 No = 0 | 2 |
| R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? | Yes = 1 No = 0 | 1 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? | Yes = 1 No = 0 | 1 |
| R 2.4. Is $> 10\%$ of the area within 150 ft of the wetland in land uses that generate pollutants? | Yes = 1 No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 | | |
| Other sources <u>Likely pollutants from surface water from human activities entering wetland</u> | Yes = 1 No = 0 | 1 |
| Total for R 2 | Add the points in the boxes above | 6 |

Rating of Landscape Potential If score is: X 3-6 = H 1 or 2 = M 0 = L Record the rating on the first page

| | | |
|---|--|----------|
| R 3.0. Is the water quality improvement provided by the site valuable to society? | | |
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? | Yes = 1 No = 0 | 0 |
| R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? | Yes = 1 No = 0 | 1 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (answer YES if there is a TMDL for the drainage in which the unit is found) | Yes = 2 No = 0 | 2 |
| Total for R 3 | Add the points in the boxes above | 3 |

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

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion

| | | |
|---|--|-----------|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | | |
| R 4.1. Characteristics of the overbank storage the wetland provides: | | |
| <i>Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks). $333 \text{ ft} / 9.7 \text{ ft} = 34$</i> | | 9 |
| If the ratio is more than 20 | points = 9 | |
| If the ratio is 10-20 | points = 6 | |
| If the ratio is 5-<10 | points = 4 | |
| If the ratio is 1-<5 | points = 2 | |
| If the ratio is < 1 | points = 1 | |
| R 4.2. Characteristics of plants that slow down water velocities during floods: <i>Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have $>90\%$ cover at person height. These are <u>NOT</u> Cowardin classes)</i> | | |
| <u>Forest or shrub for $> \frac{2}{3}$ area OR emergent plants $> \frac{2}{3}$ area</u> | points = 7 | 7 |
| Forest or shrub for $> \frac{1}{10}$ area OR emergent plants $> \frac{1}{3}$ area | points = 4 | |
| Plants do not meet above criteria | points = 0 | |
| Total for R 4 | Add the points in the boxes above | 16 |

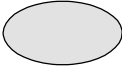
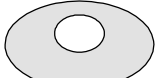




Rating of Site Potential If score is: X 12-16 = H 6-11 = M 0-5 = L Record the rating on the first page

| | | |
|--|--|----------|
| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
| R 5.1. Is the stream or river adjacent to the wetland downcut? | Yes = 0 No = 1 | 0 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 No = 0 | 1 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | Yes = 0 No = 1 | 1 |
| Total for R 5 | Add the points in the boxes above | 2 |

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

| | | |
|---|--|----------|
| R 6.0. Are the hydrologic functions provided by the site valuable to society? | | |
| R 6.1. Distance to the nearest areas downstream that have flooding problems? | | |
| <i>Choose the description that best fits the site.</i> | | 2 |
| The sub-basin immediately down-gradient of the wetland 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 | |
| R 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 R 6 | Add the points in the boxes above | 2 |

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

| 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? | |
| <p>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.</p> <p><input type="checkbox"/> Aquatic bed 4 structures or more: points = 4</p> <p><input checked="" type="checkbox"/> Emergent 3 structures: points = 2</p> <p><input type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1</p> <p><input checked="" type="checkbox"/> Forested (areas where trees have > 30% cover) 1 structure: points = 0</p> <p><i>If the unit has a Forested class, check if:</i></p> <p><input type="checkbox"/> 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</p> | 1 |
| <p>H 1.2. Hydroperiods</p> <p>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).</p> <p><input type="checkbox"/> Permanently flooded or inundated 4 or more types present: points = 3</p> <p><input checked="" type="checkbox"/> Seasonally flooded or inundated 3 types present: points = 2</p> <p><input type="checkbox"/> Occasionally flooded or inundated 2 types present: points = 1</p> <p><input type="checkbox"/> Saturated only 1 type present: points = 0</p> <p><input checked="" type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland (Berwick Creek)</p> <p><input checked="" type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland (Ditch A)</p> <p><input type="checkbox"/> Lake Fringe wetland 2 points</p> <p><input type="checkbox"/> Freshwater tidal wetland 2 points</p> | 2 |
| <p>H 1.3. Richness of plant species</p> <p>Count the number of plant species in the wetland that cover at least 10 ft². 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</p> <p>If you counted: > 19 species points = 2</p> <p>5 - 19 species Not a lot of species diversity points = 1</p> <p>< 5 species points = 0</p> | 1 |
| <p>H 1.4. Interspersion of habitats</p> <p>Decide from the diagrams below whether interspersions among Cowardin plant classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. <i>If you have four or more plant classes or three classes and open water, the rating is always high.</i></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>None = 0 points</p> </div> <div style="text-align: center;">  <p>Low = 1 point</p> </div> <div style="text-align: center;">  <p>Moderate = 2 points</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>All three diagrams in this row are HIGH = 3 points</p> | 1 |

