DEVELOPMENT SERVICES DEPARTMENT
ENVIRONMENTAL COORDINATOR
450 110th Ave NE., P.O. BOX 90012
BELLEVUE, WA 98009-9012

OPTIONAL DETERMINATION OF NON-SIGNIFICANCE (DNS) NOTICE MATERIALS

The attached materials are being sent to you pursuant to the requirements for the Optional DNS Process (WAC 197-11-355). A DNS on the attached proposal is likely. This may be the only opportunity to comment on environmental impacts of the proposal. Mitigation measures from standard codes will apply. Project review may require mitigation regardless of whether an EIS is prepared. A copy of the subsequent threshold determination for this proposal may be obtained upon request.

File No.	11-122119-LO
Project Name/Address:	East Creek/Richards Creek Stream Channel Improvements 13301 SE 26th Street
Planner:	David Pyle / dpyle@bellevuewa.gov
Phone Number:	425-452-2973
Minimum Comment Period:	**September 29, 2011**

Materials included in this Notice:

- [x] Blue Bulletin
- [x] Checklist
- [x] Vicinity Map
- [x] Plans
- [ ] Other:

ENVIRONMENTAL CHECKLIST

East Creek/Richards Creek Stream Modification

City of Bellevue File Number 10-121739-LO
10/07/2010
City of Bellevue Utilities Department Sunset/Richards Creek Flood Control and Habitat Improvement Project
Project SEPA Checklist
13301 SE 26th Street (Generally)

SEPA Checklist Reviewed By:
David Pyle, Land Use Planner
425-452-2973 - dpyle@bellevuewa.gov

Prepared for

City of Bellevue
Department of Utilities
450 – 110th Avenue NE
Bellevue, Washington 98009

Applicant is City of Bellevue Utilities Department

Prepared by

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August 19, 2011

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Environmental Checklist

A. Background Information

1. Name of proposed project if applicable:

East Creek/Richards Creek Stream Modification Project

2. Proponent:

City of Bellevue Utilities Department

3. Address and phone number of applicant and contact person:

Abe Santos
City of Bellevue – Department of Utilities
450 – 110th Avenue NE
Bellevue WA 98009
425-452-6456

4. Give an accurate, brief description of the proposal's scope and nature:

General description:

The East Creek/Richards Creek stream modification project (hereafter, "the project") proposed by the City of Bellevue Utilities Department (City) will address channel degradation and bank instability by providing stable streambed control, and channel and bank modifications in East Creek located between Kamber Road (also known as SE 26th Street) and the confluence with Richards Creek. The project goals are to:

- Reduce flooding and erosion of commercial and industrial property in the vicinity of the project site
- Preserve and enhance desirable instream, wetland, and riparian habitat functions

In addition, the project will enhance connectivity between the stream and adjacent wetlands, and improve instream fish habitat diversity and cover. This project is the final phase of a three-phase project that is being completed by the City in accordance with the *Flood Control and Sediment Management Plan - Richards Creek, Sunset Creek, and East Creek Confluence Area* (Herrera 2008).

- Acreage of site: 0.89 acres
- Number of dwelling units/buildings to be demolished: None
- Number of dwelling units/buildings to be constructed: None
- Square footage of buildings to be demolished: Not applicable
- Square footage of buildings to be constructed: Not applicable
- Quantity of earth movement (in cubic yards): Approximately 1,207 cubic yards (cy)

- Proposed land use: No change from current use
- Design features, including building height, number of stories and proposed exterior materials:

No buildings are being constructed. The project consists of channel improvements along East Creek, adjacent riparian restoration, a flood control sheet pile wall, and localized bank stabilization (roughening structure) on East Creek (see attached project plans).

5. Date checklist prepared:

August 19, 2011

6. Agency requesting checklist:

City of Bellevue – Department of Planning and Community Development

City of Bellevue Development Services Department - Office of SEPA administrator.

7. Proposed timing or schedule (including phasing, if applicable):

The project is proposed for construction during summer and fall of 2012.

8. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Yes, the East Creek Flood Control and Habitat Improvement Project is Phase 3 of a three-phase project that is being completed by the City of Bellevue in accordance with the *Flood Control and Sediment Management Plan - Richards Creek, Sunset Creek, and East Creek Confluence Area* (Herrera 2008) in order to control flooding of the surrounding properties and improve the instream and riparian habitat for fish and other wildlife in Sunset, Richards, and East creeks. See Figure 1 in Appendix A for the location of the project area. See Figure 2 in Appendix A for the distinct project phases as described in the flood control and sediment management plan.

Flood Control and Sediment Management Plan is attached as part of application materials and available in project file.

The first phase of this work was constructed in 2009 on Sunset Creek (the most upstream portion of the phased proposed stream improvement area). Phase 1 (referred to as SE 30th Street/Sunset Creek Flood Improvement Project) included a replacement culvert and sediment trap at SE 30th Street and channel modifications upstream and downstream to provide a stable streambed transition to the culvert inlet and outlet. The Phase 1 project was considered to have independent utility from future phases, and was permitted and implemented as a separate effort to address immediate needs.

Phase 1 was permitted under COB Development Services file #08-128529-LO.

The second phase of this work, the Sunset Creek/Richards Creek Flood Control and Habitat Improvement Project, includes a continuation of channel improvements and flood control measures along Sunset Creek downstream of Phase 1 to the confluence with Richards Creek. The project also entails stream improvements from the Optiva Curve (where Richards Creek turns sharply from north to east) to the historical Richards Creek flow split channel, approximately 300 feet upstream of the confluence with East Creek.

Phase 2 was permitted under COB Development Services file #10-121739-LO.

The project discussed in this checklist represents the third phase of work and continues with channel improvements to improve flood protection and reduce bank erosion for adjacent landowners, while improving geomorphic and habitat conditions in the greater Richards/East/Sunset Creek basin.

Both Phases 2 and 3 are planned to be constructed in 2012.

9. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

▪ Joint Aquatic Resource Permit Application (JARPA)	**Pending**
▪ Flood Control and Sediment Management Plan	**Complete**
▪ Basis of Design Report	**Complete**
▪ Biological Assessment	**Pending**
▪ Critical Areas Report	**Pending**

Conceptual wetland mitigation plans have been submitted as part of this application. Final wetland mitigation plans that are consistent with the approved conceptual plan will be finalized prior to issuance of construction permits.

10. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No other relevant projects or permit applications have been identified.

11. List any government approvals or permits that will be needed for your proposal, if known.

- Hydraulic Project Approval - Washington Department of Fish and Wildlife
- Clean Water Act Section 404 permit - U.S. Army Corps of Engineers
- Clean Water Act Section 401 Water Quality Certification - Washington State Department of Ecology
- Endangered Species Act concurrence – National Marine Fisheries Service (no U.S. Fish and Wildlife Service jurisdiction species occur in the action area)
- Critical Areas Land Use Permit – City of Bellevue
- Clearing and Grading Permit - City of Bellevue
- Right of Way Permit – City of Bellevue

12. **Please provide one or more of the following exhibits, if applicable to your proposal. (Please check appropriate box(es) for exhibits submitted with your proposal):**

☐ Land Use Reclassification (rezone) Map of existing and proposed zoning

☐ Preliminary Plat or Planned Unit Development
Preliminary plat map

X Clearing & Grading Permit
Plan of existing and proposed grading
Development plans

☐ Building Permit (or Design Review)
Site plan
Clearing & grading plan

☐ Shoreline Management Permit

X Site plan

13. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The project is located within, and adjacent to, the channel of East Creek, west of Richards Road and south of SE 26th Street in the City of Bellevue (Figure 1, Appendix A). The project area is within the Kelsey Creek Basin of Water Resource Inventory Area (WRIA) 8 – the Cedar/Sammamish Watershed. The legal description of this location is the northwest 1/4 of Section 10, Township 24 North, Range 5 East.

B. Environmental Elements

1. Earth

a. General description of the site (check one):

_X_ **flat**
____ **rolling**
____ **hilly**
____ **steep slopes**
____ **mountainous**
____ **other:** _____

b. What is the steepest slope on the site (approximate percent slope)?

The project area is relatively flat with a slope of approximately 1.5 percent from an elevation of 58 feet (above sea level) at the very upstream extents of the project area to an elevation of 49 feet at the downstream extents near Kamber Road.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The only soil type mapped in the study area is Urban Land (NRCS 2010) which is likely due to the high density of development present. Urban land is soil that has been modified by disturbance of the natural layers with additions of fill material several feet thick, often to accommodate large industrial and housing developments. In the study area, urban land constitutes those areas that have been filled to support industrial and commercial development.

Directly downstream of the study area, Seattle muck (0 to 5 percent slopes) soils are mapped north of Kamber Road where wetlands are prevalent on both sides of East Creek. Seattle muck is considered a hydric soil by the Natural Resources Conservation Service (NRCS 2010). A typical profile of Seattle muck is composed of a foot-thick surface layer of organic muck overlying a stratified mucky peat to muck layer extending to a depth of

approximately 60 inches. Seattle muck soils are very poorly drained with a water table near the surface.

d. ***Are there surface indications or history of unstable soils in the immediate vicinity?***

If so, describe.

There are no surface indications or a history of unstable soils in the immediate project vicinity (per King County sensitive areas map).

e. ***Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.***

Channel improvements along East Creek, adjacent riparian restoration, a flood control sheet pile wall, and localized bank stabilization (roughening structure) on East Creek include a total of 1,000 cubic yards of excavation and 212 cubic yards of fill.

All fill material for channel improvements, riparian restoration, and bank stabilization will be recovered from onsite sources or imported from a licensed commercial source. The fill will consist of topsoil and washed, rounded river boulders and streambed gravel and cobble. Non-regulated fill in the form of structural logs, some with rootwads, will be incorporated into the channel bed and banks. The flood control sheet pile wall will be constructed of metal sheet piles driven into the edge of the parking lot. Additional details regarding project construction, including channel grading, are provided in the *Critical Areas Report* prepared for the project.

f. ***Could erosion occur as a result of clearing, construction, or use? If so, generally describe.***

Clearing of riparian and wetland vegetation will be required for site access and to construct the project. Water quality impacts will be controlled through use of construction best management practices (BMPs), including temporary dewatering of the stream reach through the construction site (Drawings ESC-1 and -2; and WM-1, Appendix B). All disturbed areas will be restored with bioengineered bank stabilization techniques and appropriate native vegetation upon completion of construction.

BMP's will be applied as conditions of approval and reviewed through the Clearing and Grading application.

g. ***About what percentage of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?***

No change in impervious is expected.

No change in impervious surface area will result from the proposed project.

h. ***Proposed measures to reduce or control erosion, or other impacts on the earth, if any:***

Proposed BMPs are described below.

General Requirements

The proposed project will implement BMPs to avoid or minimize erosion-related impacts in accordance with regulatory requirements. The City of Bellevue will require its construction contractor to implement and maintain BMPs for temporary erosion and sediment control (TESC). These BMPs will be consistent with the Washington State Department of Ecology's 2005 *Stormwater Management Manual*

for Western Washington (Ecology 2005) and are considered an integral part of the effect determinations made in the biological evaluation of the proposed project.

Construction Timing

All construction activities associated with stream channel grading, streamflow bypass, and installation of channel grade control structures will take place during the approved in-water work window for the project area (July 1 to August 31). Activities that may result in unavoidable short-term sediment releases to the stream will be scheduled to commence after July 1 to avoid adverse effects on sensitive fish life history stages.

Temporary Erosion and Sediment Control

TESC measures will be in place before work begins, and additional TESC measures will be implemented as work elements occur in different areas of the site. The TESC plan will include appropriate BMPs to be implemented throughout construction that will retain dust, soil, and stormwater runoff on site and prevent pollutants and turbid discharges from entering East Creek.

Turbidity will be monitored during those construction activities with potential to release sediments to the stream. If measured turbidity 100 feet downstream of construction is more than 5 nephelometric turbidity units (NTU) greater than the background level, the activities causing the turbidity increase will be discontinued until additional measures necessary to achieve the required performance objectives can be implemented. TESC measures will be upgraded and added as necessary in response to unexpected storm events and changing site conditions (such as operation of additional pumps or relocation of silt fences).

The TESC plan will be maintained on site, and a recorded log of BMP implementation and TESC measure performance will be updated weekly. The plan and the log will be available on site for the duration of the project. Documentation will include (at a minimum) records of all BMP implementation and performance monitoring by the contractor's TESC lead as appropriate for the site conditions experienced during construction. Dewatering of the work area within the stream is planned as a major element of water quality protection during construction. Details on the dewatering plan are discussed in 3.*a*.(*4*) of this checklist.

Fueling and Lubrication

Fueling and use of lubricating oils and hydraulic fluids will be conducted offsite or at a designated staging area located at least 150 feet away from aquatic resources. All equipment working around aquatic resources, and that require hydraulic fluids, will use biodegradable hydraulic fluids.

The construction contractor will be required to develop a site-specific Spill Prevention, Control, and Countermeasures (SPCC) plan consistent with state law. The SPCC plan will address hazardous materials, fueling and maintenance of equipment, and spill containment and notification.

Removal of Best Management Practices

After the project is complete and disturbed soils are stabilized, all BMPs will be removed according to the following procedures:

- Evaluate the site to determine if the BMP is no longer needed (for example the area has been stabilized and the potential for sediment-laden water to exit the area has passed).
- Remove sediment buildup behind the BMP structures and dispose of sediments at an approved location offsite.
- Remove the BMP materials for reuse or recycling, if applicable.

Site Restoration and Revegetation

The boundaries of the clearing limits will be clearly marked before construction begins. As previously described, all disturbed areas within the clearing limits will be replanted with native trees and shrubs appropriate for the site. Soil in the vicinity of stream access points and other areas that have been compacted by heavy machinery will be tilled before replanting to enhance restoration and encourage infiltration of runoff.

Site erosion control and discharge management practices must be in compliance with the City's Clearing and Grading Codes. Review of the final erosion control and discharge control practices will be completed as part of the Clearing and Grading plan review.

2. Air

a. What types of emissions to the air would result from the proposal (for example, dust, automobile exhaust, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Heavy equipment used during construction of this project will emit exhaust and create dust that could contribute to suspended particulates during project construction. However, these emissions will be short term. The proposed project area is located in an urbanized environment characterized by light industrial land uses.

The air quality impacts resulting from construction related heavy equipment use are expected to be indistinguishable from levels produced by typical levels of truck and other vehicle traffic in the affected neighborhood. Consequently, as long as construction equipment is properly maintained and operated to minimize emissions, no significant air quality impacts are expected to result from construction activities.

Automobile and heavy equipment emissions are not regulated by the City of Bellevue and are under the authority of the State of Washington.

b. Are there any offsite sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odors that may affect this proposed project.

c. Proposed measures to reduce or control emissions or other impacts on air, if any:

Emissions from construction equipment and trucks can be reduced by using newer, well maintained equipment. Avoiding prolonged periods of vehicle idling also would reduce emissions. Construction contractors must comply with Puget Sound Clean Air Agency regulations requiring reasonable precautions to minimize odor and dust impacts. Best

management practices for the control of windborne construction dust (such as applying water to the roadway) will be used, if needed.

3. Water

a. Surface water:

1) ***Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, or wetlands)? If yes, describe and provide names. If appropriate, name the stream or river it flows into.***

There are extensive wetland systems within and around the project area that are hydrologically connected by surface and groundwater to the Richards/ East Creek system.

The project is located in the Kelsey Creek Basin of Water Resource Inventory Area (WRIA) 8 – the Cedar/Sammamish Watershed. It is located within, and directly adjacent to, approximately 430 linear feet of East Creek. The project is also located within, and directly adjacent to, approximately 4.5 acres of palustrine forested wetland (Figure 3, Appendix A).

Downstream of the project, (north of Kamber Road), East Creek flows into a riparian corridor averaging approximately 600 feet in width and discharges into Kelsey Creek approximately 0.75 miles north of Kamber Road. The Kelsey Creek watershed flows into Mercer Slough, which flows into Lake Washington.

2) ***Will the project require any work over, in, or adjacent to (within 200 feet of) the described waters? If yes, please describe and attach available plans.***

There are extensive wetland systems within and around the project area that are hydrologically connected by surface and groundwater to the Richards/ East Creek system.

Temporary impacts on East Creek, wetlands, buffers, and the 100-year floodplain will result from grading and installation of large woody materials in the channel and the adjacent banks and wetlands. The stream channel, wetlands, and buffers will be reconstructed and vegetated with native vegetation. To improve fish habitat, large woody material and spawning size gravel will be added to the stream.

Permanent impacts on wetlands will result from converting wetland to instream habitat in East Creek (for example installing gravel substrate) to provide additional fish habitat, and channel capacity to minimize flooding. In addition, some permanent impact on wetlands will result from construction of the flood control sheet pile wall. Please see the attached project engineering plan sheets in Appendix B for additional information.

Table 1. Impacts on East Creek, wetlands, and buffers in the project area.

Resource	Temporary Impacts	Permanent Impacts
East Creek Channel (waterward OHWM)	6,932 square feet (0.16 acres)	None
Stream Buffers	18,396 square feet (0.42 acres) [a]	None
Wetlands	9,475 square feet (0.22 acres)	3,036 square feet (0.07 acres)
Wetland Buffers	2,106 square feet (0.05 acres)	None

OHWM: Ordinary High Water Mark

[a] Stream buffer area includes wetland and upland areas adjacent to stream.

3) ***Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.***

Temporary and permanent impacts on Wetland A and East Creek will result from excavation and grading of the channel, which is necessary to implement channel improvements that involve enlarging, realigning, and re-grading the stream channel; and constructing grade control and bank stabilization structures.

Approximately 430 linear feet of channel improvements will involve enlarging and re-grading the stream channel and wetland benches; and constructing grade control and bank stabilization structures. Overall, the base of the channel will increase in width between approximately 4 and 14 feet. The centerline of the existing channel will shift on average, approximately 9 feet to the east.

Volumes of excavation and fill within Wetland A and below the OHWM for channel grading and installation of grade control and bank protection structures are summarized in Table 2.

Table 2. Estimated volumes of excavation and fill below the OHWM of East Creek and within wetlands.

	East Creek
Volume of excavation below existing OHWM (cubic yards) [a]	71
Volume of fill below existing OHWM (cubic yards) [b]	196
	Wetland A
Volume of excavation (cubic yards)	796
Volume of fill (cubic yards)	15

[a] Includes streambed and bank material
[b] Includes streambed material and boulders

Coniferous large woody material will be installed to stabilize the banks and provide grade control. Twelve grade control structures will be evenly spaced throughout the project reach. The structures will consist of interlaced coniferous tree logs imported from off-site, including 42 logs with root wads attached and 37 logs without root wads for a total of 79 logs (Drawings C-1 through C-8, Appendix B). After the grade control and bank stabilization logs are placed, cabled, and anchored, the ends of the logs will be buried in the bank; and the channel and lower banks will be lined with native soils and a mixture of cobbles, gravels, sand, and silt. Streambed sediment including gravels will be placed on top of the cobble mixture.

The bank roughening structure located further upstream on East Creek will be constructed of four interlaced logs with root wads attached. Most of the structure will be buried within the bank with the exception of root wads protruding out of the bank along the edge of the channel. The ground surface will be restored to existing grade after installation of the structure.

The approximate 2-foot-tall and 150-foot-long flood control sheet pile wall will be constructed of interconnecting steel sheet piles that are driven into the earth (Drawing C-1, Appendix B). An existing fence on adjacent property will be taken down to allow for access to construct the steel sheet pile wall from a parking lot.

All fill materials will be imported from a licensed commercial source. All excavated materials that are not backfilled will be retained on City of Bellevue property for use in future permitted actions, or disposed of at a permitted commercial facility.

4) ***Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.***

Flow will be diverted at three locations including upstream of the localized bank roughening structure site, upstream of the channel improvements site, and upstream of a tributary ditch that conveys flow to East Creek. At these sites coffer dams will be constructed across the channel to pool water that is pumped into bypass pipes. The coffer dams will be constructed of bulk bags filled with clean (washed) rounded gravels. Bypass flows from both sites will be diverted in pipes that run along the ground at the outer extents of the project limits that ultimately discharge flows downstream of the channel improvements site, directly upstream of Kamber Road.

Flow diversion will occur for base flows only. Work will be sequenced such that soil stabilization is complete on each portion of the project at the end of each working day. Flows will be passed through the project site on days when rain causes water levels to rise above base flow.

At the downstream extents of the project, a cofferdam consisting of bulk bags will be constructed across the channel to contain any turbid water and prevent release downstream. Bypassed flows will be discharged directly downstream of this cofferdam to an energy dissipater structure constructed of concrete Ecology blocks and gabion baskets filled with quarry spalls.

Concurrent with the installation of the bypass and dewatering of the channel, all fish and amphibians within the dewatering area will be captured and released downstream of Kamber Road. Dewatering and fish relocation will be conducted following an accepted protocol developed for this activity by the Washington State Department of Transportation (WSDOT 2009). The site will be allowed to drain to the limits of passive dewatering to facilitate fish removal. The remaining water within the exclusion area will either be pumped to the sanitary sewer system, or will be filtered using appropriate BMPs prior to return to the stream channel. The channel will remain dewatered and inaccessible to fish until construction is complete. All dewatering and fish relocation will take place during the WDFW-specified in-water work window.

The diversion pipes will be screened at the upstream end to prevent fish and other organisms from being entrained. The screening net will be situated for low pass-through velocity to avoid risk of impingement. The pipe is not expected to be

passable to upstream movement, meaning the exclusion area will impose a partial barrier to fish passage during the in-water construction period. The cofferdams, diversion pipes, energy dissipater, and all related materials will be completely removed from the site when the project is completed.

See Drawing WM-1 in Appendix B for details regarding the dewatering.

5) ***Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.***

Yes. The 100-year floodplain has been designated along East Creek (Figure 4, Appendix A).

6) ***Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.***

No waste materials will be discharged to surface waters as a result of the proposed project. Minor surface erosion of restored bed and bank areas will occur during site rewatering, and during the "first flush" of the project area during initial exposure to storm flows.

b. ***Ground water:***

1) ***Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.***

Not applicable.

2) ***Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example, domestic sewage; industrial waste, containing the following chemicals; agricultural waste; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.***

Not applicable.

No waste materials are anticipated or allowed to be discharged from any source, accept for those incidental to typical construction practices and are planned for management through project site management BMPs.

Not anticipated. Work is to be surface and channel related and no groundwater, accept channel/ ground water inter flow is expected. A secondary source of stream hydrology, ground water, when encountered, will be managed in the same manner as surface water.

c. ***Water runoff (including stormwater):***

1) ***Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.***

The project will neither increase nor reduce impervious surface area in the project vicinity or modify existing stormwater collection or disposal systems. Runoff from adjacent buildings and parking lots into the stream is expected to stay the same until additional development occurs.

2) ***Could waste materials enter ground or surface waters? If so, generally describe.***

Potential spills from construction activities and equipment could enter surface or ground water; however, a Spill Prevention, Control and Countermeasures Plan (SPCC) will be in place to prevent or reduce impacts from accidental spills.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

All construction work will be conducted within a dewatered exclusion area and on adjacent streambanks and uplands during baseflow periods. Stormwater or alluvial flow entering the work area will be pumped into the municipal sewer system, or will be treated using a filtration system to remove suspended sediments and other pollutants before discharge back to surface waters.

Soil stabilization will be complete on each portion of the project at the end of each working day. Work will not occur on days where rain is imminent and intense.

During construction, an SPCC plan will be in place to prevent or reduce impacts from accidental spills, consistent with City of Bellevue requirements for construction activities near critical areas.

4. Plants

a. Check types of vegetation found on the site:

X **deciduous tree:**
- X **alder**
- X **maple**
- ___ **aspen**
- X **others:** Black cottonwood (*Populus balsamifera*), Oregon ash (*Fraxinus latifolia*)

X **evergreen tree:**
- X **fir**
- X **cedar**
- X **pine**
- ___ **others:** ___

X **shrubs**

X **grass**

___ **pasture**

___ **crop or grain**

X **wet soil plants:**
- ___ **cattail**
- X **buttercup**
- X **bulrush**
- X **skunk cabbage**
- X **others:** red-osier dogwood (*Cornus sericea*), salmonberry (*Rubus spectabilis*), Pacific willow (*Salix lucida spp. lasiandra*), Sitka willow (*Salix sitchensis*), hardhack (*Spiraea douglasii*), lady fern (*Athyrium filix-femina*), big leaf sedge (*Carex amplifolia*), slough sedge (*Carex obnupta*), giant horsetail (*Cirsium arvense*), Pacific water parsley (*Oenanthe sarmentosa*), false lily of the valley (*Maianthemum dilatatum*), corn lily (*Veratrum viride*)

___ **water plants:**
- ___ **water lily**
- ___ **eelgrass**
- ___ **milfoil**
- ___ **others:** ___

X **other types of vegetation:** Japanese knotweed (*Polygonum x bohemicum*), reed canarygrass (*Phalaris arundinacea*), and Himalayan blackberry (*Rubus armeniacus*)

b. What kind and amount of vegetation will be removed or altered?

Vegetation removal will be limited to areas necessary to regrade the stream channel, wetlands, and banks; access the channel; install grade control and bank stabilization structures; and to remove all nonnative and invasive vegetation from the riparian areas within the project reach. The majority of riparian vegetation that will be affected consists of nonnative Himalayan blackberry.

c. List threatened or endangered species known to be on or near the site.

No listed threatened or endangered plant species are known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

The riparian area adjacent to the East Creek project reach will be restored. Wetland habitat will be restored along the banks of the constructed channel. Flat, wetland bench habitats approximately 5 feet wide will be constructed on both sides of the channel at an elevation approximately 2 feet higher than the base of the channel (Drawing C-5, Appendix B). The lower bank will be constructed of streambed sediment, which will transition to a soil lift (soil encapsulated in layers of woven and non-woven coir fabric) on the wetland benches. At the outer edges of the benches, wetland habitat will continue along gently sloped upper banks constructed of two to three stacked soil lifts, each of which are about 1 foot in height. The top layer of coir fabric encapsulating the upper lift will be secured with an anchor trench. Soil within the lifts will consist of native soils mixed with compost-amended topsoil.

The entire extents of the project will be seeded with a native wetland grass mix and planted with native wetland vegetation including the riparian areas along the channel improvement reach and bank roughening structure. The seeding areas are shown on Drawing ESC-1 in Appendix B. The planting plan and plant schedule are shown on Drawings P-1 and P-2 in Appendix B. Along the channel improvement reach, live stakes will be planted directly adjacent to the base of the channel on the lower banks and will be planted along with emergent plugs on the wetland benches. The upper banks and top of banks will be planted with potted shrubs and trees. Replanting plans are consistent with planting guidelines presented in the City of Bellevue's *Critical Areas Handbook* (City of Bellevue 2003).

5. Animals

a. List the names of any birds and animals that have been observed on or near the site or are known to be on or near the site:

Birds:	Songbirds, pileated woodpecker
Mammals:	Raccoon, opossum, beaver, other urban mammals
Fish:	Salmon, steelhead, cutthroat trout

b. List any threatened or endangered species known to be on or near the site.

According to City of Bellevue (2009a) basin fact sheets, the Puget Sound Chinook salmon occurs in the study area.

c. ***Is the site part of a migration route? If so, explain.***

East, Sunset, and Richards Creeks are a migratory corridor and a preferential spawning location used by native, anadromous, and effluvial salmonids. Chinook salmon and steelhead have not been observed in the system in recent years, potentially due to passage barriers imposed by extensive beaver dam complexes in downstream reaches of Richards Creek (Paulsen 2007).

d. ***Proposed measures to preserve or enhance wildlife, if any:***

Within the project area, wetland and riparian functions will improve including improved flood control, water quality, and fish and wildlife habitat. The combined functions of the reconstructed stream channel and riparian corridor (wetlands and buffers) within the project reach will be improved from their existing condition due to removal of invasive and non-native vegetation, installation of large woody materials and gravels that improve fish habitat, planting of dense native vegetation, and more frequent flooding of wetlands.

Impacts to habitat associated with species of local importance must be mitigated in accordance with the requirements of LUC 20.25H.150 through LUC 20.25H.170.

6. Energy and Natural Resources

a. ***What kinds of energy (for example, electricity, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.***

Not applicable.

b. ***Will your project affect the potential use of solar energy by adjacent properties? If so, generally describe.***

This proposal will not affect the use of solar energy.

c. ***What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:***

Not applicable.

7. Environmental Health

a. ***Are there any environmental health hazards, including exposure to toxic chemicals or risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.***

These potential hazards are addressed as part of the site management practices included as part of the project's Clearing and Grading Permit.

Environmental health hazards could occur from accidental spills of chemicals during project construction, and construction accidents related to the use of heavy equipment. Small amounts of materials likely to be present during construction include gasoline and diesel fuels, hydraulic fluids, oils, lubricants, and other chemical products. A spill of chemicals could potentially occur during construction as a result of either equipment failure or worker error. During construction, heavy equipment and fuels will be stored at a nearby location. Spills could also occur during refueling, from stored fuels, or from improperly disposed waste materials. Standard construction practices and safety measures will be employed to minimize the risk of spills or accidents.

1) ***Describe special emergency services that might be required.***

Emergency response during an incident would be the responsibility of the contractor. The contractor would require the assistance of the Washington Department of Ecology, Washington Department of Fish and Wildlife, or other agencies depending on the severity of the spill and the risk to people and the environment. It is expected that the contractor will rely on local emergency services for any accident related injuries.

2) ***Proposed measures to reduce or control environmental health hazards, if any:***

The contractor will develop and implement a SPCC plan according to City of Bellevue requirements, as defined in the bid documents. The SPCC plan will address hazardous materials, fueling and maintenance of equipment, and spill containment and notification. Any potentially hazardous waste discovered during project activities would be handled in accordance with Environmental Protection Agency, Department of Ecology, and local health regulations.

b. *Noise*

Construction and operation noise is regulated by BCC 9.18. The proposed construction must meet the requirements of this section.

1) ***What types of noise existing in the area may affect your project (for example, traffic, equipment operation, other)?***

None. Typical background noise levels in this urbanized environment are estimated to be 80 to 85 A-weighted decibels (dBA).

2) ***What types and levels of noise will be created by or associated with the project on a short-term or long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise will come from the site.***

Heavy equipment used during project related materials transportation, staging, and construction will produce noise levels above ambient background. Estimated peak noise levels will range between 90 and 96 dBA. After completion of the project, occasional noise from equipment used for on-going routine maintenance and repair will occur. These noise levels will be consistent with those produced by current maintenance dredging activities. Once complete, the proposed project will have no effect on ambient noise conditions.

3) ***Proposed measures to reduce or control noise impacts, if any:***

The contractor will adhere to all applicable federal, state, and local noise regulations governing construction activities.

8. Land and Shoreline Use

a. ***What is the current use of the site and adjacent properties?***

The project site is used to convey stream flow originating from Sunset Creek, Richard's Creek, and East Creek, and to convey stormwater from adjacent and upstream properties. The project site is surrounded by commercial and industrial buildings, and associated parking lots.

b. ***Has the site been used for agriculture? If so, describe.***

It is unknown whether the site was used for agriculture.

c. ***Describe any structures on the site.***

The East Creek channel and riparian buffer is bordered on both banks by commercial/ light industrial buildings and associated parking lots. A sewer main with a manhole crosses East Creek at the upstream end of the project.

d. ***Will any structures be demolished? If so, what?***

No structures will be demolished.

e. ***What is the current zoning classification of the site?***

The current zoning classification is Light Industrial (LI) (City of Bellevue 2007).

f. ***What is the current comprehensive plan designation of the site?***

The current comprehensive plan classification is Light Industrial (LI) (City of Bellevue 2009b).

g. ***If applicable, what is the current shoreline master program designation of the site?***

Not applicable. Not in shoreline jurisdiction.

h. ***Has any part of the site been classified as an environmentally sensitive area? If so, specify.*** See attached critical areas report for stream and wetland typing.

Environmentally sensitive areas include: 1) 100-year floodplain of East Creek, 2) streams and wetlands and their buffers, and 3) habitats associated with species of local importance (stream and riparian areas).

i. ***Approximately how many people will reside or work in the completed project?***

None.

j. ***Approximately how many people will the completed project displace?***

None.

k. ***Proposed measures to avoid or reduce displacement impacts, if any:***

Not applicable.

l. ***Proposed measures to ensure that the proposal is compatible with existing and projected land uses and plans, if any:***

Not applicable.

9. Housing

a. ***Approximately how many units will be provided, if any? Indicate whether high, middle, or low-income housing.***

Not applicable.

b. ***Approximately how many units will be eliminated, if any? Indicate whether high, middle, or low-income housing.***

Not applicable.

c. ***Proposed measures to reduce or control housing impacts, if any:***

Not applicable.

10. Aesthetics

a. ***What is the tallest height of any proposed structure, not including antennas; what is the principal exterior building material proposed?***

Not applicable.

b. ***What views in the immediate vicinity will be altered or obstructed?***

None. Aside from temporary and minor changes in vegetation structure, views will not be altered or obstructed.

c. ***Proposed measures to reduce or control aesthetic impacts, if any:***

Not applicable.

11. Light and Glare

a. ***What type of light or glare will the proposal produce? What time of day will it mainly occur?***

Not applicable.

b. ***Could light or glare from the finished project be a safety hazard or interfere with views?***

Not applicable.

c. ***What existing offsite sources of light or glare may affect your proposal?***

Not applicable.

d. ***Proposed measures to reduce or control light and glare impacts, if any:***

Not applicable.

12. Recreation

a. ***What designated and informal recreational opportunities are in the immediate vicinity?***

Designated recreational opportunities located in the immediate vicinity include Mercer Slough Park, located approximately 0.9 miles west of the project area; Kelsey Creek Park, located approximately 0.6 miles north of the project area; Richards Valley Open Space, located approximately 0.2 miles north of the project area; and Sunset Mini Park, located approximately 0.2 miles west of the project area.

b. ***Will the proposed project displace any existing recreational uses? If so, describe.***

The proposed project will not permanently displace any existing recreational uses.

c. ***Proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant, if any:***

Not applicable.

13. Historic and Cultural Preservation

a. ***Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.***

There are no known national, state, or locally listed historic sites on or next to the site.

b. ***Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.***

The project area is characterized by light industrial and commercial properties developed during the 1960s and 1970s. Historic development planning documents and existing conditions present no evidence of important cultural resources.

c. ***Proposed measures to reduce or control impacts, if any:***

Should evidence of cultural remains, either historic or prehistoric, be encountered during excavation, work in that immediate area will be suspended, and the find will be examined and documented by a professional archaeologist. Decisions regarding appropriate mitigation and further action will be made at that time.

14. Transportation

a. ***Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any:***

The proposed access to the project site will be from SE 26th Street (Kamber Road) and via 136th Avenue SE and SE 27th Place and parking lots on private property adjacent to the stream channel (Drawing C-1, Appendix B).

b. ***Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?***

Yes, the site is served by public transit. The nearest transit stop is at the intersection of SE 26th Street (Kamber Road) and Richards Road, approximately 0.08 miles (450 feet) west of the project area.

c. ***How many parking spaces will the completed project have? How many will the project eliminate?***

Not applicable.

d. ***Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).***

No new roads or streets, or improvements to existing roads or streets will be required.

e. ***Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.***

Not applicable.

f. ***How many vehicular trips per day will be generated by the completed project? If known, indicate when peak volumes will occur.***

None.

g. ***Proposed measures to reduce or control transportation impacts, if any:***

Not applicable.

15. Public Services

a. ***Will the project result in an increased need for public services (for example, fire protection, police protection, health care, schools, other)? If so, generally describe.***

No.

b. ***Proposed measures to reduce or control direct impacts on public services, if any.***

Not applicable.

16. Utilities

a. ***Check utilities currently available at the site:***

X **electricity**
X **natural gas**
X **water**
___ **refuse service**
X **telephone**
X **sanitary sewer**
___ **septic system**
___ **other:** _____

b. ***Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.***

Not applicable.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Mark Cross

Date: August 26, 2011

References

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Ecology. 2005. Stormwater Management Manual for Western Washington. Washington State Department of Ecology, Olympia, Washington. April 2005.

Herrera. 2008. Flood Control and Sediment Management Plan - Richards Creek, Sunset Creek, and East Creek Confluence Area. Prepared for the City of Bellevue by Herrera Environmental Consultants, Inc., Seattle, Washington.

