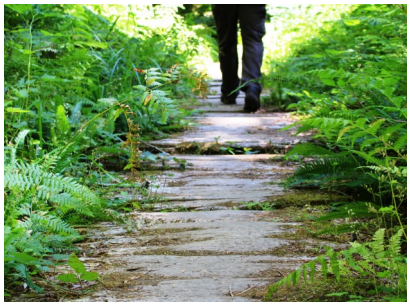
HABITAT MANAGEMENT, MITIGATION AND MONITORING PLAN

February 19, 2025



Castle Rock Business Park Permitting Outfall

Castle Rock, Washington

Prepared for

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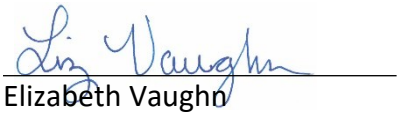
SIGNATURE PAGE

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



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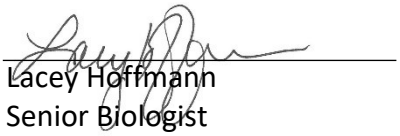

Lacey Hoffmann
Senior Biologist

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INTRODUCTION

CT6, LLC has contracted Ecological Land Services, Inc. (ELS) to prepare a Habitat Management and Mitigation Plan for impacts associated with the development of a proposed stormwater outfall within the Phase 1a boundary of infrastructure included in the Landing on the Cowlitz Master Plan (Phase 1). Phase 1a boundary consists of a portion of Cowlitz County parcel numbers 308640100, 6143802, and 30864 which are presently subject to a boundary line adjustment (City Application No. CR-BLA-24-01). Phase 1a boundary is located south of 2542 South West Larsen Lane in Castle Rock, Washington within a portion of Section 23, Township 9 North, and Range 2 West of the Willamette Meridian (Figure 1). This report has been prepared in accordance with the *City of Castle Rock Municipal Code* (CRMC) *Chapter 18.10.130, Fish and Wildlife Habitat Conservation Areas* (CMC 2024), and the City of Castle Rock, Washington Shoreline Master Program (SMP)(SMP 2022).

PROJECT HISTORY, STUDY AREA, AND PHASE 1A DESCRIPTION

A SEPA Threshold Determination Staff Report was released on July 28, 2021 for a master planned, mixed-use development known as, the LOTC Master Plan. ELS was contracted to assess all critical areas including wetlands and fish and wildlife habitats within the study area and within 300 feet of the study area for the LOTC project. An amended report summarizing methodology and critical areas known as, *Castle Rock Business Park Amended Critical Areas Report* (ELS 2022) was prepared by ELS and submitted to Mr. James Carsner of the U.S. Army Corps of Engineers (Corps) and to the appropriate Washington Department of Ecology (Ecology) staff for the purpose of a formal wetland boundary verification and verification of the ordinary high water mark (OHWM) flagging on the Cowlitz River and Salmon Creek. Wetland and stream boundaries and the OHWM of the Cowlitz River were verified by Ecology via email on August 25, 2022 and by Corps on September 16, 2022 (Corps Reference Number NWS-2022-557). An additional study area visit was conducted with Ecology on August 29, 2024 to revise the OHWM within the Phase 1a boundary. Ecology verified the proposed changes via email the same day. A memorandum reflecting the verified changes to the OHWM of the Cowlitz River within the updated Phase 1a boundary known as, *Castle Rock Business Park Memorandum* (ELS 2024) was prepared by ELS and submitted to the client and to the City of Castle Rock.

The approximate 18-acre study area is located on the eastern bank of the Cowlitz River, Type S (shoreline) of the state, and can be accessed from an existing gravel road off Huntington Avenue S (Figure 2). Most of Phase 1a consists of dredged mudflow deposits from the 1980 Mt. St. Helens eruption. Vegetation is limited to mainly sporadic deciduous native trees, herbaceous grasses and weeds, and non-native, invasive species including scotch broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*). A maintained drainage ditch, known as Ditch 4, is present along the northeast portion of the Phase 1a boundary. Ditch 4 conveys surface runoff from upslope areas and Laren Lane SW in a southwesterly direction along the northern boundary of Phase 1a. Additionally, it conveys runoff from upslope areas along the western boundary of Phase 1a in a northerly direction. All parcels within the Phase 1a boundary are zoned Industrial.

A small portion of forested vegetation is present along the western portion of Phase 1a bordering the eastern bank of the Cowlitz River. The OHWM of the Cowlitz River is well-defined along the western portion of the Phase 1a boundary, with cut banks and the presence of large woody material and wrack deposits. The proposed project is located in the Shoreline Environmental Designation (SED) High-Intensity and is within a portion of the 100-year floodplain and regulatory floodway of the Cowlitz River.

According to the SMP and *RCW 90.58*, shoreline jurisdiction includes all shorelands and waters within the City of Castle Rock that fall under this statute. This jurisdiction encompasses lands extending 200 feet landward in all directions from the OHWM of the Cowlitz River, as measured on a horizontal plane. Additionally, it includes floodways, contiguous floodplain areas landward 200 feet from such floodways, associated wetlands, critical areas with their respective buffer zones, and river deltas associated with streams subject to the program

Within Phase 1a, the Cowlitz River is classified under Code Reach Number CR-01, with a High-Intensity SED. Based on SMP *Table 8: Shoreline Reach Based RHA[1] Buffers*, the shoreline buffer for the Cowlitz River within the Phase 1a boundary is defined as 150 feet measured landward from the OHWM (Figure 2). Furthermore, SMP *Section 3.1.A* specifies Type S waters, including the Cowlitz River, fall under the jurisdiction of *RCW 90.58*, affirming shoreline jurisdiction within the Phase 1a boundary extends 200 feet from the OHWM, as well as floodways and contiguous floodplain areas (Figure 2).

METHODOLOGY

The ordinary high water mark (OHWM) delineation of the Cowlitz River was conducted following *RCW 90.58.030 and Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Ecology 2016). The OHWM along the east bank of the Cowlitz River was recorded using a hand-held GPS unit capable of sub-meter accuracy. The OHWM was then surveyed by Mackay Sposito on September 5, 2024.

PROJECT DESCRIPTION

Phase 1a of the LOTC Master Plan consists of installing a stormwater outfall within a portion of the Cowlitz River's shoreline buffer and shoreline jurisdiction. Installation of a temporary gravel road, positioned outside all critical areas and shorelines, is proposed to provide access to the project footprint; the gravel will be removed upon completion of the proposed outfall installation and mitigation efforts. Stormwater will be conveyed to the outfall through one 30-inch corrugated polypropylene pipe (CPP) within Ditch 4, one 42-inch high-density polyethylene (HDPE) pipe east of Ditch 4 which widens to 48-inch CPP west of Ditch 4, and one 30-inch CPP pipe west of Ditch 4 (Figures 3 and 4). Details of the 30-inch CPP west of Ditch 4 and the 42-to 48-inch HDPE and CPP outfall profiles can be seen on Figures 5 and 6, respectively. The primary

[1]With respect to Type S Waters, the term riparian habitat area (RHA) is interchangeable with the term "shoreline buffer" used in the City of Castle Rock's SMP.

outfall is designated as the centralized discharge point for all stormwater within the project scope. Runoff intercepted from roadway surfaces will undergo preliminary water quality treatment through bioretention planters positioned along the roadways. For each individual phase of the LOTC Master Plan, final treatment methodologies will be specified at the development stage integrating bioretention systems and mechanical filtration via catch basins to achieve regulatory compliance. The treated stormwater will be directed into an onsite conveyance system, channeling flows towards the outfall and facilitating discharge into the shoreline buffer of the Cowlitz River. Additionally, an integrated infiltration strategy will be implemented at each capture point, optimizing upland infiltration and minimizing runoff volumes entering the conveyance system.

Stormwater infrastructure will be installed primarily through trenching for accurate pipeline placement. All onsite runoff will receive treatment though roadside bioretention rain gardens before discharge. Outfall construction will be completed with landward-based excavation, beginning at the OHWM of the Cowlitz River and moving progressively away from the river. Biodegradable jute erosion matting will be placed within the proposed restoration and enhancement area to stabilize soils prior to habitat features such as rootwads and rootwad logs are installed reducing the need for further equipment access for final planting. Construction traffic will use the existing gravel road northeast of the Phase 1a boundary which can be accessed from Huntington Avenue S, avoiding access from Larson Lane SW.

A portion of the Phase 1a boundary currently lies within the regulatory floodway and the 100-year floodplain of the Cowlitz River. The proposed outfall will require 121 cubic yards of cut and 113 cubic yards of fill, resulting in a net export of 8 cubic yards in the regulatory floodway. This comparison is based on existing versus proposed surface levels and does not include additional materials from trenching, planting, or gabion wall construction. Grading quantities within and outside the floodplain are approximately balanced.

Stormwater Treatment

No stormwater treatment facility is proposed within the shoreline buffer or shoreline jurisdiction of the Cowlitz River. The primary point of discharge for the project will be the outfall, which will serve as the terminal conveyance for stormwater runoff across the entirety of the Phase 1a boundary. Runoff from roadways will be treated through bioretention planters designed to filter and treat stormwater before discharge. For the individual future phases of the LOTC Master Plan, stormwater treatment methods will be determined during the development phase, with anticipated approaches including bioretention systems or mechanical filtration via treatment catch basins. A centralized stormwater system will capture and convey treated runoff from these areas to the outfall for discharge into the shoreline buffer of the Cowlitz River. Additionally, infiltration measures will be implemented to maximize onsite infiltration of runoff at the point of capture, reducing the volume of stormwater conveyed to the river system. All components of the proposed project will be sized and designed per the *Stormwater Management Manual for the Puget Sound Basin* (Ecology 1992) and the *Stormwater Management Manual for Western Washington Volume V – Chapter 5* standards (Ecology 2024).

Cut and Fill

The proposed grading within the project area will involve approximately 113 cubic yards of fill, balanced by 121 cubic yards of cut, resulting in only 8 cubic yards of net cut within shoreline jurisdiction. Temporary stockpile areas will be designated outside of shoreline jurisdiction onsite and will be surrounded with silt fencing and covered with plastic sheeting as necessary, ensuring compliance with WSDOT standards. All steep slopes (3:1 or greater) will be stabilized using jute matting, while gentler slopes will be treated with native upland seeding and certified weed-free straw. If sediment tracking from the Phase 1a boundary becomes an issue, a wheel wash will be installed at the construction entrance to minimize offsite sediment transport.