| | |
|---|---------------|
| <p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> 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)</p> <p><input checked="" type="checkbox"/> 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 (<i>cut shrubs, trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (see H 1.1 for list of strata)</p> | 2 |
| <p>Total for H 1</p> <p style="text-align: right;">Add the points in the boxes above</p> | 7 |
| <p>Rating of Site Potential If score is: <u>15-18 = H</u> <u>X 7-14 = M</u> <u>0-6 = L</u> <i>Record the rating on the first page</i></p> | |
| H 2.0. Does the landscape have the potential to support the habitat functions of the site? | |
| <p>H 2.1. Accessible habitat (include only habitat that directly abuts wetland unit).</p> <p>Calculate: % undisturbed habitat 0% + [(5.5% moderate and low intensity land uses)/2] 2.75% = 2.75%</p> <p>If total accessible habitat is:</p> <p>> ½ (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = 1</p> <p>< 10% of 1 km Polygon points = 0</p> | 0 |
| <p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p>Calculate: % undisturbed habitat 0% + 11.3% + [(5.5% +25.1% moderate/low intensity land uses)/2] = 26.6%</p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p> | 1 |
| <p>H 2.3. Land use intensity in 1 km Polygon: if</p> <p>> 50% of 1 km Polygon is high intensity land use points = (-2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p> | -2 |
| <p>Total for H 2</p> <p style="text-align: right;">Add the points in the boxes above</p> | < 1 |
| <p>Rating of Landscape Potential If score is: <u>4-6 = H</u> <u>1-3 = M</u> <u>X < 1 = L</u> <i>Record the rating on the first page</i></p> | |
| H 3.0. Is the habitat provided by the site valuable to society? | |
| <p>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.</p> <p>Site meets ANY of the following criteria: points = 2</p> <p><input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page)</p> <p><input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)</p> <p><input type="checkbox"/> It is mapped as a location for an individual WDFW priority species</p> <p><input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources</p> <p><input type="checkbox"/> 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</p> <p><input checked="" type="checkbox"/> Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p><input type="checkbox"/> Site does not meet any of the criteria above points = 0</p> | 1 |
| <p>Rating of Value If score is: <u>2 = H</u> <u>X 1 = M</u> <u>0 = L</u> <i>Record the rating on the first page</i></p> | |

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 | Category |
|---|-------------------------------------|
| <i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i> | |
| SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes – Go to SC 1.1 No = Not an estuarine wetland | |
| SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = Category I No - Go to SC 1.2 | Cat. I |
| SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i> , see page 25) — At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or unmowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = Category I No = Category II | Cat. I Cat. II |
| SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to SC 2.2 No – Go to SC 2.3 SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = Category I No = Not a WHCV SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhp/wetlands.pdf Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = Category I No = Not a WHCV | Cat. I |
| SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i> SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to SC 3.3 No – Go to SC 3.2 SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to SC 3.3 No = Is not a bog SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = Is a Category I bog No – Go to SC 3.4 NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = Is a Category I bog No = Is not a bog | Cat. I |

| | |
|--|--|
| <p>SC 4.0. Forested Wetlands</p> <p>Does the wetland have at least <u>1 contiguous acre</u> of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? <i>If you answer YES you will still need to rate the wetland based on its functions.</i></p> <ul style="list-style-type: none"> — 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). <p style="text-align: right;">Yes = Category I No = Not a forested wetland for this section</p> | <p>Cat. I</p> |
| <p>SC 5.0. Wetlands in Coastal Lagoons</p> <p>Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?</p> <ul style="list-style-type: none"> — 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 (<i>needs to be measured near the bottom</i>) <p style="text-align: right;">Yes – Go to SC 5.1 No = Not a wetland in a coastal lagoon</p> <p>SC 5.1. Does the wetland meet all of the following three conditions?</p> <ul style="list-style-type: none"> — 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 unmowed grassland. — The wetland is larger than 1/10 ac (4350 ft²) <p style="text-align: right;">Yes = Category I No = Category II</p> | <p>Cat. I</p> <p>Cat. II</p> |
| <p>SC 6.0. Interdunal Wetlands</p> <p>Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? <i>If you answer yes you will still need to rate the wetland based on its habitat functions.</i></p> <p>In practical terms that means the following geographic areas:</p> <ul style="list-style-type: none"> — 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 <p style="text-align: right;">Yes – Go to SC 6.1 No = not an interdunal wetland for rating</p> <p>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)?</p> <p style="text-align: right;">Yes = Category I No – Go to SC 6.2</p> <p>SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?</p> <p style="text-align: right;">Yes = Category II No – Go to SC 6.3</p> <p>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?</p> <p style="text-align: right;">Yes = Category III No = Category IV</p> | <p>Cat I</p> <p>Cat. II</p> <p>Cat. III</p> <p>Cat. IV</p> |
| <p>Category of wetland based on Special Characteristics</p> <p>If you answered No for all types, enter "Not Applicable" on Summary Form</p> | <p>N/A</p> |

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Wetland Rating – Post-Restoration Condition

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A-Post Restoration Condition Date of site visit: 3-25-2019

Rated by M. McGrath Trained by Ecology? Yes X No Date of training 3-2019

HGM Class used for rating Riverine Wetland has multiple HGM classes? X Y

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

Source of base aerial photo/map Google Earth

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

1. Category of wetland based on FUNCTIONS

X **Category I** – Total score = 23 – 27

 Category II – Total score = 20 – 22

 Category III – Total score = 16 – 19

 Category IV – Total score = 9 – 15

| FUNCTION | Improving Water Quality | | | Hydrologic | | | Habitat | | | |
|---------------------------------------|-------------------------|---|---|------------|----------|---|----------|----------|----------|-----------|
| <i>Circle the appropriate ratings</i> | | | | | | | | | | |
| Site Potential | <u>H</u> | M | L | <u>H</u> | M | L | H | <u>M</u> | L | |
| Landscape Potential | <u>H</u> | M | L | H | <u>M</u> | L | H | M | <u>L</u> | |
| Value | <u>H</u> | M | L | <u>H</u> | M | L | <u>H</u> | M | L | |
| Score Based on Ratings | 9 | | | 8 | | | 6 | | | 23 |

