CENWS-PM-PL-ER May 7, 2010

FINDING OF NO SIGNIFICANT IMPACT
and
404 (b) (1) DETERMINATION

UPPER SPRINGBROOK CREEK
CHANNEL REALIGNMENT AND REHABILITATION

1. Background.

a. Purpose.

The current habitat quality of this section of Upper Springbrook Creek is highly degraded. In this reach, the creek is located less than 10 feet from the roadside, and the only vegetative cover consists of dense stands of Japanese knotweed and Himalayan blackberry. Coho salmon (*Oncorhynchus kisutch*) utilize this stream for spawning, rearing, foraging, and as refuge habitat. However, during high flow events, the straight, wood devoid channel provides little refugia, allowing for the potential of juvenile fish to be flushed further downstream. This lack of channel complexity reduces the stream's ability to provide suitable habitat for fish and wildlife.

b. Authority.

Section 306 of the WRDA of 1990 authorized the Secretary of the Army to include environmental protection as one of the primary missions of the Corps. Authorization for the Green/Duwamish River Basin Ecosystem Restoration Project, General Investigation (GI) study was authorized under Section 209 of Public Law 87-874, Puget Sound and Adjacent Waters. Congress specifically authorized the Green/Duwamish River Basin Ecosystem Restoration Project (ERP) in Section 101(b)(26) of WRDA 2000. This project is a separable element of the Green/Duwamish ERP. The Green/Duwamish ERP gained construction New Start capability in the Water and Energy Act of 2003.

2. Proposed Action.

The Corps is proposing to relocate and meander approximately 900 feet of Upper Springbrook Creek through a 100 foot easement located in a forested corridor to the north. The new channel alignment will require the excavation of 1077 cubic yards of material. Large woody debris and 525 cubic yards of spawning gravel will be placed in the new channel to enhance in-stream habitat quality. In addition, the existing 30-inch diameter corrugated steel culvert that runs underneath South 55th Street at the east end of the project would be replaced with a 46 foot long, 10 foot wide, 4 foot high box culvert that meets the requirement of the Washington Department of Fish and Wildlife (WDFW) Design of Road Culverts for Fish Passage.

3. Summary of Impacts and Compliance. Unavoidable adverse effects associated with this project are expected to include minor temporary increases in turbidity in the creek, temporary noise and increased traffic effects, a temporary reduction in aesthetic value during construction, and the excavation of 0.19 acres of forested wetlands. However, the

project will result in a net gain in aquatic habitat function and value due to the following: 1) Moving the stream away from the road and its associated run-off will decrease the amount of pollutants entering the stream and the overall "flashiness" of flow, 2) Creating meanders and placing large woody debris will promote pool-riffle structure and in-stream microhabitat for aquatic life as well as slow down water during higher flows, 3) Placing gravel creates habitat suitable for benthic invertebrate colonization and salmonid spawning, 4) Providing fish passage allows salmonids to access higher value upstream habitat, 6) Removing invasive vegetation from the project site, and planting native vegetation along the stream, in areas of disturbance, and in the decommissioned channel enhances riparian and wetland functions.

The Corps finds this projects is "not likely to adversely affect" federally listed species or critical habitat under the Endangered Species Act. Concurrence was received from National Marine Fisheries Service (NMFS) on 10 April 2001 and United Stated Fish and Wildlife Service (USFWS) on 27 March 2001. This project complies with Section 404 of the Clean Water Act. The Corps has prepared a 404(b)(1) Analysis, included as an attachment to the draft EA (Appendix E). On 28 April 2010 the project received a 401 water quality certification and a Coastal Zone Consistency Determination from the Washington Department of Ecology (WDOE). On 3 May 2010 the project received concurrence with a finding of "No historic properties affected" from the State Historic Preservation Officer (SHPO), contingent on monitoring of project construction by a professional archaeologist. Impacts to water quality, aesthetics, traffic flow, and noise will generally be highly localized and short in duration.

Avoidance measures and reduction of impacts will take the form of on-site biological and archeological monitoring, the implementation of best management practices (BMPs) during construction, and scheduling to avoid potential impacts to fish and wildlife species.

4. Finding.
Based on the attached environmental documentation, coordination, and analysis conducted by the Corps environmental staff, I have determined that this project, given the long term net gain in habitat value and function, will not result in significant adverse environmental impacts. The proposed action is not a major federal action significantly affecting the quality of the human environment, and therefore does not require preparation of an environmental impact statement.

14 May 2010
Date

Anthony O. Wright
Colonel, Corps of Engineers
District Engineer

Final Environmental Assessment

Upper Springbrook Creek
Channel Realignment and Rehabilitation

A Separable Element of the
Green-Duwamish General Investigation
Ecosystem Restoration Project

Renton, WA

May 2010

US Army Corps
of Engineers®
Seattle District

Upper Springbrook Creek
Channel Realignment and Rehabilitation

Final Environmental Assessment
May 2010

Responsible Agencies: The agencies responsible for this project are the U.S. Army Corps of Engineers, Seattle District (Corps), and the City of Renton.

Summary: Upper Springbrook Creek currently flows through a roadside ditch overgrown with invasive weeds that parallels the north side of South 55th Street for approximately 900 feet before it flows underneath Highway 167. In this reach, the creek is located less than 10 feet from the roadside, and the only vegetative cover consists of dense stands of Japanese knotweed and Himalayan blackberry. Coho salmon (*Oncorhynchus kisutch*) utilize this stream for spawning, rearing, foraging, and as refuge habitat. However, during high flow events, the straight, wood devoid channel provides little refugia, allowing for the potential of juvenile fish to be flushed further downstream. This lack of channel complexity reduces the streams ability to provide suitable habitat for fish and wildlife.

The Corps and City of Renton propose to relocate Upper Springbrook Creek away from its straightened roadside location adjacent to South 55th Street and into a more natural stream channel, as well as replacing the culvert underneath South 55th Street with a design more conducive to fish passage. The relocated stream will flow into a constructed streambed that will meander through a forested wetland that borders Highway 167. This project will increase available spawning habitat for adult fish, and will enhance rearing, foraging, and refuge habitat for juvenile salmonid and resident fish in Upper Springbrook Creek by creating off-channel habitat areas, removing the stream from a source of potential water quality contamination, through provision of a riparian buffer, and by allowing access to higher quality habitat located upstream. In accordance with the National Environmental Policy Act (NEPA), this document evaluates the potential environmental impacts of the proposed restoration alternatives.

The project does not constitute a major Federal action that will significantly affect the quality of the human or natural environment. The Corps will use best management practices to minimize potential adverse effects to aquatic and terrestrial resources. Impacts to air quality, noise, and water quality will generally be highly localized and short in duration, and wetland impacts will be mitigated to a level of insignificance by providing enhanced aquatic functions and values in the project area as a result of the creek relocation.

THE OFFICIAL COMMENT PERIOD FOR THIS ENVIRONMENTAL ASSESSMENT WAS FROM 6 APRIL 2010 TO 6 MAY 2010.

This document is available online under the project name “Upper Springbrook Creek” at: http://www.nws.usace.army.mil/ers/doc_table.cfm.

Please send comments, questions, and requests for additional information to:

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1. INTRODUCTION

The Corps of Engineers (Corps) and the City of Renton are proposing to realign a portion of Springbrook Creek, which is currently located in a roadside ditch that is directly parallel to South 55th Street, through a 100 foot easement on an adjacent forested wetland in the summer of 2011. The proposed work involves: (1) Replacing the culvert that crosses South 55th Street with a design approved by Washington Department of Fish and Wildlife (WDFW) for fish passage, (2) Realigning the channel through an adjacent forested wetland that lies to the north of South 55th Street, and (3) Placing woody debris in the new channel and planting native riparian vegetation to create complex habitat for aquatic biota.

In accordance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) evaluates the potential environmental impacts of the proposed restoration project. This restoration activity is being conducted as part of the Green/Duwamish River Basin Ecosystem Restoration Project (ERP). In the ERP, the Corps has served as the lead in developing restoration projects for the Green/Duwamish River, working with local agencies to identify, evaluate, prioritize, and coordinate implementation of potential restoration projects to assure that the restoration programs and projects from the various agencies complement each other. As part of this ecosystem approach, two major documents have been prepared that provide general information regarding the Green/Duwamish River basin and its associated existing conditions, fish and wildlife populations, and potential impacts on federally listed endangered or threatened species. The documents are as follows:

- Final Programmatic Environmental Impact Statement and Restoration Plan (FPEIS) for the Green/Duwamish River Basin Ecosystem Restoration Project, prepared by the Seattle District Corps and King County DNR in November 2000.

- Programmatic Biological Assessments for Green/Duwamish Ecosystem Restoration Project, King County, Washington. Separate Biological Assessments were prepared for species under National Marine Fisheries and US Fish and Wildlife jurisdictions for the Seattle District Corps by Jones & Stokes, June 2000.

Information from these reports has been adopted in this document largely by reference. The purpose and need statement for the Programmatic Final NEPA/SEPA Environmental Impact Statement (DEIS) and Restoration Plan was to improve the overall health of the Green/Duwamish River basin ecosystem for fish and wildlife species by increasing the quantity, quality, diversity, and connectivity of available habitat. The need for such improvement to the ecosystem was well established from years of study conducted by the U.S. Army Corps of Engineers (Corps or USACE), King County, the Port of Seattle, the Muckleshoot Indian Tribe Fisheries Department, the Washington State Department of Fish and Wildlife, and others.

The Programmatic EIS assessed the Corps proposal to implement a basin wide restoration program in the Green/Duwamish River. The programmatic Green/Duwamish Ecosystem Restoration Project EIS can be accessed online at:

http://www.nws.usace.army.mil/ers/index.cfm?status=1, under the project name "Green Duwamish Ecosystem Restoration Project."

The purpose of preparing a programmatic EIS was to expedite and provide a point of departure for future site-specific projects, and to facilitate the preparation of subsequent project-specific NEPA and SEPA documents through the use of "tiering" or "phasing." The origin of this restoration plan and EIS was an Ecosystem Restoration Study (ERS) conducted as a part of the Corps' Ecosystem Restoration Project. Restoration features at sixty-seven projects in the basin were developed and evaluated to determine the most cost effective and beneficial plan to recommend for restoration of the basin ecosystem. The recommended plan will implement a combination of 45 project-specific and programmatic restoration measures throughout the basin, one of which is the Upper Springbrook Creek Channel Realignment and Rehabilitation. This recommended National Ecosystem Restoration (NER) Plan was selected based upon cost effectiveness and incremental cost evaluation of each alternative's costs and environmental outputs. The recommended NER Plan restores aquatic and terrestrial ecosystem continuity and connectivity and addresses all limiting habitat factors for threatened and endangered salmonids within the basin.

The purpose of this tiered Environmental Assessment is to provide information to the public about the project's environmental effects and to solicit public comments on the proposed action. After receiving comments, if the Corps determines that the project will have no significant effects, a Finding of No Significant will be signed and the environmental review process will conclude.

1.1 PROJECT LOCATION AND SETTING

The project is located in the City of Renton adjacent to South 55th Street just west of highway 167, in township 23 north, range 5 east, section 31 (Willamette Meridian) in the Green River Basin. The project area encompasses a 100 foot wide easement from the road by 950 foot long section of stream nestled between the South 55th Street culvert on the upstream end and the highway 167 culvert on the downstream end totaling 2.18 acres (see Figure 1). The project is bordered to the north by a forested wetland owned by Springbrook Apartment Investors, LLC (along with the 100 foot easement), and to the south by South 55th Street, with a private residence on the south side of the road. The property slopes northward and consists primarily of category 2 forested wetland according to the Washington State Department of Ecology's Wetland Rating System (see appendix B for the rating from). Along the southern border, where the stream channel resides, there is a dense overgrowth of invasive, non-native Japanese knotweed and Himalayan blackberry. Larger trees become more prevalent away from the road and the density of the invasive species decreases.

Figure 1. Upper Springbrook Location and Project Boundary

1.2 PROJECT PURPOSE AND NEED

The overall objective of the Green-Duwamish Ecosystem restoration project is to restore significant ecosystem function, structure, and dynamic processes that have been degraded within the river basin. To accomplish this objective, the following basin-wide restoration goals were identified:

- Improve the physical nature of existing degraded habitat.
- Improve existing ecosystem functions and values. This includes improving riverine processes where reasonable.
- Address important factors limiting habitat productivity.

In the lower and middle basins of the Green River conifer vegetation has been nearly eliminated and replaced with pavement and development, particularly in the lower basin. Vegetation that still exists is dominated by deciduous trees and shrubs, some of which are aggressive invasive species. This lack of native vegetated cover and encroaching urban and suburban development has lead to degraded in-stream habitat in both the mainstem Green River and its tributaries without any functional riparian buffer. Currently, the creek is devoid of complexity or refuge for

juvenile salmonids due to channel straightening and lack of large wood recruitment providing minimal opportunities for salmonids to spawn and rear, as well as poor conditions for other aquatic species. In addition, stormwater in the basin enters the rivers and streams via the extensive amount of imperious surface, thus leading to poor water quality.

The purpose of the Upper Springbrook Creek is to increase channel diversity (large woody debris, riffle and pool habitat, and suitable substrate for spawning coho) and improve the quality of stream-side vegetation to increase habitat quality for aquatic biota, and particularly, spawning and rearing habitat for salmonids. In addition, moving the stream away from the road will create a vegetated buffer that will absorb the stormwater run-off from South 55th Street

1.3 AUTHORITY

Section 306 of the WRDA of 1990 authorized the Secretary of the Army to include environmental protection as one of the primary missions of the Corps. Authorization for the Green/Duwamish River Basin Ecosystem Restoration Project, General Investigation (GI) study was provided under Section 209 of Public Law 87-874, Puget Sound and Adjacent Waters. Congress specifically authorized the Green/Duwamish River Basin ERP in Section 101(b)(26) of WRDA 2000. This project is a separable element of the Green/Duwamish ERP. The Green/Duwamish ERP gained construction New Start capability in the Water and Energy Act of 2003.

The City of Renton is the non-Federal sponsor for the Upper Springbrook Creek Channel Realignment and Restoration project evaluated in this document. The Corps and the City of Renton have cooperated in regular interagency meetings from which the objectives for the proposed restoration work were developed.

1.4 ASSOCIATED STUDIES AND REPORTS

General information regarding the Green/Duwamish River basin and its associated existing conditions, fish and wildlife populations, and potential impacts on federally listed endangered or threatened species is adopted in this document by reference to the:

- Final Programmatic Environmental Impact Statement and Restoration Plan (FPEIS) for the Green/Duwamish River Basin Ecosystem Restoration Project, prepared by the Seattle District Corps (Corps) and King County DNRP in November 2000.

- Green Duwamish Ecosystem Restoration Study, Final Feasibility Report, prepared by the Seattle District Corps, October 2000.

- Programmatic Biological Assessments for Green/Duwamish Ecosystem Restoration Project, King County, Washington. Separate documents were prepared for species under National Marine Fisheries and US Fish and Wildlife jurisdictions for the Seattle District Corps by Jones & Stokes, June 2000.

- Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds (WRIA 9 and Vashon Island), Washington Conservation Commission and the King County Department of Natural Resources, 2000.

- Near-Term Action Agenda for Salmon Habitat Conservation, Green/Duwamish River and Central Puget Sound Watershed, Water Resource Inventory Area 9, May 2002.

- Record of Decision (ROD) for the Green\Duwamish Ecosystem Restoration Project, Washington, 30, April 2002

2. ALTERNATIVES CONSIDERED

In order to comply with the National Environmental Policy Act (NEPA), CEQ rules, and Corps regulations, the Corps performed an analysis of potential alternatives to meet the purpose and need of the project. The programmatic Green/Duwamish EIS analyzed the following alternatives: No Action, Multi-Species Approach (designed to maximize benefits to multiple species of fish and wildlife), and Single Threatened Species Approach (focusing on habitat improvement for Chinook salmon). Three alternatives were evaluated under the latter two alternatives including: Ecosystem/Habitat Forming Method, Engineered Design and Constructed Habitat Method, and Integrated Method. The selected alternative was the Multi-Species Approach with and Integrated method.

For the Upper Springbrook Project, the Corps evaluated the no-action alternative as well as two alternatives for restoration of the site. The two alternatives differed in how they will contain flood waters and minimize stranding of juvenile coho, given the downhill slope to the north of the realigned channel. These alternatives are listed below.

2.1 THE NO-ACTION ALTERNATIVE

Under the no-action alternative, the creek would likely remain a roadside ditch that is overgrown with invasive species like Japanese knotweed and Himalayan blackberry with little to no functional value for aquatic species. The upstream culvert under South 55th Street would stay as is making it difficult for migrating salmonids to pass, and causing continuous scour of the channel on the downstream end. In addition, the creek would continue to receive stormwater runoff and pollution during rains events from South 55th Street.

2.2 ALTERNATIVE 1 – Channel Realignment with Bioengineered Features to Minimize Bank Overtopping (Preferred alternative-see Appendix A for projects plans)

2.2.1 Channel Alignment

The new channel alignment would be approximately 970 feet long. The cross-sectional geometry would be trapezoidal with 3:1 side slopes, with a 6-foot bottom width, and an average depth of 1.5 feet. The channel would be over-excavated to allow for the placement of imported 6-inch minus gravel substrate along the channel bottom to provide a substrate that is suitable for instream habitat. The planform of the channel would be sinuous following existing low topography within the 100-foot wide drainage easement. The new channel alignment gradient (slope) would be approximately 1.4 percent. Plan sheets C2 through C6 show the proposed channel design details. Disturbance area include 0.19 acres where the new channel would be located, a 0.03 acre staging area located on the upstream end, and a 0.01 acre area located on the downstream end (see plan sheet C6).

Approximately 1077 cubic yards of material would be excavated, of which 506 cubic yards would be over-excavated material that is then backfilled with 6 inch minus gravel. All but 100 cubic yards of this material would be disposed of off-site at an appropriate location. The remaining 100 cubic yards of material would be used on site for floodplain plantings (see section 2.2.3 for details). Excavation would be done using two teams with a tracked excavator and tracked dumper: one on the downstream end and one on the upstream end both progressing towards the middle. Most material would be hauled out using newly excavated channel as an "access road". Areas disturbed by construction of the channel would be covered in coir fabric to aid in short-term stabilization. Long-term stabilization of the channel would be established by riparian plantings which would benefit from the coir fabric placement.

The connection of the new channel would begin at the bottom elevation of the upstream pool at South 55th Street and continue downstream. This pool elevation would establish the elevation of the upstream connection between the new channel and the existing stream. The existing channel would be backfilled at the upstream end with 19 cubic yards of material in order to direct flows to the new channel and to reduce the likelihood of an avulsion of the proposed alignment back to the former (existing) channel. Less than 5 cubic yards of material would be left in place at the upstream end of the new channel to minimize the potential inflow of water from the existing channel, which would be undisturbed during this process. This material would be removed sequentially when flow is diverted to the proposed channel (see section 1.6.4 on the replacement culvert for details). On the downstream end, the new channel alignment would meet the existing channel approximately 80 feet upstream of the Highway 167 culvert before the existing channel enters property owned by the Washington State Department of Transportation (WSDOT, 2001). A small strip of the existing bank that lies between the existing and new channel would be left in place to prevent backwatering from the existing channel. This strip would be removed, likely with a hand shovel, immediately before flow diversion into the new channel.

2.2.2 Placement of Large Woody Debris (LWD)

Placement of large woody debris would increase hydraulic variability, promote accumulation of other debris, and enhance fish habitat by providing holding areas with cover and refuge, aeration of surface water, and localized scour and deposition of channel material (microtopography). Spacing of logs would be approximately 22 pieces every 100 meters. Placing the logs would involve attaching the wire rope to a mechanical duckbill soil anchor, driving the anchor(s) below the channel bottom to a design depth, load locking the anchor and proof testing to a specified load, drilling the log(s), and securing the wire rope to the log(s). In an effort to minimize the travel required for the machinery and to minimize disturbance to the site, channel substrate placement and LWD placements would be done in sequence immediately following the excavation of the channel. Placement of LWD in the proposed channel would include three configurations (plan sheets C8-9 show details on LWD design):

Type 1 is a single log configuration that involves placement of the log in the middle of the channel with its rootwad facing upstream. A shallow trench would be excavated to place the log with approximately the top one-third diameter of the log above final grade. One mechanical soil anchor, installed into the channel subgrade and affixed to the bole downstream of the rootwad mass, would stabilize the log. During placement of the Type 1 logs a small pool would be

excavated around and underneath the rootwad. The pool would be lined with imported channel sediment.

Type 2 is a single log configuration that would be placed on alternating channel banks. The log bole would be buried into the bank a minimum of 2/3 its length with the top of the log flush with the top of the bank. One mechanical soil anchor, installed into the bank subgrade and affixed to the bole behind the rootwad mass, would stabilize the log. During placement of the Type 2 logs a small pool would be excavated around and underneath the rootwad. The pool would be lined with imported channel sediment. The excavated sediment would be placed as a bar deposit immediately downstream of the LWD placement.

Type 3 is a multiple-log bank stabilization structure along the outside bends of the right bank in the new channel. Logs with rootwads would be placed perpendicular to flow at the top of the right bank with rootwads protruding into the channel and the pole ends buried into the right bank. Log poles would be placed parallel to the channel between the perpendicular logs. The logs would then be tied together using wire rope to create a continuous structure. Mechanical soil anchors would be installed into the bank subgrade and affixed to the structure minimizing the likelihood of the structure becoming mobilized. During placement of the Type 3 configurations a pool would be excavated around and underneath the rootwads. Topsoil and vegetation removed for placement of the logs into the right bank would be set aside and replaced following backfill of the logs.

2.2.3 Bioengineered Floodplain Improvements

Due to the existing floodplain topography and fixed invert elevations of the upstream and downstream culverts, the channel depth is limited to only 1.5 feet, which would not contain peak flow discharges. Preliminary model results of the proposed conditions indicate overtopping of the banks above and including the 1-year recurrence flow throughout a majority of the project reach. Overtopping of the new channel banks is undesirable because it may potentially allow for the stranding of fish within the adjacent floodplain, as well as contribute significant volumes of water to No Name Creek, a tributary down-gradient (north) of the project site that has been known to cause flooding concerns (DEA 2001). These same concerns are also associated with the existing conditions of the channel reach, however the proposed alignment may increase the potential for bank overtopping.

To minimize these risks floodplain logs would be placed along the north extent of the project area to serve as a natural berm (see plan sheet C13 for details). The logs would be placed horizontally, partially overlapping by approximately 5 feet on either end, and partially buried up to one-half the diameter of the log. Sources of these logs would come from both off-site sources and trees that need to be removed due to channel excavation. Placement of the logs in the floodplain would maximize the potential of flow containment within the proposed floodplain; larger diameter logs would be placed in the lowest elevation locations in the floodplain and smaller diameter logs would be placed in the higher elevation locations to match the target water surface elevation (WSE) in the proposed condition. Offsetting the logs from the bank would allow floodplain connectivity to the extent possible, while retaining flows in the vicinity of the proposed channel. Live stake willow plantings would be placed adjacent to the proposed floodplain log placements. Approximately 100 cubic yards of material from the channel

excavation would be placed along the willow stakes to encourage growth. The plantings would likely not have a significant effect immediately; however, over the long term as the plantings become rooted and the foliage establishes, riparian conditions and floodplain stability would become increasingly enhanced. The established plantings would effectively create a porous wall that would diffuse stream energies during higher flows, while minimizing fish stranding yet allowing for some flow to enter the floodplain. The plantings span the entire length of the proposed floodplain log placements, a distance of approximately 775 linear feet. The spacing for the plantings is proposed for 1 foot on center (O.C.) on both sides of the log placements, with plantings on one side of each log offset 1 foot from the plantings on the opposite side. As with the instream large woody debris, floodplain wood placement would be done in sequence immediately following the excavation of the channel. Areas disturbed by the use of machinery for the placement of floodplain logs would be temporarily stabilized with the use of straw, coir fabric, or other measure.

2.2.4 Replacement of Culvert on South 55th Street

The existing 30-inch diameter corrugated steel culvert that runs underneath South 55th Street at the east end of the project would be replaced as part of the project. The replacement culvert would be constructed west of and parallel to the existing culvert. Construction of this replacement culvert is expected to occur simultaneously with the excavation of the channel, but would ultimately be at the discretion of the contractor. The 46 foot long, 10 foot wide, 4 foot high replacement box culvert would meet the requirement of the WDFW Design of Road Culverts for Fish Passage, 2003 (Culvert Design Manual) and the King County Surface Water Design Manual, 2005 (SWDM). The culvert would have a slope of 1.82 percent with 14.5 inches of gravel placed on the bottom. A low flow channel would be provided by alternating the locations of larger rock clusters along the culvert sides. Additionally, one large rock sill and two log sills would provide grade control and encourage the development of small pools within the culvert at low flow. The placement plan for sediment in the culvert is shown on plan sheets C10.1-10.4, C11, and C12. The substrate would be placed using an excavator, by hand or by other means as necessary. Log sills would also be placed within the culvert and would be placed by hand or by other means necessary.

Approximately 250 cubic yards of material would be excavated to construct the culvert. Construction of the replacement culvert would require the use of heavy machinery and would involve the removal of a section of the asphalt roadway, shoulders, and road subgrade. The removal would affect an area approximately 15 feet wide by 50 feet long and extends the entire width of the roadway. Concrete rubble and other debris present in the existing channel prior to construction would be removed and disposed of properly. Prior to commencing culvert replacement, creek flow would need to be temporarily routed outside of the replacement culvert footprint and into the existing channel. This diversion of creek flow would be achieved with the use of flexible high-density polyethylene (HDPE) pipe that is capable of conveying the entire creek flow during typical summertime flows. If flows exceed the water capacity of the pipe then all work would cease until flow could be contained. In addition to the temporary pipe, a series of temporary in-stream revetments would be necessary to isolate creek flow, both upstream and downstream of the existing culvert, for installation of the replacement culvert. Sequencing of

events for construction of the replacement culvert would include (see plan sheet C7 for more detail):

1. Install temporary fish exclusion screens upstream of the culvert replacement area and downstream of confluence of existing and proposed channels.

2. Excavate a trench across the road cut and install temporary piping at the upstream end to contain all creek flow through the culvert replacement area and beneath the upstream temporary access route. Install temporary piping at the downstream end for the temporary access route.

3. Establish an access route across both the upstream end and downstream end of existing channel by backfilling the bypass pipe and existing channel (pipes would empty on the downstream end of both access routes).

4. Commence the road cut. The road would be excavated along the replacement culvert alignment to the footprint and elevation suitable to construct the replacement culvert to its design elevation. Shoring and trench protection would be employed as necessary.

5. Demolish, remove, and dispose of the existing culvert, construct and install new culvert, and install in culvert features.

6. In preparation of routing the creek through the new channel, excavate a shallow pool just upstream of confluence with new and existing channel.

8. Excavate a small trench around the upstream end of temporary bypass pipe to allow flow through the replacement culvert.

9. Commence flow ramping: As creek flow is introduced to the new channel the sediment laden water would be pumped from the pool described in #6 into the floodplain. Flow would be ramped up as turbidity decreases,

Once the turbidity decreases below the state standards Remove small strip of existing bank at the confluence of the existing channel and downstream end of the new channel.

10. Perform fish rescue and recovery as necessary.

11. Remove the temporary flow bypass pipes after flow is fully transferred to new channel.

13. Install headwalls and wingwalls.

12. Repair the road cut according to the applicable jurisdictional standards and requirements.

Maintenance of the culvert may be required to prevent erosion on the west bank of creek upstream of the culvert and to maintain in culvert features.

2.2.5 Decommissioning of the Existing Channel

While the existing channel would no longer convey flows from Upper Springbrook Creek, the channel would continue to collect and convey the following sources of flow:

- Surface water runoff from South 55th Street which is likely laden with pollutants.
- Partial surface water runoff from areas between the existing and new channels
- Flow through an existing culvert (Existing Culvert 2) located at the middle of the project (under South 55th Street) that collects runoff in a roadside ditch approximately 400 linear feet in length, as well as a minor tributary that flows into Upper Springbrook Creek from the south
- Surface water runoff from areas south of South 55th Street
- Groundwater flow

The existing channel north of South 55th Street would remain undisturbed except for two improvements: 1) a fill of the channel at the upstream end; and 2) planting of the remaining channel between the fill area and Existing Culvert 2, where tributary flow would continue to be conveyed through the former main channel from this point downstream. Proposed planting of the existing channel includes various fast growing native species. These plants would provide naturally occurring treatment (filtration) of the remaining surface flow, by absorbing the water and associated pollutants into their tissues.

2.2.6 Riparian Plantings

Planting would occur in the fall following the completion of construction. Prior to all planting, all weeds, including Japanese knotweed and Himalayan blackberry, would be removed from the project site, and a 6-12 inch layer of mulch would be placed in areas to be planted. Emergent plants would be planted directly in the stream beds in and around wood placement, where pools are expected to form. Willow and dogwood lifts would be planted along both banks for the length of the stream. A mixture of native trees and shrubs would be planted in areas that have been disturbed by construction, and areas were invasive weeds have been removed (see table 1 for a detailed list of plants). In addition to this proposed list, a variety of other species such as salmonberry, alder, cottonwood, dogwood, willows (Salix spp.), and piggyback plant are expected to colonize the area, as seed sources are present on site. Irrigation and invasive species control would take place for five years following planting.

Table 1. Riparian Plantings in the New Channel

Location	Species	Spacing	Size
Within the littoral zone of the stream bed adjacent to pools	*Carex aurea* (sedge) *Carex hendersonii* (sedge) *Carex lenticularis* (sedge) *Carex stipata* (sedge) *Scirpus microcarpus or acutus* (bulrush)	10 inches	Plugs
Along the bank from OHW to 4ft above OHW (approximately 3 lifts)	*Salix sitchensis* (willow) *Salix lasiandra* (willow) *Salix scouleriana* (willow) *Cornus sericea* (redosier dogwood)	1 foot (3/1 salix to cornus)	stakes
Interspersed along the riparian zone of the stream in both disturbed areas and areas where invasives have been removed	*Populus balsamifera* (cottonwood) *Fraxinus latifolia* (Oregon ash) *Picea sitchensis* (sitka spruce) *Thuja plicata* (Western red cedar)	10 feet	1-2 gallon
	Rosa pisocarpa (cluster rose) *Rhamnus purshiana* (cascara buckthorn) *Physocarpus capitatus* (Pacific ninebark)	4 feet	

Maintenance and monitoring would be required for site plantings, details regarding plant monitoring can be found in Appendix C, Restoration Maintenance, and Monitoring Plan.

2.2.6 Construction Timing and Erosion Control

Construction of this project is scheduled for the summer of 2011 and expected to take approximately three months. Five eight hours days are the anticipated work hours. All in-water work would occur within the fish window (July 1- September 30) established by the Washington Department of Fish and Wildlife.

Erosion and sedimentation during construction activities would be minimized by limiting the amount of disturbance to the creek channel, banks, and the top of slope. In order to minimize the potential for erosion and transport of sediment into the creek system, the following measures would be implemented:

- A silt fence would be installed to the extent shown on the plans to minimize transport of sediment beyond the active construction area, and aid in marking access routes and clearing limits.

- The use of rock check dams to reduce flow velocity in steep slope drainages and/or straw bale dams to filter sediment in low-velocity, low-flow drainages.
- Clearing limits would be marked and visible during construction to reduce impacts and disturbance within the project area.
- Rock construction entrance(s) would be installed to minimize the transport of sediment from the project area onto street surfaces, and/or equipment washing stations located near surface streets to remove sediment from equipment prior to movement of equipment onto surface streets, and/or use of street sweepers or hand sweeping of surface streets to remove sediment and debris transported off site.
- All efforts would be made to locate storage and staging areas in flat areas above the ordinary high water line with appropriate erosion and sediment control measures, such as gravel pads.
- The number of trips made through the project site by heavy equipment would be minimized.
- Following construction completion, all disturbed areas that result in bare earth surfaces would be covered with straw and/or coir fabric to reduce the potential for erosion and sediment transport until the areas are planted in the late fall.
- Excavation requiring the temporary removal of top soil and usable vegetation within the channel would be set aside from other excavation spoils and be used to top-dress bare-cut surfaces following grading work completion.
- Revegetation of all disturbed areas would occur in the fall following the construction completion.

2.3 ALTERNATIVE 2 – Channel Realignment with a Berm to Contain Bank Overtopping

All elements of alternative 2 are the same as alternative 1, with the exception of the use of bioengineered features for floodplain improvements proposed in alternative 1. Alternative 2 proposes to construct a 900 foot long, six foot wide earthen berm west of the new channel to contain peak flow discharges and minimize stranding. While this alternative may insure less of a risk as it is a more solid structure, it was eliminated due to the associated environmental effects and additional compensatory mitigation required by the Washington Department of Ecology that will arise from the additional placement of fill in a forested wetland, and therefore, this alternative was not considered for impacts analysis.

3. EXISTING CONDITIONS

Characteristics of the existing environment have been addressed in detail within a number of documents previously prepared as part of the Green/Duwamish River Basin Restoration Project. Characteristics of the existing environment that are specific to the lower Duwamish River and the proposed project site are described in detail below based on reconnaissance work and review of available documentation. Rather than repeating information for the general Green/Duwamish River system here, that information is incorporated largely by reference to the documents listed below:

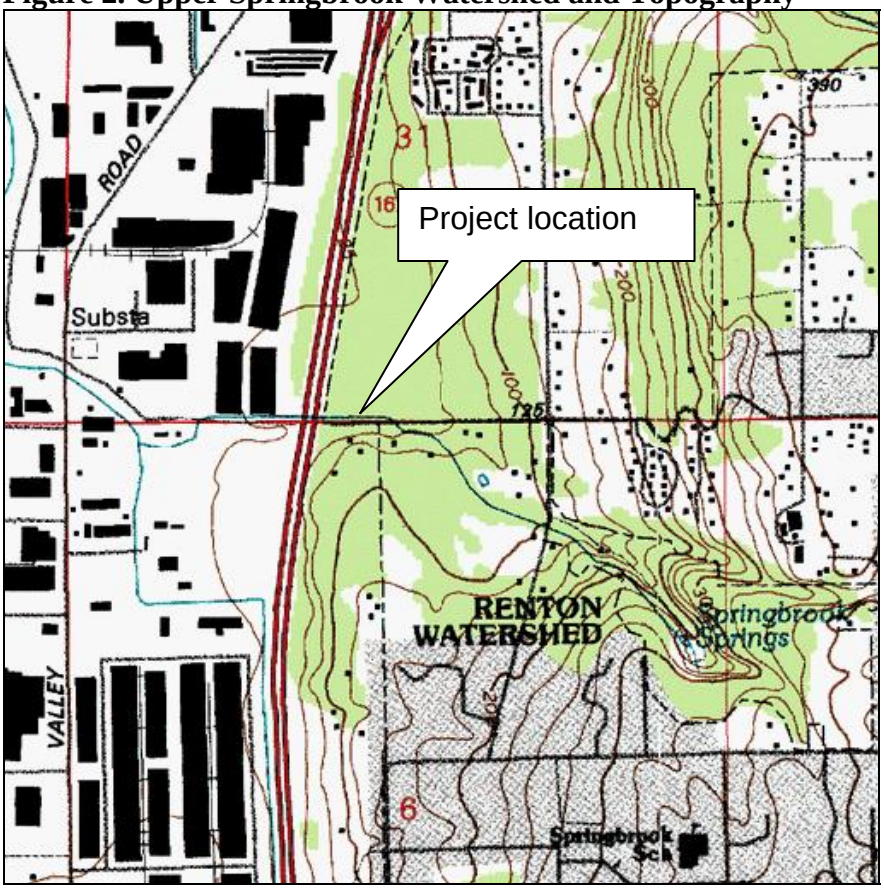
- Final Programmatic Environmental Impact Statement and Restoration Plan (FPEIS) for the Green/Duwamish River Basin Ecosystem Restoration Project, prepared by the Seattle District Corps and King County DNRP in November 2000.
- Programmatic Biological Assessments for Green/Duwamish Ecosystem Restoration Project, King County, Washington. Separate documents were prepared for species under National Marine Fisheries and US Fish and Wildlife jurisdictions for the Seattle District Corps by Jones & Stokes, June 2000.
- Seattle's Urban Blueprint for Habitat Protection and Restoration: Review Draft, prepared by the City of Seattle's Salmon Team, June 2001.
- Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds (WRIA 9 and Vashon Island), Washington Conservation Commission and the King County Department of Natural Resources, 2000.
- Near-Term Action Agenda for Salmon Habitat Conservation, Green/Duwamish River and Central Puget Sound Watershed, Water Resource Inventory Area 9, May 2002.

3.1 PHYSICAL CHARACTERISTICS

The history and physical characteristics of the Green/Duwamish River basin is described in detail in Sections 3.1 and 3.2 of the FPEIS (USACE and King County DNR 2000). A synopsis of physical characteristics and historic conditions relevant to the proposed restoration project site is presented below.

The project is located in the City of Renton in a heavily sub-urban and urbanized area. The creek where the project will take place is actually a 1.2 mile unnamed tributary of Springbrook Creek (stream number 0020, WDFW 1975). It originates roughly 0.60 miles upstream from the project location from two tributaries in a fairly steep cascade area referred to as Springbrook Springs (Figure 2). These two tributaries join just upstream of the project location flowing north before making a 90 degree turn at South 55th Street (where the project site is located) flowing west under Highway 167. It joins with Springbrook Creek 0.2 miles west of Highway 167. Springbrook Creek then joins with Mill Creek and meanders north through the City of Renton before emptying into the Black River Marsh north of Interstate 405. The Black River Marsh is a small marsh, remnant of the historic Black River, which feeds into the Green River. The section of creek that is proposed for realignment flows year-round with an average depth of 1.3 feet and an average width of 6.5 feet from top of bank to top of bank.

Figure 2. Upper Springbrook Watershed and Topography



3.1.1 Geology and Soils

The project area is located in the transition zone of the higher gradient foothills of the Cascades to flatter, more gently sloping landscape typical of large river floodplains. Near South 55th Street, where the current channel is located, the soil is composed of Alderwood gravelly sandy loam (basalt till with volcanic ash) with a 6-15 percent slope. The Alderwood soil series is not classified as a hydric soil. Farther away from the road the soil is mixed alluvial sand (a mix of sand, loamy fine sand, and gravelly sand), likely remnant of the historic stream channel. Towards the downstream end of the project soils are Snohomish loam silt, which is typical of flood plains. At the headwaters of the creek, less than one mile upstream, soils are Alderwood (basal till with volcanic ash) and Kitsap (Lacustrine deposits with a minor amount of volcanic ash); both are characterized as very steep (USDA Websoil survey, 2009).

3.1.2 Hazardous and Toxic Materials

A Preliminary Assessment Screening (PAS) was performed by the Environmental Engineering and Technology (ET) Section of the Corps to determine whether any hazardous or toxic material is present on or around the site that could affect project activities (USACE, 2008). The PAS did not identify any recognized environmental conditions at the property. The term 'recognized environmental conditions' means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past

release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property.

Washington Department of Ecology's environmental database was reviewed for hazardous waste generators, facilities, underground storage tanks, and leaking underground storage tanks in the area. According to the Washington Department of Ecology (WDOE) the only hazardous site near the project vicinity that may affect the site is located less than one mile upstream, only 200 feet from the stream. Based on the PAS, there is no evidence that this upstream site is currently or has in the past affected the project site. There are many other sites that are within a mile of the project location, however, most of them (in the Kent industrial zone) are down grade from the site and are not expected to impact the property (WDOE, 2008a).

3.1.3 Hydrologic Regime

The historic and current hydrological characteristics of the Green/Duwamish River basin are described in detail in Section 3.3 of the FPEIS (USACE and King County DNR 2000).

Upper Springbrook Creek originates from two channels located in an area referred to as Springbrook Springs that join less than a half of a mile upstream of the project site. The project area starts at South 55th Street, where a 30 inch culvert crosses beneath the road, limiting both hydraulic flow and transport of sediments. Residents have reported flooding upstream of this culvert. From this culvert to the downstream extent of the project limits, the existing channel is a mostly linear, uniform roadside swale that runs parallel to South 55th Street on the north side. The stream bottom is approximately 4 feet wide with an average gradient of 1.3 percent. Low gradient glides are the predominant habitat type, with pools lacking in the system (WDOT, 2001). The project ends at a five by ten foot box culvert underneath Highway 167. Due to its proximity to South 55th Street, it is likely that this section of stream, as well as downstream areas, experience more "flashiness" or higher peak flows during heavy rain events then that of a stream with a sufficient riparian buffer. Flow events for this portion of stream are summarized in Table 2 (WDOT, 2001).

Table 2. Discharge at Upper Springbrook Creek

Flow Event	Discharge (cubic feet per second)
1-year	48
2-year	70
5-year	84
10-year	88
25-year	99
50- year	110
100- year	121

North of the existing channel is a class 2 forested wetland according to the Washington State Wetland Rating System (see appendix B for the formal report and rating form). A delineation conducted in early September found unambiguous wetland indicators (including standing water)

at both ends of the project site. The center area, while dominated by hydrophytic vegetation, had more marginal soil indicators. This may be due to presence of sand dominated, faster draining soil in this area, possibly the result of a historic stream channel location. However, the landscape position of the site and the presence of unambiguous hydrology during the dry season both indicate the central area of the site to be wetland. Therefore, the entire project site was concluded to be wetland (see appendix B for wetland delineation and rating).

Evaluation of ground surface data indicate that the ground surface north of the existing channel drops in elevation with increasing distance from the existing right channel bank (Figure 2). When the stream overtops, its flows move northward through the adjacent forested wetland toward the City of Renton and ponds on the west side of SR 167 before eventually flowing north to No Name Creek. This area is not mapped as a FEMA flood hazard area (WDOT, 2001).

3.2 WATER QUALITY

The historic and current water quality characteristics of the Green/Duwamish River basin are described in detail in Section 3.4 of the FPEIS (USACE and King County DNR 2000).

This area of the Green Duwamish Basin (Upper Springbrook Creek) is designated for the following uses: spawning and rearing, primary recreation, domestic water, industrial water, recreational water, stock water, wildlife habitat, harvesting, and aesthetics. Because this project site is a small tributary stream, there is little water quality data available for this specific location. However, it's possible that water quality standards could be exceeded periodically for certain pollutants due to the stream's proximity to the road. Downstream of the project site, mainstem Springbrook Creek is on Washington Department of Ecology's 303d list (polluted waters) for fecal coliform and dissolved oxygen, and is also listed as a water of concern for temperature and Bis (2-Ethylhexyl) phthalate near its confluence with the Black River Marsh (WDOE, 2008b).

3.3 VEGETATION

The historic and current characteristic vegetation of the Green/Duwamish River basin are described in detail in Section 3.6 of the FPEIS (USACE and King County DNR 2000). Historically, conifers dominated the lowland forests of the Green River Valley. Currently, nearly all of these coniferous forests have been replaced by both residential and commercial development in the valley. Much of what vegetation remains is dominated by deciduous trees and invasive shrubs.

Vegetation directly adjacent to the current channel consists of dense stands of Japanese knotweed (*Polygonum cuspidatum* and *Polygonum bohemicum)* and Himalayan blackberry (*Rubus discolor)*, with occasional interspersed willows (*Salix* spp.), making it difficult to view and access the channel. Within the channel, reed canary grass (*Phalaris arundinacea*) is prevalent along with Japanese knotweed shoots. Vegetation on the south bank of the stream is limited to a narrow margin of invasive shrubs between the South 55th Street and the stream edge. Behind the stream, to the north, is a forested wetland composed mostly of deciduous species, like alder (*Alnus rubra*) and cottonwood (*Populus balsamifera*), with interspersed cedar *(Thuja plicata)*. Understory vegetation includes salmonberry *(Rubus spectabilis*), dogwood (*Cornus sericea*), skunk cabbage (*Lysichiton americanus*), and piggyback plant (*Tolmiea menziesii*).

3.4 AQUATIC BIOTA

3.4.1 Fish

The historic and current characteristic fish communities of the Green/Duwamish River basin are described in detail in Section 3.5 of the FPEIS (USACE and King County DNR 2000).

Due to the size of the stream and its separation from the mainstem Green River, the only species of anadromous salmon that are known to be present in this tributary of Springbrook Creek are coho salmon (WDFW, 1975, 2002). These coho spawn in the Green River Basin between October and December. After hatching, the juveniles will rear in fresh-water for 15 months before migrating to the ocean as smolts in the spring. They will then spend two growing seasons in the ocean before returning to freshwater to spawn as three year-olds (NMFS, 2009). Large numbers of hatchery-reared coho have been released into the Green River system since the early 1900s, therefore the coho that utilize this tributary are of a mixed hatchery and native origin (WDFW, 2002). Resident species of fish in the Springbrook system include cutthroat tout, rainbow trout, threespine stickleback, pumpkinseed sunfish, speckled dace, lamprey (*lampetra spp*.), and sculpin (*Cottus spp*.) (Harza, 1995).

Fish habitat within the channel is in a highly degraded state due to the straightened nature of the channel, lack of native overhanging vegetation, poor pool-riffle structure, and high peak flows it receives from surface water runoff from South 55th Street, all of which limit the amount of in-stream micro-habitat and refuge. Although there are some areas where suitable spawning gravel for coho exists within the current channel, it is likely hatching success and juvenile survival is limited by the factors discussed previously. The culvert underneath South 55th Street at the upstream end of the project site is a fish barrier, especially for juveniles, as its downstream invert is perched approximately three feet above the channel bed elevation, limiting access to higher quality habitat located upstream of the project area (Figure 3). In addition, downstream habitat consists of a series of channelized canals and ditches that weave through high density commercial and industrial areas of Renton and are essentially devoid of any suitable fish habitat. The Black River Marsh pump station is located 800 feet upstream of the marsh's confluence with the Green River. Although the pump station has a fish ladder for fish migrating upstream and a airlift bubble system for juvenile outmigration, it likely limits anadromous fish movement in and out of the Springbrook system.

Figure 3. South 55th Street Culvert

3.4.2 Benthic Invertebrates

A benthic invertebrate survey was done using Hess sampler methodology in the fall of 2008. Species diversity and abundance was relatively low, with a high proportion of tolerant oligochaete worms, reflecting a stream in a degraded state. Other invertebrates found in the samples include fly and midge larvae, beetle larvae, caddisfly larvae, mayfly larvae, stonefly larvae, thread worms, flat worms, and fingernail clams.

3.5 WILDLIFE

The historic and current characteristic wildlife communities of the Green/Duwamish River basin are described in detail in Section 3.7 of the FPEIS (USACE and King County DNR 2000).

Common urban wildlife such as coyotes, Columbian black-tailed deer, beaver, raccoons, opossums, rats, mice, and voles are likely to be found in the project area. Numerous bird species including white-crowned sparrows, fox and song sparrows, common yellowthroat, yellow warbler, northern flickers, American robins, American crows, Stellar blue jays, spotted towhees, red-winged blackbirds, dark-eyed juncos, black-capped chickadees, brown creepers, woodpeckers, northern oriels, flycatchers, belted kingfishers, American dippers, American goldfinches, Bewick's and winter wrens, solitary and warbling vireos, and warblers are likely to utilize the riparian areas of the project, particularly the forested portions (Connell, 1993). Birds of prey such as Cooper's, sharp-shined, and red-tailed hawks, and western screech and barred owls can be present in the project area in search of prey. Bald eagle sightings have occurred within close proximity of the project area at both Panther Lake to the southeast and the Black River Marsh to the northwest (WDFW, 2008). Tree frogs and garter snakes may also utilize the site.

3.6 THREATENED AND ENDANGERED SPECIES

The potential occurrence of federally listed threatened and endangered species within the Green/Duwamish River basin are described in detail in Section 3.7.2 of the FPEIS (USACE and King County DNR 2000).

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. The Corps prepared two Programmatic Biological Assessments (BA) to assess potential impacts of the proposed work on species protected under the Act - one for species under the jurisdiction of the USFWS and one for species under the jurisdiction of NOAA Fisheries. Those BAs covered the federally listed threatened or endangered species listed in Table 3. Since the programmatic consultation has taken place, critical habitat has been established for Puget Sound Chinook and bull trout (NMFS 2005; USFWS 2005), and Puget Sound steelhead have been listed as threatened (NMFS, 2007). The bald eagle has since been delisted.

Table 3. Green/Duwamish River Threatened and Endangered Species

Species	Listing Status	Critical Habitat
Bald Eagle *Haliaeetus leucocephalus*	Delisted	—
Marbled Murrelet *Brachyramphus marmoratus*	Threatened	Designated
Northern Spotted Owl *Strix occidentalis caurina*	Threatened	Designated
Gray Wolf *Canis lupus*	Threatened	
Canada Lynx *Lynx canadensis*	Threatened	—
Coastal/Puget Sound Bull Trout *Salvelinus confluentus*	Threatened	—
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	Designated

According to the Washington Department of Fish and Wildlife, the only species of salmon present in this portion of Springbrook Creek are coho salmon, which are not a federally listed species. Steelhead in the Green River system utilize the mainstem channel and larger tributaries like Soos and Newaukum Creeks. Chinook salmon do use mainstem Springbrook, but do not travel as far as the project location. Reports of historical bull trout use of tributaries in the lower Green River are rare, and there have been no recent observations (King County CDNR 2000). No bull trout or Chinook salmon critical habitat is designated in the project area.