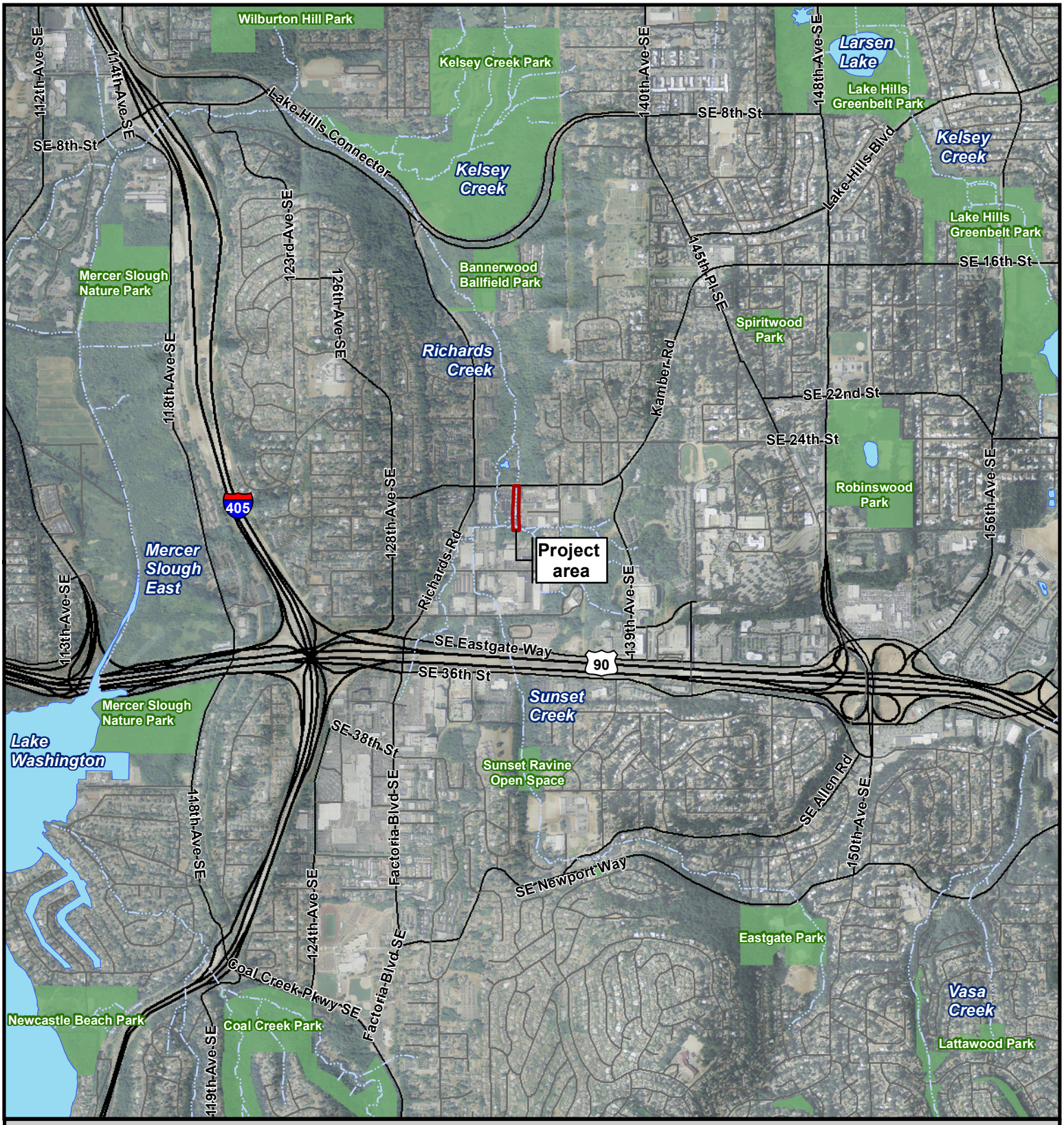
NRCS. 2010. National hydric soils list for the state of Washington. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/use/hydric/lists/state.html (accessed January 15, 2010).

Paulsen, Kit. 2007. Personal communication (field meeting with Eric Doyle, Herrera Environmental Consultants, Inc., Seattle, Washington, regarding proposed SE 30th Street/Sunset Creek Culvert Replacement Project). City of Bellevue habitat biologist. August 20, 2007.

WSDOT. 2009. WSDOT Fish Exclusion Protocols and Standards. June 25, 2009. Washington Department of Transportation. http://www.wsdot.wa.gov/NR/rdonlyres/6832EEA1-9B77-42C3-9F68-BE28C561B298/0/BA_FishHandling.pdf.

APPENDIX A

Figures



Legend

- Project area
- Stream
- Lake
- Park
- Highway

Figure 1. Vicinity map for the East Creek/ Richards Creek Fish Stream Modification Project.

N

0 1,000 2,000 4,000 Feet

HERRERA ENVIRONMENTAL CONSULTANTS

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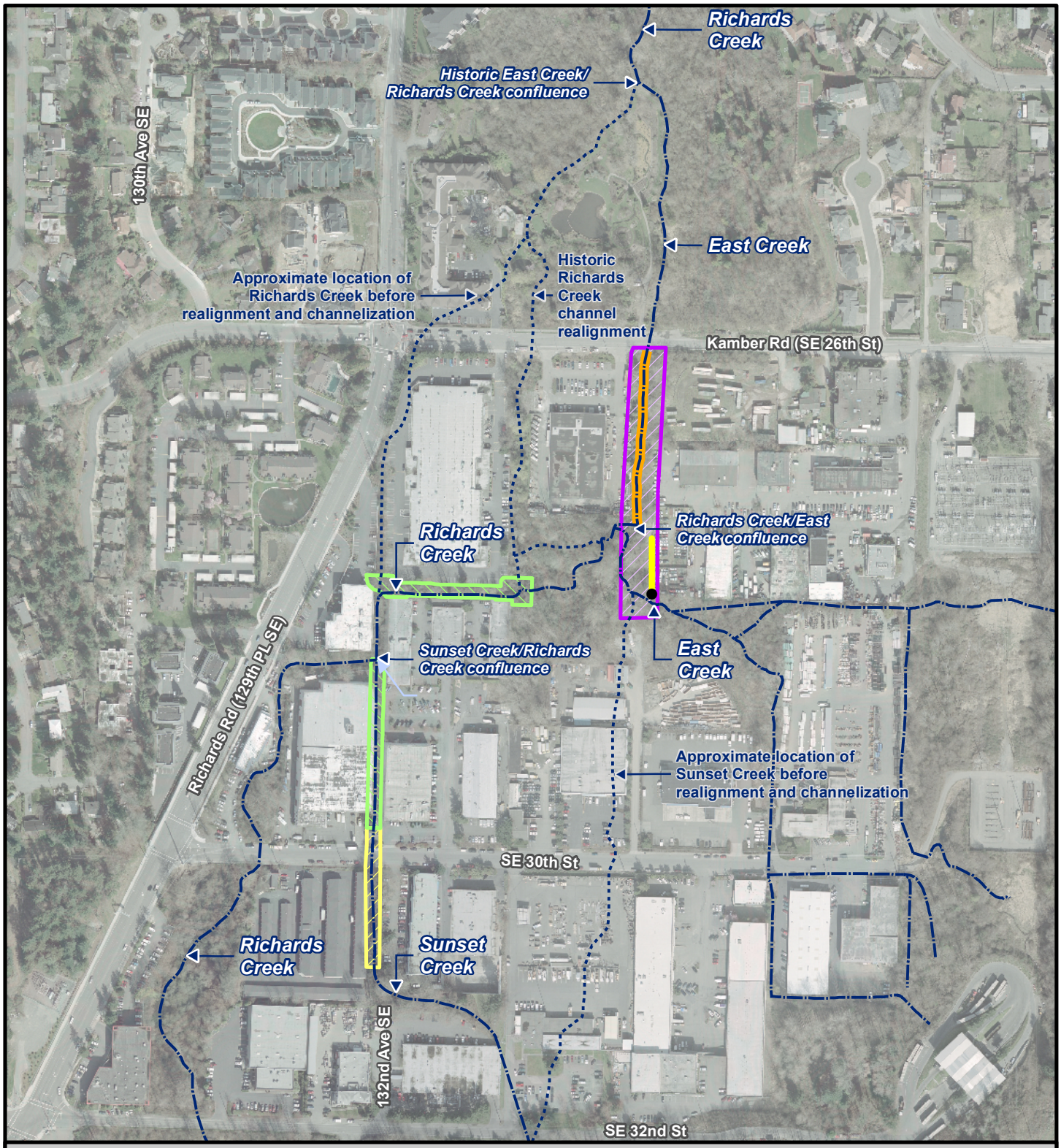


Legend

- Phase 1 project area
- Phase 2 project area
- Phase 3 project area
- Stream alignment
- Approximate historical stream alignment
- Channel improvements
- Flood control sheet pile wall
- Bank-roughening structure

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

Figure 2. Sunset, Richards, and East Creek network flood control and habitat improvement project phases and historic stream channels.

N

0 175 350 700 Feet

HERRERA ENVIRONMENTAL CONSULTANTS

Aerial photograph: City of Bellevue, 2007
Stream network: King County, 2008

K:\Projects\09-04503-000\Project\project_phases.mxd

Figure 3.
Delineated wetland and stream map for the East Creek/Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Wetland
- Ordinary high water mark
- Stream continues offsite
- Wetland continues offsite

N

0 35 70 140 Feet

HERRERA
ENVIRONMENTAL CONSULTANTS

Coordinates: NAD 83 Washington
StatePlane North (feet)
Aerial: City of Bellevue, 2007

Produced By: GIS (rdr)
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\survey_wetlands_and_stream-sepa.mxd

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

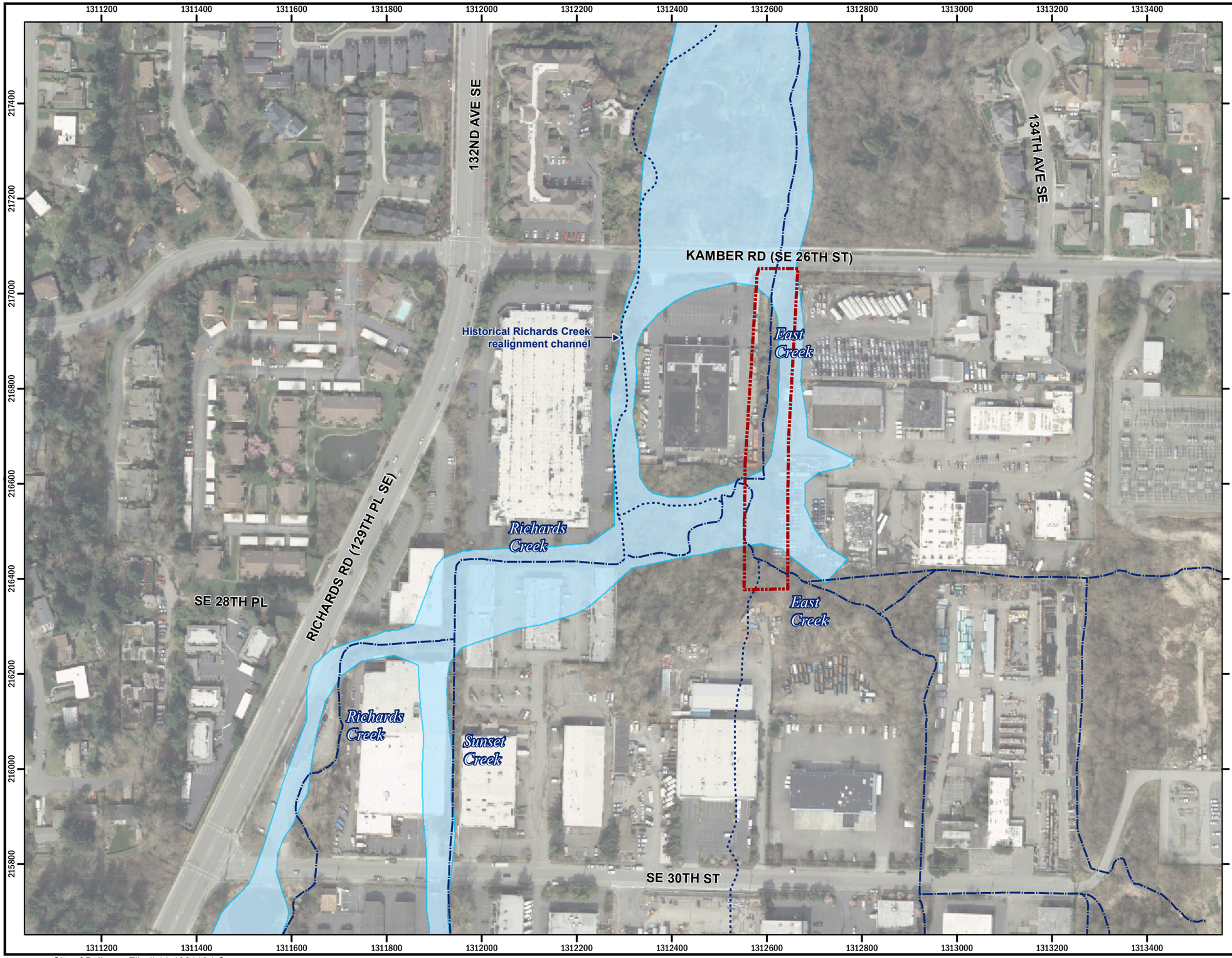


Figure 4.
Floodplain map for the East Creek/ Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Stream alignment
- Approximate historical stream alignment
- Floodplain

N

0 100 200 400 Feet

HERRERA
ENVIRONMENTAL CONSULTANTS

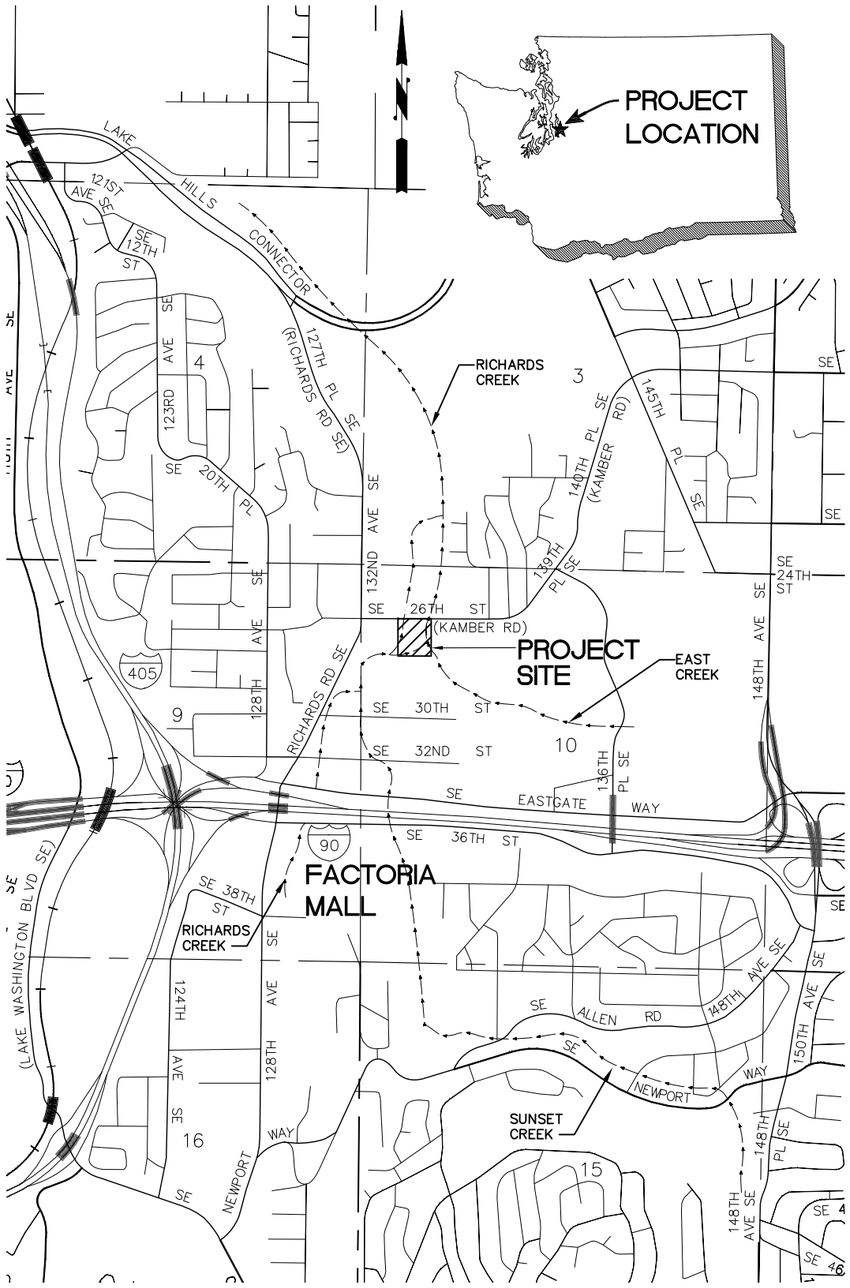
Aerial photograph: City of Bellevue, 2007
Floodplain: FEMA, 1995
Stream network: King County, 2008

Produced By: GIS
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\Floodplain_Map-phase_3-sepa.mxd

APPENDIX B

Project Engineering Plans

CITY OF BELLEVUE
EAST CREEK/RICHARDS CREEK
STREAM MODIFICATION PROJECT
BELLEVUE, WASHINGTON



VICINITY MAP
SCALE: 1"=1000'

SHEET INDEX

SHEET NO.	DWG NO.	SHEET DESCRIPTION
1	G-1	VICINITY MAP AND SHEET INDEX
2	G-2	GENERAL NOTES
3	G-3	ABBREVIATIONS AND LEGEND
4	C-1	SITE PLAN AND KEY MAP
5	C-2	SITE PREPARATION PLAN
6	C-3	UPSTREAM EAST CREEK PLAN AND PROFILE
7	C-4	DOWNSTREAM EAST CREEK PLAN AND PROFILE
8	C-5	SECTIONS
9	C-6	WOOD STRUCTURES INSTALLATION PLANS 1
10	C-7	WOOD STRUCTURES INSTALLATION PLANS 2
11	C-8	DETAILS
12	C-9	CONTROL POINT AND ALIGNMENT TABLES
13	ESC-1	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
14	ESC-2	TESC DETAILS 1
15	WM-1	FLOW DIVERSION AND FISH EXCLUSION PLAN
16	P-1	PLANTING PLAN AND SCHEDULE
17	P-2	PLANTING DETAILS

1 / C-3 — DETAIL REFERENCE NUMBER; DRAWING ON WHICH DETAIL IS SHOWN

DETAIL — SCALE: NTS — 1 / C-1 — DETAIL REFERENCE NUMBER; DRAWING FROM WHICH DETAIL WAS TAKEN

A / C-4 — SECTION REFERENCE LETTER; DRAWING ON WHICH SECTION IS SHOWN

SECTION — SCALE: NTS — A / C-2 — SECTION REFERENCE LETTER; DRAWING FROM WHICH SECTION WAS TAKEN

"–" INDICATES THAT THE DETAIL/SECTION IS SHOWN ON THE SAME SHEET

"TYP" INDICATES THAT THE DETAIL/SECTION IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED

"VAR" SPECIFIES THAT DETAIL/SECTION WAS TAKEN FROM SEVERAL DRAWINGS

NOTE AND DETAIL/SECTION REFERENCING

DATUM — NAVD 88/NAD 83

MARK EWBANK — STATE OF WASHINGTON — 29434 — REGISTERED PROFESSIONAL ENGINEER — DRAFT

ONE INCH — AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's below. Call before you dig.

60% DESIGN - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER — DATE
PROJECT MANAGER — DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

VICINITY MAP AND SHEET INDEX

DRAWING G-1 — SHT 1 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\G-1.dwg
Plot Date: 7/14/2011 12:20 PM
Cad User: Laura Turnidge

GENERAL CONSTRUCTION NOTES:

1. MATERIAL SHALL NOT BE STORED OUTSIDE OF IDENTIFIED STAGING AREAS, UNLESS APPROVED BY OWNER OR ENGINEER.
2. ALL EQUIPMENT SHALL USE ONLY BIODEGRADABLE HYDRAULIC FLUIDS.
3. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO PROJECT LIMITS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY ENGINEER.
4. CLEARING LIMITS FOR TEMPORARY ACCESS ROAD AND PROPOSED STRUCTURES SHALL BE LIMITED TO THE AREA REQUIRED FOR SAFE EQUIPMENT OPERATION. CLEARING LIMITS SHALL BE STAKED BY CONTRACTOR AND APPROVED BY ENGINEER AT LEAST 3 WORKING DAYS PRIOR TO CLEARING ACTIVITIES. CLEARING LIMITS SHALL BE STAKED TO MINIMIZE THE AREA OF DISTURBANCE.
5. CONTRACTOR SHALL PROVIDE 24 HOURS ADVANCE NOTICE TO THE ENGINEER PRIOR TO ANY REQUIRED INSPECTION.
6. CONTRACTOR SHALL SUBMIT A CONSTRUCTION SEQUENCE PLAN FOR APPROVAL AT LEAST 5 WORKING DAYS PRIOR TO SITE WORK.
7. APPROVED CONSTRUCTION SEQUENCE PLAN SHALL NOT BE ALTERED UNLESS APPROVED BY ENGINEER.
8. EQUIPMENT USED FOR THIS PROJECT SHALL BE FREE OF EXTERNAL PETROLEUM–BASED PRODUCTS WHILE WORKING AROUND THE STREAM. ACCUMULATION OF SOILS OR DEBRIS SHALL BE REMOVED FROM THE DRIVE MECHANISMS (WHEELS, TRACKS, TIRES, ETC.) AND UNDERCARRIAGE OF EQUIPMENT PRIOR TO ITS WORKING WITHIN THE CHANNEL.
9. EQUIPMENT SHALL BE CHECKED DAILY FOR LEAKS, AND ANY NECESSARY REPAIRS SHALL BE COMPLETED PRIOR TO COMMENCING WORK ACTIVITIES.
10. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT–LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE STREAM.
11. IF AT ANY TIME, AS A RESULT OF PROJECT ACTIVITIES, FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE AND WASHINGTON STATE DEPARTMENT OF ECOLOGY SHALL BE CONTACTED IMMEDIATELY BY THE ENGINEER OR BY HIS/HER DESIGNEE. WORK SHALL NOT RESUME UNTIL FURTHER APPROVAL BY OWNER'S REPRESENTATIVE.
12. EROSION AND SEDIMENTATION CONTROL METHODS SHALL BE USED TO PREVENT SILT–LADEN WATER FROM ENTERING THE CREEK. INITIAL EROSION AND SEDIMENT CONTROL MEASURES ARE SHOWN ON DRAWINGS ESC–1 AND ESC–2. THE CONTRACTOR SHALL SUBMIT A TEMPORARY EROSION AND SEDIMENT CONTROL PLAN AT LEAST 5 WORKING DAYS PRIOR TO BEGINNING SITE WORK SHOWING ADDITIONAL SITE SPECIFIC EROSION AND SEDIMENT CONTROL TECHNIQUES AND METHODS.
13. CONTRACTOR IS REQUIRED TO PLAN AND IMPLEMENT EFFECTIVE STREAM FLOW DIVERSION PER THESE PLANS AND THE CONTRACT SPECIFICATIONS.
14. CONTRACTOR IS RESPONSIBLE FOR CALLING "ONE CALL" FOR UTILITY LOCATES 72 HOURS PRIOR TO CONSTRUCTION. 1 (800) 424–5555 OR 811.
15. THE EXISTING FEATURES AS SHOWN ON THE SITE PREPARATION PLAN WERE PROVIDED BY THE CITY OF BELLEVUE AND FROM SUPPLEMENTAL FIELD WORK PERFORMED BY APS.
16. ALL DIMENSIONS SHOWN SHALL BE FIELD VERIFIED FOR FIT–UP.
17. LOCAL PROJECT BENCH MARK LOCATIONS:

LOG NOTES:

1. DECKED LOGS SHALL BE ACCESSIBLE FOR INSPECTION.
2. LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS IN A PLACE VISIBLE FOR INSPECTION PRIOR TO PLACEMENT WITH LEAD–FREE, BLAZE–ORANGE SURVEY MARKING PAINT.
3. SEE SPECIFICATIONS FOR LOG TYPE (SPECIES), DIAMETER AND LENGTH. EXCAVATIONS SHALL BE INSPECTED BY ENGINEER PRIOR TO PLACEMENT OF ANY WOOD.
4. LOG PLACEMENTS SHALL BE INSPECTED BY ENGINEER PRIOR TO BACKFILLING.

STORM DRAINAGE GENERAL PLAN NOTES:

1. ALL WORK SHALL CONFORM TO THE 2011 EDITION OF THE CITY OF BELLEVUE UTILITIES DEPARTMENT ENGINEERING STANDARDS AND THE DEVELOPER EXTENSION AGREEMENT.
3. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE EXCAVATOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN, AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. IMMEDIATELY NOTIFY THE ENGINEER IF A CONFLICT EXISTS.
5. PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO ENSURE THAT SEDIMENT OR OTHER HAZARDOUS MATERIALS DO NOT ENTER THE STORM DRAINAGE SYSTEM IN ACCORDANCE WITH THE SITES APPROVED CSWPPP. FOR ALL CONSTRUCTION DURING THE RAINY SEASON, DOWNHILL BASINS AND INLETS MUST BE PROTECTED WITH CATCH BASIN INSERTS. SIMPLY PLACING FILTER FABRIC UNDER THE GRATE IS NOT ACCEPTABLE.
6. PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF STORM DRAINAGE WORK, PIPES AND STORM DRAIN STRUCTURES SHALL BE CLEANED AND FLUSHED. ANY OBSTRUCTIONS TO FLOW WITHIN THE STORM DRAIN SYSTEM, (SUCH AS RUBBLE, MORTAR AND WEDGED DEBRIS), SHALL BE REMOVED AT THE NEAREST STRUCTURE. WASH WATER OF ANY SORT SHALL NOT BE DISCHARGED TO THE STORM DRAIN SYSTEM OR SURFACE WATERS.

22. CALL 1–800–424–5555, OR 8–1–1, 72 HOURS BEFORE CONSTRUCTION FOR UTILITY LOCATES.

24. CLEARLY LABEL PUBLIC AND PRIVATE SYSTEMS ON THE PLANS. PRIVATE SYSTEMS SHALL BE MARKED PRIVATE AND SHALL BE MAINTAINED BY THE PROPERTY OWNER(S).

30. SURFACE RESTORATION OF EXISTING ASPHALT PAVEMENT SHALL BE AS REQUIRED BY THE RIGHT–OF WAY USE PERMIT.

32. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT NO CONFLICTS EXIST BETWEEN STORM DRAINAGE LINES AND PROPOSED OR EXISTING UTILITIES PRIOR TO CONSTRUCTION.

33. BEFORE COMMENCEMENT OF TRENCHING, THE CONTRACTOR SHALL PROVIDE FILTER FABRIC FOR ALL DOWNHILL STORM DRAIN INLETS AND CATCH BASINS, WHICH WILL RECEIVE RUNOFF FROM THE PROJECT SITE. THE CONTRACTOR SHALL PERIODICALLY INSPECT THE CONDITION OF ALL FILTER FABRIC AND REPLACE AS NECESSARY.

34. MINIMUM COVER OVER STORM DRAINAGE PIPE SHALL BE 2 FEET, UNLESS OTHERWISE SHOWN.

36. AT POINTS WHERE EXISTING THRUST BLOCKING IS FOUND, MINIMUM CLEARANCE BETWEEN CONCRETE BLOCKING AND OTHER BURIED UTILITIES OR STRUCTURES SHALL BE 5 FEET.

37. WHEN WORK IS TO OCCUR IN EASEMENTS, THE CONTRACTOR SHALL NOTIFY THE EASEMENT GRANTOR AND BELLEVUE UTILITIES IN WRITING A MINIMUM OF 48 HOURS IN ADVANCE OF BEGINNING WORK (NOT INCLUDING WEEKENDS OR HOLIDAYS). FAILURE TO NOTIFY GRANTOR AND BELLEVUE UTILITIES WILL RESULT IN A STOP WORK ORDER BEING POSTED UNTIL THE MATTER IS RESOLVED TO THE SATISFACTION OF BELLEVUE UTILITIES. A WRITTEN RELEASE FROM THE EASEMENT GRANTOR SHALL BE FURNISHED TO THE UTILITIES INSPECTOR PRIOR TO PERMIT SIGNOFF.

38. THE CONTRACTOR SHALL RESTORE THE RIGHT–OF–WAY AND EXISTING PUBLIC STORM DRAINAGE EASEMENT(S) AFTER CONSTRUCTION TO A CONDITION EQUAL OR BETTER THAN CONDITION PRIOR TO ENTRY. THE CONTRACTOR SHALL FURNISH A SIGNED RELEASE FROM ALL AFFECTED PROPERTY OWNERS AFTER RESTORATION HAS BEEN COMPLETED.

UTILITIES AND AGENCIES

CITY OF BELLEVUE

ABE SANTOS – PROJECT MANAGER

450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452–6456

EMAIL: ASANTOS@BELLEVUEWA.GOV

KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, WASTEWATER TREATMENT DIVISION

SUSAN MICHAUD

201 S. JACKSON ST, MAIL STOP KSC–NR–0508
SEATTLE, WA 98104–3855

(206) 684–1311
FAX: (206) 684–1710
SUSAN.MICHAUD@KINGCOUNTY.GOV

BELLEVUE WATER DISTRICT #1

DON MCQUILLIANY
(425) 452–7865

BELLEVUE FIRE DEPARTMENT

NON–EMERGENCY GENERAL
(425) 452–6892

FIRE PREVENTION PLAN REVIEW DESK
(425) 452–4122

BELLEVUE POLICE DEPARTMENT

(425) 452–6917

CITY OF BELLEVUE – TRANSPORTATION DEPARTMENT

RON KESSACK
450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452–4631

EMAIL: RKESSACK@BELLEVUEWA.GOV

PUGET SOUND ENERGY (PSE CONSTRUCTION)

KELLY PURNELL – MUNICIPAL CONSTRUCTION PLANNER

P.O. BOX 97034
MAIL STOP: EST–11W
BELLEVUE, WA 98009–9734

(425) 462–3488
EMAIL: KELLY.PURNELL@PSE.COM

COMCAST (FORMERLY AT&T BROADBAND)

JILL LOOK

1525 75TH ST. SW, SUITE 200
EVERETT, WA 98203

(425) 263–5346
FAX: (425) 263–5352
MOBILE: (206) 396–6032
EMAIL: JILL_LOOK@CABLE.COMCAST.COM

QWEST (US WEST COMMUNICATIONS)

VERN SAXTON

1550 NEWPORT WAY NW, ROOM #2
ISSAQUAH, WA 98027

(206) 345–1177
EMAIL: VERN.SAXTON@QWEST.COM

ONE CALL

UTILITY LOCATION
(800) 424–5555 OR 811

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MARK EWBANK STATE OF WASHINGTON 49434 REGISTERED PROFESSIONAL ENGINEER
DRAFT

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NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

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Seattle, Washington
98121-1820
206-441-9080
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http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER DATE
PROJECT MANAGER DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

GENERAL NOTES

DRAWING G-2 SHT 2 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\G-2.dwg
Plot Date: 7/14/2011 12:21 PM Cad User: Laura Turnidge

ABBREVIATIONS:

AC	ASPHALT CONCRETE
APPROX	APPROXIMATE(LY)
CDF	CONTROLLED DENSITY FILL
CIP	CAST IN PLACE
COB	CITY OF BELLEVUE
CONC	CONCRETE
CMP	CORRUGATED METAL PIPE
CP	CONTROL POINT
DBH	DIAMETER AT BREAST HEIGHT
DI	DUCTILE IRON
DIA, ø	DIAMETER
DWG	DRAWING
EL	ELEVATION
ESC	EROSION AND SEDIMENT CONTROL
EX	EXISTING
FAC	FACULTATIVE
FACU	FACULTATIVE UPLAND
FACW	FACULTATIVE WETLAND
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
FT	FEET
HMA	HOT MIX ASPHALT
HVF	HIGH VISIBILITY FENCE
IE	INVERT ELEVATION
IN	INCHES
KC	KING COUNTY
LWD	LARGE WOODY DEBRIS
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
NI	NO INDICATOR
NO.	NUMBER
NTS	NOT TO SCALE
OHP	OVERHEAD POWER LINE
OHWL	ORDINARY HIGH WATER LINE
PC	PRECAST CONCRETE
PL	PROPERTY LINE
PSE	PUGET SOUND ENERGY
SDCB	STORM DRAIN CATCH BASIN
SDMH	STORM DRAIN MANHOLE
SP	STANDARD PLAN
SS	STAINLESS STEEL
SSMH	SANITARY SEWER MANHOLE
STA	STATION
TEL	TELEPHONE
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TYP	TYPICAL
UGP	UNDERGROUND POWER LINE
UGT	UNDERGROUND TELEPHONE LINE
UPL	OBLIGATE UPLAND
VAR	VARIOUS
W/IN	WITHIN
WSDOT	WASHINGTON DEPARTMENT OF TRANSPORTATION

LEGEND:

- EXISTING BUILDING
- EXISTING CURB
- 72 — EXISTING CONTOURS
- EXISTING R.O.W.
- EXISTING BANK SLOPE
- OHP — EXISTING OVERHEAD POWER LINE
- UGP — EXISTING UNDERGROUND POWER LINE
- W — EXISTING WATER LINE
- G — EXISTING GAS LINE
- SD — EXISTING STORM DRAINAGE
- S — EXISTING SANITARY SEWER
- EXISTING CHAIN LINK FENCE
- EXISTING SHEET METAL FENCE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM DRAIN MANHOLE
- T — EXISTING TELEPHONE J-BOX
- P — EXISTING POWER VAULT
- EXISTING GAS METER
- EXISTING FIRE DEPT CONNECTION
- EXISTING POWER POLE
- EXISTING POWER TRANSFORMER
- EXISTING TREES
- EXISTING BOULDERS
- EXISTING WETLANDS
- EXISTING GRADE
- EXISTING ORDINARY HIGH WATER LINE
- EXISTING PROPERTY LINE
- PERMANENT CONSTRUCTION EASEMENT LINE
- TEMPORARY CONSTRUCTION EASEMENT LINE
- 55 — PROPOSED CONTOURS
- CREEK FLOW LINE
- TEMPORARY PORTABLE CHAIN LINK FENCE
- SILT FENCE
- HVF — HIGH VISIBILITY FENCE
- EXCAVATION LIMITS
- COIR WRAP
- DIVERTED FLOW DIRECTION
- PROPOSED AVERAGE GRADE
- CLEAR AND GRUB AREA
- STREAMBED SEDIMENT
- STREAMBED COBBLE
- EXISTING GROUND
- TEMPORARY STREAM ACCESS ROAD
- EXCAVATED ALLUVIUM
- STAGING AREA
- SEEDING AREAS
- STORM DRAIN INLET PROTECTION
- 1+00 — CHANNEL THALWEG STATIONING (FT)
- PROPOSED DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE PROTECTED
- NEW STEEL SHEET PILE WALL
- NEW PRIVACY FENCE
- P — FLOW BY-PASS PUMP
- BULK BAGS
- STREAMBED COBBLES
- LOGS WITH ROOTWAD
- LOGS WITHOUT ROOTWAD
- LOGS WITH ROOTWAD BURIED
- LOGS WITHOUT ROOTWAD BURIED
- LOG SECTION
- ROOTWAD SECTION
- VEGETATION
- # — LOG IDENTIFICATION #
- CP # — LOG CONTROL POINT AND NUMBER
- DUCK BILL ANCHOR
- LARGE GRADE CONTROL STRUCTURE (PROFILE)
- SMALL GRADE CONTROL STRUCTURE (PROFILE)
- PLUNGE POOL
- VERTICAL LOG PIN (PLAN)
- CHAIN TO ECOLOGY BLOCK OR CABLE TO DUCKBILL ANCHOR
- ACCESS ROUTE FROM PUBLIC ROADWAY TO PROJECT AREA
- 1B-1 — STRUCTURE # / SMALL GRADE CONTROL STRUCTURE TYPE

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PROJECT MANAGER DATE

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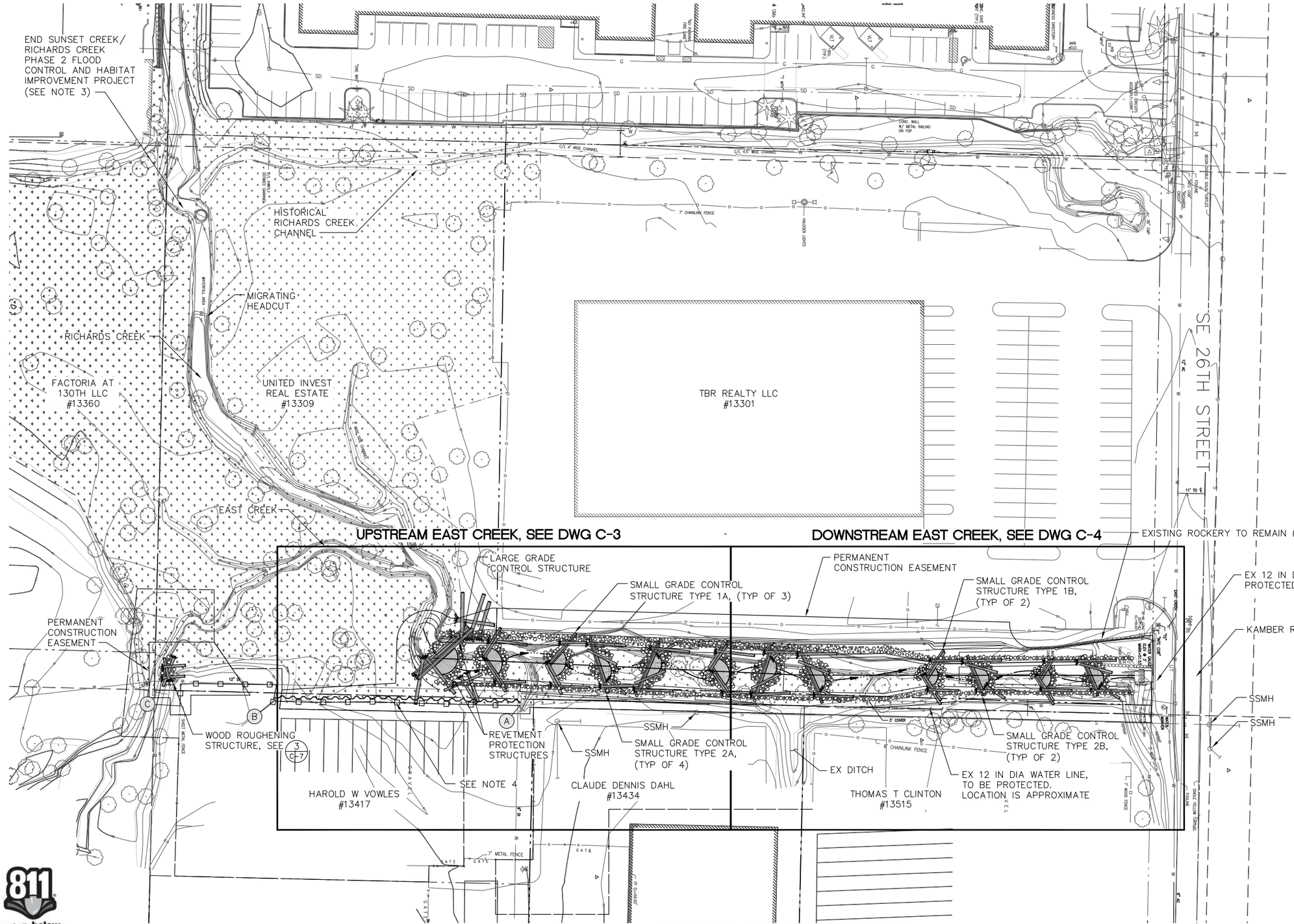
City of Bellevue UTILITIES

ABBREVIATIONS AND LEGEND

DRAWING G-3 SHT 3 OF 17



NOTES:

1. SEE DRAWING C-2 FOR SITE PREPARATION PLAN.
2. EXCAVATION LIMITS TO MAINTAIN A MINIMUM 4 FOOT SETBACK FROM EXISTING ROCKERIES, AS NOTED IN PLANS.
3. SUNSET CREEK/RICHARDS CREEK PROJECT IS SCHEDULED FOR CONSTRUCTION SUMMER 2012.
4. INSTALL APPROXIMATELY 150 LF OF NEW STEEL SHEET PILE WALL BETWEEN POINTS A AND B. INSTALL APPROXIMATELY 233 LF OF NEW PRIVACY FENCE BETWEEN POINTS A AND C. ALL FENCE AND WALL CONSTRUCTION TO BE COMPLETED FROM THE PAVED PARKING LOT ON THE EAST SIDE OF THE EXISTING SHEET METAL FENCE. NEW SHEET PILE WALL SHALL BE ALIGNED 2 FOOT WESTWARD OF NEW PRIVACY FENCE. NEW PRIVACY FENCE SHALL BE INSTALLED ALONG SAME ALIGNMENT AS EXISTING SHEET METAL FENCE WITH PROPERTY OWNER APPROVED EQUAL.