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

9 = H,H,H

8 = H,H,M

7 = H,H,L

7 = H,M,M

6 = H,M,L

6 = M,M,M

5 = H,L,L

5 = M,M,L

4 = M,L,L

3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

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

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 Figures to be prepared after pre-application meeting.

| Map of: | To answer questions: | Figure # |
|---|----------------------|----------|
| Cowardin plant classes | H 1.1, H 1.4 | 8 |
| Hydroperiods | H 1.2 | 8 |
| Ponded depressions | R 1.1 | 8 |
| Boundary of area within 150 ft of the wetland (can be added to another figure) | R 2.4 | 8 |
| Plant cover of trees, shrubs, and herbaceous plants | R 1.2, R 4.2 | 8 |
| Width of unit vs. width of stream (can be added to another figure) | R 4.1 | 8 |
| Map of the contributing basin | R 2.2, R 2.3, R 5.2 | 10 |
| 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 | 9 |
| Screen capture of map of 303(d) listed waters in basin (from Ecology website) | R 3.1 | 11 |
| Screen capture of list of TMDLs for WRIA in which unit is found (from web) | R 3.2, R 3.3 | 11 |

Lake Fringe Wetlands

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

Slope Wetlands

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

HGM Classification of Wetlands in Western Washington

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

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

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

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

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

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

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

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

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

4. Does the entire wetland unit **meet all** of the following criteria?
 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.*

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS**Water Quality Functions** - Indicators that the site functions to improve water quality

| | | |
|---|--|-----------|
| R 1.0. Does the site have the potential to improve water quality? | | |
| R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: | | |
| Depressions cover $> \frac{3}{4}$ area of wetland | points = 8 | 4 |
| Depressions cover $> \frac{1}{2}$ area of wetland | points = 4 | |
| Depressions present but cover $< \frac{1}{2}$ area of wetland | points = 2 | |
| No depressions present | points = 0 | |
| R 1.2. Structure of plants in the wetland (areas with $>90\%$ cover at person height, not Cowardin classes) | | |
| Trees or shrubs $> \frac{2}{3}$ area of the wetland | points = 8 | 8 |
| Trees or shrubs $> \frac{1}{3}$ area of the wetland | points = 6 | |
| Herbaceous plants (> 6 in high) $> \frac{2}{3}$ area of the wetland | points = 6 | |
| Herbaceous plants (> 6 in high) $> \frac{1}{3}$ area of the wetland | points = 3 | |
| Trees, shrubs, and ungrazed herbaceous $< \frac{1}{3}$ area of the wetland | points = 0 | |
| Total for R 1 | Add the points in the boxes above | 12 |

Rating of Site Potential If score is: X 12-16 = H 6-11 = M 0-5 = L

Record the rating on the first page

| | | |
|--|--|----------|
| R 2.0. Does the landscape have the potential to support the water quality function of the site? | | |
| R 2.1. Is the wetland within an incorporated city or within its UGA? | Yes = 2 No = 0 | 2 |
| R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? | Yes = 1 No = 0 | 1 |
| R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? | Yes = 1 No = 0 | 1 |
| R 2.4. Is $> 10\%$ of the area within 150 ft of the wetland in land uses that generate pollutants? | Yes = 1 No = 0 | 1 |
| R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 | | |
| Other sources <u>Likely pollutants from surface water from human activities entering wetland</u> | Yes = 1 No = 0 | 1 |
| Total for R 2 | Add the points in the boxes above | 6 |

Rating of Landscape Potential If score is: X 3-6 = H 1 or 2 = M 0 = L

Record the rating on the first page

| | | |
|---|--|----------|
| R 3.0. Is the water quality improvement provided by the site valuable to society? | | |
| R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? | Yes = 1 No = 0 | 0 |
| R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? | Yes = 1 No = 0 | 1 |
| R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (answer YES if there is a TMDL for the drainage in which the unit is found) | Yes = 2 No = 0 | 2 |
| Total for R 3 | Add the points in the boxes above | 3 |

Rating of Value If score is: X 2-4 = H 1 = M 0 = L

Record the rating on the first page

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS**Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion

| | | |
|---|--|-----------|
| R 4.0. Does the site have the potential to reduce flooding and erosion? | | |
| R 4.1. Characteristics of the overbank storage the wetland provides: | | |
| <i>Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks). $333 \text{ ft} / 9.7 \text{ ft} = 34$</i> | | 9 |
| If the ratio is more than 20 | points = 9 | |
| If the ratio is 10-20 | points = 6 | |
| If the ratio is 5-<10 | points = 4 | |
| If the ratio is 1-<5 | points = 2 | |
| If the ratio is < 1 | points = 1 | |
| R 4.2. Characteristics of plants that slow down water velocities during floods: <i>Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have $>90\%$ cover at person height. These are <u>NOT</u> Cowardin classes)</i> | | |
| Forest or shrub for $> \frac{2}{3}$ area OR emergent plants $> \frac{2}{3}$ area | points = 7 | 7 |
| Forest or shrub for $> \frac{1}{10}$ area OR emergent plants $> \frac{1}{3}$ area | points = 4 | |
| Plants do not meet above criteria | points = 0 | |
| Total for R 4 | Add the points in the boxes above | 16 |