Construction Methods

To construct the proposed stormwater outfall conveyance system, equipment to be used may include, but is not limited to, excavators, bull dozers, dump trucks, concrete trucks, compacting equipment, and hand tools. All staging and stockpile areas will be located outside of critical areas and buffers, and all project construction is proposed to be completed in a single phase during the dry season. All plant installation will be conducted during the appropriate planting windows as specified in this report.

The following details the general construction sequence:

1. All work limits will be clearly demarcated with silt fencing or construction fencing.
2. All appropriate best management practices (BMPs) will be installed.
3. Topsoil will be cleared and grubbed.
4. Infiltration areas will be marked to avoid heavy equipment from compacting soils and affecting infiltration.
5. Stormwater outfall will be graded to designed elevations.
6. Install signage prohibiting access to mitigation area.
7. Install biodegradable erosion control jute matting.
8. Install habitat features in shoreline jurisdiction.
9. Install riparian habitat and shoreline vegetation enhancement and restoration plantings.

Impact Avoidance and Minimization Measures

The project has been designed to avoid impacts to the shoreline buffer and shoreline jurisdiction to the greatest extent practicable. Due to the landscape position of the Phase 1a boundary and the water-related/water orientated nature of the stormwater outfall, complete avoidance of impacts to shorelines was not possible. Permanent impacts from the proposed gabion wall are limited to 0.002 acres (108 sq. ft.) and will be offset with a 2:1 onsite mitigation ratio. Additionally, permanent impacts from grading and installation of the outfall system within the shoreline buffer necessitates the proposed removal of three black cottonwood (*Populus trichocarpa*) trees. Neither of these permanent impacts could be avoided to accommodate project design. Alternative locations for the outfall would result in the same amount of vegetation removal or more.

Vegetation in the proposed impact areas consists of deciduous trees, grasses, weedy forbs and non-native, invasive vegetation. Temporary physical impacts to native shoreline vegetation due to grading and installation of the dual stormwater outfall pipe was limited to 0.257 acres (11,191 square feet) in the shoreline buffer and shoreline jurisdiction.

The following BMPs will be utilized during construction and operation to further minimize impacts to habitat:

Construction BMPs

1. Construction will occur mainly during the dry season (May-October) as feasible.
2. Native vegetation will be retained to the greatest extent possible within shoreline jurisdiction where improvements are not proposed.
3. Only three trees within the project area will be removed to accommodate the installation of the outfall system.
4. Clearly demarcate the job site and critical areas that must be avoided prior to ground disturbing activities.
5. Install silt fencing on the waterward side of land disturbing activities in shoreline jurisdiction.
6. No equipment will enter below the OHWM of the Cowlitz River.
7. Vehicle and equipment maintenance, repair, and/or service will be performed at designated repair facilities whenever possible.
8. All equipment will be maintained or fueled up, a minimum of 200 feet from the Cowlitz River.
9. All bare soils within shoreline jurisdiction will be mulched with certified weed-free straw after ground disturbing activities.
10. Signage will be installed along the boundary of Area 1 and Area 3 to notify the public of mitigation locations and access restrictions (Figure 7).
11. Install large woody material rootwads and horizontal logs to deter entrance from the public to the stormwater outfall.

PROJECT IMPACT SUMMARY

All impacts have been minimized to the greatest extent possible. All mitigation for impacts to the shoreline buffer and shoreline jurisdiction of the Cowlitz River is proposed onsite (Figure 7). Most project impacts come from the proposed grading and fill, and the installation of the proposed dual outfall piping system. Proposed impacts to critical areas onsite are included in Table 1.

Table 1. Stormwater Outfall Impact Summary

Shoreline Buffer Impacts		
Habitat Area	**Proposed Impact**	**Size of Impact**
Shoreline Buffer for Cowlitz River (RHA)	Permanent Shoreline Buffer Impact	0.002 acres/108 square feet
	Temporary Shoreline Buffer Impact	0.217 acres/9,444 square feet
Shoreline Impacts		
Habitat Area	**Proposed Impact**	**Size of Impact**
Shoreline Jurisdiction for the Cowlitz River (outside of RHAs)	Temporary Shoreline Jurisdiction Impact	0.014 acres/629 square feet

ONSITE MITIGATION

The applicant is proposing project impacts be compensated for through onsite, in-kind mitigation (Figure 7). The goal of onsite mitigation is to ensure no net loss of ecological functions and meet vegetation conservation standards established in the SMP. The generally accepted mitigation ratio for permanent impacts and temporary impacts to shoreline buffers and shoreline jurisdiction impacts, in ELS experience, has been generally accepted at 1:1 mitigation ratio. CT6, LLC proposes a comprehensive onsite mitigation plan to address project impacts within the shoreline buffer and shoreline jurisdiction of the Cowlitz River. The plan includes:

- Permanent Impacts**:** Mitigation at a 2:1 ratio for permanent impacts to the shoreline buffer resulting from the installation of a gabion wall.
- Temporary Impacts: Mitigation at a 1:1 ratio for temporary impacts to the shoreline buffer and shoreline jurisdiction caused by grading and the installation of an outfall pipe system.
- Tree Removal: Mitigation at a 4:1 stem count ratio for the removal of three black cottonwood trees within the shoreline buffer to accommodate the outfall system installation.

Mitigation includes a combination of restoration and enhancement with an upland native grass seed application and installing native trees and shrubs. In addition to these measures, CT6, LLC will install habitat features within the shoreline buffer of the Cowlitz River to ensure no net loss of ecological function. Performance standards, monitoring, maintenance, and contingency methods will be discussed in subsequent sections of this report to ensure the mitigation areas are successful.

Table 2.Proposed Outfall Onsite Mitigation Summary

Impact Area	Impact Amount	Proposed Impact Type and Area	Proposed Mitigation	Mitigation Ratio	Total Mitigation Proposed	Total Enhancement per Area
Shoreline Buffer	0.002 ac. (108 sq. ft.)	Permanent Impacts (Area 1)	Restore & Enhance	2:1	0.050 ac. (216 sq. ft.)	**Area 1** 0.172 ac. (7,487 sq. ft.)
	0.217 ac. (9,444 sq. ft.)	Temporary Impacts (Area 2)	Restore & Enhance	1:1	0.217 ac. (9,444 sq. ft.)	**Area 2** 0.050 ac. (2,173 sq. ft.)
	3 Black Cottonwood Trees	Permanent Vegetation Impacts (Area 1)	Stem Replacement & Enhance	4.67:1 Stem Replacement	0.032 ac. (1,400 sq. ft.)	**Area 3** 0.032 ac. (1,400 sq. ft.)
Shorelines Jurisdiction (outside of buffer)	0.014 ac. 629 sq. ft.	Temporary Impacts	Restore & Enhance	1:1	0.014 ac. (629 sq. ft.)	**Shoreline Jurisdiction** 0.014 ac. (629 sq. ft.)
Total Onsite Mitigation and Restoration:						**0.268 ac. (11,689 sq. ft.)**

LISTED SPECIES AND PRIORITY HABITATS IN THE PROJECT VICINITY

This fish and wildlife habitat management will address the species and habitats present within and adjacent to the project area according to *CRMC Table 7 Fish and Wildlife Conservation Area Classifications*, which lists ten classifications of fish and wildlife habitat. The project vicinity has Classification 1 (areas with which federal or state designated endangered, threatened, or sensitive species have a primary association), Classification 2 (state priority habitats and areas associated with state priority species), Classification 7 (Waters of the State, which includes Type S water), and Classification 8 (rivers planted with game fish by a governmental or tribal entity) All of the other classifications listed in the table are not present and will not be discussed further in this assessment (Classifications 3, 4, 5, 6, 9, and 10).

SUITABLE HABITAT FOR FISH AND WILDLIFE

The following table includes state priority habitats and federally listed or state-listed species as well as state sensitive species that have a primary association with habitat or suitable habitat within 300 feet of disturbance areas. The table was compiled using the most recent state and federal species lists (WDFW 2024, 2025a, 2025b; WDNR 2025a and 2025b; NMFS 2025; and USFWS 2025). The following table lists the species that have suitable habitat in the project vicinity.

Table 3.Endangered, Threatened, Candidate, and Sensitive Species and Priority Habitat that have Primary Habitat or Association with/on or Adjacent to the Project Site

Species or State Priority Habitat	State Status	Federal Status	Designated Critical Habitat in Project Vicinity?
Fish			
Bull Trout (*Salvelinus confluentus*)			
Columbia River DPS	Candidate	Threatened	No
Chum Salmon *(Oncorhynchus keta)*			
Columbia River Chum Salmon ESU	--	Threatened	Designated
Chinook Salmon *(Oncorhynchus tshawytscha)*			
Lower Columbia River Chinook ESU	--	Threatened	Designated
Coho Salmon *(Oncorhynchus kisutch)*			
Lower Columbia River Coho Salmon ESU	--	Threatened	Designated
Steelhead (*Oncorhynchus mykiss)*			
Lower Columbia River Steelhead DPS	Candidate	Threatened	Designated
Eulachon (Columbia River Smelt) *(Thaleichthys pacificus)*			
Eulachon Southern DPS	--	Threatened	Designated
Plants			
Western Wahoo (*Euonymus occidentalis var. occidentalis*)	Sensitive	--	--
Soft-leaved willow *(Salix sessilifolia)*	Sensitive	--	--
Priority Habitats			
Riverine	Priority Habitat	--	--

Although critical habitat is designated for some listed fish species in the project vicinity, suitable habitat for fish species is not present within the project footprint and all permanent and temporary project impacts will occur landward of the OHWM of the Cowlitz River. All permanent and temporary shoreline buffer impacts to the Cowlitz River will be mitigated using enhancement and restoration; therefore, the proposed project will avoid impacts to critical and suitable habitat for listed fish.

ELS recorded observations of surrounding topography, wildlife use, and habitat functions in Phase 1a boundary according to *CRMC Appendix 18.10F*. The listed plant species in Table 3 could occur within the project vicinity because they have suitable habitat provided by riparian areas.

MANAGEMENT RECOMMENDATIONS

Effects to species are generally avoided or minimized if the project meets management recommendations discussed below. Species detailed in Table 3 that do not have state or federal management recommendations will not be discussed.

Bull Trout

Federal

Federal management recommendations are not explicit, but state that for the Olympic Management Unit, recovery of bull trout includes protecting, restoring, and maintaining suitable habitat conditions and water quality with actions such as removing fish-passage barriers, maintaining and improving water quality, and improving habitat conditions in and along mainstem rivers (USFWS 2004).