According to the Washington Priority Habitat Database and Washington Gap Analysis wolves, lynx, and grizzly bears are only found on the slopes and foothills of the Cascade Mountains, and there have been no reported sightings within the Puget Sound lowlands. Marbled murrelets and spotted owls also nest in the old growth forests of the Cascades and Olympic Mountains and are not known to be present in Puget Sound lowlands (WDFW, 2008).

Therefore, no federally listed ESA species or their critical habitat are expected to occur within the Upper Springbrook project area.

3.7 CULTURAL RESOURCES

The existing condition of the site indicates there is a low probability for the project to effect historic properties up to a depth of three feet below the current ground surface. However, given the current understanding of the geological deposits with the general project area and documented rapid accumulation of sediments within the Green River Basin (Forsman *et al.* 2003), it is recommended any excavation below three feet be monitored for cultural materials for the following reasons:

a) Prior Disturbance. In order for an archaeological site to be eligible to the National Register of Historic Places (NRHP) under Criterion D, it must exhibit several characteristics including: stratigraphic integrity, sufficient quantity of archaeological materials and have the potential to yield important information to our understanding of the regional history or prehistory. Stratigraphic integrity, whether vertical or horizontal, can be suggested by the presence of intact features and/or activity areas, or the presence of a limited range of projectile point styles or other temporally diagnostic artifact types. Historic archaeological sites must retain integrity and have the potential to provide information beyond that which is available in the written documentation or oral histories.

Presently, as a result of subsurface investigations the project area lacks sufficient stratigraphic integrity and archaeological materials. However, an understanding of deeper deposits is presently lacking. It is likely the project area has been sufficiently disturbed up to the proposed depth of the proposed project, but this still needs to be confirmed. The Corps has determined this confirmation can be gathered by the monitoring of the proposed channel excavations during the construction phase because the likelihood of discovering archaeological materials is considered to be low.

b) Absence of recorded historic properties. The Corps conducted an ethno-historic investigation of the project area to determine potential effects of the proposed maintenance work on cultural and religious sites of importance to the Muckleshoot people. Research included a search of the Washington Department of Archeology and Historic Preservation (DAHP) Electronic Historic Sites Inventory Database, archival research and consultation with the Muckleshoot Tribal Historic Preservation Officer (THPO) and cultural advisor. The result of this investigation was the determination that the project is unlikely to have an adverse effect on intact pre-Contact cultural deposits should any exist within the project area of potential effect (APE). Although a number of cultural resources sites are documented within the general vicinity of the project, they are

outside of the project APE, as defined. There are no previously recorded pre-Contact or early historic archaeological sites within the project APE.

c) There are no historic buildings present or previously recorded in this project area. The Corps conducted a search of the Department of Archaeology and Historic Preservation Electronic Historic Sites Inventory Database, in addition to referencing archival materials and the appropriate municipal records. This research indicated there have been no previously recorded structures in this location. In addition, given the nature of this project there will be no impact to any viewsheds of any recorded historic properties.

3.8 NATIVE AMERICAN CONCERNS

The cultural and historic resources of the Green/Duwamish River basin are described in detail in Section 3.16 of the FPEIS (USACE and King County DNR 2000). Site-specific information is presented below.

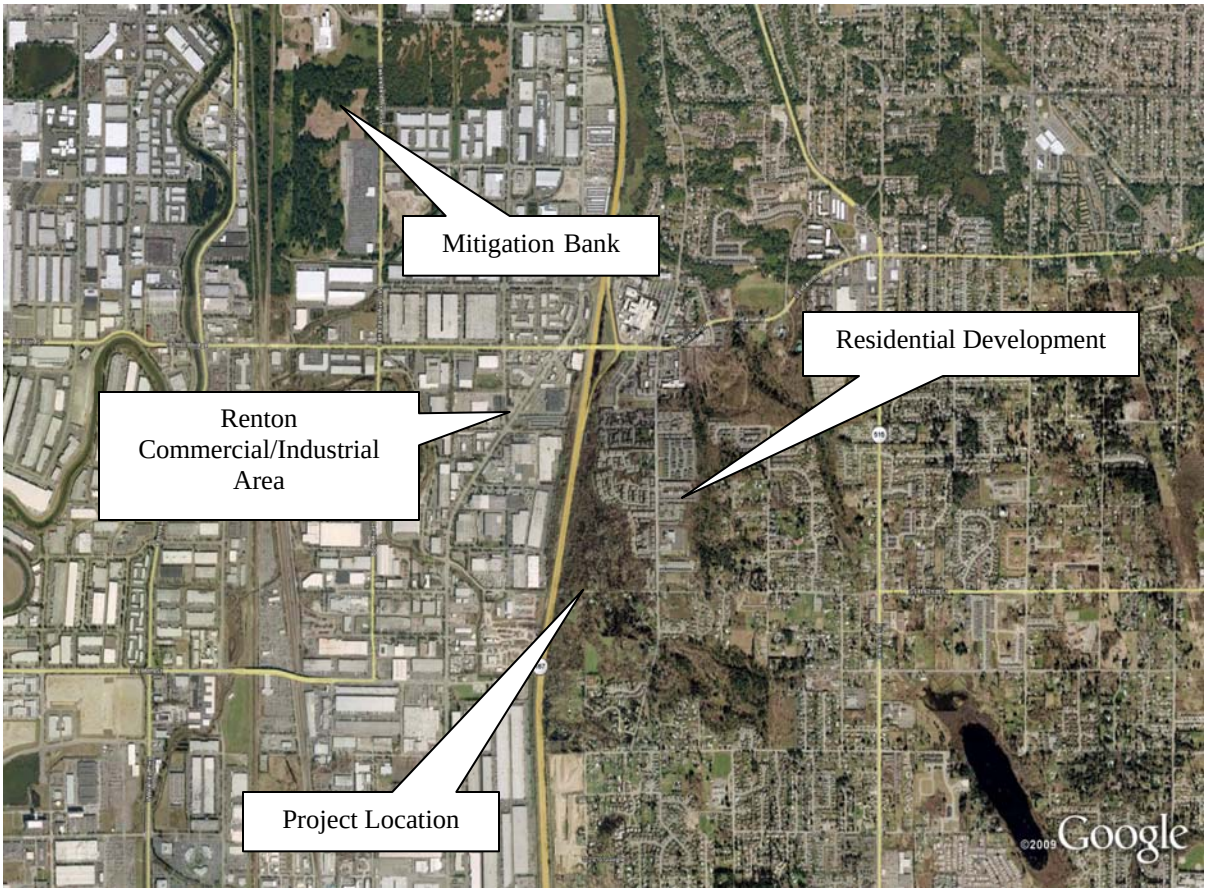
The Springbrook Creek System is within the usual and accustomed fishing area of the Muckleshoot Indian Tribe. The Muckleshoot tribe considers the fisheries resources of the Springbrook Creek/Green River system to be an invaluable resource, and a primary goal of the tribe is to protect and restore each run of fish in its usual and accustomed fishing area.

3.9 LAND USE

The historic and current land and shoreline use of the Green/Duwamish River basin are described in detail in Section 3.11 of the FPEIS (USACE and King County DNR 2000) and in the WRIA 9 Habitat-limiting Factors and Reconnaissance Report (Kerwin and Nelson, 2000) in the section titled “Land Use.” A discussion of land use relevant to the proposed restoration project site follows.

The City of Renton is designated as an incorporated area according to the King County Land Use Survey (King County, 2009). The property where the project is located is a forested area owned by Springbrook Apartments, LLC and is zoned as residential. A 100 foot easement was granted to the City of Renton by Springbrook Apartments to construct this project. Land use in the City of Renton is dominated by industrial and commercial development with interspersed multi and single family residential development. The project site is bordered to north by a forested wetland, which is part of a narrow vegetated corridor that runs parallel to the eastern side of Highway 167 for roughly three miles, starting at the junction with I-405. To the south, the forested corridor continues with low density residential development. To the east of this corridor, the landscape is dominated by both multi- and single family residential developments. The project area is bordered to the west by Highway 167, and to the west of this highway the landscape is almost exclusively commercial development (Figure 4). However, the Springbrook Creek Wetland and Habitat Mitigation Bank is located amongst this development, one mile to the northwest of the project site.

Figure 4. Land Use Around the Upper Springbrook Creek Project Location



3.10 RECREATION

Little recreation exists in the immediate area. There are no trails and the area is densely overgrown with invasive shrubs. The project is also located on a dead end street adjacent to Highway 167 and surrounded by private property. All these factors make access to the site difficult. The nearest source of recreation will be the Green River Trail, located two miles to the west, used for biking and jogging, and Panther Lake, 1.5 miles to the southeast, used for fishing and smallcraft boating (Fishing Works, 2009).

3.11 AIR QUALITY AND NOISE

Information characterizing the air quality and noise levels within the Green/Duwamish River basin is described in detail in Sections 3.8 and 3.9 of the FPEIS (USACE and King County DNR 2000). A discussion of current site-specific information relevant to the proposed restoration project site is presented below.

In general, air quality in the Puget Sound region is considered to be good. Areas where pollutants originate from are mostly urban where there is a high density of cars, residences, and industry. Sources of these pollutants include car and truck exhaust and smoke from outdoor burning and wood stoves (WDOE, 2009). In 2008, the Puget Sound Clean Air Agency reported that Puget Sound was in attainment for CO_2, NO_2, SO_2, and lead, and the percentage of days air

quality was considered to be good in King County was 78%, the percentage of days that air quality was "moderate" was 21%, and percentage of days where the air quality was considered "unhealthy for sensitive groups" occurred 1% of the time, likely during times of stable weather when there is an absence of wind. In the winter months, temperature inversions can occur as a result of low solar heating. During these occasions, high concentrations of pollutants associated with wood burning (stoves and fireplaces) and transportation sources can occur. This condition is intensified by the topography of the valley walls. However, for fine particulate matter (pm 2.5) no exceedances of the federal standards occur in King County. In addition, ozone is a standard that can be exceeded in Puget Sound on hot, sunny days during the summer. In 2006-2008 the Mud Mountain monitor in Enumclaw, King County violated the federal 8-hour ozone standard (Puget Sound Clean Air Agency, 2008). This monitoring stations is located in a rural region; although the precursor chemicals that react with sunlight to produce ozone are generated primarily in large metropolitan areas. Ozone can typically be transported 10-30 miles downwind from the original source (Puget Sound Clean Air Agency, 2008).

Primary sources of noise and pollution at the project area come from traffic on Highway 167, located perpendicular to the downstream end of the project site. Noise from South 55th Street is minimal as it is a dead end.

3.12 TRANSPORTATION

Information characterizing traffic and transportation within the Green/Duwamish River basin is described in detail in Section 3.10 of the FPEIS (USACE and King County DNR 2000). A synopsis of site-specific information relevant to the project site is presented below.

Traffic within the vicinity of the project occurs along Highway 167, which crosses the stream just downstream. There is minimal traffic on South 55th Street as it dead ends at Highway 167, therefore limiting traffic to a few local residents.

3.13 AESTHETICS

Information characterizing visual quality and aesthetic resources within the Green/Duwamish River basin is described in detail in Section 3.13 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the project site is presented below.

There is little aesthetic value to this section of stream due to its proximity to South 55th Street and Highway 167, and its overgrowth of invasive vegetation. The forested wetland is a part of a narrow strip of vegetated land that lies to the east of Highway 167. This "green" corridor is one of only a few in a landscape dominated by urban development. Enjoyment of this corridor is difficult to the west due to the location of Highway 167; however it is visible from the highway. To the east access can be limited due to the placement of private residences and dense overgrowths of blackberry. It is likely that local residents that border this green space enjoy viewing birds and urban wildlife.

4. ENVIRONMENTAL EFFECTS OF THE PREFERRED ALTERNATIVE

4.1 PHYSICAL CHARACTERISTICS

4.1.1 Geology and Soils

4.1.1.1 No action

Under the no action alternative no impacts to geology and soils will occur.

4.1.1.2 Preferred Alternative

Information describing the environmental effects on the topography, geology, and soils of the Green/Duwamish River basin is presented in Section 4.4.1 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below

Under the preferred alternative impacts to geology and soils are expected to be minimal as the footprint of the project is limited to the new channel alignment, which will receive spawning gravels for coho salmon and be planted with native riparian vegetation (including 3-6 inches of mulch). Disturbance from construction will be short-term and temporary. Topography of the wetland will change slightly due to the creation of the new stream channel and the construction of a bioengineered berm. Approximately 1077 cubic yards of soil will be excavated to construct the new channel, of 100 cubic yards will be used on the bioengineered berm- the rest will be hauled offsite. There will be a pulse of sedimentation following diversion of the stream into the restored streambed, resulting in short term turbidity increases as the streambed adjusts to the new flow, and localized shifting of sediments will continue sporadically as the new stream recovers and adjusts. Soil erosion control measures should minimize these impacts. Therefore, impacts to geology and soils are expected be insignificant.

4.1.2 Hazardous and Toxic Materials

4.1.2.1 No action

There are currently no hazardous or toxic materials on site. Under the no action alternative, conditions are expected to remain unchanged.

4.1.2.2 Preferred Alternative

Information describing the environmental effects on hazardous and toxic materials of the Green/Duwamish River basin is presented in Section 4.4.2 of the FPEIS (USACE and King County DNR 2000). A synopsis of site-specific information relevant to the proposed restoration project site is presented below.

There is currently no hazardous or toxic material on site. During construction and installation activities, fuels, oils, lubricants, and other hazardous materials will be used. An accidental release or spill of any of these substances could occur. A spill could result in potentially adverse impacts to on-site soils. However, the amounts of fuel and other lubricants and oils will be limited, and the equipment needed to quickly limit any contamination will be located on site. To minimize the likelihood of potential spills and leaks of petroleum and hydraulic fluids during project construction, construction equipment will be inspected daily for leaks and petroleum contamination. Additionally, a spill prevention control and containment plan designed to reduce

impacts from spills (fuel, hydraulic fluid, etc.) will be in place prior to the start of construction. Finally, the project will not introduce any hazardous materials to the project areas. Therefore impacts to hazardous and toxic materials are expected to be insignificant.

4.1.3 Hydrologic Regime

4.1.3.1 No action

Under the no action alternative the channel will remain in its current location, directly adjacent to the road, and the culvert underneath South 55th Street will remain in place. Water will continue to back up upstream of this culvert during heavy rain events due to its constrictive size and configuration. The stream channel will continue to receive stormwater runoff from South 55th Street causing steep peaks in flow during heavy rain events with little area for slow water refuge due to its straightened nature.

4.1.3.2 Preferred Alternative

Information describing the environmental effects on the water resources of the Green/Duwamish River basin is presented in Section 4.5 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Under the preferred alternative the hydraulic regime is expected to improve with the replacement of the culvert and the meandering of the new stream channel. Replacing the culvert underneath South 55th Street will increase conveyance and reduce flooding upstream. Meandering the stream will slow down flow at bends. The placement of large wood and plantings will provide areas of slow water by the creation of pools, and minimize bank overtopping. In addition, relocating this section of stream away from South 55th Street will greatly decrease the amount of surface water runoff entering this section of stream, thus decreasing peak flow during heavy rain events. Due to the existing topography of the site, increased flooding to the north could occur during higher flows. However this flooding poses little risk to human development as the area is mostly forested wetland. In addition, the presence of the bioengineered berm should minimize this risk.

4.2 WATER QUALITY

4.2.1 No Action

Under the no action alternative water quality will remain as is, in a degraded state from storm-water run-off received from South 55th Street

4.2.2 Preferred Alternative

Information describing the environmental effects on the water quality of the Green/Duwamish River basin is presented in Section 4.6 of the FPEIS (USACE and King County DNR 2000). A synopsis of site-specific information relevant to the proposed restoration project site is presented below.

Temporary increases in turbidity may result from construction activities. The largest impact will occur during the connection of the relocated channel with a new culvert. In addition, there will be a pulse of sedimentation following diversion of the stream into the restored streambed, resulting in short term turbidity increases as the streambed adjusts to the new flow. Localized

shifting of sediments will continue sporadically as the new stream heals and adjusts. High flows during the winter and spring following construction will continue to mobilize sediments in the project area, potentially contributing to small increases in turbidity over that normally seen during high flow events.

In order to reduce temporary increases in turbidity and potential related effects on juvenile salmonids, all 'in-water' construction work will take place during the established fish window (July 1 – September 30), which is the driest time of the year. Construction techniques, sequencing, and timing will minimize soil disturbance to the extent practical to reduce the generation of turbidity during connection of the new channel to the new culvert. To mitigate turbid flow in the new channel, a temporary shallow trench or pool will be excavated downstream of the confluence of the new and existing channels, where the turbid water will be pumped into the floodplain. Similarly, the design and implementation of the erosion-control and the Storm Water Pollution Prevention (SWPPP) plans will incorporate best management practices (BMPs) such as installation of a silt fence, placement of staging areas in flat areas above the ordinary high water line with gravel pads, minimizing the number of trips heavy equipment makes though the site, and revegetation of disturbed areas to further reduce the duration and magnitude of the temporary increases in turbidity. Turbidity monitoring during construction will ensure that these temporary increases are in compliance with State Water Quality Conditions.

Water quality in this section of Upper Springbrook Creek should improve as a result of the project. Stormwater from South 55th Street will no longer run off directly into the creek, and the buffering wetland and planted decommissioned channel will filter pollutants from the runoff before it enters the creek. In addition, as the native trees and shrubs along the stream bank mature, they will shade the stream channel, preventing further increases in water temperature.

4.3 VEGETATION

4.3.1 No Action

Under the no action alternative vegetation will remain as is, with dense overgrowths of Himalayan blackberry and Japanese knotweed along the stream, and the forested wetland vegetation will be left intact.

4.3.2 Preferred Alternative

Information describing the environmental effects on vegetation in the Green/Duwamish River basin is presented in Section 4.8 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Under the preferred alternative the invasive vegetation along the current channel will be removed and planted with native water tolerant species. Due to the alignment of the new channel through the forested wetland, approximately 10 larger alders and understory will need to be removed. The trees that will be taken down will be used to create the planted log berm that will stabilize the bank and decrease the frequency of bank overtopping. Native trees and shrubs will be planted along the stream banks. Temporary impacts to the wetland may result from the staging areas used to access the site and the placement of logs both in-channel and adjacent to the

channel to create the wood berm. Impacts from the staging areas will occur mainly in areas of Japanese knotweed and Himalayan blackberry, and will be returned to their original state (minus the invasive vegetation) following construction. Any impacts to vegetation in the wetland from the construction of the log berm will be compensated by riparian plantings (see plan sheets 27-29 for the planting plan, and appendix C, Draft Restoration, Maintenance, and Monitoring Plan, for details that will ensure planting success).

The proposed action is consistent with the Corps requirements of Nationwide Permit (NWP) 27 for stream and wetland restoration activities. Under this permit, compensatory mitigation is not required if the authorized work results in a net increase in aquatic resource functions and values in the project area. While the project will result in impacts to 0.27 acres of the forested wetland (of which 0.19 acres will be permanently lost), the newly constructed streambed will provide enhanced functional habitat value for fish, aquatic invertebrates, amphibians, and other aquatic biota, as well as a similar increase in function and value for mammals, birds, and insects in riparian areas. The plantings will increase the habitat value of the site by creating additional opportunities for foraging, nesting, cover, and refuge for a wide variety of species.

4.4 AQUATIC BIOTA

4.4.1 Fish

4.4.1.1 No Action

Under the no action alternative fish communities will continue to experience degraded habitat with lack of channel complexity (due to the straightened channel configuration) and woody debris, poor water quality conditions, and high peak flows due to surface water runoff.

4.4.1.2 Preferred Alternative

Information describing the environmental effects on the fisheries resources of the Green/Duwamish River basin is presented in Section 4.7 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Temporary impacts to fish may result during construction, particularly during the connection of the culvert with the new channel. These impacts will be avoided by installing a temporary fish exclusion fence upstream of the new channel prior to the release of water into the new channel to reduce the likelihood of fish migrating into the new channel with inadequate flow depths present. Flow from the existing creek will be slowly and sequentially transferred to the new channel in an effort to closely monitor water quality conditions, stability of the new channel, and to perform fish rescue and recovery within the existing creek. Additional recommendations for procedures to implement during the dewatering phase may arise from consultation with WDFW. However, no significant or long-term negative impacts on fish populations in Upper Springbrook Creek are expected because of the construction activities.

Other temporary impacts to fish could arise from elevated turbidity levels. In order to reduce temporary increases in turbidity and potential related effects on juvenile salmonids, all ‘in-water’ construction work will take place during the appropriate fish window (July 1 to September 30), the driest time of the year. In addition, best management practices such as installation of a silt fence, placement of staging areas in flat areas above the ordinary high water line with gravel

pads, minimizing the number of trips heavy equipment makes though the project site, and the revegetation of disturbed areas will reduce the generation of turbidity during construction.

In the long term, habitat quality conditions for both anadromous and resident fish are expected to increase greatly. Meandering the stream and the placement of large woody debris will provide pool-riffle structure. The pools will be used as refuge and foraging habitat for both juvenile coho as well as resident fish. Riffles will be utilized for spawning by adult coho as well other fish that are found faster flowing areas, such as sculpin. Diverting the stream away from the road will greatly decrease the amount surface water run-off pollutants fish are exposed to. Streambed gravel will line the channel, providing spawning habitat and better substrate for the production of aquatic insects and other benthic and epibenthic organisms that provide a prey base for juvenile salmonids. Planting the stream banks with native vegetation will provide shading that serves as thermal refuge during warm summer days, as well as a source of organic input for the food chain and insect drop as a direct source of food.

4.4.2 Aquatic Invertebrates

4.4.2.1 No Action

Under the no action alternative benthic invertebrate diversity and abundance will remain low due to the degraded in-stream conditions and pollution runoff received from South 55th Street.

4.4.2.2 Preferred Alternative

Information describing the environmental effects on the aquatic invertebrates of the Green/Duwamish River basin is presented in Section 4.7 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

All benthic invertebrates within the old channel are likely to be lost due to partial backfilling and diversion of flow into the new channel. It is expected that benthic invertebrates will rapidly colonize the new channel and overall diversity and abundance will increase will be greater than the old channel since there will no longer be exposure to pollutants from runoff the stream receives from South 55th Street . In addition, the newly planted native vegetation and many deciduous trees and shrubs that already exists on site will provide a source of organic input to fuel benthic invertebrate communities. The placement of gravel will provide suitable substrate for benthic communities.

4.5 WILDLIFE

4.5.1 No Action

No changes to wildlife use will occur in the area under this alternative.

4.5.2 Preferred Alternative

Information describing the environmental effects on wildlife of the Green/Duwamish River basin is presented in Section 4.9 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Wildlife that is foraging or resting in the vicinity of the project at the time of construction may be temporarily displaced due to the noise and movement of the machinery. However, these effects

will be temporary and displaced animals will likely return to the area after construction is completed. As urban-adapted predators, bald eagles and other raptors that may be foraging over the area are unlikely to be affected by the construction activities as they will focus on other, larger streams in the area. No breeding or nesting areas will be directly impacted, as the construction will take place in mid to late summer. Construction of the restoration site is not expected to result in a long-term reduction in the abundance or distribution of any prey items that local wildlife may be seeking. Planting native trees and shrubs along the stream bank will increase the extent and species diversity in the restoration site by creating additional opportunities for foraging, nesting, cover, and refuge for a wide variety of species.

4.6 THREATENED AND ENDANGERED SPECIES

4.6.1 No Action

The degraded condition of the creek will continue to influence downstream conditions for threatened Chinook and steelhead by way of surface water runoff received from South 55th Street.

4.6.2 Preferred Alternative

Information describing the environmental effects on threatened and endangered fish species of the Green/Duwamish River basin is presented in Section 4.7.4 of the FPEIS (USACE and King County DNR 2000); the effects on threatened and endangered plant species is presented in Section 4.8.3 of the FPEIS and effects on threatened and endangered wildlife species is presented in Section 4.9.2 of the FPEIS (USACE and King County DNR 2000).

The effect determinations made in the Programmatic Biological Assessments for 2the Green Duwamish Ecosystem restoration are listed in Table 4. The USFWS concurred with the determination of "may affect, but not likely to adversely affect" for the bald eagle, marbled murrelet, northern spotted owl, gray wolf, Canada lynx, and bull trout via a concurrence letter dated 27 March 2001 (Appendix D). Similarly, NOAA Fisheries concurred with the determination of "may affect, but not likely to adversely affect" for Puget Sound Chinook salmon via a concurrence letter dated 10 April 2001 (Appendix D). Steelhead have since been listed, but do not occur in the project area. In addition, bull trout and Chinook critical habitat have been designated; however there is no designation in the project area.

Table 4. Threatened and Endangered Species Effects Determinations for the Green-Duwamish Ecosystem Restoration

Species	Listing Status	Critical Habitat	Effects Determination	Services Concurrence
Bald Eagle *Haliaeetus leucocephalus*	Delisted	—	Not likely to adversely affect	Yes
Marbled Murrelet *Brachyramphus marmoratus*	Threatened	Designated	Not likely to adversely affect species or critical habitat	Yes
Northern Spotted Owl *Strix occidentalis caurina*	Threatened	Designated	Not likely to adversely affect species or critical habitat	Yes
Gray Wolf *Canis lupus*	Threatened		Not likely to adversely affect	Yes
Canada Lynx *Lynx canadensis*	Threatened	—	Not likely to adversely affect	Yes
Coastal/Puget Sound Bull Trout *Salvelinus confluentus*	Threatened	—	Not likely to adversely affect	Yes
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	Designated	Not likely to adversely affect species or critical habitat	Yes

A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Although there are no threatened and endangered species occurring within the project area, there are Chinook, steelhead, and bull trout in downstream larger rivers. In order to reduce downstream temporary increases in turbidity and potential related effects on these three species of fish , all 'in-water' construction work will take place during the appropriate fish window (July 1 to September 30), which tends to be the driest time of the year. In addition, best management practices such as installation of a silt fence, placement of staging areas in flat areas above the ordinary high water line with gravel pads, minimizing the number of trips heavy equipment makes though the site, and the revegetetation of disturbed areas will reduce the generation of turbidity during connection of the new channel to the new culvert.

The Corps expects the proposed action will have "**no effect"** on Puget Sound steelhead, Puget Sound Chinook critical habitat, and Puget Sound bull trout critical habitat because they are not present in the project area and downstream effects will be miniscule.

In addition, the Upper Springbrook restoration project will likely contribute to improved conditions in larger downstream sections of stream where species like Chinook salmon, steelhead, and bull trout do occur. By moving the stream away from the road, the downstream environments will no longer receive runoff from South 55th Street. By routing the stream

through a forested wetland, this small tributary will remain cooler during the summer months which will potentially lead to decreases in temperatures downstream.

4.7 CULTURAL RESOURCES

4.7.1 No Action

No disturbance to any possible cultural and historic resources will occur under this alternative.

4.7.2 Preferred Alternative

Information describing the effects on cultural and historic resources of the Green/Duwamish River basin is presented in Section 4.18 of the FPEIS (USACE and King County DNR 2000).

The preferred alternative will have little potential to affect historic properties up to three feet below the current ground surface. It is unlikely ground disturbance below three feet will impact and historic properties, but given the geological nature of the project area, a Corps archaeologist will monitor the excavation stage of construction for cultural materials. The Corps has obtained concurrence with a finding of "No historic properties affected" from the State Historic Preservation Officer (SHPO), pending the monitoring of the project by a professional archaeologist" on May 3, 2010 (Appendix H).

4.8 NATIVE AMERICAN CONCERNS

4.8.1 No Action

There will be no change in Native American concerns for the site under this alternative.

4.8.2 Preferred Alternative

Information describing the effects on cultural and historic resources, including those of Native American concern, of the Green/Duwamish River basin is presented in Section 4.18 of the FPEIS (USACE and King County DNR 2000). A synopsis of site-specific information relevant to the proposed restoration project site is presented below.

The project will improve habitat available to salmon in Upper Springbrook Creek by improving the quality of rearing and foraging habitat available to this important resource for Native American Tribes in the area. Coordination with the Muckleshoot Indian Tribe is ongoing to ensure tribal concerns regarding usual and accustomed fisheries are incorporated into the site design. Construction timing of the project should avoid impacts to both out-migrating juvenile salmonids and adults moving upstream to spawn. Thus, construction will also avoid impacts to resources of importance to the Muckleshoot Indian Tribe.

Additionally, the Corps consulted with the Department of Archaeology and Historic Preservation (DAHP) and has attempted to consult with the Muckleshoot Tribe to determine potential effects of the proposed project on cultural and religious sites of importance to the Muckleshoot people. In addition, previously research has included a search of the DAHP Electronic Historic Sites Inventory Database and archival research. The Corps has not received a response from the Muckleshoot concerning this project. The Corps Archaeologist initiated formal consultation with the Muckleshoot Tribe via e-mail on 29 April 2010. The e-mail respectfully requested comment by 7 May 2010 concerning this project by explaining that this project was under a tight deadline due to its use of stimulus funds. A copy of the report and an official consultation letter

(Appendix H) were attached to this e-mail sent to the Cultural Resources Manager and the Tribal Archaeologist of the Muckleshoot Tribe. In addition, phone calls and subsequent voice mails were placed to the Muckleshoot cultural representatives above on 29 April 2010 and 4 May 2010. There was no response to any of these communications. Finally, a follow up round of communications involving e-mails, phone calls with voicemails and a letter were all conducted on 6 May 2010 requesting comment at their earliest convenience. These requests included the notification that the State Historic Preservation Office (SHPO) has concurred with the determination of "No Historic Properties Effected, pending monitoring by a professional archaeologist" on 3 May 2010. As of yet, representative(s) of the Muckleshoot Tribe have not responded to any of these attempts to coordinate.

4.9 LAND USE

4.9.1 No Action

There will be no changes to land use at the site under this alternative.

4.9.2 Preferred Alternative

Information describing the environmental effects on land and shoreline use in the Green/Duwamish River basin is presented in Section 4.13 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Land use in the project vicinity will not change because of the creek relocation. The proposed project will not affect land use in areas adjacent to the project area, including nearby residential properties. However, construction vehicles may disrupt traffic for local residents. These impacts will be temporary and highly localized, and are therefore are not expected to be significant.

4.10 RECREATION

4.10.1 No Action

Under this alternative, no changes in recreation will occur on site.

4.10.2 Preferred Alternative

Information describing the environmental effects on recreation in the Green/Duwamish River basin is presented in Section 4.14 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Recreation in the project area is not expected to change significantly. There are no plans to put in any access trails; however the clearing of the invasive shrub vegetation may make access easier for those who will like to enjoy the creek.

4.11 AIR QUALITY AND NOISE

4.11.1 No Action

No changes to air quality will occur under this alternative.

4.11.2 Preferred Alternative

Information describing the environmental effects on air quality and noise in the Green/Duwamish River basin is presented in Sections 4.10 and 4.11, respectively, of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Construction vehicles may temporarily increase air emissions and noise in the immediate project vicinity. Approximately 11 landowners surrounding the project area will experience impacts during construction. Noise associated with the use of heavy machinery may disturb local homeowners. However, these impacts will be temporary and highly localized, and will not result in significant impacts.

For every gallon of diesel fuel burned, 22 pounds of CO_2 are produced, and every gallon of gasoline produces 19.4 pounds of CO2 (USEPA, 2008). Based on two excavators and two haulers (500 horsepower each) operating, an estimated 76.66 tons of CO_2 will be produced by construction equipment, using a roadway construction emissions spreadsheet model for non-road equipment (SMAQMD 2008). Also calculated for non-road construction equipment are carbon monoxide (CO), volatile organic carbons (VOCs), nitrogen oxides (NOx), particulate matter (PM), and sulfur oxides (SOx). In addition, loaded dump trucks that might get five miles per gallon of diesel will be required to haul off 1077 cubic yards of material and deliver 525 cubic yards of gravel. In addition to diesel use, there will be gasoline consumed in transporting Corps and construction personnel to the site. Table 5 outlines assumed emissions based on USEPA (2008) and SMAQMD (2008). Emissions from construction equipment will not exceed EPA's *de minimis* threshold or affect the implementation of Washington's Clean Air Act implementation plan. The CO_2 emissions listed below may seem insignificant compared to the thousands of metric tons emitted per year globally (Raupach et. al., 2007). Nevertheless, diesel fuel consumption by heavy machinery required for construction, material haul-off, and gasoline consumption for travel to the sites for all Corps projects, including this project, are a part of world-wide cumulative contributions to change in climate by way of increases in greenhouse gas emission.

Table 5. Estimated emission (tons) of air pollutants and green house gases from operation of vehicles and construction equipment for Upper Springbrook Creek Channel Realignment and Rehabilitation

	CO	ROG (ozone precursors)	CO_2	NO_X	PM	SO_X
Non-road emissions*	0.11	0.07	76.66	0.79	0.03	2.11E-06
Truck emissions **			28.34			
Personal vehicle emissions***			0.58			

*Construction equipment; based on spreadsheet model from SMAQMD (2008); assumes four 500-hp engines working 10 hrs per day, 15 days.
** Assumes 5 mpg diesel, 168 trips, 50 miles round trip for disposal, 25 miles round trip for gravel delivery.
*** Assumes 20 mpg gasoline, 4 round trips/day, 20 miles round trip.

4.12 TRANSPORTATION

4.12.1 No Action

No changes to transportation will occur under this alternative.

4.12.2 Preferred Alternative

Information describing the environmental effects on traffic and transportation in the Green/Duwamish River basin is presented in Section 4.12 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Construction vehicles may temporarily increase the volume of traffic in the immediate project vicinity during excavation of the site. They may also disrupt traffic along South 55th Street and Talbot Road as vehicles access and depart the construction site. This may cause a slight increase in congestion during peak commuting hours. Local residents living on South 55th Street will be inconvenienced by an increase in machinery traffic during construction. Also, South 55th Street will need to closed to one lane in the area where the upstream culvert is located while the new culvert is being installed. However, these impacts will be temporary and highly localized, and are not expected to be significant. To minimize traffic impacts, a traffic control plan will be developed and implemented.

4.13 AESTHETICS

4.13.1 No Action

Under this alternative no changes to aesthetics are expected to occur.

4.13.2 Preferred Alternative

Information describing the environmental effects on visual quality and aesthetic resources of the Green/Duwamish River basin is presented in Section 4.15 of the FPEIS (USACE and King County DNR 2000). A discussion of site-specific information relevant to the proposed restoration project site is presented below.

Removing Upper Springbrook Creek from the existing roadside ditch and relocating it into a more natural stream channel will greatly improve the visual and aesthetic appeal of the creek. A buffer of trees and shrubs will shield the creek from South 55th Street for the majority of the reach. Removal of invasive weeds and the planting of native vegetation will also increase the visual appeal of the site.

During excavation and construction of the site, the aesthetic quality of the general area could be reduced due to the noise and air emissions generated by the construction equipment, which may disturb local homeowners. However, these impacts will be temporary and highly localized, and are not expected to result in significant impacts.

5. UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects of the proposed project include:

(1) Noise disturbance to wildlife and homeowners in the vicinity due to operating heavy machinery during excavation and construction of the restoration site. Most wildlife are anticipated to avoid the area while work is in progress. To reduce impacts, work will be conducted only during daylight hours in accordance with local noise ordinances.

(2) Disruption of local traffic in the project vicinity during construction. Proper signage and flagmen will be utilized to address safety concerns and move traffic through the area as quickly as possible.

(3) Mortality of forested wetland vegetation, including 10 larger alder trees and under-story shrubs within the project site. Planned plantings onsite will compensate for this impact.

(4) Excavation of approximately 0.19 acres of existing forested wetland. The enhancement of the remaining wetlands by routing a creek channel through the area, removing invasive plant species, and planting native species will compensate for this loss by increasing the overall habitat function of the site.

(5) Impacts to turbidity during the connection of the newly aligned stream to the upstream culvert and the downstream existing channel.

(6) Impacts to the biota in the existing channel due to partial backfilling and diverting flow to the new channel.

6. CUMULATIVE IMPACTS

Cumulative impacts result from the "individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). As such they include the impacts of this restoration project considered in conjunction with current and future projects constructed or planned within the lower Green/Duwamish River watershed.

Multiple restoration projects are ongoing in the Green-Duwamish basin, both associated with the Corps and the Green-Duwamish ERP and associated with other efforts. Specifically, other ERP projects proposed for implementation in the near future include: Riverview Park Side Channel Construction, Big Spring Creek Restoration in Enumclaw, Meridian Creek Outlet and Wetland Restoration in Kent, and Mill Creek Wetland Restoration in Auburn. In addition, other ERP restoration projects have been completed in recent past (i.e. Site 1 Estuarine Restoration, Codiga Farms Side Channel Construction, Hamm Creek Realignment, and Meridian Valley Creek Realignment). Additional projects not associated with the ERP are planned or on-going in the Green-Duwamish watershed include invasive species removal, gravel nourishment, removal of fish barriers or culvert replacements, levee realignment, limiting livestock access to creeks, and public outreach efforts to educate the public about land use impacts. All of these efforts will result in long-term, cumulative benefits to the amount and functional value of restored habitat, improvements in the overall watershed condition, and will ultimately increase the ability of the watershed to support critical life history stages of native fish and wildlife populations. Other less beneficial activities in the watershed include ongoing levee and dam repairs and continued

development and ongoing land use practices all of which perpetuate the degraded condition of the Green River.

Negative effects of the Upper Springbrook Creek Restoration project add to the cumulative negative effects by development and activities in the watershed. However, these negative effects are temporary and are associated only with the actual construction of the project, concentrated mainly in the channel, construction in the forested wetland, and when the new stream channel is hydraulically joined to the old channel before it exits under Highway 167. The combination of best management practices (BMPs) reduce the cumulative, short-term (i.e. construction related) impacts of these projects to an insignificant level. More significantly, the long-term beneficial effects generated by the project compensate for these short-term negative effects. Thus, the proposed restoration project will contribute to beneficial cumulative effects within the watershed from restoration activities and will help to incrementally offset adverse impacts on habitats from past, present, and future redevelopment projects along Upper Springbrook Creek.

7. COORDINATION

Development and design of this project has been coordinated with involvement by the following agencies and entities:

- State of Washington Department of Fish and Wildlife
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- Washington Department of Ecology
- Washington State Historic Preservation Office
- Muckleshoot Indian Tribe
- City of Renton, King County, Washington
- Corps of Engineers Sacramento District- agency technical review.

A public comment period was held from 6, April 2010 to 6 May 2002. Comments received and the Corps responses to these comments can be found in Appendix I

8. ENVIRONMENTAL COMPLIANCE

8.1 National Environmental Policy Act

This Environmental Assessment, dated May 2010, is intended to achieve NEPA compliance for the proposed project. As required by NEPA, this EA describes existing environmental conditions at the project site, the proposed action and alternatives, potential environmental impacts of the proposed project, and measures to minimize environmental impacts. The Corps invited submission of factual comment on the environmental impact of the proposed project. Comments were considered in determining whether it will be in the best public interest to proceed with the proposed project. The Corps considered all submissions received before the expiration date of the public notice that accompanied the draft environmental assessment. Based on the analysis in the EA and the comments received the Corps has determined that a Finding of No Significant Impact (FONSI) is appropriate.

8.2 Endangered Species Act of 1973 as amended (PL 93-205)

In accordance with Section 7(a)(2) of the Endangered Species act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must identify and evaluate any threatened and endangered species, and their critical habitat, that may be affected by an action proposed by that agency. Two separate Biological Assessments (one for NMFS and one for USFWS) were prepared for the Green–Duwamish ERP in association with the (Final Programmatic Environmental Impact Statement) FPEIS which assessed potential effects to listed species from the proposed projects. The BAs determined that the proposed work was not likely to adversely affect endangered or threatened species or their critical habitats designated under the Act. Supplemental consultation for newly listed species and critical habitat has been determined to have "no effect", due to their absence at the project site and insignificant impacts to downstream reaches. Consultation with the service is, therefore, not required.

8.3 Clean Water Act

Section 404 of the Clean Water Act authorized a permit program for the disposal of dredged or fill material into waters of the United States, and defined conditions which must be met by Federal projects before they may make such discharges. The Corps of Engineers retains primary responsibility for this permit program. The USACE does not issue itself a permit under the program it administers, but rather demonstrates compliance with the substantive requirements of the Act through preparation of a 404(b)(1) evaluation.

The Corps is preparing a 404(b)(1) evaluation to document findings regarding this project pursuant to Section 404 of the Act as well as Section 10 of the Rivers and Harbors Act of 1899. Preliminarily, the Corps believes that this project is analogous to the conditions of Nationwide Permit 27, Aquatic Habitat Restoration. This document can be found in Appendix F.

Section 401 of the Act requires federal agencies to comply with EPA, state, or tribal water quality standards. EPA has delegated Section 401 to the Washington Department of Ecology. This work requires a WQC from the Washington Department of Ecology for compliance with Section 401 of the Clean Water Act for work below the Ordinary High Water (OHW) line. On 28 April 2010, the Corps received a 401 certification under the conditions of a Nationwide Permit 27 from the Washington Department of Ecology (Appendix G).

Section 402 of the Act requires a National Pollutant Discharge Elimination System (NPDES) permit and the associated implementing regulations for General Permit for Discharges from large and small construction activities for construction disturbance over one acre. This project will not have land disturbance of over one acre and therefore a NPDES permit need not be obtained.

8.4 Coastal Zone Management Act (16 USC 1456 et. seq.)

The Coastal Zone Management Act of 1972 as amended (15 CFR 923) requires Federal agencies to carry out their activities in a manner, which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program. The proposed action will relocate a stream through an adjacent wetland, thus moving the shoreline. However, this project will not cause substantial adverse effects to shore resources or the environment. After review of the City of Renton Shoreline Master Plan, the Corps believes this proposal is consistent to the maximum extent practicable. On 28 April 2010, Coastal Zone

Consistency Determination concurrence was received from the Washington Department of Ecology (Appendix G).

8.5 National Historic Preservation Act (16 U.S.C. 470)

The National Historic Preservation Act (16 USC 470) requires that the effects of proposed federal undertakings on sites, buildings structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The Upper Springbrook Creek project is Federal undertaking of the type which might affect historic properties. As such it is subject to the Section 106 process. The Corps, in order to comply with Section 106 of the NHPA has initiated historic properties studies for the proposed project. The area of potential effects for the project was defined as the project area, access road, and staging areas. There are no recorded properties listed in, or eligible for listing in the National Register of Historic Places (NRHP) within the project area of potential effects (APE).

8.6 Fish and Wildlife Coordination Act (16 U.S.C. 661)

The Fish and Wildlife Coordination Act (16 U.S.C. 661) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. The Corps conducted a programmatic consultation with USFWS for the Green-Duwamish ERP. A Fish and Wildlife Coordination Act Report was received for the Green-Duwamish ERP in association with the FPEIS.

8.7 Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d)

The BGEPA prohibits the taking, possession or commerce of bald and golden eagles, except under certain circumstances. Amendments in 1972 added penalties for violations of the act or related regulations.

No take of either bald or golden eagles is likely during project construction. There are no observed nests at the project site and no known nests within a half mile of the project site. Therefore, no adverse affect to eagles are anticipated. If a nest or juveniles are observed during construction, appropriate measures will be taken to ensure no harassment occurs.

8.8 Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)

No portions of the Green River or its tributaries have been designated as a Wild and Scenic River and this act is therefore not applicable to the proposed work.

8.9 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental affects of agency programs and activities on minority and low-income populations.

The project does not involve the siting of a facility that will discharge pollutants or contaminants, so no human health effects will occur. Therefore the proposed action is in compliance with this order.

8.10 Executive Order 11990, Protection of Wetlands, May 24, 1977

Although 0.27 acres of wetlands will be impacted due to the excavation of the new channel and the placement of three staging areas for access during construction (only 0.19 acres will be permanently impacted), the overall gain in habitat functions and value that will result from relocating the creek away from the road, meandering it through the adjacent wetland, placing gravel suitable for fish spawning and invertebrate colonization, and planting native riparian vegetation are expected to offset this loss.

8.11 Executive Order 11988, Floodplain Management, 24 May 1977

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains." The proposed action will not create a change that will affect occupancy of the floodplain.

9. CONCLUSION

Based on this Environmental Assessment and on coordination with Federal agencies, Native American Tribes, and State agencies, the Upper Springbrook Creek Restoration project is not expected to result in significant adverse environmental impacts. The Upper Springbrook Creek Restoration project is not considered a major Federal action having a significant impact on the human environment. Therefore, the preparation of an environmental impact statement is not required.

Literature Cited

Connell, Margaret A., James G. Hallett, and Stephen B. WeStreet 1993. Wildlife Use of Riparian Habitats: A Literature Review. TEW-WL1-001.

DEA. 2001. Hydraulic Report – State Route 167 Culvert Replacement, Upper Springbrook Creek, MP 23.6, King County. Prepared for Washington State Department of Transportation, Northwest Region, Seattle, Washington. David Evans & Associates, Inc. September 2001.

Fishing Works. 2009. Panther Lake Fishing in King County. Accessed online at: http://www.fishingworks.com/lakes/washington/king/renton/panther-lake/

Harza. 1995. Final Report: Comprehensive fisheries assessment of the Mill Creek, Garrison Creek and Springbrook system. Consultant report prepared for the City of Kent, Environmental Engineering. Kent, Washington. 114. pp. + Appendices.

Kerwin, J. and T. S. Nelson, (Eds.). December 2000. "Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds (WRIA 9 and Vashon Island)." Washington Conservation Commission and the King County Department of Natural Resources.

King County. 2005. King County Surface Water Design Manual. King County, Washington.

King County Department of Development and Environmental Services. 2009. Land Use Atlas. Accessed online at: http://www.kingcounty.gov/property/permits/gis/LandUseAtlas.aspx

KCDNRP (King County Department of Natural Resources and Parks). 2002. King County bull trout program: 2001 bull trout surveys, freshwater and marine nearshore. Prepared by Taylor Associates, Inc., Seattle, Washington.

National Marine Fisheries Service (NMFS). 2005. Endangered and threatened species; Designation of Critical Habitat for 12 Evolutionary Significant Units of West Coast Salmon and Steelhead in Washington, Oregon and Idaho.

NMFS. 2007. Endangered and Threatened Species: Final Listing Determination for Puget Sound Steelhead; Final Rule. 72 FR 26722-26735.

NMFS. 2009. Species of Concern Information Page: Coho Salmon. Accessed online at: http://www.nmfs.noaa.gov/pr/pdfs/species/cohosalmon_detailed.pdf

Puget Sound Clean Air Agency. 2008. 2007 Air Quality Data Summary. Accessed online at: http://www.pscleanair.org/news/library/reports/2007AQDSFinal.pdf

Raupach, R.M., G. Marland, P. Ciais, C. Le Cuere, J. Canadell, G. Klepper, and C. Field. 2007. Global and regional drivers of accelerating CO_2 emissions. Proceedings of the National Academy of Sciences 104(24):10288-10293.

SMAQMD (Sacramento Metropolitan Air Quality Management District). 2008. CEQA tools. Accessed online at: http://www.airquality.org/ceqa/index.shtml.

U.S. Army Corps of Engineers (USACE) and King County Department of Natural Resources (DNR). 2000. Programmatic NEPA/SEPA Environmental Impact Statement and Green/Duwamish River Restoration Plan. Seattle, WA.

USACE. 2008. Phase 1 Environmental Site Assessment to Support the Upper Springbrook Creek Restoration Project. Seattle, WA.