Rating of Site Potential If score is: X 12-16 = H 6-11 = M 0-5 = L

Record the rating on the first page

| | | |
|--|--|----------|
| R 5.0. Does the landscape have the potential to support the hydrologic functions of the site? | | |
| R 5.1. Is the stream or river adjacent to the wetland downcut? | Yes = 0 No = 1 | 0 |
| R 5.2. Does the up-gradient watershed include a UGA or incorporated area? | Yes = 1 No = 0 | 1 |
| R 5.3. Is the up-gradient stream or river controlled by dams? | Yes = 0 No = 1 | 1 |
| Total for R 5 | Add the points in the boxes above | 2 |

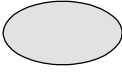
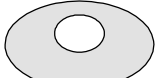





Rating of Landscape Potential If score is: 3 = H X 1 or 2 = M 0 = L

Record the rating on the first page

| | | |
|---|--|----------|
| R 6.0. Are the hydrologic functions provided by the site valuable to society? | | |
| R 6.1. Distance to the nearest areas downstream that have flooding problems? | | |
| <i>Choose the description that best fits the site.</i> | | 2 |
| The sub-basin immediately down-gradient of the wetland 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 | |
| R 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 R 6 | Add the points in the boxes above | 2 |

Rating of Value If score is: X 2-4 = H 1 = M 0 = L

Record the rating on the first page

| 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: <i>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.</i> | 2 |
| <input type="checkbox"/> Aquatic bed 4 structures or more: points = 4 <input checked="" type="checkbox"/> Emergent 3 structures: points = 2 <input checked="" type="checkbox"/> Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1 <input checked="" type="checkbox"/> Forested (areas where trees have > 30% cover) 1 structure: points = 0 <i>If the unit has a Forested class, check if:</i> <input type="checkbox"/> The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon | |
| H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (see text for descriptions of hydroperiods). | 2 |
| <input type="checkbox"/> Permanently flooded or inundated 4 or more types present: points = 3 <input checked="" type="checkbox"/> Seasonally flooded or inundated 3 types present: points = 2 <input type="checkbox"/> Occasionally flooded or inundated 2 types present: points = 1 <input type="checkbox"/> Saturated only 1 type present: points = 0 <input checked="" type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland (Berwick Creek) <input checked="" type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland (Ditch A) <input type="checkbox"/> Lake Fringe wetland 2 points <input type="checkbox"/> Freshwater tidal wetland 2 points | |
| H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft ² . <i>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</i> If you counted: > 19 species points = 2 5 - 19 species Not a lot of species diversity points = 1 < 5 species points = 0 | 2 |
| H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersions among Cowardin plant classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. <i>If you have four or more plant classes or three classes and open water, the rating is always high.</i> | 2 |
|     <p>None = 0 points Low = 1 point Moderate = 2 points</p>    <p>All three diagrams in this row are HIGH = 3 points</p> | |

| | |
|---|-----|
| H 1.5. Special habitat features: Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i> <input checked="" type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). <input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland <input type="checkbox"/> 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) <input checked="" type="checkbox"/> 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 (<i>cut shrubs, trees that have not yet weathered where wood is exposed</i>) <input checked="" type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>) <input type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (see H 1.1 for list of strata) | 3 |
| Total for H 1 | 11 |
| Rating of Site Potential If score is: <u>15-18 = H</u> <u>7-14 = M</u> <u>0-6 = L</u> <i>Record the rating on the first page</i> | |
| H 2.0. Does the landscape have the potential to support the habitat functions of the site? | |
| H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>). <i>Calculate: % undisturbed habitat 0% + [(5.5% moderate and low intensity land uses)/2] 2.75% = 2.75%</i> 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. <i>Calculate: % undisturbed habitat 0% + 11.3% + [(5.5% +25.1% moderate/low intensity land uses)/2] = 26.6%</i> 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 1 km Polygon is high intensity points = 0 | -2 |
| Total for H 2 | < 1 |
| Rating of Landscape Potential If score is: <u>4-6 = H</u> <u>1-3 = M</u> <u>X < 1 = L</u> <i>Record the rating on the first page</i> | |
| 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? <i>Choose only the highest score that applies to the wetland being rated.</i> Site meets ANY of the following criteria: points = 2 <input checked="" type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW priority species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0 | 2 |
| Rating of Value If score is: <u>X 2 = H</u> <u>1 = M</u> <u>0 = L</u> <i>Record the rating on the first page</i> | |

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 | Category |
|---|-------------------------------------|
| <i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i> | |
| SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes – Go to SC 1.1 No = Not an estuarine wetland | |
| SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = Category I No - Go to SC 1.2 | Cat. I |
| SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i> , see page 25) — At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or unmowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = Category I No = Category II | Cat. I Cat. II |
| SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to SC 2.2 No – Go to SC 2.3 SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = Category I No = Not a WHCV SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes = Category I No = Not a WHCV | Cat. I |
| SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i> SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to SC 3.3 No – Go to SC 3.2 SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to SC 3.3 No = Is not a bog SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = Is a Category I bog No – Go to SC 3.4 NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = Is a Category I bog No = Is not a bog | Cat. I |