State

WDFW (Rodrick and Milner 1991) advises the following management recommendations for streams that contain bull trout and steelhead: 1) maintain buffer zones along stream banks of at least the width of the height of the tallest tree or 50 feet, whichever is wider, 2) avoid road construction and maintenance activities, and 3) avoid in-stream structures, such as bridges, trestles, boat ramps, or culverts, that impede the natural movements of fish.

The proposed project will limit tree removal to three trees in the shoreline buffer and shoreline jurisdiction of the Cowlitz River. These trees will be replaced at a 4:1 ratio for stem count. Permanent and temporary impacts within the project area will be fully mitigated onsite through enhancement and restoration of the shoreline buffer and shoreline jurisdiction of the Cowlitz River. Mitigation onsite will result in an overall functional lift of riparian habitat when compared to current conditions. All other proposed impacts are placed outside of the shoreline buffer and shoreline jurisdiction to avoid any impacts to the Cowlitz River and its associated listed species. The project, as designed, is consistent with both federal and state management recommendations.

Salmon and Steelhead

Federal

The Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2010) is being used as a recovery plan for salmon and steelhead by the National Marine Fisheries Service. This plan gives the following key recovery priorities in the lower Cowlitz subbasin to attain recovery of listed salmon and steelhead:

1. Manage regulated stream flows through the hydropower system.
2. Restore floodplain function, riparian function, and stream habitat diversity.
3. Protect intact forest in headwater basins.
4. Manage growth and development to protect watershed processes and habitat conditions.
5. Address immediate risks with short-term habitat fixes.
6. Manage forest lands to protect and restore watershed processes.
7. Restore passage at culverts and other artificial barriers.
8. Align hatchery priorities consistent with conservation objectives.
9. Manage fishery impacts so they do not impede progress toward recovery.
10. Reduce out-of-subbasin impacts so that the benefits of in-basin actions can be realized.

State

WDFW does not have specific documents that have a short list of management recommendations for salmon; however, they do provide them for rainbow trout/steelhead (Rodrick and Milner 1991). Steelhead and salmon have similar life histories and habitat needs, so they are expected to be similar, if not identical. The following are management recommendations for steelhead:

1. Buffer zones of at least the width of the height of the tallest tree should be maintained along stream banks, which provide rainbow trout and steelhead habitat, and any other stream which directly or indirectly influences rainbow trout and steelhead habitat.
2. Road construction and maintenance activities should be avoided adjacent to streams which provide rainbow trout and steelhead habitat.
3. Instream structures, such as bridges, piers, boat ramps, or culverts must not impede the natural movements of rainbow trout and steelhead.
4. Waters inhabited by steelhead parr should not be treated with metal-based herbicides during the period March 1 through June 15.

The proposed project will limit tree removal to three trees in the shoreline buffer and shoreline jurisdiction of the Cowlitz River. These trees will be replaced at a 4:1 ratio for stem count. The project is proposing to offset permanent and temporary impacts within the project area by fully mitigating impacts onsite within the shoreline buffer and shoreline jurisdiction of the Cowlitz River. Mitigation onsite will result in an overall functional lift of riparian habitat when compared to current conditions. All other proposed impacts are placed outside of the shoreline buffer and shoreline jurisdiction to avoid any impacts to the Cowlitz River and its associated listed species. The project, as designed, is consistent with both federal and state management recommendations. The project, as designed, is consistent with both federal and state management recommendations.

Riparian Habitat

The WDFW management recommendation for riparian habitat (Knutson and Naef 1997) is to "protect riparian habitat areas". Standard recommended buffer widths for areas with typed and non-typed streams are somewhat different than widths required in the CRMC and further in the SMP. This project has been designed to avoid and minimize impacts to the shoreline buffer of the Cowlitz River within the Phase 1a boundary to the greatest extent possible, and where impacts to the shoreline buffer could not be avoided, onsite mitigation will be performed. Onsite mitigation will include the removal of non-native, invasive species, excluding reed canarygrass (*Phalaris arundinacea*), installation of geotextile erosion control fabric, installation of large woody material for habitat enhancement and riparian bank stabilization, installation of native shrubs, and spreading native seed mix, resulting in no net loss of ecological function.

HABITAT MANAGEMENT PLAN

This project requires a Habitat Management Plan in accordance with *CRMC.18.10.130.E*. because the project proposes impacts within 250 feet of a Classification 1, 2, 7, and 8 habitat area, which

includes species management recommendations (above) and development performance standards that are included below.

CRMC 18.10.130(D) – DEVELOPMENT PERFORMANCE STANDARDS

The following are development standards applicable to this project (in *italics*) as listed in *CRMC 18.10.130(D),* followed by a discussion of how they are met (in regular font).

1. *Best available science shall be used to conduct any biological assessments of fish and wildlife habitats and to propose mitigation steps required for specific developments.*

   Best available science and the most recent available data were used in preparing this document and the mitigation plan.

2. *Locate buildings and structures in a manner that preserves the habitat or minimizes adverse impact.*

   No permanent buildings are proposed within the shoreline buffer or shoreline jurisdiction of the Cowlitz River. The proposed outfall structure will be located landward of the OHWM and will be limited to 108 square feet of permanent impacts. Both permanent and temporary impacts associated with the outfall installation will be fully mitigated onsite through enhancement and restoration to maintain existing habitat quality. Mitigation measures will also focus on enhancing the ecological function of the area, preserving habitat integrity while contributing to overall ecological improvement.

3. *Consolidate habitat and vegetated open space in contiguous blocks, and where possible locate habitat contiguous to other habitat, open space or landscaped areas to contribute to a continuous system or corridor that provides connections to adjacent habitat areas.*

   All proposed impacts within the shoreline buffer and shoreline jurisdiction of the Cowlitz River will be fully mitigated, restored, or enhanced, with no access-related disturbance to critical areas. This approach will ensure the continuity and integrity of the habitat, preserving essential ecological functions.

4. *Use native species in any landscaping of disturbed or undeveloped areas and in any enhancement of habitat or buffers. Emphasize diversity in selection of plant materials and structure of landscaping.*

   Mitigation plantings and upland seed mix proposed for critical habitats onsite will consist of native species tailored to the specific hydrological regime of the area.

5. *Remove and/or control any noxious or undesirable species of plants as identified by the Cowlitz County weed control board.*

A mitigation and monitoring plan will be implemented to identify, remove, and control non-native, invasive species excluding reed canarygrass as designated by the Cowlitz County weed control board. Regular monitoring will be conducted to assess the effectiveness of these measures and address any resurgence of problematic species. See the section titled *Goals, Objectives, and Performance Standards* for specific information regarding noxious species.

6. *Demonstrate how existing trees will be preserved, preferably in groves.*

   Only three trees are proposed to be removed within the shoreline buffer of the Cowlitz River. The removal of these trees will be mitigated within the shoreline buffer of the Cowlitz River at a 4:1 stem count ratio.

7. *Preserve and introduce native plant species which serve as a food source for wildlife; provide shelter from climatic extremes and predators; provide structure and cover for reproduction and rearing of young.*

   The proposed mitigation trees and shrubs are known to produce cones, fruits, and leaves that serve as a food source for various wildlife species, including birds and insects. The trees and shrubs will provide dense growth for habitat and the large woody material placed throughout the mitigation area will provide nesting opportunities. The proposed native trees, shrubs, and herbaceous species will create a multi-layered canopy that provides various microhabitats to support species through their lifecycle.

8. *Preserve the natural hydraulic and ecological functions of drainage systems.*

   The proposed stormwater outfall system will be installed landward of the OHWM of the Cowlitz River to preserve the natural hydraulic and ecological functions of the drainage system. Runoff from upslope areas will be managed by regulating flow through native vegetation in the enhancement and restoration area, Area 1, which will allow for infiltration into the uplands of the shoreline buffer. This process will help prevent excessive erosion and sedimentation from entering the Cowlitz River. Upland infiltration of stormwater runoff will capture sediments, nutrients, and pollutants, supporting water quality and recharging groundwater.

9. *Preserve critical fish and wildlife habitat areas through maintenance of stable channels, adequate low flows, management of stormwater runoff, erosion, and sedimentation.*

   The project will preserve critical fish and wildlife habitats by maintaining stable channels, managing stormwater runoff, and minimizing erosion and sedimentation. Geotextile fabric and large woody material placed in the enhancement and restoration area will stabilize the bank and create habitat complexity, benefiting fish and other aquatic species. Native vegetation will further aid in filtering runoff and reducing sediment flow into the Cowlitz River, supporting habitat health.

10. *Manage access to critical fish and wildlife habitat areas to protect species which are sensitive to human disturbance.*

    Access to critical fish and wildlife habitat areas will be managed to protect species sensitive to human disturbance. Signage will be installed along the boundary of Area 1 and Area 3 to reduce access to the mitigation area and minimize human impact to critical fish and wildlife habitat areas (Figure 7).

11. *Maintain or enhance water quality through control of runoff and use of best management practices.*

Water quality will be maintained and enhanced by minimizing the removal of trees within the shoreline buffer of the Cowlitz River and mitigating onsite within the shoreline buffer of the Cowlitz River at a 4:1 stem count ratio. The project heavily focuses on removing all non-native, invasive species excluding reed canarygrass. Mitigation and enhancement plantings, all located landward of the OHWM of the Cowlitz River, will help reduce erosion and prevent sediment from entering the river. No fill will be placed below the OHWM. Additionally, biodegradable erosion control jute matting and willow cuttings in the enhancement and restoration area will reduce erosion and filter runoff, promoting infiltration within the upland riparian habitat. Mitigation proposed will result in no net loss of ecological functions provided by shoreline buffer, as well as within shoreline jurisdiction of the Cowlitz River.

ONSITE ENHANCEMENT AND RESTORATION PLAN

To determine how mitigation measures should be applied to ensure no net loss of ecological function, ELS biologists first considered the location of impact should be at least functionally equivalent to the location where mitigation takes place. The goal of onsite mitigation is to result in an overall lift of ecological function when compared to existing riparian and shoreline habitat functions. Proposed project impacts are from permanent and temporary loss of habitat due to removing native vegetation. A total of 0.002 acres (108 square feet) of permanent impacts and 0.271 acres (9,444 square feet) of temporary impacts to the shoreline buffer landward of the OHWM of the Cowlitz River are proposed. Additionally, 0.014 acres (629 square feet) of temporary impacts to shoreline jurisdiction of the Cowlitz River is proposed. Temporary impacts are due to trenching and grading for the installation of a stormwater conveyance system and permanent impacts result from the installation of a gabion wall for the outfall. These shoreline vegetation impacts include the permanent and temporary loss of habitat availability within the shoreline buffer and shoreline jurisdiction. All permanent and temporary impacts will be mitigated onsite through removal of non-native, invasive species, excluding reed canarygrass, placing large woody material within the project area, planting native trees and shrubs, and seeding all proposed mitigation areas to provide no net loss of ecological function. Table 4 summarizes proposed project impacts, and Table 5 summarizes proposed onsite mitigation through restoration and enhancement.