USDA (United States Department of Agriculture). 2009. Web Soil Survey. Accessed online at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

USEPA (U.S. Environmental Protection Agency). 2008. Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel. Accessed online at: http://www.epa.gov/OMS/climate/420f05001.htm

USFWS (US Fish and Wildlife Service). 1999. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States: Final Rule. 50 FR 589110-58933

Washington Department of Fish and Wildlife (WDFW). 1975. A Catalog of Washington Streams and Salmon Utilization, Volume 1 Puget Sound

WDFW. 1999. Washington GAP Data Analysis. Accessed online at: http://www.wdfw.wa.gov/wlm/gap/vdm.htm

WDFW. 2002. Washington State salmon and steelhead stock inventory, Olympia, Washington

WDFW. 2003. Design of Road Culverts for Fish Passage. Washington Department of Fish and Wildlife

WDFW. 2008. Priority Habitat and Species List (PHS). Accessed online at : http://wdfw.wa.gov/hab/phsliStreethtm

Washington Department of Ecology (WDOE). 2008a. Hazardous Sites LiStreet Online at: http://www.ecy.wa.gov/pubs/0809043a.pdf

Washington Department of Ecology (WDOE). 2008b. Water Quality Assessment Tool for Washington. Accessed online at : http://apps.ecy.wa.gov/wqawa2008/viewer.htm

WDOE. 2009. Air Quality webpage. Accessed online at: http://www.ecy.wa.gov/air.html

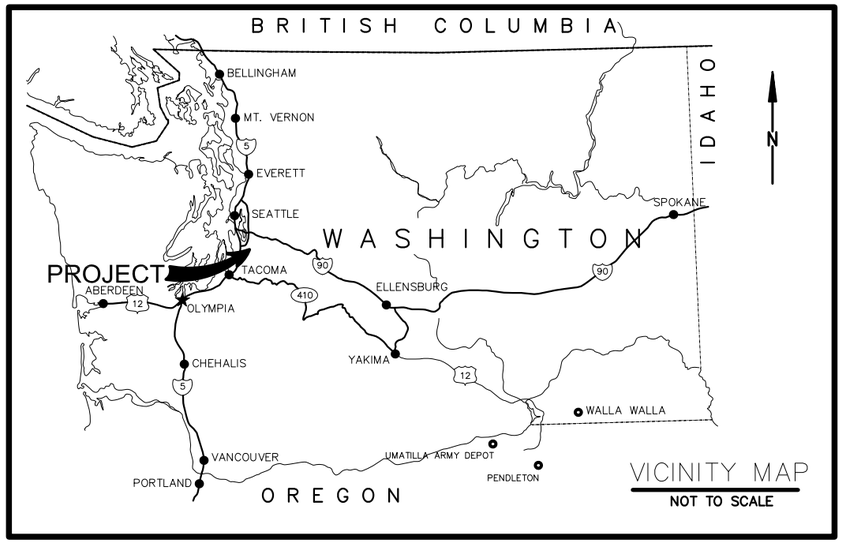
WDOT (Washington Department of Transportation). 2001. Hydraulic Report: State Route 167 Culvert Replacement, Upper Springbrook Creek. WDOT0000-0231

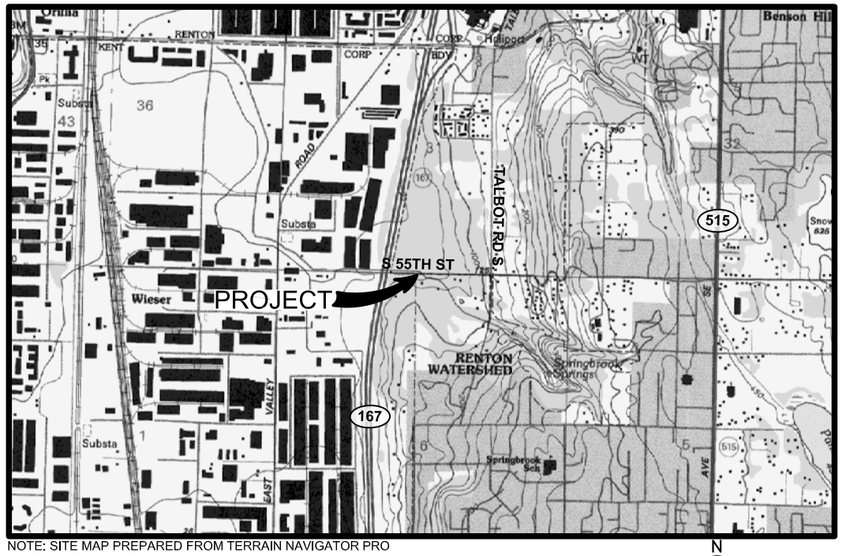
Appendix A
Project Plans

US Army Corps
of Engineers
Seattle District

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT

RENTON,
WASHINGTON





NOTE: SITE MAP PREPARED FROM TERRAIN NAVIGATOR PRO
USGS TOPOQUAD 1:24K, RENTON, WA 47122-D2-TF-024

N
PLAN NORTH
IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

PN 134779 FY 10

ANCHOR QEA
1605 CORNWALL AVENUE | BELLINGHAM, WA 98225 | (360) 733-4311

US Army Corps of Engineers
Seattle District

File # | Invitation # | Date

Recommended by (TYPE IN NAME) CHIEF, DESIGN BRANCH DATE:
Approved by (TYPE IN NAME) ACTG CH, ENG. AND CONST. DIV DATE:

Submitted by (TYPE IN NAME) DESIGN MANAGER
Reviewed by (TYPE IN NAME) CH, TECH ENG AND REVIEW SEC. DATE:

U.S.ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by
ANCHOR QEA, LLC
A/E FIRM NAME
5-11-2010
DATE:

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
COVER SHEET
RENTON WA
PN 134779

Plate number:
G-1
Sheet 1 of 30

May 11, 2010 8:32am epipkin B:\Projects\0202_Corps\090202-01_SpringbrookCreek\CAD\100%\090202-01-WK-SPRINGBROOK-100% DRAFT-003.dwg G-1 COVER

PROJECT INFORMATION:

PROJECT LOCATION: SPRINGBROOK CREEK AT S 55TH ST.
BETWEEN TALBOT RD. S AND EAST VALLEY
FREEWAY (STATE ROUTE 167), RENTON, WA 98055

CONTRACTING AGENCY: U.S. ARMY CORPS OF ENGINEERS-SEATTLE DISTRICT
4735 EAST MARGINAL WAY SOUTH
SEATTLE, WA 98134

POINT OF CONTACT: LYNN WETZLER, PROJECT MANAGER
(206)764-3695

LOCAL SPONSOR: CITY OF RENTON
1055 S. GRADY WAY
RENTON, WA 98057

LOCAL SPONSOR CONTACT: ALLEN QUYNN,P.E., SURFACE WATER UTILITY ENGINEER

CONSULTING ENGINEER: TRACY DRURY, P.E., PROJECT ENGINEER
ANCHOR QEA, LLC
1605 CORNWALL AVENUE
BELLINGHAM, WA 98225
(360)733-4311 x223

SHEET SEQUENCE	SHEET NO.	SHEET TITLE
1	G-1	COVER SHEET
2	G-2	NOTES AND SPECIFICATIONS
3	C-1	EXISTING CONDITIONS AND SURVEY CONTROL PLAN
4	C-2	PROJECT PLAN SITE MAP
5	C-3	PROJECT PLAN 1
6	C-4	PROJECT PLAN 2
7	C-5	PROJECT PLAN 3
8	C-6	SITE ACCESS AND STAGING PLAN
9	C-7	CARE OF WATER PLAN
10	C-8.0	TYPICAL CHANNEL CROSS-SECTIONS
11	C-8.1	TYPICAL CHANNEL CROSS-SECTIONS AND DETAILS
12	C-9.0	GRADING PLAN AND WOOD PLACEMENT CHANNEL STATIONS 0+00 TO 4+50
13	C-9.1	GRADING PLAN AND WOOD PLACEMENT CHANNEL STATIONS 4+75 TO 9+60
14	C-9.2	GRADING PROFILE
15	C-9.3	SECTION VIEWS: STATIONS 9+60 TO 6+00
16	C-9.4	SECTION VIEWS: STATIONS 5+75 TO 2+00
17	C-9.5	SECTION VIEWS: STATIONS 1+75 TO 0+00
18	C-10.0	CULVERT CONSTRUCTION PLAN AND PROFILE
19	C-10.1	CULVERT CONSTRUCTION CROSS-SECTIONS
20	C-10.2	CULVERT INLET PLAN AND CONNECTION DETAILS
21	C-10.3	CULVERT OUTLET PLAN AND DETAILS
22	C-10.4	CULVERT CHANNEL PLAN AND SECTIONS
23	C-11	SANITARY SEWER PLAN AND DETAILS
24	C-12.0	ROAD REPLACEMENT PLAN
25	C-12.1	ROAD REPLACEMENT SECTIONS
26	C-13	FLOODPLAIN LOG PLACEMENT AND PLANTING DETAILS
27	C-14	TYPICAL DETAILS
28	L-1.0	PLANTING PLAN CHANNEL STATIONS 0+00 TO 4+20
29	L-1.1	PLANTING PLAN CHANNEL STATIONS 4+20 TO 9+60
30	L-2.0	PLANTING TABLE

GENERAL CONSTRUCTION NOTES:

1. UNLESS OTHERWISE NOTED IN THE DRAWINGS AND SPECIFICATIONS, ALL WORK SHALL CONFORM TO CITY OF RENTON SPECIAL PROVISIONS AND STANDARD PLANS AND WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD DETAILS (CURRENT EDITION), "STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION".
2. DETAILS ARE INTENDED TO SHOW THE FINAL RESULT OF THE DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB SITE DIMENSIONS OR CONDITIONS AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
3. CONTRACTOR SHALL KEEP JOB SITE AREA CLEAN AND HAZARD-FREE. CONTRACTOR SHALL DISPOSE OF ALL DIRT, DEBRIS, AND RUBBISH FOR DURATION OF THE WORK. UPON COMPLETION OF WORK, CONTRACTOR SHALL REMOVE ALL MATERIAL AND EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY.
4. REPRESENTATIONS OF TRUE NORTH SHALL NOT BE USED TO IDENTIFY OR ESTABLISH THE BEARING OF TRUE NORTH AT THIS JOB SITE.
5. WHERE A CONSTRUCTION DETAIL IS NOT SHOWN OR NOTED, THE DETAIL SHALL BE THE SAME AS FOR OTHER SIMILAR WORK.
6. IN-STREAM WORK TO BE COMPLETED DURING SUMMER OF 2011 (1 JUL 11 - 30 SEP 11). SEE SPECIFICATIONS, PERMITS, AND THESE PLANS FOR FURTHER DETAIL. IN-STREAM WORK INCLUDES ACTIVITIES CONDUCTED IN EXISTING AND PROPOSED CHANNELS.

STANDARD CIVIL NOTES:

1. ALL SITE WORK SHALL BE AS INDICATED ON THE CONTRACT DOCUMENTS.
2. DO NOT EXCAVATE OR DISTURB BEYOND THE PROJECT LIMITS UNLESS NOTED OTHERWISE.
3. RUBBISH, DEBRIS, GARBAGE, AND OTHER REFUSE SHALL BE REMOVED FROM THE JOB SITE AND DISPOSED OF LEGALLY.
4. NO TOPSOIL, ORGANIC SPOILS, FILL, EXCAVATED MATERIAL, RIPRAP, CONSTRUCTION MATERIAL, EQUIPMENT, OR ANY OTHER SUCH ITEMS SHALL BE PLACED, STOCKPILED, OR PARKED IN THE ROADWAY SUCH THAT IT WOULD PREVENT A MINIMUM WIDTH OF 12-FEET FOR TRAFFIC CLEARANCE.
5. ANY BACKFILL, NOT OTHERWISE DESCRIBED ON THE CONTRACT DOCUMENTS, MUST BE PLACED WITH A MAXIMUM LIFT DEPTH OF 12-INCHES AND COMPACTED AS DESCRIBED IN THE SPECIFICATIONS OR AS INSTRUCTED BY CONTRACTING OFFICER.
6. CONTRACTOR AND ITS EMPLOYEES SHALL PROVIDE SAFETY TRAINING FOR THE WORK CREW PRIOR TO STARTING THE PROJECT.
7. THE AREAS OF THE JOB SITE DISTURBED BY THE WORK SHALL BE GRADED SMOOTH TO THE PRE-CONSTRUCTION GRADE AND PROTECTED AND/OR REVEGETATED AS SPECIFIED HEREON.
8. ALL MATERIALS SHALL BE NEW AND UNDAMAGED, UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER. THE SAME MANUFACTURER OF EACH ITEM SHALL BE USED THROUGHOUT THE WORK UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.

UTILITY NOTES:

1. THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE DRAWINGS ARE APPROXIMATE. THE LOCATIONS OF EXISTING UTILITIES HAVE NOT BEEN FIELD VERIFIED. THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT THE UTILITY LOCATION REQUEST CENTER (ONE-CALL CENTER) AT 811 FOR UTILITY LOCATIONS NOT LESS THAN TWO (2) BUSINESS DAYS BEFORE THE SCHEDULED DATE FOR EARTHWORK OR TRENCHING THAT MAY IMPACT EXISTING UTILITIES.
2. EXISTING TELECOMMUNICATIONS UTILITIES CONTACT INFORMATION: QWEST COMMUNICATIONS INTERNATIONAL INC. BURIED LINE SERVICES, 1-800-566-3009. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH UTILITY OWNERS REGARDING RELOCATION SERVICES.
3. ALL ABANDONED UTILITIES WHICH INTERFERE WITH THE EXECUTION OF THE WORK SHALL BE VERIFIED BY THE CONTRACTING OFFICER AND THE UTILITY FRANCHISE PRIOR TO DISTURBING THE UTILITIES. ONLY AFTER WRITTEN APPROVAL OF DISTURBANCE OR MODIFICATION OF THE UTILITY FROM THE UTILITY FRANCHISE IS RECEIVED BY THE CONTRACTING OFFICER MAY THE CONTRACTOR TAKE ACTION.
4. SIZE, LOCATION, AND TYPE OF ANY UNDERGROUND UTILITIES OR IMPROVEMENTS SHALL BE ACCURATELY NOTED AND PLACED ON AS-BUILT DRAWINGS BY THE CONTRACTOR AND ISSUED TO THE USACE AND/OR ENGINEER AT COMPLETION OF THE PROJECT.

SURVEY NOTES:

1. SURVEY PROVIDED BY:
DUANE HARTMAN AND ASSOCIATES, INC. (DHA JOB No.07-1279)
16928 WOODINVILLE-REDMOND ROAD, B-107
WOODINVILLE, WA 98072
(425)483-5355
2. SURVEY CONDUCTED BETWEEN JULY 22 AND JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009. FOOT NOMINAL VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83/1991
3. BASIS OF BEARINGS: WASHINGTON STATE PLANE NORTH ZONE BASED ON KNOWN COORDINATES FROM ONSITE CONTROL.

ABBREVIATIONS

ABB.	TERM
ABB.	ABBREVIATION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
CDF	CONTROLLED DENSITY FILL
CSTC	CRUSHED SURFACING TOP COURSE
CSBC	CRUSHED SURFACING BASE COURSE
CFS	CUBIC FEET PER SECOND
CONC.	CONCRETE
CONT.	CONTINUED
CP	CONTROL POINT (AS IN SURVEY)
CY	CUBIC YARD
DBH	DIAMETER AT BREAST HEIGHT
DHA	DUANE HARTMAN & ASSOCIATES
D.I.	DUCTILE IRON
DIA.	DIAMETER
DIV.	DIVERSION
EA.	EACH
EIPS	EXTRA IMPROVED PLOW STEEL
EL. or ELEV.	ELEVATION
EX.	EXISTING
FT.	FOOT OR FEET
GALV.	GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIX ASPHALT
I.E.	INVERT ELEVATION
IN.	INCH OR INCHES
IWRC	INDEPENDENT WIRE ROPE CORE
LWD	LARGE WOODY DEBRIS
LS	LUMP SUM
MAX.	MAXIMUM
MIN.	MINIMUM
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
OE	OVERHEAD ELECTRIC
OHWL	ORDINARY HIGH WATER LINE
P.E.	PROFESSIONAL ENGINEER
PK	PROPERTY CORNER
PVC	POLYVINYL CHLORIDE
QRTR.	QUARTER
QTY.	QUANTITY
R.O.W.	RIGHT-OF-WAY
S	SLOPE
S.S.	SANITARY SEWER
SF	SQUARE FOOT OR FEET
SO.	SOUTH
SPEC.	SPECIFICATION
SSMH	SANITARY SEWER MANHOLE
STA.	STATION
STRUCT.	STRUCTURE
SY	SQUARE YARD
TBD	TO BE DETERMINED
TYP.	TYPICAL
USACE	U.S. ARMY CORPS OF ENGINEERS
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WSEL	WATER SURFACE ELEVATION

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

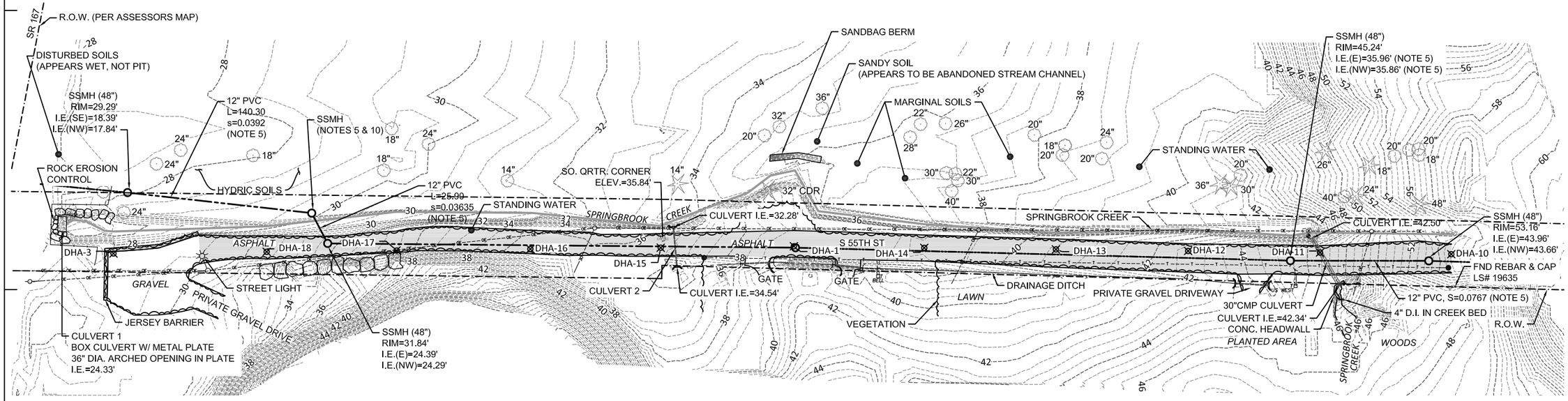
Description	Symbol	Appr.	Date

Date: 11 MAY 10
File #
Rev.
Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Prepared by: ANCHOR QEA

U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
NOTES AND SPECIFICATIONS
RENTON PN 134779 WASHINGTON

Plate number:
G–2
Sheet 02of 30



SURVEY CONTROL POINTS				
POINT#	NORTHING (FT)	EASTING (FT)	ELEV. (FT)	DESCRIPTION
DHA-1	160017.05	1297746.47	39.38	SPIKE
DHA-3	160011.62	1297231.48	29.09	COTTON SPINDLE
DHA-10	160011.09	1298244.08	55.07	PK NAIL
DHA-12	160013.51	1298044.86	42.67	PK NAIL
DHA-11	160012.30	1298144.71	46.42	PK NAIL
DHA-13	160014.69	1297944.79	40.58	PK NAIL
DHA-14	160015.86	1297845.16	39.12	PK NAIL
DHA-15	160015.98	1297645.70	36.29	PK NAIL
DHA-16	160014.94	1297547.01	36.40	PK NAIL
DHA-17	160013.80	1297445.76	33.42	PK NAIL
DHA-18	160012.87	1297347.42	30.32	PK NAIL

LEGEND:

- EXISTING CREEK
- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- RIGHT-OF-WAY (PER ASSESSORS MAP)
- EDGE OF VEGETATION
- EDGE OF ASPHALT
- CULVERT
- DITCH
- SANITARY SEWER LINE
- OVERHEAD ELECTRIC UTILITY
- UNDERGROUND TELEPHONE UTILITY
- FENCE
- TELEPHONE MANHOLE
- TELEPHONE RISER
- POWER POLE
- SURVEY CONTROL POINT
- SANITARY SEWER MANHOLE
- ROCK EROSION CONTROL
- ABANDONED GAGE
- TREE (DECIDUOUS)
- TREE (CEDAR)
- QUARTER SECTION CORNER

0 40 80
SCALE IN FEET

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE 0.5-FOOT.
4. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22- JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
5. SELECTED SANITARY SEWER INFORMATION FROM *CASCADE SEWER DISTRICT, SEWER PLAN AND PROFILE U.L.I.D. NO. 34, S-229701* DATED DECEMBER 1, 1978, PROVIDED BY CITY OF RENTON.
6. WETLAND SURVEY CONDUCTED SEPTEMBER, 2008 BY USACE.
7. EXISTING TREES TO BE PROTECTED UNLESS OTHERWISE DIRECTED BY CONTRACTING OFFICER AS DESCRIBED IN SPECIFICATIONS.
8. RELOCATION OF EXISTING UTILITIES TO BE COORDINATED BY CITY OF RENTON REPRESENTATIVES.
9. SURVEYORS NOTES INCLUDE SOIL OBSERVATIONS SUCH AS "DISTURBED SOILS", "NOT PIT", "MARGINAL SOILS". OBSERVATIONS WERE MADE AT THE TIME OF THE FIELD SURVEY.
10. ELEVATIONS TO BE FIELD VERIFIED PRIOR TO CHANNEL CONSTRUCTION.

N
PLAN NORTH

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

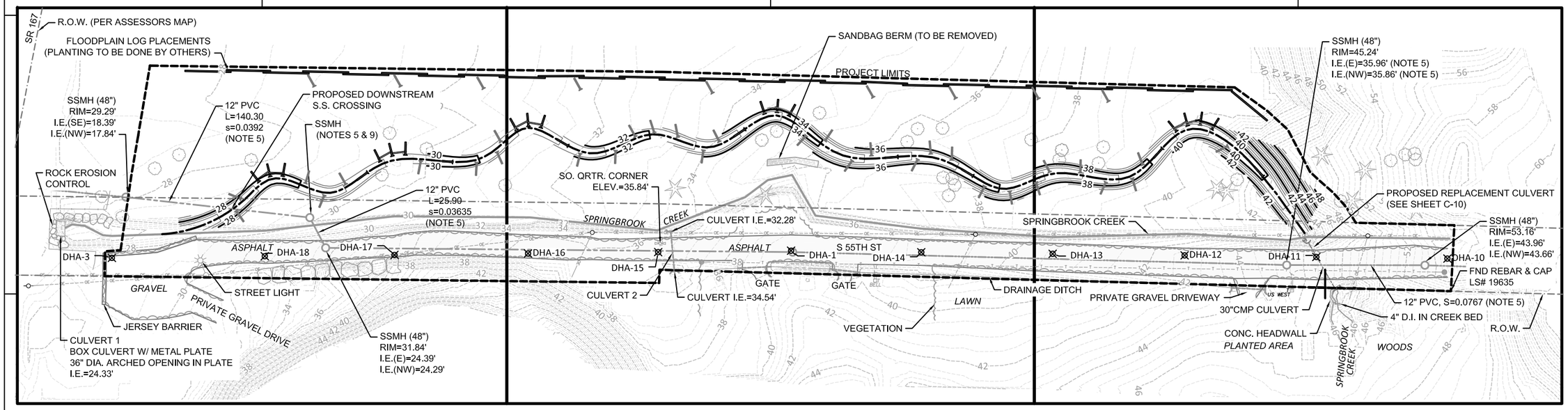
Symbol	Description	Date	Appr.	Symbol	Description
		//			

Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
File #
Rev.

U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
EXISTING CONDITIONS AND SURVEY CONTROL PLAN
RENTON PN 134779 WASHINGTON

Plate number:
C–1
Sheet 03of 30



LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CREEK ALIGNMENT
- EXISTING CREEK
- EXISTING CULVERT
- EXISTING DITCH
- EXISTING SANITARY SEWER LINE
- EXISTING UNDERGROUND TELEPHONE UTILITY
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING EDGE OF VEGETATION
- EXISTING FENCE
- PROJECT/CONSTRUCTION LIMIT BOUNDARY (NOTE 8)
- PROPOSED CULVERT
- RIGHT-OF-WAY (PER ASSESSORS MAP)
- EXISTING TELEPHONE MANHOLE
- EXISTING TELEPHONE RISER
- EXISTING POWER POLE
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING SANITARY SEWER MANHOLE
- ABANDONED GAGE
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)
- QUARTER SECTION CORNER
- PROPOSED LWD PLACEMENT TYPE 1
- PROPOSED LWD PLACEMENT TYPE 2
- PROPOSED LWD PLACEMENT TYPE 3
- PROPOSED FLOODPLAIN LOG PLACEMENT (DIAMETER INDICATED IN DRAWING, NOTE 6)

0 40 80
SCALE IN FEET

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7. FLOODPLAIN LOG DIAMETERS ARE BASED ON 10-YEAR FLOOD EVENT.
8. PROJECT LIMIT TO SOUTH IS R.O.W. ON SOUTH SIDE OF S.55TH ST.
9. ELEVATIONS TO BE FIELD VERIFIED PRIOR TO CHANNEL CONSTRUCTION.

N
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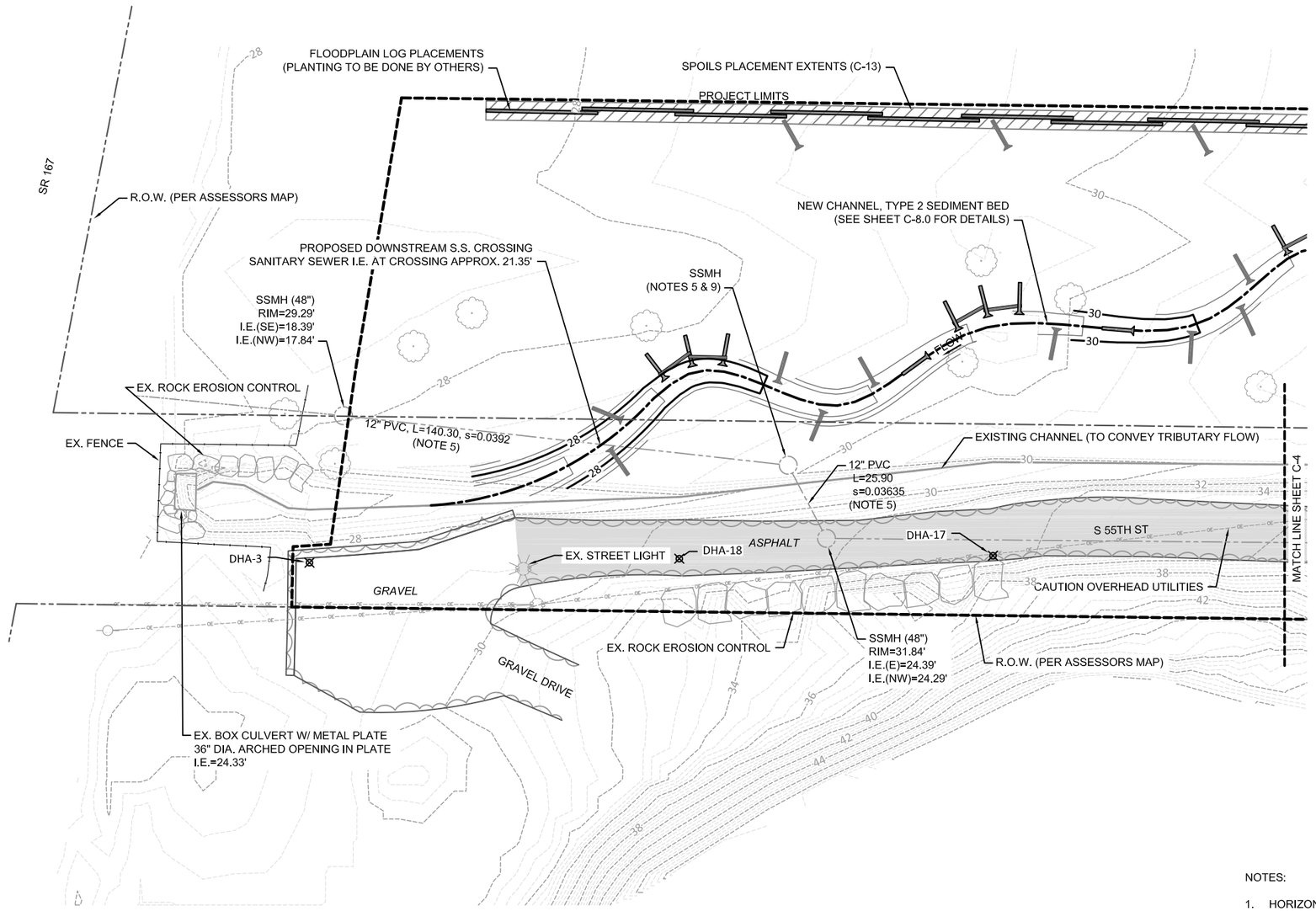
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PROJECT PLAN SITE MAP
RENTON PN 134779 WASHINGTON

Plate number:
C–2
Sheet 04 of 30



0 20 40
SCALE IN FEET

LEGEND:

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- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
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- PROPOSED CREEK ALIGNMENT
- EXISTING CREEK
- EXISTING CULVERT
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- EXISTING UNDERGROUND TELEPHONE UTILITY
- EXISTING OVERHEAD ELECTRIC UTILITY
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- EXISTING FENCE
- PROJECT/CONSTRUCTION LIMIT BOUNDARY (NOTE 8)
- PROPOSED CULVERT
- RIGHT-OF-WAY (PER ASSESSORS MAP)
- SPOILS PLACEMENT EXTENTS (C-13)
- EXISTING TELEPHONE MANHOLE
- EXISTING TELEPHONE RISER
- EXISTING POWER POLE
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING SANITARY SEWER MANHOLE
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)
- PROPOSED LWD PLACEMENT TYPE 1 (SEE SHEET C-9.0)
- PROPOSED LWD PLACEMENT TYPE 2 (SEE SHEET C-9.0)
- PROPOSED LWD PLACEMENT TYPE 3 (SEE SHEET C-9.0)
- PROPOSED FLOODPLAIN LOG PLACEMENT (NOTE 6)

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9. ALL ELEVATIONS TO BE FIELD VERIFIED PRIOR TO CHANNEL CONSTRUCTION.

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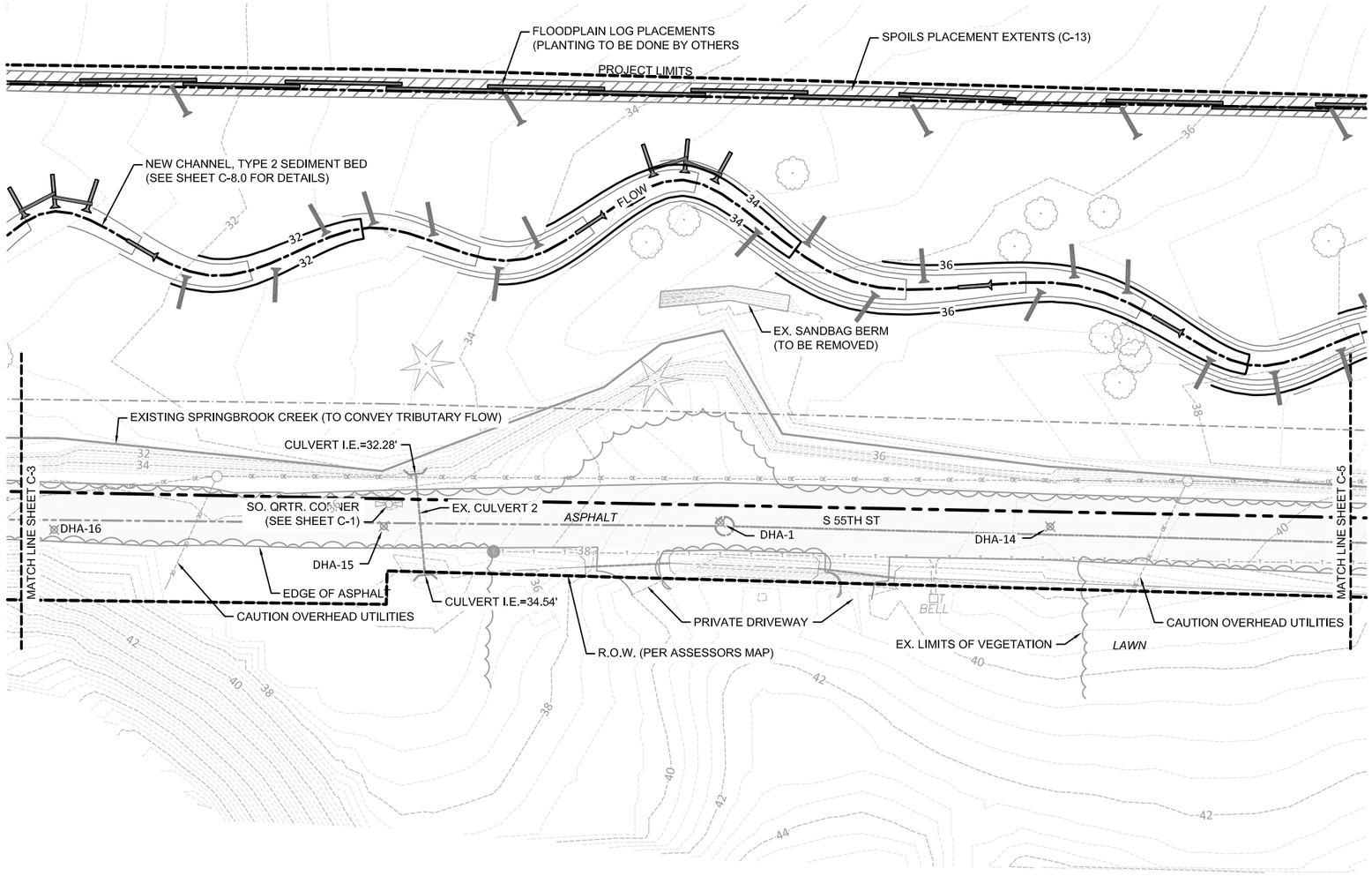
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PROJECT PLAN 1
RENTON WASHINGTON
PN 134779

Plate number:
C–3
Sheet 05of 30



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- PROPOSED LWD PLACEMENT TYPE 2 (SEE SHEET C-9.0)
- PROPOSED LWD PLACEMENT TYPE 3 (SEE SHEET C-9.0)
- PROPOSED FLOODPLAIN LOG PLACEMENT (NOTE 6)

0 20 40
SCALE IN FEET

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5. NOT APPLICABLE THIS SHEET.
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7. FLOODPLAIN LOG DIAMETERS ARE BASED ON 10-YEAR FLOOD EVENT.
8. PROJECT LIMIT TO SOUTH IS R.O.W. ON SOUTH SIDE OF S.55TH ST.

N
PLAN NORTH

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Seattle District

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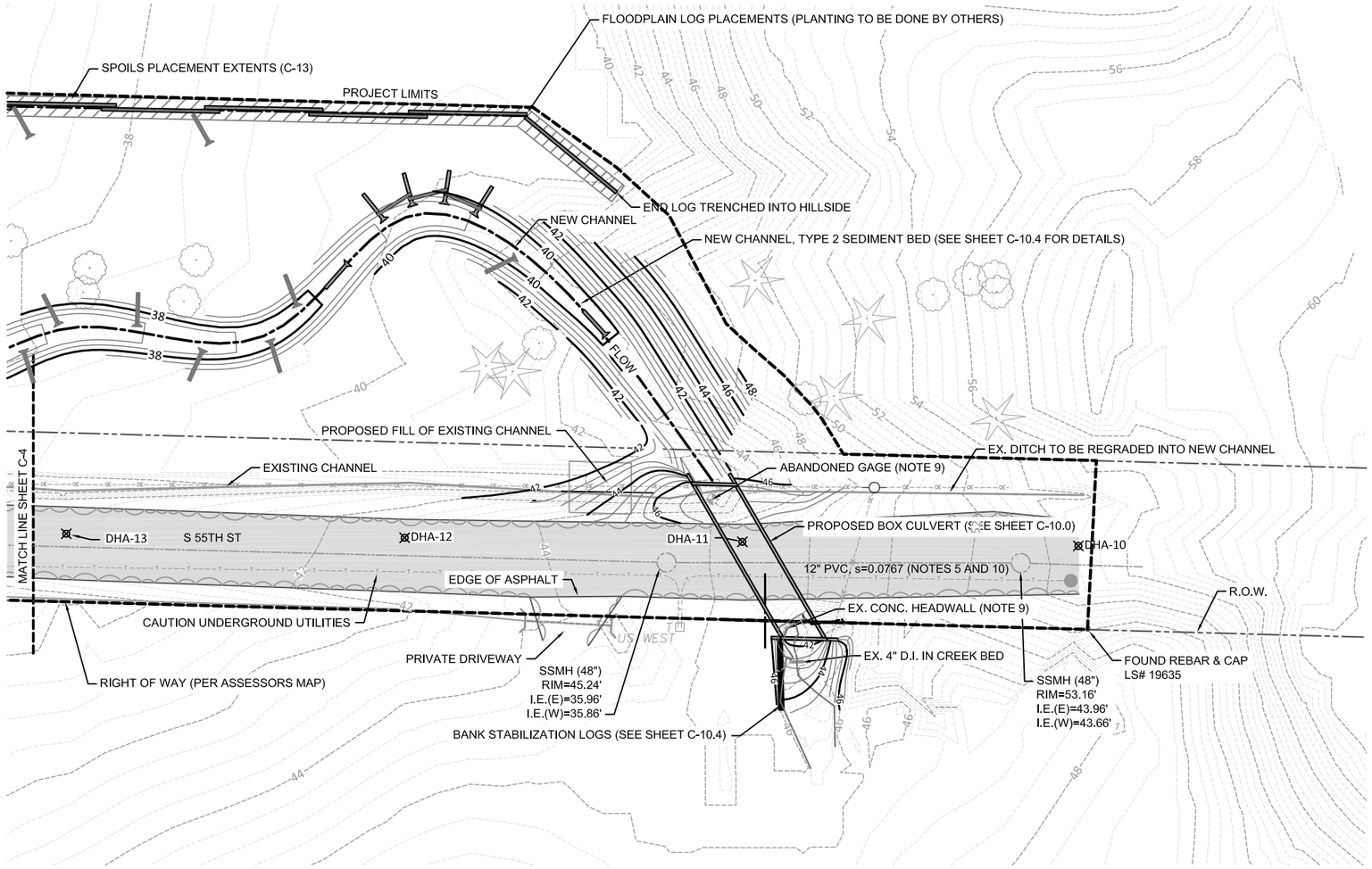
Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
File #
Rev.

U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PROJECT PLAN 2
RENTON PN 134779 WASHINGTON

Plate number:
C-4
Sheet 06of 30



0 20 40

SCALE IN FEET

LEGEND:

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- PROPOSED CONTOUR-MAJOR (2-FOOT)
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- PROPOSED CREEK ALIGNMENT
- EXISTING CREEK
- EXISTING CULVERT
- EXISTING DITCH
- EXISTING SANITARY SEWER LINE
- EXISTING UNDERGROUND TELEPHONE UTILITY
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING EDGE OF VEGETATION
- EXISTING FENCE
- PROJECT/CONSTRUCTION LIMIT BOUNDARY (NOTE 8)
- PROPOSED CULVERT
- RIGHT-OF-WAY (PER ASSESSORS MAP)
- SPOILS PLACEMENT EXTENTS (C-13)
- EXISTING TELEPHONE MANHOLE
- EXISTING TELEPHONE RISER
- EXISTING POWER POLE
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING SANITARY SEWER MANHOLE
- ABANDONED GAGE
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- EXISTING TREE (CEDAR)
- PROPOSED LWD PLACEMENT TYPE 1 (SEE SHEET C-9.0)
- PROPOSED LWD PLACEMENT TYPE 2 (SEE SHEET C-9.0)
- PROPOSED LWD PLACEMENT TYPE 3 (SEE SHEET C-9.0)
- PROPOSED FLOODPLAIN LOG PLACEMENT (NOTE 6)

NOTES:

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7. FLOODPLAIN LOG DIAMETERS ARE BASED ON 10-YEAR FLOOD EVENT.
8. PROJECT LIMIT TO SOUTH IS R.O.W. ON SOUTH SIDE OF S.55TH ST.
9. TO BE DEMOLISHED, REMOVED, AND DISPOSED OF AT CONTRACTING OFFICERS DIRECTION.
10. SANITARY SEWER LINE TO BE ENCASED PRIOR TO PROPOSED CULVERT INSTALLATIONS. SEE SHEET C-11 FOR DETAILS.

N

PLAN NORTH

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Seattle District

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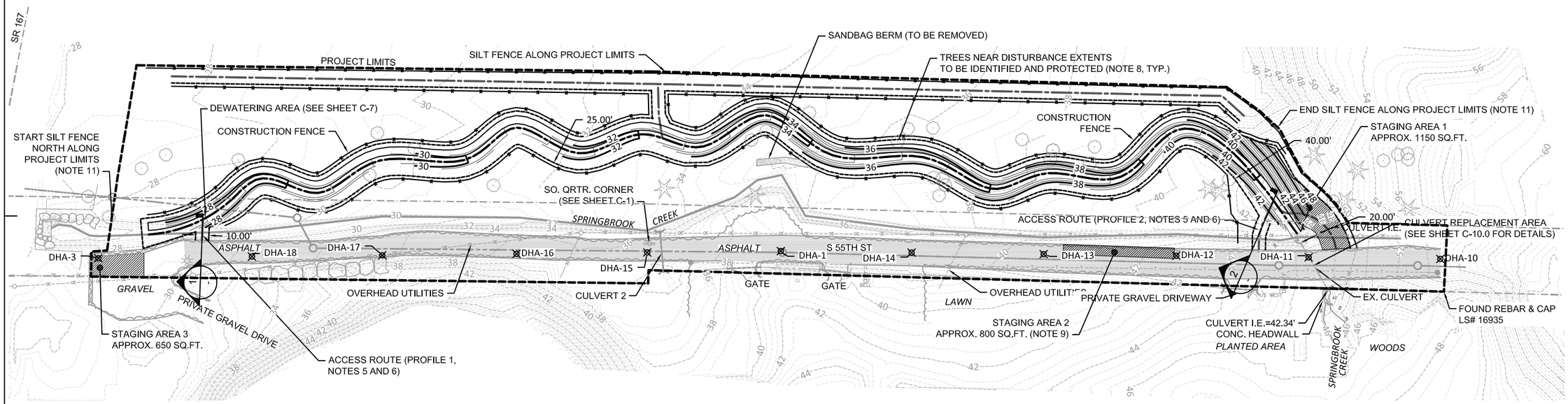
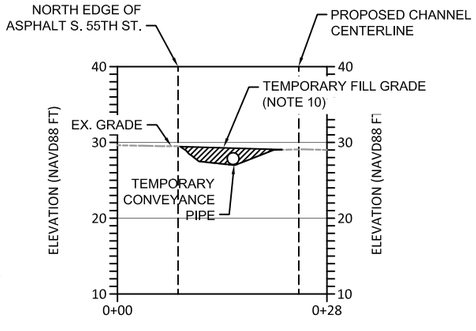
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

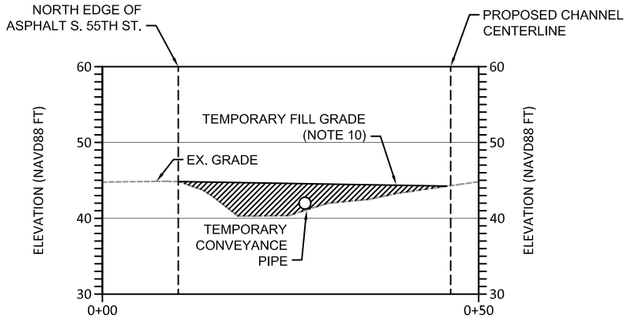
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PROJECT PLAN 3
RENTON PN 134779 WASHINGTON

Plate number:
C–5
Sheet 07of 30





PROFILE VIEW 1: PROPOSED CHANNEL ACCESS ROUTE AT WEST END OF S. 55TH ST.
1"=10'



PROFILE VIEW 2: PROPOSED CHANNEL ACCESS ROUTE AT EAST END OF S. 55TH ST.
1"=10'

LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CREEK ACCESS ROUTE
- EXISTING CREEK
- EXISTING CULVERT
- EXISTING DITCH
- EXISTING SANITARY SEWER LINE
- EXISTING UNDERGROUND TELEPHONE UTILITY
- EXISTING OVERHEAD ELECTRIC UTILITY
- EXISTING EDGE OF VEGETATION
- CONSTRUCTION FENCE
- EXISTING FENCE
- PROJECT/CONSTRUCTION LIMIT BOUNDARY (NOTE 8)
- PROPOSED CULVERT
- RIGHT-OF-WAY (PER ASSESSORS MAP)
- STAGING AREA
- EXISTING TELEPHONE MANHOLE
- EXISTING TELEPHONE RISER
- EXISTING POWER POLE
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING SANITARY SEWER MANHOLE
- ABANDONED GAGE
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)

NOTES:

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2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE 0.5-FOOT.
4. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22- JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
5. EQUIPMENT TRAVELING ON ROADWAYS MUST BE FREE OF SEDIMENT AND DEBRIS.
6. TEMPORARY ACCESS ROADS TO BE BLOCKADED DURING NON-WORKING HOURS TO PREVENT ACCESS.
7. PROJECT LIMIT TO SOUTH IS R.O.W. ON SOUTH SIDE OF S.55TH ST.
8. CONTRACTOR WILL COORDINATE WITH USACE REPRESENTATIVE TO DEFINE TREE REMOVAL AND PROTECTION UPON STAKING CHANNEL ALIGNMENT.
9. TEMPORARY STAGING SHALL ALLOW A MINIMUM OF 10 FEET FOR TRAFFIC CLEARANCE AT ALL TIMES. REFERENCE CITY OF RENTON STANDARD PLAN (WSDOT K-20.20-01 "LANE CLOSURES WITHOUT FLAGGERS-LOW VOLUME ROADS") FOR LANE CLOSURE PROCEDURES.
10. TEMPORARY IMPROVEMENTS SHALL BE REMOVED AND AREA AFFECTED RETURNED TO ORIGINAL GRADE AND CONDITION FOLLOWING COMPLETION OF NEW CHANNEL CONSTRUCTION.