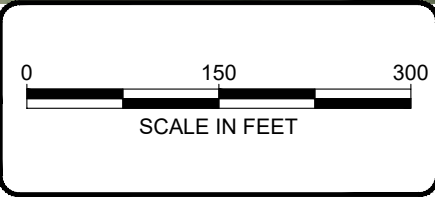
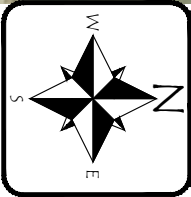
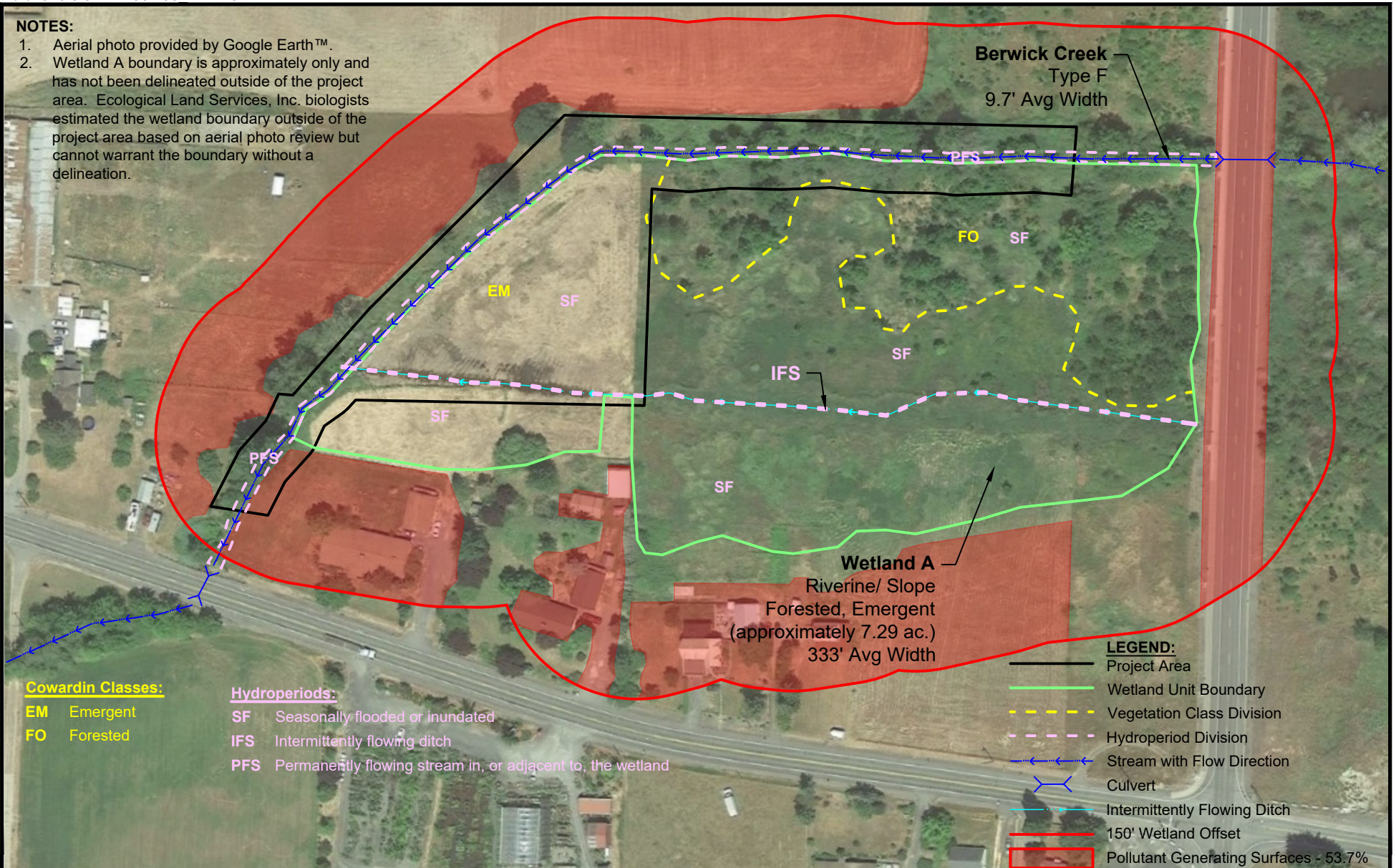
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| | |
|--|--|
| <p>SC 4.0. Forested Wetlands</p> <p>Does the wetland have at least <u>1 contiguous acre</u> of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? <i>If you answer YES you will still need to rate the wetland based on its functions.</i></p> <ul style="list-style-type: none"> — 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). <p style="text-align: right;">Yes = Category I No = Not a forested wetland for this section</p> | <p>Cat. I</p> |
| <p>SC 5.0. Wetlands in Coastal Lagoons</p> <p>Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?</p> <ul style="list-style-type: none"> — 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 (<i>needs to be measured near the bottom</i>) <p style="text-align: right;">Yes – Go to SC 5.1 No = Not a wetland in a coastal lagoon</p> <p>SC 5.1. Does the wetland meet all of the following three conditions?</p> <ul style="list-style-type: none"> — 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 unmowed grassland. — The wetland is larger than 1/10 ac (4350 ft²) <p style="text-align: right;">Yes = Category I No = Category II</p> | <p>Cat. I</p> <p>Cat. II</p> |
| <p>SC 6.0. Interdunal Wetlands</p> <p>Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? <i>If you answer yes you will still need to rate the wetland based on its habitat functions.</i></p> <p>In practical terms that means the following geographic areas:</p> <ul style="list-style-type: none"> — 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 <p style="text-align: right;">Yes – Go to SC 6.1 No = not an interdunal wetland for rating</p> <p>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)?</p> <p style="text-align: right;">Yes = Category I No – Go to SC 6.2</p> <p>SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?</p> <p style="text-align: right;">Yes = Category II No – Go to SC 6.3</p> <p>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?</p> <p style="text-align: right;">Yes = Category III No = Category IV</p> | <p>Cat I</p> <p>Cat. II</p> <p>Cat. III</p> <p>Cat. IV</p> |
| <p>Category of wetland based on Special Characteristics</p> <p>If you answered No for all types, enter "Not Applicable" on Summary Form</p> | <p>N/A</p> |