Table 4.Summary of Shoreline Buffer and Shoreline Jurisdiction Impacts to the Cowlitz River

Shoreline Buffer Impacts		
Habitat Area	**Proposed Impact**	**Size of Impact**
Shoreline Buffer (Cowlitz River RHA)	Permanent	0.002 ac. (108 sq. ft.)
	Temporary	0.217 ac (9,444 sq. ft.)
Shoreline Jurisdiction impacts		
Habitat Area	**Proposed Impact**	**Size of Impact**
Shoreline Jurisdiction (Cowlitz River)	Temporary	0.014 ac. (629 sq. ft.)

Table 5. Onsite Restoration and Enhancement Summary

Impact Area	Impact Amount	Proposed Impact Type and Area	Proposed Mitigation	Mitigation Ratio	Total Mitigation Proposed	Total Enhancement per Area
Shoreline Buffer	0.002 ac. (108 sq. ft.)	Permanent Impacts (Area 1)	Restore & Enhance	2:1	0.050 ac. (216 sq. ft.)	**Area 1** 0.172 ac. (7,487 sq. ft.)
	0.217 ac. (9,444 sq. ft.)	Temporary Impacts (Area 2)	Restore & Enhance	1:1	0.217 ac. (9,444 sq. ft.)	**Area 2** 0.050 ac. (2,173 sq. ft.)
	3 Black Cottonwood Trees	Permanent Vegetation Impacts (Area 1)	Stem Replacement & Enhance	4.67:1 Stem Replacement	0.032 ac. (1,400 sq. ft.)	**Area 3** 0.032 ac. (1,400 sq. ft.)
Shorelines Jurisdiction (outside of buffer)	0.014 ac. 629 sq. ft.	Temporary Impacts	Restore & Enhance	1:1	0.014ac. (629 sq. ft.)	**Shoreline Jurisdiction** 0.014 ac. (629 sq. ft.)
					Total Onsite Mitigation and Restoration:	**0.268 ac. (11,689 sq. ft.)**

SHORELINE BUFFER MITIGATION (AREA 1)

Permanent impacts to the shoreline buffer of the Cowlitz River due to the installation of a gabion wall for the stormwater outfall conveyance system are proposed to be mitigated at a 2:1 ratio and temporary impacts to the shoreline buffer of the Cowlitz River due to grading within Area 1 are proposed to be mitigated at a 1:1 ratio. Mitigation will include removal of all non-native, invasive species, excluding reed canarygrass, installation of biodegradable erosion control jute matting, placement of large woody material as habitat structures, installation of shrubs, seeding with a native upland seed mix, and mulching Area 1 with certified weed-free straw. Permanent and temporary shoreline buffer impacts due to the installation of the gabion wall will occur where vegetation almost completely consists of non-native, invasive species. Existing functions in Area 1 are reduced because of the presence of scotch broom and Himalayan blackberry. For this reason, mitigation will create a native vegetated area resulting in a lift of ecological functions in the shoreline buffer. Mitigation plantings will promote infiltration to remove pollutants in surface runoff, and protective signage will deter human access to critical shoreline habitat. Habitat

features including at least two logs and five rootwads will be installed in Area 1 to provide valuable wildlife habitat for birds and small mammals for nesting and roosting. Dense shoreline plantings in Area 1 will result in a functional lift of ecological functions through slowing surface runoff and promoting infiltration and establishing a native seed source that can spread throughout shoreline and riparian habitat areas.

Prior to installation of mitigation plantings, all non-native, invasive species, excluding reed canarygrass will be removed and compacted soils in Area 1 will be ripped or tilled to allow plants to better establish root systems, and biodegradable jute erosion control matting and habitat features including downed logs and rootwads will be placed within Area 1. Table 5 details mitigation ratios and Table 6 details shrub and seed specifications for Area 1.

Table 6.Planting Specifications and Native Upland Seed Mixture (Area 1)

Shoreline Buffer Planting Area 1-Mitigation of 0.172-acres/7,487 square feet			
Species	**Spacing** (on-center)	**Stock**	**Quantity**
Shrubs			
Scouler's willow (*Salix scouleriana*, FAC)	4-feet	Cutting Stock	200
Dune willow (*Salix hookeriana*, FACW)			135
Sitka willow (*Salix sitchensis*, FACW)			135
		Total	**470**

Shoreline Buffer Planting Area 1-Mitigation of 0.172-acres/7,487 square feet			
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus			
Species	**Composition**	**Rate**	**Quantity**
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 7.5 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus,* FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

HABITAT FEATURES (AREA 1)

Prior to installing plants, habitat features including downed logs and rootwads will be placed within Area 1 (Figure 7). These features will be a maximum of 20 feet apart, and a minimum of two logs with attached rootwads and five rootwads will be placed within Area 1. Actual locations will be determined in the field with consideration to the listed spacing and density to produce the most natural appearance possible. All rootwads will be a minimum of 6 feet in diameter and will be placed on its side so lateral roots can provide habitat and roosting opportunities for birds. Downed logs with rootwads will be a minimum of 20 feet long and will have a minimum diameter of 20-inches at the small end with branches retained as much as possible. Downed logs will be placed so they do not roll downhill towards the public or the Cowlitz River. Specifications for habitat features within Area 1 are detailed in Table 7.

Table 7.Habitat Feature Specifications (Area 1)

Habitat Feature Type	Specifications	Location	Quantity to be Installed
Rootwads	>6' in diameter Clean roots of soils prior to transportation Retain lateral roots as much as possible Place on its side so roots can provide perching	Along the waterward side of the proposed gabion wall (Area 1)	Minimum of 5
Downed Logs with Rootwads	20" in diameter on the small end >20 feet in length Retain branches as much as possible Place logs so they do not roll downhill towards the river		Minimum of 2

SHORELINE BUFFER RESTORATION (AREA 2)

Area 2 as shown on Figure 7 is also within the shoreline buffer of the Cowlitz River. Only temporary impacts to herbaceous vegetation are proposed within Area 2 to accommodate grading and the installation of stormwater outfall piping. Restoration within Area 2 will be restored at a 1:1 ratio by removing non-native, invasive species, excluding reed canarygrass prior to construction. Post construction mitigation will include seeding with a native upland seed mix and mulching with a certified weed-free straw. Existing functions in Area 2 are reduced because of the presence of scotch broom and Himalayan blackberry. For this reason, restoration will create a native vegetated area that will result in a lift of ecological functions in the shoreline buffer. All restoration specifications for Area 2 are detailed in Table 5 and specifications for native upland seed mix are detailed in Table 8.

Table 8.Native Upland Seed Mixture (Area 2)

Shoreline Buffer Planting Area 2- Mitigation of 0.050-acres/2,173 square feet			
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus			
Species	**Composition**	**Rate**	**Quantity**
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 2.2 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus,* FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

SHORELINE BUFFER MITIGATION (AREA 3)

Permanent impacts due to tree removal within the shoreline buffer of the Cowlitz River will be mitigated within Area 3 (Figure 7). Mitigation in Area 3 includes removing non-native, invasive vegetation, excluding reed canarygrass, planting native trees at a 4.67:1 stem replacement ratio, seeding with a native upland seed mix and mulching Area 3 with certified weed-free straw. Mitigation within Area 3 will compensate for the removal of three native black cottonwood (*Populus trichocarpa*) trees in Area 1, which is necessary for grading and installation of the proposed stormwater outfall conveyance system. Removing invasive species and establishing native vegetation will improve ecological functions, including pollutant removal, reducing human disturbance, slowing surface runoff, promoting infiltration, and providing a native seed source that can spread throughout the shoreline buffer.

Prior to installation of mitigation plantings, all non-native, invasive vegetation, excluding reed canarygrass will be removed and compacted soils in Area 3 will be ripped or tilled to allow plants to better establish root systems. All mitigation specifications for Area 3 are detailed in Table 5 and Table 9 details native tree installation and native upland seed mix specifications for Area 3.

Table 9.Planting Specifications and Native Upland Seed Mixture (Area 3)

Shoreline Buffer Planting Area 3-Mitigation of 0.032-acres/1,400 square feet			
Species	**Spacing** (on-center)	**Stock**	**Quantity**
Trees			
Lodgepole Pine (*Pinus contorta*)	10-feet	1-gallon potted	14

Shoreline Buffer Planting Area 1-Mitigation of 0.172-acres/7,487 square feet			
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus			
Species	**Composition**	**Rate**	**Quantity**
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 1.4 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus,* FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

SHORELINE JURISDICTION OF THE COWLITZ RIVER MITIGATION

All temporary impacts to shoreline jurisdiction of the Cowlitz River are proposed to be mitigated at a 1:1 ratio by removing all removing non-native, invasive vegetation, excluding reed canarygrass prior to construction. Post construction mitigation will include seeding with a native upland seed mix and mulching with a certified weed-free straw over 1,747 square feet of the temporarily impacted shoreline jurisdiction. Existing functions of the impacted area within shoreline jurisdiction of the Cowlitz River outside of the shoreline buffer are minimal due to scotch broom and Himalayan blackberry. The restoration of this area will provide an overall ecological functional lift by eliminating non-native, invasive vegetation, excluding reed canarygrass and restoring the impacted areas with native vegetation providing habitat, and foraging opportunities. All mitigation specifications for shoreline jurisdiction of the Cowlitz River are detailed in Table 5 and Table 10 details native upland seed mix specifications.

Table 10.Native Upland Seed Mixture (Shoreline Jurisdiction of the Cowlitz River)

Shoreline Jurisdiction of the Cowlitz River-Restoration of 0.014-acres/629 square feet			
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus			
Species	**Composition**	**Rate**	**Quantity**
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 0.63 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus,* FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

Specifications for Phase 1a Preparation, Planting, and Maintenance

The following specifications will be used to protect existing critical areas, set boundaries for mitigation, provide direction for installing vegetation and habitat features, and provide maintenance requirements for the 5-year monitoring and maintenance period.