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City of Bellevue UTILITIES

SITE PLAN AND KEY MAP

DRAWING C-1 — SHT 4 OF 17

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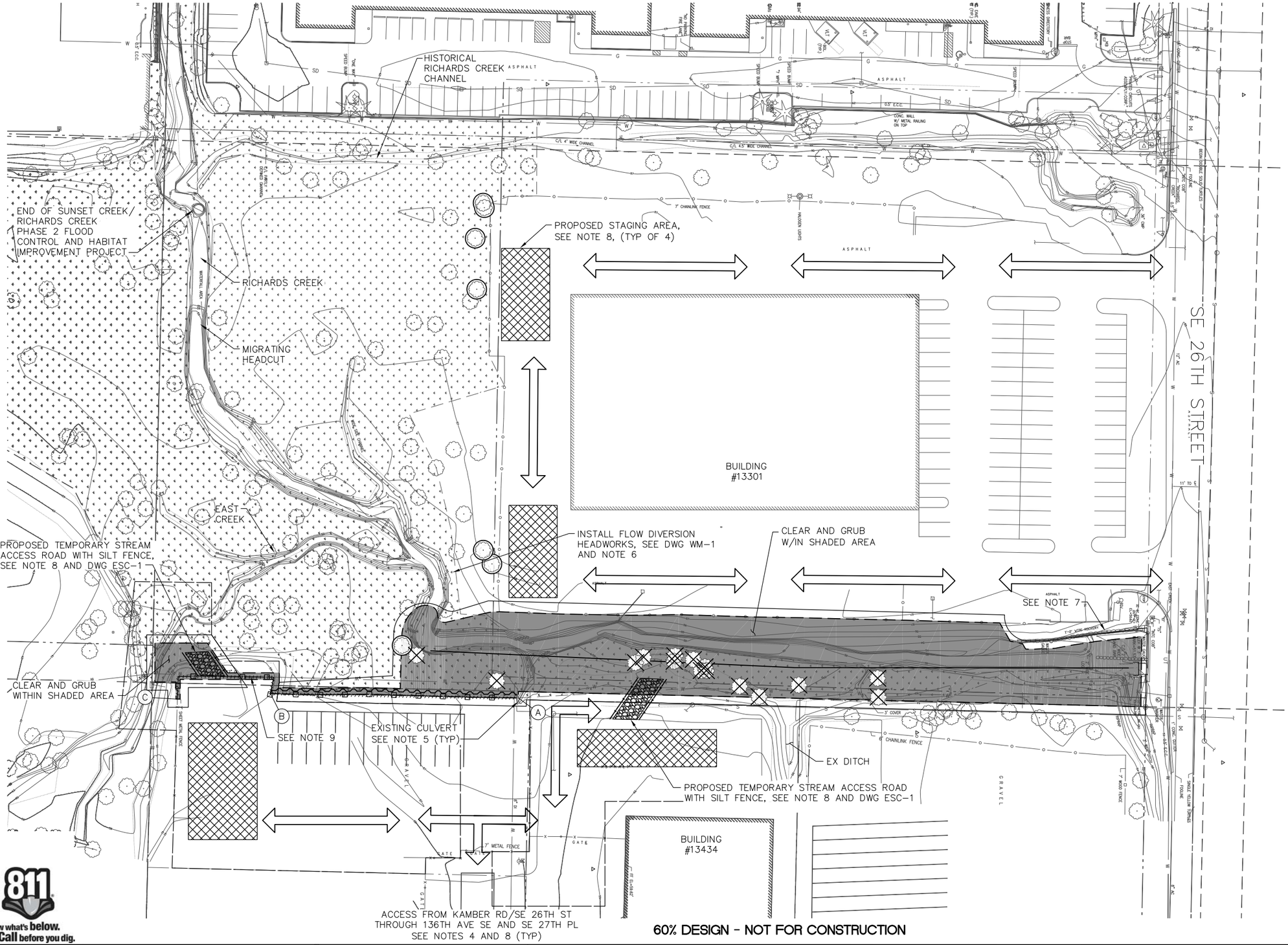

30 0 30 60
1"=30'

NOTES:

1. CONTRACTOR SHALL FENCE THE PERIMETER OF THE CHANNEL CONSTRUCTION ZONE WITH HIGH VISIBILITY FENCE, PER WDSOT STANDARD PLAN I-10.10-1 PRIOR TO COMMENCEMENT OF ANY CHANNEL CONSTRUCTION ACTIVITIES.
2. PRIOR TO ANY CLEARING OR GRUBBING THE CONTRACTOR SHALL INSTALL TREE PROTECTION FOR ALL TREES DESIGNATED/FLAGGED BY THE CITY OF BELLEVUE TO REMAIN. TREE PROTECTION SHALL CONSIST OF ¾" 4'X4' PLYWOOD BOXES CENTERED ON THE TRUNK OF THE TREE OR APPROVED EQUAL.
3. EXISTING PARKING LOT CURBS AND PAVEMENT USED FOR ACCESS SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. THE CONTRACTOR SHALL RESTORE ANY AREAS DISTURBED DURING CONSTRUCTION TO THEIR ORIGINAL APPROXIMATE CONDITION.
4. CONTRACTOR SHALL NOT BLOCK BUILDING EGRESS.
5. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF, AND DURING, CONSTRUCTION ACTIVITIES UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
6. CONTRACTOR SHALL NOT DISTURB EXISTING WOODY DEBRIS, VEGETATION, OR CHANNEL HABITAT UPSTREAM OF THE FLOW DIVERSION HEADWORKS.
7. CONTRACTOR SHALL NOT DISTURB RETAINING WALL ROCKERY LOCATED ON TBR BUILDING PROPERTY NEAR BUILDING #13301.
8. STAGING AREAS AND ACCESS ROUTES SHOWN ARE THE MINIMUM NECESSARY TO COMPLETE CONSTRUCTION. ENGINEER SHALL APPROVE ANY ALTERNATE LOCATIONS AND ROUTES PROPOSED BY THE CONTRACTOR PRIOR TO THEIR USE.
9. REMOVE APPROXIMATELY 233 LF OF EXISTING SHEET METAL FENCE BETWEEN POINTS A AND C. ALL FENCE REMOVAL WORK AND WALL CONSTRUCTION TO BE COMPLETED FROM THE PAVED PARKING LOT ON THE EAST SIDE OF THE EXISTING SHEET METAL FENCE.

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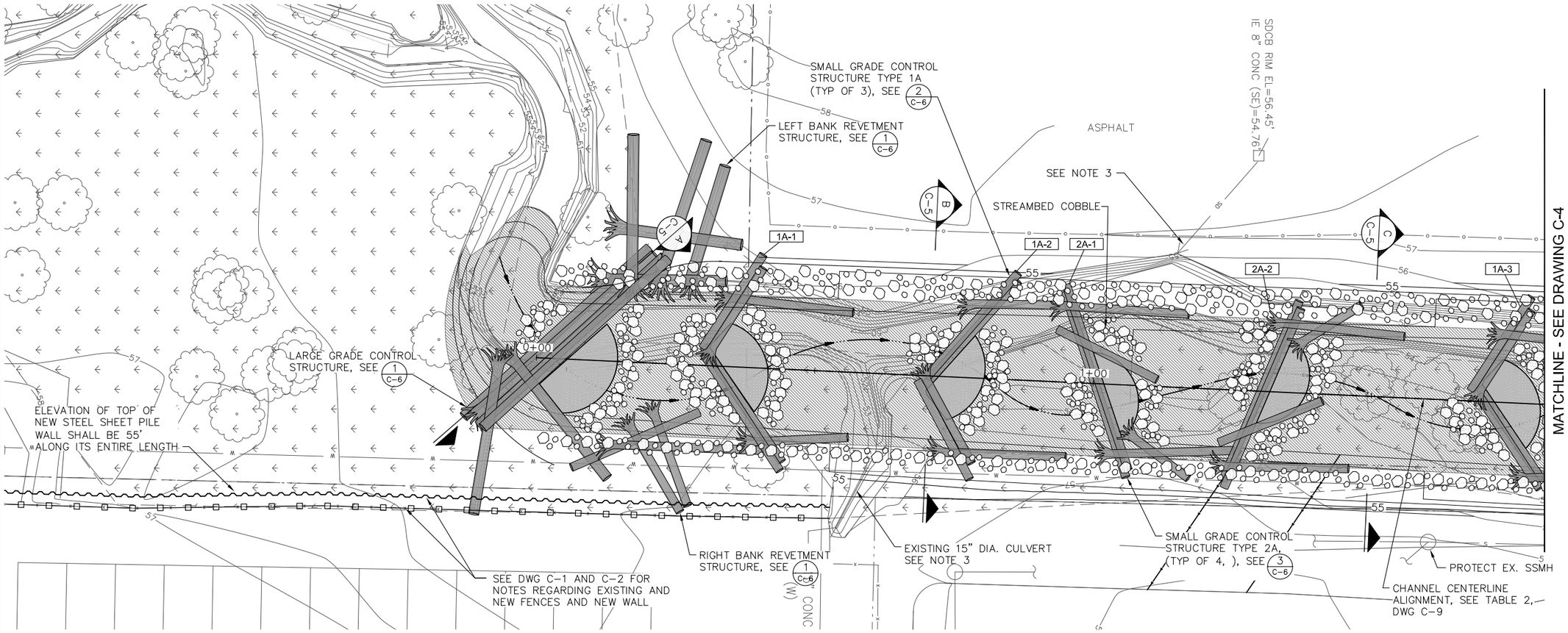
City of Bellevue
UTILITIES

SITE PREPARATION PLAN

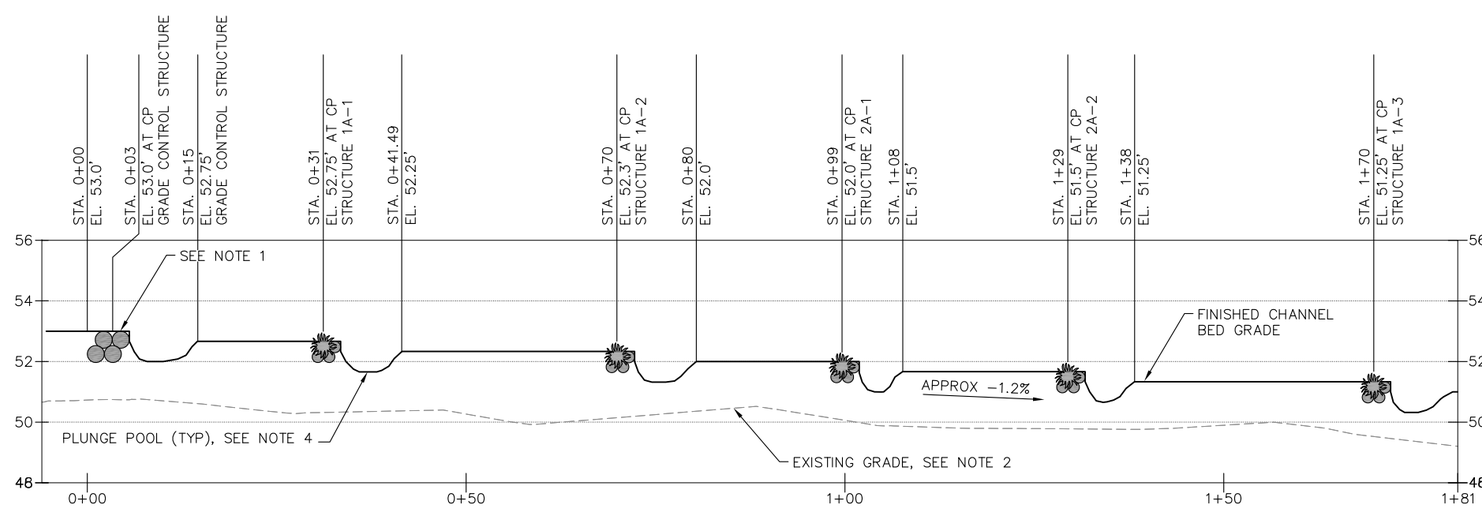
DRAWING C-2 | SHT 5 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-2.dwg
Plot Date: 7/14/2011 12:21 PM
Cad User: Laura Turnidge



NOTES:

1. PROPOSED GRADING TO TIE IN AT APPROX CONSTRUCTION STATIONING 0+00 AND ELEVATION 53.0 FT.
2. EXISTING CHANNEL GRADE SHOWN ON PROFILE IS BASED ON EXISTING CHANNEL CENTERLINE. EXISTING CHANNEL CENTERLINE HAS BEEN UPDATED TO MATCH PROPOSED CHANNEL STATIONING.
3. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF AND DURING CONSTRUCTION ACTIVITIES, UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
4. ALL PLUNGE POOLS SHALL BE OVEREXCAVATED 12" AND BACKFILLED WITH 12" THICKNESS OF STREAMBED COBBLES IN BOTTOM OF POOL.
5. BERM ALIGNMENT STATION 0+00 IS OFFSET 24 FT EAST OF CHANNEL ALIGNMENT STATION 0+52. BERM ALIGNMENT STATION PROGRESSES RIGHT TO LEFT STARTING WITH STATION 0+00.
6. UNSURVEYED STORM DRAIN OUTFALLS MAY BE PRESENT IN PROJECT LIMITS.
7. SEE DWG C-5, C-6, AND C-7 FOR LOCATION OF STRUCTURE CONTROL POINTS ON THE LARGE AND SMALL GRADE CONTROL STRUCTURES.



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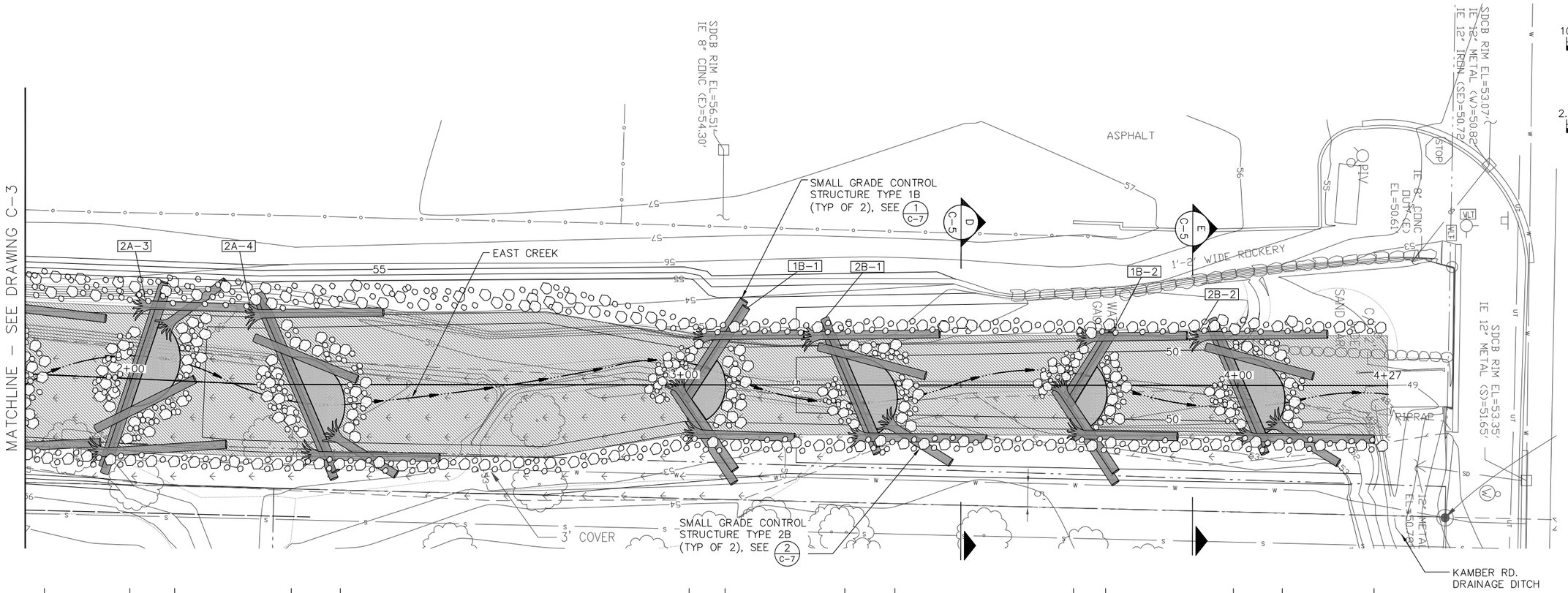
City of Bellevue UTILITIES

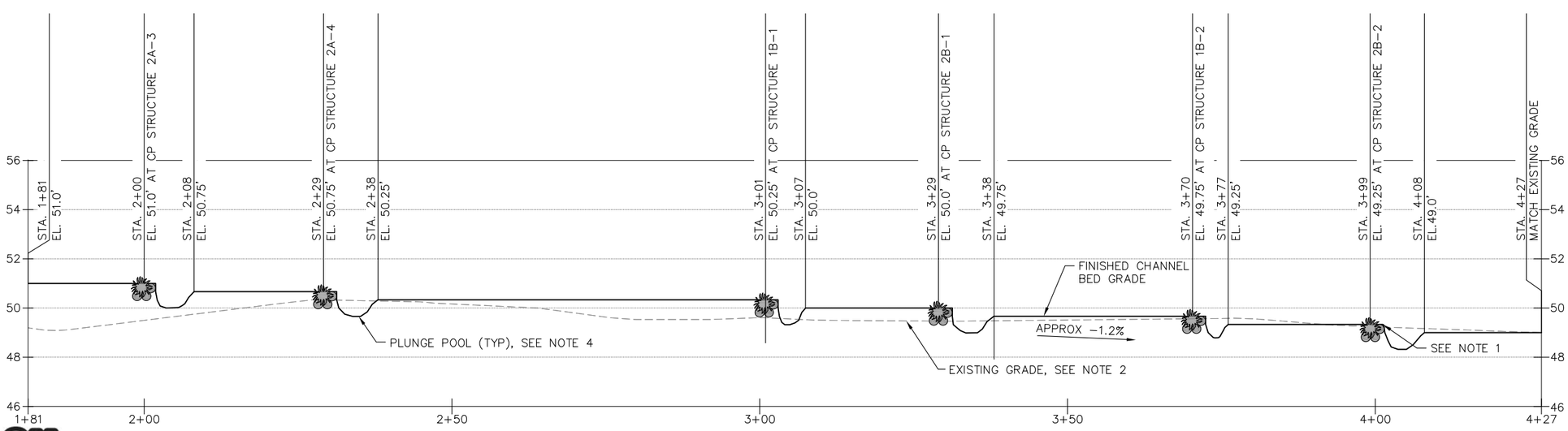
UPSTREAM EAST CREEK PLAN AND PROFILE

DRAWING C-3 SHT 6 OF 17



HORIZONTAL SCALE
10 0 10 20
1"=10'

VERTICAL SCALE
2.5 0 2.5 5
1"=2.5'



NOTES:

1. END GRADING AT STA 4+27 AND APPROX ELEVATION 49.0 FT.
2. EXISTING CHANNEL GRADE IS BASED ON EXISTING CHANNEL CENTERLINE. EXISTING CHANNEL CENTERLINE HAS BEEN UPDATED TO MATCH PROPOSED CHANNEL STATIONING.
3. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF AND DURING CONSTRUCTION ACTIVITIES, UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
4. ALL PLUNGE POOLS SHALL BE OVEREXCAVATED 12" AND BACKFILLED WITH 12" THICKNESS OF STREAMBED COBBLES IN BOTTOM OF POOL.
5. UNSURVEYED STORM DRAIN OUTFALLS MAY BE PRESENT IN PROJECT LIMITS.

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City of Bellevue UTILITIES

DOWNSTREAM EAST CREEK PLAN AND PROFILE

DRAWING C-4 SHT 7 OF 17

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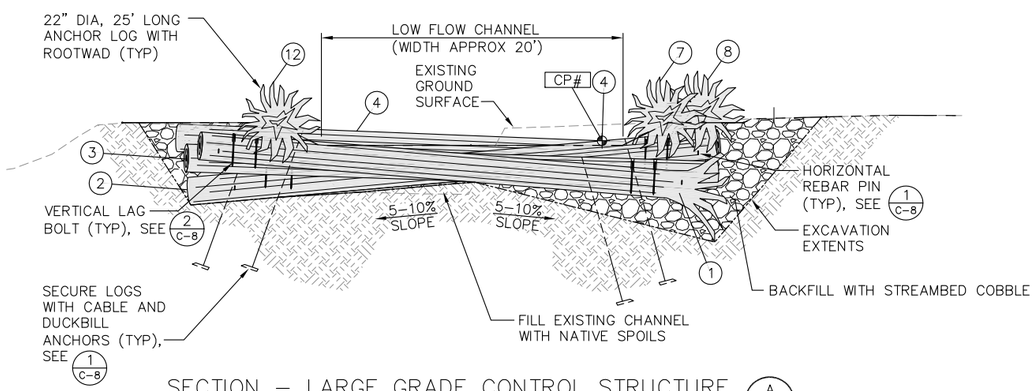
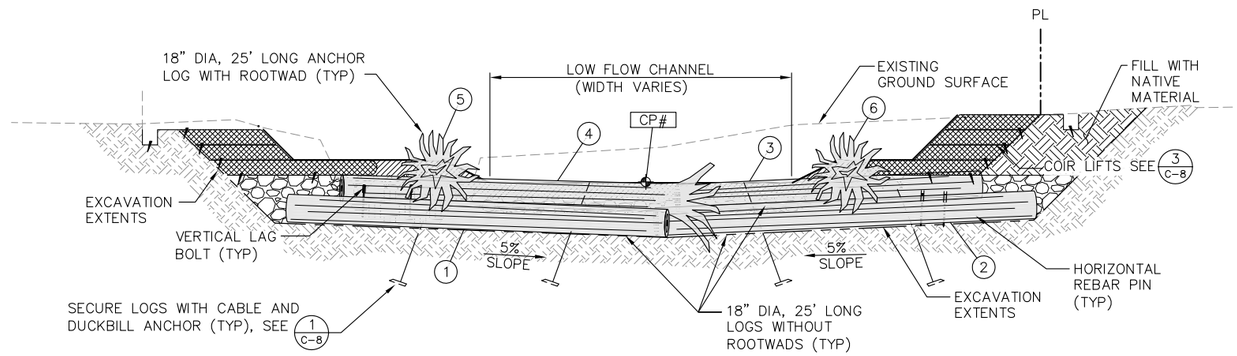
NOTES:

1. WHERE TOP TWO COIR WRAP LIFTS COME WITHIN 4 FEET OF BUILDINGS, CURB, OR PERMANENT ROCKERIES, INSTALLATION AND STAKING REQUIREMENTS TO BE PROVIDED BY THE ENGINEER.
2. TAPER LOW FLOW CHANNEL WIDTH FROM 20' TO 10' BETWEEN STA 2+75 AND 3+00.



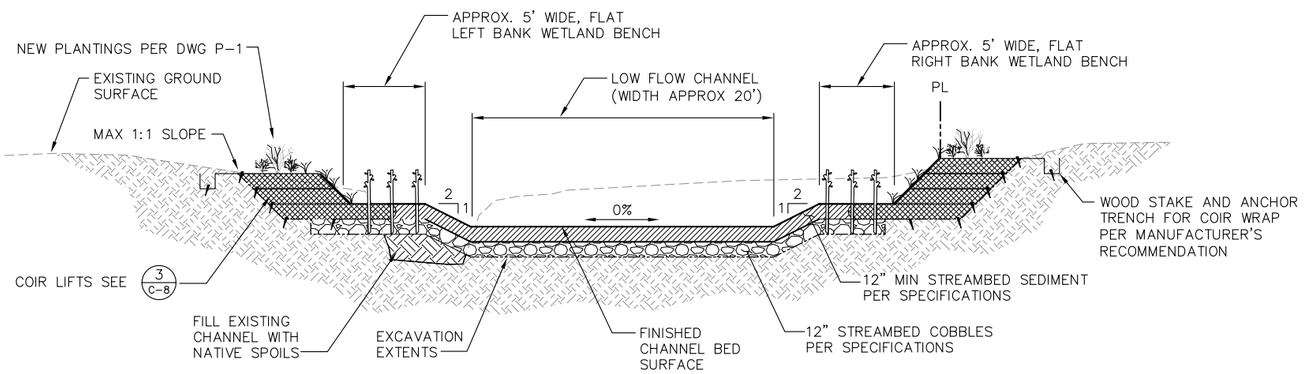
SECTION – LARGE GRADE CONTROL STRUCTURE (A / C-3,C-6)

SCALE: 1"=5'



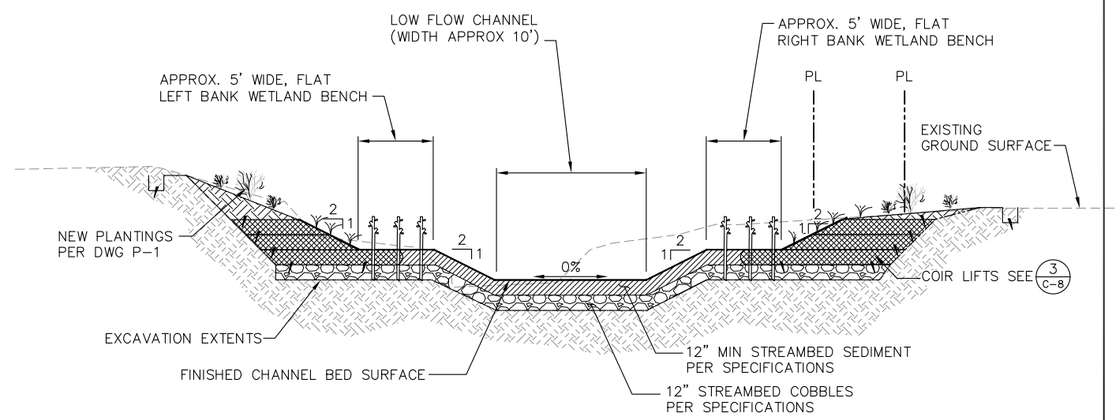
SECTION – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPES 1A AND 1B (B / C-3, C-4)

SCALE: 1"=5'



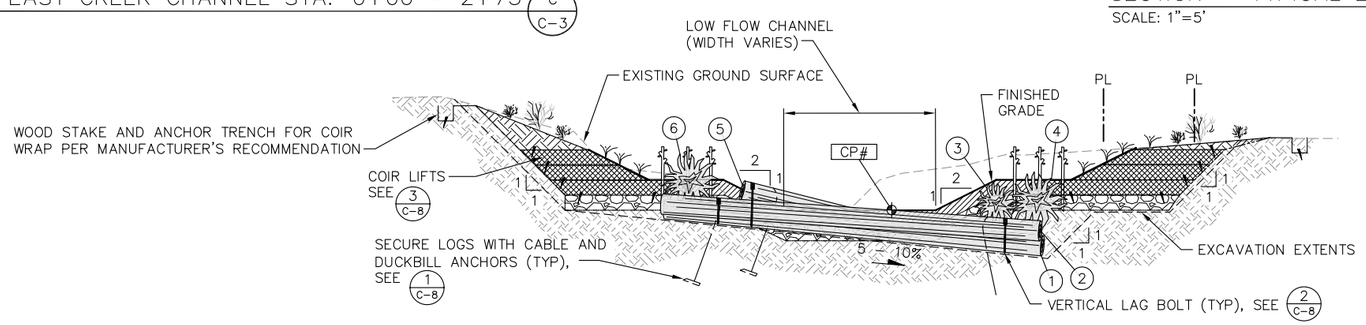
SECTION – TYPICAL EAST CREEK CHANNEL STA: 0+00 – 2+75 (C / C-3)

SCALE: 1"=5'



SECTION – TYPICAL EAST CREEK CHANNEL STA: 3+00 – 4+27 (D / C-4)

SCALE: 1"=5'



SECTION – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPES 2A AND 2B (E / C-3, C-4)

SCALE: 1"=5'

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				East Creek/Richards Creek Stream Channel Improvements

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2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER — DATE

PROJECT MANAGER — DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

SECTIONS

DRAWING C-5 — SHT 8 OF 17

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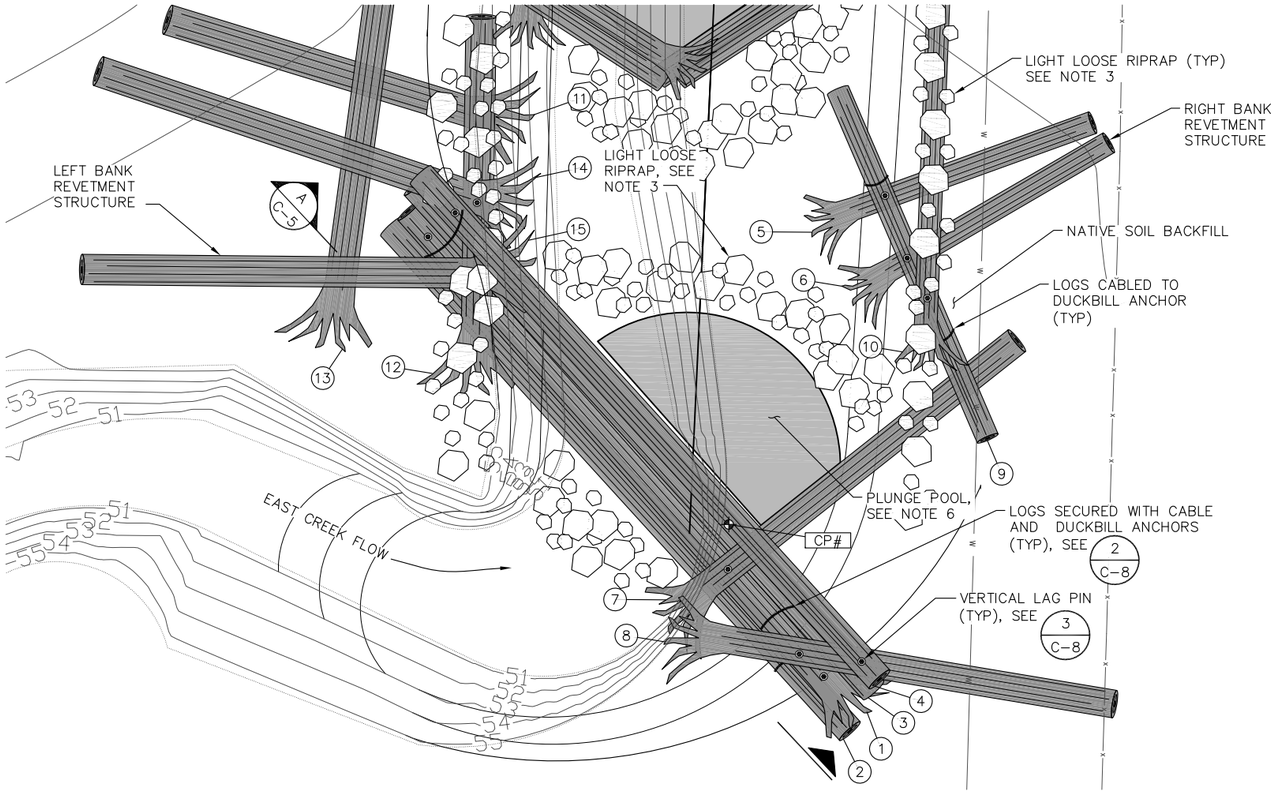
Plot Date: 7/14/2011 12:21 PM



PLAN – LARGE GRADE CONTROL STRUCTURE & LEFT & RIGHT BANK REVETMENT STRUCTURES (1 / C-3)

SCALE: 1" = 5'

LOG TABLE – LARGE GRADE CONTROL STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	22	45	YES
2	22	45	NO
3	22	45	NO
4	22	45	NO
7	24	25	YES
8	18	20	YES
12	22	25	YES

LOG TABLE – RIGHT BANK REVETMENT STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
5	22	30	YES
6	22	30	YES
9	18	20	YES
10	18	30	YES

LOG TABLE – LEFT BANK REVETMENT STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
11	18	25	YES
13	24	30	YES
14	24	30	YES
15	24	25	YES

LOG TABLE –SMALL GRADE CONTROL STRUCTURE TYPE 1A STA: 0+00 TO 3+00

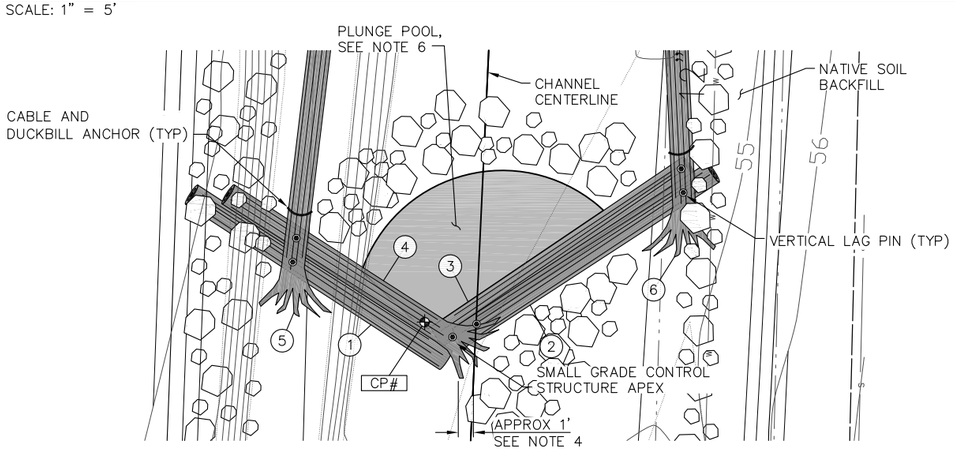
LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	25	NO
2	18	25	NO
3	18	25	NO
4	18	20	YES
5	18	25	YES
6	18	20	YES

LOG TABLE – SMALL GRADE CONTROL STRUCTURE TYPE 2A STA: 0+00 TO 3+00

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	35	NO
2	18	35	NO
3	18	15	YES
4	18	25	YES
5	18	20	NO
6	18	25	YES

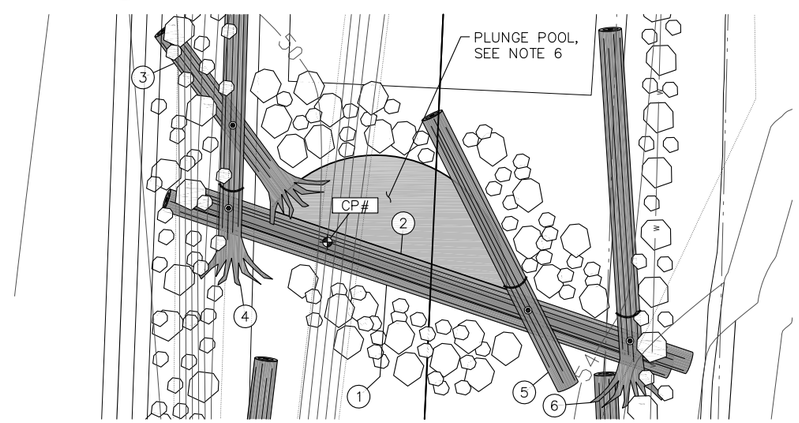
NOTES:

1. CONTRACTOR SHALL MINIMIZE EXCAVATION INTO EXISTING BANK. MATERIAL EXCAVATED TO PLACE LOGS CAN BE REUSED ON REGRADED BANKS. CONTRACTOR SHALL PUSH LOGS INTO BANK USING EXCAVATOR WHEREVER POSSIBLE TO MINIMIZE EXCAVATION.
2. LOG IDENTIFICATION NUMBERS REPRESENT AN ORDER OF PLACEMENT/INSTALLATION. CORRESPONDING LOG DIMENSIONS SHOWN IN THE LOG SCHEDULE TABLE.
3. LIGHT LOOSE RIPRAP SHALL BE PLACED AND BURIED AMIDST THE INTERLOCKED LOGS AS DIRECTED BY THE ENGINEER.
4. SMALL GRADE CONTROL STRUCTURE TYPE A APEXES ARE OFFSET 1.0' TO THE SIDE OF THE CHANNEL CENTERLINE. THE SIDE TO WHICH A GRADE CONTROL STRUCTURE IS OFFSET OF THE CENTERLINE IS OPPOSITE THE STRUCTURES UPSTREAM AND DOWNSTREAM OF IT.
5. LOG #5 IN SMALL GRADE CONTROL STRUCTURE TYPE 2A TO BE SET AND BURIED IN CHANNEL BOTTOM AT ONE END AS DIRECTED BY THE ENGINEER.
6. PLUNGE POOL TO BE EXCAVATED TO APPROXIMATE DIMENSIONS SHOWN ON PLAN AND IN PROFILES ON DWGS. C–3 AND C–4.