0 40 80
SCALE IN FEET

N
PLAN NORTH

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US Army Corps of Engineers
Seattle District

Description	Symbol	Appr.	Date

Designed by: B.KEENAN
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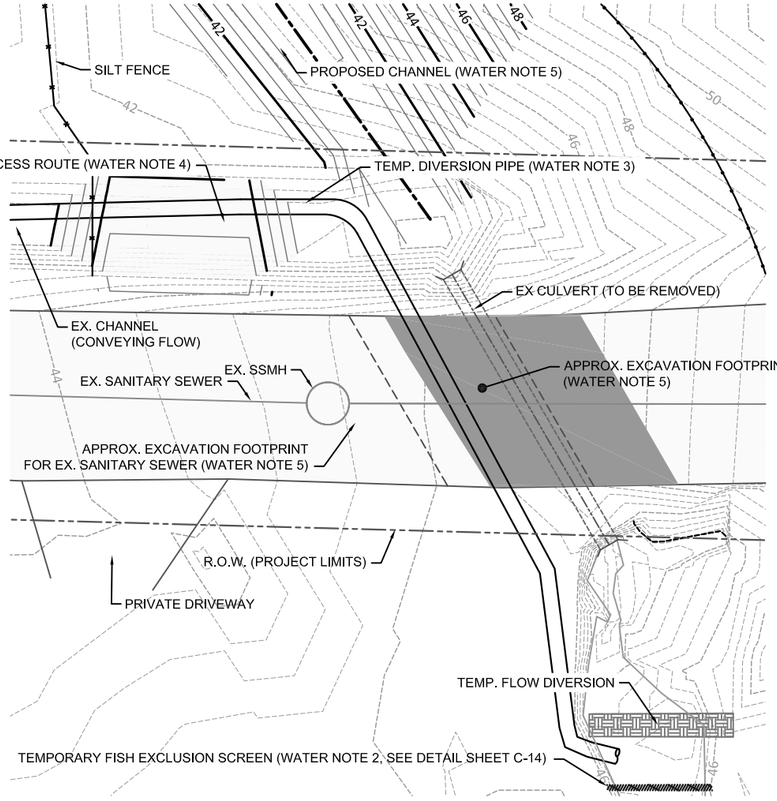
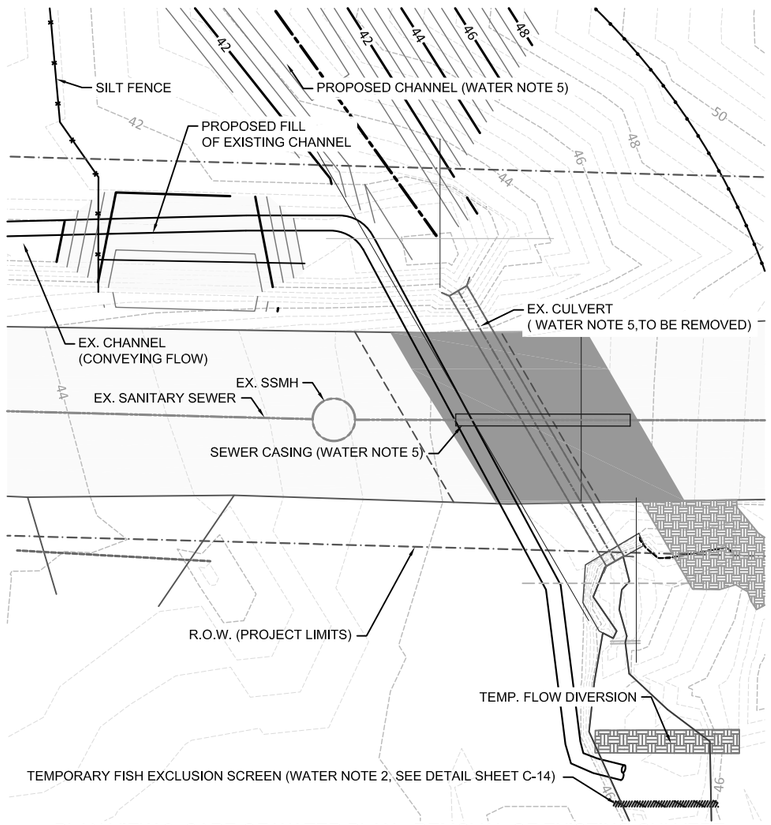
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
SITE ACCESS AND STAGING PLAN
RENTON WASHINGTON PN 134779

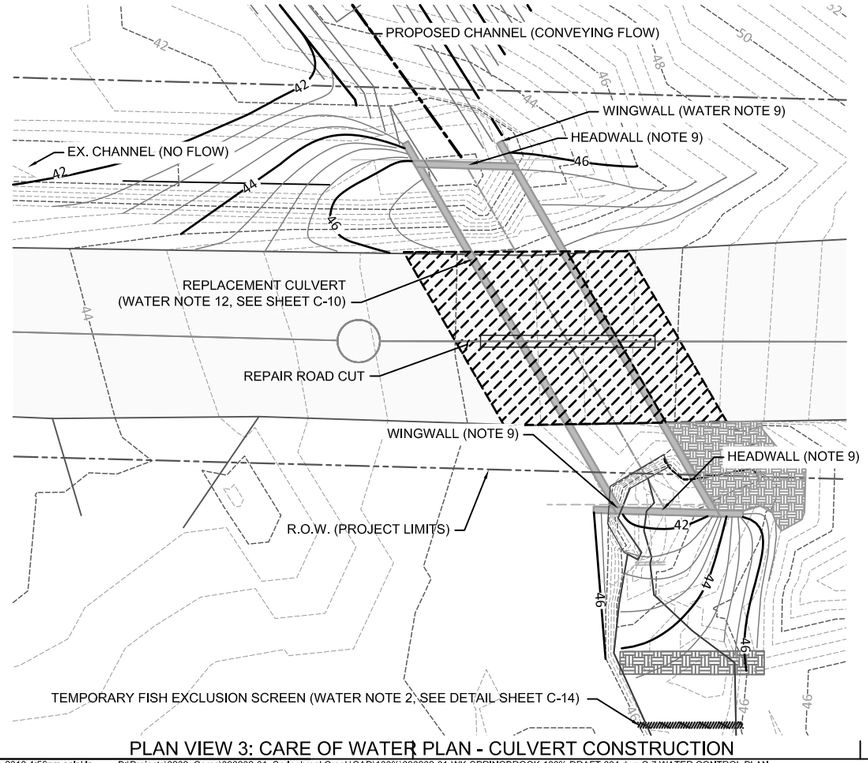
Plate number: C–6
Sheet 08of 30



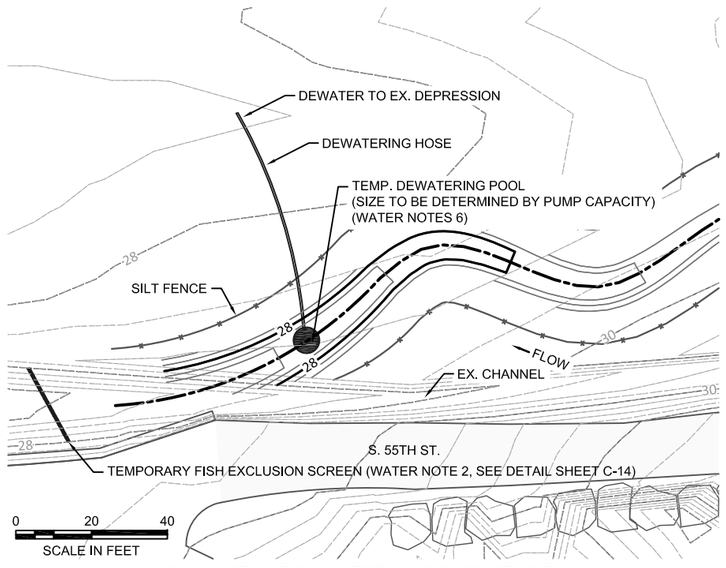
PLAN VIEW 1: CARE OF WATER PLAN - TEMPORARY FLOW BYPASS



PLAN VIEW 2: CARE OF WATER PLAN - REMOVAL OF EXISTING CULVERT



PLAN VIEW 3: CARE OF WATER PLAN - CULVERT CONSTRUCTION



PLAN VIEW: DOWNSTREAM CONFLUENCE

DIVERSION AND CARE OF WATER SEQUENCE NOTES (WATER NOTES):

1. ALL WORK SHALL BE PERFORMED DURING AUTHORIZED IN-STREAM WORK PERIOD (1 JULY - 30 SEPTEMBER 2011). IN-STREAM WORK SHALL COMPLY WITH ALL CONSTRUCTION PERMIT REQUIREMENTS.
2. INSTALL TEMPORARY FISH EXCLUSION SCREENS UPSTREAM OF CULVERT REPLACEMENT AREA AND DOWNSTREAM OF CONFLUENCE OF EXISTING AND PROPOSED CHANNELS. FISH EXCLUSION SCREENS SHALL MEET PERMIT REQUIREMENTS.
3. INSTALL TEMPORARY BYPASS PIPING TO CONTAIN ALL CREEK FLOW THROUGH THE CULVERT REPLACEMENT AREA AND BENEATH THE TEMPORARY ACCESS ROUTE.
4. ESTABLISH ACCESS ROUTE ACROSS UPSTREAM END OF EXISTING CHANNEL BY BACKFILLING THE BYPASS PIPE AND EXISTING CHANNEL.
5. COMMENCE ALL CHANNEL DESIGN, WOOD PLACEMENT, AND CULVERT REPLACEMENT ACTIVITIES.
   a. DEMOLISH AND REMOVE EXISTING CULVERT.
   b. INSTALL SEWER CASING.
   c. BACKFILL SEWER IMPROVEMENTS.
   d. CONSTRUCT REPLACEMENT CULVERT
   e. INSTALL STREAM MATERIAL IN CULVERT.
6. IN PREPARATION OF ROUTING THE CREEK THROUGH THE PROPOSED CHANNEL, EXCAVATE A SHALLOW POOL IN THE PROPOSED CHANNEL DIRECTLY UPSTREAM OF THE CONFLUENCE OF EXISTING AND PROPOSED CHANNELS. INSTALL A SMALL PUMP IN THE POOL TO DEWATER TURBID WATER AS NEEDED.
   a. AS CREEK FLOW IS INTRODUCED INTO THE NEW CHANNEL SEDIMENT-LADEN WATER WILL BE PUMPED FROM DEWATERING HOLE INTO RIGHT BANK FLOODPLAIN.
   b. SEDIMENT-LADEN WATER FROM PROPOSED CHANNEL SHALL NOT ENTER EXISTING CHANNEL, AS REQUIRED BY PERMITS.
   c. RAMP UP FLOW THROUGH THE PROPOSED CHANNEL AS TURBIDITY DECREASES
   d. HALT PUMPING ONCE TURBIDITY DECREASES BELOW PERMITTED LEVELS
7. EXCAVATE TRENCH IN TEMPORARY FLOW DIVERSION TO ALLOW FLOW THROUGH REPLACEMENT CULVERT.
   a. FLOW RAMPING FROM EXISTING CHANNEL TO PROPOSED CHANNEL BEGINS.
   b. FLOW SHALL BE SLOWLY INCREASED INTO PROPOSED CHANNEL TO LIMIT TURBIDITY AND THE NEED FOR PUMPING.
   c. PUMP WATER FROM DEWATERING HOLE IN DOWNSTREAM PORTION OF PROPOSED CHANNEL AS DESCRIBED ABOVE.
   d. FISH RESCUE AND RECOVERY IN EXISTING CHANNEL SHALL BE CONDUCTED IN COORDINATION WITH THE FLOW RAMPING PROCESS.
8. ONCE FLOW RAMPING AND FISH RESCUE IS COMPLETE, REMOVE THE TEMPORARY BYPASS PIPE AND GRADE CHANNEL AS SHOWN.

DEWATERING NOTE:

1. DEWATERING OF THE SEWER PIPE CASING, CULVERT REPLACEMENT, HEADWALLS, AND WINGWALLS AREAS WILL BE NECESSARY TO REMOVE GROUNDWATER SEEPAGE FOR THE AREA DURING CONSTRUCTION. THIS WILL REQUIRE ONE OR MORE SMALL PORTABLE PUMPS THAT CAN BE PLACED WHERE NEEDED DURING THE CONSTRUCTION PROCESS. WATER FROM DEWATERING WILL BE PUMPED TO THE RIGHT FLOOPLAIN FOR INFILTRATION INTO THE FLOODPLAIN AND WILL NOT BE PUMPED INTO THE PROPOSED CHANNEL.

SPRINGBROOK CREEK CONSTRUCTION PERIOD HYDROLOGY

EXCEEDANCE PROBABILITY	DISCHARGE (cfs)
95%	1.3
90%	1.4
80%	1.5
70%	1.7
60%	1.9
50%	2.1
40%	2.3
30%	2.6
20%	3.2
10%	4.1
5%	4.5

HYDROLOGY NOTES:

1. SELECTION OF APPROPRIATE WATER CONTROL FACILITIES IS THE CONTRACTORS RESPONSIBILITY.
2. HYDROLOGY IS FOR A CONSTRUCTION PERIOD BETWEEN JULY 1ST AND OCTOBER 1ST.

N

PLAN NORTH

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

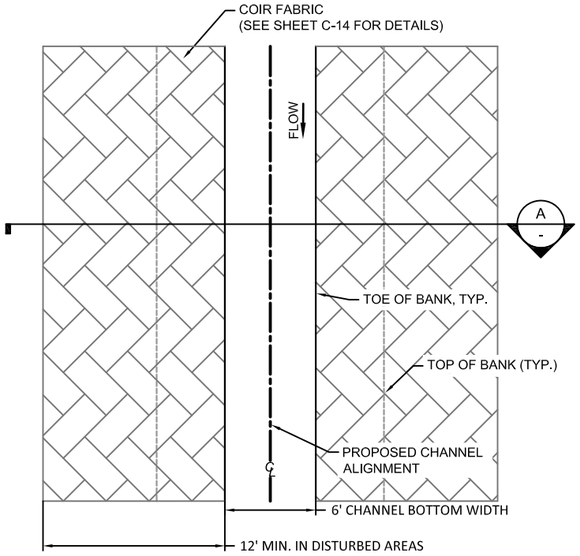
Symbol	Description	Date	Appr.	Symbol	Description
		//			

Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
File #
Rev.

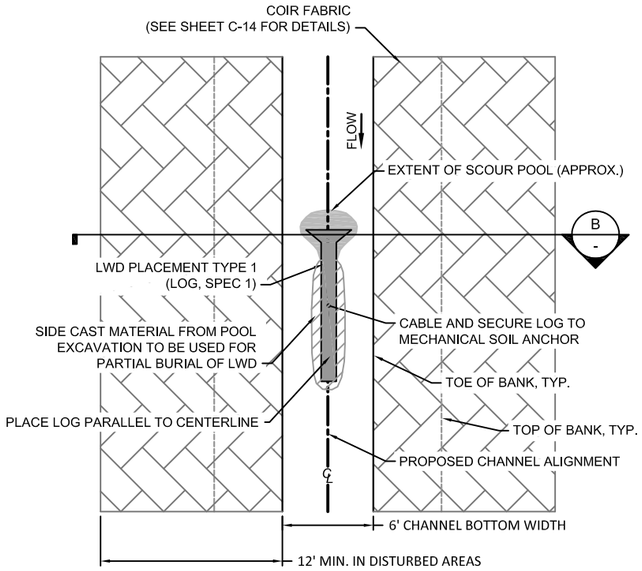
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CARE OF WATER PLAN
RENTON PN 134779 WASHINGTON

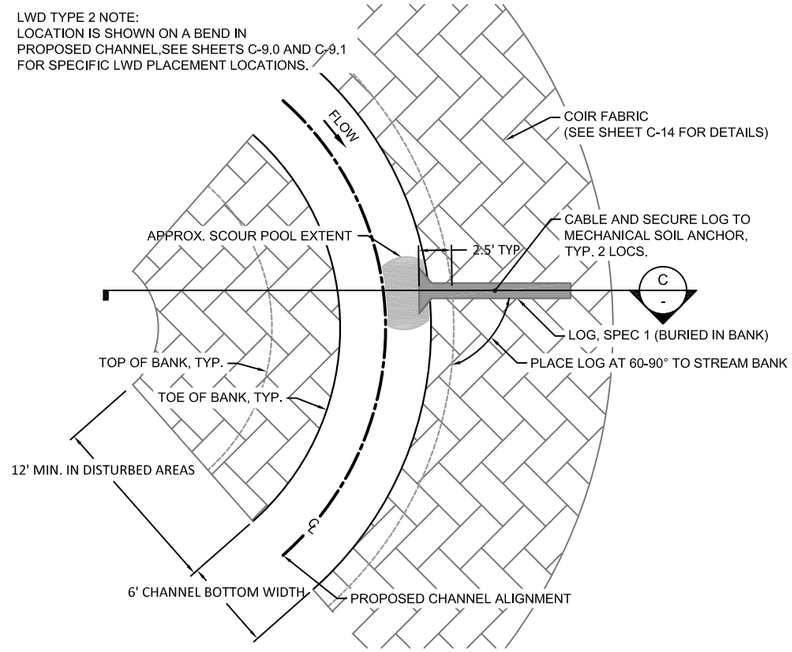
Plate number:
C–7
Sheet 09of 30



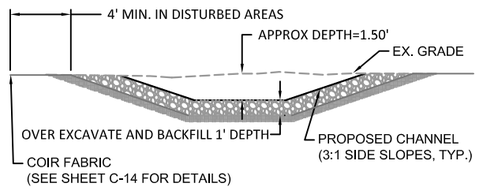
PLAN VIEW: TYPICAL PROPOSED CHANNEL



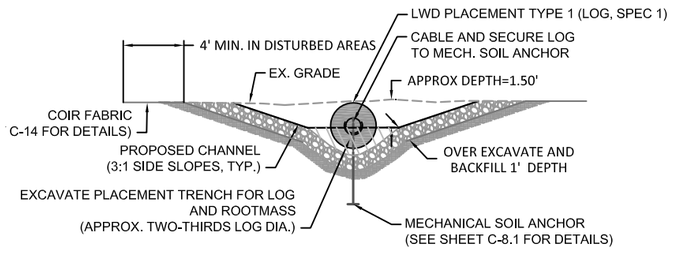
PLAN VIEW: TYPICAL LWD PLACEMENT TYPE 1



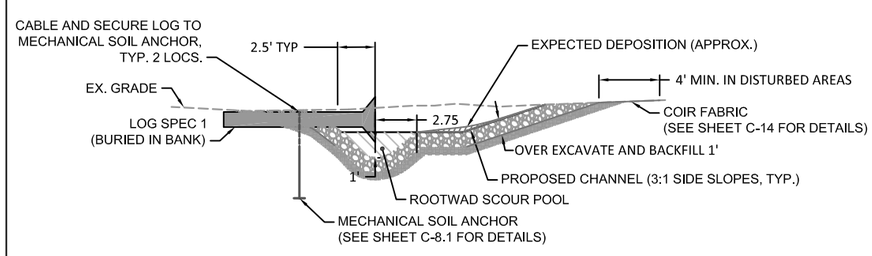
PLAN VIEW: TYPICAL LWD PLACEMENT TYPE 2



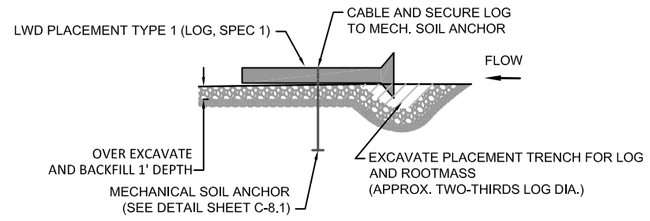
A — SECTION: TYPICAL PROPOSED CHANNEL
SCALE: 1" = 5'



B — SECTION: TYPICAL LWD PLACEMENT TYPE 1
SCALE: 1" = 5'



C — SECTION: TYPICAL LWD PLACEMENT TYPE 2
SCALE: 1" = 5'



PROFILE VIEW: TYPICAL LWD PLACEMENT TYPE 1

0 5 10
SCALE IN FEET

NOTES:

1. MECHANICAL SOIL ANCHORS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AND AS SHOWN IN PLANS.
2. CABLE AND SECURE LOGS TO MECHANICAL SOIL ANCHOR AS SHOWN ON SHEET C-8.1
3. COIR FABRIC INSTALLED FROM TOE OF OVER EXCAVATION BANK TO 4' MIN. BEYOND EDGE OF SEDIMENT FILL.
4. COIR FABRIC TO COVER ALL DISTURBED OVER BANK AREAS ALONG CHANNEL ALIGNMENT.
5. BACKFILL SHOWN IS TYPE 2 SEDIMENT (SPEC. SEC. 35 31 19) UNLESS OTHERWISE INDICATED.

N
PLAN NORTH

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

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Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
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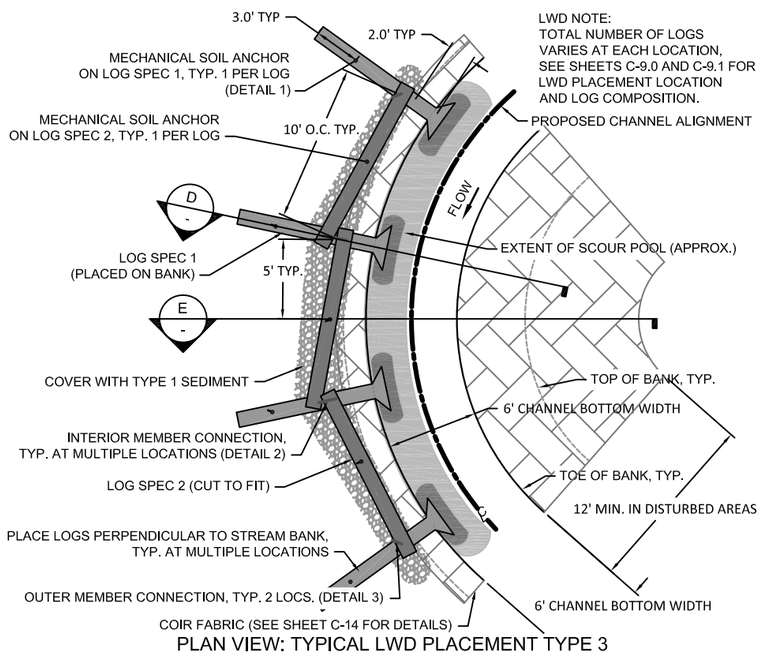
Rev.

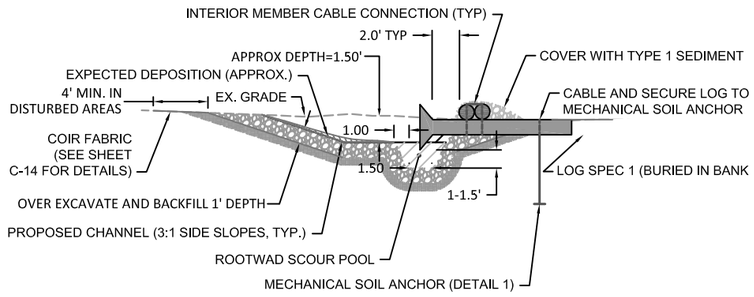
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
TYPICAL CHANNEL CROSS-SECTIONS
RENTON PN 134779 WASHINGTON

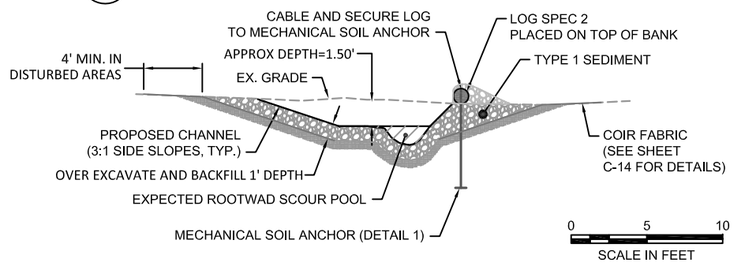
Plate number:
C-8.0
Sheet 10of 30



PLAN VIEW: TYPICAL LWD PLACEMENT TYPE 3



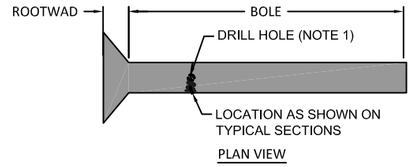
D — SECTION: TYPICAL LWD PLACEMENT TYPE 3
SCALE:1" = 5'



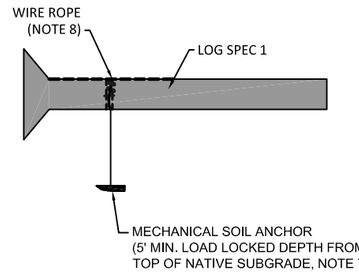
E — SECTION: TYPICAL LWD PLACEMENT TYPE 3
SCALE:1" = 5'

NOTES:

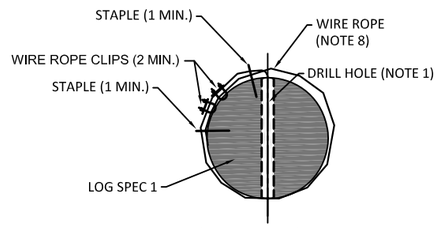
1. MECHANICAL SOIL ANCHORS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AND AS SHOWN IN PLANS.
2. CABLE AND SECURE LOGS TO MECHANICAL SOIL ANCHOR AS SHOWN ON SHEET C-8.1
3. COIR FABRIC INSTALLED FROM TOE OF OVER EXCAVATION BANK TO 4' MIN. BEYOND EDGE OF SEDIMENT FILL.
4. COIR FABRIC TO COVER ALL DISTURBED OVER BANK AREAS ALONG CHANNEL ALIGNMENT.
5. BACKFILL SHOWN IS TYPE 2 SEDIMENT (SPEC. SEC. 35 31 19) UNLESS OTHERWISE INDICATED.



PLAN VIEW

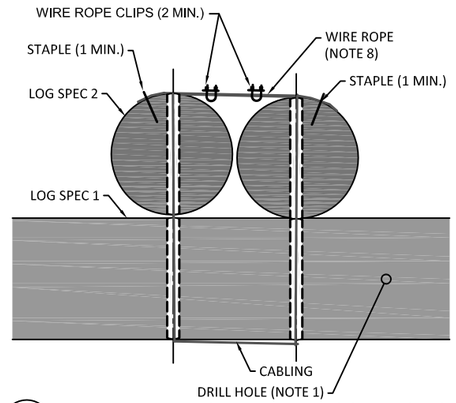


ASSEMBLED PROFILE VIEW

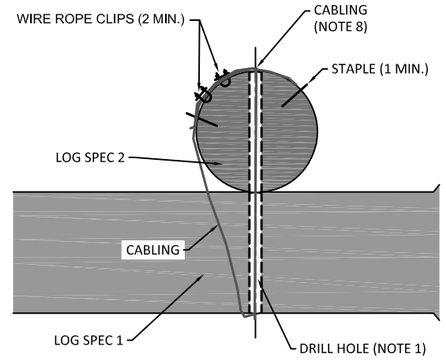


ASSEMBLED SECTION VIEW

1 — DETAIL: CABLE AND ANCHOR
SCALE:NTS



2 — DETAIL: INTERIOR MEMBER CONNECTIONS
SCALE:NTS



3 — DETAIL: OUTER MEMBER CONNECTIONS
SCALE:NTS

METAL PRODUCT SPECIFICATIONS		
DESCRIPTION	**SPEC. DIMENSION**	**MATERIAL**
WIRE ROPE	5/16" DIA.	6x19 GALV. EIPS IWRC
WIRE ROPE CLIP	5/16" CAP.	GALV. DROP FORGED STEEL
STEEL STAPLE	4" LONG	GALV. DROP FORGED STEEL
MECH. SOIL ANCHOR	138-DB1	SEE FORESIGHT MFG. SPEC

METAL PRODUCT SPECIFICATIONS NOTES:
A. USE SPECIFIED PRODUCT OR EQUAL, AS APPROVED BY ENGINEER.

LWD LOG SPECIFICATIONS				
	DIA. (IN.)	MIN. LENGTH (FT)	ROOTWAD (3x DBH)	TREE SPECIES
LOG SPEC. 1	12-15	10	YES	DOUGLAS FIR, SITKA SPRUCE, HEMLOCK
LOG SPEC. 2	12-15	12	NO	"
LOG SPEC. 3	18	35	NO	"
LOG SPEC. 4	24	35	NO	"
LOG SPEC. 5	30	35	NO	"

LOG SPECIFICATIONS NOTES:
A. LOG DIAMETER TAPER SHALL NOT EXCEED ONE INCH PER 10 FEET LENGTH
B. LOGS SIZE MEASURED DBH.

CONSTRUCTION SEQUENCE OF EVENTS FOR LWD PLACEMENT

1. LOGS MAY BE PREDRILLED. DRILL LOGS IN CENTER OF BOLE. HOLE DIAMETER NOT TO EXCEED 1.50 TIMES THE WIRE ROPE DIAMETER. LOCATIONS VARY PER PLACEMENT, SEE PLAN SHEETS.
2. PLACE STRUCTURES AND LOGS AS SHOWN ON PLAN SHEETS.
3. PROVIDE SUFFICIENT LENGTH OF WIRE ROPE TO INSTALL MECHANICAL SOIL ANCHOR AND SECURE TO LOGS AS SHOWN.
4. DRIVE MECHANICAL SOIL ANCHOR AS INSTRUCTED BY MANUFACTURER INSTALLATION PROCEDURES IN LOCATIONS SHOWN ON PLANS.
5. LOAD LOCK MECHANICAL SOIL ANCHOR AS INSTRUCTED BY MANUFACTURER INSTALLATION PROCEDURES.
6. ANCHOR STABILITY SHALL BE **PROOFED TO A LOAD NO LESS THAN 1000 LB** CONSISTENT WITH METHODS RECOMMENDED BY THE MANUFACTURER.
7. PROOFED ANCHOR DEPTH SHALL BE NO LESS THAN THAT SHOWN IN DETAIL 1. FINAL INSTALLATION TO BE APPROVED BY CONTRACTING OFFICER.
8. THREAD WIRE ROPE UP THROUGH HOLE IN LOG, PULL WIRE ROPE TIGHT.
9. WRAP WIRE ROPE ONE AND ONE-QUARTER TIMES THE LOG CIRCUMFERENCE AND SECURE TWO STRANDS OF WIRE ROPE WITH WIRE ROPE CLIPS INSTALLED TO MANUFACTURE RECOMMENDED SPECIFICATIONS.
10. STAPLE LOOSE ENDS OF WIRE ROPE AND OPPOSITE SIDE OF CONNECTION TO LOG. STAPLES SHALL BE DRIVEN PERPENDICULAR TO LOG SURFACE.
11. BACKFILL OR COVER LWD AS SHOWN WITH SPECIFIED BACKFILL MATERIAL.

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US Army Corps of Engineers
Seattle District

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U.S.ARMY ENGINEER DISTRICT,SEATTLE
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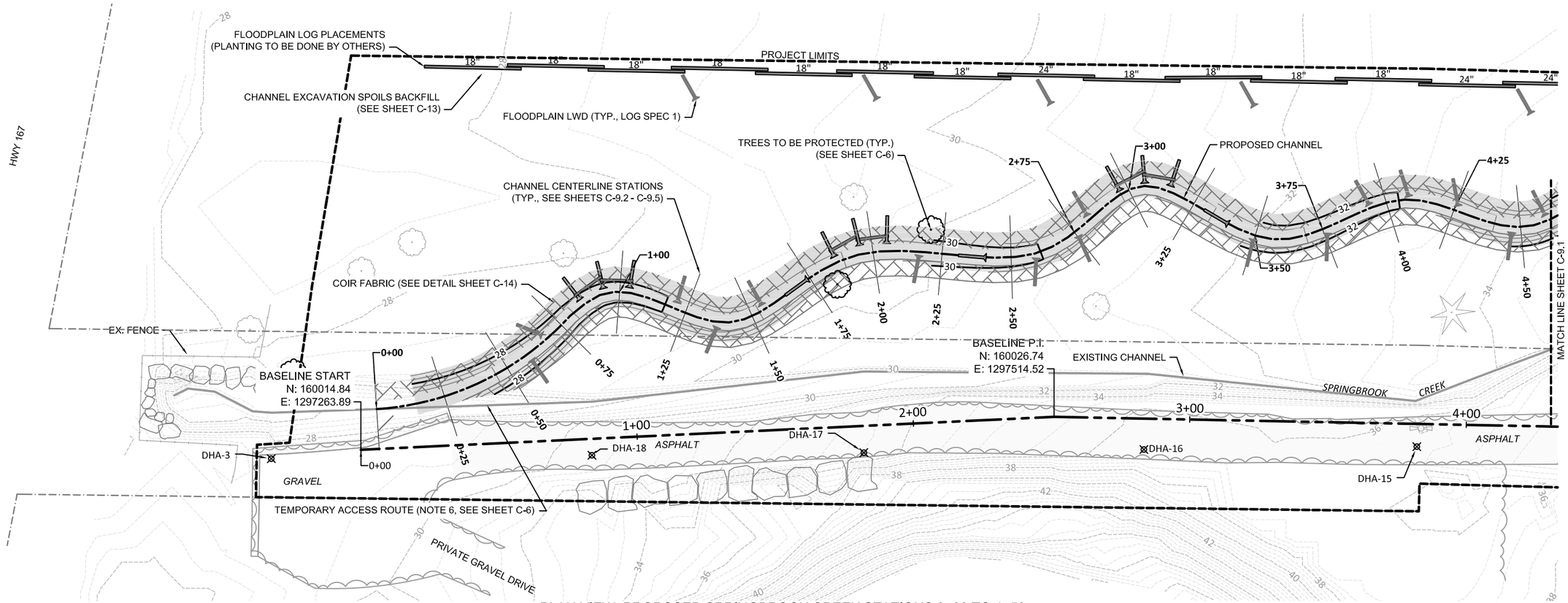
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
TYPICAL CHANNEL CROSS-SECTIONS AND DETAILS
RENTON PN 134779 WASHINGTON

Plate number: C-8.1
Sheet 11of 30



PLAN VIEW: PROPOSED SPRINGBROOK CREEK STATIONS 0+00 TO 4+50

CHANNEL CENTERLINE STAKING

BASELINE STATION	OFFSET LEFT (FT)
0+.06.38	14.45
0+30.64	19.60
0+53.55	28.37
0+74.57	47.61
0+96.17	52.48
1+19.50	43.93
1+43.55	41.70
1+65.05	54.36
1+88.41	62.48
2+13.29	60.81
2+38.15	58.41
2+56.94	66.88
2+76.38	82.48
2+99.94	77.92
3+22.37	66.99
3+46.47	69.72
3+69.55	79.72
3+94.02	77.63
4+18.21	72.02

IN-CHANNEL LWD PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)	*CHANNEL SIDE	LWD TYPE
0+63.24	29.54	LEFT	2
0+67.46	38.34	RIGHT	2
0+81.74	50.44	RIGHT	3
0+90.38	54.07	RIGHT	3
0+99.75	53.91	RIGHT	3
1+16.70	47.67	RIGHT	2
1+30.65	38.19	LEFT	2
1+47.32	45.37	RIGHT	2
1+64.33	54.03	CENTER	1
1+74.29	61.52	RIGHT	3
1+83.63	65.21	RIGHT	3
1+93.44	65.52	RIGHT	3
2+04.92	60.63	LEFT	2
2+29.11	58.66	CENTER	1
2+47.24	57.61	LEFT	2
2+58.46	65.50	LEFT	2
2+61.46	72.89	RIGHT	2
2+73.18	82.20	RIGHT	3
2+82.08	85.12	RIGHT	3
2+91.41	84.20	RIGHT	3
3+12.49	70.97	CENTER	1
3+21.70	65.53	LEFT	2

IN-CHANNEL LWD PLACEMENT (CONT.)

3+48.48	68.31	LEFT	2
3+63.36	78.86	RIGHT	2
3+77.58	82.09	RIGHT	2
3+95.52	79.07	RIGHT	2
4+15.04	69.91	LEFT	2
4+27.08	76.23	RIGHT	2

* CHANNEL SIDE REFERS TO FACING DOWNSTREAM

FLOODPLAIN LOG PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)	ELEV. (FT)
0+29.51	137.27	28.75
0+59.53	136.43	29.14
0+88.59	133.35	29.44
1+18.66	132.65	29.75
1+48.95	129.24	30.05
1+78.34	128.57	30.32
2+06.23	125.32	30.64
2+36.54	124.60	31.22
2+59.15	122.28	31.57
2+88.66	123.34	32.16
3+19.60	122.88	32.75
3+50.12	124.17	33.32
3+80.42	122.72	33.97
4+10.77	123.93	33.41

FLOODPLAIN LWD PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)
1+27.04	120.83
1+92.39	117.72
2+47.62	113.07
3+21.14	113.73
4+21.23	113.03

LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CREEK ALIGNMENT
- EXISTING CREEK
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)
- EXISTING TREE (TO BE PROTECTED)
- EXTENT OF GRADING
- COIR FABRIC

LWD TYPE:

STATION OFFSET REFERENCE POINT (TYPICAL FOR ROOTWAD LOGS IN ALL PLACEMENT TYPES)

1. LOG SPEC 1 (SEE SHEET C-8.0)
2. LOG SPEC 1 (SEE SHEET C-8.0)
3. LOG SPEC 1 & 2 (SEE SHEET C-8.1)

PROPOSED FLOODPLAIN LOG PLACEMENT (DIAMETER INDICATED IN DRAWING, NOTE 5)

ELEVATION REFERENCE POINT

STATION OFFSET REFERENCE POINT

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
1. VERTICAL DATUM: NAVD 88 FEET.
2. CONTOUR INTERVALS ARE .5-FOOT.
3. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22-JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
4. FOR SURVEY CONTROL POINT DATA REFER TO SHEET C-1.
5. FLOODPLAIN LOGS ARE APPROX. 35-FOOT LENGTH (LENGTH TBD BY AVAILABLE MATERIALS). SPOIL MATERIAL FROM CHANNEL EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES TO BE PLACED ADJACENT TO FLOODPLAIN LOGS TO SUPPORT LIVESTAKE PLANTINGS, SEE SHEET C-13 FOR DETAILS.
6. TEMPORARY IMPROVEMENTS SHALL BE REMOVED AND AREA AFFECTED RETURNED TO ORIGINAL GRADE AND CONDITION FOLLOWING COMPLETION OF NEW CHANNEL CONSTRUCTION.

0 20 40
SCALE IN FEET

N
PLAN NORTH

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Seattle District

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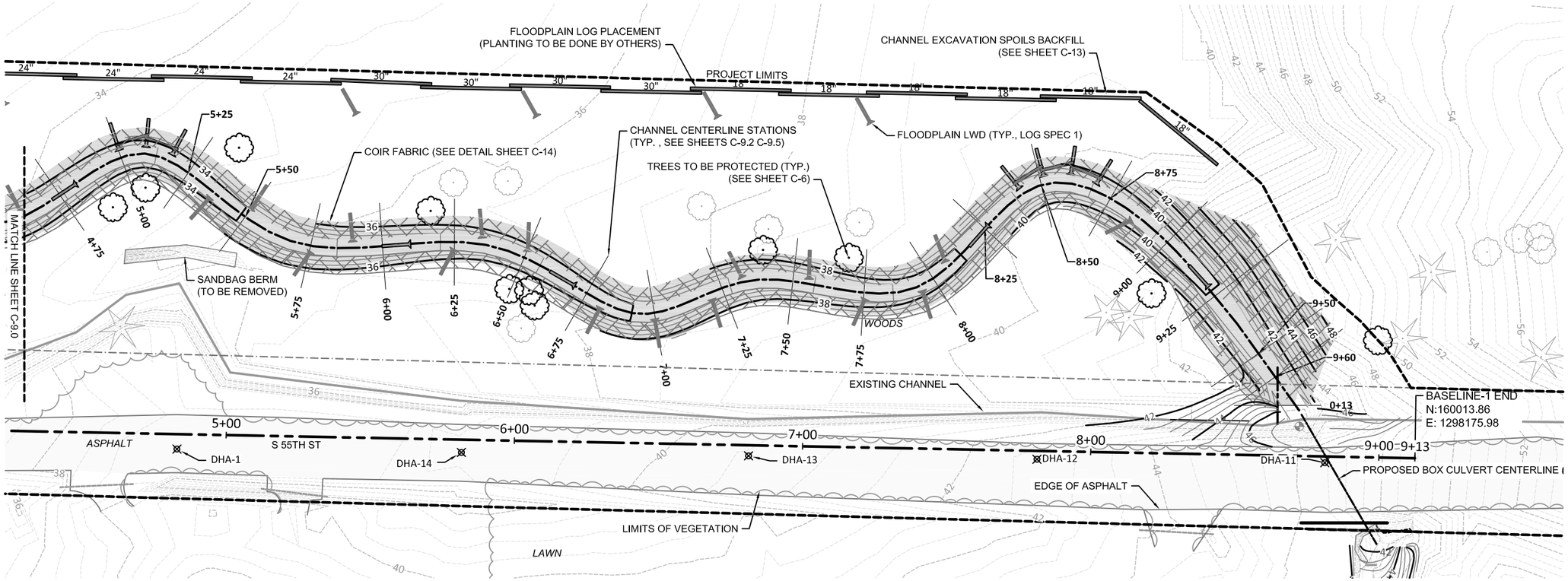
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
GRADING PLAN AND WOOD PLACEMENT
CHANNEL STATIONS 0+00 TO 4+50
RENTON WASHINGTON PN 134779

Plate number:
C–9.0
Sheet 12of 30



PLAN VIEW: PROPOSED SPRINGBROOK CREEK STATIONS 4+75 TO 9+60

CHANNEL CENTERLINE STAKING

BASELINE STATION	OFFSET LEFT (FT)
4+40.62	82.27
4+61.71	95.51
4+85.07	90.74
5+05.16	75.87
5+28.01	66.31
5+52.93	66.59
5+77.86	68.49
6+02.18	63.59
6+24.12	51.67
6+47.68	45.38
6+70.96	54.33
6+95.52	57.15
7+20.28	53.76
7+44.14	59.15
7+61.95	76.89
7+81.11	92.16
8+05.12	88.08
8+25.13	73.20
8+41.93	54.76
8+54.91	33.40
8+64.50	17.00

IN-CHANNEL LWD PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)	*CHANNEL SIDE	LWD TYPE
4+46.29	86.24	CENTER	1
4+60.99	98.06	RIGHT	3
4+70.33	99.36	RIGHT	3
4+79.28	96.77	RIGHT	3
4+92.77	82.38	LEFT	2
5+07.05	78.49	RIGHT	2
5+28.07	64.19	LEFT	2
5+42.56	67.88	RIGHT	2
5+62.73	67.50	CENTER	1
5+77.70	66.08	LEFT	2
5+87.50	70.11	RIGHT	2
6+03.40	65.78	RIGHT	2
6+20.11	54.00	CENTER	1
6+28.87	46.79	LEFT	2
6+47.84	43.22	LEFT	2
6+67.60	50.40	LEFT	2
6+77.89	58.09	RIGHT	2
7+01.11	58.03	RIGHT	2
7+20.67	51.59	LEFT	2
7+40.46	54.83	LEFT	2
7+48.32	64.90	RIGHT	2
7+63.03	78.05	CENTER	1

IN-CHANNEL LWD PLACEMENT (CONT.)

7+73.61	90.86	RIGHT	3
7+81.87	95.29	RIGHT	3
7+91.21	96.01	RIGHT	3
8+00.05	92.90	RIGHT	3
8+12.63	80.70	LEFT	2
8+39.82	58.04	CENTER	1

* CHANNEL SIDE REFERS TO FACING DOWNSTREAM

FLOODPLAIN LOG PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)	ELEV. (FT)
4+41.04	122.77	33.93
4+71.64	124.04	35.44
5+02.54	122.76	36.01
5+33.92	123.99	36.60
5+65.09	122.06	36.78
5+95.95	123.26	37.06
6+27.64	121.97	37.65
6+58.67	123.37	38.07
6+89.32	122.13	38.97
7+19.77	123.21	39.79
7+50.65	121.83	40.17
7+80.11	123.07	40.38
8+14.60	122.20	40.26

FLOODPLAIN LWD PLACEMENT

BASELINE STATION	OFFSET LEFT (FT)
5+43.05	112.19
6+05.63	112.62
6+68.43	113.53
7+21.49	112.50

LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CREEK ALIGNMENT
- EXISTING CREEK
- SURVEY CONTROL POINT (SEE SHEET C-1)
- EXISTING TREE (DECIDUOUS)
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- EXISTING TREE (TO BE PROTECTED)
- EXTENT OF GRADING
- COIR FABRIC

LWD TYPE:

- STATION OFFSET REFERENCE POINT (TYPICAL FOR ROOTWAD LOGS IN ALL PLACEMENT TYPES)
- 1 — LOG SPEC 1 (SEE SHEET C-8.0)
- 2 — LOG SPEC 1 (SEE SHEET C-8.0)
- 3 — LOG SPEC 1 & 2 (SEE SHEET C-8.1)
- PROPOSED FLOODPLAIN LOG PLACEMENT (DIAMETER INDICATED IN DRAWING, NOTE 5)
- ELEVATION REFERENCE POINT
- STATION OFFSET REFERENCE POINT

NOTES:
1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
1. VERTICAL DATUM: NAVD 88 FEET.
2. CONTOUR INTERVALS ARE .5-FOOT.
3. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22-JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
4. FOR SURVEY CONTROL POINT DATA REFER TO SHEET C-1.
5. FLOODPLAIN LOGS ARE APPROX. 35-FOOT LENGTH (LENGTH TBD BY AVAILABLE MATERIALS). SPOIL MATERIAL FROM CHANNEL EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES TO BE PLACED ADJACENT TO FLOOPLAIN LOGS TO SUPPORT LIVESTAKE PLANTINGS, SEE SHEET C-13 FOR DETAILS.
6. TEMPORARY IMPROVEMENTS SHALL BE REMOVED AND AREA AFFECTED RETURNED TO ORIGINAL GRADE AND CONDITION FOLLOWING COMPLETION OF NEW CHANNEL CONSTRUCTION.

0 20 40
SCALE IN FEET

N
PLAN NORTH

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

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Designed by: B.KEENAN
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Checked by: T.DRURY
Date: 11 MAY 10
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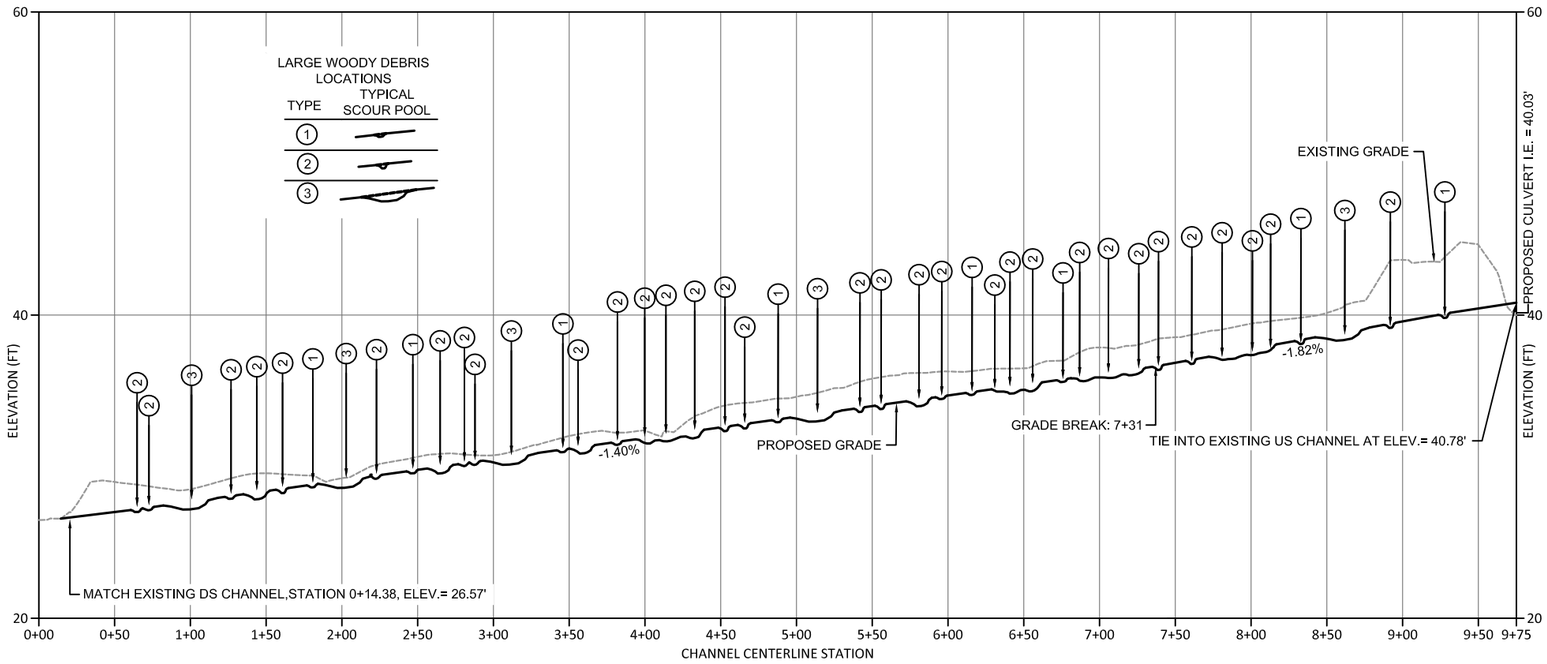
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
GRADING PLAN AND WOOD PLACEMENT
CHANNEL STATIONS 4+50 TO 9+60
RENTON PN 134779 WASHINGTON

Plate number:
C–9.1
Sheet 13of 30



PROFILE VIEW: EXISTING THALWEG AND PROPOSED SPRINGBROOK CREEK GRADE
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'

SCALE IN FEET
0 50 100
0 5 10
VERT. SCALE IN FEET
VERT. EXAGGERATION x10

NOTES:
1. VERTICAL DATUM: NAVD 88 FEET.
2. FOR TYPICAL SECTIONS SEE SHEETS C-9.3 - C-9.5

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

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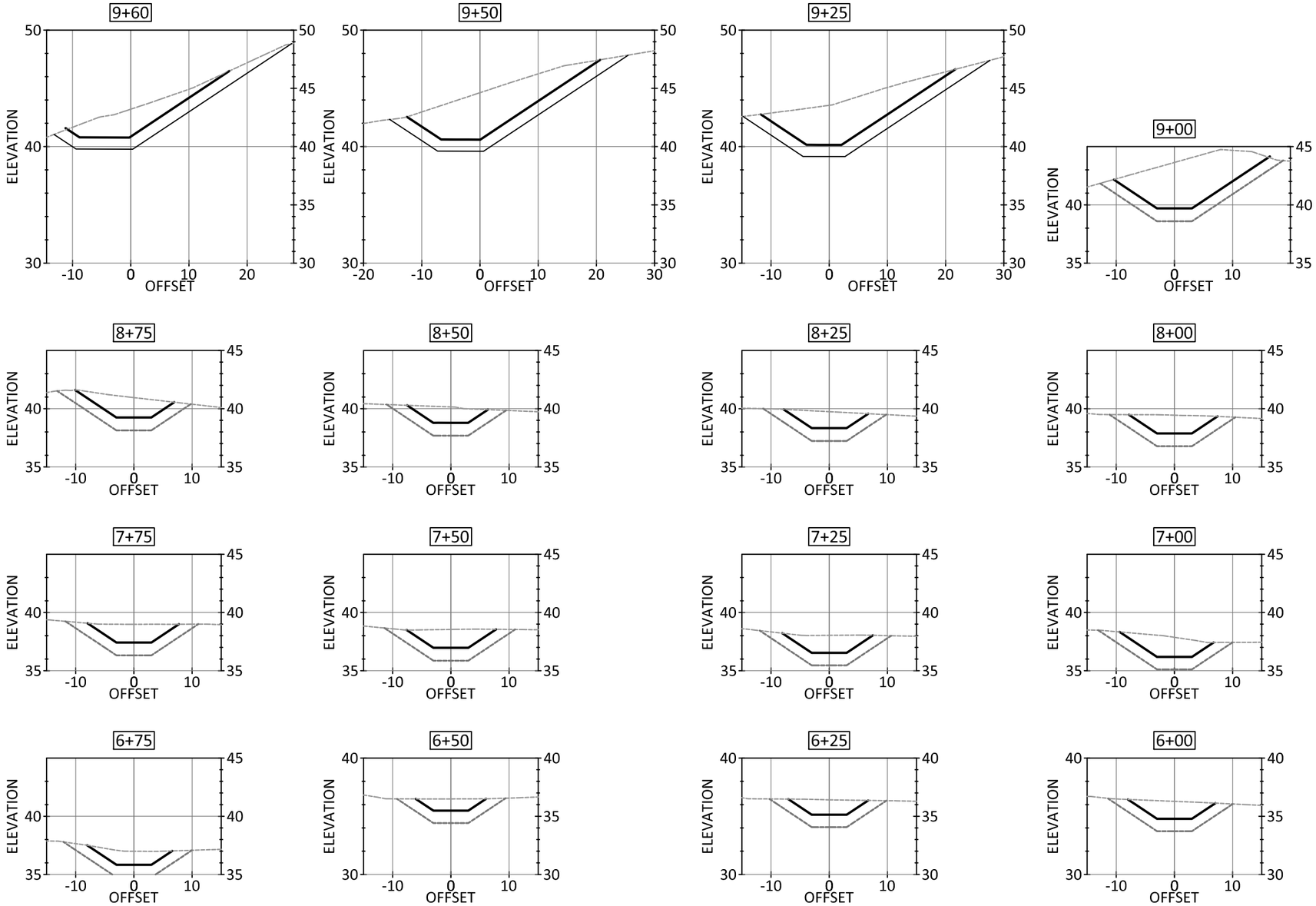
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
GRADING PROFILE
RENTON PN 134779 WASHINGTON

Plate number:
C–9.2
Sheet 14 of 30

May 11, 2010 5:00pm eplpkin B:\Projects\0202_Corps\090202-01_SpringbrookCreek\CAD\100%\090202-01-WK-SPRINGBROOK-100% DRAFT-004.dwg C-9.2 GRADING PROFILE



SCALE IN FEET
0 10 20
0 5 10
VERT. SCALE IN FEET
VERT. EXAGGERATION x2

LEGEND:

- EXISTING GRADE
- ROUGH FINISHED GRADE
- EXCAVATION LIMITS

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET
3. SECTION VIEWS SHOW ROUGH CHANNEL GRADING, REFER TO SHEETS C-8.0 AND C-8.1 FOR ADDITIONAL DETAIL.