Prepare Mitigation Areas

1. Install appropriate BMPs along the mitigation area boundaries.
2. Stake or flag the mitigation area waterward of shorelines jurisdiction.
3. Install temporary construction fencing along the boundary of the mitigation areas onsite to prevent equipment access.
4. Rip or till soils in planting locations as needed to loosen compact soils in mitigation areas.
5. Remove all non-native, invasive vegetation, excluding reed canarygrass within the proposed mitigation areas.
6. Install riparian bank stabilizing biodegradable jute matting within Area 1.

Install Habitat Features within Area 1

1. Install a minimum of seven pieces of habitat features including downed logs or rootwads according to the specifications in Table 7.
2. Habitat features will be located within Area 1 west of the proposed gabion wall within the shoreline buffer of the Cowlitz River, landward of the OHWM.
3. Place habitat features a maximum of 20 feet apart.
4. Place rootwads on their side.
5. Place downed logs so they will not roll downhill.

Install Cutting Stock in Area 1, Bare root Stock in Area 3, and Native Upland Seed Mixture in all Mitigation Areas

1. Plant native 1-gallon potted trees and cuttings during the late fall to early spring (October-March) at spacing identified in Table 6 and Table 9, respectively.
2. 1-gallon potted trees will be purchased from a native plant nursery.
3. Cuttings will be collected within the Phase 1a boundary, where possible. Any remaining cuttings will be salvaged from local offsite sources or purchased from a native plant nursery. Onsite or local offsite cutting material will be used as much as possible because these plants are best adapted to the local microclimate.
4. Cuttings will be a minimum of 3 feet long and between ¼ to ½ inches in diameter.
5. One-gallon potted trees and cuttings will be protected until installation by being refrigerated, covered in damp burlap, placed in moist sand or peat, or other method of keeping cool and moist.
6. Cuttings will be installed within 1 to 2 days of harvesting.
7. Unused cuttings must be properly stored at the end of each planting day to prevent drying out.
8. Spread appropriate amount of native upland seed mix within all mitigation areas.

9. Install a minimum of 3-inch depth mulch layer within all mitigation areas. The mulch will be comprised of certified weed-free straw. Avoid placing mulch directly against plant stems.
10. Irrigate all newly installed 1-gallon potted trees, cuttings, and seeded areas as the Phase 1a boundary and weather conditions warrant.

Install Habitat Signs

Install durable, enamel coated metal critical area signs at a minimum of 100-foot intervals on metal or wood posts bordering mitigation Area 1 and Area 3.

Maintain Enhancement and Restoration Areas

The planted 1-gallon potted trees and shrub cuttings will be maintained as often as necessary to ensure that the specified performance standards are met. The maintenance includes the following:

1. 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*."
2. Irrigate planted 1-gallon potted trees and shrubs during the dry season for the first 2 to 3 years after planting. Water should be delivered at a minimum rate of 1 gallon every 4 weeks. Adjust as necessary based on site and weather conditions.
3. Remove competing vegetation from around the base of plant species during first 2 to 3 years after planting and as needed thereafter.
4. Replace mulch as needed to suppress competing vegetation.
5. Replace dead or failed 1-gallon potted trees or cuttings to meet the minimum annual performance standards (Table 11). 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:

1. Replant 1-gallon potted trees.
2. Replant shrub cuttings.
3. Implement a fertilizing schedule.
4. Repair damaged limbs or prune dead branches.
5. Substitute the anti-herbivore device, such as painting lower stems with sanded latex paint, or spraying herbivore deterrent.

GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

The goal of this mitigation plan is to establish a multi strata riparian habitat buffer and shoreline vegetation screening to compensate for impacts to the shoreline buffer and to shoreline jurisdiction of the Cowlitz River from grading and installation of a stormwater outfall conveyance system. The proposed mitigation will enhance and restore vegetative structure, habitat, and water quality functions. To accomplish this goal, the following goals, objectives, and performance standards have been established.

NON-NATIVE, INVASIVE SPECIES REMOVAL

Objective 1: Remove all non-native, invasive plants, excluding reed canarygrass within enhancement and restoration areas to improve habitat and ecological function within the shoreline buffer and shoreline jurisdiction of the Cowlitz River.

Performance Standard 1a: Manually or mechanically remove all non-native, invasive plants, excluding reed canarygrass within the enhancement and restoration areas prior to installation of habitat features, plantings, seeding, and mulching. This performance standard is complete when all non-native, invasive plants, excluding reed canarygrass are removed and documented in the as-built report.

Performance Standard 1b: Inspect all mitigation areas and remove all non-native, invasive plants, excluding reed canarygrass. Non-native, invasive plants, excluding reed canarygrass will not exceed 10 percent cover in all mitigation areas for the duration of monitoring. This performance standard is completed when documented in all annual monitoring reports.

HABITAT STRUCTURE

Objective 2: Install habitat features to favor small mammals and birds to improve riparian habitat functions. Habitat features will also deter public presence near active operations.

Performance Standard 2a: A minimum of seven habitat features including rootwads or downed logs will be placed within Area 1. The performance standard is completed when the habitat features are installed and documented in the as-built report.

VEGETATIVE STRUCTURE

Objective 3: Establish a multi strata riparian habitat buffer and shoreline jurisdiction herbaceous vegetation screening to compensate for impacts to the shoreline buffer and to shoreline jurisdiction of the Cowlitz River, and to enhance vegetative structure, habitat, and water quality functions.

Performance Standard 1a: Install all native 1-gallon potted trees, native shrub cuttings, and mulch and seed mitigation areas as described in Tables 6, and 8-10. The performance standard is completed when plants are installed and documented in the as-built report.

Performance Standard 1b: By Year 1, native trees and shrubs will achieve at least 90 percent survival. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1c: By Year 2, native trees and shrubs will achieve at least 80 percent survival. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1d: By Year 3, native trees and shrubs will achieve at least 75 percent survival. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1e: By Year 5, native trees and native shrubs will have a minimum 25 percent cover. Dead plants will be replaced if this performance standard is not met.

Table 11.Performance Standards for Vegetation by Monitoring Year

	Percent Survival and Cover			
	Year 1	**Year 2**	**Year 3**	**Year 5**
Tree & Shrub Strata				
Survival	≥90%	≥80%	≥75%	--
Cover	--	--	--	≥25%
Non-native, invasive vegetation, excluding reed canarygrass				
Cover of non-native, invasive species	<10%	<10%	<10%	<10%

LONG-TERM SITE PROTECTION

Objective 4: Establish long term protection mechanism for Area 1 and Area 3.

Performance Standard 4a: Record a conservation covenant with the City of Castle Rock protecting Area 1 and Area 3 in perpetuity. This performance standard will be met when a conversation covenant is recorded at the city and a copy is included in the as-built report.

Performance Standard 4b: Critical areas signage with verbiage approved by the responsible official made of enamel coated metal attached to a durable metal or wood posts shall be installed at a maximum of 100 feet apart along the perimeter Area 1 and Area 3. Signage shall be maintained in perpetuity. This performance standard will be met when all installed signs are documented in the final monitoring report. Additional signage may be required during additional development phases.

MONITORING, MAINTENANCE, AND CONTINGENCY METHODS

The shoreline buffer and shoreline jurisdiction mitigation areas will be monitored for a five-year period following project construction in Year 0 (as-built), 1, 2, 3, and 5. Monitoring reports will

be submitted to the City of Castle Rock by December 31st of each monitoring year. The goal of monitoring is to determine if previously stated performance standards are being met. All mitigation areas will be monitored once during the growing season, preferably during the same two-week period each year to better compare data.

Monitoring of the mitigation areas will follow the requirements of established performance standards. Monitoring plots will be established within the shoreline buffer and shoreline jurisdiction of the Cowlitz River. A minimum of four monitoring plots will be established to document if the Phase 1a boundary is meeting performance standards. At least one photostation will be established per monitoring plot to document changes over time. Additional photostations may be established outside of monitoring plots as needed. Photostations and monitoring plot locations will be established in the as-built report.

MONITORING PLOTS

During the first annual monitoring event, a minimum of four monitoring plots will be established, with at least two monitoring plots in Area 1 and two monitoring plots within Area 3. The monitoring plots will be staked with metal t-posts and identification tags. Their locations will be identified by GPS and placed on an as-built Phase 1a boundary map that will accompany the monitoring reports. Permanent photo points will be established at each monitoring plot and directions documented on Phase 1a boundary map.

Vegetation

To assess the status of the vegetation within the mitigation areas, the vegetation monitoring will measure the following:

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

Fauna

To assess the development of wildlife habitat within shoreline jurisdiction, wildlife monitoring will document the following regarding use of the downed logs or rootwads, and overall plant condition:

- Insect use
- Amphibian/reptile use
- Bird use
- Mammal use

- Level of herbivory

Soils and Hydrology

If the planted species show poor or failed growth, soil moisture and soil nutrients may also be monitored during the growing season. If necessary, soil moisture will be monitored monthly during the growing season and soil nutrients will be assessed annually during the growing season. Corrective actions will be taken as appropriate based on the soil moisture and soil nutrient data. These actions include, but are not limited to, a revised irrigation schedule and a fertilization schedule.

At minimum the following items will be included in annual monitoring reports:

- Location, map, and as-built drawing including any changes.
- Historic description of the project, including dates of plant installation, current year of monitoring, and remedial actions taken (if necessary).
- Description of monitoring methods.
- Documentation of vegetative performance standards and overall development.
- Assessment of non-native, invasive species, excluding reed canarygrass and recommendations for continued management.
- Photographs from established photostations.
- Observations of wildlife including amphibians, invertebrates, reptiles, birds, and mammals. If photographs are taken, they will be included.
- Summary of maintenance and contingency measures completed for the past year and proposed for the next year.

MAINTENANCE

Maintenance will occur during the growing season and will include the following:

- Irrigating mitigation areas as needed during the dry season for the first three years. Taper watering in Years 2-3.
- Remove competing non-native, invasive species excluding reed canarygrass as needed within a 3-foot radius of planted species, re-apply mulch as needed.
- Replace dead or failed plants as described for the original installation to meet the minimum performance standards.

CONTINGENCY MEASURES

If performance standards are not met by Year 5, steps will be taken to correct the situation in a timely manner. The following steps will be implemented when an area is identified as failing or potentially failing:

- Identify the cause(s) of failure or potential failure.
- Identify the extent of failure of potential failure.
- Implement corrective actions such as irrigating, fertilizing, or replanting.
- Document activities and include this data in annual monitoring reports.