Wetland Rating Figures

NOTES:

1. Aerial photo provided by Google Earth™.
2. Wetland A boundary is approximately only and has not been delineated outside of the project area. Ecological Land Services, Inc. biologists estimated the wetland boundary outside of the project area based on aerial photo review but cannot warrant the boundary without a delineation.



1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

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DWN: EF
REQ. BY: LH
PRJ. MGR: MM
CHK: MM
PROJECT NO:
362.35

Figure 8
150' OFFSET WETLAND RATING
Berwick Creek Flood Reduction and Restoration
Port of Chehalis
City of Chehalis, Lewis County, WA
Section 10 & 15, Township 13N, Range 2W, W.M.

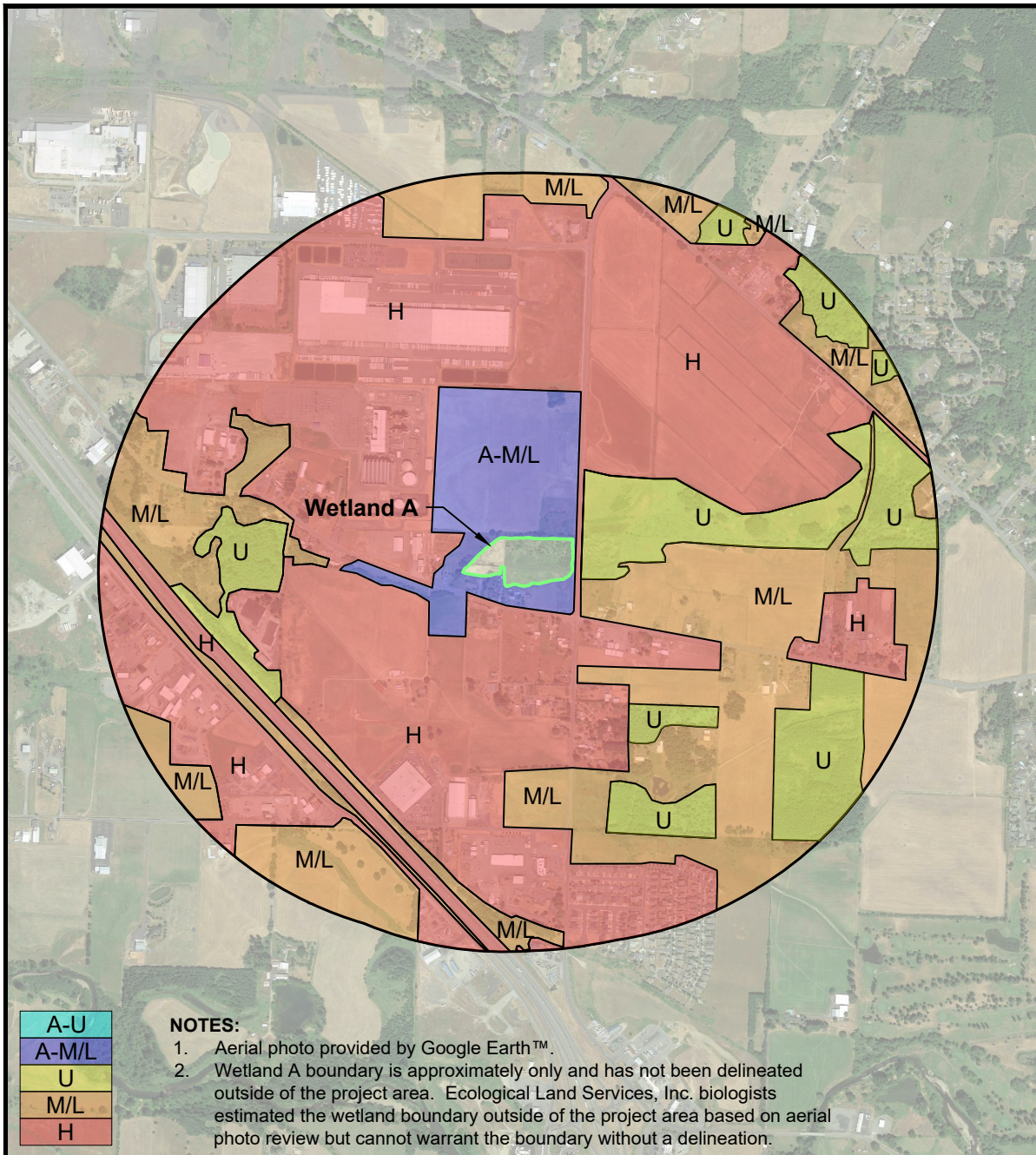


Figure 9
1KM OFFSET WETLAND RATING
 Berwick Creek Flood Reduction and Restoration
 Port of Chehalis
 City of Chehalis, Lewis County, WA
 Section 10 & 15, Township 13N, Range 2W, W.M.