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 1A 0+00–3+00 (2 / C-3)

SCALE: 1" = 5'



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 2A 0+00–3+00 (3 / C-3)

SCALE: 1" = 5'

Know what's below. Call before you dig.

60% DESIGN - NOT FOR CONSTRUCTION

NAVD 88/NAD 83

DRAFT

ONE INCH — AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

NO	DATE	BY	APPR	REVISIONS

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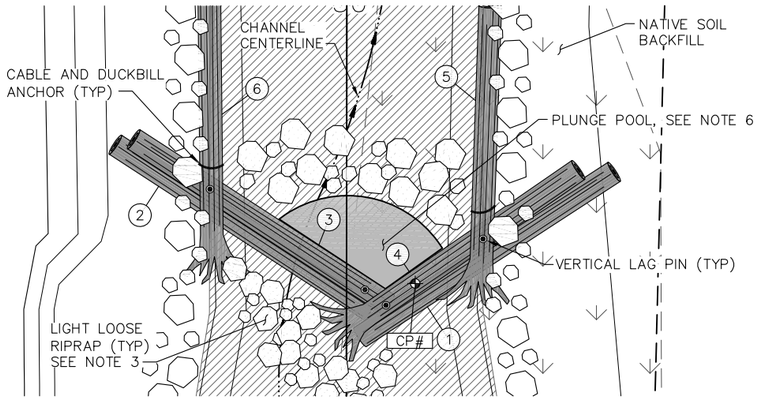
City of Bellevue UTILITIES

WOOD STRUCTURES INSTALLATION PLANS 1

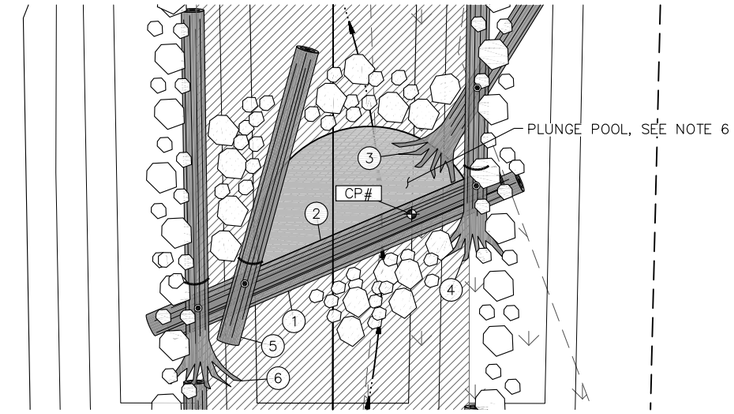
DRAWING C-6 — SHT 9 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C6.dwg
Plot Date: 7/14/2011 12:22 PM
Cad User: Laura Turnidge



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 1B 3+00–4+27 (1 / C–4)

SCALE: 1" = 5'



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 2B 3+00–4+27 (2 / C–4)

SCALE: 1" = 5'

LOG TABLE –SMALL GRADE CONTROL STRUCTURE TYPE 1B STA: 3+00 TO 4+27

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	20	NO
2	18	20	NO
3	18	20	NO
4	18	20	YES
5	18	20	YES
6	18	20	YES

LOG TABLE – SMALL GRADE CONTROL STRUCTURE TYPE 2B STA: 3+00 TO 4+27

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	25	NO
2	18	25	NO
3	18	15	YES
4	18	25	YES
5	18	20	NO
6	18	25	YES

LOG TABLE – WOOD ROUGHENING STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	20	YES
2	18	15	YES
3	18	15	YES
4	18	15	YES

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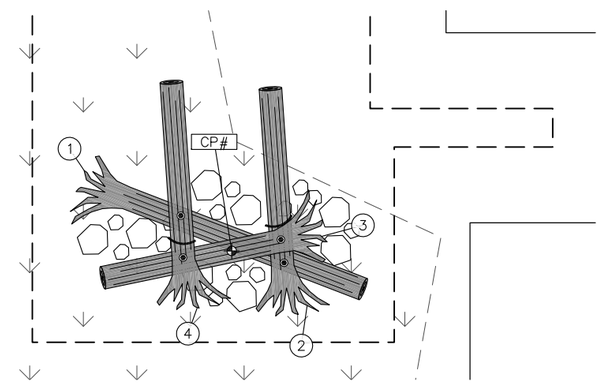
3. LIGHT LOOSE RIPRAP SHALL BE PLACED AND BURIED AMIDST THE INTERLOCKED LOGS AS DIRECTED BY THE ENGINEER.
4. SMALL GRADE CONTROL STRUCTURE APEXES ARE OFFSET 1.0' TO THE SIDE OF THE CHANNEL CENTERLINE. THE SIDE TO WHICH A GRADE CONTROL STRUCTURE IS OFFSET OF THE CENTERLINE IS OPPOSITE THE STRUCTURES ABOVE AND BELOW IT.
5. LOG #5 IN SMALL GRADE CONTROL STRUCTURE TYPE 2B TO BE SET AND BURIED IN CHANNEL BOTTOM AT ONE END AS DIRECTED BY THE ENGINEER.
6. PLUNGE POOL TO BE EXCAVATED TO APPROXIMATE DIMENSIONS SHOWN ON PLAN AND IN PROFILES ON DWGS. C–3 AND C–4.



PLAN – WOOD ROUGHENING STRUCTURE ON UPPER EAST CREEK (3 / C–1)

SCALE: 1"=5'

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-7.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge

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DATUM

NAVD 88/NAD 83

DRAFT

MARK EWBANK STATE OF WASHINGTON 29434 REGISTERED PROFESSIONAL ENGINEER

ONE INCH
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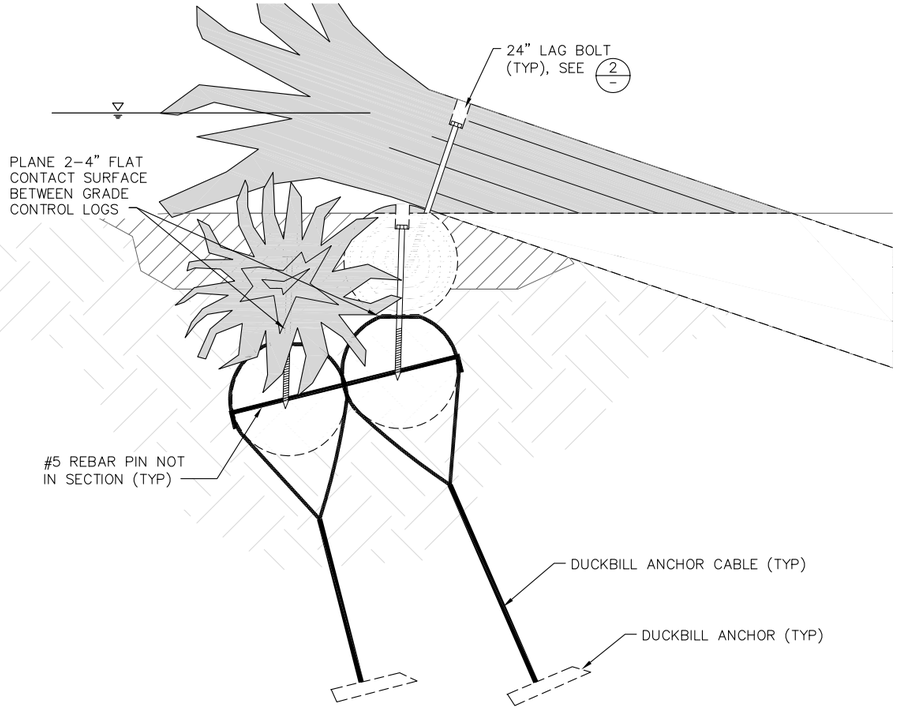
City of Bellevue UTILITIES

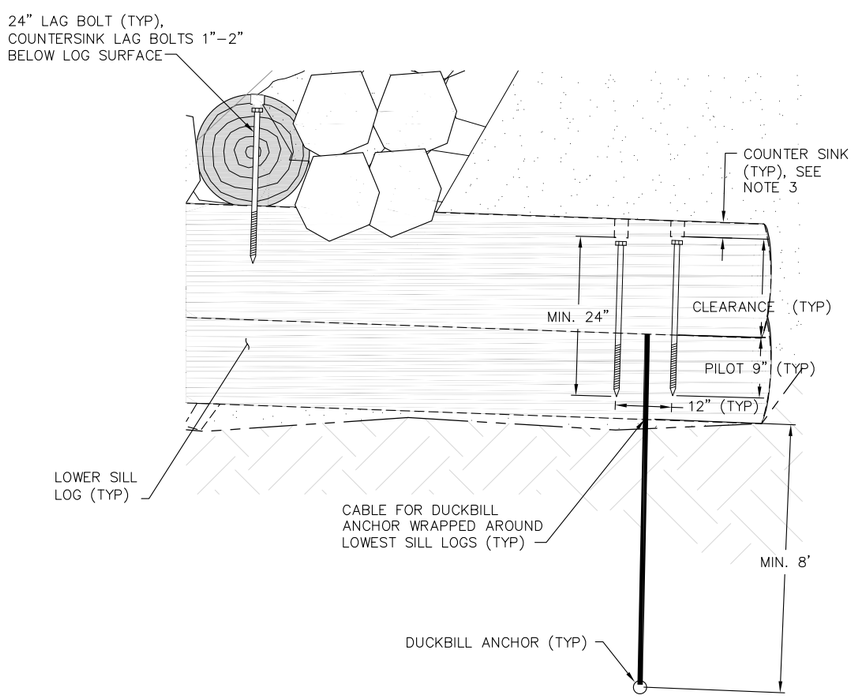
WOOD STRUCTURES INSTALLATION PLANS 2

DRAWING C-7 SHT 10 OF 17



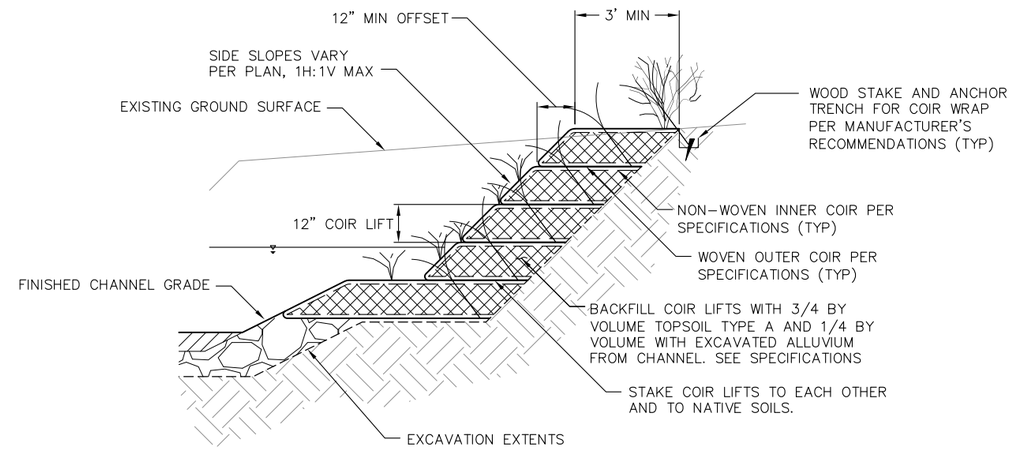
SECTION–LARGE GRADE CONTROL STRUCTURE LAG/PIN DETAIL (1 / C-5)

SCALE: 1"=1'



DETAIL–TYPICAL LAG BOLT INSTALLATION DETAIL (2 / C-5)

SCALE: 1"=1'



DETAIL – COIR LIFTS (3 / C-5)

SCALE: 1"=2'

COIR WRAP PREPARATION

(SEE SPECIAL PROVISIONS)

STEP 1
- PLACE WOVEN OUTER COIR
- PLACE NON–WOVEN INNER COIR
- STAKE COIR FABRIC TO NATIVE SOIL

STEP 2
- PLACE 12" SOIL COMPOSED OF TOPSOIL TYPE A AMENDED WITH ALLUVIUM

STEP 3
- PLACE SEED MIX PER PLANTING PLAN

STEP 4
- WRAP WOVEN OUTER COIR AND NONWOVEN INNER COIR AROUND SOIL LIFT

STEP 5
- STAKE PER COIR MANUFACTURER'S RECOMMENDATION

811 Know what's below. Call before you dig.

60% DESIGN - NOT FOR CONSTRUCTION

DATUM

NAVD 88/NAD 83

MARK EWBANK STATE OF WASHINGTON 29434 REGISTERED PROFESSIONAL ENGINEER

DRAFT

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City of Bellevue UTILITIES

DETAILS

DRAWING C-8 — SHT 11 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-8.dwg Cad User: Laura Turnidge
Plot Date: 7/14/2011 12:22 PM

TABLE – GRADE CONTROL STRUCTURES CONTROL POINT TABLE:

STRUCTURE NUMBER	STRUCTURE TYPE	CHANNEL STA	NORTHING	EASTING

TABLE – PROPOSED CHANNEL CONTROL ALIGNMENT TABLE:

CHANNEL STA	NORTHING	EASTING	ELEVATION

TABLE – CONTROL POINT TABLE:

BERM STA	NORTHING	EASTING	ELEVATION

CONTROL POINT AND ALIGNMENT TABLES TO BE COMPLETED FOR 100% DESIGN

60% DESIGN - NOT FOR CONSTRUCTION

NAVD 88/NAD 83

DRAFT

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Cad User: Laura Turnidge

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City of Bellevue UTILITIES

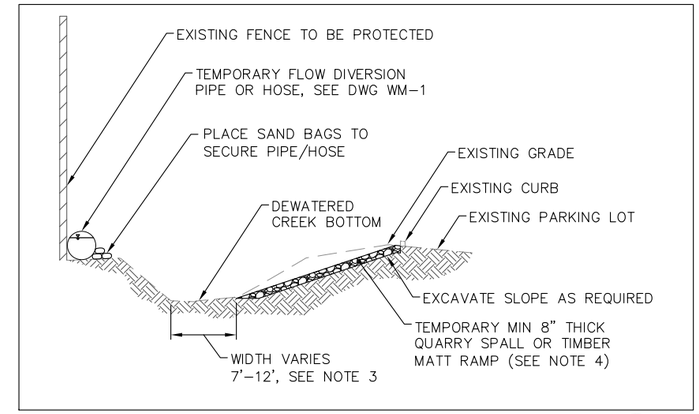
CONTROL POINT AND ALIGNMENT TABLES

DRAWING C-9 SHT 12 OF 17

NOTES:

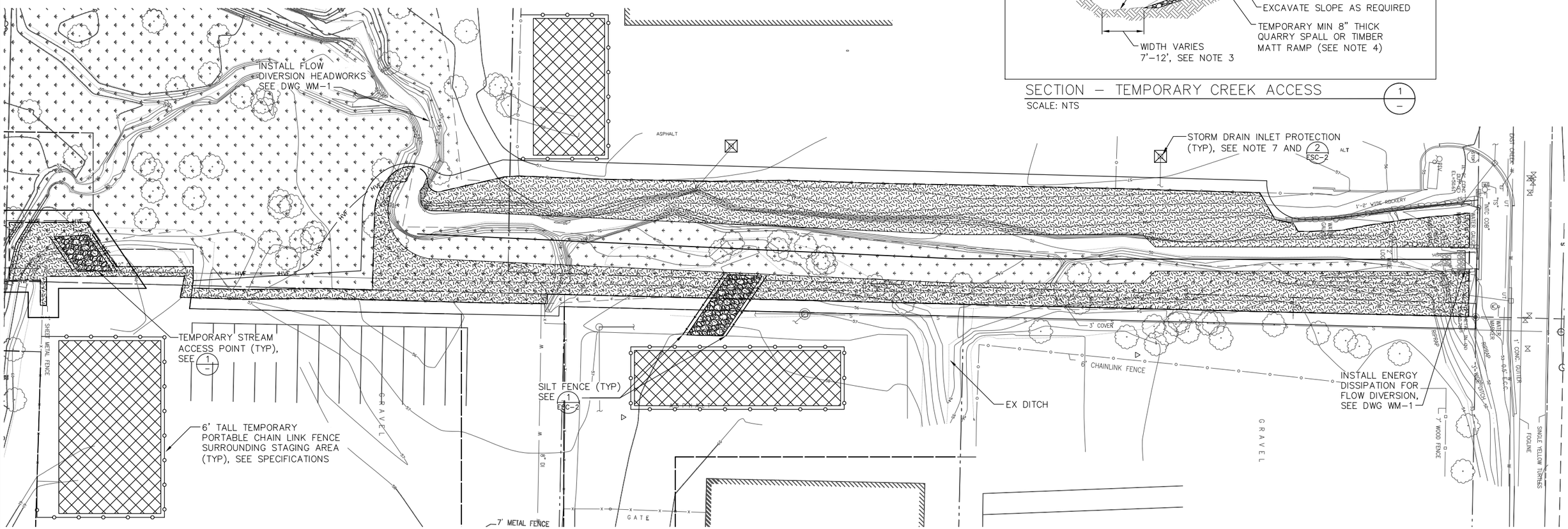
1. NO MECHANIZED EQUIPMENT SHALL BE STORED WITHIN 100' OF CREEK.
2. HIGH VISIBILITY FENCE AND SILT FENCE SHALL BE INSTALLED PRIOR TO COMMENCING CLEARING AND GRUBBING. A MINIMUM OF 2 DAYS NOTICE WILL BE GIVEN TO THE ENGINEER TO ALLOW FOR APPROVAL OF CLEARING LIMITS PRIOR TO ANY CLEARING OR GRUBBING ACTIVITIES.
3. TEMPORARY ACCESS FOR TRACKED EQUIPMENT ON CHANNEL ALIGNMENT MAY REQUIRE TEMPORARY GRADING OF CHANNEL BOTTOM.
4. QUARRY SPALLS OR TIMBER MATT FOR TEMPORARY STREAM ACCESS SHALL BE REMOVED UPON COMPLETION OF STREAM WORK.
5. TURBIDITY MONITORING SHALL BE PERFORMED IN ACCORDANCE WITH EPA METHOD 180.1 AND THE CONTRACT SPECIFICATIONS. SEE DWG WM-1 FOR MONITORING LOCATIONS.
6. CONTRACTOR SHALL PUMP CREEK FLOWS AS SHOWN ON DWG WM-1DURING INSTALLATION AND REMOVALS OF DIVERSION HEADWORKS AND OUTLET ENERGY DISSIPATERS, AND DURING ALL IN-STREAM CONSTRUCTION ACTIVITIES.
7. CONTRACTOR SHALL INSTALL STORM DRAIN INLET PROTECTION ON ALL CATCH BASINS IN PROJECT AREA AS DIRECTED BY ENGINEER.
8. DIRT AND MUD ON CONTRACTOR'S VEHICLE TIRES AND ON MATERIAL DELIVERY VEHICLE TIRES SHALL BE WASHED OFF AND RETAINED ONSITE, SUBJECT TO OTHER SEDIMENT CONTROL BMP'S, PRIOR TO VEHICLES EXITING THE SITE ON TO KAMBER ROAD.

20 0 20 40
1"=20'



SECTION – TEMPORARY CREEK ACCESS (1/–)

SCALE: NTS



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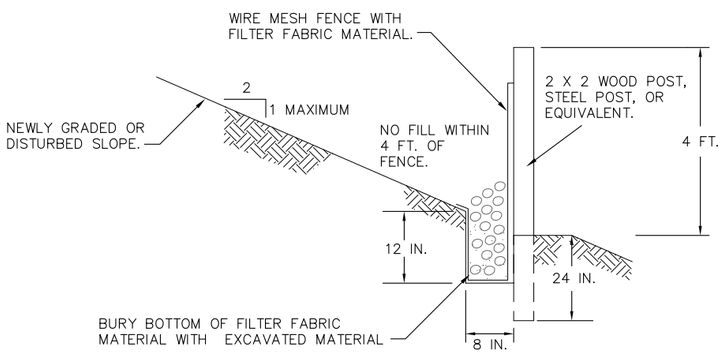
City of Bellevue UTILITIES

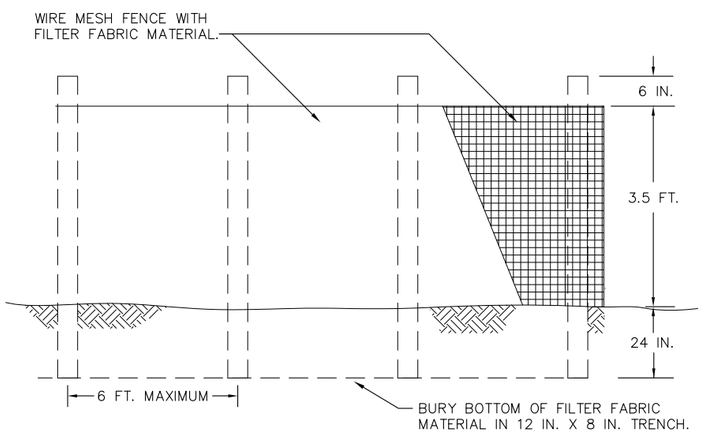
TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DRAWING ESC-1 SHT 13 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\ESC-1.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge



TYPICAL CROSS SECTION



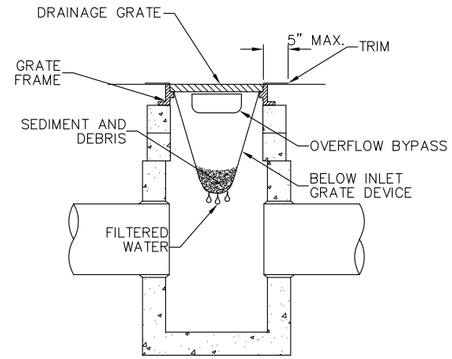
ELEVATION

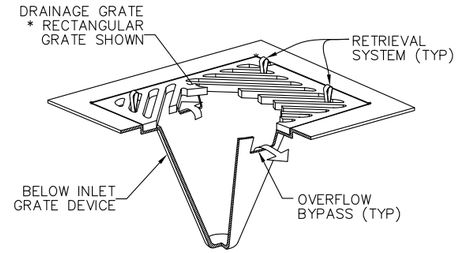
NOTES:

1. FENCE SHALL NOT BE INSTALLED ON SLOPES STEEPER THAN 2:1.
2. JOINTS IN FILTER FABRIC SHALL BE OVERLAPPED 6 INCHES AT POST.
3. USE STAPLES, WIRE RINGS, OR EQUIVALENT TO ATTACH FABRIC TO WIRE FENCE.
4. REMOVE SEDIMENT WHEN IT REACHES 1/3 FENCE HEIGHT.

SILT FENCE DETAIL (1 / ESC-1)

SCALE: NTS





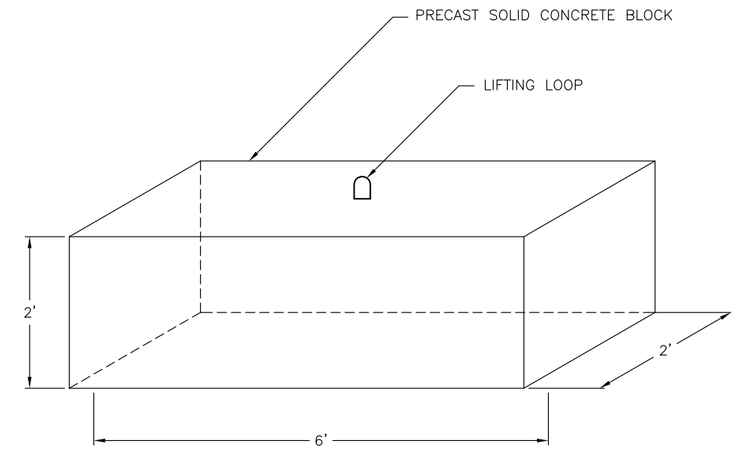
ISOMETRIC VIEW

NOTES:

1. SIZE THE BELOW INLET GRATE DEVICE (BIGD) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
2. THE BIGD SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BIGD WITHOUT SPILLING THE COLLECTED MATERIAL.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).

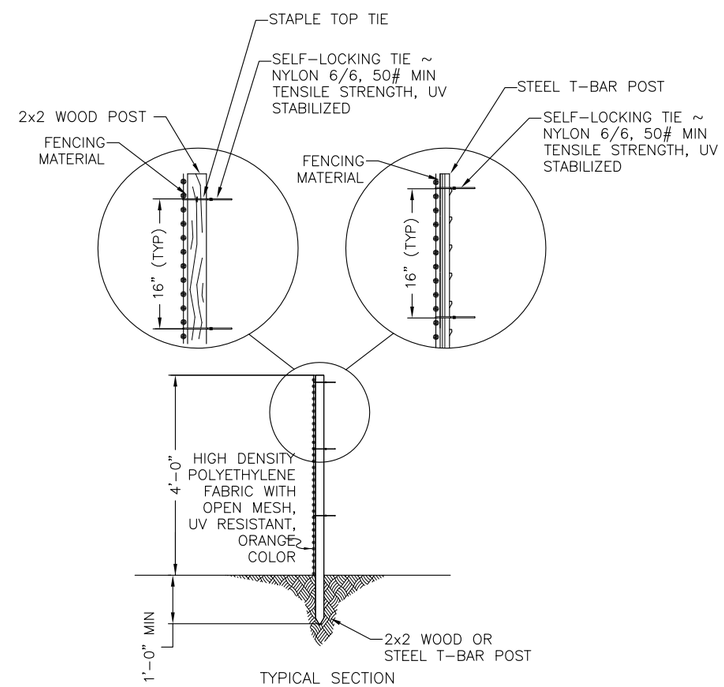
STORM DRAIN INLET PROTECTION (2 / ESC-1)

SCALE: NTS



DETAIL – ECOLOGY BLOCK (4 / WM-1)

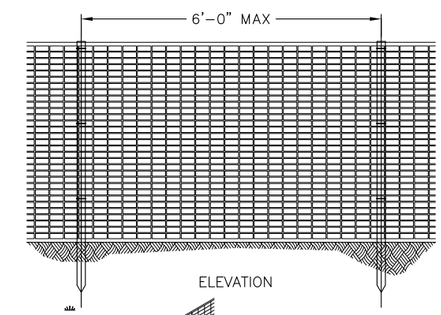
SCALE: NTS



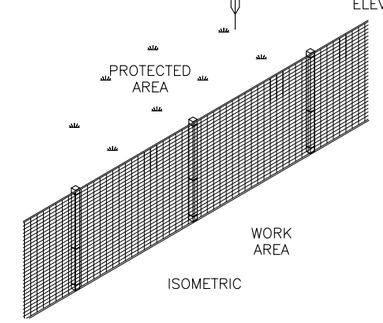
TYPICAL SECTION

HIGH VISIBILITY FENCE DETAIL (3 / ESC-1)

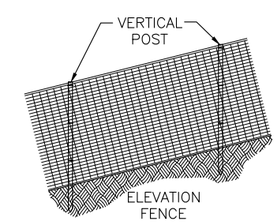
SCALE: NTS



ELEVATION



ISOMETRIC



ELEVATION FENCE ON SLOPE

60% DESIGN - NOT FOR CONSTRUCTION

DATUM

NAVD 88/NAD 83

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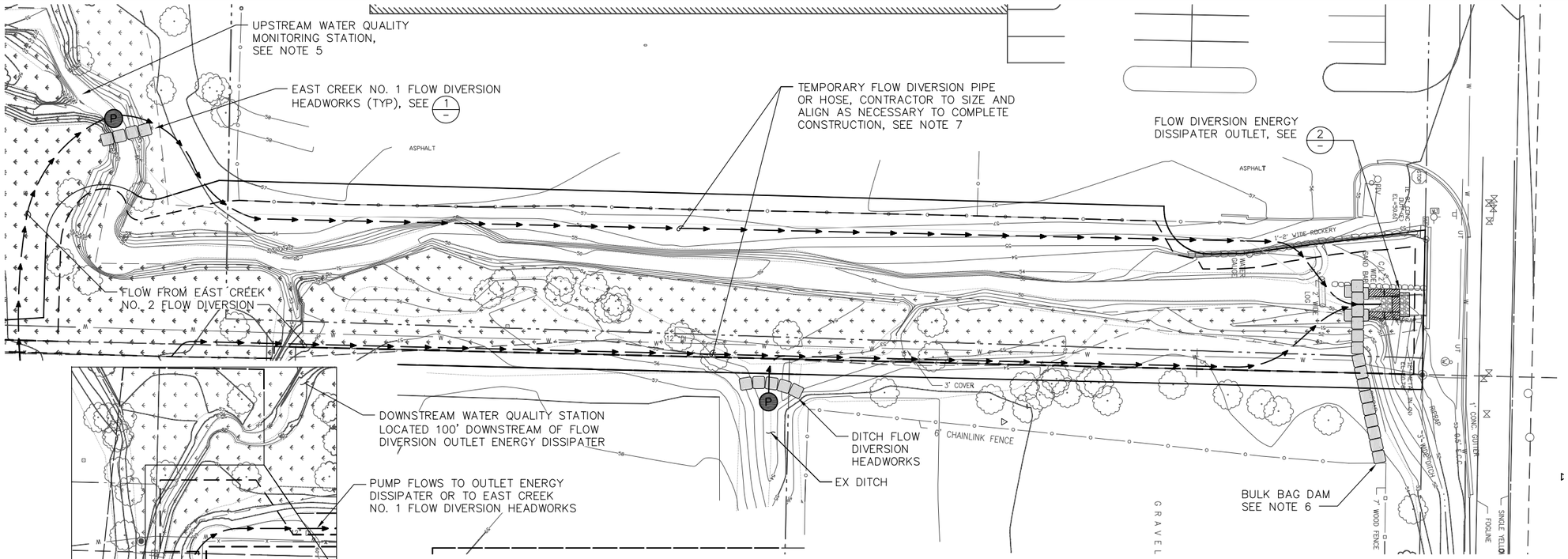
City of Bellevue UTILITIES

TESC DETAILS 1

DRAWING ESC-2 SHT 14 OF 17

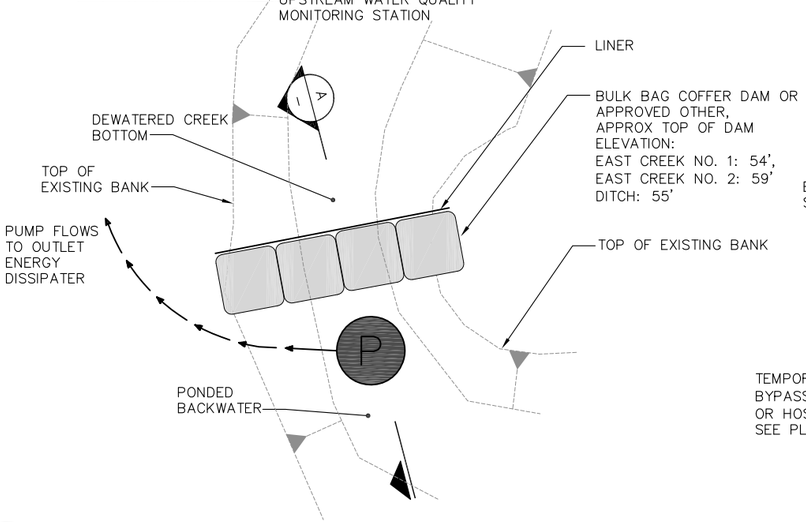
Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\ESC-2.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge



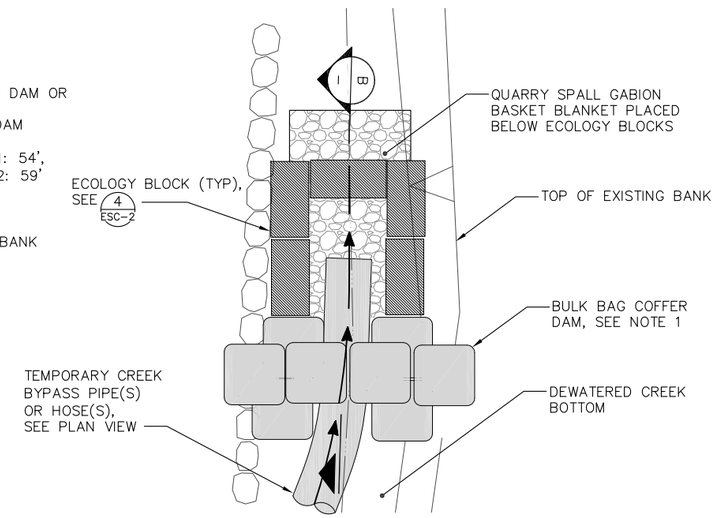
20 0 20 40
1"=20'

NOTES:

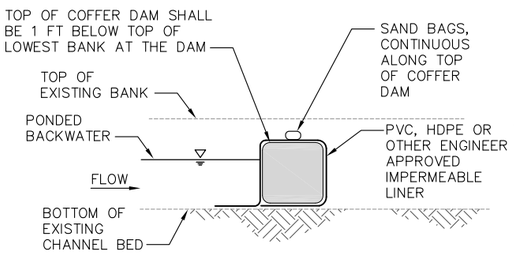
1. SIZE, QUANTITY AND CONFIGURATION OF BULK BAGS SHOWN FOR COFFER DAMS ARE CONCEPTUAL ONLY AND WILL VARY FROM THAT SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING APPROPRIATE SIZE, QUANTITY AND CONFIGURATION OF BULK BAGS NECESSARY TO DIVERT FLOW AND ISOLATE THE WORK AREA AND ENABLE SUCCESSFUL OPERATION OF PUMP BY-PASS SYSTEM AND MINIMIZE FLOW LEAKAGE TO THE EXTENT NECESSARY TO COMPLETE CONSTRUCTION AND CONFORM TO PERMIT REQUIREMENTS. MINOR EXCAVATION OF STREAM BANKS WILL BE ALLOWED TO KEY-IN BULK BAGS AS NECESSARY TO MINIMIZE FLOW LEAKAGE AND COMPLETE INSTALLATION OF COFFER DAM. ALL BULK BAGS SHALL BE FILLED WITH CLEAN WASHED ROUNDED GRAVEL.
2. PUMPING OF CREEK AND DITCH FLOWS DURING INSTALLATION AND REMOVAL OF UPSTREAM COFFERDAM AND DOWNSTREAM OUTFALL DISSIPATER, AND DURING ALL INSTREAM CONSTRUCTION, WILL BE REQUIRED AT ALL TIMES EXCEPT DURING HIGH FLOWS. SEE SPECIFICATIONS REGARDING FLOW BY-PASS REQUIREMENTS DURING HIGH FLOWS.
3. COORDINATE FISH EXCLUSION WITH CREEK DIVERSION PER THE WSDOT FISH EXCLUSION PROTOCOLS AND STANDARDS (AUGUST 2006) AND THE REQUIREMENTS OF THE HYDRAULIC PROJECT APPROVAL.
4. CONTRACTOR SHALL REMOVE ALL TEMPORARY FLOW DIVERSION MATERIALS FOLLOWING CONSTRUCTION AND FULLY RESTORE DISTURBED AREAS TO PRECONSTRUCTION CONDITIONS.
5. DOWNSTREAM WATER QUALITY MONITORING STATION TO BE LOCATED 100 FEET DOWNSTREAM OF FLOW DIVERSION OUTLET ENERGY DISSIPATER ON DOWNSTREAM SIDE OF KAMBER RD. BRIDGE.
6. CONSTRUCT TEMPORARY BULKBAG DAM AS SHOWN PRIOR TO STARTING INSTREAM WORK TO PREVENT BACKWATER EFFECTS FROM KAMBER RD. DRAINAGE. ENGINEER SHALL APPROVE ALIGNMENT PRIOR TO INSTALLATION.
7. ALL TEMPORARY FLOW DIVERSION EQUIPMENT, PIPES AND HOSES SHALL BE LOCATED AND ALIGNED WITHIN THE PERMANENT AND TEMPORARY CONSTRUCTION EASEMENTS.