- If routine corrective action will not correct the problem, immediately consult with the appropriate agencies.
- Evaluate recommendations from resource agency staff and implement recommendations in a timely manner.

Funding for corrective actions will be the responsibility of the applicant.

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.

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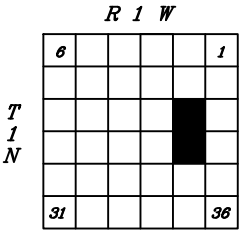
FIGURES

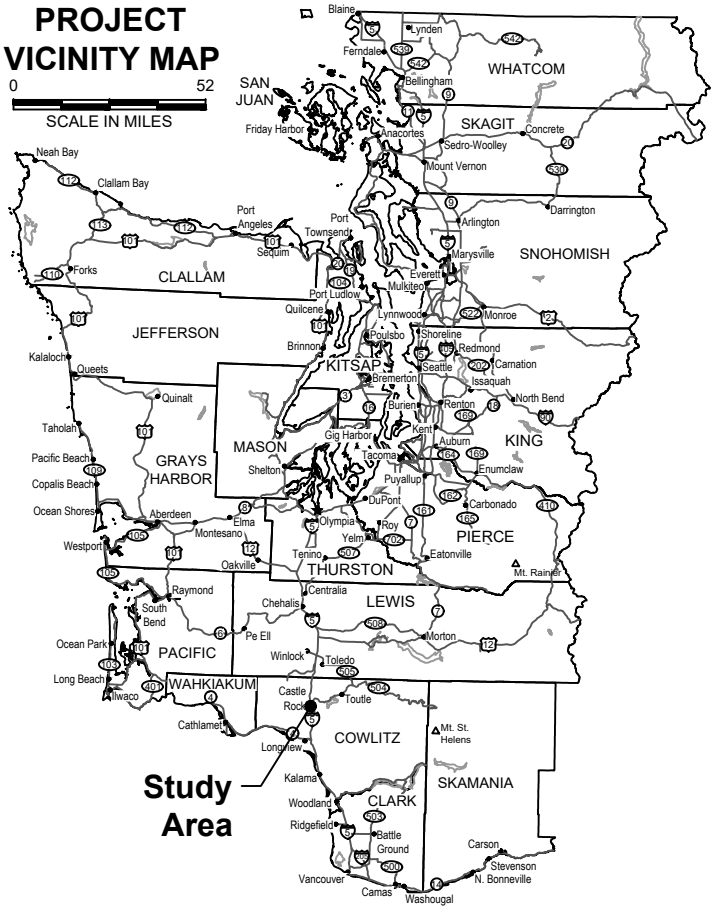
WASHINGTON

Latitude: 46.2552°
Longitude: -122.8900°

LOCATION MAP



PROJECT VICINITY MAP



NOTE:
Quadrangle topographic map from USGS.

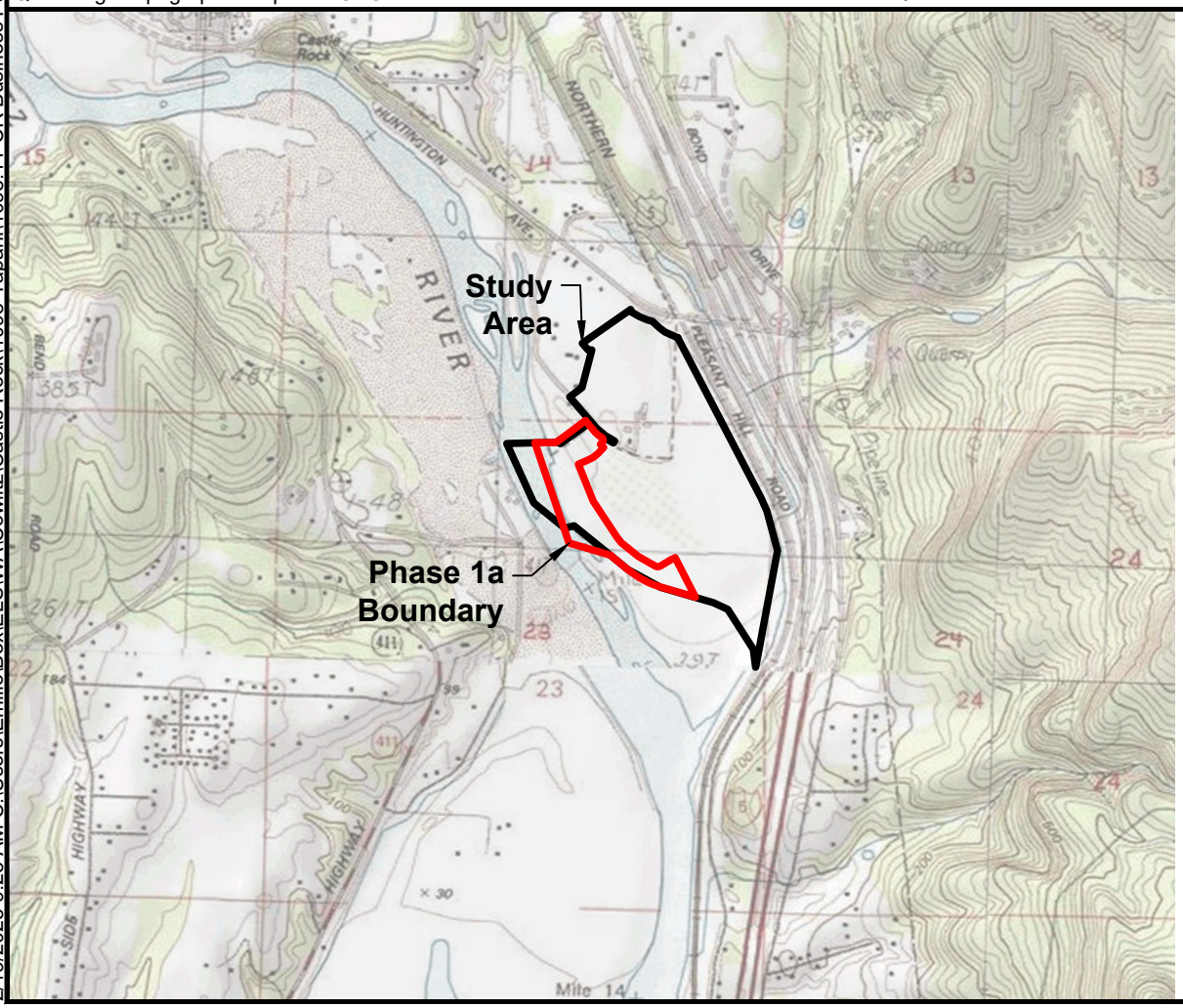


Figure 1
VICINITY MAP
Castle Rock Buisness Park Permitting Outfall
CT6, LLC
Castle Rock, Cowlitz County, WA
Section 14,23, Township 9N, Range 2W, W.M.

DATE: 2/19/25
DWN: EF
REQ. BY: EV
PRJ. MGR: EV
CHK: GB
PROJECT NO: 1098.11

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
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Ecological Land Services

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Parcel #: 30813

Parcel #: 30812

Parcel #: 6143802

Parcel #: 30864

Larson Ln SW

Ditch #4

Ditch #1

Ditch #1A

Ditch #3

Wetland B
Depressional
Category III
Emergent
Seasonally Flooded
Saturated Only
(0.13 ac./5,717 sq. ft.)

150'

200'

45'

40'

50'

40'

Cowlitz River
(Type S)

TP-2
TP-5
TP-15
TP-16
TP-17
TP-18
TP-19
TP-20
TP-21
TP-22
TP-23
TP-24
TP-29
TP-30
TP-31
TP-12
TP-13
TP-14

LEGEND:

- Study Area
- Phase 1a Boundary (18.31 ac.)
- Parcel Boundary
- Wetland Boundary
- Wetland Buffer
- Ditch with Flow Direction
- OHWM
- 150' Shoreline Buffer
- Shoreline Jurisdiction
- FEMA Floodway
- 100-Year Floodplain
- Existing Gravel Road
- TP-1 Test Plot Location
- 5' Contours
- Tree (3)

NOTE(S):

1. Aerial from Google Earth™.
2. Wetlands and test plots were mapped by an ELS biologist using a hand-held GPS unit with submeter accuracy.
3. OHWM and contours were surveyed by MacKay and Sposito.
4. Trees were surveyed by Tapani.

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Figure 2
EXISTING CONDITIONS
Castle Rock Buisness Park Permitting Outfall
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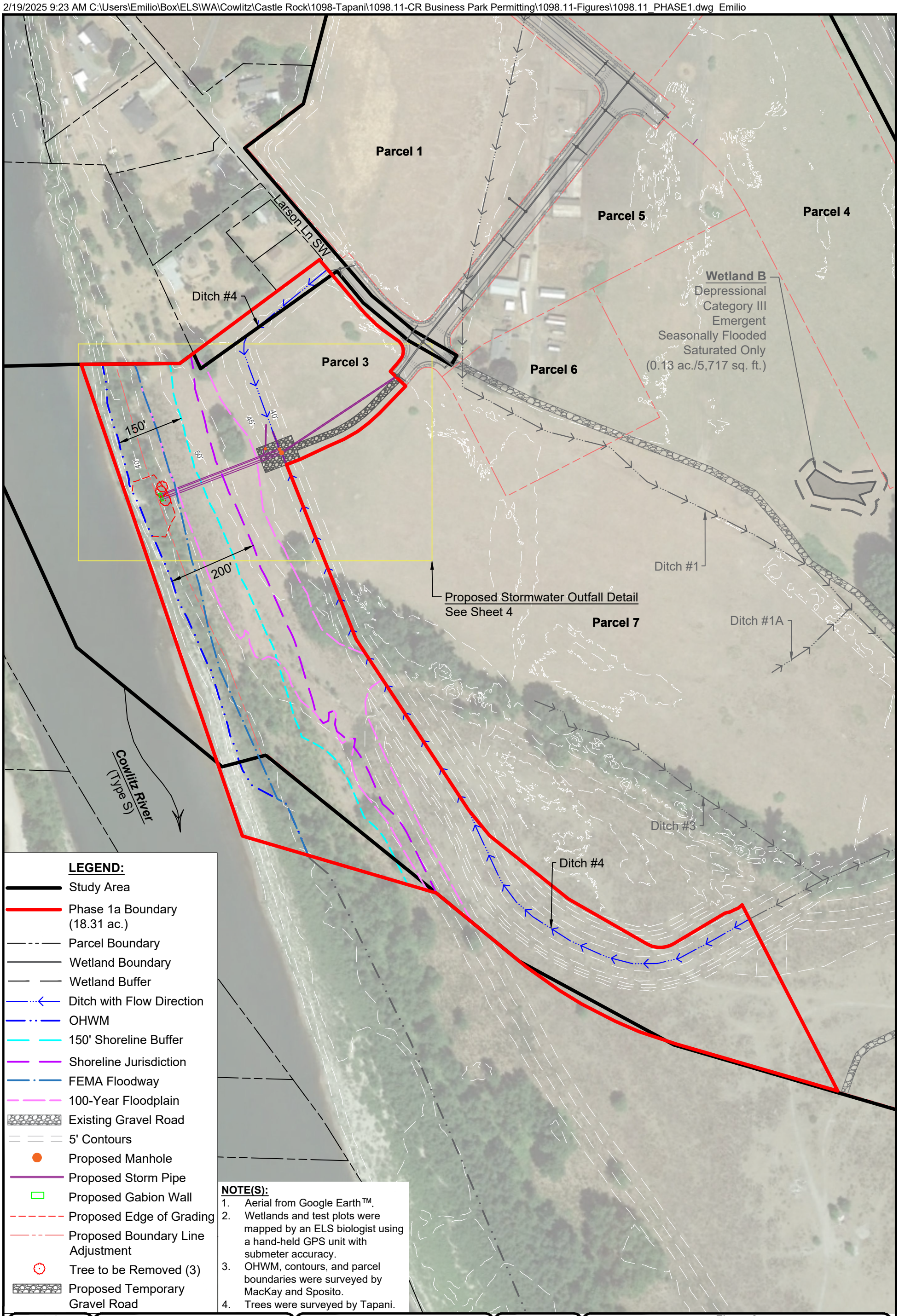