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 Longview, WA 98632
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 Fax: (360) 414-9305
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| |
|-------|
| A-U |
| A-M/L |
| U |
| M/L |
| H |

- NOTES:**
1. Aerial photo provided by Google Earth™.
 2. Wetland A boundary is approximately only and has not been delineated outside of the project area. Ecological Land Services, Inc. biologists estimated the wetland boundary outside of the project area based on aerial photo review but cannot warrant the boundary without a delineation.

LEGEND:

| | | |
|-----------------------|--------------------------------|---------------------------------|
| Wetland Unit Boundary | H2.1 Accessible Habitat | H2.2 Undisturbed Habitat |
| | A-U A-U (0%) | U U (11.3%) |
| | A-M/L A-M/L (5.5%) | M/L M/L (25.1%) |
| | H2.3 Land Use Intensity | H H (58.1%) |

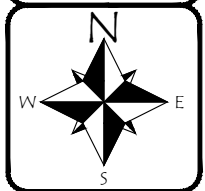
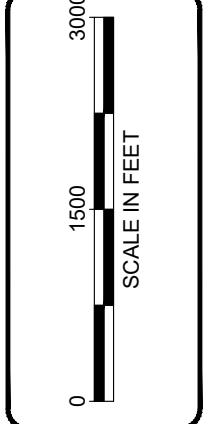
H 2.1 - Accessible habitat is < 10% of 1 km Polygon (2.75%).
 H 2.2 - Undisturbed habitat 10-50% and in 1-3 patches (26.6%).
 H 2.3 - > 50% of polygon is high land use intensity (58.1%).