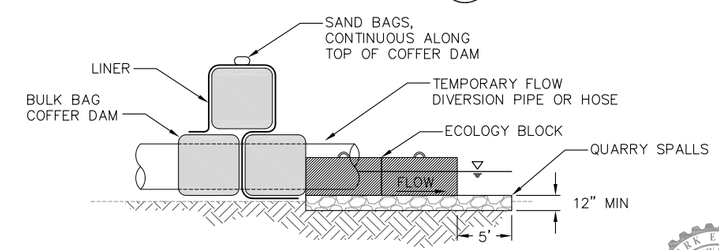
FLOW DIVERSION HEADWORKS, TYP (1)
SCALE: 1" = 5'



FLOW DIVERSION OUTLET ENERGY DISSIPATER (2)
SCALE: 1" = 5'



FLOW DIVERSION HEADWORKS SECTION (A)
SCALE: NTS



FLOW DIVERSION OUTLET ENERGY DISSIPATER SECTION (B)
SCALE: SCALE: 1"=5'

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60% DESIGN - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By
DESIGN MANAGER DATE
PROJECT MANAGER DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

FLOW DIVERSION AND FISH EXCLUSION PLAN

DRAWING WM-1 SHT 15 OF 17

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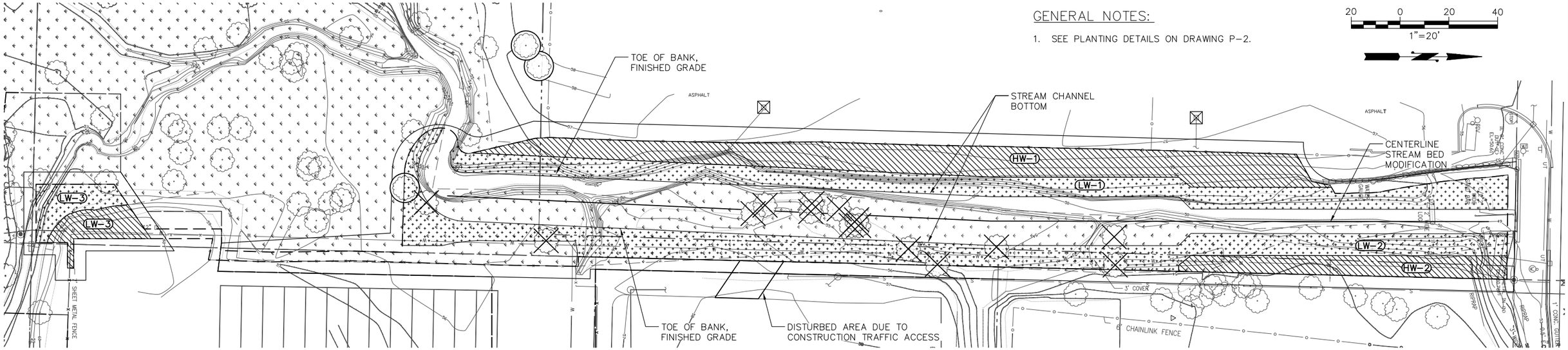

GENERAL NOTES:

1. SEE PLANTING DETAILS ON DRAWING P-2.

20 0 20 40
1"=20'

PLANTING NOTES:

1. SEEDING AND PLANTING SHALL OCCUR AFTER ELEVATIONS HAVE BEEN APPROVED BY ENGINEER.
2. NATIVE SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS.
3. NATIVE SEED MIX SHALL BE APPLIED BY HAND TO FACES OF SOIL LIFTS AND TOP OF UPPERMOST LIFT PRIOR TO WRAPPING WITH ORGANIC EROSION CONTROL BLANKET. ALL OTHER AREAS SHALL BE HYDROSEEDED.
4. PLANTING OF ALL TREES, SHRUBS, AND EMERGENTS SHALL TAKE PLACE DURING THE DORMANT SEASON (OCTOBER 1 – FEBRUARY 28).
5. ALL PLANTS SHALL CONFORM TO THE STANDARDS OF THE CURRENT EDITION OF AMERICAN STANDARD FOR NURSERY STOCK AS APPROVED BY THE AMERICAN STANDARDS INSTITUTE (ANSI Z60.1–2004).
6. ALL CONTAINERIZED PLANTS SHALL BE NURSERY CONTAINER GROWN A MINIMUM OF ONE YEAR. PLANT MATERIAL IS TO BE SUPPLIED BY COMMERCIAL NURSERIES THAT SPECIALIZE IN NATIVE PLANTS.
7. PLANT SUBSTITUTIONS ARE SUBJECT TO APPROVAL BY THE ENGINEER.
8. PLANTS SHALL BE TAGGED FOR IDENTIFICATION WHEN DELIVERED.
9. ALL TREE AND SHRUB PLANTINGS SHALL BE SETBACK A MINIMUM OF 5 FEET FROM ALL FENCES AND PAVEMENT EDGES.
10. KEEP PLANTS SHADED UNTIL THE ACTUAL TIME OF PLANTING. DO NOT LET PLANT MATERIAL SIT IN SUN OR DRY OUT BEFORE PLANTING.
11. ENGINEER SHALL APPROVAL ALL PLANT ZONE BOUNDARIES AND PLANT LAYOUT PRIOR TO PLANTING.
12. THOROUGHLY WATER ALL PLANTED AREAS IMMEDIATELY AFTER PLANTING AND WATER FOR OPTIMUM HEALTH DURING DRY PERIODS DURING PLANT ESTABLISHMENT PERIOD.
13. AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AND NOT SHOWN TO BE PLANTED ON THESE PLANS SHALL BE RESTORED AND SEEDED AS DIRECTED BY THE ENGINEER.
14. SEE SPECIFICATIONS FOR ADDITIONAL SOIL PREPARATION, SEEDING, PLANTING, AND MAINTENANCE INFORMATION.

PLANT SCHEDULE

STRATUM	SCIENTIFIC NAME	COMMON NAME	MATERIAL TYPE AND SIZE	ON CENTER (O.C.) SPACING	HIGH WETLAND (HW) PLANT ZONE QUANTITIES			LOW WETLAND (LW) PLANT ZONE QUANTITIES			NOTES
					HW-1	HW-2	HW-3	LW-1	LW-2	LW-3	
TREE											
	ALNUS RUBRA	RED ALDER	1 GALLON, 12–18" HEIGHT	10' O.C.	11	4	2				
	CRATAEGUS DOUGLASII	DOUGLAS HAWTHORN	1 GALLON, 12–18" HEIGHT	10' O.C.	11	4	2				
	FRAXINUS LATIFOLIA	OREGON ASH	1 GALLON, 12–18" HEIGHT	10' O.C.				22	28	3	PLANT IN SOIL ONLY
	POPULUS BALSAMIFERA	BLACK COTTONWOOD	1 GALLON, 12–18" HEIGHT	10' O.C.	11	4	2				
	MALUS FUSCA	CRABAPPLE	1 GALLON, 12–18" HEIGHT	10' O.C.	11	4	2				
	SALIX LUCIDA	PACIFIC WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	10' O.C.				22	28	3	
SHRUB											
	LONICERA INVOLUCRATA	BLACK TWINBERRY	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7				
	PHYSOCARPUS CAPITATUS	PACIFIC NINEBARK	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7				
	ROSA PISOCARPA	SWAMP ROSE	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7				
	SYMPHORICARPOS ALBUS	SNOWBERRY	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7				
	CORNUS SERICEA	RED–OSIER DOGWOOD	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	3' O.C.				108	136	13	
	SALIX GEYERIANA	GEYER WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	3' O.C.				108	136	13	
	SALIX HOOKERIANA	HOOKER WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	3' O.C.				108	136	13	
	SALIX SITCHENSIS	SITKA WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	3' O.C.				108	136	13	
EMERGENT											
	CAREX AMPLIFOLIA	BIGLEAF SEDGE	PLUG	1' O.C.				936	1178	111	PLANT IN SOIL ONLY
	CAREX OBNUPTA	SLOUGH SEDGE	PLUG	1' O.C.				936	1178	111	PLANT IN SOIL ONLY
	CAREX STIPATA	SAWBEAK SEDGE	PLUG	1' O.C.				936	1178	111	PLANT IN SOIL ONLY
	SCIRPUS MICROCARPUS	SMALL–FRUITED BULRUSH	PLUG	1' O.C.				936	1178	111	PLANT IN SOIL ONLY

LEGEND

HIGH WETLAND PLANTING ZONE

LOW WETLAND PLANTING ZONE

TREES TO BE RETAINED AND PROTECTED DURING CONSTRUCTION. SEE DRAWING C–2 FOR SPECIFICATIONS

DATUM

NAVD 88/NAD 83

DRAFT

MARK EWBANK STATE OF WASHINGTON 49434 REGISTERED PROFESSIONAL ENGINEER

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

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98121-1820
206-441-9080
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EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER DATE
PROJECT MANAGER DATE

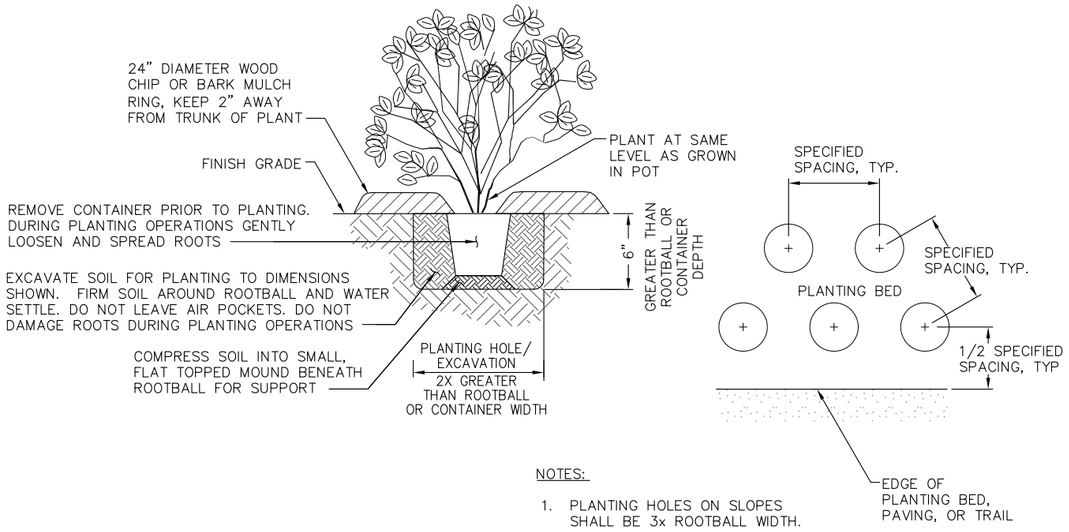
M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

PLANTING PLAN AND SCHEDULE

DRAWING P-1 SHT 16 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\P-1.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge

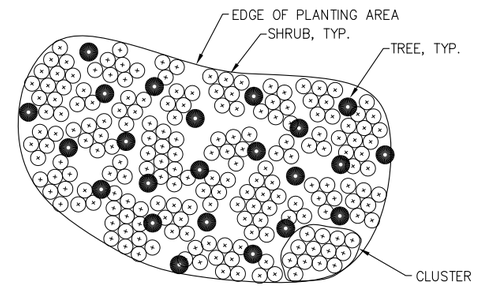


NOTES:

1. PLANTING HOLES ON SLOPES SHALL BE 3x ROOTBALL WIDTH.

TREE AND SHRUB PLANTING (1 / –)

SCALE: NTS

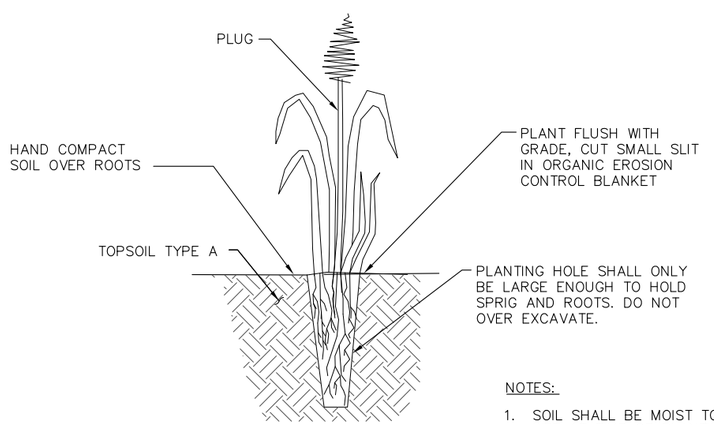


NOTES:

1. PLANT SHRUBS IN CLUSTERS OF THREE, FIVE, OR SEVEN SHRUBS.
2. IN CLUSTERS OF THREE, FIVE OR SEVEN SHRUBS PLANT ONE SPECIES.
3. EVENLY SPACE CLUSTERS THROUGHOUT PLANTING AREA.
4. INTENT OF SHRUB PLANTING IS TO APPEAR NATURAL AND INFORMAL.

SHRUB SPACING AROUND TREES (2 / –)

SCALE: NTS

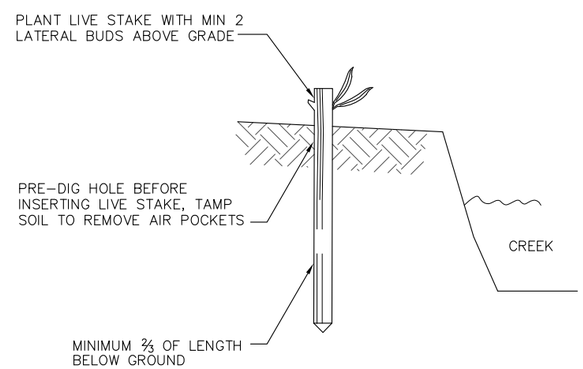


NOTES:

1. SOIL SHALL BE MOIST TO WET AT TIME OF PLANTING.

LIVE STAKE INSTALLATION (3 / –)

SCALE: NTS



LIVE STAKE PLANTING (4 / –)

SCALE: NTS

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Plot Date: 7/14/2011 12:23 PM
Cad User: Laura Turnidge

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NAVD 88/NAD 83

DATUM

DRAFT

MARK EWBANK STATE OF WASHINGTON 39434 REGISTERED PROFESSIONAL ENGINEER

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CHECKED BY	DATE

City of Bellevue UTILITIES

PLANTING DETAILS

DRAWING P-2

SHT 17 OF 17

CRITICAL AREAS REPORT

East Creek/Richards Creek Stream Modification

Prepared for

City of Bellevue
Utilities Department
450 – 110th Avenue NE
Bellevue, Washington 98004

Prepared by

Herrera Environmental Consultants
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
Telephone: 206.441.9080

August 23, 2011

Disclaimer

Herrera Environmental Consultants, Inc. has prepared this report for use by the City of Bellevue. The results and conclusions in this report represent the professional opinion of Herrera Environmental Consultants, Inc. They are based in part upon (1) site reconnaissance, and (2) examination of public domain information concerning the study area.

The work was performed according to critical area studies and reporting standards required by the City of Bellevue Land Use Code (Part 20.25H) and the accepted standards in the field of jurisdictional wetland determination and delineation using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (Environmental Laboratory 2010). In addition, work was conducted according to accepted standards for determining the ordinary high water mark (OHWM) of streams using the definition set forth in Washington Administrative Code 173-22-030(11) and *Determining the Ordinary High Water Mark on Streams in Washington State* (Olson and Stockdale 2010). However, final determination of jurisdictional wetland and OHWM boundaries pertinent to Section 404 of the Clean Water Act is the responsibility of the Seattle District of the U.S. Army Corps of Engineers. Various agencies of the State of Washington and local jurisdictions may require a review of final site development plans that could potentially affect zoning, buffer requirements, water quality, and/or habitat functions of lands in question. Therefore, the findings and conclusions in this report should be reviewed by appropriate regulatory agencies before any detailed site planning and/or construction activities.

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1.0 Executive Summary

The City of Bellevue Utilities Department proposes to construct the East Creek/Richards Creek stream modification project as the third phase of the Flood Control and Sediment Management Plan for Richards Creek, Sunset Creek, and East Creek (Herrera 2008). The independent, yet complimentary project phases recommended in this plan are intended to comprehensively address chronic flooding, improve bank stability, and improve instream and wetland habitat conditions within and surrounding Richards, Sunset, and East Creeks. The first phase was constructed in 2009 and included a replacement culvert with built in sediment trap at SE 30th Street as well as channel modifications upstream and downstream to provide a stable streambed transition to the culvert inlet and outlet. The second phase will continue the channel and habitat improvements and flood control measures along a reach of Sunset Creek downstream of SE 30th Street as well as along a reach of Richards Creek upstream of the confluence with East Creek. The second phase is planned for construction during 2011.

The proposed third phase described in this report will address channel degradation and bank instability by providing stable streambed control and channel and bank modifications in East Creek located between Kamber Road (also known as SE 26th Street) and the confluence with Richards Creek. The project goals are to:

1. Reduce flooding and erosion of commercial and industrial property in the vicinity of the project site

2. Preserve and enhance desirable instream, wetland, and riparian habitat functions

This phase is planned for construction during 2012. The project includes the following elements:

- Channel enlargement to alleviate flooding

- Installation of grade control, bank stabilization, and habitat structures consisting of large woody materials to prevent head-cut migration and eroding banks; provide stable, physical habitat, and restore riverine wetland processes

- Construction of a flood control sheet pile wall adjacent to a developed neighboring property

- Removal of non-native invasive vegetation and revegetation with native plants

- Reestablishment and rehabilitation of wetland habitat including riverine benches along the proposed channel to mitigate wetland impacts and provide refuge for fish during high flows

The Phase 3 project will address ongoing channel incision in East Creek through restoration measures that will effectively raise the elevation of the streambed with grade controls. Upstream of East Creek, the project will indirectly restore an incised segment of Richards Creek over time by allowing for sediment to deposit in the stream channel and reverse the trend of incision. These measures would inherently increase the frequency and magnitude of overbank flooding of adjacent developed properties that necessitates flood reduction measures including an enlarged stream channel and flood control sheet pile wall.

The proposed project is located within, and directly adjacent to, the channel of East Creek in the City of Bellevue. The project area is within the Kelsey Creek Basin of Water Resource Inventory Area (WRIA) 8 – the Cedar/Sammamish Watershed.

The critical areas that will be affected include East Creek, adjacent wetlands, and upland buffers for these aquatic resources (see Table ES-1). In addition, temporary effects will occur to an area of special flood hazard (100-year floodplain) and habitat associated with species of local importance.

Table ES-1. Impacts on East Creek and wetlands in the project area.

Resource	Temporary Impacts	Permanent Impacts
East Creek Channel (waterward OHWM)	6,932 square feet (0.16 acres)	None
Wetlands	9,475 square feet (0.22 acres)	3,036 square feet (0.07 acres)
Upland Buffer	2,106 square feet (0.05 acres)	None
Total	18,513 square feet (0.43 acres)	3,036 square feet (0.07 acres)

OHWM: Ordinary High Water Mark

Temporary impacts on East Creek, wetlands, buffers, and the 100-year floodplain will result from grading and installation of large woody materials in the channel and the adjacent banks and wetlands. The stream channel, wetlands, and buffers will be reconstructed and vegetated with native vegetation. To improve fish habitat, large woody material and spawning size gravel will be added to the stream.

Permanent impacts on wetlands will result from converting wetland to instream habitat in East Creek (for example installing gravel substrate) to provide additional fish habitat, and channel capacity to minimize flooding. In addition, some permanent impact on wetlands will result from construction of the flood control sheet pile wall.

The project will compensate for permanent impacts on Wetland A by reestablishing and rehabilitating wetlands. Wetlands will be reestablished directly west of the channel improvements including flat, bench habitat intended for high-flow flooding. Direct wetland rehabilitation in the project area will benefit existing wetlands on the east side of the channel improvements that will also include development of bench habitat. Indirect wetland rehabilitation will improve large areas of Wetland A upstream of the channel improvements area where frequency and magnitude of flooding will be increased.

Wetlands will be reestablished in the project area at an acreage replacement ratio of approximately 1-to-1, which is less than the required 3-to-1 ratio according to Bellevue Land Use Code (LUC). However, the Bellevue LUC 20.25H.105.E, also states that wetland enhancement (which includes rehabilitation) is appropriate if it is demonstrated that functions of degraded wetlands will be increased. To this end, proposed wetland mitigation includes rehabilitation at an acreage replacement ratio of approximately 18-to-1.

The project will substantially improve functions within the larger wetland system located directly upstream of the project reach. By raising the elevation of the channel and providing grade control, the project will eliminate and restore the severe channel incision that has occurred along East Creek and Richards Creek within the wetland. Therefore, the project will restore riverine functions within the wetland that have largely ceased to exist due to severe channel incision that largely confines flows within the channel. Within the project area, wetland and riparian functions will improve including improved flood control, water quality, and fish and wildlife habitat.

The combined functions of the reconstructed stream channel and riparian corridor (wetlands and buffers) within the project reach will be improved from their existing condition due to removal of invasive and non-native vegetation, installation of large woody materials and gravels that improve fish habitat, planting of dense native vegetation, and more frequent flooding of wetlands.

2.0 Introduction

The East Creek/Richards Creek stream modification project (hereafter, "the project") proposed by the City of Bellevue Utilities Department (City) will address channel degradation and bank instability by providing stable streambed control, and channel and bank modifications in East Creek located between Kamber Road (also known as SE 26th Street) and the confluence with Richards Creek. The project goals are to:

3. Reduce flooding and erosion of commercial and industrial property in the vicinity of the project site

4. Preserve and enhance desirable instream, wetland, and riparian habitat functions

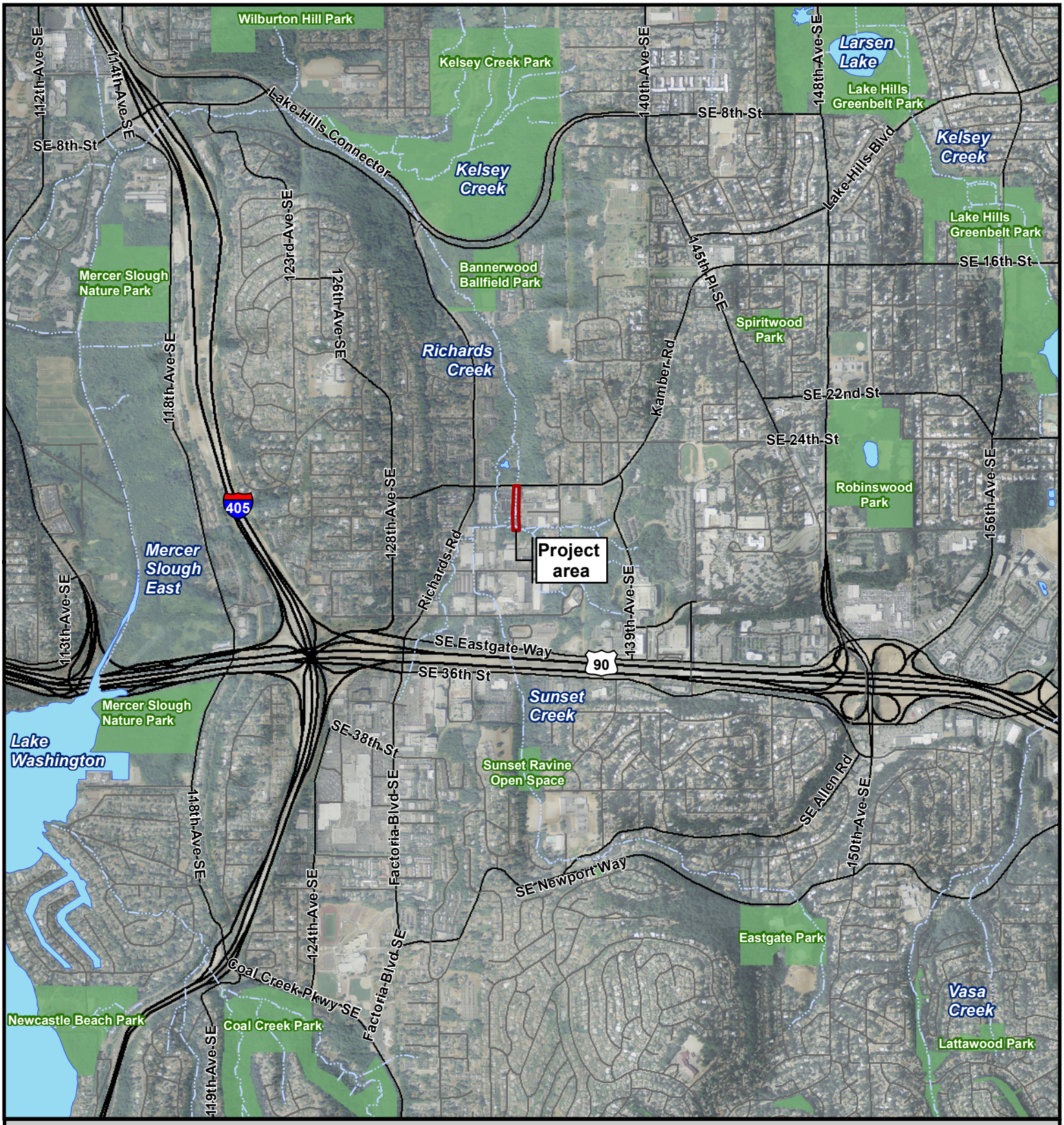
In addition, the project will enhance connectivity between the stream and adjacent wetlands, and improve instream fish habitat diversity and cover. This project is the final phase of a three-phase project that is being completed by the City in accordance with the Flood Control and Sediment Management Plan for Richards Creek, Sunset Creek, and East Creek (Herrera 2008).

2.1 Project Setting

The project is located within, and directly adjacent to, the channel of East Creek in the City of Bellevue, just upstream of Kamber Road (Figure 1). Throughout this report, the "project area" refers to the area depicted on Figure 2 and is largely confined to those areas where construction will occur. The "study area" includes the project area, that portion of Richards Creek and adjacent wetlands that extend upstream to the downstream extents of the Phase 2 project area, and adjacent industrial and commercial properties. The study area is within the Kelsey Creek Basin of Water Resource Inventory Area (WRIA) 8 – the Cedar/Sammamish Watershed in the northwest quarter of Section 10, Township 24 North, and Range 5 East. See Figure 2 for the location of the project area and distinct project phases as described in Sunset Creek Flood Control and Sediment Management Plan (Herrera 2008).

The study area is a mix of undeveloped and developed private property. The developed properties are generally occupied by light industrial and high-technology commercial businesses. The undeveloped properties include a large wetland system which Richards Creek and East Creek flow through. The developed properties appear to be built on fill.

Downstream of the project, (north of Kamber Road), East Creek flows into a riparian corridor averaging approximately 600 feet in width and discharges into Kelsey Creek approximately 0.75 miles north of Kamber Road. The Kelsey Creek watershed flows into Mercer Slough, which flows into Lake Washington. Upstream of Interstate 405 (I-405), Kelsey Creek is considered a 303d listed impaired water according to the Washington State Department of Ecology (Ecology)



Legend

- Project area
- Stream
- Lake
- Park
- Highway

Figure 1. Vicinity map for the East Creek/ Richards Creek Fish Stream Modification Project.

N

0 1,000 2,000 4,000 Feet

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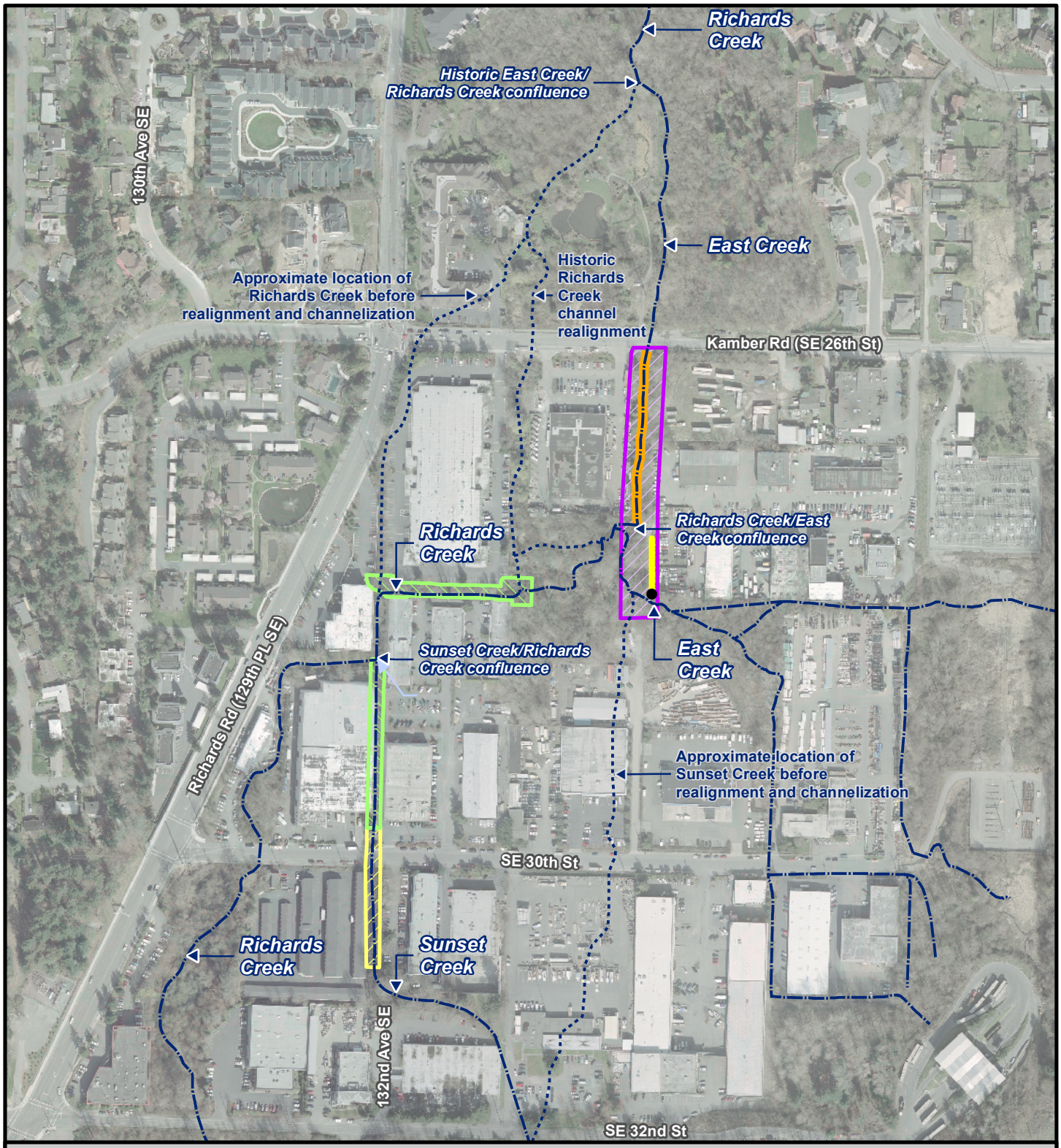

Legend

- Phase 1 project area
- Phase 2 project area
- Phase 3 project area
- Stream alignment
- Approximate historical stream alignment
- Channel improvements
- Flood control sheet pile wall
- Bank-roughening structure

Figure 2. Sunset, Richards, and East Creek network flood control and habitat improvement project phases and historic stream channels.

N

0 175 350 700 Feet

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Aerial photograph: City of Bellevue, 2007
Stream network: King County, 2008

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and is listed for low dissolved oxygen levels and high temperature and fecal coliform levels (Ecology 2008). Downstream of I-405, the Mercer Slough is listed for fecal coliform.

2.2 Project History

The historical channel configuration of Sunset Creek, Richards Creek, and East Creek within the vicinity of the study area was significantly different than it is at the present time. Under predevelopment conditions, the channels within the study area were free to move laterally and shift course as sediment deposits filled channels and locally reduced sediment transport capacity, which is typical of channels on alluvial fans (see historic channel locations on Figure 2). During the development that occurred during the 1960s, when land was being graded and commercial buildings adjacent to the channel network were being constructed, Sunset Creek, Richards Creek, and East Creek were realigned (Figure 2). To maintain the altered channel locations, the banks of these streams were armored in several areas. This channelization ended the natural process of dynamic sediment deposition and channel relocation and concentrated sediment deposition along the constructed channel alignments.

Channel realignment, channel confinement, and increased rates of sediment production from land development throughout the watershed have directly resulted in recurrent flooding and sedimentation problems, channel instability, and degraded habitat conditions in the Richards Creek, Sunset Creek, and East Creek channel network between SE 30th Street and Kamber Road. To minimize flooding problems, annual dredging activities removed approximately twenty cubic yards of sediment from the streams each year. To obtain more sustainable long-term solutions, the City contracted with Herrera Environmental Consultants (Herrera) to prepare the Sunset Creek Flood Control and Sediment Management Plan (Herrera 2008). This plan provides a comprehensive analysis and proposed solutions to ongoing sediment management and flooding challenges in these drainages, while producing a net improvement in habitat conditions. Based on this plan, the City began to pursue a phased series of projects (Figure 2) to address flooding, promote channel stability, and improve habitat conditions.

The first phase of this work was constructed in 2009 on Sunset Creek (the most upstream project). Phase 1 (referred to as the SE 30th Street/Sunset Creek Flood Improvement Project) included replacement of twin 42-inch diameter corrugated metal pipe culverts that convey Sunset Creek beneath SE 30th Street with a specialized fish-passable and sediment trapping culvert; and habitat enhancing channel modifications upstream and downstream of the roadway to stabilize the streambed transition to the new culvert inlet and outlet.

The Sunset Creek/Richards Creek Flood Control and Habitat Improvement Project constitutes the second phase of work and continues with channel improvements and flood control measures along Sunset Creek downstream of Phase 1 to the confluence with Richards Creek. The project also entails stream improvements from the Optiva Curve (where Richards Creek turns sharply from north to east) to the historical Richards Creek flow split channel, approximately 300 feet upstream of the confluence with East Creek (Figure 2). Phase 2 is planned for construction in 2012.

The project discussed in this report, the East Creek/Richards Creek stream modification project, constitutes the third phase of work and continues with channel improvements and flood control measures along East Creek downstream of Phase 2 between Kamber Road and the East Creek confluence (Figure 2). Phase 3 is also planned for construction in 2012. The Phase 3 project addresses ongoing incision taking place within the East Creek and Richards Creek channels. The East Creek channel is conveyed through a large box culvert that was installed in 2007 beneath Kamber Road approximately 400 feet downstream of the confluence between East Creek and Richards Creek. At approximately the same time, a number of beaver dams were removed downstream of the Kamber Road culvert. Both of these actions reinforced the current flow geometry and caused the East Creek and Richards Creek channels to become incised.

2.3 Project Description

The project consists of channel improvements along East Creek, adjacent riparian restoration, a flood control sheet pile wall, and localized bank stabilization (roughening structure) on East Creek (see Figure 2 and project plans in Appendix A). These project elements are described briefly below and describe in more detail under the Project Construction section. Construction access for all of these components is from adjacent commercial properties.

2.3.1 Channel Improvements

The proposed channel improvements start at Kamber Road and extend approximately 430 feet upstream and involve enlarging, slightly realigning, and re-grading the stream channel; and constructing grade control and bank stabilization structures. Channel improvements will passively restore channel incision upstream of the project limits within East Creek and Richards Creek over time as sediment is deposited and fills up the channel to the elevation of the proposed upstream grade control structure. Upstream of this location, approximately three feet depth of channel will fill in over time. The project will reverse the trend of incision, allow for the channel and upstream banks to stabilize, and provide greater hydrologic connectivity between the channel and adjacent wetlands.

To alleviate flooding, channel improvements will involve excavating and widening the East Creek channel. Grade control structures consisting of large woody materials will be constructed at regular intervals throughout the project reach to stabilize the stream, prevent head-cut migration, and allow for fish-passage.

Bank toes will be protected from stream erosion using large woody material and boulders that are buried into the stream bank and integrated into grade control structures. Bioengineered stabilization of the project reach will incorporate wood, boulders, cobbles, gravels, coir fabric, and native vegetation to provide both stability and improved habitat complexity. Placed gravels will restore salmon spawning substrate to the project reach. Suitable spawning substrate is anticipated to remain in the reach after construction.

2.3.2 Riparian Restoration

The riparian area adjacent to the East Creek project reach will be restored. Throughout the project reach, non-native invasive vegetation will be removed and replanted with native plants. Riparian wetland habitat will be restored including riverine benches along both sides of the proposed channel to mitigate wetland impacts and provide refuge for fish during high flows. The entire project limits will be vegetated with a native wetland grass seed mix and native live stakes, emergents, shrubs, and trees. The planted vegetation will improve plant diversity and the roots will provide bank stabilization through soil cohesion as they spread over time.

2.3.3 Flood Control Sheet Pile Wall

Construction of a flood control sheet pile wall is proposed to prevent flooding of an adjacent commercial property located to the east of East Creek and directly south of the channel improvements reach (Figure 2). The approximate 2-foot tall wall will be constructed of interconnecting steel sheet piles that are driven into the earth. The wall will be approximately 150 feet long and aligned 2 feet west of an existing property fence.

2.3.4 Wood Roughening Structure

The localized wood roughening structure on the upstream reach of East Creek is intended to protect the corner of a commercial property from erosion, which is located approximately 15 feet from the edge of the channel. The structure is located about 70 feet south of the flood control sheet pile wall. The structure will have the added benefit of improving habitat in East Creek by introducing root wads into the channel.

2.4 Hydraulic Analysis

A hydraulic analysis was conducted to determine the flooding risk to adjacent properties and to demonstrate the hydrologic impacts of the proposed stream channel and bank modifications (Herrera 2011). Results of hydraulic modeling were also used to define invert elevations of grade control structures, analyze potential bed scour at wood structures, and to establish 100-year water depths for calculating ballast requirements to offset wood structure buoyancy.

Based on hydraulic modeling results, under existing conditions, the parking lots located east of the project reach experience extensive flooding under several flooding scenarios (e.g., 2-year, 10-year, and 100-year). Proposed channel improvements will reduce flooding frequency of these parking lots to the 100-year flood event only. The proposed flood control sheet pile wall is intended to eliminate flooding that results from these events. The channel improvements will lessen flooding of the parking lot to the north, but not eliminate it, even for the 2-year event.

In addition, hydraulic modeling results indicate that under proposed conditions of the Phase 2 and 3 projects, water surface elevations will increase within the existing wetland starting directly

downstream of the Phase 2 project extents. Frequency of flooding will increase for smaller flood events as the channel becomes less incised. Increased flooding of the wetland is one of the goals of the project in order to restore riverine flooding functions within the wetland.

2.5 Project Construction

The project is scheduled to be constructed in 2012. All in-stream work will be conducted during the in-water work window established by the Washington Department of Fish and Wildlife (WDFW), which is anticipated to extend from July 1 to August 31. All in-stream work is expected to be conducted during one in-water work season. Project plans are provided in Appendix A.

2.5.1 Project Elements Sequencing

The project consists of the following elements (exact sequencing may vary and some elements will occur concurrently):

1. Site preparation and staging
2. Installation of temporary flow bypasses, fish removal and relocation
3. Channel excavation and grading
4. Installation of grade control and bank stabilization structures
5. Bank construction
6. Flood control sheet pile wall construction
7. Wetland restoration and revegetation of riparian area
8. Reintroduction of flow to channel

Each of these elements is described in more detail in the following sections.