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Figure 3
PROPOSED CONDITIONS OVERVIEW
Castle Rock Buisness Park Permitting Outfall
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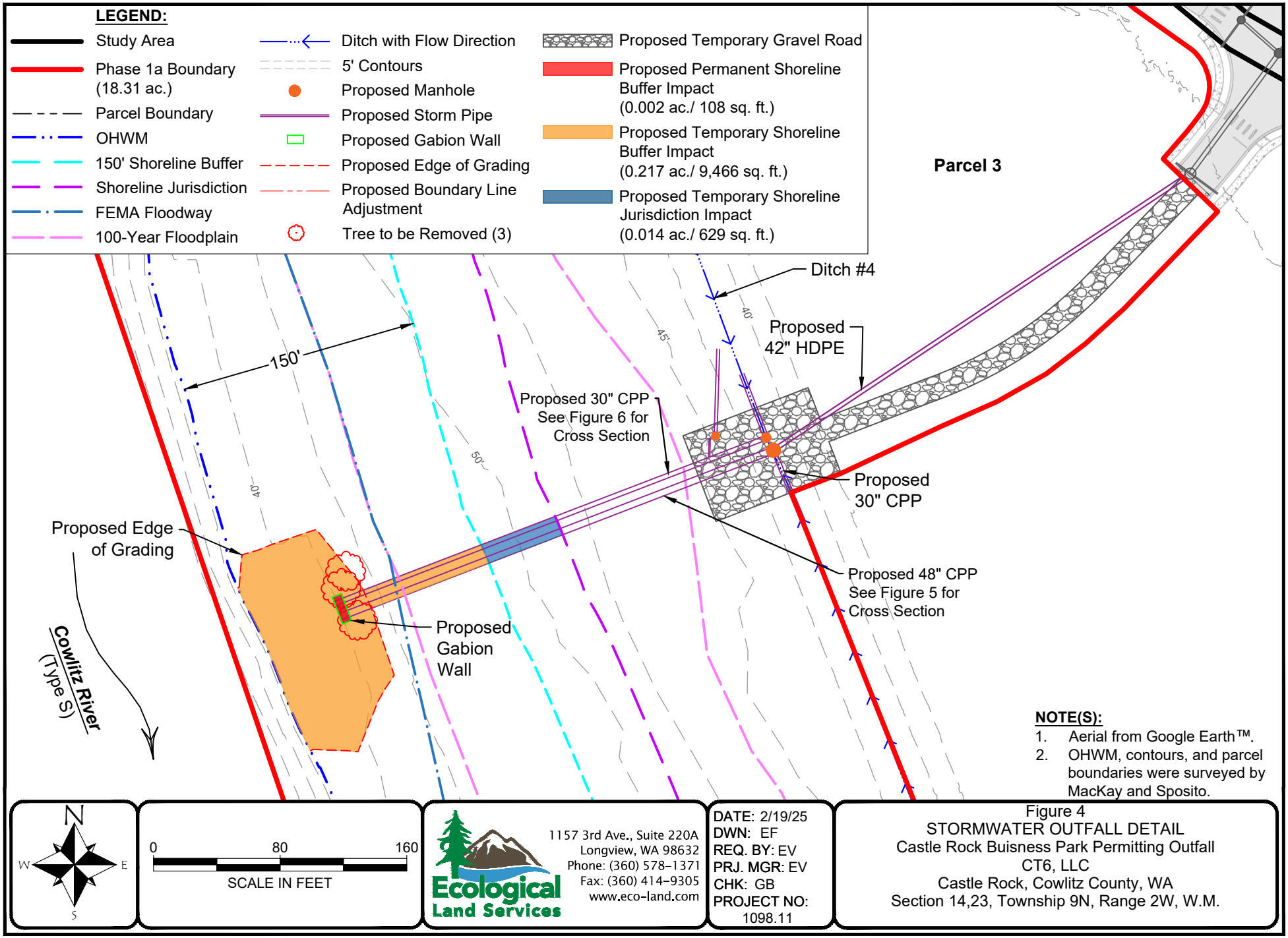

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Figure 4
STORMWATER OUTFALL DETAIL
Castle Rock Buisness Park Permitting Outfall
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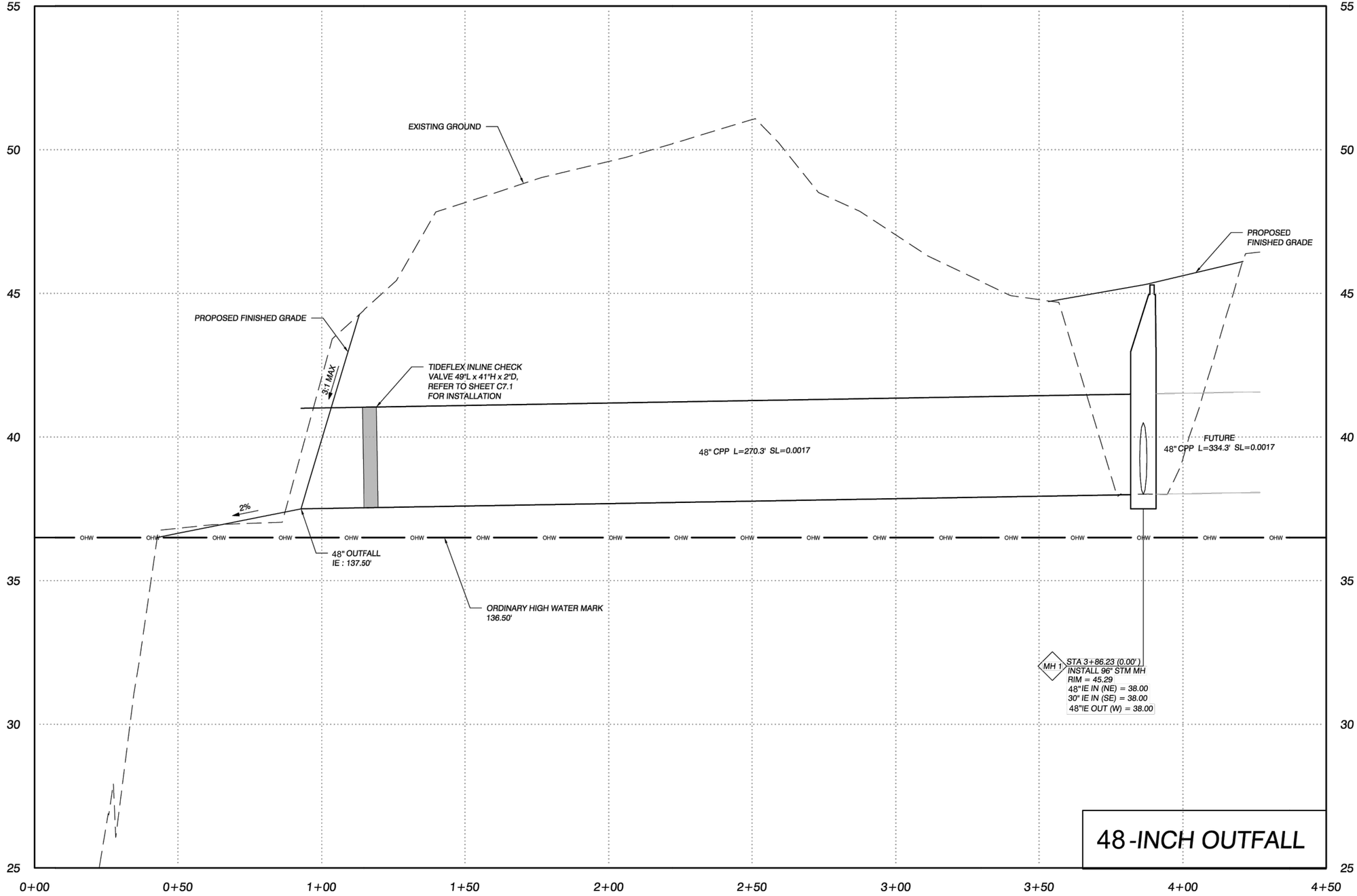