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

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Seattle District

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SEATTLE, WASHINGTON

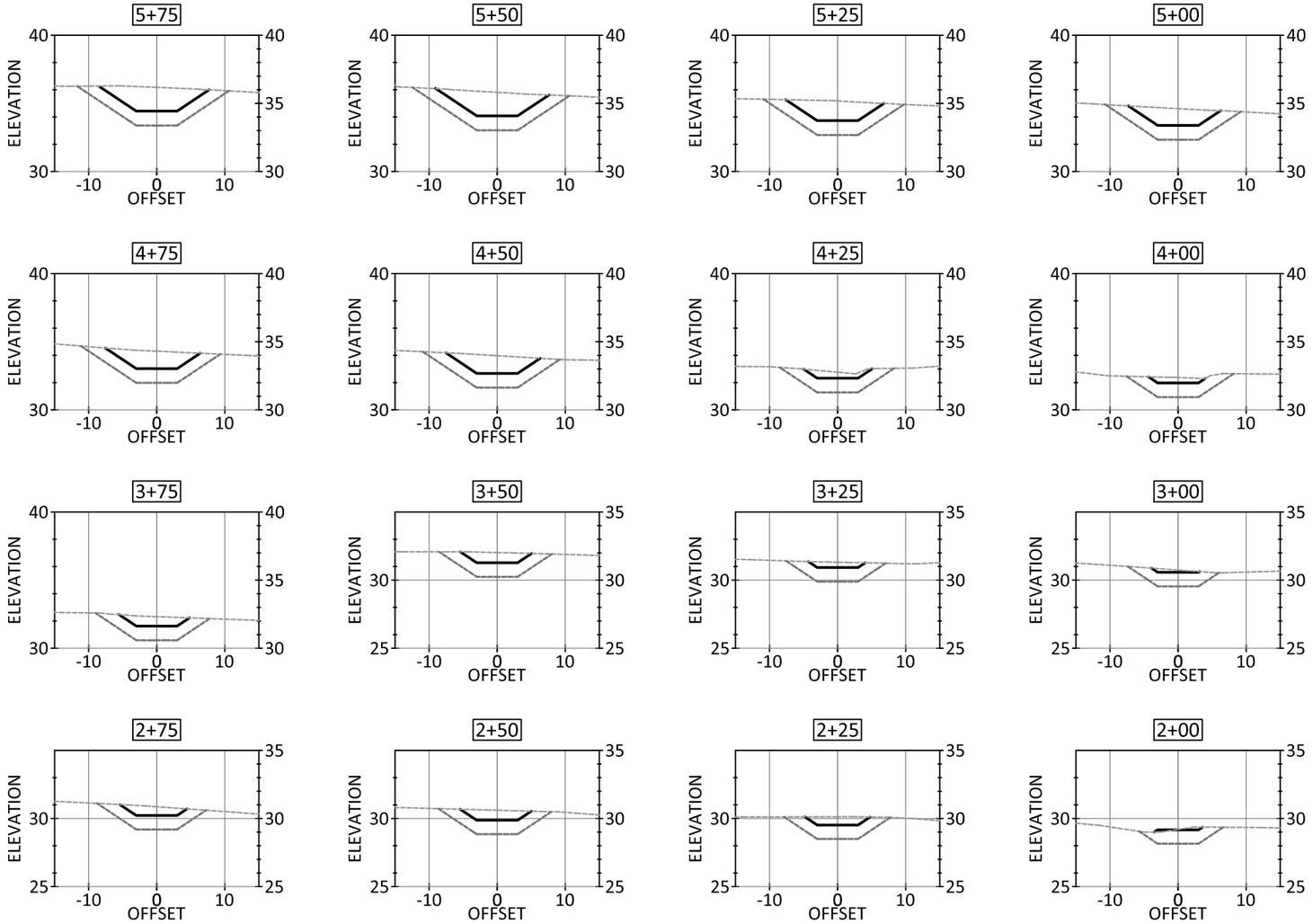
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT

SECTION VIEWS: STATIONS 9+60 TO 6+00

RENTON PN 134779 WASHINGTON

Plate number:
C–9.3
Sheet 15of 30



SCALE IN FEET
0 10 20
0 5 10
VERT. SCALE IN FEET
VERT. EXAGGERATION x2

LEGEND:

- EXISTING GRADE
- ROUGH FINISHED GRADE
- EXCAVATION LIMITS

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET
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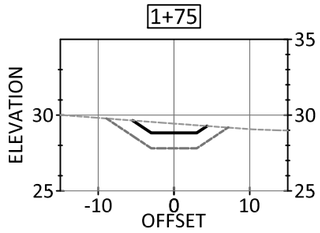
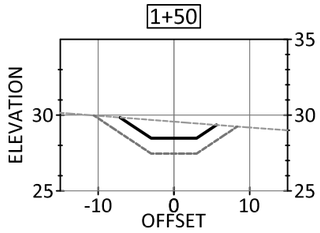
SEATTLE, WASHINGTON

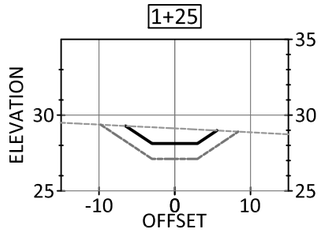
Prepared by: ANCHOR QEA

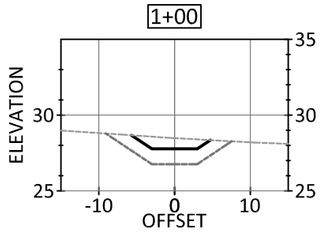
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
SECTION VIEWS: STATIONS 5+75 TO 2+00
RENTON PN 134779 WASHINGTON

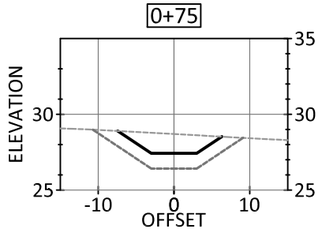
Plate number:
C-9.4
Sheet 16of 30

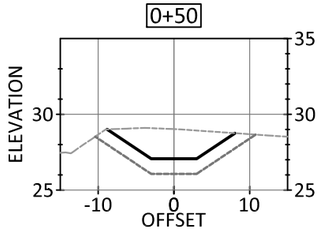


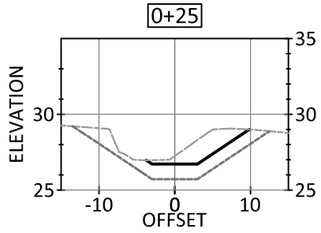


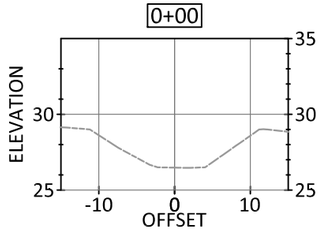












SCALE IN FEET
0 10 20
0 5 10
VERT. SCALE IN FEET
VERT. EXAGGERATION x2

LEGEND:

- EXISTING GRADE
- ROUGH FINISHED GRADE
- EXCAVATION LIMITS

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET
3. SECTION VIEWS SHOW ROUGH CHANNEL GRADING, REFER TO SHEETS C-8.0 AND C-8.1 FOR ADDITIONAL DETAIL.

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Seattle District

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Checked by: T.DRURY
Date: 11 MAY 10
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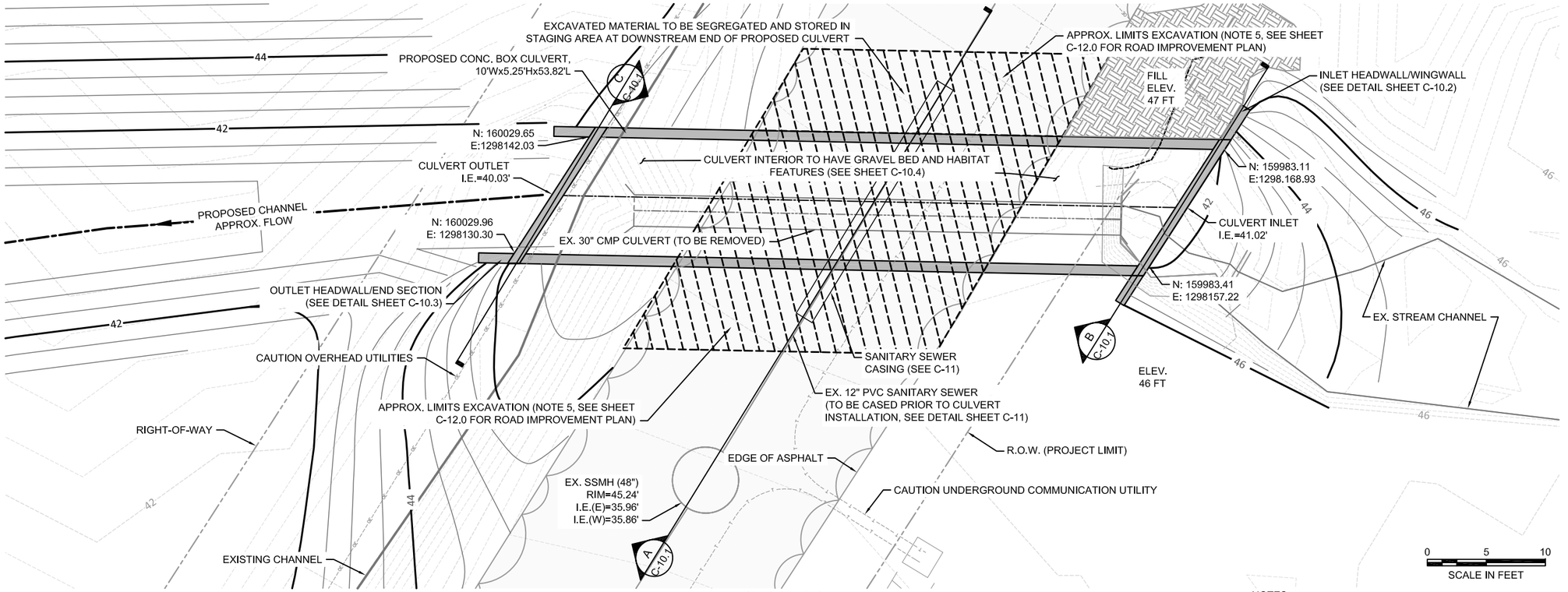
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
SECTION VIEWS: STATIONS 1+75 TO 0+00
RENTON PN 134779 WASHINGTON

Plate number:
C–9.5
Sheet 17of 30



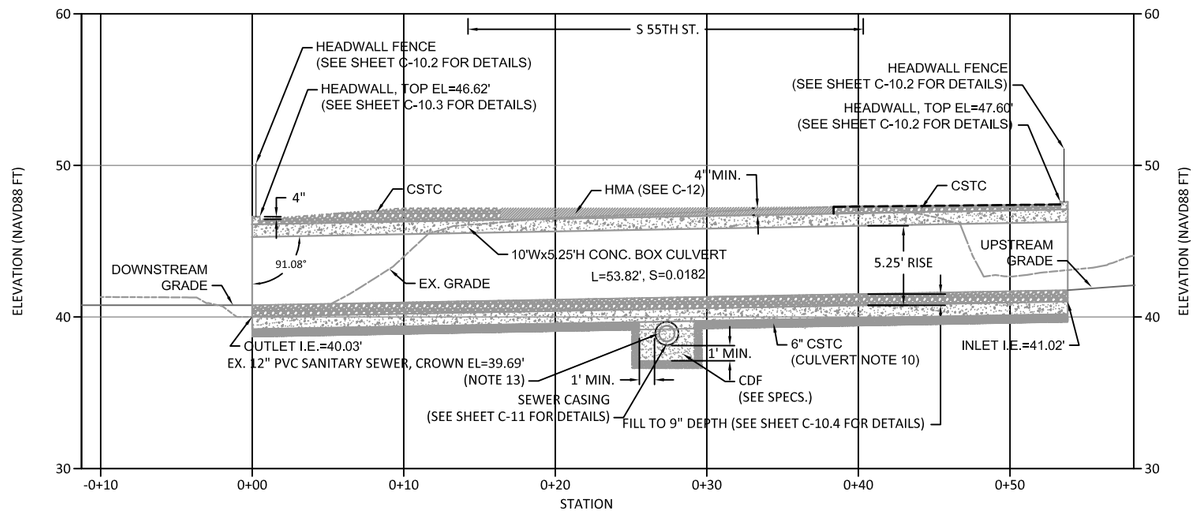
PLAN VIEW: PROPOSED CULVERT

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE .5-FOOT.
4. SSMH LID TO BE ADJUSTED AS NECESSARY UPON COMPLETION OF CULVERT INSTALLATION, PER SPECIFICATIONS.
5. ASPHALT TO BE CUT-BACK 24" MIN. FROM EDGE OF EXCAVATION CUT SLOPE. SHORING/EXCAVATION PROTECTION AS REQUIRED BY SPECIFICATIONS.
6. TEMPORARY CONSTRUCTION EASEMENT TO BE ACQUIRED BY CONTRACTOR PRIOR TO CONSTRUCTION.

CULVERT NOTES:

1. ONE 10 FT SPAN BY 5.25 FT RISE PRECAST CONCRETE BOX CULVERT.
2. NOMINAL WALL THICKNESS 10 INCHES.
3. CENTER LINE CULVERT LENGTH 53.83 FT
4. UPSTREAM CENTERLINE INVERT ELEVATION 41.02 FT
5. DOWNSTREAM CENTERLINE INVERT ELEVATION 40.03 FT
6. CULVERT CENTERLINE SLOPE 1.82%
7. UPSTREAM AND DOWNSTREAM END SECTIONS BEVELED AS SHOWN TO MATCH ROAD ALIGNMENT.
8. WINGWALLS AND END SECTIONS TO EXTEND AS SHOWN TO STABILIZE BANKS AT CULVERT INLET AND OUTLET.
9. GRADE AREA UPSTREAM OF CULVERT AS SHOWN TO DIVERT FLOW INTO CULVERT.
10. IF UNSUITABLE MATERIALS ARE ENCOUNTERED DURING CULVERT INSTALLATION AT THE BEDDING LEVEL, EXCAVATE 1-FOOT ADDITIONAL PLACE AND COMPACT 6" CSTC AND BACKFILL REMAINING AREA WITH CDF.
11. PIPE ZONE BACKFILL AND BACKFILL ABOVE PIPE ZONE SHALL BE PERFORMED IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 7-08.3(3). COMPACTION EFFORTS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION CONSIDERATIONS FOR THE AREA.
12. A GEOTECHNICAL ENGINEER SHALL BE ONSITE DURING ALL BACKFILLING ACTIVITIES TO ASSURE PROPER COMPACTION EFFORTS AND COMPLIANCE WITH ABOVE SPECIFICATIONS. CONTRACTOR WILL CONTACT THE ENGINEER BEFORE COMMENCING THESE ACTIVITIES TO ASSURE HIS/HER PRESENCE.
13. CONFIRM EXISTING SEWER ELEVATIONS. IF SEWER ELEV. DIFFERS, PREPARE SUBMITTAL FOR REVIEW AND APPROVAL BY ENGINEER FOR PROPOSED CHANGES.



PROFILE VIEW: PROPOSED CULVERT

CULVERT DESIGN STANDARD REFERENCES:

1. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (5TH EDITION), LIVE LOAD TYPE HL-93.
2. WSDOT BRIDGE DESIGN MANUAL, M 23-50.02, CURRENT EDITION (SUPPLEMENTS AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS)
3. WSDOT LOCAL AGENCY GUIDELINES, M 36-63.06, CHAPTERS 34 AND 42.
4. BOX CULVERTS SHALL BE IN ACCORDANCE WITH ASTMC-1433

PLAN NORTH

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US Army Corps of Engineers
Seattle District

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Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
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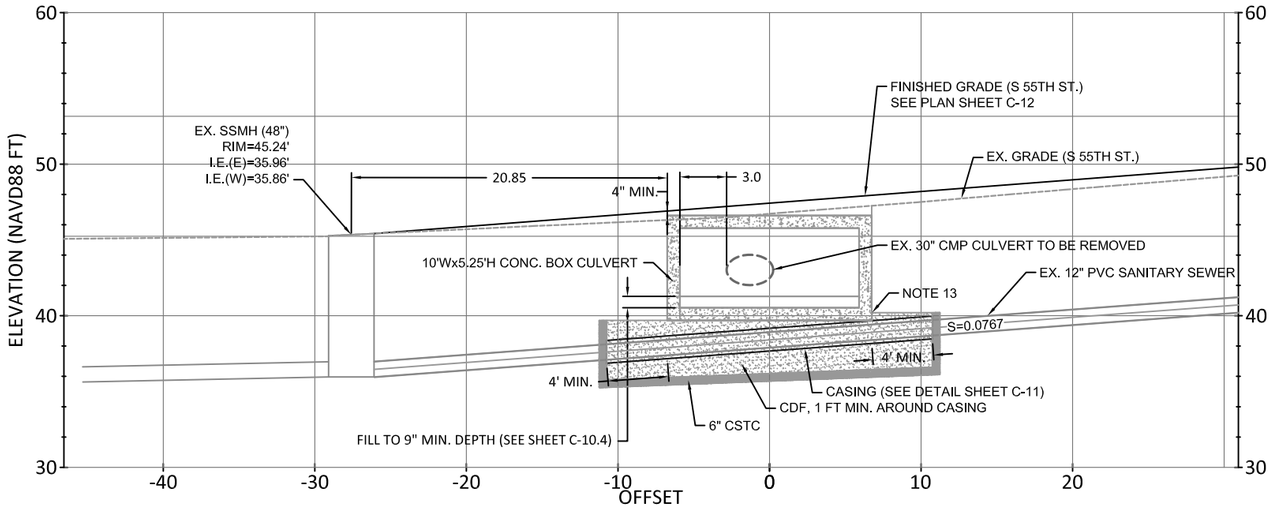
U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CULVERT CONSTRUCTION PLAN AND PROFILE
RENTON PN 134779 WASHINGTON

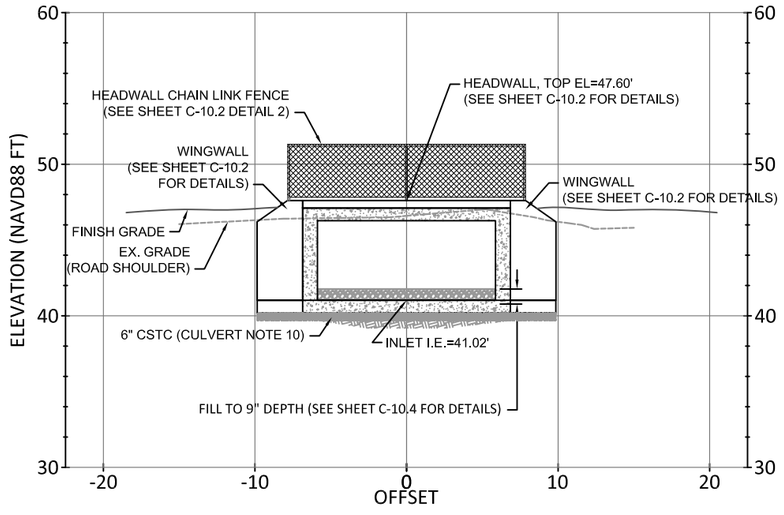
Plate number:
C–10.0
Sheet 18of 30



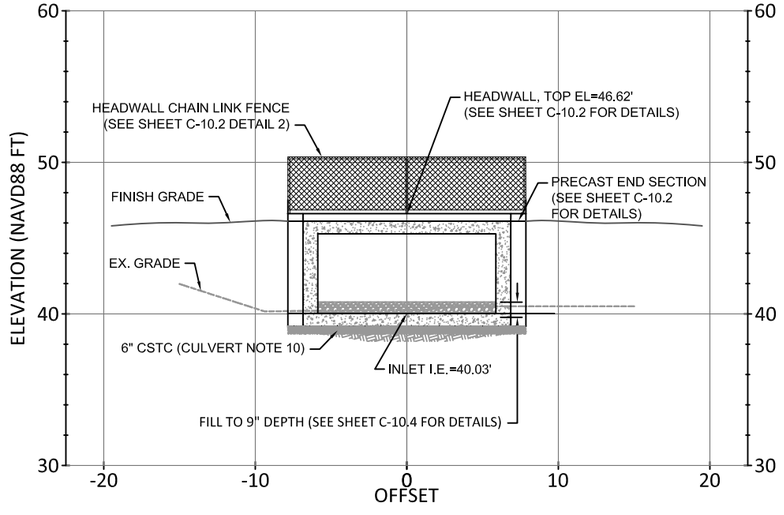
A C-10 SECTION VIEW: PROPOSED CULVERT
SCALE: 1" = 5'

CULVERT NOTES:

1. ONE 10 FT SPAN BY 5.25 FT RISE PRECAST CONCRETE BOX CULVERT.
2. NOMINAL WALL THICKNESS 10 INCHES.
3. CENTER LINE CULVERT LENGTH 53.83 FT
4. UPSTREAM CENTERLINE INVERT ELEVATION 41.02 FT
5. DOWNSTREAM CENTERLINE INVERT ELEVATION 40.03 FT
6. CULVERT CENTERLINE SLOPE 1.82%
7. UPSTREAM AND DOWNSTREAM END SECTIONS BEVELED AS SHOWN TO MATCH ROAD ALIGNMENT.
8. WINGWALLS AND END SECTIONS TO EXTEND AS SHOWN TO STABILIZE BANKS AT CULVERT INLET AND OUTLET.
9. GRADE AREA UPSTREAM OF CULVERT AS SHOWN TO DIVERT FLOW INTO CULVERT.
10. IF UNSUITABLE MATERIALS ARE ENCOUNTERED DURING CULVERT INSTALLATION AT THE BEDDING LEVEL, EXCAVATE 1-FOOT ADDITIONAL PLACE AND COMPACT 6" CSTC AND BACKFILL REMAINING AREA WITH CDF.
11. PIPE ZONE BACKFILL AND BACKFILL ABOVE PIPE ZONE SHALL BE PERFORMED IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 7-08.3(3). COMPACTION EFFORTS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION CONSIDERATIONS FOR THE AREA.
12. A GEOTECHNICAL ENGINEER SHALL BE ONSITE DURING ALL BACKFILLING ACTIVITIES TO ASSURE PROPER COMPACTION EFFORTS AND COMPLIANCE WITH ABOVE SPECIFICATIONS. CONTRACTOR WILL CONTACT THE ENGINEER BEFORE COMMENCING THESE ACTIVITIES TO ASSURE HIS/HER PRESENCE.
13. CONFIRM EXISTING SEWER ELEVATIONS. IF SEWER ELEV. DIFFERS, PREPARE SUBMITTAL FOR REVIEW AND APPROVAL BY ENGINEER FOR PROPOSED CHANGES.



B C-10 SECTION VIEW: PROPOSED CULVERT INLET
SCALE: 1" = 5'



C C-10 SECTION VIEW: PROPOSED CULVERT OUTLET
SCALE: 1" = 5'

0 5 10
SCALE IN FEET

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.

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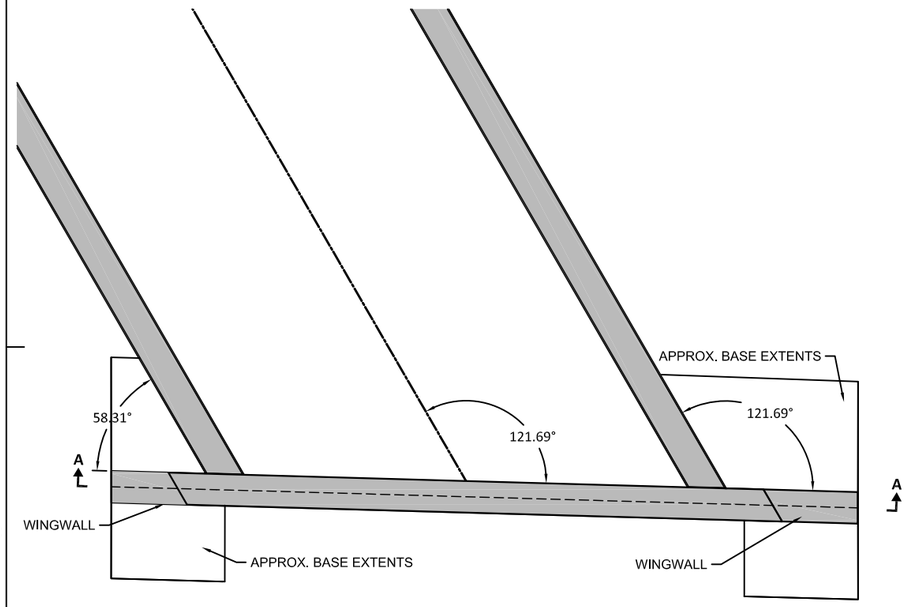
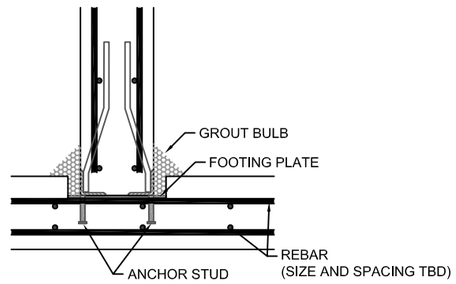
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CULVERT CONSTRUCTION CROSS-SECTIONS
RENTON PN 134779 WASHINGTON

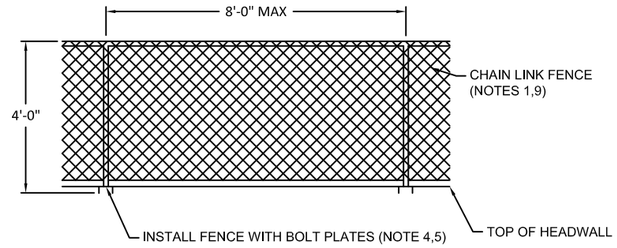
Plate number:
C–10.1
Sheet 19of 30



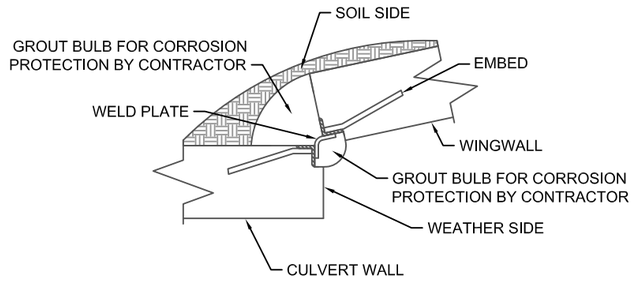
PLAN VIEW: CULVERT INLET END SECTION



1 - DETAIL: SIDE VIEW CONNECTION DETAIL
SCALE:N.T.S.



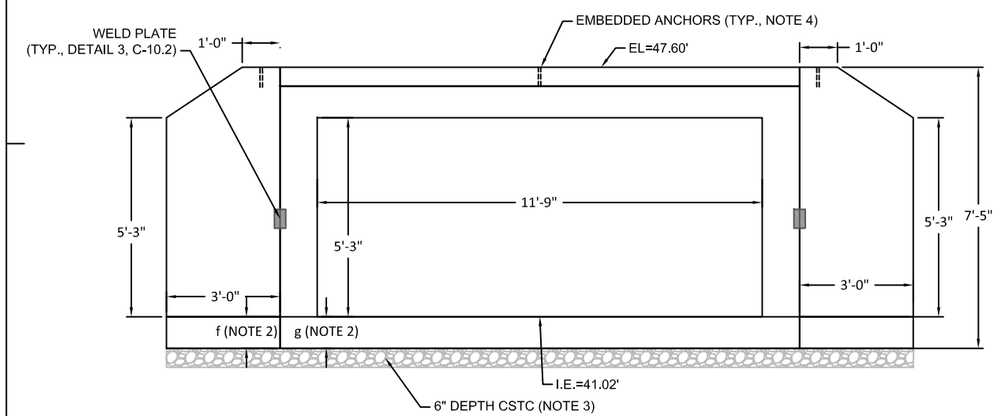
2 - DETAIL: TYPICAL ELEVATION VIEW CHAINLINK FENCE
SCALE:N.T.S.



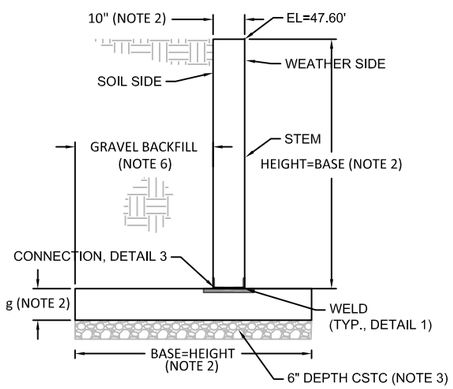
3 - DETAIL: PLAN VIEW CULVERT WINGWALL CONNECTION
SCALE:N.T.S.

NOTES:

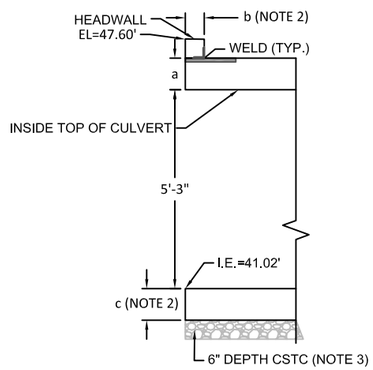
1. MANUFACTURER TO PROVIDE STRUCTURAL DESIGN SHOP DRAWINGS AND DESIGN CALCULATIONS FOR CONTRACTING OFFICER'S APPROVAL.
2. DIMENSIONS SHALL BE DESIGNED AND INCLUDED IN SHOP DRAWINGS.
3. IF UNSUITABLE MATERIALS ARE ENCOUNTERED DURING CULVERT INSTALLATION AT THE BEDDING LEVEL, EXCAVATE 1-FOOT ADDITIONAL, PLACE AND COMPACT 6" CSTC AND BACKFILL REMAINING AREA WITH CDF.
4. EMBED CONCRETE ANCHORS INTO CONCRETE PER MANUFACTURER SPECIFICATIONS.
5. ATTACH FENCE TO HEADWALL WITH BOLT PLATES.
6. GRAVEL BACKFILL TO END OF BASE PLUS A MAXIMUM OF 3 FT BEYOND.
7. HEADWALL MAY BE INTEGRATED INTO END SECTION AT CONTRACTOR'S OPTION.
8. WINGWALL STEM AND BASE MAY BE INTEGRATED INTO ONE PIECE AT CONTRACTORS OPTION.
9. CHAIN LINK FENCE SHALL CONFORM TO CITY OF RENTON SPECIAL PREVISIONS AND STANDARD PLANS L002 AND L002.1, WITH THE FOLLOWING MODIFICATIONS:
   - 9.1. FENCE SHALL ATTACH TO HEADWALL AND WINGWALL USING EMBEDDED CONCRETE ANCHORS AND STEEL BOLT PLATES AS SHOWN ON THIS SHEET.



A - SECTION VIEW A-A' CULVERT INLET END SECTION
SCALE: 1" = 2'



SIDE VIEW: CULVERT INLET WINGWALL



SIDE VIEW: CULVERT INLET HEADWALL

0 2 4
SCALE IN FEET

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

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U.S.ARMY ENGINEER DISTRICT,SEATTLE
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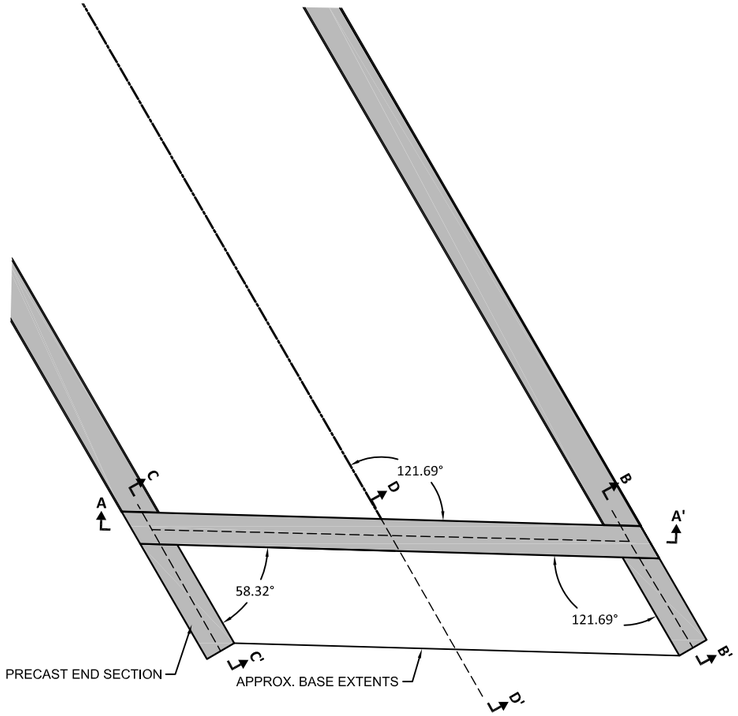
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CULVERT INLET PLAN AND CONNECTION DETAILS
RENTON PN 134779 WASHINGTON

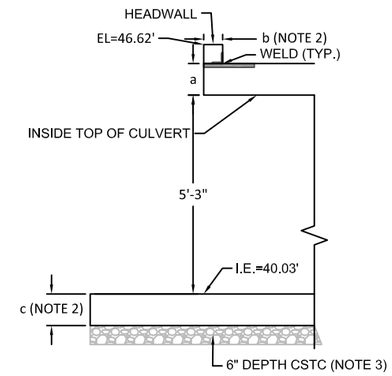
Plate number:
C–10.2
Sheet 20of 30

NOTES:

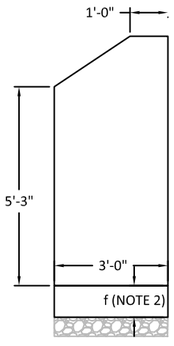
1. MANUFACTURER TO PROVIDE STRUCTURAL DESIGN SHOP DRAWINGS AND DESIGN CALCULATIONS FOR CONTRACTING OFFICER'S APPROVAL.
2. DIMENSIONS SHALL BE DESIGNED AND INCLUDED IN SHOP DRAWINGS.
3. IF UNSUITABLE MATERIALS ARE ENCOUNTERED DURING CULVERT INSTALLATION AT THE BEDDING LEVEL, EXCAVATE 1-FOOT ADDITIONAL, PLACE AND COMPACT 6" CSTC AND BACKFILL REMAINING AREA WITH CDF.
4. EMBED CONCRETE ANCHORS INTO CONCRETE PER MANUFACTURER SPECIFICATIONS.
5. ATTACH FENCE TO HEADWALL WITH BOLT PLATES.
6. GRAVEL BACKFILL TO END OF BASE PLUS A MAXIMUM OF 3 FT BEYOND.
7. HEADWALL MAY BE INTEGRATED INTO END SECTION AT CONTRACTOR'S OPTION.
8. WINGWALL STEM AND BASE MAY BE INTEGRATED INTO ONE PIECE AT CONTRACTORS OPTION.



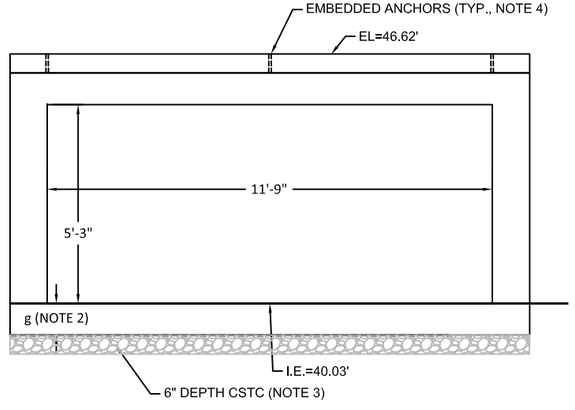
PLAN VIEW: CULVERT OUTLET END SECTION



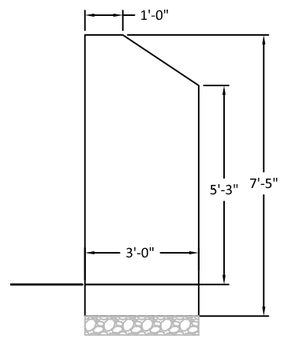
D — DETAIL: SECTION VIEW CULVERT OUTLET WINGWALL
SCALE: 1" = 2'



C — SECTION VIEW C-C' CULVERT WING WALL
SCALE: 1" = 2'



A — SECTION VIEW A-A' CULVERT OUTLET END SECTION
SCALE: 1" = 2'



B — SECTION VIEW B-B' CULVERT WING WALL
SCALE: 1" = 2'

0 2 4
SCALE IN FEET

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

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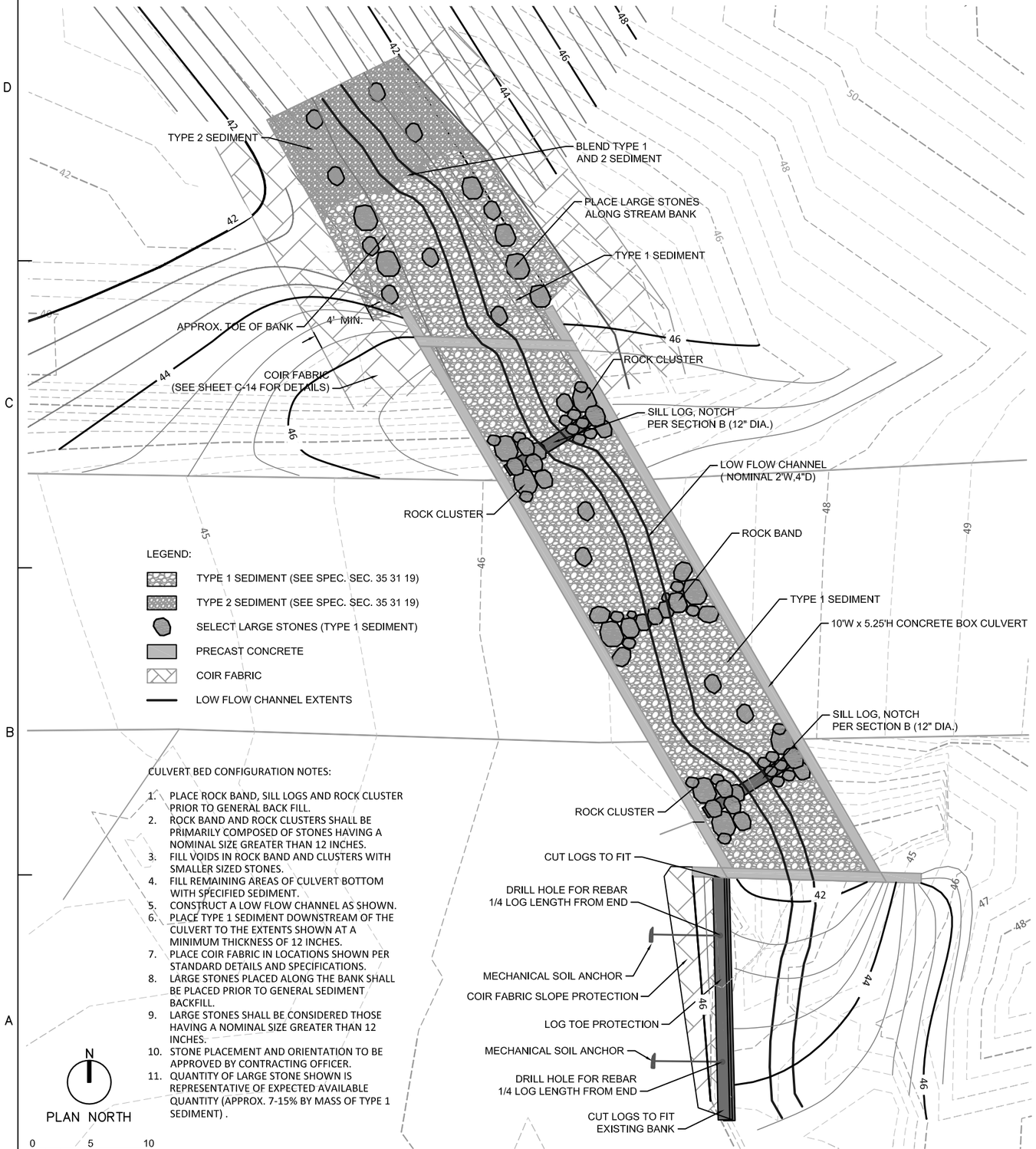
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
File #
Rev.

U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

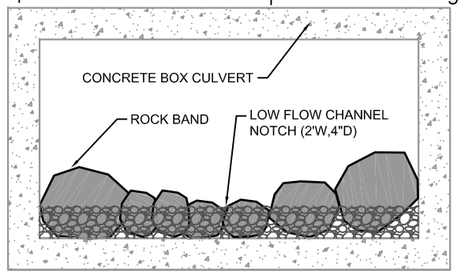
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CULVERT OUTLET PLAN AND DETAILS
RENTON PN 134779 WASHINGTON

Plate number: C–10.3
Sheet 21of 30

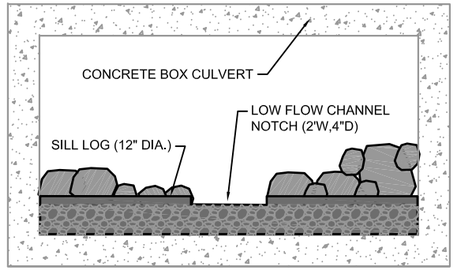


CULVERT BED CONFIGURATION NOTES:

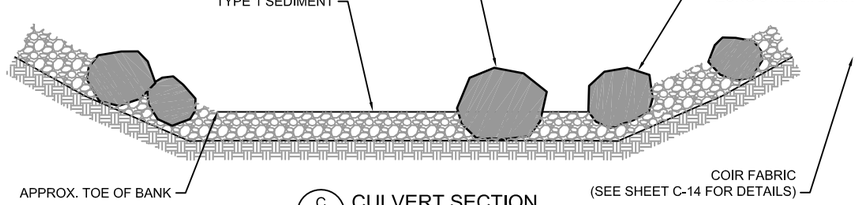
1. PLACE ROCK BAND, SILL LOGS AND ROCK CLUSTER PRIOR TO GENERAL BACK FILL.
2. ROCK BAND AND ROCK CLUSTERS SHALL BE PRIMARILY COMPOSED OF STONES HAVING A NOMINAL SIZE GREATER THAN 12 INCHES.
3. FILL VOIDS IN ROCK BAND AND CLUSTERS WITH SMALLER SIZED STONES.
4. FILL REMAINING AREAS OF CULVERT BOTTOM WITH SPECIFIED SEDIMENT.
5. CONSTRUCT A LOW FLOW CHANNEL AS SHOWN.
6. PLACE TYPE 1 SEDIMENT DOWNSTREAM OF THE CULVERT TO THE EXTENTS SHOWN AT A MINIMUM THICKNESS OF 12 INCHES.
7. PLACE COIR FABRIC IN LOCATIONS SHOWN PER STANDARD DETAILS AND SPECIFICATIONS.
8. LARGE STONES PLACED ALONG THE BANK SHALL BE PLACED PRIOR TO GENERAL SEDIMENT BACKFILL.
9. LARGE STONES SHALL BE CONSIDERED THOSE HAVING A NOMINAL SIZE GREATER THAN 12 INCHES.
10. STONE PLACEMENT AND ORIENTATION TO BE APPROVED BY CONTRACTING OFFICER.
11. QUANTITY OF LARGE STONE SHOWN IS REPRESENTATIVE OF EXPECTED AVAILABLE QUANTITY (APPROX. 7-15% BY MASS OF TYPE 1 SEDIMENT) .



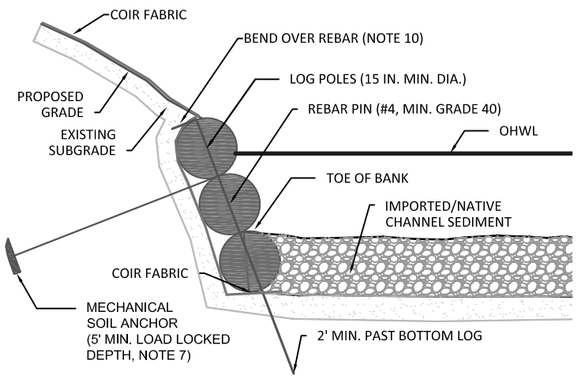
A CHANNEL SECTION
SCALE:1" = 2'



B CULVERT SECTION
SCALE:1" = 2'



C CULVERT SECTION
SCALE:1" = 2'



UPSTREAM BANK STABILIZATION DETAIL
N.T.S.

BANK STABILIZATION NOTES:

1. GRADE BANK AS SHOWN IN PLAN.
2. PLACE COIR FABRIC OVER DISTURBED AREAS.
3. PROVIDE SUFFICIENT LENGTH OF WIRE ROPE TO INSTALL MECHANICAL SOIL ANCHOR AND SECURE TO REBAR AS SHOWN.
4. DRIVE MECHANICAL SOIL ANCHOR AS INSTRUCTED BY MANUFACTURER INSTALLATION PROCEDURES IN LOCATIONS SHOWN ON PLANS.
5. LOAD LOCK MECHANICAL SOIL ANCHOR AS INSTRUCTED BY MANUFACTURER INSTALLATION PROCEDURES.
6. ANCHOR STABILITY SHALL BE **PROOFED TO A LOAD NO LESS THAN 1000 LB** CONSISTENT WITH METHODS RECOMMENDED BY THE MANUFACTURER.
7. PROOFED ANCHOR DEPTH SHALL BE NO LESS THAN THAT SHOWN ON PLANS. FINAL INSTALLATION TO BE APPROVED BY CONTRACTING OFFICER.
8. PLACE LOGS ALONG TOE OF THE BANK. BOTTOM LOG PLACED SO TOP OF THE LOG IS FLUSH WITH CHANNEL BOTTOM.
9. DRIVE REBAR PIN THROUGH CENTER OF LOGS AS SHOWN AND COIR FABRIC UNDER BOTTOM LOG. REBAR PIN TO EXTEND A MINIMUM OF 2 FT PAST BOTTOM LOG.
10. BEND TOP OF REBAR OVER A MINIMUM OF 0.5 FT TOWARDS THE BANK
11. SECURE MECHANICAL SOIL ANCHOR TO REBAR PIN WITH WIRE ROPE LEAD AS SHOWN. CONNECTION CAPACITY TO BE NO LESS THAN PROOFED MECHANICAL SOIL ANCHOR LOAD.