2.5.2 Site Preparation and Staging

Site preparation activities include the contractor mobilizing to the project site, establishing staging areas, establishing site access routes and traffic control, marking the work and clearing limits, and installing temporary erosion and sediment control (TESC) best management practices (BMPs). Staging areas are planned on parking lots and other nonvegetated surfaces located on adjacent commercial properties. Access to the project area will occur via Kamber Road, private driveways, and parking lots adjacent to the project site.

Vegetation removal will be limited to areas necessary to regrade the stream channel, wetlands, and banks; access the channel; install grade control and bank stabilization structures; and to remove all nonnative and invasive vegetation from the riparian areas within the project reach. The majority of riparian vegetation that will be affected consists of nonnative Himalayan blackberry (*Rubus armeniacus*).

2.5.3 Stream Flow Bypasses, Fish Removal, and Fish Relocation

Temporary dewatering of the work area will be necessary to construct project elements within the stream. This will be achieved by diverting flow around the construction areas (see Drawing WM-1, Appendix A). Flow will be diverted at three locations including upstream of the localized bank roughening structure site, upstream of the channel improvements site, and upstream of a tributary ditch that conveys flow to East Creek. At these sites coffer dams will be constructed across the channel to pool water that is pumped into bypass pipes. The coffer dams will be constructed of bulk bags filled with clean (washed) rounded gravels. Bypass flows from both sites will be diverted in pipes that run along the ground at the outer extents of the project limits that ultimately discharge flows downstream of the channel improvements site, directly upstream of Kamber Road.

At the downstream extents of the project, a cofferdam consisting of bulk bags will be constructed across the channel to contain any turbid water and prevent release downstream. Bypassed flows will be discharged directly downstream of this cofferdam to an energy dissipater structure constructed of concrete Ecology blocks and gabion baskets filled with quarry spalls.

Concurrent with the installation of the bypass and dewatering of the channel, all fish and amphibians within the dewatering area will be captured and released downstream of Kamber Road. Dewatering and fish relocation will be conducted following an accepted protocol developed for this activity by the Washington State Department of Transportation (WSDOT 2009). The site will be allowed to drain to the limits of passive dewatering to facilitate fish removal. The remaining water within the exclusion area will either be pumped to the sanitary sewer system, or will be filtered using appropriate BMPs prior to return to the stream channel. The channel will remain dewatered and inaccessible to fish until construction is complete. All dewatering and fish relocation will take place during the WDFW-specified in-water work window.

The diversion pipes will be screened at the upstream end to prevent fish and other organisms from being entrained. The screening net will be situated for low pass-through velocity to avoid risk of impingement. The pipe is not expected to be passable to upstream movement, meaning the exclusion area will impose a partial barrier to fish passage during the in-water construction period. The cofferdams, diversion pipes, energy dissipater, and all related materials will be completely removed from the site when the project is completed.

2.5.4 Excavation, Grading, Grade Control Structures, Bank Stabilization, Bank Construction, and Flood Control Sheet Pile Wall Construction

Approximately 430 feet of channel improvements will involve enlarging and re-grading the stream channel and wetland benches; and constructing grade control and bank stabilization structures. The base of the new channel will be 20 feet wide for approximately 275 feet at the upstream extents, then transition to a width of 10 feet for approximately 125 feet extending to Kamber Road. Overall, the base of the channel will increase in width between approximately 4 and 14 feet. The banks will be set back accordingly. In addition, the centerline of the existing

channel will shift on average, approximately 9 feet to the east. Shifting the channel east provides more room to construct stable banks and wetland benches between the channel and the parking lot on the west side of the channel. The finished channel bed slope will be approximately 1.2 percent.

Coniferous large woody material will be installed to stabilize the banks and provide grade control. Twelve grade control structures will be evenly spaced throughout the project reach. The structures will consist of interlaced coniferous tree logs imported from off-site, including 42 logs with root wads attached and 37 logs without root wads for a total of 79 logs (see Drawings C-1 through C-7, Appendix A). The structures will create pool and riffle habitat for fish. The grade control structures will be spaced at a frequency to promote fish passage and are designed such that there is no more than a 6-inch elevation difference between structures to ensure juvenile fish passage at a variety of flow rates.

After the grade control and bank stabilization logs are placed, cabled, and anchored, the ends of the logs will be buried in the bank; and the channel and lower banks will be lined with native soils and a mixture of cobbles, gravels, sand, and silt. Streambed sediment including gravels will be placed on top of the cobble mixture.

The bank roughening structure located further upstream on East Creek will be constructed of four interlaced logs with root wads attached. Most of the structure will be buried within the bank with the exception of root wads protruding out of the bank along the edge of the channel. The ground surface will be restored to existing grade after installation of the structure.

The approximate 2-foot tall and 150-foot long flood control sheet pile wall will be constructed of interconnecting steel sheet piles that are driven into the earth (see Sheet C-1, Appendix A). An existing fence on adjacent property will be taken down to allow for access to construct the steel sheet pile wall from a parking lot.

2.5.5 Wetland Restoration and Revegetation of Riparian Areas

The riparian area adjacent to the East Creek project reach will be restored. Wetland habitat will be restored along the banks of the constructed channel. Flat, wetland bench habitats approximately 5 feet wide will be constructed on both sides of the channel at an elevation approximately 2 feet higher than the base of the channel (see Drawing C-5 in Appendix A). The lower bank will be constructed of streambed sediment, which will transition to a soil lift (soil encapsulated in layers of woven and non-woven coir fabric) on the wetland benches. At the outer edges of the benches, wetland habitat will continue along gently sloped upper banks constructed of two to three stacked soil lifts, each of which are about 1 foot in height. The top layer of coir fabric encapsulating the upper lift will be secured with an anchor trench. Soil within the lifts will consist of native soils mixed with compost-amended topsoil.

The entire extents of the project will be seeded with a native wetland grass mix and planted with native wetland vegetation including the riparian areas along the channel improvement reach and bank roughening structure (see Drawings ESC-1, P-1, and P-2 in Appendix A). A plant schedule

for the project is provided on Drawing P-2 in Appendix A. Along the channel improvement reach, live stakes will be planted directly adjacent to the base of the channel on the lower banks and will be planted along with emergent plugs on the wetland benches. The upper banks and top of banks will be planted with potted shrubs and trees. Replanting plans are consistent with planting guidelines presented in the City of Bellevue's *Critical Areas Handbook* (City of Bellevue 2003).

2.5.6 Reintroduction of Flow

Following completion of the channel bed, wetland, and bank modifications, the temporary cofferdams will be removed, flows will be re-established through the project area, and the temporary bypass pipes will be removed. This activity will be conducted consistent with the WSDOT (2009) standard protocol for this practice.

3.0 Critical Areas Assessment

Consistent with City of Bellevue Land Use Code (Bellevue LUC) 20.25H.245, the supporting information upon which this report is based was developed by qualified professionals in the areas of wetlands, fisheries biology, and geomorphology using the best available science and guidance. This report provides Critical Area Report (CAR) information needs specified throughout Bellevue LUC 20.25H. Section 3.1 presents allowable use and development classifications and how applicable performance standards are achieved. For ease of reference, information in this report includes sections for the following critical areas affected by the project:

- Section 3.2: Streams
- Section 3.3: Wetlands
- Section 3.4: Habitat Associated with Species of Local Importance
- Section 3.5: Areas of Special Flood Hazard

These sections address reporting requirements specific to the critical area of concern per the Bellevue LUC as well as general CAR reporting requirements in Bellevue LUC 20.25H.250.B.

3.1 Allowable Use and Development

The proposed action is classified as an allowable use and development under three categories identified in Bellevue LUC 20.25H.055.B: Instream Structures, Habitat Improvement Projects, and Public Flood Protection Measures. The project will:

- Address channel degradation and bank instability by providing stable streambed grade control (instream structures)

- Reduce flooding of adjacent property by enlarging the channel and constructing a flood control sheet pile wall (public flood protection measures)

- Preserve and enhance desirable habitat functions (habitat improvement projects)

According to Bellevue LUC 20.25H.055.B, specific performance standards are required for each allowable use and development category, which for the proposed project apply to wetlands, streams, and areas of special flood hazard. Justifications for performance standards that apply specifically to the allowable use and development categories are presented below. Justifications for performance standards specific to a critical area are presented in the subsections below.

3.1.1 Performance Standard for New and Expanded Uses or Development

According to the table in Bellevue LUC 20.25H.055.B, the performance standard for New and Expanded Uses or Development must be achieved for projects classified as Instream Structures and Public Flood Protection Measures in accordance with Bellevue LUC 20.25H.05.C.2. The necessity of installing grade control structures in East Creek and expansion of the channel dimensions is twofold: provide additional channel capacity to reduce flooding of adjacent infrastructure and restore the East Creek and Richards Creek channel bed and banks that have incised and eroded as a result of a replaced culvert at Kamber Road and removal of beaver dams. Incision and erosion have degraded fish habitat, which will be restored by the project.

Because the project aims to repair the East Creek and Richards Creek channels, there are no alternative locations for instream structures. There is no technically feasible or practicable alternative for reducing flooding of adjacent property with less impact on critical areas or critical areas buffers. Providing additional channel capacity will result in some temporary and permanent impacts on wetlands requiring mitigation; however, expanding the channel dimensions in the proposed location of East Creek improve wetlands that are degraded compared to more pristine wetland conditions within the upstream reach. All of the impacts can be mitigated through compensatory measures as described in following sections.

All of the remaining undeveloped land in the project vicinity is occupied by critical areas or critical area buffers. The only undeveloped land nearby suitable for an alternative facility (such as a detention basins), are occupied by mature forested wetlands, which would sustain extensive impacts if construction occurred there.

The project site is surrounded by infrastructure including parking lots and commercial buildings. Adjacent gravel or asphalt parking lots are located within approximately 5 to 15 feet of the proposed project. The only other alternative to constructing the proposed project would involve acquiring existing infrastructure and converting it to expanded East Creek and Richards Creek floodplain. The cost of this action is substantially disproportionate to the cost of the proposed project and associated environmental impact.

3.1.2 Performance Standards for Specific Uses or Development

In accordance with Bellevue LUC 20.25H.05.C.3, the project complies with performance standards that apply to Public Flood Protection Measures and Instream Structures. In accordance with LUC 20.25H.05.C.3.c, to alleviate flooding, channel enlargement and flood control sheet pile wall measures (for example new public flood protection measures) have been designed by qualified professionals including engineers, geomorphologists, and fish biologists as depicted in the plans contained in Appendix A. These professionals have conducted hydraulic analyses that support the design as presented in a basis of design report (Herrera 2011).

Likewise, in accordance with Bellevue LUC 20.25H.05.C.3.d, grade control structures in East Creek have been designed by the same qualified professionals. As presented in the basis of design report (Herrera 2011) and depicted in the plans contained in Appendix A, the project

design will result in measurable benefits including improved fish habitat conditions, improved hydrologic connectivity between streams and adjacent wetlands, decreased bank erosion, and stabilization of stream and wetland conditions. Also in accordance with this section of the code, the City of Bellevue Utilities Department will obtain all required state and federal permits for the project prior to undertaking development, which are anticipated to include a Section 404 permit from the U.S. Army Corps of Engineers (Corps), Section 401 Water Quality Certification from Ecology, and a Hydraulic Project Approval from WDFW.

In accordance with Bellevue LUC 20.25H.05.C.3.j, the habitat improvement components of this project are allowed within critical areas (East Creek, wetlands, buffers) because they will improve functions. As described further in this report, instream habitat improvements will improve conditions for fish including restoration of spawning habitat, creation of pool habitat, introduction of instream cover, and regulation of stream temperatures through shading from planted streamside vegetation. In addition, habitat improvements will increase the functions of wetlands and buffers by removing invasive vegetation, increasing native plant diversity, introducing large woody material habitat structure, and providing increased flooding of riverine wetlands. Also in accordance with this section of the code, the project is sponsored by a public agency (City of Bellevue).

3.2 Streams

This section describes streams and buffers in the study area and project area. The objectives of the stream assessment were to:

- Delineate (flag) the OHWM of all streams in the study area
- Classify all stream using the classification system according to Bellevue LUC 20.25H.075
- Determine the applicable stream buffer widths according to Bellevue LUC 20.25H.075
- Characterize existing stream and buffer conditions
- Evaluate impacts on streams and buffers
- Evaluate applicable Bellevue LUC performance standards
- Assess stream and buffer functions and values

3.2.1 Methods

Evaluating the presence, extent, and type of streams requires a review of available information about the site (such as surveys and studies), followed by an onsite stream delineation. The following sections describe the research methods and field protocols for the stream evaluation.

3.2.1.1 Review of Available Information

A literature review was performed to determine the historical and current presence of streams in and near the study area. The sources of information are:

- Aerial photographs of the project vicinity (City of Bellevue 2010)
- Topographic map of the project vicinity (City of Bellevue 2009a)
- Topographic survey of the study area (CTS Engineers, Inc. 2010)
- City of Bellevue critical areas inventory data (City of Bellevue 2010)
- City of Bellevue basin fact sheets (City of Bellevue 2009b)
- A Catalog of Washington Streams and Salmon Utilization (WDF 1975)
- SalmonScape computer mapping system (WDFW 2010a)
- Washington State Priority Habitat and Species (PHS) data (WDFW 2010b)

3.2.1.2 Stream Ordinary High Water Mark Delineation

The ordinary high water mark (OHWM) of streams within the study area was delineated using the definition provided in the WAC, Section 222-16-010, which has been adopted by the City of Bellevue (LUC 20.50.038). According to this definition, the OHWM of streams is "that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation." In addition, methods in the publication *Determining the Ordinary High Water Mark on Streams in Washington State* (Olson and Stockdale 2010) were applied.

To delineate the OHWM, the bed and adjacent banks of streams in the study area were examined for indications of regular high water events. Factors considered when assessing changes in vegetation include:

- Scour (removal of vegetation and exposure of gravel, sand, or other soil substrate)
- Drainage patterns
- Elevation of floodplain benches
- Changes in sediment texture across the floodplain

- Sediment layering
- Sediment or vegetation deposition
- Changes in vegetation communities across the floodplain

Herrera biologists placed flagging on the site, indicating the horizontal and vertical location of the OHWM along the streams. The locations of OHWM flags were subsequently surveyed by CTS Engineers, Inc.

3.2.1.3 Stream Category Designation

Stream categories were determined based on the designation system in Bellevue LUC 20.25H.075. This system is based primarily on fish, wildlife, and human use, and consists of four stream types: Type S, F, N, or O.

- Type S streams are those inventoried as "Shorelines of the State" under the Shoreline Management Master Program for the City of Bellevue, pursuant to RCW Chapter 90.58.
- Type F streams are those that contain fish or fish habitat, including waters diverted for use by a federal ,state, or tribal fish hatchery from the point of diversion for 1,500 feet or the entire tributary if the tributary is highly significant for protection of downstream water quality.
- Type N streams are those that are not type S or type F waters and that are physically connected to a type S or F water by an above ground system, stream or wetland.
- Type O streams are those that are not type S, F or N waters and are not physically connected to type S, F, or N waters by an above ground channel system, stream, or wetland.

3.2.2 Results

This section discusses the results of the stream delineation, including a review of information obtained from various references, and an analysis of stream conditions in the study area as observed during field investigations.

3.2.2.1 Analysis of Available Information

The available existing information compiled for this stream assessment is summarized in the following subsections.

3.2.2.1.1 Mapped Streams

The City of Bellevue (2009b, 2010) basin fact sheets and critical areas inventory identify the Richards Creek and East Creek stream network in the study area. On these maps, Richards Creek is shown as splitting in two directions: (1) north and eventually crossing Kamber Road and (2) east and eventually converging with East Creek. Since these maps were produced, Richards Creek has avulsed to the east under most flows joining with East Creek as depicted on Figure 3. East Creek then flows north under a bridge at Kamber Road.

3.2.2.1.2 Topography

Through the study area the gradient of East Creek is relatively flat with a slope of about 1 percent from an elevation of 55 feet (above sea level) at the upstream extents near the isolated roughening structure to an elevation of 49 feet at the downstream extents near Kamber Road. Likewise, the gradient of Richards Creek is about 1 percent from an elevation of 55 feet at the downstream extents of the Phase 2 project to an elevation of 51 feet at the confluence with East Creek.

3.2.2.1.3 Fish Use

According to City of Bellevue (2009b) basin fact sheets, fish species occurring in the study area within East Creek and Richards Creek include Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), cutthroat trout (*O. clarkii*), sculpin (*Cottus* spp.), lamprey (*Lampetra* spp.), and stickleback (*Gasterosteus* spp.).

3.2.2.2 Analysis of Stream Conditions

Stream delineation field activities were conducted by Herrera biologists Kris Lepine, Katheryn Seckel, and George Iftner. The stream delineation was conducted on April 27, 2010, and January 28, 2011.

Herrera biologists delineated the OHWM on both sides of Richards Creek and East Creek in the study area. The locations and extents of the streams and their buffers are shown on Figure 4. The width of East Creek downstream of its convergence with Richards Creek is approximately 10 feet. The location of the OHWM is typically located near the base of the eroding banks as distinguished by indicators of scour. A summary of stream conditions for East Creek including a representative photograph of the project area reach is provided in Table 1.

3.2.3 Cumulative Stream Impacts

As a result of the proposed project, there will be temporary impacts on the East Creek streambed and buffers during construction. These impacts are summarized in Table 2 and depicted graphically in Figure 5.

Figure 3.
Previously mapped wetlands and streams for the East Creek/Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Stream alignment
- Approximate historical stream alignment

NWI wetland type

- PSSC — Palustrine, scrub-shrub, seasonally-flooded
- PFOC — Palustrine, forested, seasonally-flooded
- PUBHx — Palustrine, unconsolidated bottom, permanently flooded, excavated

N

0 100 200 400 Feet

HERRERA ENVIRONMENTAL CONSULTANTS

Aerial photograph: City of Bellevue, 2007
Wetlands: USFWS, 1981
Stream network: King County, 2008

Produced By: GIS
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\Wetlands_and_Streams-phase_3.mxd

Figure 4.
Delineated wetland and stream map for the East Creek/Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Wetland
- Ordinary high water mark
- Stream continues offsite
- Wetland continues offsite

N

0 35 70 140 Feet

HERRERA
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Coordinates: NAD 83 Washington
StatePlane North (feet)
Aerial: City of Bellevue, 2007

Produced By: GIS (rdr)
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\survey_wetlands_and_stream.mxd

Table 1. Summary of East Creek within the Study Area.

Stream Name	**East Creek**		
WRIA Stream Catalog #	**08-0261 (South Fork Kelsey Creek)**		
		Local Jurisdiction	City of Bellevue
		WDNR/City of Bellevue Stream Category	Type F
		City of Bellevue Buffer Width	50 feet (Developed site)
		Documented Fish Use	Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), cutthroat trout (*O. clarkii*), sculpin (*Cottus* spp.), lamprey (*Lampetra* spp.), and stickleback (*Gasterosteus* spp.)
Connectivity (where stream flows from/to)	East Creek originates east of the project area within largely deciduous forest areas. Within the study area, Richards Creek converges with East Creek, which flows north through the project area and underneath Kamber Road. The flows increase dramatically downstream of the convergence due to the combined input from the Sunset Creek and Richards Creek basins. North of Kamber Road, East Creek flows north through a large riparian wetland and eventually discharges into Kelsey Creek, which flows into Mercer Slough, which flows into Lake Washington.		
Location of Stream Relative to Project Area	The channel improvements extend along a 430-foot reach of East Creek that flows north in a straight configuration through a narrow riparian corridor between commercial developments (Figure 2). In addition, the project includes construction of an isolated bank roughening structure along the right (north) bank of East Creek at the corner of a commercial development (Figure 2). See project plans in Appendix A for more information.		
Stream Condition in Study Area	Downstream of the Richards Creek convergence, East Creek is largely incised due to head cutting throughout the study area. The banks are undercut or vertical for several feet in height due to active erosion. The channel has incised into a compacted clay layer, which is the dominant substrate in the channel. The stream becomes less incised within approximately 100 feet of Kamber Road and sand substrate is dominant with subdominant small cobbles and gravels. Glide habitat is dominant throughout East Creek within the study area with occasional short riffle sections. Valuable rearing and spawning habitat is nearly nonexistent due to lack of pool habitat, instream cover, and gravels.		
Riparian/Buffer Condition	Vegetated riparian buffer conditions are largely degraded throughout the channel improvements project area along East Creek. Wetland A is contained within portions of the stream buffer on both sides of the stream. The tops of the banks are dominated by invasive and exotic Himalayan blackberry (*Rubus armeniacus*) and reed canarygrass (*Phalaris arundinacea*). In places, the blackberries grow completely over the channel. No trees exist along the left (west) bank of the stream, whereas mature black cottonwoods occur along the outer riparian corridor on the west side along the northern 200 feet of the project area. For approximately 170 feet in length along the right (east) bank, an adjacent property owner has maintained the undeveloped buffer in an unvegetated state with the exception of occasional Pacific willow (*Salix lasiandra*) trees. A combination of Himalayan blackberries and native shrubs and trees are common where the isolated bank roughening structure is proposed. See Appendix B for a complete list of plant species in the study area.		

Table 2. Impacts on East Creek stream channel and buffers.

Resource	Temporary Impacts	Permanent Impacts
East Creek Channel (waterward OHWM)	6,932 square feet (0.16 acres)	None
Stream Buffers	18,396 square feet (0.42 acres) [a]	None
Total	25,328 square feet (0.58 acres)	None

OHWM: Ordinary High Water Mark

[a] Stream buffer area includes wetland and upland areas adjacent to stream.

3.2.3.1 Temporary Impacts

The temporary impacts on East Creek will result from excavation and grading of the channel, which is necessary to implement channel improvements that involve enlarging, realigning, and re-grading the stream channel; and constructing grade control and bank stabilization structures (see Project Description and Project Construction sections above). Where the bank roughening structure is proposed along the upstream reach of East Creek, only minor temporary impacts on the outer channel will occur during installation of the structure within the bank.

Temporary impacts on the stream buffers will result from reconstructing the banks including initial clearing of vegetation; temporary construction access; excavation and grading of stream banks and wetland bench habitat; reconstruction of banks, and planting of native vegetation. Much of these impacts are on wetlands that occur within the stream buffer, primarily on the east side of East Creek. Most of the cleared vegetation will consist of invasive and exotic plants with the exception of 11 red alder (*Alnus rubra*) and Pacific willow trees, some of which have multiple trunks (see Table 3). In addition, some native shrubs and saplings near Kamber Road will be cleared where native plantings were installed previously when the culvert was replaced at Kamber Road. Although some mature trees will need to be removed to allow for construction of channel improvements, most surrounding mature trees will be preserved (see Drawing C-2 in Appendix A).

Table 3. Trees to be cleared along East Creek.

Scientific Name	Common Name	Quantity	Diameter at Breast Height (inches)
Alnus rubra	Red alder	6	Single trunks -- 12, 14, 14, 8, 10, 10
Salix lucida	Pacific willow	5	Double trunk -- 12, 16
			Double trunk -- 12, 12
			Double trunk – 12, 12
			Double trunk – 12, 14
			Single trunk -- 12
Total		11	

Figure 5.
Wetland, stream, and buffer impacts for the East Creek/Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Wetland
- Ordinary high water mark
- Permanent wetland impact
- Temporary wetland impact
- Temporary stream impact
- Temporary upland buffer impact
- Stream continues offsite
- Wetland continues offsite

N

0 35 70 140 Feet

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Coordinates: NAD 83 Washington StatePlane North (feet)
Aerial: City of Bellevue, 2007

Produced By: GIS (rdr)
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\survey_wetlands_and_stream_impacts.mxd

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

3.2.3.2 Permanent Impacts

No permanent impacts will occur to the East Creek channel throughout the project area. In addition, no permanent impacts will occur to the East Creek buffer – the project will not affect the existing outer extents of stream buffers throughout the project area. However, as a result of enlarging and slightly realigning the channel, the buffer widths will be modified in relation to the outer extents of the reconstructed channel. By moving the channel slightly to the east, the buffer widths will become more proportional on each side of the channel. Currently, the buffer width along the west side of East Creek is between approximately 5 and 20 feet wide, whereas the buffer width along the east side is 40 to 50 feet wide. Although channel improvements will widen the base of the channel, after construction a channel width will form over time based on ordinary flows that should resemble a similar width of the existing stream channel today. Therefore, the stream buffer area will remain the same and no permanent impacts on the buffer will occur.

3.2.4 Bellevue Land Use Code Stream Performance Standards

The project is in compliance with all of the applicable general stream performance standards in Bellevue LUC 20.25H.080.A. The outer edge of the East Creek critical area buffer will be planted within the project area with dense native vegetation to limit pet or human intrusion (see Drawings P-1 and P-2 in Appendix A). According to Bellevue LUC 20.25H.080.B, modification of the East Creek stream channel involving slight realignment is allowed because the project is in connection with installation of instream structures and habitat improvements.

3.2.5 Stream Functions and Values Assessment

3.2.5.1 Existing Stream Functions and Values

East Creek within the project area functions at a low level for fish habitat. Downstream of the Richards Creek convergence, East Creek is largely incised due to head cutting throughout the study area. The banks are undercut or vertical for several feet in height due to active erosion. The channel has incised into a compacted clay layer, which is the dominant substrate in the channel. Uniform glide habitat is dominant with occasional short riffle sections. Valuable rearing and spawning habitat is nearly nonexistent due to lack of pool habitat, instream cover, and gravels.

The buffers adjacent to East Creek within the project area primarily function at a low level because they are much narrower than the 50-foot regulated width necessary to support a functioning stream. The undeveloped, vegetated buffer width ranges between 5 and 50 feet on either side of the stream. Furthermore, the vegetated riparian buffer conditions are largely degraded throughout the East Creek project area. The tops of the banks are dominated by invasive and exotic Himalayan blackberry and reed canarygrass. An adjacent property owner maintains a large portion (approximately 4,700 square feet) of the buffer (also a portion of Wetland A) in an unvegetated state, with the exception of occasional alder and Pacific willow trees. During site visits, only dead grass was observed in the understory suggesting that herbicide had been applied. Mature trees only occur along a portion of the eastern buffer at the outer limits.

3.2.5.2 Future Stream Functions and Values

The project will improve fish habitat functions, throughout the project reach. Pool habitat (12 pools) will be restored for fish rearing and gravel substrate will be restored for spawning. Constructed wetland benches will provide refuge for fish during high flows. The project will improve instream cover for fish in the form of large woody material and planted native vegetation will improve shading cover over the stream. By raising the elevation of the channel and providing grade control, the project will restore the severe channel incision that has occurred along East Creek.

The project cannot improve buffers by providing additional width (due to existing development constraints); however, the project will make existing widths more proportional on each side of the new stream. In addition, the project will remove dominant invasive and exotic vegetation and restore the project area with planted native emergents, shrubs, and trees.

Improvements in stream and buffer functions are anticipated to improve further after completion of construction and last over the anticipated life of the project, which is designed to be relatively permanent. After construction, over the course of approximately 4 years, the incised upstream reach of Richards Creek within the study area will be passively restored as it fills in with sediment. Spawning gravels are anticipated to continue to be deposited from sources upstream in the basin. Over time, native vegetation will mature and provide shade to the stream and stabilize soils along the banks through root cohesion.

3.3 Wetlands

This section describes wetlands and buffers in the study area and project area. The objectives of the wetland assessment were to:

- Delineate (flag) all wetlands in the study area
- Classify delineated wetlands using the U.S. Fish and Wildlife Service (USFWS) and hydrogeomorphic (HGM) classification systems (Cowardin et al. 1979, Brinson 1993)
- Designate the category of delineated wetlands using the Washington State Wetland Rating System for Western Washington–Revised (Hruby 2004), which is the designation system required according to Bellevue LUC 20.25H.095.B
- Determine the applicable wetland buffer widths according to Bellevue LUC 20.25H.095.C.1
- Characterize existing wetland and buffer conditions
- Evaluate impacts on wetlands and buffers

- Evaluate applicable Bellevue LUC performance standards
- Assess wetland and buffer functions and values

3.3.1 Methods

Evaluating the presence, extent, and type of wetlands requires a review of available information about the site (such as surveys and studies), followed by an onsite wetland delineation. The following sections describe the research methods and field protocols for the wetland evaluation. More information about the methodology used in the wetland delineation performed for this project is available in Appendix C.

3.3.1.1 Review of Available Information

A literature review was completed to determine the historical and current presence of wetlands and streams in and near the study area. The sources of information are:

- Aerial photographs of the project vicinity (City of Bellevue 2007)
- Topographic map of the project vicinity (City of Bellevue 2009a)
- Topographic survey of the study area (CTS Engineers 2010)
- National Wetlands Inventory map of wetland areas in the project vicinity (USFWS 1981)
- City of Bellevue critical areas inventory data (City of Bellevue 2010)
- City of Bellevue basin fact sheets (City of Bellevue 2009b)
- Washington State Priority Habitat and Species (PHS) data (WDFW 2010b)
- Washington State Natural Heritage Program data (WDNR 2010)
- King County area soil survey for the project vicinity (NRCS 2010a)
- Hydric soils list for Washington (NRCS 2010b)

3.3.1.2 Wetland Delineation

This wetland delineation was performed in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (Environmental Laboratory 2010).

The methods in these guidance manuals use a three-parameter approach for identifying and delineating wetlands, and rely on the presence of field indicators for hydrophytic vegetation, hydric soils, and hydrology. The methods for evaluating these three parameters are described in Appendix C. This wetland delineation was performed according to procedures specified under the routine wetland determination method (Environmental Laboratory 1987).

To identify potential wetlands, wetland biologists evaluated field conditions by traversing the study area including areas within 300 feet of the project site. A test plot was established for each area that appeared to have potential wetland characteristics. For each test plot, data on dominant plant species, soil conditions in test plots, and evidence of hydrologic conditions were recorded on wetland determination data forms (Appendix D). Plants, soils, and hydrologic conditions were also analyzed and documented in adjacent upland areas. Based on collected data, a determination of wetland or upland was made for each area examined.

Following confirmation of wetland conditions in a given area, the wetland boundary was delineated by placing sequentially-numbered, flagging along the wetland perimeter. Test plot locations were also marked with flagging. The locations of wetland boundaries and test plots were subsequently surveyed by the City of Bellevue.

3.3.1.3 Wetland Classification, Category Designation, and Functional Assessment

This section provides information on the methods used to classify the wetlands, determine rating categories, and assess functions provided by the wetlands.

Wetland Classification

Wetlands observed on the study area were classified according to the USFWS classification system (Cowardin et al. 1979). This system is based on an evaluation of attributes such as vegetation class, hydrologic regime, salinity, and substrate. The wetlands were also classified according to the HGM system, which is based on an evaluation of attributes such as the position of the wetland within the surrounding landscape, the source and location of water just before it enters the wetland, and the pattern of water movement in the wetland (Brinson 1993).

Wetland Category Designation

Wetlands categories were designated using the *Washington State Wetland Rating System for Western Washington-Revised* (Hruby 2004), hereafter referred to as the Ecology rating system. The Ecology rating system categorizes wetlands according to specific attributes such as rarity; sensitivity to disturbance; hydrologic, water quality, and habitat functions; and special characteristics (such as if a mature forested wetland or bog). The total score for all functions determines the wetland rating. The rating system consists of four categories, with Category I wetlands exhibiting outstanding functions and/or special characteristics and Category IV wetlands exhibiting minimal attributes and functions. The rating categories are used to identify permitted uses in the wetland and its buffer, to determine the width of buffers needed to protect the wetland from adjacent development, and to identify the mitigation ratios required to

compensate for potential impacts on wetlands. The Ecology rating system is required to designate wetland categories according to Bellevue LUC 20.25H.095.B.

Wetland Functional Assessment

Wetland functions are those processes that occur within a wetland, such as the storage of water, cycling of nutrients, and maintenance of diverse plant communities and habitat which benefits wildlife. Wetland functions can be grouped into three broad categories: habitat functions, hydrologic functions, and water quality functions.

Habitat functions include providing food, water, and shelter for fish, shellfish, birds, amphibians, and mammals. Wetlands also serve as a breeding ground and nursery for numerous species. Hydrologic functions include reducing the velocity of stormwater, recharging and discharging groundwater, and providing flood storage. Water quality functions include the potential for removing sediment, nutrients, heavy metals, and toxic organic compounds.

Wetland functions were assessed using the *Washington State Wetland Rating System for Western Washington-Revised* (Hruby 2004), which is approved by Ecology for evaluating wetland functions in Washington. This system generates a score for each function based on the wetland's potential and opportunity for providing the function. Using the scores on the wetland rating forms, a qualitative functional rating (high, moderate, or low) was derived for functions (water quality, hydrology, and habitat) and values provided by each wetland, based on supplemental guidance provided by Ecology (Hruby 2011).

3.3.2 Results

This section discusses the results of the wetland delineation, including a review of available information and an analysis of wetland conditions in the study area as observed during field investigations.

3.3.2.1 Analysis of Available Information

The available existing information compiled for this wetland assessment is summarized in the following subsections.

3.3.2.1.1 Mapped Wetlands

The National Wetlands Inventory indicates Palustrine scrub-shrub (PSS), and forested (PFO), seasonally-flooded wetlands are located in the study area (Figure 3).

3.3.2.1.2 Mapped Soils

The only soil type mapped in the study area is Urban Land (NRCS 2010b) (Figure 6), which is likely due to the high density of development present. Urban land is soil that has been modified

by disturbance of the natural layers with additions of fill material several feet thick, often to accommodate large industrial and housing developments. In the study area, urban land constitutes those areas that have been filled to support industrial and commercial development.

Directly downstream of the study area, Seattle muck (0 to 5 percent slopes) soils are mapped north of Kamber Road where wetlands are prevalent on both sides of East Creek. Seattle muck is considered a hydric soil by the Natural Resources Conservation Service (NRCS 2010b). A typical profile of Seattle muck is composed of a foot-thick surface layer of organic muck overlying a stratified mucky peat to muck layer extending to a depth of approximately 60 inches. Seattle muck soils are very poorly drained with a water table near the surface.

3.3.2.1.3 Topography

Wetlands adjacent to East Creek and Richards Creek within the study area are relatively flat with a slope of approximately 1.5 percent from an elevation of 58 feet (above sea level) at the upstream extents near the isolated bank roughening structure to an elevation of 49 feet at the downstream extents near Kamber Road.

3.3.2.2 Analysis of Wetland Conditions

Wetland delineation field activities were conducted by Herrera biologists Kris Lepine, Katheryn Seckel, and George Iftner. The lead biologist (Kris Lepine) is certified by the Society of Wetland Scientists as a Professional Wetland Scientists (PWS). The wetland delineation was conducted on April 27, 2010. It was determined that the growing season (as defined in Appendix C) had begun, because plants were in full leaf out.

Herrera biologists delineated wetlands adjacent to Richards Creek and East Creek in the study area, referred to as Wetland A. The wetland was not delineated in entirety as it extends north, south, east, and west of the study area. The location and extent of the wetland and buffers within the study area are shown in Figure 4. A summary of the wetland characteristics within the study area is provided in Table 4. For Wetland A, biologists completed wetland delineation data forms (Appendix D) and an Ecology wetland rating form (Appendix E). A representative photograph of the wetland in the study area is included in Table 4.

Within the project area, Wetland A is degraded when compared to the rest of the study area where the wetland is much wider and contains diverse native vegetation, forested cover, habitat structure (such as snags), and less invasive vegetation. Within the project area, Wetland A is primarily limited to a narrow zone less than 35 feet wide along the east side of East Creek. The wetland is dominated by reed canarygrass and Himalayan blackberry. An adjacent property owner maintains a large portion (approximately 4,700 square feet) of the wetland in an unvegetated state, with the exception of occasional alder and Pacific willow trees. During site visits, only dead grass was observed in the understory suggesting that herbicide had been applied.

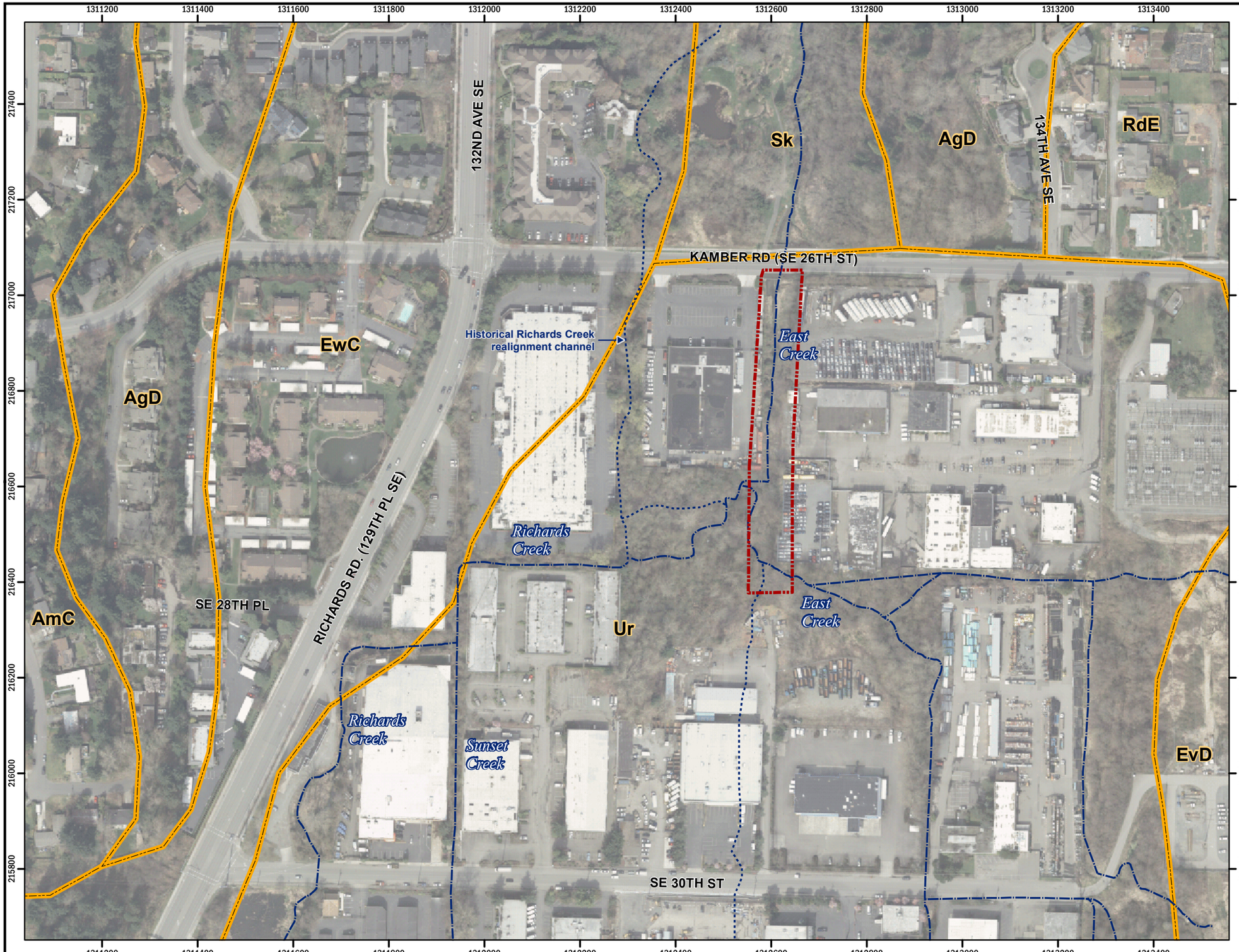

Figure 6.
Soil map for the East Creek/Richards Creek and Stream Modification Project.