48 -INCH STORMWATER OUTFALL PROFILE

Figure 5
48 INCH STORMWATER OUTFALL - CROSS SECTION
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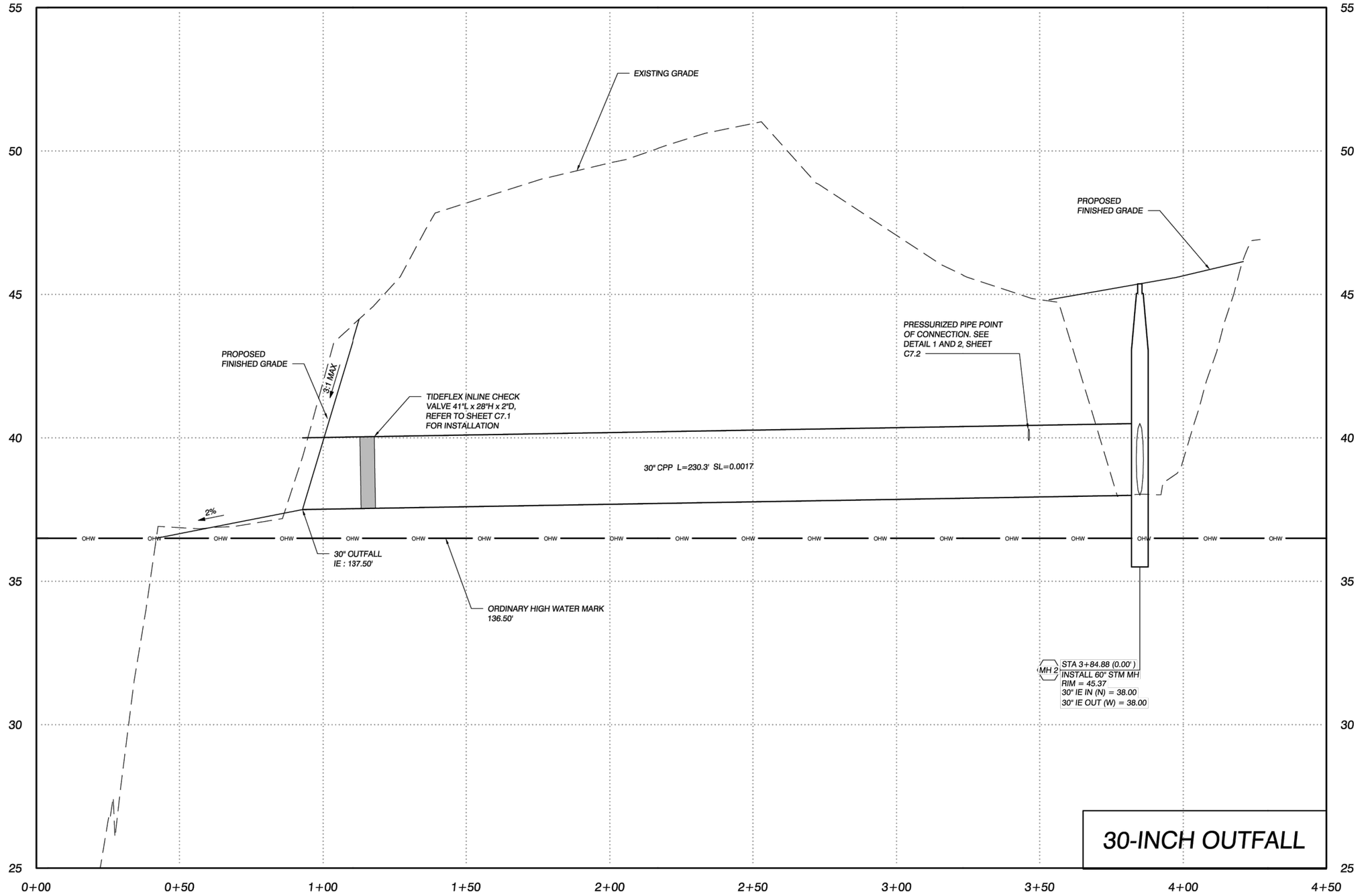

30-INCH STORMWATER OUTFALL PROFILE

Figure 6
30 INCH STORMWATER OUTFALL - CROSS SECTION
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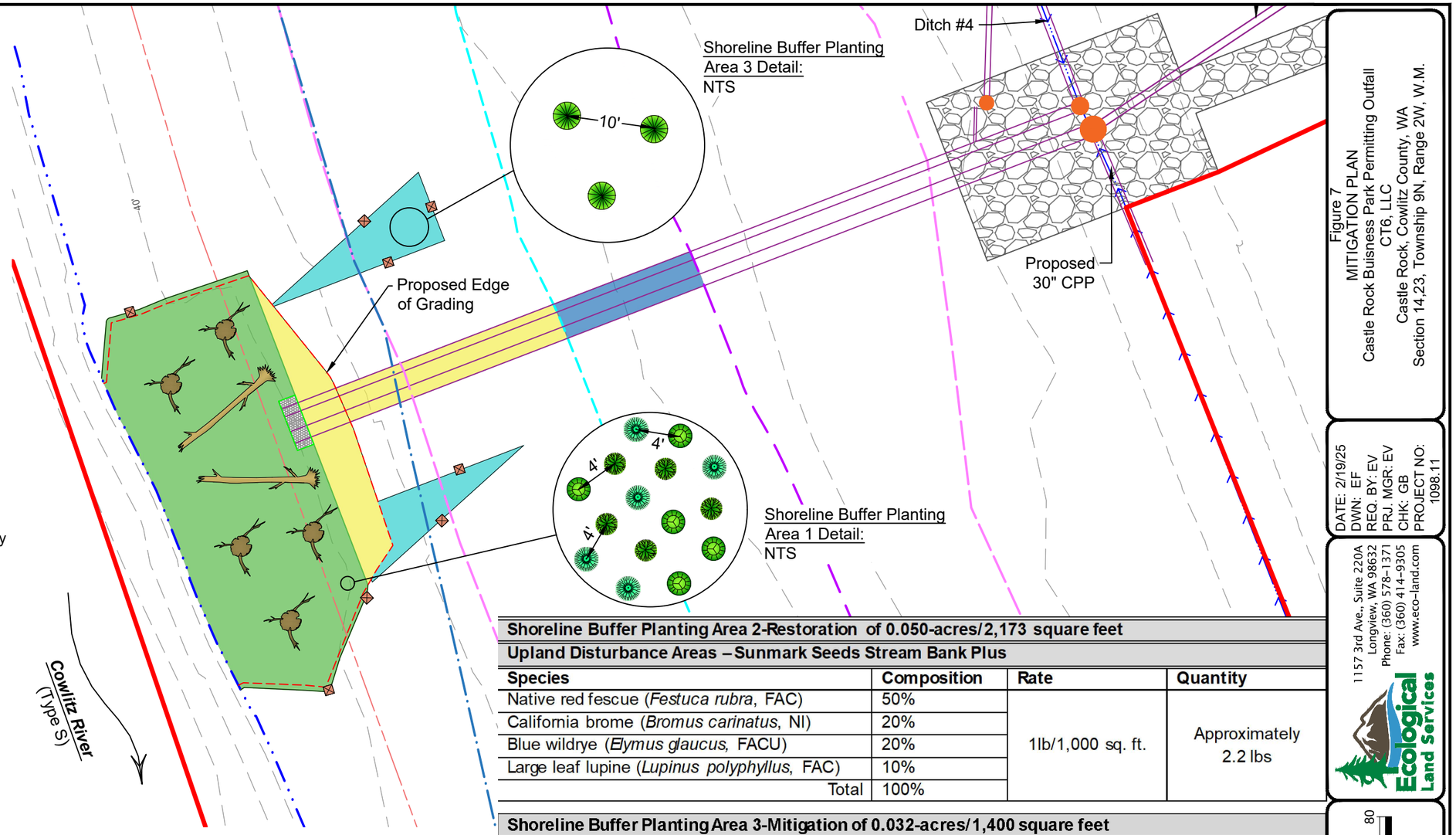
LEGEND:

- Phase 1a Boundary (18.31 ac.)
- Parcel Boundary
- OHWM
- 150' Shoreline Buffer
- Shoreline Jurisdiction
- FEMA Floodway
- 100-Year Floodplain
- Ditch with Flow Direction
- 5' Contours
- Proposed Manhole
- Proposed Storm Pipe
- Proposed Gabion Wall
- Proposed Edge of Grading
- Proposed Boundary Line Adjustment
- Proposed Temporary Gravel Road
- Shoreline Buffer Planting Area 1 (0.172 ac./7,487 sq. ft.)
- Shoreline Buffer Planting Area 2 - Seeded Only (0.050 ac./2,195 sq. ft.)
- Shoreline Buffer Planting Area 3 (0.032 ac./1,400 sq. ft.)
- Shoreline Jurisdiction Planting Area - Seeded Only (0.014 ac./629 sq. ft.)
- Proposed Rootwad (5)
- Proposed Rootwad Log (2)
- Mitigation Area Signage

NOTE(S):

1. Aerial from Google Earth™.
2. OHWM, contours, and parcel boundaries were surveyed by MacKay and Sposito.
3. Mitigation areas will have biodegrable jute erosion fabric anchored down by proposed willow stakes and large rootwads.
4. Plants, rootwads, and rootwad logs are not to scale and locations are approximate as shown. Actual locations will be determined in the field, with consideration to the listed spacing and density to produce the most natural appearance possible.



Shoreline Buffer Planting Area 1-Mitigation of 0.172-acres/7,487 square feet

Species	Spacing (on-center)	Stock	Quantity
Shrubs			
Scouler's willow (*Salix scouleriana*, FAC)	4-feet	cutting	200
Dune willow (*Salix hookeriana*, FACW)			135
Sitka willow (*Salix sitchensis*, FACW)			135
		Total	**470**

Shoreline Buffer Planting Area 1-Mitigation of 0.172-acres/7,487 square feet
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus

Species	Composition	Rate	Quantity
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 7.5 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus*, FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

Shoreline Buffer Planting Area 2-Restoration of 0.050-acres/2,173 square feet
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus

Species	Composition	Rate	Quantity
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 2.2 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus*, FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

Shoreline Buffer Planting Area 3-Mitigation of 0.032-acres/1,400 square feet

Species	Spacing (on-center)	Stock	Quantity
Trees			
Lodgepole Pine (*Pinus contorta*, FAC)	10-feet	1-gallon potted	14
		Total	**14**

Shoreline Buffer Planting Area 3-Mitigation of 0.032-acres/1,400 square feet
Upland Disturbance Areas – Sunmark Seeds Stream Bank Plus

Species	Composition	Rate	Quantity
Native red fescue (*Festuca rubra*, FAC)	50%	1lb/1,000 sq. ft.	Approximately 1.4 lbs
California brome (*Bromus carinatus*, NI)	20%		
Blue wildrye (*Elymus glaucus*, FACU)	20%		
Large leaf lupine (*Lupinus polyphyllus*, FAC)	10%		
Total	100%		

Figure 7
MITIGATION PLAN
Castle Rock Buisness Park Permitting Outfall
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