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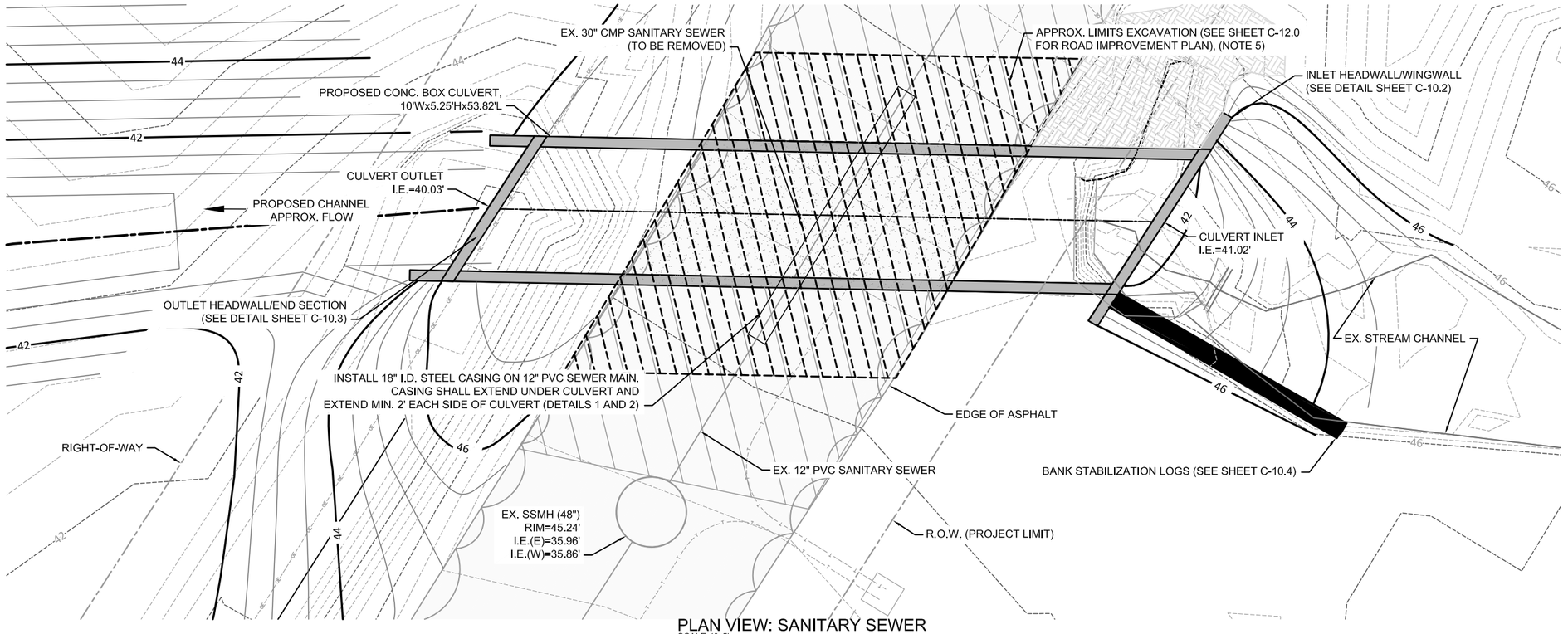
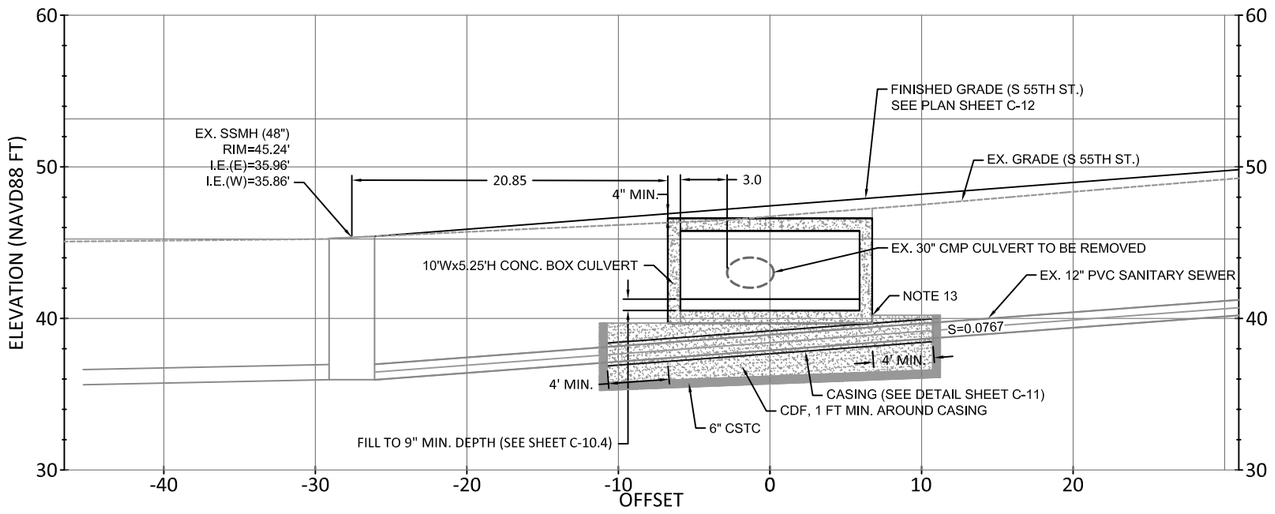
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
CULVERT CHANNEL PLAN AND SECTIONS
RENTON PN 134779 WASHINGTON

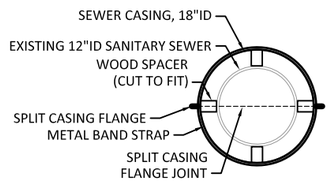
Plate number:
C–10.4
Sheet 22of 30



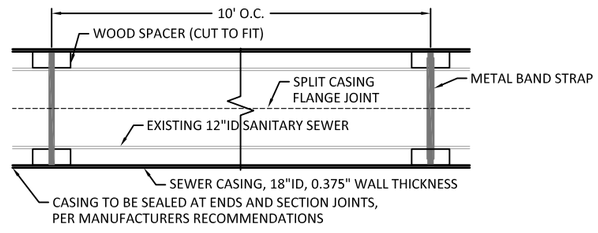
PLAN VIEW: SANITARY SEWER
SCALE: 1"=5'



PROFILE VIEW: SANITARY SEWER
SCALE: 1"=5'



1 - DETAIL: SECTION VIEW SEWER CASING
SCALE: 1" = 1'



2 - DETAIL: PLAN VIEW SEWER CASING
SCALE: 1" = 1'

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE .5-FOOT.
4. SSMH FRAME AND COVER TO BE ADJUSTED AS NECESSARY UPON COMPLETION OF CULVERT INSTALLATION, PER SPECIFICATIONS.
5. CONTRACTOR RESPONSIBLE FOR TRENCH PROTECTION MEASURES.

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

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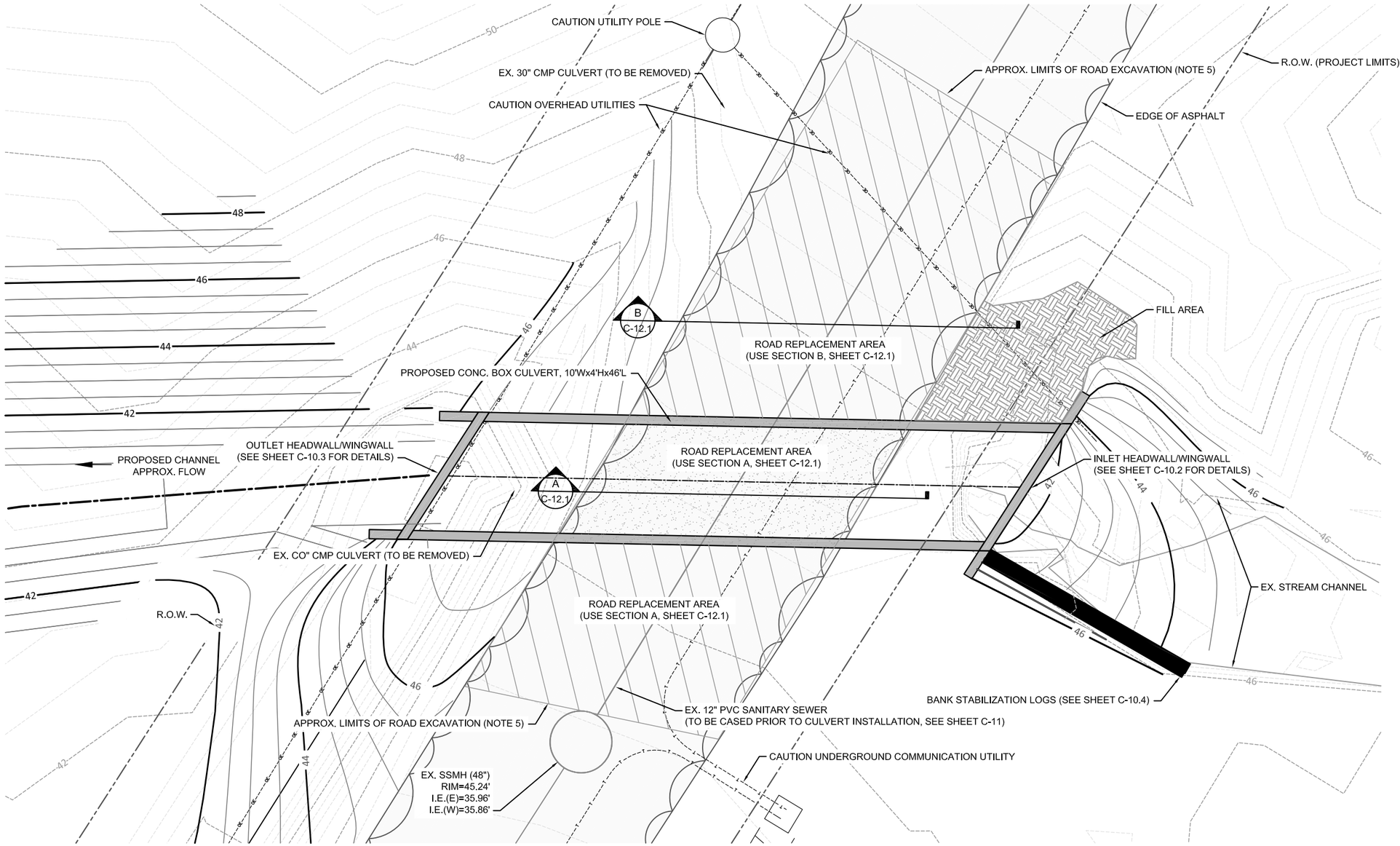
SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
SANITARY SEWER PLAN AND DETAILS
RENTON PN 134779 WASHINGTON

Plate number: C–11
Sheet 23 of 30



PLAN VIEW: ROAD REPLACEMENT

0 5 10
SCALE IN FEET

PLAN NORTH

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE .5-FOOT.
4. SSMH FRAME AND COVER TO BE ADJUSTED UPON COMPLETION OF CULVERT INSTALLATION, PER SPECIFICATIONS.
5. ROAD REPLACEMENT CONSTRUCTION TO BE COORDINATED WITH LOCAL AGENCIES.

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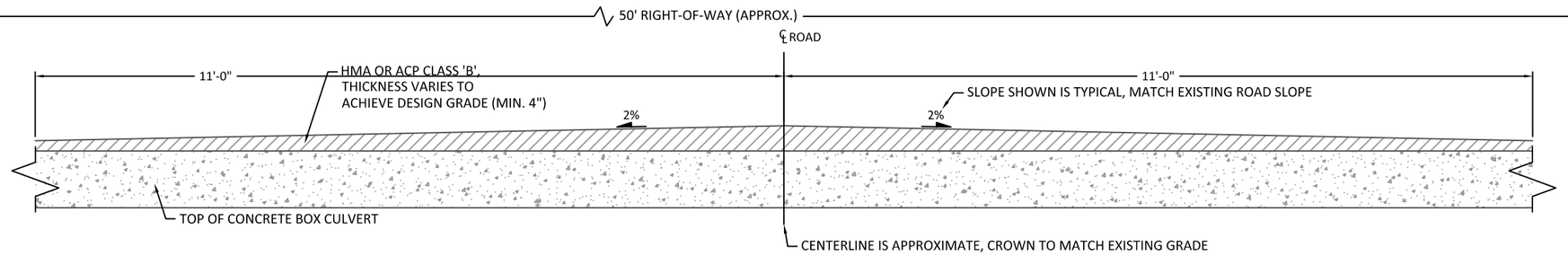
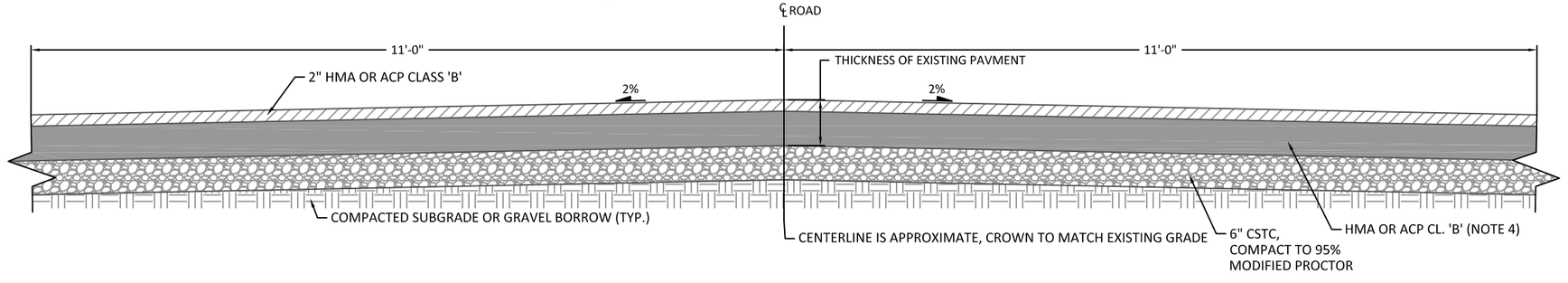
Prepared by:
ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
ROAD REPLACEMENT PLAN
RENTON WASHINGTON PN 134779

Plate number:
C–12
Sheet 24 of 30



A
-
CULVERT ROAD REPLACEMENT SECTION
SCALE:NOT TO SCALE



B
-
ROAD REPLACEMENT SECTION
SCALE:NOT TO SCALE

ROAD REPLACEMENT NOTES:

1. ROAD MATERIALS TO MEET WSDOT STANDARD SPECIFICATION FOR ROAD BRIDGE, AND MUNICIPAL CONSTRUCTION 2008, MANUAL M 41-10.
2. CRUSHED SURFACING (CSBC, CSTC), REFER TO WSDOT M 41-10, PART 9-03.9(3), PART 4-04, AND RELATED PARTS.
3. HOT MIX ASPHALT (HMA) SHALL BE CLASS A, REFER TO WSDOT M 41-10, PART 5-04, PART 9-03.8, AND RELATED PARTS.
4. MINIMUM THICKNESS OF MATERIAL SHALL BE: 2" HMA OR ACP CLASS 'B', IN NO CASE SHALL THE THICKNESS BE LESS THAN THAT OF THE EXISTING PAVEMENT SECTION.

0 5 10
SCALE IN FEET

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Seattle District

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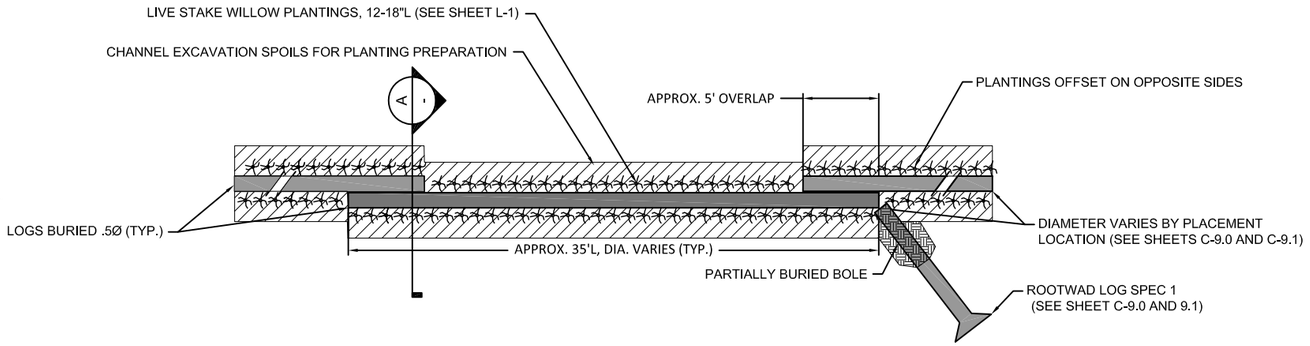
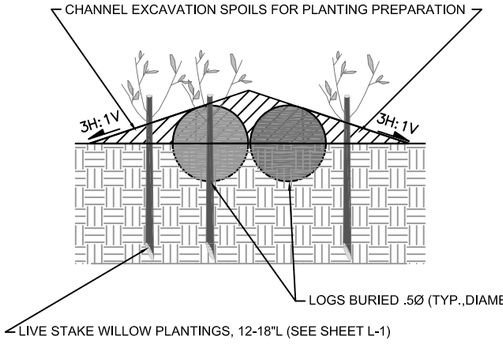
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
ROAD REPLACEMENT SECTIONS
RENTON PN 134779 WASHINGTON

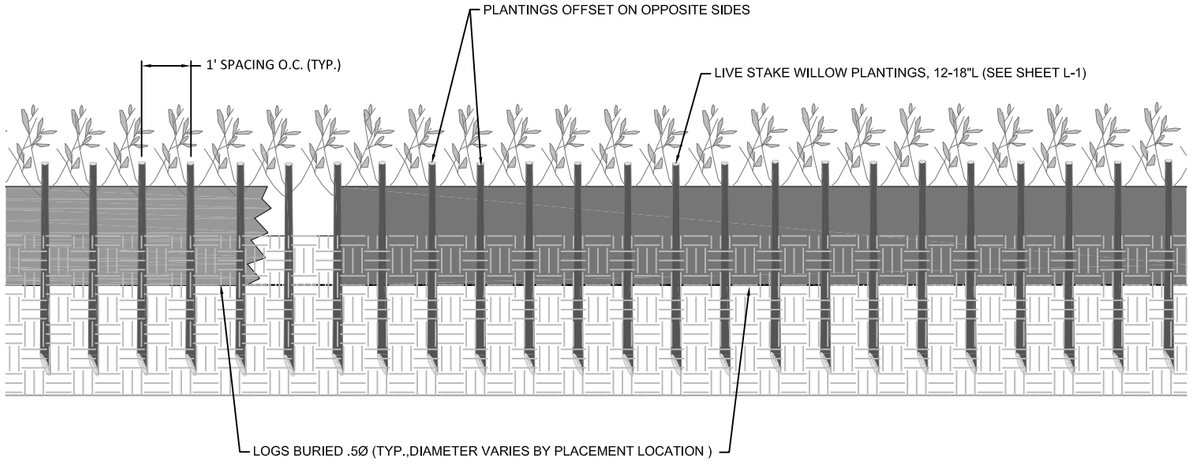
Plate number:
C–12.1
Sheet 25of 30



PLAN VIEW: TYPICAL FLOODPLAIN LOG PLACEMENT
NOT TO SCALE



A / - SECTION: TYPICAL FLOODPLAIN LOG PLACEMENT
SCALE:NOT TO SCALE



SIDE VIEW: TYPICAL FLOODPLAIN LOG PLACEMENT
NOT TO SCALE

NOTES:

1. FLOODPLAIN LOGS ARE APPROX. 35-FOOT LENGTH (LENGTH TBD BY AVAILABLE MATERIALS). SPOIL MATERIAL FROM CHANNEL EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES TO BE PLACED ADJACENT TO FLOODPLAIN LOGS TO SUPPORT LIVE STAKE PLANTINGS.
2. FLOODPLAIN LOG DIAMETERS ARE BASED ON 10-YEAR FLOOD EVENT, FOR 100-YEAR EVENT DIAMETERS WOULD INCREASE BY APPROX. 6-INCHES.
3. LIVE STAKES TO BE PLANTED UNDER SEPARATE CONTRACT FOLLOWING PROJECT CONSTRUCTION.

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

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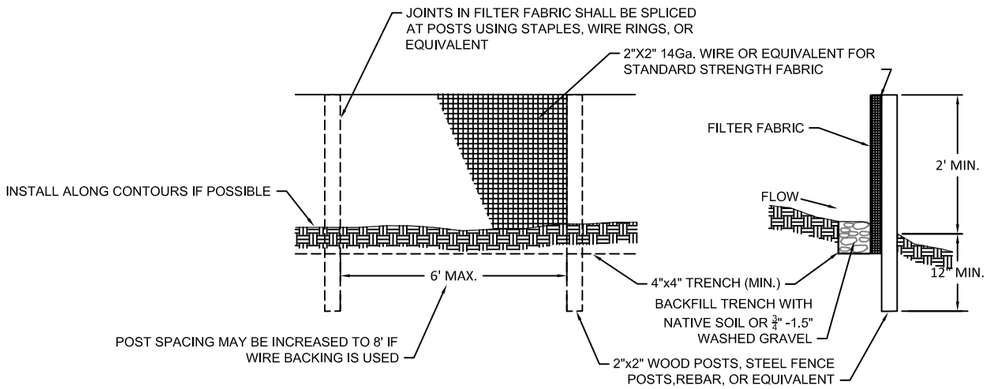
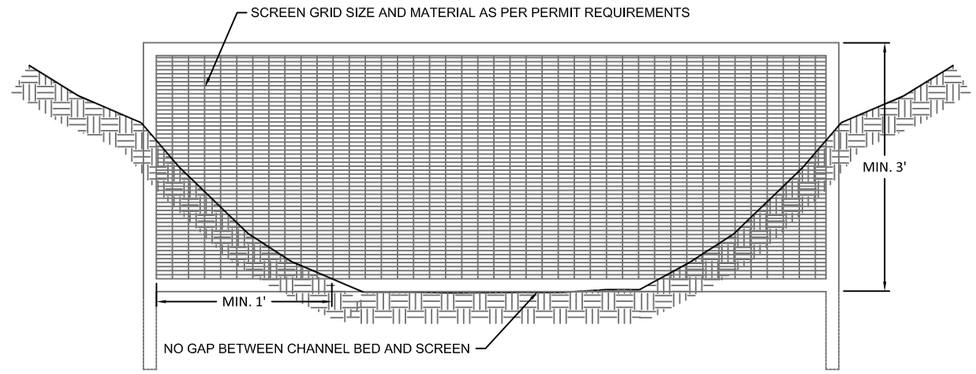
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
FLOODPLAIN LOG PLACEMENT AND PLANTING DETAILS
RENTON PN 134779 WASHINGTON

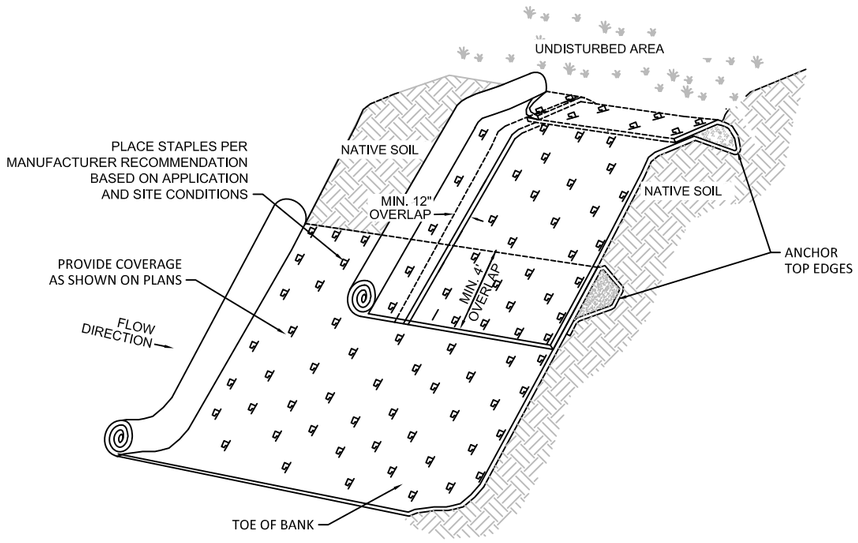
Plate number:
C–13
Sheet 26of 30



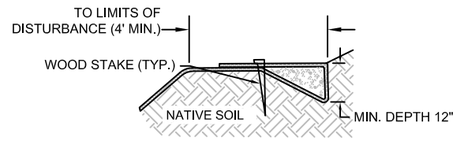
1 / - DETAIL: TYPICAL SILT FENCE INSTALLATION
SCALE:NOT TO SCALE



3 / - DETAIL: TYPICAL FISH EXCLUSION FENCE
SCALE:NOT TO SCALE



2 / - DETAIL: TYPICAL COIR FABRIC INSTALLATION
SCALE:NOT TO SCALE



TOP EDGE ANCHOR

COIR FABRIC NOTES:
1. COIR FABRIC SHOULD BE INSTALLED FROM DOWNSTREAM TO UPSTREAM FROM THE TOE OF BANK UP. FOR ADDITIONAL INFORMATION REFER TO SPECIFICATIONS.
2. DO NOT STRETCH COIR FABRIC TIGHT - ALLOW THE ROLLS TO MOLD TO ANY IRREGULARITIES.
3. FOR SLOPES GREATER THAN 3H:1V, COIR FABRIC SHALL BE PLACED IN VERTICAL STRIPS.
4. SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS, PRIOR TO APPLICATION. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
5. FOR SEEDED AREAS, APPLY SEED PRIOR TO INSTALLING MAT.
6. FOR PLANTED AREAS, INSTALLCOIR FABRIC PRIOR TO PLANTING.
7. LAY COIR FABRIC LOOSELY AND STAKE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
8. PLACE CHANNEL FILL MATERIAL FOLLOWING FABRIC INSTALLATION.

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SEATTLE, WASHINGTON
Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
TYPICAL DETAILS
RENTON PN 134779 WASHINGTON

Plate number: C–14
Sheet 27 of 30

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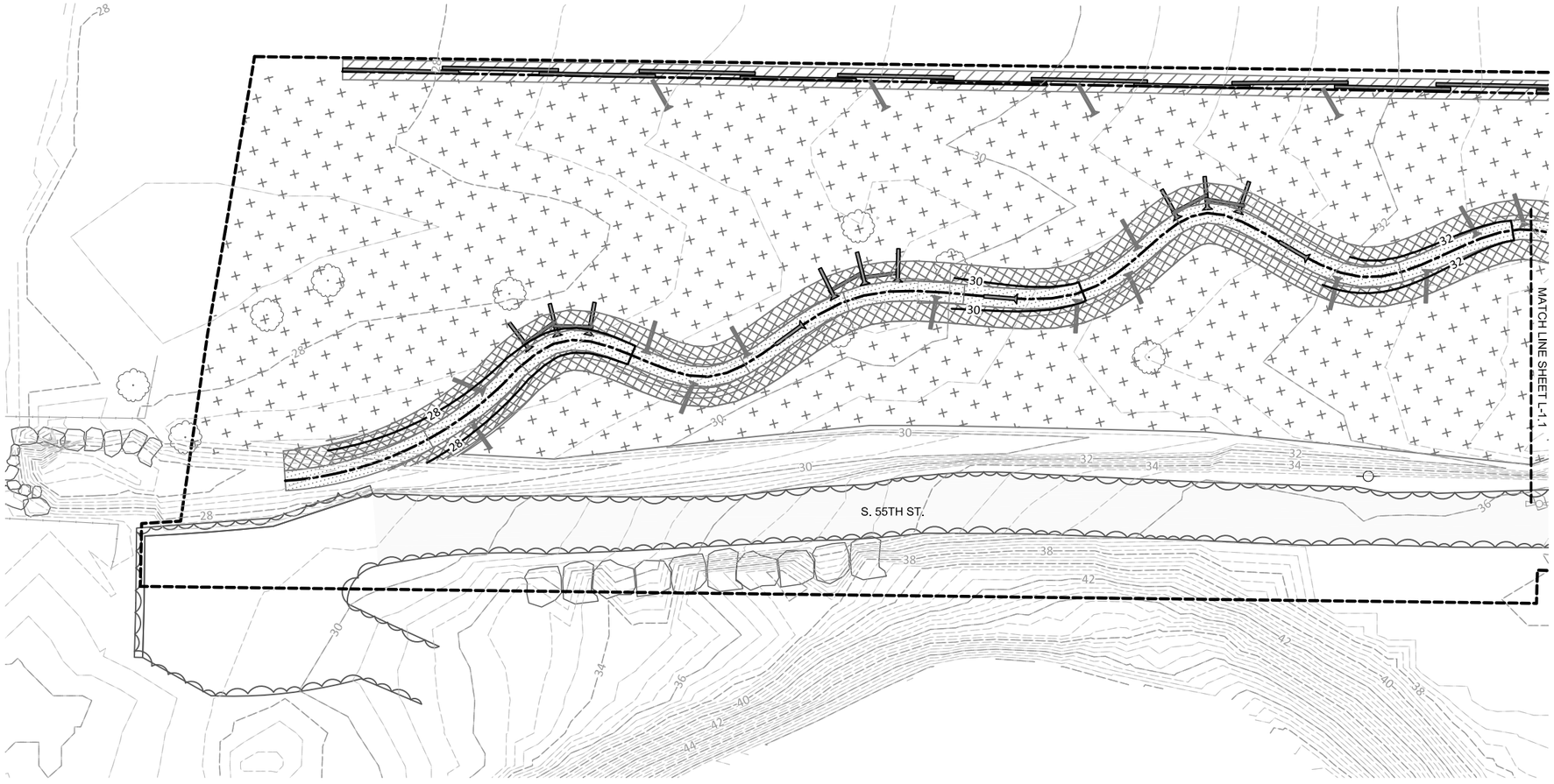

LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROJECT/CONSTRUCTION LIMIT BOUNDARY
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)

PLANTING AREA TYPES:
(SEE SHEET L-2 FOR DESCRIPTIONS)

	AREA (ACRES) THIS SHEET:
LITTORAL ZONE PLANTING AREA	0.06
FORMER CHANNEL PLANTING AREA	0.00
BANK PLANTING AREA	0.11
RIPARIAN ZONE PLANTING AREA	0.82
FLOOD PLAIN LOG PLACEMENT PLANTING AREA	0.04

0 20 40
SCALE IN FEET

N
PLAN NORTH

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE 0.5-FOOT.
4. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22- JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
5. ALL PLANTING TO BE DONE BY OTHERS.

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

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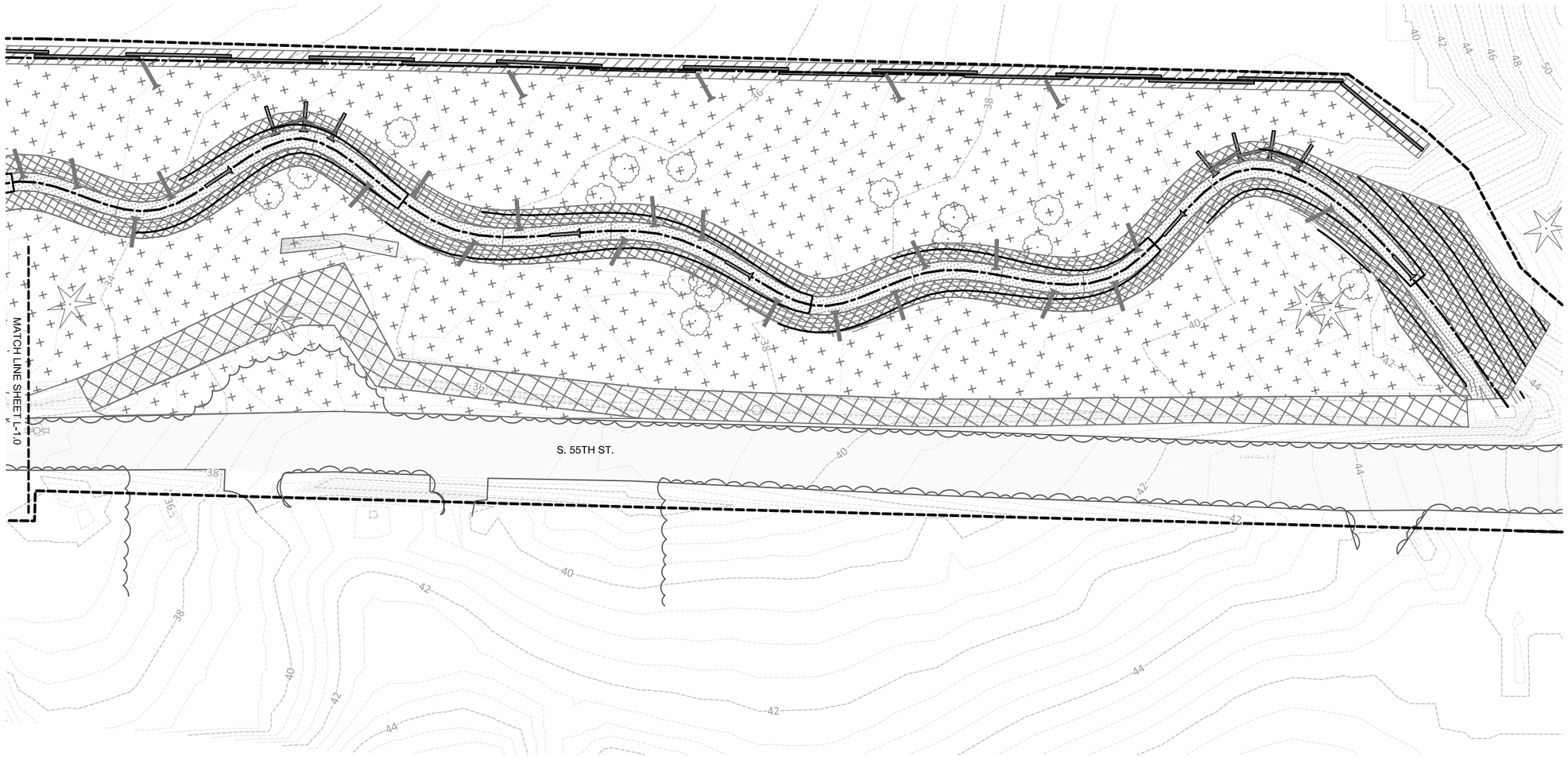
GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PLANTING PLAN CHANNEL STATIONS 0+00 TO 4+20
RENTON PN 134779 WASHINGTON

Plate number:
L–1.0
Sheet 28of 30



LEGEND:

- EXISTING CONTOUR-MAJOR (2-FOOT)
- EXISTING CONTOUR-MINOR (0.5-FOOT)
- PROPOSED CONTOUR-MAJOR (2-FOOT)
- PROPOSED CONTOUR-MINOR (0.5-FOOT)
- PROJECT/CONSTRUCTION LIMIT BOUNDARY
- EXISTING TREE (DECIDUOUS)
- EXISTING TREE (CEDAR)

PLANTING AREA TYPES: (SEE SHEET L-2 FOR DESCRIPTIONS)	AREA (ACRES) THIS SHEET:
LITTORAL ZONE PLANTING AREA	0.08
FORMER CHANNEL PLANTING AREA	0.11
BANK PLANTING AREA	0.18
RIPARIAN ZONE PLANTING AREA	0.90
FLOODPLAIN LOG PLACEMENT PLANTING AREA	0.05

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: NAVD 88 FEET.
3. CONTOUR INTERVALS ARE 0.5-FOOT.
4. EXISTING CONDITIONS SURVEY CONDUCTED BY DUANE HARTMAN AND ASSOCIATES JULY 22- JULY 29, 2009 AND ADDITIONALLY ON NOVEMBER 9, 2009.
5. ALL PLANTING TO BE DONE BY OTHERS.

0 20 40
SCALE IN FEET

N
PLAN NORTH

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Seattle District

Symbol	Description	Date	Appr.	Symbol	Description
		/ /			

Designed by: B.KEENAN
Drawn by: E.PIPKIN
Checked by: T.DRURY
Date: 11 MAY 10
File #
Rev.

U.S.ARMY ENGINEER DISTRICT,SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

Prepared by: ANCHOR QEA

GREEN DUWAMISH RIVER ECOSYSTEM RESTORATION
UPPER SPRINGBROOK CREEK PROJECT
PLANTING PLAN CHANNEL STATIONS 4+20 TO 9+60
RENTON WASHINGTON
PN 134779

Plate number:
L–1.1
Sheet 29of 30

Appendix B

CENWS-PM-PL-ER
29 October 2008

MEMORANDUM FOR RECORD

SUBJECT: UPPER SPRINGBROOK CREEK RESTORATION PROJECT

Wetland delineation and determination at Upper Springbrook Creek
09/05/2008
Site visit to locate wetlands within the boundaries of a proposed stream restoration
Field notes taken by Kristin Kerns as directed by Andrea Cummins

The proposed project is to realign and restore Upper Springbrook Creek located in the City of Renton, King County, Washington. The current stream runs parallel to South 55th Street and into a culvert under Highway 167. The restoration will include constructing a more natural, meandering creek alignment along 950 feet of South 55th Street and replanting the riparian zone with appropriate native vegetation. During the site visit the project footprint was determined and assessed for potential impacts to wetlands.

Site Location:
Upper Springbrook Creek is located in Renton, Washington, Section 31, Township 23 North, and Range 5 East. The creek currently runs through private property, under South 55th Street via a culvert, parallel to South 55th Street, and into a culvert under Highway 167. The project area was located using aerial photos and project design diagrams.

Site Description:
Springbrook Creek has a stream length of 12.0 miles, and approximately 19.1 miles of tributary streams and 3.8 miles of drainage ditches, it is the largest sub basin in the lower Green River Basin. Springbrook Creek sub basin drains an area of about 15,763 acres and enters the Green River (via the Black River) at approximately RM 11.

From its confluence with Mill Creek upstream to the State Route 167 highway crossing, which includes the area of the proposed project, Upper Springbrook Creek more closely resembles a drainage ditch than a natural stream. Dominant vegetation is invasive species: reed canary grass (*Phalaris arundinacea*), blackberry (*Rubus armenicus*) and knotweed (*Polygonum cuspidatum* and *Polygonum bohemicum*) in particular. Access to the stream in the project reach was impossible without prior mechanical removal of blackberry and knotweed. On the north side of the creek native vegetation is more prevalent. Alder (*Alnus rubra*), cottonwood (*Populus balsamifera*), salmonberry (*Rubus spectabilis*), dogwood (*Cornus sericea*), skunk cabbage (*Lysichiton americanus*) and piggyback plant (*Tolmeia menziesii*) are present to varying extents along the 950ft length of the stream.

Methods:
Access to the project area was via nine previously cleared access points, in this report identified as #1 at the eastern most end of the project through #9 at the project boundary with Highway 167. It was not possible to walk the length of the project along either side of the stream due to the dense cover of blackberry and knotweed. Vegetation and soil data was collected (as required) at each of these entry points approximately 50ft in from the road and assessed for wetland indicators. A shovel was used to excavate soil to a depth of 16-18 inches. Soil samples were examined for hydric properties and the presence or absence of hydrology. Vegetation cover was visually estimated for each strata within a 30ft radius of the sample site. Soil pits were not dug in areas of standing water as the presence of surface water during the dry season and predominance of hydrophytic vegetation was considered visual confirmation of a wetland.

Results:
Vegetation throughout the project site was dominated by hydrophytes. Standing water was present in the eastern most 250ft of the site, at access points #1 and #2. At access point #3 and #4 surface water was no longer present. Soil pits were dug and soils were determined to be sandy-silt in texture and marginally hydric. At access point #5, the soil was sandy in texture and very marginally hydric, possibly indicating the location of the previous stream channel. In addition, sand bags were observed in the vicinity of the soil pit and may have contributed to the presence of sand in the area. At access point #6 surface water was present; no soil pit was necessary. At access point #7 and #8 surface water was not present but soils were hydric. At access point #9, at the edge of the project site near Highway 167, soils were wet although no surface water was present. Soils were not colored at this location due to the extremely disturbed condition from highway construction and maintenance.

Unambiguous wetland indicators (including standing water) were present at both ends of the project site, at access points #1, #2, #6, #7, #8 and #9. The center area, access points #3, #4, and #5, while dominated by hydrophytic vegetation had more marginal soil indicators. This may be due to presence of sand dominated, faster draining soil in this area, possibly the result of a previous stream channel location as discussed above. However, the landscape position of the site and the dry season hydrology present during the site visit both indicate the central area of the site to be wetland. Therefore, the entire project site was concluded to be wetland.

Wetland name or number _____

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): Upper Springbrook Cr Date of site visit: _____

Rated by Andrea Cummins / Chemine Jacobs Trained by Ecology? Yes__ No X Date of training_____

SEC: ___ TWNSHP: ____ RNGE: ____ Is S/T/R in Appendix D? Yes___ No___

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	18
Score for Hydrologic Functions	32
Score for Habitat Functions	18
TOTAL score for Functions	68

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply___

Final Category (choose the "highest" category from above) II

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	
Natural Heritage Wetland		Riverine	X
Bog		Lake-fringe	
Mature Forest		Slope	
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above		Check if unit has multiple HGM classes present	

Does the wetland unit being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That May Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered* ***animal or plant*** *species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		X
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered* ***animal*** *species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		X
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		
SP4. *Does the wetland unit have a local significance in addition to its functions*? For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		X

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Wetland name or number _____

Classification of Wetland Units in Western Washington

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 (i.e. except during floods)?

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

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES – Freshwater Tidal Fringe NO – Saltwater Tidal Fringe (Estuarine)**

*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 rated as an **Estuarine** wetland.* Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p.).

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 both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) at least 20 acres (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**?

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 <3ft diameter and less than 1 foot deep).*

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

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

X The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river

X The overbank flooding occurs at least once every two years.

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

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

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 clases. 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 your wetland. 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 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	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still 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.

D	**Depressional and Flats Wetlands** **WATER QUALITY FUNCTIONS** - Indicators that the wetland unit functions to improve water quality	**Points** (only 1 score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 (*If ditch is not permanently flowing treat unit as "intermittently flowing"*) Provide photo or drawing	**Figure ___**
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation > = 95% of area points = 5 Wetland has persistent, ungrazed, vegetation > = 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation > = 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	**Figure ___**
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	**Figure ___**
D	**Total for D 1** *Add the points in the boxes above*	
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p. 44)* multiplier _____
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 ***Add score to table on p. 1***	

Wetland name or number _____

D	**Depressional and Flats Wetlands** HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream degradation	**Points** (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.46)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	
D	**Total for D 3** *Add the points in the boxes above*	
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems — Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p. 49)* multiplier _____
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	

Wetland name or number _____

R	**Riverine and Freshwater Tidal Fringe Wetlands** WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	**Points** (only 1 score per box)
R	**R 1. Does the wetland unit have the <u>potential</u> to improve water quality?**	*(see p.52)*
R	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: Depressions cover >3/4 area of wetland points = 8 Depressions cover > 1/2 area of wetland points = 4 If depressions > ½ of area of unit draw polygons on aerial photo or map Depressions present but cover < 1/2 area of wetland points = 2 No depressions present points = 0	Figure ___ 2
R	R 1.2 Characteristics of the vegetation in the unit (areas with >90% cover at person height): Trees or shrubs > 2/3 the area of the unit points = 8 Trees or shrubs > 1/3 area of the unit points = 6 Ungrazed, herbaceous plants > 2/3 area of unit points = 6 Ungrazed herbaceous plants > 1/3 area of unit points = 3 Trees, shrubs, and ungrazed herbaceous < 1/3 area of unit points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 8
R	*Add the points in the boxes above*	10
R	**R 2. Does the wetland unit have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* X Grazing in the wetland or within 150ft X Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 feet of wetland X A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging X Residential, urban areas, golf courses are within 150 ft of wetland X The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above standards for water quality — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.53)* multiplier 2
R	**<u>TOTAL</u> - Water Quality Functions** Multiply the score from R 1 by R 2 ***Add score to table on p. 1***	18

Comments

Wetland name or number _____

R	**Riverine and Freshwater Tidal Fringe Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
	R 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.54)*
R	R 3.1 Characteristics of the overbank storage the unit provides: *Estimate the average width of the wetland unit 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 unit)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is between 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 Aerial photo or map showing average widths	Figure ___ 9
R	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *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 NOT Cowardin classes): Forest or shrub for >1/3 area OR herbaceous plants > 2/3 area points = 7 Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area points = 4 Vegetation does not meet above criteria points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 7
R	*Add the points in the boxes above*	16
R	**R 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* X There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. — There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding — Other_____ *(Answer NO if the major source of water to the wetland is controlled by a reservoir or the wetland is tidal fringe along the sides of a dike)* **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.57)* multiplier 2
R	**TOTAL - Hydrologic Functions** Multiply the score from R 3 by R 4 ***Add score to table on p. 1***	32

Comments

Wetland name or number _____

L	**Lake-fringe Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	**Points** (only 1 score per box)
L	**L 1. Does the wetland unit have the potential to improve water quality?**	*(see p.59)*
L	L 1.1 Average width of vegetation along the lakeshore *(use polygons of Cowardin classes)*: Vegetation is more than 33ft (10m) wide — points = 6 Vegetation is more than 16 (5m) wide and <33ft — points = 3 Vegetation is more than 6ft (2m) wide and <16 ft — points = 1 Vegetation is less than 6 ft wide — points = 0 Map of Cowardin classes with widths marked	Figure ___
L	L 1.2 Characteristics of the vegetation in the wetland: *choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of Cover is total cover in the unit, but it can be in patches. NOTE: Herbaceous does not include aquatic bed.* Cover of herbaceous plants is >90% of the vegetated area — points = 6 Cover of herbaceous plants is >2/3 of the vegetated area — points = 4 Cover of herbaceous plants is >1/3 of the vegetated area — points = 3 Other vegetation that is not aquatic bed or herbaceous covers > 2/3 unit — points = 3 Other vegetation that is not aquatic bed in > 1/3 vegetated area — points = 1 Aquatic bed vegetation and open water cover > 2/3 of the unit — points = 0 Map with polygons of different vegetation types	Figure ___
L	*Add the points in the boxes above*	
L	**L 2. Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in the lake water, or polluted surface water flowing through the unit to the lake. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Wetland is along the shores of a lake or reservoir that does not meet water quality standards — Grazing in the wetland or within 150ft — Polluted water discharges to wetland along upland edge — Tilled fields or orchards within 150 feet of wetland — Residential or urban areas are within 150 ft of wetland — Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of lake shore) — Power boats with gasoline or diesel engines use the lake — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.61)* multiplier _____
L	**TOTAL - Water Quality Functions** Multiply the score from L1 by L2 ***Add score to table on p. 1***	

Comments

	Lake-fringe Wetlands HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce shoreline erosion	**Points** (only 1 score per box)
L	**L 3. Does the wetland unit have the <u>potential</u> to reduce shoreline erosion?**	*(see p.62)*
L	L 3 Distance along shore and average width of Cowardin classes along the lakeshore (**do not** include aquatic bed): *(choose the highest scoring description that matches conditions in the wetland)* > ¾ of distance is shrubs or forest at least 33 ft (10m) wide — points = 6 > ¾ of distance is shrubs or forest at least 6 ft. (2 m) wide — points = 4 > ¼ distance is shrubs or forest at least 33 ft (10m) wide — points = 4 Vegetation is at least 6 ft (2m) wide (any type except aquatic bed) — points = 2 Vegetation is less than 6 ft (2m) wide (any type except aquatic bed) — points = 0 Aerial photo or map with Cowardin vegetation classes	Figure ___
L	*Record the points from the box above*	
L	**L 4. Does the wetland unit have the <u>opportunity</u> to reduce erosion?** Are there features along the shore that will be impacted if the shoreline erodes? *Note which of the following conditions apply.* — There are human structures and activities along the upland edge of the wetland (buildings, fields) that can be damaged by erosion. — There are undisturbed natural resources along the upland edge of the wetland (e.g. mature forests other wetlands) than can be damaged by shoreline erosion — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.63)* multiplier
L	**TOTAL - Hydrologic Functions** Multiply the score from L 3 by L 4 ***Add score to table on p. 1***	

Comments

S	**Slope Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	**Points** (only 1 score per box)
S	**S 1. Does the wetland unit have the potential to improve water quality?**	*(see p.64)*
S	S 1.1 Characteristics of average slope of unit: Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance)* points = 3 Slope is 1% - 2% points = 2 Slope is 2% - 5% points = 1 Slope is greater than 5% points = 0	
S	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES = 3 points NO = 0 points	
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.* Dense, uncut, herbaceous vegetation > 90% of the wetland area points = 6 Dense, uncut, herbaceous vegetation > 1/2 of area points = 3 Dense, woody, vegetation > ½ of area points = 2 Dense, uncut, herbaceous vegetation > 1/4 of area points = 1 Does not meet any of the criteria above for vegetation points = 0 Aerial photo or map with vegetation polygons	Figure ___
S	**Total for S 1** *Add the points in the boxes above*	
S	**S 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft — Untreated stormwater discharges to wetland — Tilled fields, logging, or orchards within 150 feet of wetland — Residential, urban areas, or golf courses are within 150 ft upslope of wetland — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.67)* multiplier _____
S	**TOTAL - Water Quality Functions** Multiply the score from S1 by S2 ***Add score to table on p. 1***	

Comments

S	**Slope Wetlands** HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
	S 3. Does the wetland unit have the potential to reduce flooding and stream erosion?	*(see p.68)*
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. (stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows)* Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland. points = 6 Dense, uncut, **rigid** vegetation > 1/2 area of wetland points = 3 Dense, uncut, **rigid** vegetation > 1/4 area points = 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid points = 0	
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points = 2 NO points = 0	
S	*Add the points in the boxes above*	
S	**S 4. Does the wetland have the opportunity to reduce flooding and erosion?** Is the wetland in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows? *Note which of the following conditions apply.* — Wetland has surface runoff that drains to a river or stream that has flooding problems — Other_____ *(Answer NO if the major source of water is controlled by a reservoir (e.g. wetland is a seep that is on the downstream side of a dam)* **YES** multiplier is **2** **NO** multiplier is **1**	*(see p. 70)* multiplier _____
S	**TOTAL - Hydrologic Functions** Multiply the score from S 3 by S 4 ***Add score to table on p. 1***	

Comments

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the <u>potential</u> to provide habitat for many species?	
H 1.1 <u>Vegetation structure</u> ***(see p. 72)***	**Figure ___**
Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.	
____Aquatic bed	
____Emergent plants	
_X_ Scrub/shrub (areas where shrubs have >30% cover)	
_X_ Forested (areas where trees have >30% cover)	
If the unit has a forested class check if:	
_X_ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon	
Add the number of vegetation structures that qualify. If you have:	
4 structures or more points = 4 3 structures points = 2 2 structures points = 1 1 structure points = 0	2
Map of Cowardin vegetation classes	
H 1.2. <u>Hydroperiods</u> ***(see p. 73)***	**Figure ___**
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 acre to count. (see text for descriptions of hydroperiods)	
____Permanently flooded or inundated — 4 or more types present points = 3	
____Seasonally flooded or inundated — 3 types present points = 2	
_X_ Occasionally flooded or inundated — 2 types present point = 1	
_X_ Saturated only — 1 type present points = 0	
_X_ Permanently flowing stream or river in, or adjacent to, the wetland	
____ Seasonally flowing stream in, or adjacent to, the wetland	2
____ ***Lake-fringe wetland* = 2 points**	
____***Freshwater tidal wetland* = 2 points**	
Map of hydroperiods	
H 1.3. <u>Richness of Plant Species</u> ***(see p. 75)***	
Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)*	
You do not have to name the species.	
Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle	
If you counted: > 19 species points = 2 5 - 19 species points = 1 < 5 species points = 0	
List species below if you want to:	1

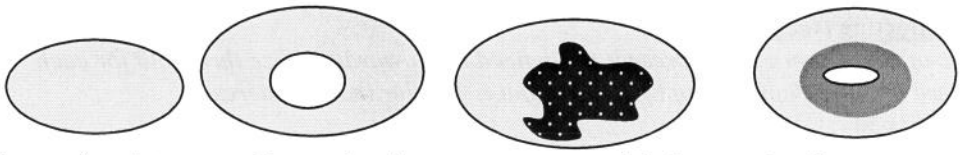
Total for page 5

Wetland name or number _____

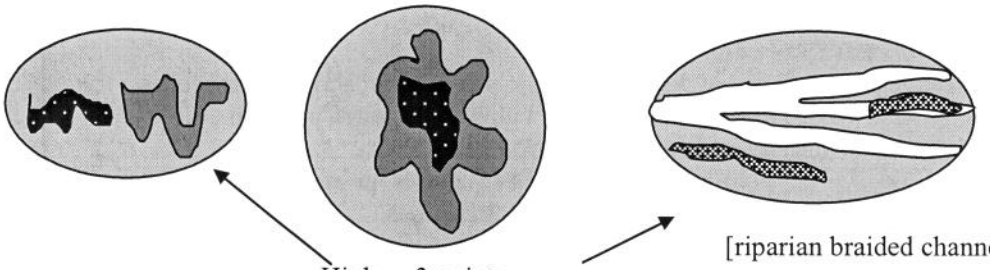
H 1.4. Interspersion of habitats *(see p. 76)*

Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.