Legend

- Approximate project area
- Stream alignment
- Approximate historical stream alignment

Soil classification (NRCS)

- **AgD** Alderwood gravelly sandy loam, 15 to 30% slopes
- **AmC** Arents, Alderwood material, 6 to 15 percent slopes
- **EvD** Everett gravelly sandy loam, 15 to 30 percent slopes
- **EwC** Everett gravelly sandy loams, 6 to 15 percent slopes
- **RdE** Ragnar-Indianola association, moderately steep
- **Sk** Seattle muck
- **Ur** Urban land

N

0 100 200 400 Feet

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Aerial photograph: City of Bellevue, 2007
Wetlands: USFWS, 1981
Stream network: King County, 2008

Produced By: GIS
Project: \\herrera\hecnet\gis-k\Projects\09-04503-000\Project\Soils_Updated-phase_3.mxd

Table 4. Summary of Wetland A within the Study Area.

Wetland Name	**Wetland A**		
		Local Jurisdiction	City of Bellevue
		WRIA	8
		Wetland Size	~4.5 acres
		Wetland Rating[a]	Category II
		City of Bellevue Buffer Width	75 feet
		USFWS Classification[a]	Palustrine forested (PFO)
		HGM Classification[b]	Riverine
		Wetland Data Forms	Appendix D, WLA-TP1, -TP3, -TP4
		Upland Data Form	Appendix D, WLA-TP2
Dominant Vegetation	Wetland A is dominated by a forested community of red alder and black cottonwood (*Populus trichocarpa*) with a shrub understory of willows, red-osier dogwood (*Cornus sericea*), salmonberry (*Rubus spectabilis*); and an herbaceous understory of lady fern (*Athyrium filix-femina*), big leaf sedge (*Carex amplifolia*), slough sedge (*Carex obnupta*), giant horsetail (*Equisetum telmateia)*, creeping buttercup (*Ranunculus repens*), small fruited bulrush (*Scirpus microcarpus*), and piggyback plant (*Tolmiea menziesii*). Non-native vegetation is prevalent in the project area and includes Himalayan blackberry and reed canarygrass (see photo). A complete plant list is provided in Appendix B. Plants observed at test plots are on data forms in Appendix D.		
Soils	As observed in soil pits, hydric soils include high organic content including mucky soils. Mineral textures vary including silt loam; gravelly loamy sand, and silty clay loam. Observed matrix soil colors vary including very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), and very dark gray (10YR 3/1). Redoxymorphic features are common including concentrations, coated sand grains, pore linings with colors of dark red (2.5YR 3/6) and yellowish red (5YR 5/8). See data forms in Appendix D.		
Hydrology	As observed in soil pits, wetlands soils exhibited saturated soils at the surface. In addition, areas of shallow ponding were observed in isolated areas throughout the wetland. Hydrologic sources to Wetland A include direct precipitation; groundwater; runoff from surrounding uplands, parking lots, and rooftops; and flooding from adjacent Richards Creek and East Creek. See data forms in Appendix D.		
Buffer Condition	The buffer surrounding Wetland A is primarily developed consisting of parking lots, gravel lots, and commercial buildings. The vegetated buffers are very narrow and dominated by Himalayan blackberry and English ivy with occasional black cottonwood and Douglas fir trees. A complete plant list is provided in Appendix B.		

[a] Wetland category is based on Ecology wetland rating system (Hruby 2004), per Bellevue LUC 20.25H.095.B.

[b] Wetland buffer widths are according to Bellevue LUC 20.25H.095.C.

[c] U.S. Fish and Wildlife Service classification is based on Cowardin et al. (1979): palustrine forested (PFO)

[d] Hydrogeomorphic classification is based on Brinson (1993).

3.3.3 Cumulative Wetland Impacts

As a result of the proposed project, there will be temporary and permanent impacts on Wetland A and buffers adjacent to East Creek. These effects are summarized in Table 5 and depicted graphically in Figure 5.

Table 5. Impacts on Wetland A and buffers.

Resource	Temporary Impacts	Permanent Impacts
Wetland A	9,475 square feet (0.22 acres)	3,036 square feet (0.07 acres)
Wetland Buffers	2,106 square feet (0.05 acres)	None
Total	11,581 square feet (0.27 acres)	3,036 square feet (0.07 acres)

3.3.3.1 Temporary Impacts

Temporary impacts on Wetland A and buffers will result from excavation and grading of the channel, which is necessary to implement channel improvements that involve enlarging, realigning, and re-grading the stream channel; and constructing grade control and bank stabilization structures (see Project Description and Project Construction sections above). In addition, temporary impacts will result from activities necessary to reconstruct the banks including initial clearing of vegetation; temporary construction access; excavation and grading of stream banks and wetland bench habitat; reconstruction of banks, and planting of native vegetation. Where the bank roughening structure is proposed along the upstream reach of East Creek, a small area of Wetland A and buffer will be temporarily impacted during installation of the structure within the bank.

As a result of channel improvements, temporary (and permanent) impacts on Wetland A will require removal of 11 red alder and Pacific willow trees, some of which have multiple trunks. These tree impacts also occur within the buffer of East Creek and are presented above in Table 3. In addition, clearing of some native shrubs and saplings near Kamber Road will be cleared where native plantings were installed previously when the culvert was replaced. Although some mature trees will need to be removed to allow for construction of channel improvements, most surrounding mature trees will be preserved (see Drawing C-2 in Appendix A).

3.3.3.2 Permanent Impacts

Permanent impacts on Wetland A will result from realigning the channel on average approximately 9 feet to the east. Shifting the channel east provides more room to construct stable banks and wetland benches between the channel and the parking lot on the west side of the channel. Where the channel is realigned, some existing wetland habitat will be replaced with stream channel habitat, representing a permanent impact. The base of the new channel will increase by 10 feet to a 20-foot total width along approximately 275 feet of the upstream portion of the channel improvements, and willow live stakes will be planted in this segment to provide riverine wetland habitat within the channel. After construction when flows are reintroduced to the channel, flows will carve a low flow channel within the 20-foot wide section of channel.

Based on existing conditions, it is anticipated that the low flow channel will be approximately 10 feet wide.

In addition, installation of a flood control sheet pile wall will intrude 2 feet into the wetland for a length of approximately 130 feet resulting in permanent impact on a small portion of Wetland A.

Throughout the project area, existing buffers surrounding Wetland A are primarily developed and consist of parking lots, gravel lots, and commercial buildings. The vegetated upland buffers are very narrow and consist of fill material at the edge of developments. The project will result in some reestablishment of wetland habitat within existing buffers; however, the project will maintain a narrow zone of upland buffer at the edge of the project area. Therefore, the project will not result in permanent impacts on buffers.

3.3.4 Bellevue Land Use Code Wetland Performance Standards

The project is in compliance with all of the applicable general wetland performance standards in Bellevue LUC 20.25H.100. Wetland A and adjacent buffer will be planted within the project area with dense native vegetation to limit pet or human intrusion (see Drawings P-1 and P-2 in Appendix A).

3.3.5 Wetland Functions and Values Assessment

In accordance with Bellevue LUC 20.25H.110.B, the following sections provide a functional evaluation for Wetland A. Functions of Wetland A within the study area were evaluated according to data in the Ecology wetland rating form (Hruby 2004), and supplemental qualitative ratings (high, medium, low) were determined based on Ecology compensatory mitigation guidance (Hruby 2011). This methodology entails rating the entire wetland unit which includes a substantial amount of wetland area that is outside of the project area. Conditions within the project area are much more degraded than portions of Wetland A located west of the project area. Therefore, the portion of Wetland A in the project area does not provideas high a level of functions as the rest of the wetland. A summary of the function scores, the total wetland score, and the associated category rating for Wetland A is provided in Table 6. The wetland rating form is provided in Appendix E.

Table 6. Wetland A functions and values.

Function	Rating of Site Potential [a]	Rating of Landscape Potential [a]	Rating of Value [a,]	Score [b]
Improving Water Quality	Moderate	Moderate	Moderate	20
Hydrologic	High	Moderate	High	26
Habitat	Moderate	Moderate	High	19
Total Score				65

[a] Qualitative ratings are based on Hruby (2011).

[b] Score based on Hruby (2004).

The functions and values of Wetland A were evaluated based on its riverine HGM class. Hydraulic modeling results indicate that most of the wetland experiences overbank flooding from Richards Creek and East Creek at least once every 2 years (Herrera 2011). The modeling is supported by field observations within the wetland including drainage patterns and shallow depressions with flooding.

Overall, Wetland A has a moderate rating for improving water quality which is due to several factors including presence of depressions capable of trapping sediments; dense trees and shrubs capable of resisting water velocities and promoting sediment deposition; surrounding urban area that contributes runoff; and capability of improving impaired (303d listed) water bodies downstream.

Wetland A has a highly rated hydrologic function for potential to reduce flooding and erosion due to an average wetland width that is much wider than the stream channel. In addition, trees and shrubs are capable of slowing flows. Wetland A is moderately rated for potential to provide hydrologic benefits to the surrounding landscape due to presence of surrounding urban areas that contribute peak flows. The hydrologic functions at the site have a high value to society because the site has been identified as important for flood storage and conveyance by the City of Bellevue (Herrera 2008).

Wetland A rates as having a moderate potential to provide important habitat functions due to several factors that create niches for fish and wildlife including forest cover with underlying shrub and herbaceous strata; several hydroperiods (permanently flooded, occasionally flooded, flowing stream); high richness of native plants, and several types of habitat features (such as snags, downed wood, undercut banks). Wetland A provides a moderate rated habitat function for ability to support habitat in the surrounding landscape because although there is very little accessible habitat directly adjacent to the wetland unit, there is approximately 140 acres of wildlife habitat patches within a kilometer radius. Wetland A is a high value to society because Richards Creek and East Creek provide habitat for threatened Puget Sound Chinook salmon within the wetland unit and the wetland contains several WDFW priority habitats (such as riparian and instream).

3.3.6 Wetland Mitigation Plan

This wetland mitigation plan was prepared in accordance with Bellevue LUC 20.25H.220 (Mitigation Plan Requirements) and LUC 20.25H.105 (Mitigation and Monitoring -- Additional Provisions).

3.3.6.1 Compensation for Wetland Impacts

The project will compensate for permanent impacts on Wetland A by reestablishing and rehabilitating wetlands (see Table 7 and Figure 7). Wetlands will be reestablished directly west of the channel improvements where benches will be constructed. Direct wetland rehabilitation in the project area includes the area of existing wetlands on the east side of the channel improvements that will be reconstructed and improved. Indirect wetland rehabilitation

Figure 7.
Wetland mitigation measures for the East Creek/Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Wetland
- Ordinary high water mark
- Stream continues offsite
- Wetland continues offsite

Wetland mitigation

- Reestablishment
- Rehabilitation

N

0 35 70 140 Feet

HERRERA ENVIRONMENTAL CONSULTANTS

Coordinates: NAD 83 Washington StatePlane North (feet)
Aerial: City of Bellevue, 2007

Produced By: GIS (rdr)
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City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

comprises large areas of Wetland A upstream of the channel improvements area where frequency and magnitude of flooding will be increased based on hydraulic analysis (Herrera 2011).

Table 7. Wetland mitigation measures.

Mitigation Measure	Area	Location
Reestablishment	3,885 square feet (0.09 acres)	West of realigned channel
Rehabilitation (direct)	8,705 square feet (0.20 acres)	West and East of realigned channel
Rehabilitation (indirect)	47,338 square feet (1.09 acres)	Increased flooding in Wetland A
Total	59,928 square feet (1.38 acres)	

In accordance with Bellevue mitigation preferences (LUC 20.25H.105), proposed compensatory mitigation measures involve reestablishing wetlands on-site on upland sites that were formerly wetland; and enhancing degraded wetlands through rehabilitation. Furthermore, compensatory mitigation is considered in-kind because it strives to restore riverine wetlands, which is the hydrogeomorphic class of Wetland A.

Wetlands will be reestablished in the project area at an acreage replacement ratio of approximately 1-to-1, which is less than the required 3-to-1 ratio according to Bellevue LUC 20.25H.105.C). However, according to Bellevue LUC 20.25H.105.E, wetland enhancement (which includes rehabilitation) is appropriate if it is demonstrated that functions of degraded wetlands will be increased. To this end, proposed wetland mitigation includes rehabilitation at an acreage replacement ratio of approximately 18-to-1.

Ecology guidance for calculating credits and debits for compensatory mitigation in wetlands was applied to evaluate functions that will be provided by Wetland A after construction and to what extent wetland functions will be improved (Hruby 2011). The levels of existing functions including water quality improvement, hydrologic, and habitat are provided in Table 6 and the functions scoring form is provided in Appendix F. The evaluation of functions provided after project goals and objectives are met, indicates that overall, the levels of functions within Wetland A will largely remain the same because the proposed project only directly affects a small portion of the overall wetland. However, the project will improve the level of hydrologic function overall within Wetland A by reversing the process of channel incision through the wetland, thereby increasing frequency and depth of flooding within the wetland.

All functions will improve within that portion of Wetland A located in the project area. Wetland reestablishment and rehabilitation measures will improve water quality functions by planting shrubs and herbaceous plants in areas exposed to flow, which will act to filter and trap sediments associated with pollution. Hydrologic functions will improve by increasing the width of wetland adjacent to the channel in the form of benches that are capable of flooding during higher flows. Habitat functions will improve by increasing the richness of plant species and introducing large woody material.

Furthermore, Ecology guidance for calculating credits and debits for compensatory mitigation in wetlands was applied to evaluate adequacy of the proposed wetland mitigation (Hruby 2011). This guidance provides a system for determining "debits" based on acreage of wetland impact, levels of wetland functions affected, vegetation community affected, and temporal loss of function (which is the time it takes for functions to be fully restored). In addition, this guidance provides a system for determining "credits" of proposed mitigation based on increases in level of wetland function, type of mitigation measure (such as creation/reestablishment, rehabilitation, etc.), acreage, and risk associated with mitigation success. After calculating debits and credits for the project, a balance is determined and if credits outweigh debits, the project is considered to adequately mitigate wetland impacts. Debit and credit forms for this project are provided in Appendix F.

Our evaluation of debits and credits for the project indicates that overall, the project will balance out with a surplus of 0.12 credits. Although small debit balances in the functional categories for improving water quality (-0.25) and habitat function (-0.28) result from the proposed mitigation, these debits are outweighed by a credit balance for hydrologic function (+0.65).

3.3.6.2 Goal, Objective, and Success Criteria

The goal of the wetland mitigation plan is to reestablish and rehabilitate forested wetlands within the channel improvements and wood roughening structure project areas in support of replacing and improving water quality, hydrologic, and wildlife functions. To meet this goal, the objective is to plant a variety of emergent, herbaceous, shrub, and tree species that will develop into a mature forested vegetation community with adequate cover and composition.

All areas that are restored will be subject to the following success criteria, which will be monitored for a period of at least 10 years.

3.3.6.2.1 Year 1 Success Criterion (2013)

By the end of the first growing season (fall 2013), 100 percent of the plantings will be alive as demonstrated by budding leaves. The planting contract stipulates that the contractor must replant all plants that did not survive by the end of the first year. The percentage of area covered by nonnative species (e.g., Himalayan blackberry, ivy) will not exceed 10 percent throughout the planting areas.

3.3.6.2.2 Year 2 Success Criterion (2014)

By the end of the second growing season (fall 2014), at least 80 percent of the plantings will be alive demonstrated by budding leaves. The percentage of area covered by nonnative or invasive species (e.g., Himalayan blackberry, reed canarygrass) will not exceed 10 percent throughout the planting areas.

3.3.6.2.3 Year 3 Success Criterion (2015)

By the end of the third growing season (fall 2015), woody vegetation (shrubs and trees) will cover at least 20 percent of the planting areas; and emergent and herbaceous understory plants will cover at least 30 percent of the planting areas. The percentage of area covered by nonnative or invasive species (e.g., Himalayan blackberry, reed canarygrass) will not exceed 10 percent throughout the planting areas.

3.3.6.2.4 Year 5 Success Criterion (2017)

By the end of the fifth growing season (fall 2017), woody vegetation (shrubs and trees) will cover at least 50 percent of the planting areas; and emergent and herbaceous understory plants will cover at least 50 percent of the planting areas. The percentage of area covered by nonnative or invasive species (e.g., Himalayan blackberry, reed canarygrass) will not exceed 10 percent throughout the planting areas.

3.3.6.2.5 Year 7 Success Criterion (2019)

By the end of the seventh growing season (fall 2019), woody vegetation (shrubs and trees) will cover at least 70 percent of the planting areas; and emergent and herbaceous understory plants will cover at least 50 percent of the planting areas. The percentage of area covered by nonnative or invasive species (e.g., Himalayan blackberry, reed canarygrass) will not exceed 10 percent throughout the planting areas.

3.3.6.2.6 Year 10 Success Criterion (2021)

By the end of the tenth growing season (fall 2021), woody vegetation (shrubs and trees) will cover at least 90 percent of the planting areas; and emergent and herbaceous understory plants will cover at least 50 percent of the planting areas. The percentage of area covered by nonnative or invasive species (e.g., Himalayan blackberry, reed canarygrass) will not exceed 10 percent throughout the planting areas.

3.3.6.3 Wetland Mitigation Site Plan

Wetland mitigation in the form of reestablishment and rehabilitation will be implemented according to the project engineering plans (Appendix A). The project will be constructed during 2012. Earthwork will occur during the summer, seeding in the fall, and planting during late fall or winter. As part of the project, wetland habitat will be constructed along the banks of East Creek including flat, wetland benches along both sides of the channel. The bench habitats will be approximately 5 feet wide at an elevation approximately 2 feet higher than the base of the channel. Cross-sections, plans, and profiles of the channel, benches, and banks are shown on Drawings C-3, C-4, and C-5 in Appendix A. The lower bank will be constructed of streambed sediment, which will transition to a soil lift (soil encapsulated in layers of woven and non-woven coir fabric) on the wetland benches. At the outer edges of the benches, wetland habitat will continue along gently sloped upper banks constructed of two to three stacked soil lifts, each of

which are about 1 foot in height. The top layer of coir fabric encapsulating the upper lift will be secured with an anchor trench. Soil within the lifts will consist of native soils mixed with compost-amended topsoil.

Replanting plans are consistent with planting guidelines presented in the City of Bellevue's *Critical Areas Handbook* (City of Bellevue 2003). The entire extents of the project will be seeded with a native wetland grass mix and planted with native wetland vegetation including the riparian areas along the channel improvement reach and bank roughening structure (see Drawings ESC-1, P-1, and P-2 in Appendix A). A plant schedule for the project is provided on Drawing P-2 in Appendix A. Along the channel improvement reach, live stakes will be planted directly adjacent to the base of the channel on the lower banks and will be planted along with emergent plugs on the wetland benches. The upper banks and top of banks will be planted with potted shrubs and trees. A dense planting plan is proposed including emergent plugs planted one foot on center, live stakes and shrubs planted 4 feet on center, and trees planted 10 feet on center. Seeding will occur immediately after construction during the fall. All planting will occur during the dormant season (October through February).

3.3.6.4 Monitoring and Contingency Plan

All planting areas will be monitored to evaluate the success of revegetation measures in support of replacing functions that were affected during construction. During construction, the project engineer and biologist will monitor the site to ensure that best management practices (BMPs) are implemented such that there are no unanticipated impacts on wetlands or buffers.

The success of mitigation will be determined by monitoring the site and determining if success criteria are achieved. The City of Bellevue will arrange to have the mitigation site monitored by a biologist for a minimum of 10 years. At a minimum, monitoring visits to the site will take place at least once a year during Years 1, 2, 3, 5, 7, and 10 after construction. For the purpose of measuring plant cover, monitoring transects will be established within the planting areas. During monitoring visits, representative photographs will be taken from established photo points. After each monitoring visit, a report presenting the results of the site inspection will be submitted to City of Bellevue Planning and Community Development, Ecology, WDFW, and the Corps.

During Years 1 and 2, the survival of plantings and cover of invasive vegetation will be assessed within the planting areas. In addition, the extent of natural colonization in terms of percent cover of herbaceous and emergent plants; and woody shrubs and trees will be measured. During Years 2, 3, 5, 7, and 10, percent plant cover will be evaluated including native and invasive vegetation.

During each monitoring year, in addition to assessing conditions along monitoring transects, observations of overall conditions will be made throughout the planting areas. Within the monitoring report, the biologist responsible for monitoring will present detailed monitoring methods, results, and make recommendations for annual maintenance of the planting areas such as replanting, watering, weeding, and removal of trash. If plants are not succeeding, the biologist will make recommendations for contingency actions, which could include suitable

plant substitutions based on site conditions. If it is evident that wetland conditions are not established within proposed wetland mitigation areas, a broader contingency plan will be necessary, which could include modifying grades or structures on the site with additional monitoring or implementing additional mitigation measures on or off-site. If additional mitigation becomes necessary, regulatory agencies will be consulted.

3.4 Habitat Associated with Species of Local Importance

This section presents a habitat assessment associated with fish and wildlife species of local importance in accordance with Bellevue LUC 20.25H.150. The objectives of the habitat assessment were to:

- Describe vegetation on and adjacent to the site
- Identify species of local importance that have a primary association with habitat on or adjacent to the site, and assess potential impacts
- Discuss any federal, state, or local special management recommendations
- Discuss direct and indirect potential impacts on habitat, including cumulative impacts
- Discuss measures to avoid, minimize, mitigate, and preserve existing habitats and restore any habitat that was degraded prior to the current proposed activity (see Section 3.6)
- Discuss ongoing management practices that will protect habitat after the site has been developed

3.4.1 Methods

To evaluate habitat conditions in the study area, Herrera biologists surveyed the study area to identify dominant species, forest maturity, concentrations of native and invasive plant populations, other habitat features (such as snags and logs), habitat potential to support fish and wildlife species of local importance, and indications of use by these species. To observe habitat conditions and fish and wildlife, Herrera biologists including Kris Lepine, Katheryn Seckel, and George Iftner conducted field visits in April and May of 2010.

In addition, Herrera reviewed information provided by WDFW's Priority Habitats and Species (PHS) Program (WDFW 2010a), fish usage information from the Salmonscape mapping program (WDFW 2010b), and City of Bellevue basin fact sheets (City of Bellevue 2009b).

3.4.2 Vegetation On and Adjacent to the Site

The project area is located along East Creek and portions of Wetland A (see Section 3.3); and is surrounded by developed commercial properties. Most of the vegetation on and adjacent to the site is contained within Wetland A because surrounding developed parking lots and buildings are built within historic floodplain wetlands. Wetland A within the greater study area is dominated by a forested community of red alder and black cottonwood with a shrub understory of willows, red-osier dogwood, salmonberry; and an herbaceous understory of lady fern, big leaf sedge, slough sedge, giant horsetail, creeping buttercup, small fruited bulrush, and piggyback plant. Non-native vegetation is prevalent in the project area and includes Himalayan blackberry and reed canarygrass. A complete plant list is provided in Appendix B.

3.4.3 Species of Local Importance with Primary Habitat Association

Herrera examined the presence of species of local importance with a primary association with habitats occurring in the project area. The following species may occur based on the presence of suitable habitat and/or documented occurrence:

- **Fish species:** According to City of Bellevue (2009b) basin fact sheets, fish species of local importance occurring in the study area within East Creek and Richards Creek include Chinook salmon and coho salmon. Before hydrological modification and subsequent changes in downstream habitat conditions, known or likely distribution of Chinook salmon in Sunset Creek extended up to (and perhaps beyond) SE 30th Street. Coho spawning and rearing has been documented in the Richards and Sunset Creek channels up to and immediately upstream of SE 30th Street (Paulsen 2007; WDFW 2007). Neither species has been documented in the project area in recent years, as a result of two factors: depressed population abundance; and partial barriers to fish passage created by beaver activity in downstream areas of Richards Creek (Paulsen 2007).

- **Vaux's swift:** There is potential nesting habitat for Vaux's swift in hollows of snags at the site. However, Vaux's swift are more closely associated with old-growth forested habitat, which is not present in the study area (Larsen et al. 2004).

- **Pileated woodpecker:** There is good habitat for pileated woodpeckers and it is assumed that breeding habitat is present as well due to the presence of suitably sized trees and observations of adults with fledglings during site visits in May 2010.

Several species of local importance are not expected to occur either because the species are not present or because suitable habitat is not present. There is little to no habitat for bald eagle, peregrine falcon, merlin, osprey, great blue heron, green heron, or red-tailed hawk due to the closed canopy and dense vegetation that precludes access. In addition, these species are typically

not associated with small stream habitat. However, occasional canopy openings may provide opportunity for feeding among red-tailed hawk and great blue heron. Heron are more likely to be found in wetlands north of the study area where open habitat is more accessible. There is no habitat for common loon, purple martin, or western grebe, which require lakeshore habitat.

There is no habitat for Oregon spotted frog or western pond turtle, both of which require perennial water sources and pools. There is foraging and dispersal habitat for western toad in the project area, but no breeding habitat, due to the lack of pools and ponds.

There is poor habitat for the protected bat species (western big-eared bat, Keen's Myotis, long-legged Myotis, and long-eared Myotis) since there are only two snags in which they could potentially roost. These bats roost in cavities in large trees and snags which are present and forage over a variety of habitats for prey (insects). These bats prefer roosting in conifers, which are not present in the study area.

3.4.4 Federal, State, or Local Management Recommendations

The project will improve the functions of East Creek (see Section 3.2) in a manner that is consistent with recommendations provided by WDFW for riparian priority habitats (Knutson and Naef 1997). Specifically, the project will follow the recommendations to restore degraded riparian habitat, emulate natural conditions, and use non-structural (bioengineered) bank protection techniques. The addition of coniferous large woody material in the stream as part of the project will enhance pileated woodpecker foraging habitat, as downed logs are a common feeding location for this species (Larsen et al. 2004).

3.4.5 Direct Impacts, Indirect Impacts and Probable Cumulative Impacts

There will be no adverse direct impacts on habitat for Vaux's swift or pileated woodpecker. No standing snags will be removed. The only vegetation removal will be restricted to trees, shrubs, emergents, and other herbaceous vegetation within the project area away from snag locations where these species may occur. All areas of vegetation cleared during construction will be planted with native vegetation. Work will occur in the summer, after pileated woodpecker breeding is complete. The addition of large woody material as part of the project will enhance pileated woodpecker foraging habitat, as downed logs are a common feeding location for this species. If present, construction noise may temporarily disturb Vaux's swift and pileated woodpecker, but they would be expected to return after construction is complete.

The project will not have any adverse direct effects on fish species; however, during construction the channel will be dewatered and all flow diverted around the construction sites. Fish that may be in the project area will be relocated downstream following WDFW (2009) protocols. During construction, water quality will be monitored to assure that turbid water is not released downstream where fish may be present. If turbidity that exceeds state water quality standards is observed, construction will cease until the turbidity problems are rectified.

There are no cumulative impacts on habitats associated with species of local significance anticipated as a result of the proposed project, since the project area will be fully restored to an improved condition.

3.5 Areas of Special Flood Hazard

This section presents a special flood hazard assessment in accordance with Bellevue LUC 20.25H.175. The objectives of the special flood hazard assessment were to:

- Identify areas of special flood hazard in the study area
- Discuss the effect of the project on special flood hazard areas
- Discuss how both general and specific City of Bellevue performance standards are achieved

3.5.1 Special Flood Hazard Areas On and Adjacent to the Site

Special flood hazard areas on and adjacent to the site include the 100-year floodplain as delineated on the flood insurance rate map by the Federal Emergency Management Agency (see Figure 8, FEMA 1995). The 100-year floodplain spans most of the project area and extends upstream and downstream along East Creek and Richards Creek within the study area.

3.5.2 Project Effects on Special Flood Hazard Areas

The project involves several components within the 100-year floodplain. Structures proposed within the 100-year floodplain include 12 grade control structures made of large woody materials, a flood control sheet pile wall, and a localized bank stabilization (wood roughening) structure made of large woody material (see Section 2.3). In addition, the profile of East Creek will be slightly raised in elevation and the high-flow channel dimensions will be widened. These changes will affect the 100-year floodplain by reducing flood elevations by different amounts depending on the location in the floodplain (Herrera 2011). The most significant decreases will be for the properties immediately east of the project site.

3.5.3 Bellevue Land Use Code Special Flood Hazard Areas Performance Standards

In accordance with Bellevue general performance standards (LUC 20.25H.180.C), project modifications within the 100-year floodplain will maintain the character of existing vegetation within the study area. Existing riverine wetlands within the 100-year floodplain are accustomed to overbank flooding and increases in flooding frequency resulting from the project are intended to restore historic flooding conditions and therefore will not have an adverse effect on existing vegetation.

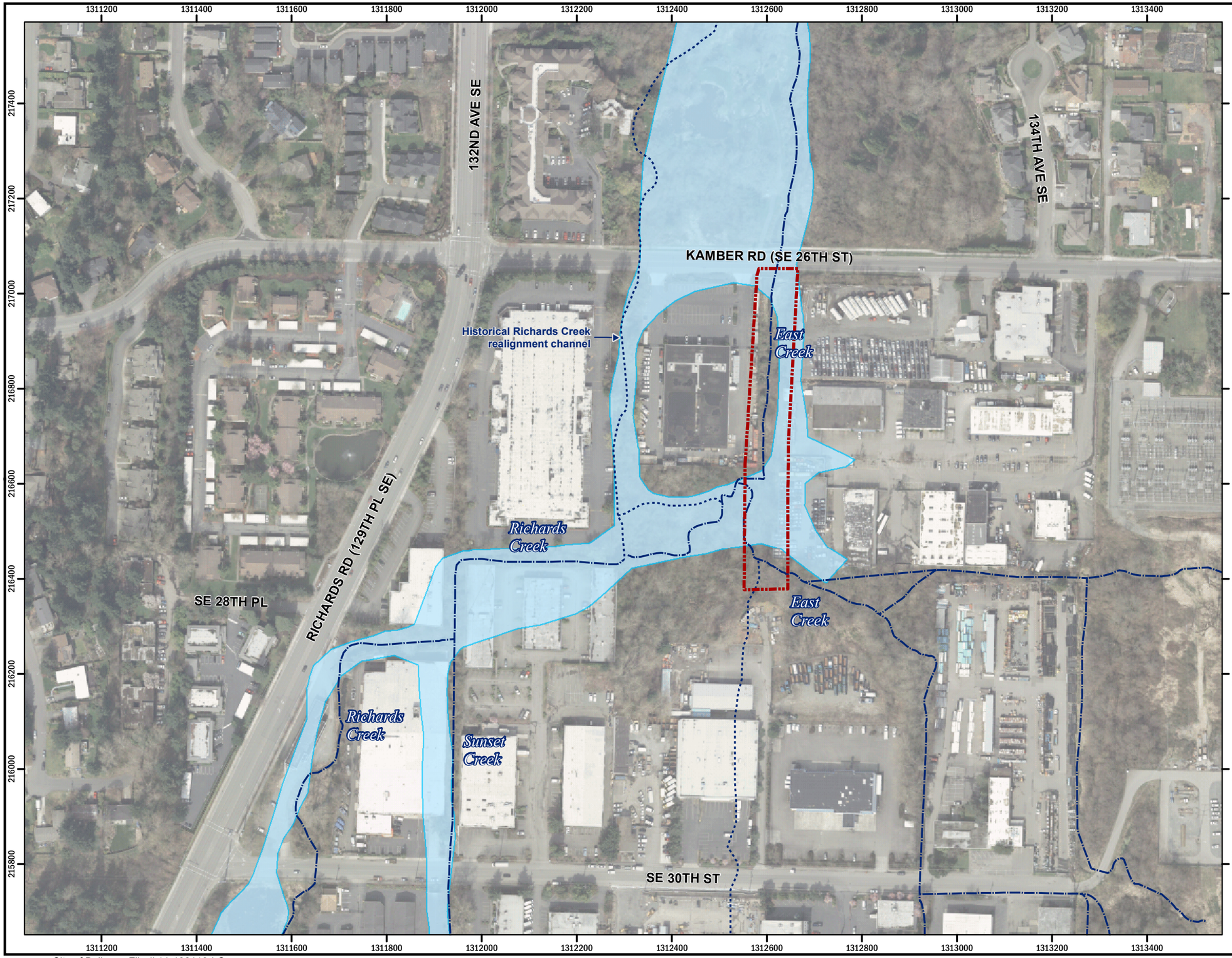

Figure 8.
Floodplain map for the East Creek/ Richards Creek Stream Modification Project.

Legend

- Approximate project area
- Stream alignment
- Approximate historical stream alignment
- Floodplain

N

0 100 200 400 Feet

HERRERA
ENVIRONMENTAL CONSULTANTS

Aerial photograph: City of Bellevue, 2007
Floodplain: FEMA, 1995
Stream network: King County, 2008

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Channel and bank elevations proposed by the project are intended to restore East Creek to conditions prior to incision caused by a combination of culvert replacement at Kamber Road and removal of downstream beaver dams. No structures are proposed as a part of this phase of the project that result in a rise in base flood elevation when compared to pre-incision conditions.

In accordance with Bellevue LUC, proposed modifications to the channel are allowed because the project is associated with habitat improvements. Furthermore, the City of Bellevue is committed to maintaining the channel in a condition that ensures that flood carrying capacity is not diminished.

An objective of the project is to provide public flood protection measures. Channel improvements will reduce flooding to adjacent properties and a flood control sheet pile wall will be constructed to prevent flooding. In accordance with Bellevue specific performance standards (LUC 20.25H.180.D), these measures are allowed in a special flood hazard area because the project will produce measurable benefits, including decreased erosion, peak flow reduction, improved water quality (see Section 3.3), and improved aquatic habitat that do not threaten existing structures adjacent to the project.

3.6 Mitigation Sequencing

The project follows requirements for mitigation sequencing as outlined in Bellevue LUC 20.25H.110.B; joint Ecology, Corps, and Environmental Protection Agency (EPA) guidance (Ecology 2006); and State Environmental Policy Act (Washington Administrative Code Chapter 197-11-768).

3.6.1 Avoidance of Impacts

The project design seeks to avoid critical areas impacts to the maximum extent possible while achieving project goals. Permanent impacts on East Creek will be avoided as well as adverse impacts on Chinook and coho salmon (species of local importance) that may occur in the stream. In addition, the project will avoid impacts on existing snags that provide potential habitat for Vaux's swift and pileated woodpecker (species of local importance).

Complete avoidance of permanent impacts on wetlands is not feasible because measures are necessary to achieve the goal of improving fish habitat and reducing flooding and erosion of commercial and industrial property in the vicinity of the project site. The project will address ongoing channel incision in East Creek and Richards Creek through restoration measures that will effectively raise the elevation of the streambed with grade controls. These measures would inherently increase the frequency and magnitude of overbank flooding of adjacent developed properties that necessitates flood reduction measures including an enlarged stream channel and flood control sheet pile wall located in portions of Wetland A.

In addition, temporary impacts on East Creek, wetlands, and buffers are necessary to achieve this goal and the goal of preserving and enhancing desirable instream, wetlands, and riparian habitat functions.

Furthermore, the project avoids impacts on areas of special flood hazard (100-year floodplain) and does not threaten existing structures adjacent to the project.

3.6.2 Minimization of Impacts

The project greatly minimizes impacts by confining the project area to a portion of Wetland A that is narrow and largely degraded in its existing condition. Incised portions of Richards Creek with eroding banks are in need of restoration upstream of the project area. However, direct measures to restore the stream in this area are not planned because construction activity would result in substantial temporary impacts on an intact, forested portion of Wetland A. Instead, the project is designed to indirectly restore this area over time by allowing for sediment to deposit in the stream channel and reverse the trend of incision.

3.6.3 Rectification of Impacts

The project aims to rectify temporary and permanent impacts on East Creek, wetlands, and buffers by repairing and rehabilitating East Creek and adjacent wetlands and buffers by installing grade control, bank stabilization, and habitat structures consisting of large woody materials to prevent head-cut migration and eroding banks; and provide stable, physical habitat. In addition, temporary impacts will be rectified by restoring these areas including revegetation with native plants.