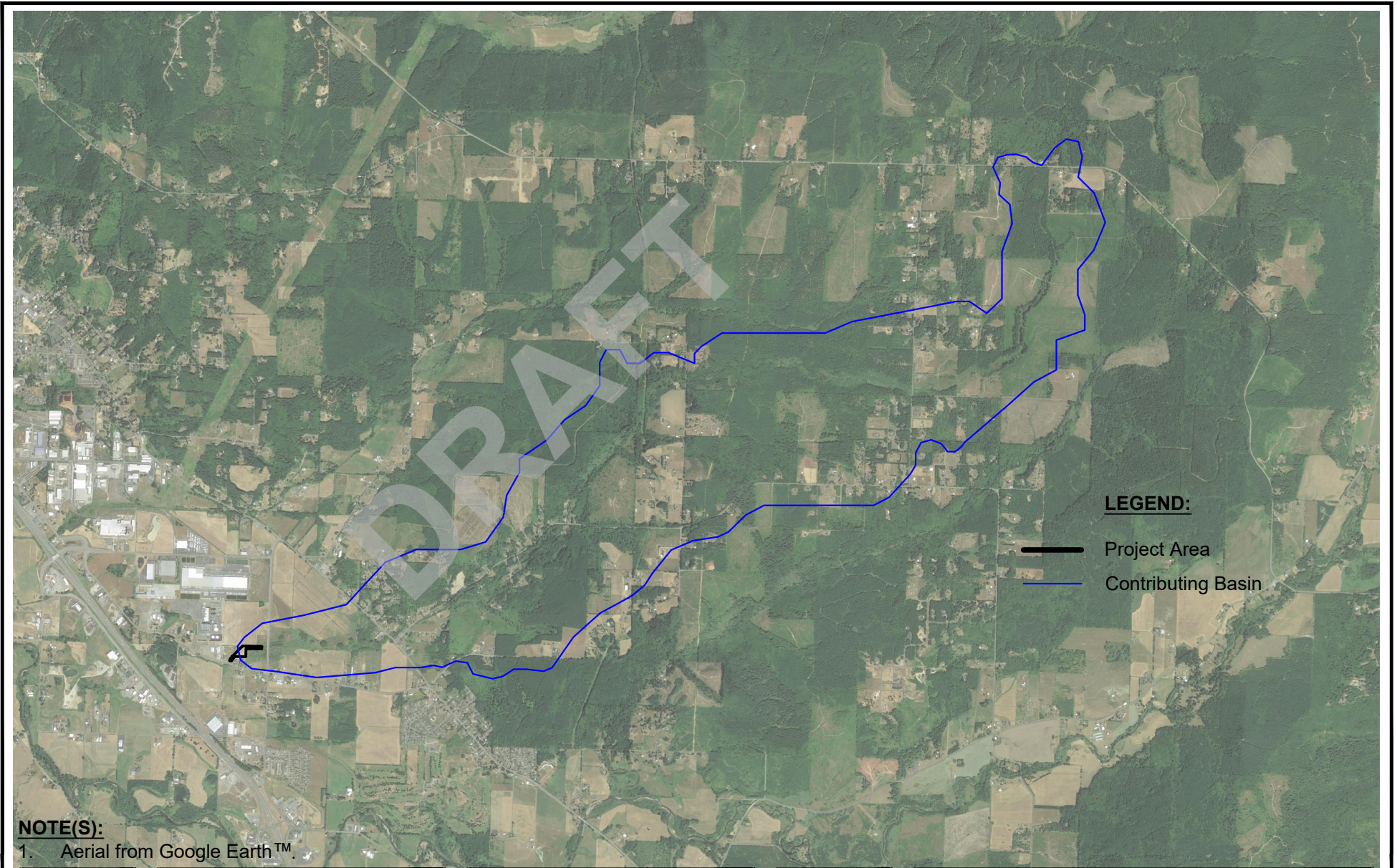
H 2.1. Accessible Habitat Equation

$$0\% \text{ A-U habitat} + [(5.5\% \text{ A-M/L intensity land uses})/2] \text{ } = \underline{2.75\%}$$

H 2.2. Total Undisturbed Habitat Equation

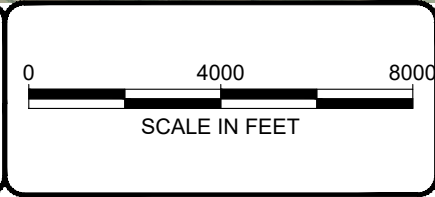
$$0\% \text{ A-U} + 11.3\% \text{ U habitat} + [(5.5\% \text{ A-M/L} + 25.1\% \text{ M/L land uses})/2] \text{ } = \underline{26.6\%}$$





NOTE(S):

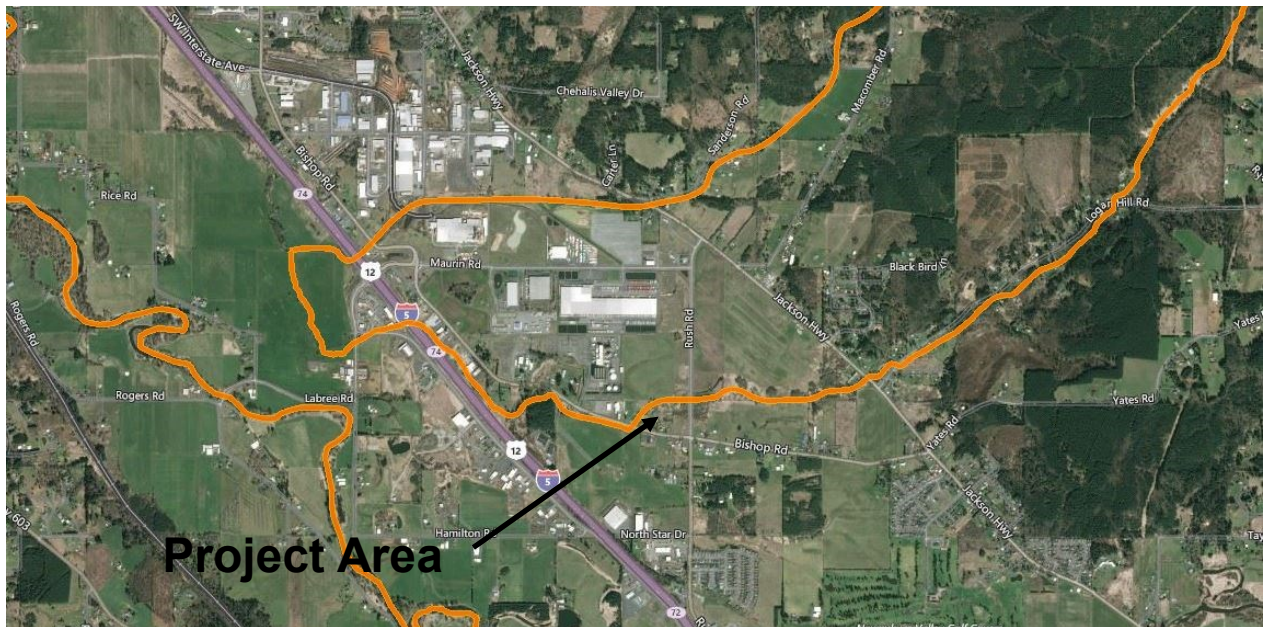
1. Aerial from Google Earth™.



1157 3rd Ave., Suite 220A
Longview, WA 98632
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Figure 10
CONTRIBUTING BASIN
Berwick Creek Flood Reduction and Restoration
Port of Chehalis
City of Chehalis, Lewis County, WA
Section 10 & 15, Township 13N, Range 2W, W.M.



Water Quality Atlas Map - 303(d)

Orange - Category 4A waters



Project Area

Water Quality Atlas Map - TDMLs

Purple - approved Yellow - in development



1157 3rd Ave., Ste 220A
 Longview, WA 98632
 Phone: (360) 578-1371
 Fax: (360) 414-9305
 www.eco-land.com

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 PROJ #: 362.35

Figure 11
 303(d) LISTED WATERS & TMDLs
 Berwick Creek Flood Restoration & Restoration
 Port of Chehalis
 City of Chehalis, Lewis County Washington
 Section 10 & 15, Township 13N, Range 2W, W.M.