Figure ___



None = 0 points Low = 1 point Moderate = 2 points



High = 3 points [riparian braided channels]

NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes

1

H 1.5. Special Habitat Features: *(see p. 77)*

Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long).

X Standing snags (diameter at the bottom > 4 inches) in the wetland

X Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m)

____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)*

____ At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated. *(structures for egg-laying by amphibians)*

____ Invasive plants cover less than 25% of the wetland area in each stratum of plants

NOTE: The 20% stated in early printings of the manual on page 78 is an error.

3

H 1. TOTAL Score - potential for providing habitat
Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5

9

Comments

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0**. X Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	**Figure ___** 1
H 2.2 Corridors and Connections ***(see p. 81)*** H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? (*dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor*). YES = **4 points** (*go to H 2.3*) NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** (*go to H 2.3*) NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 3

Wetland name or number _____

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)***

Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.*

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

____**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 p. 152*).

____**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 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 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:** Woodlands 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*).

X **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*).

X **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: pp. 167-169 and glossary in Appendix A).*

____**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 7.6 m (25 ft) high and occurring below 5000 ft.

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

X **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 > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.

If wetland has **3 or more** priority habitats = **4 points**
If wetland has **2** priority habitats = **3 points**
If wetland has **1** priority habitat = **1 point** No habitats = 0 points

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

4

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	2
TOTAL for H 1 from page 14	9
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	18

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands ***(see p. 86)*** Does the wetland unit 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 ___	
SC 1.1 Is the wetland unit 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 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

SC 2.0 Natural Heritage Wetlands *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ___ or accessed from WNHP/DNR web site ___ YES____ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO ___ SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO ____not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs *(see p. 87)* Does the wetland unit (**or any part of the unit**) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog.* ***If you answer yes you will still need to rate the wetland based on its functions.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to Q. 3 No - go to Q. 2 2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? Yes - go to Q. 3 No - Is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes – Is a bog for purpose of rating No - go to Q. 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" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. *1.* Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cover)?* 2. YES = Category I No___ Is not a bog for purpose of rating	**Cat. I**

SC 4.0 Forested Wetlands ***(see p. 90)*** Does the wetland unit have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its functions.* — **Old-growth forests**: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm) or more. NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. — **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have average diameters (dbh) exceeding 21 inches (53cm); crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES = Category I NO ___not a forested wetland with special characteristics	**Cat. I**
SC 5.0 Wetlands in Coastal Lagoons ***(see p. 91)*** Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* YES = Go to SC 5.1 NO___ not a wetland in a coastal lagoon SC 5.1 Does the wetland meets all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than 1/10 acre (4350 square feet) YES = Category I NO = Category II	**Cat. I** **Cat. II**

SC 6.0 Interdunal Wetlands *(see p. 93)* Is the wetland unit west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES - go to SC 6.1 NO __ not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula- lands west of SR 103 • Grayland-Westport- lands west of SR 105 • Ocean Shores-Copalis- lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is once acre or larger? YES = Category II NO – go to SC 6.2 SC 6.2 Is the unit between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III	**Cat. II** **Cat. III**
Category of wetland based on Special Characteristics *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p.1	

Appendix C

Upper Springbrook Creek

Channel Realignment and Rehabilitation

Draft Restoration, Maintenance, and Monitoring Plan

April, 2010

1. Introduction

The Corps of Engineers and the City of Renton are proposing to realign a portion of Springbrook Creek, which is currently located in a roadside ditch directly parallel to South 55th Street, and extends through a 100-foot easement on an adjacent forested wetland. The proposed work involves: (1) Replacing the culvert that crosses South 55th Street with a design approved by Washington Department of Fish and Wildlife (WDFW) for fish passage, (2) Realigning the channel through the forested wetland that lies to the north of South 55th Street, and (3) Placing woody debris and spawning gravel in the new channel and planting native riparian vegetation to create complex habitat for aquatic biota.

1.1 Project Goals and Objectives

The overall objective of the Green-Duwamish Ecosystem restoration project is to restore significant ecosystem function, structure, and dynamic processes that have been degraded within the river basin. To accomplish this objective, the following basin-wide restoration goals were identified:

- Improve the physical nature of existing degraded habitat.
- Improve existing ecosystem functions and values. This includes improving riverine processes where reasonable.
- Address important factors limiting habitat productivity.

In the lower and middle basins of the Green River conifer vegetation has been nearly eliminated and replaced with pavement and development, particularly in the lower basin. Vegetation that still exists is dominated by deciduous trees and shrubs, some of which are aggressive invasive species. This lack of vegetated cover and encroaching urban and sub-urban development has lead to degraded in-stream habitat without a functional riparian buffer in both the mainstem Green River and its tributaries. Current conditions are devoid of complexity or refuge due to channel straightening and lack of large wood recruitment providing minimal opportunities for salmonids to spawn and rear, as well as poor conditions for other aquatic species. In addition, stormwater in the basin enters the rivers and streams via the extensive amount of imperious surface in the basin thus leading to poor water quality and flashy hydrology.

The objectives of the Upper Springbrook Creek Channel Realignment and Rehabilitation are to:

- Increase channel diversity (large woody debris, riffle and pool habitat, and suitable substrate for fish spawning and rearing)
- Improve the quality of riparian habitat, thereby increasing habitat quality for aquatic biota, and particularly, spawning and rearing habitat for salmonids.
- Improve water quality and hydrology by decreasing the amount of the stormwater run-off the creek receives directly from South 55th Street.

1.2 Location

The project is located in the City of Renton adjacent to South 55th Street just west of highway 167, in township 23 north, range 5 east, section 31. The project area includes a 950 foot long section of stream that flows though a 100-foot-wide easement between the South 55th Street culvert and Highway 167. The project area is bordered to the north by a forested wetland owned by Springbrook Apartment Investors, LLC, and to the south by South 55th Street, with a private

residence on the south side of the road. The area topography slopes northward consisting primarily forested wetland rated as Category II per Washington Department of Ecology's Wetlands Rating System. Along the southern boundary of the project area, where the stream channel resides, there is a dense overgrowth of invasive Japanese knotweed and Himalayan blackberry. Larger trees become more prevalent further from the road and the density of the invasive species decreases.

1.3 Functional Lift in Aquatic Habitat

Habitat limiting factors for the Springbrook Creek watershed include (King County, 2000):

- Degraded water quality
- Fish passage barriers
- Lack of functional riparian habitat
- Prolific invasive vegetation, some of which can lead to fish passage barriers
- Lack of large woody debris
- Siltation

In order to move the channel away from South 55th Street and design a more natural morphology, there will be unavoidable impacts to the Category II wetland to the north of the existing channel. Permanent impacts to this wetland will result from the excavation 0.19 acres of soil to construct the new channel. This new channel will be lined with a one-foot layer of gravel suitable for fish spawning, and is technically considered to be fill placement in a wetland. Temporary impacts will results from two staging areas (totaling 0.04 acres); one on the upstream end and one on the downstream end of the project site. Upon completion of construction, all gravel and rock will be removed and staging areas and will be replanted with native vegetation; long term impacts are expected to be non-existent. In addition, several construction sequencing and best management practices will be utilized to minimize disturbance to the wetland.

Despite the minor and temporal impacts to the forested wetland, the project is expected to result in an net gain in aquatic habitat value and function based on the following: 1) Moving the stream away from the road and its associated run-off will decrease the amount of pollutants directly entering the stream and the overall "flashiness" of flow, 2) Creating meanders and placing large woody debris will promote pool-riffle structure and in-stream microhabitat for aquatic life, as well as slow down water during higher flows, 3) The introduction of gravel substrate suitable for benthic invertebrate colonization and salmonid spawning, 4) Providing fish passage to higher value upstream habitat, 6) Removing invasive vegetation from the project site, and 7) Planting native vegetation along the stream, in areas of disturbance, and in the decommissioned channel. Also, topography of the wetland, which slopes to the north, and the presence of alluvial soils suggests that Upper Springbrook Creek (which flows due west in this reach) historically flowed through this wetland. For these reasons, and given the habitat limiting factors in the system, the minor wetland impacts are justified in order to improve the overall habitat quality and provide a net functional lift to this degraded section of Upper Springbrook Creek.

2. Maintenance and Protection

The restored habitats are designed to be ultimately self-sustaining. However, to ensure success of the plantings and the eventual development of the targeted plant communities and habitats, certain maintenance and protection activities will be conducted. The City of Renton (as the local sponsor) will be responsible for the long-term maintenance of the site. Maintenance and protection activities will include:

- Replacement of dead plants, including substitution of unsuccessful species to obtain targeted percent cover performance criteria for the site. Established trees and shrubs that die over time will not be removed unless they pose a direct threat to safety of people or property.
- Spring and fall inventories and removal of invasive species for the first five years post-construction. Invasive species such as Himalayan and cut leaf blackberry, reed canary grass, purple loosestrife, English ivy, butterfly bush, Scot's broom, and Japanese knotweed will be diligently controlled using manual methods to the greatest extent possible. Other control methods, including limited spot application of approved herbicide, could be employed if necessary if manual removal is not effective. The City of Renton will be responsible for the removal of invasive vegetation for 5 years following the completion of construction
- Weed control matting, protective tree collars, chemical browse-repellants, and/or other measures will be implemented, as necessary to limit competitive pressures or browse damage to plantings.
- Irrigation of riparian plantings from the end of May through the end of October as warranted by regional weather or on-site soil conditions. The City of Renton will be responsible for irrigation of the riparian planting for 5 years post construction.
- King County Sensitive Area signage will be placed along the outer perimeter of the site to identify the area a sensitive landscape feature and limit vegetation trampling/pedestrian traffic.

3. Monitoring

3.1 Pre-construction and Construction Monitoring

Because the success rate of restoration efforts is increased through the coordination and communication between all parties before and during construction, monitoring by the project biologists from the Corps will take place during construction. A pre-construction meeting of the personnel responsible for the design and those responsible for implementation of the restoration site will take place prior to the onset of construction. The purpose of the meeting will be to review the intent of the restoration plan, establish a pathway of communication during construction, agree upon the construction sequence and address and resolve any questions.

As this is a habitat restoration project, the biological elements are critical to the design and ultimate success of the project. Therefore, the project biologists from the Corps will play a significant role in all decisions regarding project construction. The project biologists will be present on-site during all stages of the restoration process, including but not limited to, (1) Excavation of the new channel, (2) Installation of the fish exclusion fencing and fish rescue (3)

Final grading and approval of materials such as logs, (4) Placement of habitat structures, (5) Inspection of the plant materials and recommendation for their final placement before planting, (6) Making adjustments in planting plans, as needed, in response to as-built field conditions, (7) Ensuring that construction activities are conducted per the approved plan, and (8) Resolving problems that arise during implementation, thus lessening problems that might occur later during the post-construction monitoring phase. The project biologists will also review the 'as-built' site conditions (including elevations, number and species of installed plants, and photo points) immediately following construction to create a baseline condition against which the future evolution of the site will be measured.

3.2 Post-Construction Monitoring

As a restoration project, this site will be dynamic and will evolve in accordance with river flow and sediment accumulation following diversion of flow into the new channel. Thus, strict achievement of predetermined 'performance standards' will not necessarily predict the success or reveal the failure of the restoration effort. The monitoring and evaluation will be flexible and will focus on determining whether the overall goals and objectives of the restoration are being met, as measured by performance targets. We will also use 'monitoring metrics', which do not have specific performance targets associated with them, in order to document some of the more unpredictable aspects of the development and use of the site.

Evaluation of the evolution of the restored habitats will be based on the establishment of the targeted habitats within the restoration site and on the ecologic functioning of those habitats. Most post-construction monitoring will be conducted in years 2 and 6 following construction. Monitoring and maintenance of plants will occur more often, details are included in subsequent sections. Data collection will be used to further the understanding of restoration in an urban setting, with the focus on the development of in-stream and riparian habitats and their use by fish and invertebrates. Data collected will be integrated into the larger volume of fish-use data that has been gathered in the lower Duwamish River as part of the Green-Duwamish Ecosystem Restoration General Investigation. The Corps and the City of Renton will use the knowledge gained through this restoration project to adaptively manage the project site and to improve the design and implementation of future restoration efforts in the area.

3.2.1 Evaluation of Specific Objectives

Objective 1: ***Increase channel diversity (large woody debris, riffle and pool habitat, and suitable substrate for fish spawning and rearing)***

Performance Target 1, Emergent plant survival and percent cover: Because the creek will likely make adjustments at the site, changes in the relative proportions of the site supporting emergent communities are expected to influence the number and distribution of plants on the site. Emergent plant survival will be assessed by counting the number of live plants, and subtracting that number from the plant quantities listed on the As-Built planting plan. Percent coverage will be measured within plots of a standard 3-foot diameter using the Braun-Blanquet cover-abundance technique, or other similar methodology. Plant mortality in excess of the standards listed below will be replaced with the same species or a substitute species (depending

on the extent and cause of the mortality) in quantities appropriate to maintain the survival and percent cover standards desired for this project

- 100% after one year (per one year guarantee on plant materials),
- 80% after two years
- 50% cover after three years, and 70% cover after five years.

Monitoring Metric 1, **Fish Presence and Abundance:**
There are no specific performance standards for this metric. Measuring usage of the site by fish will be done using electroshocking methods in a section of stream for a length of approximately 35 times the mean stream width. Electroshocking will begin at a riffle and end at a riffle to limit the number of fish that escape the sampling. All fish will be identified to species and measured. This method will be done in the spring before March 1 and July 15 as directed by the Washington Department of Fish and Wildlife.

Monitoring Metric 2, Coho Salmon Spawning Surveys
There are no specific performance standards for this metric. Methods are still to be determined. Surveys will be done in October.

Monitoring Metric 3, Benthic Invertebrate Diversity and Abundance
There are no specific performance standards for this metric. Benthic invertebrates will be sampled using Hess sampler methodology or equivalent. All benthic invertebrates will be identified to family and enumerated. Sampling will be done in July.

Monitoring Metric 4, Frequency and Size of Pools and Riffles:
There are no specific performance standards for this metric. Parameters such as width to depth ratio of pools and riffles, volume of pools, number of and length of pools and riffles, and distances between will be collected in the summer.

Monitoring Metric 5, Channel Sinuosity:
There are no specific performance standards for this metric. Sinuosity will be measured in the summer and late fall.

Monitoring Metric 6, Substrate Size Distribution:
There are no specific performance standards for this metric. Methods are still to be determined. Measurements will be taken in the summer and late fall.

Monitoring Metric 7, Large Woody Debris (LWD) Frequency:
There are no specific performance standards for this metric. Number of large woody debris structures will be estimated and distance between each structure will be measured. Information will be collected in the summer and the late fall.

Monitoring Metric 8, Water Depth and Velocity:
There are no specific performance standards for this metric. Water depth will be measured with a yard or meter stick, wetted width will be measured with a measuring tape, and flow will measured with a flow meter. Velocity will be calculated from this information. Information will

be collected in the summer during a low flow event, in the early fall during base flow, and the late fall during a high flow event.

Objective 2: Improve the quality riparian vegetation therefore increasing habitat quality for aquatic biota, and particularly, spawning and rearing habitat for salmonids.

Performance Target 1, Riparian Plant survival: Because the stream will likely make adjustments in the elevations of the site, changes in the relative proportions of the site supporting mudflat and marsh communities are expected and will influence the number, species, and distribution of plants on the site. Plant survival will be assessed by counting (and marking for replacement) all dead trees and shrubs and subtracting that number from the plant quantities listed on the As-Built planting plan. Plant mortality in excess of these standards will be replaced with the same species or a substitute species (depending on the extent and cause of the mortality) in quantities appropriate to maintain the survival and percent cover standards desired for this project. Planted and desirable volunteer trees and shrubs should be healthy and have a survival rate of:

- 100% after one year (per one year guarantee on plant materials),
- 80% after two years, and every year thereafter through the end of the five-year monitoring period.

Performance Target 2, Percent Coverage of Riparian Plants: Percent coverage will be measured within plots of a standard 30-foot diameter using the Braun-Blanquet cover-abundance technique, or other similar methodology. The target percent cover will be applied to sample plots within areas anticipated to support the target plant communities based on As-Built drawings, but may ultimately be applied to other areas of the site which evolve into the target communities. The condition the project is trying to achieve is for the planted and desirable volunteer tree, shrub, and herbaceous species to provide a minimum of the targeted percent cover as follows, or for the plants to be healthy, unsuppressed by invasive species, and expanding at a rate acceptable to the project team. This provision is intended to accommodate slower than anticipated growth due to unanticipated site conditions or the need for implementation of contingency measures:

Cover Type	Years After Planting	Target % Coverage
Riparian Forested Community	One year	25%
(trees and shrubs)	Three years	35%
	Five years	50%

Performance Target 3, Percent Coverage of Non-Native, Invasive Plants
Percent cover of invasive vegetation, including blackberry, knotweed, loosestrife, reed canary grass, Scot's broom, English ivy, and butterfly bush, will not exceed 10%. Methods for monitoring this metric are to be determined.

Monitoring Metric 1, Percent Overhanging Cover and Shading:

There are no specific performance standards for this metric. Methods will likely include the use of a densiometer and visual estimates. Information will be collected in the summer.

Monitoring Metric 2, Wildlife Habitat Functions: There are no specific performance standards for this metric. Data collected will be used to document use of restored habitats by wildlife and will be added to the data set of wildlife use of other restoration sites in the lower Duwamish River. Increases in wildlife habitat functions will be documented primarily by seasonal bird and mammal surveys conducted at the site at least three times per year, generally timed in the early spring, summer, and winter to document the greatest diversity of bird species using the restoration site. Incidental observations of mammals, reptiles, and amphibians made during any site visit will also be recorded.

Objective 3: Improve water quality by decreasing the amount of the stormwater run-off the creek receives from South 55th Street

Monitoring Metric 1: Monitor Physical Water Quality Parameters
There are no specific performance standards for this metric. The following parameters will be measured: dissolved oxygen, pH, conductivity, temperature, and turbidity. Information will be collected in the summer during low flow, in the fall during base flow, and in the late fall during a high flow event.

Monitoring Metric 2: Monitor Chemical Water Quality Parameters
Neither the Corps nor the City of Renton has the capability to measure chemical water quality parameters. Discussions with Washington Department of Ecology are anticipated about the potential for monitoring of nutrients, metals, and other pollutants at this site.

4. Adaptive Management and Contingencies

Potential scenarios that will require adaptive management of the site, along with conceptual approaches to correct problems, are presented below. Specific corrective actions will be determined based on site conditions and project history and will be determined collectively by the City of Renton and the Corps.

Potential Scenario: Less than the targeted percent survival of planted vegetation species.
Potential corrective actions: replanting to maintain targeted plant survival, substitution of failing species with different species more appropriate for site conditions.

Potential Scenario: Percent coverage of plant not steadily increasing and/or does not meet targeted percent cover.
Potential corrective actions: replanting, more aggressive invasive species control, substitution of species, fertilizer, soil amendment, irrigation, browse control measures, or other remedial actions to correct potential causes of poor growth.

Potential Scenario: Blackberry, knotweed, loosestrife, reed canary grass, Scot's broom, English ivy, butterfly bush or other non-native, invasive plants constitute greater than 10% coverage of the restoration site.
Potential corrective actions: manual removal, herbicide application, or mechanical grubbing of plants, off-site disposal required.

4.1 Initiating Procedures

Contingency measures will be implemented if the monitoring program (or any other documented observations by qualified personnel) indicates goals and objectives are not being met. The Corps and the City of Renton, in coordination with regulatory and funding agencies, will then assess monitoring metric parameters and initiate the implementation of corrective actions to address the identified issue.

4.2 Responsible Parties

The contingency plan may require extension of the monitoring phase of the project, especially if major changes in the plan are required. As applicable, Corps project biologists and engineers, in consultation with agency personnel, will make adaptive management recommendations. The parties responsible for implementation of the restoration plan and any associated contingencies are as follows:

Project Manager City of Renton:	Allen Quynn City of Renton
Project Manager Corps:	Lynn Wetlzer U.S. Army, Corps of Engineers, Seattle District 206-764-3695
Project Biologists Corps:	Chemine Jackels U.S. Army, Corps of Engineers, Seattle District 206-764-3646

Literature Cited

King County. 2000. WRIA 9 Habitat Limiting Factors and Reconnaissance Assessment for Salmon Habitat: Green/Duwamish and Central Puget Sound Watersheds. Accessed online at: http://www.govlink.org/watersheds/9/reports/Recon.aspx

Appendix D
Concurrence Letters from NMFS and USFWS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

April 10, 2001

Colonel Ralph H. Graves
District Engineer
Corps of Engineers, Seattle District
Post Office Box 37551
Seattle, Washington 98124-3755

Attention: Patrick T. Cagney

Re: Section 7 Informal Consultation on the U.S. Army Corps of Engineers' Green Duwamish Ecosystem Restoration Program, King County, Washington (NMFS No. WSB-00-423) and Essential Fish Habitat Consultation.

Dear Colonel Graves:

This correspondence is in response to your request for consultation under the Endangered Species Act (ESA). Additionally, this letter serves to meet the requirements for consultation under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Endangered Species Act

The National Marine Fisheries Service (NMFS) has reviewed the August 31, 2000 request for concurrence with your findings of "may affect, not likely to adversely affect (NLAA)" for the above referenced program, based on the Programmatic Biological Assessment (PBA, June 2000), Final Feasibility Report (October 2000), and Supplemental Letter (March 27, 2001). Your findings in regard to the listing of Puget Sound chinook salmon (*Oncorhynchus tshawytscha*) as Threatened under the ESA. This consultation with the United States Army Corps of Engineers (ACOE) is conducted under section 7(a)(2) of the ESA, and its implementing regulations, 50 CFR Part 402.

The NMFS has evaluated the 50 projects in this ten-year program directed at ecosystem habitat restoration and enhancement, largely for salmonids and especially Chinook salmon, and concurs with your findings of "may affect, not likely to adversely affect," to either the species or the designated critical habitat for most of the projects (See Table 1). Based on the ACOE's Supplemental Letter of March 27, 2001 to the PBA, NMFS agrees with the assignment of the projects into four groups: early action (Calendar Year 2001), Phase 1 projects (Years 2002-2003), Phase 2 (Years 2004-2009), and those that require an individual consultation or reinitiation under this consultation, based on requiring more detailed construction plans. Five projects during Phase 1 are considered Demonstration Projects which will provide information on how to better implement larger scale projects planned for Phase 2 which ultimately occur at

multiple sites or units.

Table 1 Green Duwamish Ecosystem Restoration Program Projects

Project No	Project Name	Phase	ESA Status
Marine Projects			
1	Elliott Bay Nearshore	1	Concur
Tidally-Influenced Estuarine Projects			
2	Site 1, Duwamish	1	Concur
3	Riverton Side Channel	1	Concur
4	Codiga Farms	Early Action	Concur
Free-Flowing Riverine Projects			
5	Black River Marsh	2	Concur
6	Gilliam Creek	2	Concur
7	Lower Springbrook Creek	1	Concur
8	Upper Springbrook Creek	1	Concur
9	Mill Creek East	2	Concur
10	Garrison Creek	2	Concur
11	Mullen Slough, Prentice Nursery Reach	2	Concur
12	Mullen Slough Reach	2	Concur
13	Mill Creek, Schuler Brothers Reach	2	Concur
14	Mill Creek, Merlino Reach	2	Concur
15	Mill Creek, Wetland 5 K Reach	2	Concur
16	Mill Creek, Goedeke Reach	2	Concur
17	Green River Park	1	Concur
18	Horsehead Bend Side Channel	1	Concur
19	NE Auburn Creek	1	Concur
20	Meridian Valley Creek	1	Concur
21	Lake Meridian Outlet Relocation	1	Concur
22	Olson Creek	1	Concur
23	Riverside Estates Side Channel	2	Concur
24	Mainstem Maintenance	1	Concur for Demo[1]
25	Porter Levee	2	Concur
26	Kaech Levee Pond	2	Concur
27	Ray Creek Trib Corridor	2	Concur
28	Hamikami Levee Modification	2	Concur
29	Turley Levee Setback	2	Concur
30	Loans Levee Setback	1	Concur
31	Burns Creek Restoration	1	Concur
32	Middle Green River Large Woody Debris	1	Concur for Demo

33	Middle Green River Gravel Replacement	1	Concur for Demo
34	Flaming Geyser Landslide	2	Individual[3]
35	Flaming Geyser Side Channel	2	Concur
36	Newaukum Creek	1	Concur for Demo
37	Big Spring Creek	2	Concur
38	Brunner Slough	1	Concur
39	Upper Green R Side Channel Enhancement	2	Individual
40	Upper Green River Gravel Replacement	1	Concur for Demo

Above Howard Hansen Dam

41	Gale Creek	1	Concur[3]
42	Boundary Creek	2	Concur[3]
43	Sweeney Creek	Early Action	Concur[3]
44	Olsen Creek	2	Concur[3]
45	May Creek	2	Concur[3]
46	Maywood Creek	2	Concur[3]
47	Gold Creek	2	Concur[3]
48	Sunday Creek Riparian Planting	1	Concur
49	North East Creek	2	Concur[3]
50	Volunteer Revegetation	1	Concur

[1] Concurrence as NLAA for one demonstration unit in each project.
[2] Either reinitiate this consultation or initiate a new consultation, based on further Project designs.
[3] Culvert replacement projects will use NMFS' Guidelines for Salmonid Passage at Stream Crossings, Final Draft, March 28, 2000 (Appended).

Those restoration projects in which NMFS concurs provide an increase in quantity of critical and essential fish habitat though the removal of upland fill and the removing of fish passage impediments and an increase in quality of the critical and essential fish habitat because of the reasons provided in your Biological Assessment and Supplemental Letter: 1) the work will be done during a time of the year when chinook salmon are not present; 2) most of the upland construction will take place "in the dry" with final connection to the aquatic environment during permissible periods, 3) the implementation employs a landscape ecological approach for the entire watershed from the headwaters of the Green River through the Duwamish estuary to marine habitats in Elliott Bay shallow subtidal substrates; 4) these projects will complement other ongoing Green-Duwamish River Basin restoration and mitigation efforts; and 5) the project will meet all of the Washington Department of Fish and Wildlife Hydraulic Project Approval conditions.

This concludes informal consultation on these actions in accordance with 50 CFR 402.14(b)(1). The ACOE must reinitiate this ESA consultation if: 1) new information reveals effects of the action that may affect listed species in a way not previously considered; 2) the action is modified

in a manner that causes an effect to the listed species that was not previously considered; or 3) a new species is listed, or critical habitat designated, that may be affected by the identified action.

Essential Fish Habitat

Federal agencies are obligated, under Section 305 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1855(b)) and its implementing regulations (50CFR600), to consult with NMFS regarding actions that are authorized, funded, or undertaken by that agency, that may adversely affect Essential Fish Habitat (EFH). The MSA (§3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Furthermore, NMFS is required to provide the Federal agency with conservation recommendations which minimize the adverse effects of the project and conserve EFH. This consultation is based, in part, on information provided by the Federal agency and descriptions of EFH for Pacific coast groundfish, coastal pelagic species, and Pacific salmon contained in the Fishery Management Plans produced by the Pacific Fisheries Management Council.

The proposed actions and action areas are described in the Biological Assessment. The action area covers four different types of habitats: marine, tidally-influenced estuarine, and riverine. The marine habitats contain designated EFH for various life-history stages of 46 species of groundfish, 4 coastal pelagic species, and three species of Pacific salmon; the estuarine habitats contain designated EFH for various life-history stages of 17 species of groundfish, four coastal pelagic species, and three species of Pacific salmon; and the riverine habitats include designated EFH for various life-history stages of three species of Pacific salmon (Table 2). Information submitted by the ACOE in the Programmatic Biological Assessment is sufficient for NMFS to conclude that the proposed action may adversely impact EFH in the short term by:

1. Increased siltation during in-water construction operations; and

2. Release of previously unknown chemical contamination during construction.

EFH Conservation Recommendations: The conservation measures that the ACOE included as part of the proposed action are adequate to minimize the long-term adverse impacts from this project to designated EFH for the species in Table 2. It is NMFS' understanding that the ACOE intends to implement the proposed activity with these built-in conservation measures that minimize potential adverse effect to the maximum extent practicable. While NMFS is satisfied with the nineteen General Best Management Practices (BMPs, in Section 2.5) in the PBA, short-term impacts should be minimized with the following recommendations.

1. Where gravel/cobble material is to be used in gravel replacement projects, it will be sieved (screen) to remove fine-grained materials smaller than 1/4" in diameter (BMP #15). It is assumed projects will require some level of maintenance over time; this should not include in-water dredging of sediments.

2. Construction activities will cease if chemical contamination found at any site exceeds the State of Washington sediment standards or Model Toxics Control Act, where applicable (BMP #16), until the contamination is either removed or the project abandoned.

Please note that the MSA (§305(b)(4)(B)) requires the Federal agency to provide a written response to NMFS' EFH conservation recommendations within 30 days of its receipt of this letter.

This concludes EFH consultation in accordance with the MSA and 50CFR600. The ACOE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920(k)).

This concludes ESA and EFH consultations. If you have questions regarding either of these consultations, please contact Robert Clark at 206-526-4338.

Sincerely,

Donna Darm
Acting Regional Administrator

Table 2. Species of fishes with designated EFH in the proposed action areas (M = Marine, E = Estuarine, R = Riverine).

Groundfish Species	redstripe rockfish (M) *S. proriger*	Dover sole (M, E) *Microstomus pacificus*
spiny dogfish (M, E) *Squalus acanthias*	rosethorn rockfish (M) *S. helvomaculatus*	English sole (M) *Parophrys vetulus*
big skate (M) *Raja binoculata*	rosy rockfish (M) *S. rosaceus*	flathead sole (M, E) *Hippoglossoides elassodon*
California skate (M, E) *Raja inornata*	rougheye rockfish (M) *S. aleutianus*	petrale sole (M, E) *Eopsetta jordani*
longnose skate (M) *Raja rhina*	sharpchin rockfish (M) *S. zacentrus*	rex sole (M) *Glyptocephalus zachirus*
ratfish (M, E) *Hydrolagus colliei*	splitnose rockfish (M) *S. diploproa*	rock sole (M, E) *Lepidopsetta bilineata*
Pacific cod (M, E) *Gadus macrocephalus*	striptail rockfish (M) *S. saxicola*	sand sole (M, E) *Psettichthys melanostictus*
hake (M, E) *Merluccius productus*	tiger rockfish (M) *S. nigrocinctus*	starry flounder (M) *Platichthys stellatus*
black rockfish (M) *Sebastes melanops*	vermilion rockfish (M) *S. miniatus*	arrowtooth flounder (M, E) *Atheresthes stomias*
bocaccio (M, E) *S. paucispinis*	yelloweye rockfish (M) *S. ruberrimus*	
brown rockfish (M, E) *S. auriculatus*	yellowtail rockfish (M) *S. flavidus*	Coastal Pelagic Species
canary rockfish (M) *S. pinniger*	shortspine thornyhead (M) *Sebastolobus alascanus*	anchovy (M, E) *Engraulis mordax*
China rockfish (M) *S. nebulosus*	cabezon (M, E) *Scorpaenichthys marmoratus*	Pacific sardine (M, E) *Sardinops sagax*
copper rockfish (M, E) *S. caurinus*	lingcod (M, E) *Ophiodon elongatus*	Pacific mackerel (M, E) *Scomber japonicus*
darkblotch rockfish (M) *S. crameri*	kelp greenling (M, E) *Hexagrammos decagrammus*	market squid (M, E) *Loligo opalescens*
greenstriped rockfish (M) *S. elongatus*	sablefish (M, E) *Anoplopoma fimbria*	Pacific salmon Species
Pacific ocean perch (M) *S. alutus*	Pacific sanddab (M, E) *Citharichthys sordidus*	chinook (M, E, R) *Oncorhynchus tshawytscha*
quillback rockfish (M, E) *S. maliger*	butter sole (M, E) *Isopsetta isolepis*	coho (M, E, R) *O. kisutch*
redbanded rockfish (M) *S. babcocki*	curlfin sole (M, E) *Pleuronichthys decurrens*	Puget Sound pink (M, E, R) *O. gorbuscha*

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Washington Office
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Lacey, Washington 98503
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MAR 2 7 2001

Colonel Ralph H. Graves
District Engineer
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Attention: Mr. Pat Cagney

(FWS Reference: 1-3-01-I-0906)

Dear Colonel Graves:

This letter responds to your August 31, 2000 transmittal letter and Programmatic Biological Assessment (PBA) for the Green/Duwamish Ecosystem Restoration Program which we received on September 5, 2000. We are able to provide partial concurrence.

The PBA covers forty-nine restoration projects within the Green/Duwamish River Basin that the Corps of Engineers (Corps) is proposing for implementation over a ten year period. Fish and Wildlife Service (Service) and Corps staff have discussed on a number of occasions the need for more detailed project information to complete the Section 7 consultation. The Service proposed that the Corps meet annually with the Service, prior to the construction season, to review any refinements in project details that could have an impact on federally listed species, but especially the Coastal/Puget Sound bull trout. The Corps informed us in January 2001, that they were uncomfortable with the requirement for future reviews because of the uncertainties that could potentially affect project implementation. Instead, the Corps requested that the Service treat the PBA as a batch consultation. You further asked that we separate out any of the projects that we considered to be lacking in sufficient detail to complete the consultation, as well as projects for which we could not concur with the Corps' effect determination. For the purposes of this consultation, we are treating the forty-nine projects described in the PBA as a batch consultation.

The Corps of Engineers has determined that the actions, as described in its PBA, are not likely to adversely affect the bald eagle *(Haliaeetus leucocephalus)*, marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), gray wolf (*Canis lupus*), Canada lynx (*Lynx canadensis*) and Coastal/Puget Sound bull trout (*Salvelinus confluentus*).

Based on the information provided in the PBA and the Corps' final feasibility report for the Green/Duwamish River Basin ecosystem restoration study, we concur with the Corps' determination of effects for the bald eagle, marbled murrelet, northern spotted owl, gray wolf, and Canada lynx. With regard to the Coastal/Puget Sound bull trout, we concur with the Corps' effect determination for forty-three of the forty-nine projects described in the PBA and listed in the attachment to this letter. These projects are covered under this consultation for a period of ten years.

We do not concur with the Corps' "not likely to adversely effect" determination for the bull trout for the following six projects: (1) mainstem maintenance (Auburn to Elliott Bay); (2) middle Green River large woody debris placement; (3) middle Green River gravel replacement; (4) Flaming Geyser landslide control; (5) Newaukum Creek restoration; and (6) upper Green River gravel replacement. We recommend that the Corps consult individually on these projects.

Although these six projects are expected to benefit bull trout in the long term, we believe they have the potential to adversely affect bull trout in the short term. These projects are larger and more complex than the others, involve significant in-water work, and have not been developed in enough detail at this time for us to conclude that the adverse impacts to bull trout would be insignificant. As project details become more refined, our concern for these projects and their potential impact to bull trout may lessen. In the absence of detailed project information, we need to be more cautious and therefore conclude that bull trout foraging could be adversely affected in the short term as a result of fine sediment releases during the modification of streambanks, the construction of engineered log jams, the addition of spawning gravels and the construction of other habitat improvements. Elevated levels of sediment can reduce the abundance of bull trout prey resources as well as make it more difficult for bull trout to locate their prey.

This concludes informal consultation pursuant to 50 CFR 402.13. This project should be re-analyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this project.

If you have further questions about this letter or your responsibilities under the Act, please contact Gwill Ging at (360) 753-6041 or John Grettenberger at (360) 753-6044.

Sincerely,

Lynn P. Childers

for Carol Schuler, Manager
Western Washington Office

Attachment A. The U.S. Fish and Wildlife Service concurs with Corps of Engineers' not likely to adversely affect determination for the following projects:

Lower Green/Duwamish River Sites

Elliott Bay Nearshore
Site 1, Duwamish
Riverton Side Channel
Codiga Farms

Middle Basin Restoration Sites

Black River Marsh
Gilliam Creek
Lower Springbrook Creek
Upper Springbrook Creek
Mill Creek East
Garrison Creek.
Mullen Slough, Prentice Nursery Reach
Mullen Slough Reach
Mill Creek, Schuler Brothers Reach
Mill Creek, Merlino Reach.
Mill Creek, Wetland 5K Reach.
Mill Creek, Goedeke Reach
Green River Park
Horsehead Bend Side Channel.
NE Auburn Creek
Meridian Valley Creek
Lake Meridian Outlet Relocation
Olson Creek
Riverside Estates Side Channel
Porter Levee Setback
Kaech Levee Pond
Ray Creek Trib Corridor
Hamikami Levee Modification
Turley Levee Setback
Loans Levee Setback
Burns Creek Restoration
Flaming Geysers Side Channel
Big Spring Creek
Brunner Slough
Upper Green River Side Channel Enhancement

Upper Basin Restoration Sites:

Gale Creek
Boundary Creek
Sweeney Creek
Olson Creek
May Creek
Maywood Creek
Gold Creek
Sunday Creek Riparian Planting
North East Creek

Appendix E
401 Certification

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

April 28, 2010

United States Army Corps of Engineers
Attn: Chemine Jackels
PO Box 3755
Seattle, WA 98124

RE: U.S. Army Corps of Engineers Reference #PL-10-02
Upper Springbrook Creek Channel Realignment and Rehabilitation Project, Renton, King County, Washington

Dear Ms. Jackels:

Ecology has determined that the above project meets the requirements for Washington State 401 Water Quality Certification and Coastal Zone Management Act Consistency under NWP #27. Therefore, an individual 401 certification will not be required for this project.

Any changes to your project that would impact water quality should be submitted in writing to Ecology before work begins for additional review.

This letter does not exempt you from other requirements of federal, state, and local agencies.

Please contact me if you have any questions regarding this letter at (425) 649-7129 or e-mail rpad461@ecy.wa.gov.

Sincerely,

Cindy Avanzino for

Rebekah R. Padgett
Federal Permit Manager
Shorelands and Environmental Assistance Program

RRP:cja

e-cc: Patrick McGraner, Ecology
Larry Fisher, Washington Department of Fish and Wildlife

Appendix F

Clean Water Act Section 404(b)(1) Evaluation

Upper Springbrook Creek Channel Realignment and Rehabilitation
King County, Washington

Clean Water Act
Rivers and Harbors Act

Prepared by:

U.S. Army Corps of Engineers
Seattle District
Environmental Resources Section

March 2010

US Army Corps of Engineers ®
Seattle District

Introduction

The purpose of this document is to record the U.S. Army Corps of Engineers (USACE) compliance evaluation of a planned stream realignment and rehabilitation on Upper Springbrook Creek in the City of Renton, WA, pursuant to the Clean Water Act (CWA), the Rivers and Harbors Act (RHA), and the General Regulatory Policies of USACE.

Specifically, Section 404 of the CWA requires an evaluation of impacts for work involving discharge of fill material into the waters of the U.S., and evaluation guidance can be found in the CWA 404(b)(1) Guidelines [40 CFR §230.12(a)]. Section 10 of the Rivers and Harbors Act [33 USC §403] prohibits modification to or creation of an obstruction within a navigable water of the U.S. unless recommended by the Secretary of the Army and authorized by the Chief of Engineers. The General Regulatory Policies of the Corps of Engineers [33 CFR §320.4(a)] provide measures for evaluating permit applications for activities undertaken in navigable waters.

The main body of this document summarizes the information presented in Attachment A and includes relevant information from the Environmental Assessment for the project that was collected pursuant to the National Environmental Policy Act (NEPA) of 1969 [42 USC §4321 et seq.]. Attachment A provides the specific USACE analysis of compliance with the CWA 404(b)(1) and the General Regulatory Policy requirements.

Project Background

The US Army Corps of Engineers, Seattle District, in concert with the City of Renton, Washington, is proposing to realign and rehabilitate a section of Upper Springbrook Creek in Renton, WA. Work will be done beginning in July 2011. This section of stream currently flows through a roadside ditch overgrown with invasive weeds that parallels the north side of South 55th Street for approximately 900 feet before its flows underneath Highway 167. In this reach, the creek is located less than 10 feet from the road and the only vegetative cover consists of dense stands of Japanese knotweed and Himalayan blackberry.

The proposed work involves: (1) Replacing the culvert that crosses South 55th Street with a design approved by WDFW for fish passage, (2) Realigning the channel through an adjacent forested wetland that lies north of South 55th Street, and (3) Placing woody debris in the new channel and planting native riparian vegetation to create complex habitat for aquatic biota.

Project Need

Coho salmon (*Oncorhynchus kisutch*), as well as other aquatic fauna, utilize this stream for spawning, rearing, foraging, and as refuge habitat. However, during high flow events, the straight, wood devoid channel provides little refugia, allowing for the potential of juvenile fish to be flushed further downstream. In addition, in its current location the stream receives urban runoff from South 55th Street, exposing aquatic biota to pollutants.

Project Purpose

The purpose of the Upper Springbrook Creek realignment and rehabilitation is to increase channel diversity (large woody debris, riffle and pool habitat, and suitable substrate for spawning coho) and

plant higher quality habitat providing stream-side vegetation to increase habitat value and ecosystem functions for aquatic biota, and particularly, improve spawning and rearing habitat for salmonids. In addition, moving the stream away from the road will create a vegetated buffer that will absorb the stormwater run-off from South 55th Street

Proposed Action and Alternatives

Alternatives considered under NEPA must include the proposed action (preferred alternative), and the no-action alternative. Other reasonable alternatives that meet the project purpose and need must also be considered in detail.

Three alternatives were considered for the purposes of this project: **1)** The No Action Alternative 2**)** Channel Realignment with Bioengineered Features to contain Bank Overtopping, and **3)** Channel Realignment with a Berm.

The no action alternative was eliminated because it did not meet the project objectives and alternative 3, channel realignment with a berm, was eliminated because of the associated environmental effects and additional compensatory mitigation required by the Washington Department of Ecology that will arise from the additional placement of fill in a forested wetland.

Potentially Adverse Effects (Individually or Cumulatively) on the Aquatic Environment

a. Effects on Physical, Chemical, or Biological Characteristics of the Aquatic Ecosystem

Short term impacts from temporary increases in turbidity may result from construction activities and general disturbance due to the presence and operation of large equipment. The largest impact will occur during the connection of the relocated channel with a new culvert. In addition, there will be a pulse of sedimentation following diversion of the stream into the restored streambed, resulting in short term turbidity increases as the streambed adjusts to the new flow.

There will be impacts to approximately 0.27 acres of wetland (of which 0.19 acres will have permanent impacts) which include ten larger Alders and understory shrubs, due to the alignment of the new channel. However, aquatic habitat quality for plants, aquatic invertebrates, resident and anadromous fish, and local wildlife is expected to improve significantly. Meandering the stream and the placement of large woody debris will provide pool-riffle structure and allow flows to slow down during heavy rain events. The pools will be used as refuge and foraging habitat for fish. Riffles will provide habitat for aquatic invertebrates and will be utilized for spawning by adult coho salmon. Diverting the stream away from the road will greatly decrease the amount surface water run-off pollutants in-stream organisms are exposed to and reduce peak flows. Streambed gravel will line the channel, providing spawning habitat and better substrate for the production of aquatic insects and other benthic and epibenthic organisms. Planting the stream banks with native vegetation will provide shading that functions as a thermal refuge during warm summer days as well as providing a source of organic input for the food chain and insect drop as a direct source of food.

In addition, replacing the culvert underneath South 55th Street will increase conveyance and reduce flooding upstream. Not only will micro-habitat quality improve, but there will likely be an overall decrease in flashiness of the stream and the adjacent forested wetland.

b. Effects on Recreational, Aesthetic, Historical, and Economic Values

Recreation in the project area is not expected to change significantly. There are no plans to put in any access trail; however, clearing of the invasive shrub vegetation may make access easier for those who will like to enjoy the creek. During excavation and construction of the site, the aesthetic quality of the general area could be reduced due to the noise and air emissions generated by the construction equipment, which may disturb local homeowners. However, these impacts will be temporary and highly localized, and are not expected to result in significant impacts. Impacts to economic value are expected to be insignificant.

In accordance with the National Historic Preservation Act (16 USC 470), historic properties have been investigated, and concurrence was received from the Washington State Historic Preservation Office (SHPO) on May 3, 2010.

c. Findings

There will be no significant adverse impacts to aquatic ecosystem functions and values. It is expected that aquatic ecosystem functions and values will increase by relocating the stream away from the road, meandering it though a forested wetland, and planting the banks with native vegetation.

All Appropriate and Practicable Measures to Minimize Potential Harm to the Aquatic Ecosystem

a. Impact Avoidance Measures

Three project alternatives were evaluated in order to select the best alternative for minimizing cost and impact to the environment. The proposed project action was selected because it will have the least negative impact on the environment and generate the greatest potential gains for habitat value and ecosystem functions.

b. Impact Minimization Measures

USACE will take all practicable steps during construction of the project to minimize impacts to aquatic, terrestrial and wetland resources during construction. Contingencies will be in place if any of the water quality protection measures fail to achieve their intended function. USACE will observe all construction windows to ensure that impacts to migratory fish will be avoided or minimized. The minimization measures will be as follows:

- Best management practices (BMPs), such as stormwater runoff prevention, will be used to ensure that no unnecessary damage to the environment occurs
- To mitigate turbid flow in the new channel, a temporary shallow trench or pool will be excavated downstream of the confluence of the new and existing channels, where the turbid water will be pumped into the floodplain.

- A temporary fish exclusion fence will be installed upstream of the South 55th Street Culvert prior to the release of water into the new channel to reduce the likelihood of fish migrating into the new channel with inadequate flow depths present.
- Flow from the existing creek will be slowly and sequentially transferred to the new channel in an effort to closely monitor water quality conditions, stability of the new channel, and to perform fish rescue and recovery within the existing creek.
- In-water work will occur only during the WDFW established fish window (July 1-September 30).
- A Corps biologist will periodically check on construction progress to ensure BMPs are in place and environmental impacts are properly avoided and minimized
- Permanent impacts to wetlands will be limited to the footprint of the new channel. Temporary impacts will be limited to staging and access areas; machine travel in these areas will be minimized to the extent possible; and these areas will be replanted with native vegetation following completion of construction.
- Areas disturbed by construction of the channel that are not improved will be covered in coir fabric to aid in short-term stabilization.
- Coir fabric will also be installed along the banks of the new channel below the imported channel sediment and extend upland as necessary. Long-term stabilization will be established by riparian planting.

c. Compensatory Mitigation Measures

Although the project will result in impacts to approximately 0.27 acres of wetland (of which 0.19 acres will be permanently lost) to realign the channel, the gain in habitat value and ecosystem function from moving the stream away from the road, meandering it through a forested wetland, and planting native vegetation will exceed this loss.

d. Findings

USACE has determined that all appropriate and practicable measures have been taken to minimize potential harm to the environment.

Other Factors in the Public Interest

a. Fish and Wildlife

USACE has coordinated construction activities with local Native American Tribes and state and federal resource agencies to ensure that only minimal impacts to fish and wildlife resources will occur. In-water portions of the project will take place during the designated fish window, established by WDFW, to avoid impacts to fish. A Corps biologist will check for perched bald eagles before construction begins to avoid and minimize disturbance due to large machinery. Work may be delayed if it appears that there will be a disturbance to eagles. USACE has submitted a Programmatic Biological Assessment for the Green Duwamish Ecosystem restoration to the U.S. Fish and Wildlife Service and National Marine Fisheries Service, and has received concurrence of "may affect, not likely to adversely affect" for federally listed species located in the project area.

b. Water Quality.
USACE concluded that this project will not violate state water quality standards and received a 401 certification from the Washington Department of Ecology under a Nationwide Permit 27 on April 28, 2010.

c. Historical and Cultural Resources
In accordance with the National Historic Preservation Act (16 USC 470), historic properties have been investigated, and concurrence was received from the Washington State Historic Preservation Office (SHPO) on May 3, 2010.

e. Environmental Benefits.
The project will result in an overall increase in habitat value and function for aquatic life by moving the stream away from the road, meandering the channel through a forested wetland, placing substrates suitable for benthic invertebrate colonization and salmonid spawning, planting the banks with native vegetation, and providing upstream fish passage through the culvert underneath South 55th Street

9. Conclusions. USACE finds that this project is within the public's interest, complies with the substantive elements of Section 404 of the Clean Water Act and the Rivers and Harbors Act, and meets the 401 certification and Coastal Zone Management Consistency criteria per Nationwide Permit 27: Aquatic Habitat Restoration, Establishment, and Enhancement Activities.

Attachment A

Clean Water Act 404(b)(1) Evaluation [40 CFR §230]
Permit Application Evaluation [33 CFR §320.4]

404(b)(1) Evaluation [40 CFR §230]

Potential Impacts on Physical and Chemical Characteristics [Subpart C]:

1. Substrate [230.20]
The placement of gravel suitable for benthic invertebrate colonization and salmonid spawning is expected to lead to an overall increase in habitat value.

2. Suspended particulates/turbidity [230.21]
Overall, water quality in this section of Upper Springbrook Creek should improve as a result of the project. Stormwater from South 55th Street will no longer run off directly into the creek, and the buffering wetland and planted decommissioned channel will act to filter pollutants from the runoff before it enters the creek.

Temporary increases in turbidity may result from construction activities. The largest impact will occur during the connection of the relocated channel with a new culvert. In addition, there will be a pulse of sedimentation following diversion of the stream into the restored streambed, resulting in short term turbidity increases as the streambed adjusts to the new flow. Localized shifting of sediments will continue sporadically as the new stream heals and adjusts. Construction techniques, sequencing, and timing will minimize soil disturbance to the extent practical to reduce the generation of turbidity during connection of the new channel to the new culvert. Similarly, the design and implementation of the erosion-control and the Storm Water Pollution Prevention (SWPPP) plans will incorporate best management practices (BMPs) to further reduce the duration and magnitude of the temporary increases in turbidity. Turbidity monitoring during construction will ensure that these temporary increases are in compliance with State Water Quality Conditions.

3. **Water [230.22]**
   The project is not expected to add any nutrients to the water that could affect the clarity, color, odor, or aesthetic value of the water, or that could reduce the suitability of Upper Springbrook Creek for aquatic organisms or recreation. Coniferous large woody debris, which is resistant to breakdown (and therefore has low biochemical oxygen demand), will be placed to enhance fish habitat.

4. **Current patterns and water circulation [230.23]**
   The hydraulic regime is expected to improve with the replacement of the culvert and the meandering of the new stream channel. Replacing the culvert underneath South 55th Street will increase conveyance and reduce flooding upstream. Meandering the stream will provide the opportunity for flow to slow down at bends. The placement of large wood and plantings will provide areas of slow water by the creation of pools and minimize bank overtopping. In addition, relocating this section of stream away from South 55th Street will greatly decrease the amount of surface water runoff entering this section of stream farther decreasing peak flow during heavy rain events.

5. **Normal water fluctuations [230.24].**
   Overall flashiness during high and low flow events in Upper Springbrook Creek is expected to decrease by moving the stream away from South 55th Street, designing a meandered channel, and providing a vegetated buffer to absorb surface water runoff.
   .
6. **Salinity gradients [230.25]**
   Not applicable, since Upper Springbrook Creek is freshwater.

Potential Impacts on Biological Characteristics of the Aquatic Ecosystem [Subpart D]:

1. **Threatened and endangered species [230.30]**
   USACE has submitted a Programmatic Biological Assessment for the Green Duwamish Ecosystem restoration in 2001 to the U.S. Fish and Wildlife Service and National Marine Fisheries Service, and has received concurrence of “may affect, not likely to adversely affect” for

federally listed species at that time. Since then, Chinook salmon and bull tout critical habitat has been established and Puget Sound steelhead have been listed as threatened. However, none of these occur in the project area, therefore a determination of "no effect" has been made for bull trout and Chinook critical habitat, and steelhead at Upper Springbrook Creek.

2. **Fish, crustaceans, mollusks and other aquatic organisms in the food web [230.31]**
   There may be temporary impacts to aquatic organisms during construction and connection of the channel. However, aquatic habitat quality conditions are expected improve greatly following construction. Meandering the stream and the placement of large woody debris will provide pool-riffle structure. The pools will be used as refuge and foraging habitat for fish. Riffles will provide habitat for aquatic invertebrates and will be utilized for spawning by adult coho salmon. Diverting the stream away from the road will greatly decrease the amount surface water run-off pollutants organisms are exposed to. Streambed gravel will line the channel, providing spawning habitat and better substrate for the production of aquatic insects and other benthic and epibenthic organisms. Planting the stream banks with native vegetation will provide shading that functions as a thermal refuge during warm summer days as well as providing a source of organic input for the food chain and insect drop as a direct source of food.

3. **Other wildlife [230.32]**
   Birds and other wildlife may be temporarily displaced during construction due to noise and presence of construction vehicles. Because these impacts will only occur during the period of construction, they are expected to be discountable and temporary. Planting native trees and shrubs along the stream bank will increase the extent and species diversity restoration site by creating additional opportunities for foraging, nesting, cover, and refuge for a wide variety of species.

Potential Impacts on Special Aquatic Sites [Subpart E]:

1. **Sanctuaries and refuges [230.40]**
   Not applicable, since Upper Springbrook Creek is not designated by local, state or federal regulations to be managed principally for the preservation and use of fish and wildlife resources.

2. **Wetlands [230.41]**
   A field inspection of the project area determined that the forested area adjacent to the site, in which the new channel will be routed through, is a wetland. The realignment of the channel through this area will result in impacts to approximately 0.27 acres of wetland, of which 0.19 acres will be permanently lost. However, the gain in habitat value and ecosystem function from moving the stream away from the road, meandering it through a forested wetland, planting native vegetation, and providing fish passage upstream are expected to exceed this loss.

3. **Mud flats [230.42]**
   Not applicable, there are no mudflats present in streams.

4. **Vegetated shallows [230.43]**

Not applicable, there are no vegetated shallows in Upper Springbrook Creek.

5. **Corral reefs [230.44**]
   Not applicable.

6. **Riffle and pool complexes [230.45]**
   Little pool-riffle complex exist in the current channel due to its straightened morphology. Placing gravel and large woody debris in the new channel along with meandering it through a forested area will create pool-riffle structures that are beneficial to aquatic biota.

Potential Effects on Human Use Characteristics [Subpart F]:

1. **Municipal and private water supplies [230.50]**
   The project will not impact water supply.

2. **Recreational and commercial fisheries [230.51]**
   There are no known commercial fisheries at or near the project area. For recreational and tribal harvest, the project is expected to improve spawning and rearing habitat for coho salmon by provide spawning gravels, increasing pool-riffle structure, planting the banks with native vegetation, moving the stream away from the surface runoff generated from South 55th Street, and provide fish passage to higher quality habitat upstream.

3. **Water-related recreation [230.53]**
   Recreation in the project area is not expected to change significantly. In general access to the site is difficult due to the dead ending of South 55th Street at Highway 167, residential development that surrounds the site, and no plans to put in an access trail. However with the clearing of the invasive shrub vegetation may make access easier for those who would like to enjoy the creek.

4. **Aesthetics [230.53]**
   During construction there will be some minor disturbance from heavy equipment noise and exhaust.

5. **Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves [230.54]**
   No such structures or areas are designated in the project area.

Evaluation and Testing [Subpart G]:

1. **General evaluation of dredged or fill material [230.60]**
   The only fill to be placed on the site will be a layer of 6-inch minus fish gravel within the new channel. All imported material will be free from contamination and obtained from a permitted facility.

2. **Chemical, biological, and physical evaluation and testing [230.61]**
   Imported spawning gravel will have large grain size and come from a source free from contamination.

Actions to Minimize Adverse Effects [Subpart H]:

1. **Actions concerning the location of the discharge [230.70]**
   USACE is not selecting a disposal site, but rather is excavating a channel and disposing of the material at an upland site.
2. **Actions concerning the material to be discharged [230.71]**
   A 6 inch layer of fish gravel will be placed within the new channel. Rock will be placed at the temporary staging areas, but will be removed following construction completion. Most of the material from the stream excavation will be hauled out using the new channel as an access road; however 100 cubic yards of this material will be placed along the floodplain log berm where the willow stakes will be placed to encourage growth.
3. **Actions controlling the material after discharge [230.72]**
   The only material to be added to the site will be spawning gravel. There will be a pulse of sedimentation following diversion of the stream into the restored streambed, resulting in short term turbidity increases as the streambed adjusts to the new flow, and localized shifting of sediments will continue sporadically as the new stream heals and adjusts.
4. **Actions affecting the method of dispersion [230.73]**
   See above.
5. **Actions related to technology [230.74]**
   No specific advanced technologies will be used to construct this site.
6. **Actions affecting plant and animal populations [230.75]**
   USACE has coordinated construction activities with local Native American Tribes and state and Federal resource agencies to ensure that minimal impacts to fishery and wildlife resources will occur. In-water portions of the project will take place during the designated fish window to avoid impacts to fish. Providing spawning gravels, increasing pool-riffle structure, planting the banks with native vegetation, moving the stream away from the surface runoff generated from South 55th Street, and providing fish passage to higher quality habitat upstream is expected to lead in an increase in habitat value for aquatic biota. A Corps biologist will check for perched bald eagles before construction begins to avoid and minimize disturbance due to large machinery. Work will be delayed if it appears that there will be a disturbance to eagles. In addition, fish rescue will take place prior to the initial connection with the new channel.
7. **Actions affecting human use [230.76]**
   The construction of the stabilization structure is not expected to diminish water quality or any other aesthetically pleasing feature of the aquatic site.
8. **Other actions [230.77]**
   Best management practices (such as dust suppression measures) will be used to ensure that no unnecessary damage to the environment occurs during construction.

General Policies for Evaluating Permit Applications [33 CFR §320.4]

1. **Public Interest Review [320.4(a)]**
   USACE finds this stream realignment and rehabilitation action to be in compliance with the

404(b)(1) guidelines and not contrary to public interest.

2. **Effects on wetlands [320.4(b)]**
   See 404(b)(1) evaluation above. Minimal impacts to wetlands are expected that will be offset by the overall gain in habitat value of this restoration project.
3. **Fish and wildlife [320.4(c)]**
   USACE consulted extensively with state and federal resource agencies, tribes and other interested members of the public on this action.
4. **Water quality [320.4(d)]**
   USACE certifies that this project will not violate Water Quality Standards as set forth by the Clean Water Act and received a401 Water Quality Certification under the conditions of Nationwide Permit 27 from the Washington Department of Ecology on April 28, 2010.
5. **Historic, cultural, scenic, and recreational values [320.4(e)]**
   No permit application is necessary for these values, and in accordance with the National Historic Preservation Act (16 USC 470), historic properties have been investigated, and concurrence was received from the Washington State Historic Preservation Office (SHPO) on May 3, 2010. Additionally, affected tribes will be consulted as required under NHPA.
6. **Effects on limits of the Territorial Sea [320.4(f)]**
   Not applicable, since the project will not occur in coastal waters.
7. **Consideration of property ownership [320.4(g)]**
   The property is owned by Springbrook Apartments. An easement has been granted to construct the project.
8. **Activities affecting coastal zones [320.4(h)]**
   A coastal zone consistency determination was received from the Washington Department of Ecology on April 28, 2010 per the conditions of a Nationwide Permit 27.
9. **Activities in marine sanctuaries [320.4(i)]**
   Not applicable, since the area is not a marine sanctuary.
10. **Other federal, state, or local requirements [320.4(j)]**
    USACE has concurrence from the U.S. Fish and Wildlife Service and National Marine Fisheries Service on the findings of the Programmatic Biological Assessment for the Green Duwamish Ecosystem Restoration Project. USACE received a 401 Water Quality Certification per the conditions of a Nationwide Permit 27 from the Washington Department of Ecology on May 3, 2010. The local sponsor, the City of Renton, is pursuing a Hydraulic Approval Permit with the Washington Department of Fish and Wildlife.
11. **Safety of impoundment structures [320.(k)]**
    Not applicable, since an impoundment structure is not being built.
12. **Water supply and conservation [320.4(m)]**
    No impacts to water supply are anticipated; therefore no permit is needed concerning water supply.
13. **Energy conservation and development [320.4(n)]**
    Not applicable.
14. **Navigation [320.4(o)]**
    Not applicable.
15. **Environmental benefits [320.4(p)]**
    The project will result in an overall increase in habitat value and function by moving the stream away from the road, meandering the channel through a forested wetland, placing substrates

suitable for benthic invertebrate colonization and salmonid spawning, planting the banks with native vegetation, and providing upstream fish passage through the culvert underneath South 55th Street.

16. Economics [320.4(q)]

No impacts to economics are anticipated.

17. Mitigation [320.4(r)].

Although the project will result in impacts to approximately 0.27 acres of wetland (of which 0.19 will be permanently lost) to excavate the new channel, the gain in habitat value and ecosystem function from moving the stream away from the road, meandering it through a forested wetland, placing spawning gravels and large woody debris, and planting native vegetation are expected to exceed this loss. Therefore, no mitigation is required.

Appendix G

COASTAL ZONE MANAGEMENT ACT
CONSISTANCY DETERMINATION

Upper Springbrook Creek Channel Realignment and Rehabilitation
March, 2010

This restoration and rehabilitation of Springbrook Creek is an activity undertaken by a Federal agency. The following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

1. Introduction: The proposed Federal action applicable to this consistency determination is the channel realignment and rehabilitation of a section of Upper Springbrook Creek, as described in the Environmental Assessment. This determination of consistency with the Washington Coastal Zone Management Act is based on review of applicable sections of the City of Renton Shoreline Master Program. The determination of consistency is further confirmed through analogy to the provisions of the regional conditions under Nationwide Permit (NWP) 27 pursuant to the Corps of Engineers' Clean Water Act Section 404 permitting program. The regional conditions under NWP 27 provide that the State of Washington has predetermined its concurrence that the channel realignment and rehabilitation project meeting NWP 27 parameters is consistent with the State's coastal management program as long as individual review under CWA Section 401 is not triggered. The consequent State predetermination of concurrence with a conclusion of consistency provides extrinsic validation for the Corps' analysis that follows.

2. State Of Washington Shoreline Management Program. Primary responsibility for implementation of the State of Washington Shoreline Management Act of 1971 has been assigned to local governments. The applicable local government office responsible for King County is the King County Department of Development and Environmental Services.

3. Description of the City of Renton Plan. According to Renton Municipal Code (RMC) 4-3-090, Upper Springbrook Creek is not classified by the City and State as Shorelines of the State, and therefore RMC 4-3-050, Critical Areas Regulation, apply to this project site. The following outlines pertinent sections of the City of Renton program. The Corps of Engineers consistency determination is indicated in bold italics.

4-3-050 CRITICAL AREAS REGULATIONS:
L. STREAMS AND LAKES:

1. Applicability/Lands to Which These Regulations Apply: These stream and lake regulations apply to sites containing all or portions of Class 2 to 4 streams or lakes and/or their buffers as

described below. This section does not apply to Class 1 waters which are regulated by RMC 4-3-090, Shoreline Master Program Regulations, or to Class 5 waters which are exempt. All other critical area regulations, including, but not limited to, flood hazard regulations and wetland regulations, do apply to classified streams where applicable.

a. Classification System: The following classification system is hereby adopted for the purposes of regulating streams and lakes in the City. Stream and lake buffer widths are based on the following rating system:

i. Class 1: Class 1 waters are perennial salmonid-bearing waters which are classified by the City and State as Shorelines of the State.

ii. Class 2: Class 2 waters are perennial or intermittent salmonid-bearing waters which meet one or more of the following criteria:

(a) Mapped on Figure Q4, Renton Water Class Map, as Class 2; and/or

(b) Historically and/or currently known to support salmonids, including resident trout, at any stage in the species lifecycle; and/or

(c) Is a water body (e.g., pond, lake) between one half (0.5) acre and twenty (20) acres in size.

iii. Class 3: Class 3 waters are non-salmonid-bearing perennial waters during years of normal rainfall, and/or mapped on Figure Q4, Renton Water Class Map, as Class 3.

iv. Class 4: Class 4 waters are non-salmonid-bearing intermittent waters during years of normal rainfall, and/or mapped on Figure Q4, Renton Water Class Map, as Class 4.

v. Class 5: Class 5 waters are non-regulated non-salmonid-bearing waters which :

(a) Flow within an artificially constructed channel where no naturally defined channel had previously existed; and/or

(b) Are a surficially isolated water body less than one-half (0.5) acre (e.g., pond) not meeting the criteria for a wetland as defined in subsection M of this Section.

The Upper Springbrook Creek project site is mapped as a class 2 stream by the City of Renton and meets the criteria of a class 2 stream since it supports coho salmon. Only those sections of the Shoreline Master Plan relevant to Class 2 streams are addressed throughout the remainder of this Consistency Determination.

3. Studies Required:

d. Studies Waived:

i. Standard Stream or Lake Study: May only be waived by the Administrator when the applicant provides satisfactory evidence that:

(a) A road, building or other barrier exists between the water body and the proposed activity, or

(b) The water body or required buffer area does not intrude on the applicant's lot, and based on evidence submitted, the proposal will not result in significant adverse impacts to nearby water bodies regulated under this Section; or

(c) Applicable data and analysis appropriate to the proposed project exists and an additional study is not necessary.

Consistent- an Environmental Assessment has been prepared to comply with NEPA (National Environmental Policy Act). Much of the information required in a Standard Stream Study can be found in this document; therefore an additional study is not necessary.

iii. Stream or Lake Mitigation Plan: May only be waived when no impacts have been identified through a supplemental stream or lake study.

Consistent- the Environmental Assessment identifies no significant negative impacts to the stream or the surrounding environment, thus mitigation will not be necessary. Overall conditions should improve as the stream will be moved away from a road, spawning gravel and large woody debris will be placed in the new channel, invasive vegetation will be removed from the site , and native vegetation will be planted along the new channel, in the old decommissioned channel, and in areas of disturbance.

4. General Standards for Class 2 to 4 Waters:

a. Disturbance Prohibited: Streams and lakes and their buffer areas shall be undisturbed, except where the buffer is to be enhanced, or where exemptions allowed in subsection C of this Section are conducted, or where allowed to be altered in accordance with subsections L5, L7 and L8 of this Section. Where water body or buffer disturbance has occurred in accordance with exemption or development permit approval during construction or other activities, revegetation with native vegetation shall be required.

Consistent- the project will enhance the buffer along the South side of the creek by relocating it and meandering it through the forested wetland to the North. The project includes the removal of invasive vegetation and planting of native emergents, shrubs, and trees in areas disturbed during construction.

b. No Net Loss: There shall be no net loss of riparian area or shoreline ecological function resulting from any activity or land use occurring within the regulated buffer area.

Consistent- the project is relocating the stream from its current location along a road to a meandered configuration through a forested area, and therefore riparian area and ecological function is expected to improve.

5. Stream/Lake Buffer Width Requirements:

a. Buffers and Setbacks:

i. Minimum Stream/Lake Buffer Widths: The minimum width of the required buffers shall be based upon the water body class.

(a) Class 2: one hundred feet (100').

(b) Class 3: seventy five feet (75').

(c) Class 4: thirty five feet (35').

Consistent- the current buffer along the south bank of this section of Upper Springbrook Creek has a buffer width of only a couple of feet before the road. Relocating the stream away from the road will improve the functional buffer to an average of around 60 feet. The buffer along the north bank goes on for several hundred feet.

6. Stream or Lake Buffer Use Restrictions and Maintenance: Any activity or proposal subject to this subsection L shall comply with the following standards within required buffer areas:

a. Preservation of Native Vegetation: Existing native vegetation shall be preserved to the extent possible, preferably in consolidated areas.

Consistent- the project will remove invasive vegetation and plant native vegetation. Caution will be taken to minimize disturbance to native vegetation during construction. Disturbed areas will be planted with native vegetation following completion of construction.

b. Revegetation Required: Where water body buffer disturbance has occurred in accordance with exemption or development permit approval or other activities, revegetation with native vegetation shall be required.

Consistent- native vegetation will be planted on site following construction.

c. Use of Native Species: When revegetation is required, native species, or other appropriate species naturalized to the Puget Sound region and approved by the Reviewing Official, shall be used. A variety of species shall be used which serve as food or shelter from climatic extremes and predators, and as structure and cover for reproduction and rearing of young.

Consistent- a Corps botanist developed a list of native emergents, shrubs, and trees to be planted on site.

d. Removal of Noxious Species: When required as a condition of approval, noxious or undesirable species of plants shall be removed or controlled so as to not compete with native vegetation.

Consistent- noxious weeds will be removed from the site prior the planting native vegetation. For five years post-planting noxious weed removal will occur as part of routine maintenance.

8. Alterations Within Streams and Lakes or Associated Buffers.

a. Transportation Crossings:

i. Criteria for Administrative Approval of Transportation Crossings in Stream/Lake or Buffer Areas: Construction of vehicular or non-vehicular transportation crossings may be permitted in accordance with an approved supplemental stream/lake study subject to the following criteria:

(a) The proposed route is determined to have the least impact on the environment, while meeting City Comprehensive Plan Transportation Element requirements and standards in RMC 4-6-060; and

Consistent- an Environmental Assessment has been prepared with a determination of insignificant impacts to the environment. The project will replace a 30 inch diameter pipe culvert under South 55th Streetreet with a ten foot wide by 4 foot tall box culvert which will meet the requirement of the Washington Department of fish and Wildlife Culvert Design Manual (2003) allowing for improved fish access to higher quality upstream habitat.

(b) The crossing minimizes interruption of downstream movement of wood and gravel; and

Consistent- the project will replace a 30 inch diameter pipe culvert under South 55th Street with a ten foot wide by 4 foot tall box culvert, thus allowing for significantly more movement of wood and gravel.

(c) Transportation facilities in buffer areas shall not run parallel to the water body; and

Consistent- crossing is perpendicular to stream.

(d) Crossings occur as near to perpendicular with the water body as possible; and

Consistent- crossing is perpendicular to stream.

(e) Crossings are designed according to the Washington Department of Fish and Wildlife *Fish Passage Design at Road Culverts*, 1999, and the National Marine Fisheries Service *Guidelines for Salmonid Passage at Stream Crossings*, 2000, as may be updated, or equivalent manuals as determined by the Responsible Official; and

Consistent- the project will replace a 30 inch diameter pipe culvert under South 55th Street with a ten foot wide by 4 foot tall box culvert which will meet the requirement of the Washington Department of fish and Wildlife Culvert Design Manual (2003).

(f) Seasonal work windows are determined and made a condition of approval; and

Consistent- all in-water work will be done in the fish window established by Washington Department of Fish and Wildlife (July 1 through September 30).

(g) Mitigation criteria of subsection L3c(ii) of this Section are met.

Consistent- this project will result in an overall gain in aquatic habitat functions and values by relocating the stream away from the road and through a forested corridor, placing spawning gravel and large woody debris in the new channel, removing invasive vegetation and planting native species, and replacing the culvert underneath South 55th Street. Therefore the project is self-mitigating.

e. Alterations of Streams and Lakes or Associated Buffers – Stream Relocation:

i. Administrative Approval of Stream Relocation: Stream relocation may be allowed when analyzed in an accepted supplemental stream or lake assessment, and when the following criteria and conditions are met:

(a) Criteria: Stream relocation may only be permitted if associated with:

(1) A public flood hazard reduction/habitat enhancement project approved by appropriate State and/or Federal agencies; or
(2) Expansion of public road or other public facility improvements where no feasible alternative exists; or
(3) A public or private proposal restoring a water body and resulting in a net benefit to on- or off-site habitat and species.

Consistent- the relocation of the stream away from South 55th Street through a forested wetland in a more natural channel is a habitat enhancement.

(b) Additional Conditions: The following conditions also apply to any stream relocation proposal meeting one or more of the above criteria:

(1) Buffer widths shall be based upon the new stream location; provided, that the buffer widths may be reduced or averaged if meeting criteria of subsection L5c or L5d of this Section or subsection L8e(i)(b)(2) of this Section. Where minimum required buffer widths are not feasible for stream relocation proposals that are the result of activities pursuant to criteria in subsections L8e(i)(a)(1) and (2) of this Section, other equivalent on- or off-site compensation to achieve no-net-loss of riparian function is provided;
(2) When Class 4 streams are proposed for relocation due to expansions of public roads or other public facility improvements per subsection L8e(i)(a)(2) of this Section, the buffer area between the facility and the relocated stream shall not be less than the width prior to the relocation. The provided buffer between the facility and the relocated stream shall be enhanced or improved to provide appropriate function given the class and condition of the stream; or if there is no buffer currently, other equivalent on- or off-site compensation to achieve no net loss of riparian function is provided.
(3) Applicable mitigation criteria of subsection L3c(ii) of this Section must be met.
(4) Proper notifications and records must be made of stream relocations, per subsection D3b of this Section, Information to be Obtained and Maintained, and subsection D3c of this Section, Alterations of Watercourses, in cases where the stream/lake is subject to flood hazard regulations of this Section, as well as subsection F8 of this Section if neighboring properties are impacted.

Consistent- the proposed channel relocation will have a wider buffer than the stream does at its current location, and since the project is an improvement, no mitigation is required. The stream is not subject to flood hazard regulations.

M. WETLANDS:

1. Applicability: The wetland regulations apply to sites containing or abutting wetlands as described below. Category 3 wetlands, less than two thousand two hundred (2,200) square feet in area, are exempt from these regulations if they meet exemption criteria in subsection C of this Section.

a. Classification System: The following classification system is hereby adopted for the purposes of regulating wetlands in the City. Wetlands buffer widths, replacement ratios and avoidance criteria shall be based on the following rating system:

i. Category 1: Category 1 wetlands are wetlands which meet one or more of the following:

(a) The presence of species listed by Federal or State government as endangered or threatened, or the presence of essential habitat for those species; and/or

(b) Wetlands having forty percent (40%) to sixty percent (60%) permanent open water (in dispersed patches or otherwise) with two (2) or more vegetation classes; and/or

(c) Wetlands equal to or greater than ten (10) acres in size and having three (3) or more vegetation classes, one of which is open water; and/or

(d) The presence of plant associations of infrequent occurrence; or at the geographic limits of their occurrence; and/or

ii. Category 2: Category 2 wetlands are wetlands which meet one or more of the following criteria:

(a) Wetlands that are not Category 1 or 3 wetlands; and/or

(b) Wetlands that have heron rookeries or osprey nests, but are not Category 1 wetlands; and/or

(c) Wetlands of any size located at the headwaters of a watercourse, i.e., a wetland with a perennial or seasonal outflow channel, but with no defined influent channel, but are not Category 1 wetlands; and/or

(d) Wetlands having minimum existing evidence of human-related physical alteration such as diking, ditching or channelization; and/or

iii. Category 3: Category 3 wetlands are wetlands which meet one or more of the following criteria:

(a) Wetlands that are severely disturbed. Severely disturbed wetlands are wetlands which meet the following criteria:

(1) Are characterized by hydrologic isolation, human-related hydrologic alterations such as diking, ditching, channelization and/or outlet modification; and

(2) Have soils alterations such as the presence of fill, soil removal and/or compaction of soils; and

(3) May have altered vegetation.

(b) Wetlands that are newly emerging. Newly emerging wetlands are:

(1) Wetlands occurring on top of fill materials; and

(2) Characterized by emergent vegetation, low plant species richness and used minimally by wildlife. These wetlands are generally found in the areas such as the Green River Valley and Black River Drainage Basin.

(c) All other wetlands not classified as Category 1 or 2 such as smaller, high quality wetlands.

Consistent- The wetland to the North of Upper Springbrook Creek, which is the location of the proposed new channel, is classified as a category three wetland since it shows evidence of being severely disturbed due to alterations such as road placement and outlet modification.

2. General Standards for Permit Approval: Permit approval by the Reviewing Official for projects involving regulated wetlands or wetland buffers shall be granted only if the approval is consistent with the provisions of this Section. Additionally, approvals shall only be granted if:

a. A proposed action avoids adverse impacts to regulated wetlands or their buffers or takes affirmative and appropriate measures to minimize and compensate for unavoidable impacts; and

b. The proposed activity results in no net loss of regulated wetland area, value, or function in the drainage basin where the wetland is located; or

c. A variance process is successfully completed to determine conditions for permitting of activity requested including measures to reduce impacts as appropriate.

Consistent- the proposed stream alignment through the adjacent forested wetland will have insignificant impacts, as determined by the Environmental Assessment, and will result in a net gain in aquatic habitat function and value by relocating the stream way from the road, placing gravel and large woody debris in the new channel, removing invasive vegetation, and planting native emergents, shrubs, and trees along the stream, in the decommissioned channel, and in areas of disturbance.

3. Study Required:

a. When Study Is Required: Wetland assessments are required as follows:

i. Wetland Classification: The applicant shall be required to conduct a study to determine the classification of the wetland if the subject property or project area is within one hundred feet (100') of a wetland even if the wetland is not located on the subject property but it is determined that alterations of the subject property are likely to impact the wetland in question or its buffer. If there is a potential Category 1 or 2 wetland within three hundred feet (300') of a proposal, the City may require an applicant to conduct a study even if the wetland is not located on the subject property but it is determined that alterations of the subject property are likely to impact the wetland in question or its buffer.

Consistent- a wetland report was prepared by a qualified Corps botanist. The wetland was rated as a category 3 using the City of Renton's criteria.

ii. Wetland Delineation: A wetland delineation is required for any portion of a wetland on the subject property that will be impacted by the permitted activities.

Consistent- a wetland delineation was done on the wetland to the north of the stream and it was determined to all be wet.

4. Delineation of Regulatory Edge of Wetlands:

a. Methodology: For the purpose of regulation, the exact location of the wetland edge shall be determined by the wetlands specialist hired at the expense of the applicant through the performance of a field investigation using the procedures provided in the following manual:

Washington State Wetlands Identification and Delineation Manual, Washington State Department of Ecology, March 1997, Ecology Publication No. 96-94.

b. Delineations – Open Water: Where wetlands are contiguous with areas of open freshwater, streams, or rivers, the delineation shall be consistent with the Washington State Wetlands Rating System: Western Washington, Second Edition, Washington State Department of Ecology, August 1993, Publication No. 93-74, Appendix 5, or another accepted Federal or State methodology, subject to City review.

c. Adjustments to Delineation by City: Where the applicant has provided a delineation of the wetland edge, the City shall review and may render adjustments to the edge delineation. In the event the adjusted edge delineation is contested by the applicant, the City shall, at the applicant's expense, obtain the services of an additional qualified wetlands specialist to review the original study and render a final delineation.

Consistent- the entire swath of green space North of this section of Upper Springbrook Creek is mapped as wetland by the City of Renton and has been confirmed by a Corps of Engineers botaniStreet

6. Wetland Buffers:

a. Buffers Required:

i. Wetland buffer zones shall be required of all proposed regulated activities abutting regulated wetlands.

ii. Any wetland created, restored, or enhanced in conjunction with creation or restoration as compensation for approved wetland alterations shall include the standard buffer required for the class of the wetland being replaced.

iii. All required wetland buffer zones shall be retained in their natural condition. Category 3 wetland buffers of twenty five feet (25') require the buffers be fully vegetated with native species or restored; otherwise increased buffer widths to protect functions and values may be required.

iv. Where buffer disturbance has occurred during construction or other activities, revegetation with native vegetation may be required.

Consistent- the buffer surrounding the wetland with not change by relocating the stream. All disturbed areas will be planted with native vegetation.

8. Wetland Changes – Alternative Methods of Development: If wetland changes are proposed for a non-exempt activity, the applicant shall evaluate alternative methods of developing the property using the following criteria in this order and provide reasons why a less intrusive method of development is not feasible. In determining whether to grant permit approval per subsection M2 of this Section, General Standards for Permit Approval, the Reviewing Official shall make a determination as to whether the feasibility of less intrusive methods of development have been adequately evaluated and that less intrusive methods of development are not feasible:

a. Avoid any disturbances to the wetland or buffer;

b. Minimize any wetland or buffer impacts;

c. Restore any wetlands or buffer impacted or lost temporarily; and

d. Compensate for any permanent wetland or buffer impacts by one of the following methods:

i. Restoring a former wetland and provide buffers at a site once exhibiting wetland characteristics to compensate for wetlands lost;

ii. Creating new wetlands and buffers for those lost; and

iii. In addition to restoring or creating a wetland, enhancing an existing degraded wetland to compensate for lost functions and values.

Consistent- the only permanent disturbance to the wetland will be in the area where the new channel will be located, which will be approximately 0.19 acres. However, there will be an overall gain in habitat value and function both in the new channel and within the wetland as invasive plants will be removed and replaced with native emergents, shrubs, and trees. The old decommissioned channel will also have native vegetation removed and planted with a mixture of native species and will, therefore, function as part of the wetland.

9. Compensating for Wetlands Impacts:

a. Goal: The overall goal of any compensatory project shall be no net loss of wetland function and acreage and to strive for a net resource gain in wetlands over present conditions. The concept of "no net loss" means to create, restore and/or enhance a wetland so that there is no reduction to total wetland acreage and/or function.

b. Plan Requirements: The applicant shall develop a plan that provides for land acquisition, construction, maintenance and monitoring of replacement wetlands that recreate as nearly as possible the wetland being replaced in terms of acreage, function, geographic location and setting, and that are equal to or larger than the original wetlands.

c. Plan Performance Standards: Compensatory mitigation shall follow an approved mitigation plan pursuant to subsections M8 to M10 of this Section and shall meet the minimum performance standards in subsection F8 of this Section.

d. Acceptable Mitigation – Permanent Wetland Impacts: Any person who alters regulated wetlands shall restore or create equivalent areas or greater areas of wetlands than those altered in order to compensate for wetland losses. Enhancement of wetlands may be provided as mitigation if it is conducted in conjunction with mitigation proposed to create or restore a wetland in order to maintain "no net loss" of wetland acreage. Subsections M10 through M12 provide further detail on wetland restoration, creation, and enhancement.

e. Restoration, Creation, or Combined Enhancement Required – Compensation for Permanent Wetland Impacts: As a condition of any permit allowing alteration of wetlands and/or wetland buffers, or as an enforcement action, the City shall require that the applicant engage in the restoration or creation of wetlands and their buffers (or funding of these activities) in order to offset the impacts resulting from the applicant's or violator's actions. Enhancement in conjunction with restoration or creation may be allowed in order to offset the impacts resulting from an applicant's actions. Enhancement is not allowed as compensation for a violator's actions.

f. Compensating for Temporary Wetland Impacts: Where wetland disturbance has occurred during construction or other activities, see subsection C5f(ii) of this Section.

g. Mitigation Bank Agreement – Glacier Park Company: Pursuant to the Wetland Mitigation Bank Agreement between the City and the Glacier Park Company, King County

recording number 9206241805, wetland alteration and wetland mitigation shall be conducted in accordance with the agreement.

Consistent- since there will be a net gain in both stream and wetland habitat function and value from the project no mitigation/compensation beyond what is already proposed in the project (removal of invasive vegetation, planting of native emergents, shrubs, and trees, replacing the culvert underneath South 55th Street, moving the stream from the road and meandering it through the forested wetland, and placing spawning gravel and large woody debris in the new channel) is necessary.

12. Wetland Enhancement:

a. Enhancement Proposals – Combined with Restoration and Creation: Any applicant proposing to alter wetlands may propose to enhance an existing degraded wetland, in conjunction with restoration or creation of a wetland in order to compensate for wetland losses. Wetland enhancement shall not be allowed as compensation if it is not accomplished in conjunction with a proposal to restore or create a wetland.

Consistent- the project itself will enhance an existing wetland by removing invasive vegetation and planting native emergents, shrubs, and trees. No additional or off-site enhancement is required.

Based on the above evaluation, it is determined that the proposed rehabilitation activities comply with the policies, general conditions, and activities as specified in the King County Shoreline Master Program. The proposed action is considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the King County Shoreline Master Program.

Appendix H
SHPO Concurrence and Letter and Emails to the Tribe

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

May 3, 2010

Mr. Aaron Naumann
Environmental Resources Section
Seattle District, Corps of Engineers
PO Box 3755
Seattle, Washington 98124-3755

RE: Upper Springbrook Creek Realignment & Rehabilitation Project
Log No.: 050310-02-COE-S

Dear Mr. Naumann

Thank you for contacting our department. We have reviewed the professional archaeological survey report you provided for the proposed Upper Springbrook Creek Realignment & Rehabilitation Project in King County, Washington.

We concur with your determination of No Historic Properties Affected. We concur with the stipulation for professional archaeological monitoring for excavations below 3 feet. Please provide the monitoring reports when available.

We also would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act, as amended, and it's implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment on this undertaking and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: rob.whitlam@dahp.wa.gov

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Environmental Resources Section

Melissa Calvert, ATOM (Cultural Resources Manager)
Philip Starr Building
39015 172nd Ave SE
Auburn, WA 98092

SUBJECT: Request for knowledge of, or concerns with, Historic Properties for the proposed Upper Springbrook Creek Channel Realignment and Rehabilitation Project, King County

Dear Ms. Calvert:

The U.S Army Corps of Engineers (Corps) and the City of Renton propose to realign and rehabilitate a portion of the Upper Springbrook Creek currently parallel to S. 55th St. in a roadside ditch. The proposed action includes: 1) replacing the culvert underneath S. 55th St. with an appropriately designed box culvert as approved by the State of Washington Department of Fish and Wildlife (WDFW) for fish passage, 2) realigning the channel through an adjacent forested wetland that lies to the north of S. 55th St. in order to create complex habitat for aquatic biota. This project has been determined to be a Federal undertaking of the type that might affect historic properties and therefore must comply with the policies therein the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (16 U.S.C. 470).

Corps archaeologists conducted an archaeological and historical investigation of the project area and did not identify any significant prehistoric or historic resources during the survey. All ten shovel test pits excavated during the cultural resources survey were negative for cultural materials and indicated thick alluvial deposits were present within the APE. However, it is reported in the literature that the general vicinity of the project area is composed of rapidly aggregated alluvial deposits, which means there is the potential for deeply buried native sediments within the area of potential effect (APE). As a result, Corps archaeologists recommend any excavation conducted beyond the extent of these shovel test pits, or a depth of approximately 3 feet, be monitored by a professional archaeologist.

To further identify historic properties, Section 106 of the National Historic Preservation Act (NHPA or the Act) of 1966, as amended (36 CFR 800.4[a][3]), requires Federal agencies to seek information from tribes likely to have knowledge of, or concerns with, historic properties within the project's APE. We are specifically seeking assistance in identifying properties that may be of religious or cultural significance and may be eligible for listing in the National Register of Historic Places (NRHP), including Traditional Cultural Properties (TCPs). Specific

guidance concerning the Corps' obligation to contact your tribe regarding this issue is found at 36 CFR 800.4(a)(4), which states that the agency official shall:

> (4) Gather information from any Indian tribe or Native Hawaiian organization identified pursuant to Sec. 800.3(f) to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and may be eligible for the National Register, recognizing that an Indian tribe or Native Hawaiian organization may be reluctant to divulge specific information regarding the location, nature, and activities associated with such sites. The agency official should address concerns raised about confidentiality pursuant to Sec. 800.11(c).

We appreciate any assistance you can provide us in our efforts to comply with Section 106 of the NHPA. Please be assured that the Corps will treat any information you decide to share with us with the degree of confidentiality that is required in Section 800.11(c) of the NHPA, or with any other special restrictions you may require. In order to fulfill these obligations we request that you provide comments at your earliest convenience

A copy of the assessment and project plan has been included for your perusal. If you have any questions or require additional information, please feel free to contact me at (206) 764-4476 or by e-mail at aaron.j.naumann@usace.army.mil.

Sincerely,

Aaron J. Naumann, Corps Archaeological Technician, MA, RPA
Environmental Resources Section

Enclosure

Cc (with enclosures):
Laura Murphy
Philip Starr Building
39015 172nd Ave SE
Auburn, WA 98092

Dated 5/6/2010

Melissa and Laura,

I am sending this e-mail as a follow up and an update to a previous e-mail I send on April 29, 2010 concerning the Upper Springbrook Creek Channel Realignment and Rehabilitation Project near Kent, WA. The Corps has since received concurrence from the State Historic Preservation Officer on the determination of "No Historic Properties Effected, pending monitoring by a profession archaeologist". This project has a particularly tight schedule due to the fact it involves federal stimulus money. If you could please comment at your earliest convenience it would be greatly appreciated. I apologize for the short lead time on this project and am happy to answer any questions you may have regarding it.

Sincerely,

Aaron Naumann, MA, RPA, Corps Archaeological Technician
Tel: (206.764.4476

Dated 4/29/10

Melissa and Laura,

The United States Corps of Engineers (Corps) has a project in need of your comments that is under a fairly tight deadline. It is a fish restoration project near Kent on a small parcel of land with no known associated cultural materials. Liz Ellis and I conducted the cultural resources review, and I wrote up the report (see attached). We did not find any evidence of any cultural materials in our archival research or during the actually archaeological survey. However, we recommend monitoring of the project because of the potential for deeply buried deposits to be present in the area. We would be very appreciative if you could review the attached report and provide us with your opinion/decision regarding this project by May 7th. I apologize for the short lead time and will try calling you later this afternoon.

Sincerely,

Aaron Naumann, MA, RPA, Corps Archaeological Technician
Tel: (206.764.4476)

Appendix I
Public Comments

Received 4/15/10

Comment- Hi Chemine: Some feedback on the EA document - would be helpful to have the location of Springbrook listed in the document. Only through closely reading the document can one find out that it is a part of the Duwamish system.
Thanks.

Response- Indicated under the "Project Location" section that the stream is part of the Green River Basin. "Hydrology" section gives and extensive description of the stream configuration and its link to the Green River

Received 5/7/10 from the Muckleshoot Indian Tribe Fisheries Division

1. Culvert design

Comment: Previously, MITFD identified potential concerns with the proposed culverts inability to provide adequate clearance for wood and sediment passage. We recommended elevating the existing sewer line within the road prism to enable greater clearance for the stream within the culvert in our 1/6/2010 email. It appears that this issue may not have been fully considered and the culvert may still have some problems provide adequate clearance for wood passage. If so, we recommend (as we did on 1/14/2010) that the culvert be maintained such that any wood that is unable to pass through the culvert on its own accord, be relocated to the downstream channel and floodplain.

Response: Relocating the sewer line is not feasible at this point. The City of Renton will maintain the culvert, and relocate any wood that does not pass through the culvert downstream in the restoration site.

Comment: In our 1/6/2010 email, we also expressed concerns that the proposed culvert design may not be adequate to provide juvenile fish passage, particularly at higher discharges. To address this concern, we recommended that culvert be designed to pass juvenile salmonids up to at least the 10-year flood and should be achieved by ensuring continuous shallow margin habitat that offers slower water velocities at a range of flows within the culvert. Per your email on 5/5/2010 at 214 pm, the culvert has been designed to be a 10 foot wide culvert using WDFW's Stream Simulation Design for the culvert. We estimate that the natural geomorphic bankfull width using WDFW's regression method (Bob Barnard, unpublished data) is 7.4 feet, which results in a culvert width of 11 feet. The proposed culvert is slightly less than this width. We hope that the new culvert will be able to successful pass juvenile salmon.

Response: The design team disagrees with the method that was used to calculate 11 feet. They went out and measured the bankfull width, and even used a value from upstream which could be

considered to be outside of too much human influence, and got a width that gave a 10 feet wide culvert.

Comment: We also suggested that wood be used to create roughness in the culvert instead of rock. WDFW disagreed according to the meeting notes. We maintain our previous recommendation that wood should be placed perpendicular to the flow in the culvert to control sediment and maximize fish passage.

Response: Since the City of Renton, who is cost sharing this project, will be obtaining an HPA for this project, the Corps needs to go with WDFW's recommendation

2. Log Berm

Comment: Previously, we provided two recommendations regarding the log berm. First, we recommended that the existing sand bag berm on the north side of the new channel be removed. The project proposes to remove this sand bag berm per Sheet C-4 and replace it with a log berm structure to keep flows from migrating to the north. As far as the proposed log berm is concerned, we recommended that the structure should be modified so that it functions primarily for wood storage/recruitment to the creek upon lateral migration. We suggested that logs with rootwads at an angle be used to help trap sediment and mobile wood. We are concerned that this feature may limit the ability for lateral channel migration that creates and maintains fish habitat. Sheet C-2 indicates that some of the wood for this berm will be include logs with rootwads at an angle to implement this recommendation.

Response: Unfortunately, we can't really allow for too much lateral migration due to the sloping topography of the land and the flooding impacts that may be caused down gradient. We are also limited to a 100 foot wide easement that is bordered to the south by S. 55th St. The purpose of the log berm in to minimize fish stranding and keep the channel within the 100 foot easment.

3. Channel Design and Wood

Comment: Previously, we recommended that the new channel be designed with 3:1 slopes. The EA and Sheet C-9.3 indicate that the slopes will be constructed at 3:1 slopes. The cross-sections suggest a uniform trapezoidal channel design. Instead, we recommend that the channel design be more diverse using undulating banks, array of depths and widths, etc. where possible that more closely replicates natural channel configurations rather than a uniform trapezoidal channel.

Response: It is difficult for a contractor to build a channel that is diverse immediately after construction is complete. The design team is confident that the placement of LWD in the channel and the sediment grain size, which is designed to be more mobile, will create bars and pools

during higher flow events leading to diversity in channel morphology over time through geomorphic change and channel evolution.

Comment: We also recommended that the quantity of the proposed wood resemble wood loading conditions found in more natural streams and for the Corps to use Fox and Bolton (2007) recommendation's of loading to the 75th percentile of natural conditions. We also recommend organizing wood based on natural conditions described in Fox (2003). We provided these documents in our previous emails. Sheet C-2 shows 56 pieces of wood in the project area that will be within the Ordinary High Water Mark. It appears that the project has been modified and added wood per our recommendations.

However, we have some concerns with the proposed wood design. The wood placement in the design shows a uniform, somewhat evenly spaced wood design that lacks diversity. We recommend that the wood be located into clusters as well as individual pieces at an array of configurations provides a broader range of habitat niches and geomorphic responses than does the evenly spaced and uniform positions of the wood depicted in the drawings.

Response: The proposed wood design does have clusters of wood placed on the outside curve of bends. More LWD has been placed in the channel then what was recommended by the Muckleshoot Indian Tribe Fisheries Division. The Design team is confident that LWD structures will become more diverse over time as smaller pieces/fractions of wood recruit from upstream sources and windfall. Again, the Corps is relying on geomorphic change and evolution of the channel as well as growth of the riparian to create diversity.

4. Monitoring

Comment: The project should conduct pre-project fish use monitoring to determine the existing conditions. The timing of the project may not allow this work; therefore, the project should at least assemble all of the known existing fish use information and make some determination of the pre-existing project fish use conditions. The post project fish monitoring as proposed is good and is essential to be done to determine both juveniles and adult salmon use. The Corps may want to consider using fyke nets or other less lethal methods to monitor for juvenile use as the WRIA 9 fish distribution maps indicate that steelhead salmon are found in Springbrook Creek. (see http://your.kingcounty.gov/dnrp/library/2000/kcr728/vol2/partV/FISHDIST/Steelhead/SteelhddistroLOWER.pdf for more information).

Response: The Corps is currently coordinating with WDFW for approval to collect baseline information on fish presence in the Creek. We hope to sample to the Creek this year or next year in the early summer. Although there are steelhead in Springbrook Creek, they are not present in this tributary (which is actually an unnamed Creek that branches off of Upper Springbrook). The WRIA map listed above shows this branch as not have steelhead as well. The Corps has

coordinated with both WDFW and NMFS on this issue and verified with maps that there are no steelhead present in this section of stream.

Before sampling, the Corps will conduct a site visit to determine what sampling methods work best for the site. Dense overgrowth of invasive species may make it difficult to use nets. If electrofishing is utilized, it will be conducted by a biologist experienced in both electroshocking and fish handling.

Also, the MITFD would like to receive copies of all monitoring reports complete for this project.

5. Project Coordination

Again, we appreciate the opportunity to work with the Corps on this project prior to the issuance of this EA. Please note that it would have been useful to receive communication from the Corps earlier about the proposed project changes that addressed our previously identified concerns prior to the issuance of the EA and the 95% design. We hope that for future projects this information would be provided to the MITFD early to better facilitate coordination and work cooperatively to create a project that meets our objectives to restore and protect salmon habitat.

We also appreciate your comments and suggestions, which lead to an overall better design. Ideally coordination on the 95% plans would have been done prior to the posting of the draft Environmental Assessment (EA). However, because this project is stimulus funded there was an aggressive timeline. We went from 35% plans to 95% plans, and as soon as the 95% plans were received we had to go out for the public comment period on the Environmental Assessment. There was simply no time between receiving the 95% plans and posting the draft EA.