3.6.4 Reduction of Impacts

As a result of the project, ongoing impacts on the project site and within the study area will be reduced over time. By repairing incised portions of East Creek and Richards Creek with grade control, bank stabilization, and habitat structures, channel incision will be halted and greatly reduced over time. In addition, the City of Bellevue will monitor the project after construction to insure that it is stable and provides functional habitat.

3.6.5 Compensation for the Impacts

The project will compensate for permanent impacts on Wetland A by reestablishing and rehabilitating wetlands. Wetlands will be reestablished directly west of the channel improvements where benches will be constructed. Direct wetland rehabilitation in the project area includes the area of existing wetlands on the east side of the channel improvements that will be reconstructed and improved. Indirect wetland rehabilitation comprises large areas of Wetland A upstream of the channel improvements area where frequency and magnitude of flooding will be increased based on hydraulic analysis (Herrera 2011). Additional information on compensation for wetland impacts is provided in Section 3.3.

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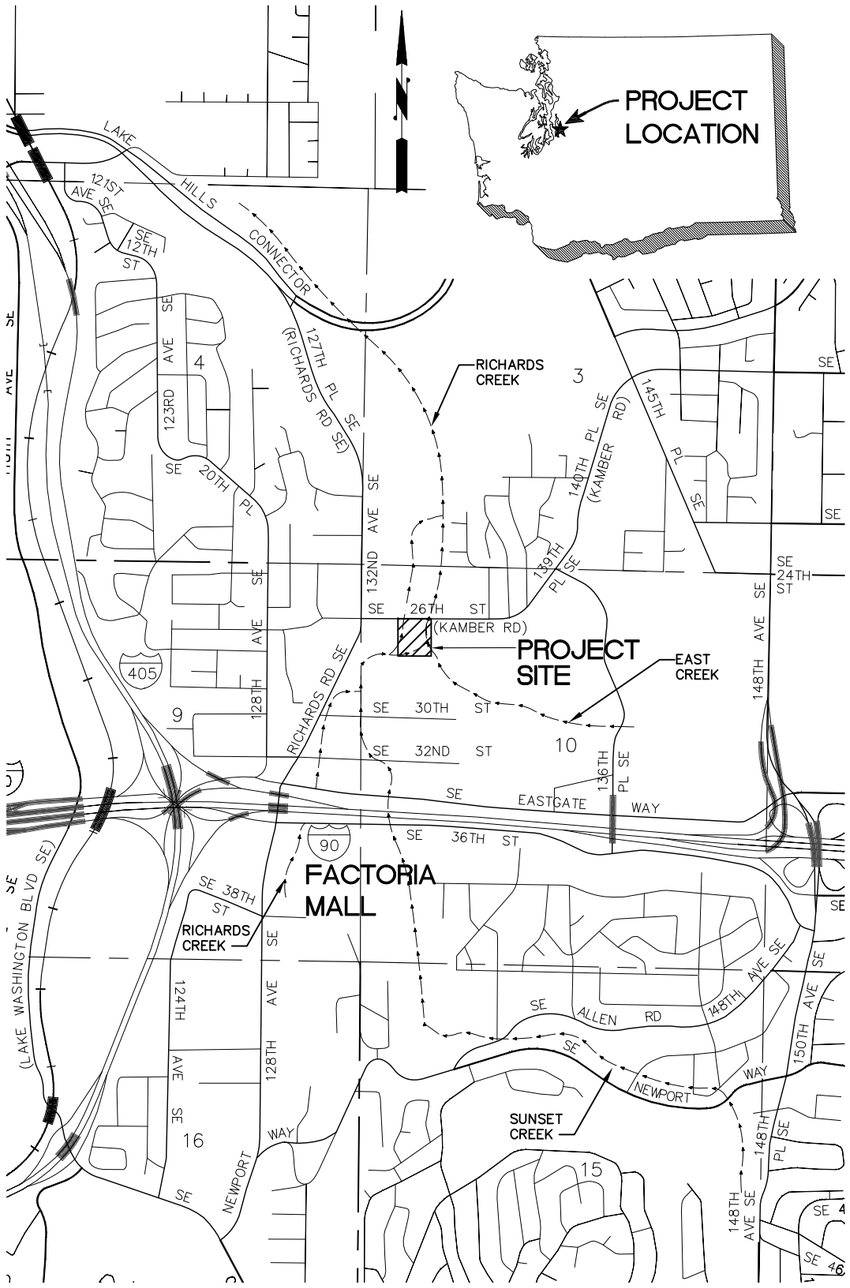
APPENDIX A

Project Engineering Plans

CITY OF BELLEVUE
EAST CREEK/RICHARDS CREEK
STREAM MODIFICATION PROJECT
BELLEVUE, WASHINGTON



VICINITY MAP
SCALE: 1"=1000'

SHEET INDEX

SHEET NO.	DWG NO.	SHEET DESCRIPTION
1	G-1	VICINITY MAP AND SHEET INDEX
2	G-2	GENERAL NOTES
3	G-3	ABBREVIATIONS AND LEGEND
4	C-1	SITE PLAN AND KEY MAP
5	C-2	SITE PREPARATION PLAN
6	C-3	UPSTREAM EAST CREEK PLAN AND PROFILE
7	C-4	DOWNSTREAM EAST CREEK PLAN AND PROFILE
8	C-5	SECTIONS
9	C-6	WOOD STRUCTURES INSTALLATION PLANS 1
10	C-7	WOOD STRUCTURES INSTALLATION PLANS 2
11	C-8	DETAILS
12	C-9	CONTROL POINT AND ALIGNMENT TABLES
13	ESC-1	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
14	ESC-2	TESC DETAILS 1
15	WM-1	FLOW DIVERSION AND FISH EXCLUSION PLAN
16	P-1	PLANTING PLAN AND SCHEDULE
17	P-2	PLANTING DETAILS

1 / C-3 — DETAIL REFERENCE NUMBER; DRAWING ON WHICH DETAIL IS SHOWN

DETAIL — SCALE: NTS — 1 / C-1 — DETAIL REFERENCE NUMBER; DRAWING FROM WHICH DETAIL WAS TAKEN

A / C-4 — SECTION REFERENCE LETTER; DRAWING ON WHICH SECTION IS SHOWN

SECTION — SCALE: NTS — A / C-2 — SECTION REFERENCE LETTER; DRAWING FROM WHICH SECTION WAS TAKEN

"–" INDICATES THAT THE DETAIL/SECTION IS SHOWN ON THE SAME SHEET

"TYP" INDICATES THAT THE DETAIL/SECTION IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED

"VAR" SPECIFIES THAT DETAIL/SECTION WAS TAKEN FROM SEVERAL DRAWINGS

NOTE AND DETAIL/SECTION REFERENCING

DATUM — NAVD 88/NAD 83

MARK EWBANK — STATE OF WASHINGTON — 29434 — REGISTERED PROFESSIONAL ENGINEER — DRAFT

ONE INCH — AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's below. Call before you dig.

60% DESIGN - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

HERRERA ENVIRONMENTAL CONSULTANTS
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Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER — DATE
PROJECT MANAGER — DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

VICINITY MAP AND SHEET INDEX

DRAWING G-1 — SHT 1 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\G-1.dwg
Plot Date: 7/14/2011 12:20 PM
Cad User: Laura Turnidge

GENERAL CONSTRUCTION NOTES:

1. MATERIAL SHALL NOT BE STORED OUTSIDE OF IDENTIFIED STAGING AREAS, UNLESS APPROVED BY OWNER OR ENGINEER.
2. ALL EQUIPMENT SHALL USE ONLY BIODEGRADABLE HYDRAULIC FLUIDS.
3. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO PROJECT LIMITS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY ENGINEER.
4. CLEARING LIMITS FOR TEMPORARY ACCESS ROAD AND PROPOSED STRUCTURES SHALL BE LIMITED TO THE AREA REQUIRED FOR SAFE EQUIPMENT OPERATION. CLEARING LIMITS SHALL BE STAKED BY CONTRACTOR AND APPROVED BY ENGINEER AT LEAST 3 WORKING DAYS PRIOR TO CLEARING ACTIVITIES. CLEARING LIMITS SHALL BE STAKED TO MINIMIZE THE AREA OF DISTURBANCE.
5. CONTRACTOR SHALL PROVIDE 24 HOURS ADVANCE NOTICE TO THE ENGINEER PRIOR TO ANY REQUIRED INSPECTION.
6. CONTRACTOR SHALL SUBMIT A CONSTRUCTION SEQUENCE PLAN FOR APPROVAL AT LEAST 5 WORKING DAYS PRIOR TO SITE WORK.
7. APPROVED CONSTRUCTION SEQUENCE PLAN SHALL NOT BE ALTERED UNLESS APPROVED BY ENGINEER.
8. EQUIPMENT USED FOR THIS PROJECT SHALL BE FREE OF EXTERNAL PETROLEUM–BASED PRODUCTS WHILE WORKING AROUND THE STREAM. ACCUMULATION OF SOILS OR DEBRIS SHALL BE REMOVED FROM THE DRIVE MECHANISMS (WHEELS, TRACKS, TIRES, ETC.) AND UNDERCARRIAGE OF EQUIPMENT PRIOR TO ITS WORKING WITHIN THE CHANNEL.
9. EQUIPMENT SHALL BE CHECKED DAILY FOR LEAKS, AND ANY NECESSARY REPAIRS SHALL BE COMPLETED PRIOR TO COMMENCING WORK ACTIVITIES.
10. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT–LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE STREAM.
11. IF AT ANY TIME, AS A RESULT OF PROJECT ACTIVITIES, FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE AND WASHINGTON STATE DEPARTMENT OF ECOLOGY SHALL BE CONTACTED IMMEDIATELY BY THE ENGINEER OR BY HIS/HER DESIGNEE. WORK SHALL NOT RESUME UNTIL FURTHER APPROVAL BY OWNER'S REPRESENTATIVE.
12. EROSION AND SEDIMENTATION CONTROL METHODS SHALL BE USED TO PREVENT SILT–LADEN WATER FROM ENTERING THE CREEK. INITIAL EROSION AND SEDIMENT CONTROL MEASURES ARE SHOWN ON DRAWINGS ESC–1 AND ESC–2. THE CONTRACTOR SHALL SUBMIT A TEMPORARY EROSION AND SEDIMENT CONTROL PLAN AT LEAST 5 WORKING DAYS PRIOR TO BEGINNING SITE WORK SHOWING ADDITIONAL SITE SPECIFIC EROSION AND SEDIMENT CONTROL TECHNIQUES AND METHODS.
13. CONTRACTOR IS REQUIRED TO PLAN AND IMPLEMENT EFFECTIVE STREAM FLOW DIVERSION PER THESE PLANS AND THE CONTRACT SPECIFICATIONS.
14. CONTRACTOR IS RESPONSIBLE FOR CALLING "ONE CALL" FOR UTILITY LOCATES 72 HOURS PRIOR TO CONSTRUCTION. 1 (800) 424–5555 OR 811.
15. THE EXISTING FEATURES AS SHOWN ON THE SITE PREPARATION PLAN WERE PROVIDED BY THE CITY OF BELLEVUE AND FROM SUPPLEMENTAL FIELD WORK PERFORMED BY APS.
16. ALL DIMENSIONS SHOWN SHALL BE FIELD VERIFIED FOR FIT–UP.
17. LOCAL PROJECT BENCH MARK LOCATIONS:

LOG NOTES:

1. DECKED LOGS SHALL BE ACCESSIBLE FOR INSPECTION.
2. LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS IN A PLACE VISIBLE FOR INSPECTION PRIOR TO PLACEMENT WITH LEAD–FREE, BLAZE–ORANGE SURVEY MARKING PAINT.
3. SEE SPECIFICATIONS FOR LOG TYPE (SPECIES), DIAMETER AND LENGTH. EXCAVATIONS SHALL BE INSPECTED BY ENGINEER PRIOR TO PLACEMENT OF ANY WOOD.
4. LOG PLACEMENTS SHALL BE INSPECTED BY ENGINEER PRIOR TO BACKFILLING.

STORM DRAINAGE GENERAL PLAN NOTES:

1. ALL WORK SHALL CONFORM TO THE 2011 EDITION OF THE CITY OF BELLEVUE UTILITIES DEPARTMENT ENGINEERING STANDARDS AND THE DEVELOPER EXTENSION AGREEMENT.
3. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE EXCAVATOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN, AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. IMMEDIATELY NOTIFY THE ENGINEER IF A CONFLICT EXISTS.
5. PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO ENSURE THAT SEDIMENT OR OTHER HAZARDOUS MATERIALS DO NOT ENTER THE STORM DRAINAGE SYSTEM IN ACCORDANCE WITH THE SITES APPROVED CSWPPP. FOR ALL CONSTRUCTION DURING THE RAINY SEASON, DOWNHILL BASINS AND INLETS MUST BE PROTECTED WITH CATCH BASIN INSERTS. SIMPLY PLACING FILTER FABRIC UNDER THE GRATE IS NOT ACCEPTABLE.
6. PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF STORM DRAINAGE WORK, PIPES AND STORM DRAIN STRUCTURES SHALL BE CLEANED AND FLUSHED. ANY OBSTRUCTIONS TO FLOW WITHIN THE STORM DRAIN SYSTEM, (SUCH AS RUBBLE, MORTAR AND WEDGED DEBRIS), SHALL BE REMOVED AT THE NEAREST STRUCTURE. WASH WATER OF ANY SORT SHALL NOT BE DISCHARGED TO THE STORM DRAIN SYSTEM OR SURFACE WATERS.

22. CALL 1–800–424–5555, OR 8–1–1, 72 HOURS BEFORE CONSTRUCTION FOR UTILITY LOCATES.

24. CLEARLY LABEL PUBLIC AND PRIVATE SYSTEMS ON THE PLANS. PRIVATE SYSTEMS SHALL BE MARKED PRIVATE AND SHALL BE MAINTAINED BY THE PROPERTY OWNER(S).

30. SURFACE RESTORATION OF EXISTING ASPHALT PAVEMENT SHALL BE AS REQUIRED BY THE RIGHT–OF WAY USE PERMIT.

32. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT NO CONFLICTS EXIST BETWEEN STORM DRAINAGE LINES AND PROPOSED OR EXISTING UTILITIES PRIOR TO CONSTRUCTION.

33. BEFORE COMMENCEMENT OF TRENCHING, THE CONTRACTOR SHALL PROVIDE FILTER FABRIC FOR ALL DOWNHILL STORM DRAIN INLETS AND CATCH BASINS, WHICH WILL RECEIVE RUNOFF FROM THE PROJECT SITE. THE CONTRACTOR SHALL PERIODICALLY INSPECT THE CONDITION OF ALL FILTER FABRIC AND REPLACE AS NECESSARY.

34. MINIMUM COVER OVER STORM DRAINAGE PIPE SHALL BE 2 FEET, UNLESS OTHERWISE SHOWN.

36. AT POINTS WHERE EXISTING THRUST BLOCKING IS FOUND, MINIMUM CLEARANCE BETWEEN CONCRETE BLOCKING AND OTHER BURIED UTILITIES OR STRUCTURES SHALL BE 5 FEET.

37. WHEN WORK IS TO OCCUR IN EASEMENTS, THE CONTRACTOR SHALL NOTIFY THE EASEMENT GRANTOR AND BELLEVUE UTILITIES IN WRITING A MINIMUM OF 48 HOURS IN ADVANCE OF BEGINNING WORK (NOT INCLUDING WEEKENDS OR HOLIDAYS). FAILURE TO NOTIFY GRANTOR AND BELLEVUE UTILITIES WILL RESULT IN A STOP WORK ORDER BEING POSTED UNTIL THE MATTER IS RESOLVED TO THE SATISFACTION OF BELLEVUE UTILITIES. A WRITTEN RELEASE FROM THE EASEMENT GRANTOR SHALL BE FURNISHED TO THE UTILITIES INSPECTOR PRIOR TO PERMIT SIGNOFF.

38. THE CONTRACTOR SHALL RESTORE THE RIGHT–OF–WAY AND EXISTING PUBLIC STORM DRAINAGE EASEMENT(S) AFTER CONSTRUCTION TO A CONDITION EQUAL OR BETTER THAN CONDITION PRIOR TO ENTRY. THE CONTRACTOR SHALL FURNISH A SIGNED RELEASE FROM ALL AFFECTED PROPERTY OWNERS AFTER RESTORATION HAS BEEN COMPLETED.

UTILITIES AND AGENCIES

CITY OF BELLEVUE

ABE SANTOS – PROJECT MANAGER

450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452–6456

EMAIL: ASANTOS@BELLEVUEWA.GOV

KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, WASTEWATER TREATMENT DIVISION

SUSAN MICHAUD

201 S. JACKSON ST, MAIL STOP KSC–NR–0508
SEATTLE, WA 98104–3855

(206) 684–1311
FAX: (206) 684–1710
SUSAN.MICHAUD@KINGCOUNTY.GOV

BELLEVUE WATER DISTRICT #1

DON MCQUILLIANY
(425) 452–7865

BELLEVUE FIRE DEPARTMENT

NON–EMERGENCY GENERAL
(425) 452–6892

FIRE PREVENTION PLAN REVIEW DESK
(425) 452–4122

BELLEVUE POLICE DEPARTMENT

(425) 452–6917

CITY OF BELLEVUE – TRANSPORTATION DEPARTMENT

RON KESSACK
450 110TH AVENUE NE
BELLEVUE, WA 98004
(425) 452–4631

EMAIL: RKESSACK@BELLEVUEWA.GOV

PUGET SOUND ENERGY (PSE CONSTRUCTION)

KELLY PURNELL – MUNICIPAL CONSTRUCTION PLANNER

P.O. BOX 97034
MAIL STOP: EST–11W
BELLEVUE, WA 98009–9734

(425) 462–3488
EMAIL: KELLY.PURNELL@PSE.COM

COMCAST (FORMERLY AT&T BROADBAND)

JILL LOOK

1525 75TH ST. SW, SUITE 200
EVERETT, WA 98203

(425) 263–5346
FAX: (425) 263–5352
MOBILE: (206) 396–6032
EMAIL: JILL_LOOK@CABLE.COMCAST.COM

QWEST (US WEST COMMUNICATIONS)

VERN SAXTON

1550 NEWPORT WAY NW, ROOM #2
ISSAQUAH, WA 98027

(206) 345–1177
EMAIL: VERN.SAXTON@QWEST.COM

ONE CALL

UTILITY LOCATION
(800) 424–5555 OR 811

811 Know what's below. Call before you dig.

DATUM
NAVD 88/NAD 83

MARK EWBANK STATE OF WASHINGTON 49434 REGISTERED PROFESSIONAL ENGINEER
DRAFT

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Approved By

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M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

GENERAL NOTES

DRAWING G-2 SHT 2 OF 17

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ABBREVIATIONS:

AC	ASPHALT CONCRETE
APPROX	APPROXIMATE(LY)
CDF	CONTROLLED DENSITY FILL
CIP	CAST IN PLACE
COB	CITY OF BELLEVUE
CONC	CONCRETE
CMP	CORRUGATED METAL PIPE
CP	CONTROL POINT
DBH	DIAMETER AT BREAST HEIGHT
DI	DUCTILE IRON
DIA, ø	DIAMETER
DWG	DRAWING
EL	ELEVATION
ESC	EROSION AND SEDIMENT CONTROL
EX	EXISTING
FAC	FACULTATIVE
FACU	FACULTATIVE UPLAND
FACW	FACULTATIVE WETLAND
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
FT	FEET
HMA	HOT MIX ASPHALT
HVF	HIGH VISIBILITY FENCE
IE	INVERT ELEVATION
IN	INCHES
KC	KING COUNTY
LWD	LARGE WOODY DEBRIS
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
NI	NO INDICATOR
NO.	NUMBER
NTS	NOT TO SCALE
OHP	OVERHEAD POWER LINE
OHWL	ORDINARY HIGH WATER LINE
PC	PRECAST CONCRETE
PL	PROPERTY LINE
PSE	PUGET SOUND ENERGY
SDCB	STORM DRAIN CATCH BASIN
SDMH	STORM DRAIN MANHOLE
SP	STANDARD PLAN
SS	STAINLESS STEEL
SSMH	SANITARY SEWER MANHOLE
STA	STATION
TEL	TELEPHONE
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TYP	TYPICAL
UGP	UNDERGROUND POWER LINE
UGT	UNDERGROUND TELEPHONE LINE
UPL	OBLIGATE UPLAND
VAR	VARIOUS
W/IN	WITHIN
WSDOT	WASHINGTON DEPARTMENT OF TRANSPORTATION

LEGEND:

- EXISTING BUILDING
- EXISTING CURB
- 72 — EXISTING CONTOURS
- EXISTING R.O.W.
- EXISTING BANK SLOPE
- OHP — EXISTING OVERHEAD POWER LINE
- UGP — EXISTING UNDERGROUND POWER LINE
- W — EXISTING WATER LINE
- G — EXISTING GAS LINE
- SD — EXISTING STORM DRAINAGE
- S — EXISTING SANITARY SEWER
- EXISTING CHAIN LINK FENCE
- EXISTING SHEET METAL FENCE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM DRAIN MANHOLE
- T — EXISTING TELEPHONE J-BOX
- P — EXISTING POWER VAULT
- EXISTING GAS METER
- EXISTING FIRE DEPT CONNECTION
- EXISTING POWER POLE
- EXISTING POWER TRANSFORMER
- EXISTING TREES
- EXISTING BOULDERS
- EXISTING WETLANDS
- EXISTING GRADE
- EXISTING ORDINARY HIGH WATER LINE
- EXISTING PROPERTY LINE
- PERMANENT CONSTRUCTION EASEMENT LINE
- TEMPORARY CONSTRUCTION EASEMENT LINE
- 55 — PROPOSED CONTOURS
- CREEK FLOW LINE
- TEMPORARY PORTABLE CHAIN LINK FENCE
- SILT FENCE
- HVF — HIGH VISIBILITY FENCE
- EXCAVATION LIMITS
- COIR WRAP
- DIVERTED FLOW DIRECTION
- PROPOSED AVERAGE GRADE
- CLEAR AND GRUB AREA
- STREAMBED SEDIMENT
- STREAMBED COBBLE
- EXISTING GROUND
- TEMPORARY STREAM ACCESS ROAD
- EXCAVATED ALLUVIUM
- STAGING AREA
- SEEDING AREAS
- STORM DRAIN INLET PROTECTION
- 1+00 — CHANNEL THALWEG STATIONING (FT)
- PROPOSED DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE PROTECTED
- NEW STEEL SHEET PILE WALL
- NEW PRIVACY FENCE
- P — FLOW BY-PASS PUMP
- BULK BAGS
- STREAMBED COBBLES
- LOGS WITH ROOTWAD
- LOGS WITHOUT ROOTWAD
- LOGS WITH ROOTWAD BURIED
- LOGS WITHOUT ROOTWAD BURIED
- LOG SECTION
- ROOTWAD SECTION
- VEGETATION
- # — LOG IDENTIFICATION #
- CP # — LOG CONTROL POINT AND NUMBER
- DUCK BILL ANCHOR
- LARGE GRADE CONTROL STRUCTURE (PROFILE)
- SMALL GRADE CONTROL STRUCTURE (PROFILE)
- PLUNGE POOL
- VERTICAL LOG PIN (PLAN)
- CHAIN TO ECOLOGY BLOCK OR CABLE TO DUCKBILL ANCHOR
- ACCESS ROUTE FROM PUBLIC ROADWAY TO PROJECT AREA
- 1B-1 — STRUCTURE # / SMALL GRADE CONTROL STRUCTURE TYPE

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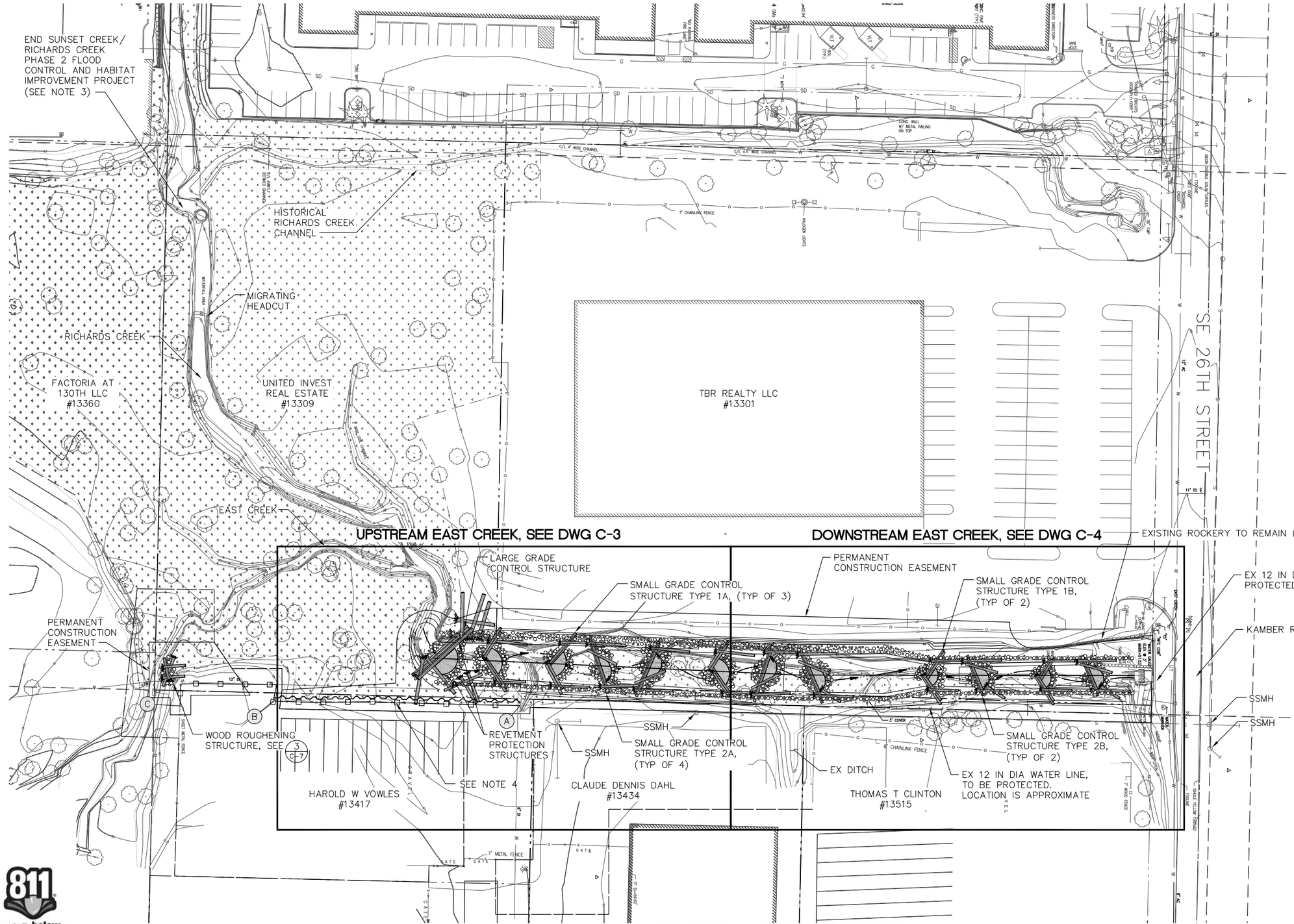
City of Bellevue UTILITIES

ABBREVIATIONS AND LEGEND

DRAWING G-3 SHT 3 OF 17



NOTES:

1. SEE DRAWING C-2 FOR SITE PREPARATION PLAN.
2. EXCAVATION LIMITS TO MAINTAIN A MINIMUM 4 FOOT SETBACK FROM EXISTING ROCKERIES, AS NOTED IN PLANS.
3. SUNSET CREEK/RICHARDS CREEK PROJECT IS SCHEDULED FOR CONSTRUCTION SUMMER 2012.
4. INSTALL APPROXIMATELY 150 LF OF NEW STEEL SHEET PILE WALL BETWEEN POINTS A AND B. INSTALL APPROXIMATELY 233 LF OF NEW PRIVACY FENCE BETWEEN POINTS A AND C. ALL FENCE AND WALL CONSTRUCTION TO BE COMPLETED FROM THE PAVED PARKING LOT ON THE EAST SIDE OF THE EXISTING SHEET METAL FENCE. NEW SHEET PILE WALL SHALL BE ALIGNED 2 FOOT WESTWARD OF NEW PRIVACY FENCE. NEW PRIVACY FENCE SHALL BE INSTALLED ALONG SAME ALIGNMENT AS EXISTING SHEET METAL FENCE WITH PROPERTY OWNER APPROVED EQUAL.

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City of Bellevue UTILITIES

SITE PLAN AND KEY MAP

DRAWING C-1 — SHT 4 OF 17

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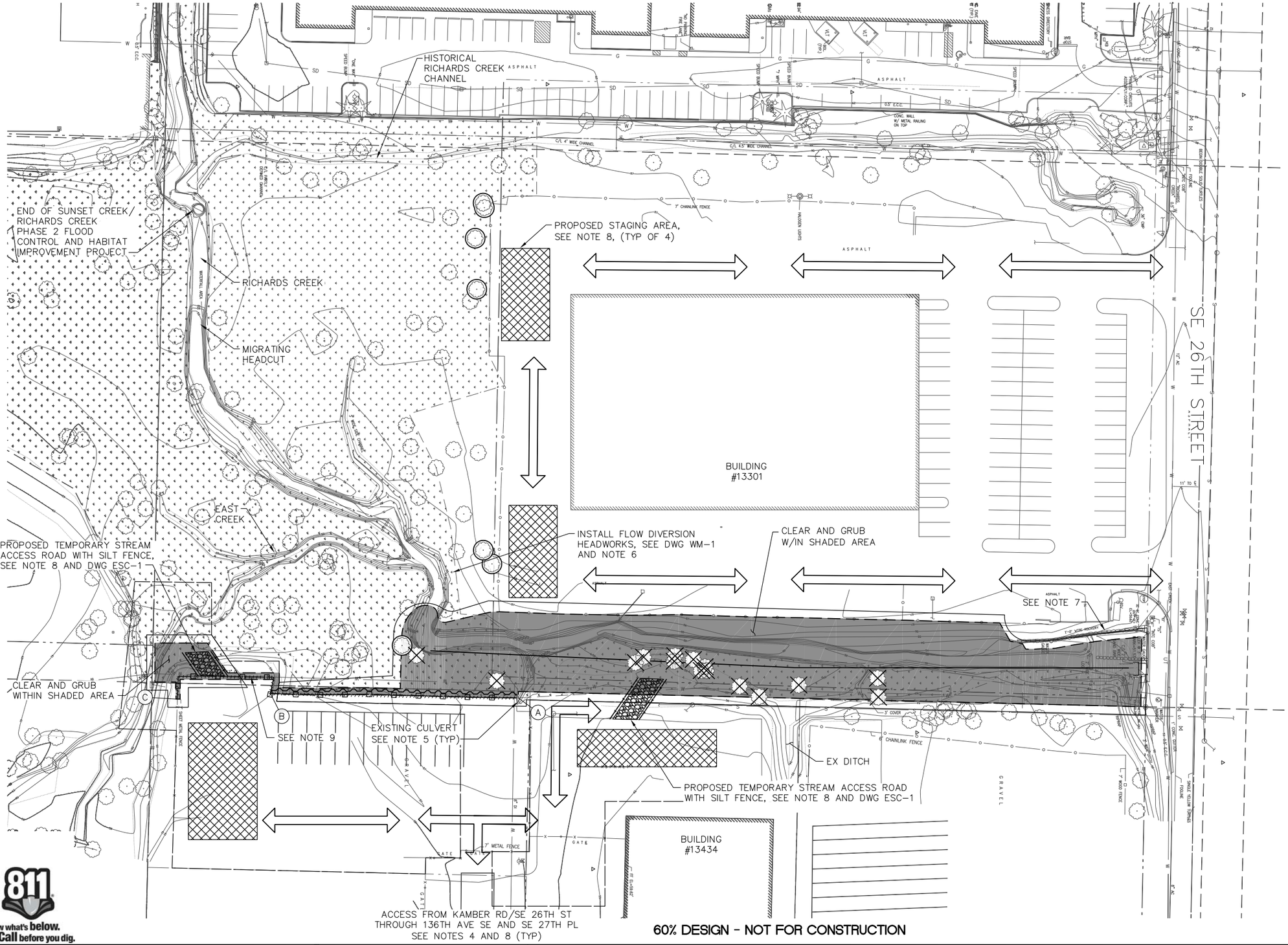

30 0 30 60
1"=30'

NOTES:

1. CONTRACTOR SHALL FENCE THE PERIMETER OF THE CHANNEL CONSTRUCTION ZONE WITH HIGH VISIBILITY FENCE, PER WDSOT STANDARD PLAN I-10.10-1 PRIOR TO COMMENCEMENT OF ANY CHANNEL CONSTRUCTION ACTIVITIES.
2. PRIOR TO ANY CLEARING OR GRUBBING THE CONTRACTOR SHALL INSTALL TREE PROTECTION FOR ALL TREES DESIGNATED/FLAGGED BY THE CITY OF BELLEVUE TO REMAIN. TREE PROTECTION SHALL CONSIST OF ¾" 4'X4' PLYWOOD BOXES CENTERED ON THE TRUNK OF THE TREE OR APPROVED EQUAL.
3. EXISTING PARKING LOT CURBS AND PAVEMENT USED FOR ACCESS SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. THE CONTRACTOR SHALL RESTORE ANY AREAS DISTURBED DURING CONSTRUCTION TO THEIR ORIGINAL APPROXIMATE CONDITION.
4. CONTRACTOR SHALL NOT BLOCK BUILDING EGRESS.
5. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF, AND DURING, CONSTRUCTION ACTIVITIES UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
6. CONTRACTOR SHALL NOT DISTURB EXISTING WOODY DEBRIS, VEGETATION, OR CHANNEL HABITAT UPSTREAM OF THE FLOW DIVERSION HEADWORKS.
7. CONTRACTOR SHALL NOT DISTURB RETAINING WALL ROCKERY LOCATED ON TBR BUILDING PROPERTY NEAR BUILDING #13301.
8. STAGING AREAS AND ACCESS ROUTES SHOWN ARE THE MINIMUM NECESSARY TO COMPLETE CONSTRUCTION. ENGINEER SHALL APPROVE ANY ALTERNATE LOCATIONS AND ROUTES PROPOSED BY THE CONTRACTOR PRIOR TO THEIR USE.
9. REMOVE APPROXIMATELY 233 LF OF EXISTING SHEET METAL FENCE BETWEEN POINTS A AND C. ALL FENCE REMOVAL WORK AND WALL CONSTRUCTION TO BE COMPLETED FROM THE PAVED PARKING LOT ON THE EAST SIDE OF THE EXISTING SHEET METAL FENCE.

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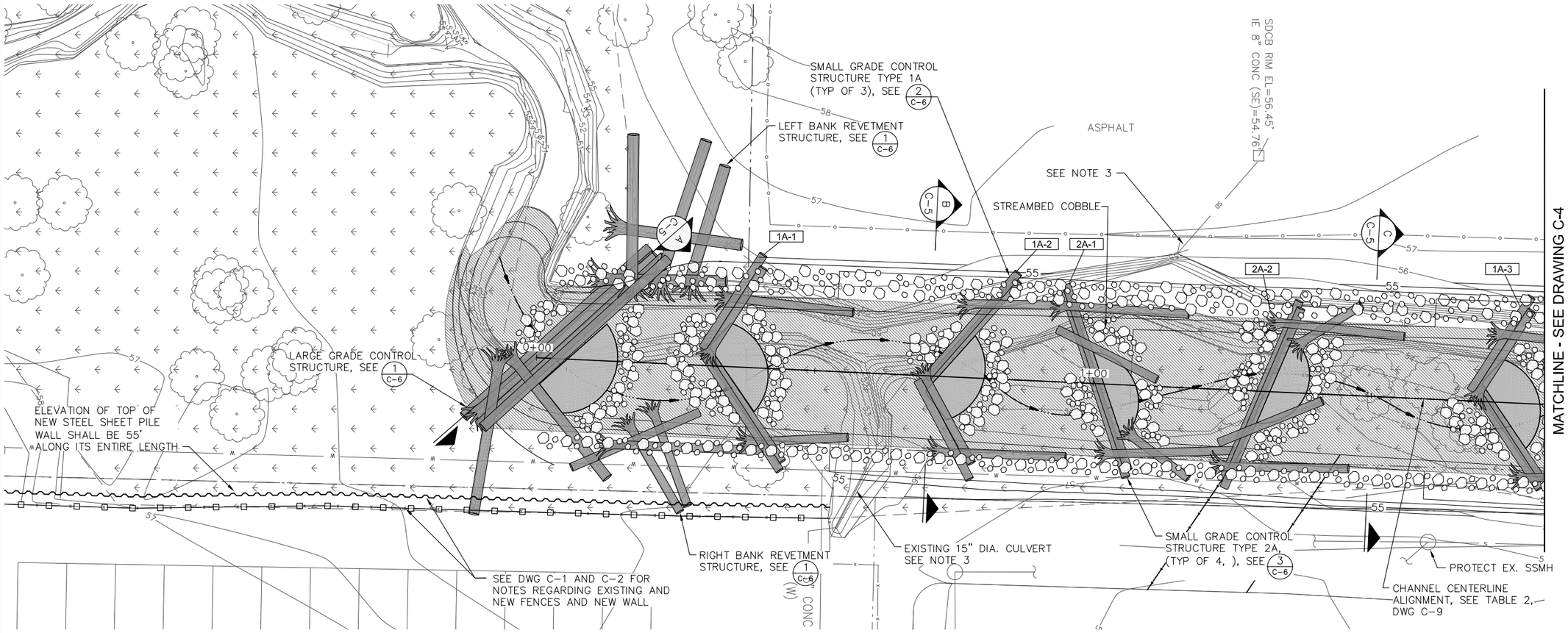
City of Bellevue
UTILITIES

SITE PREPARATION PLAN

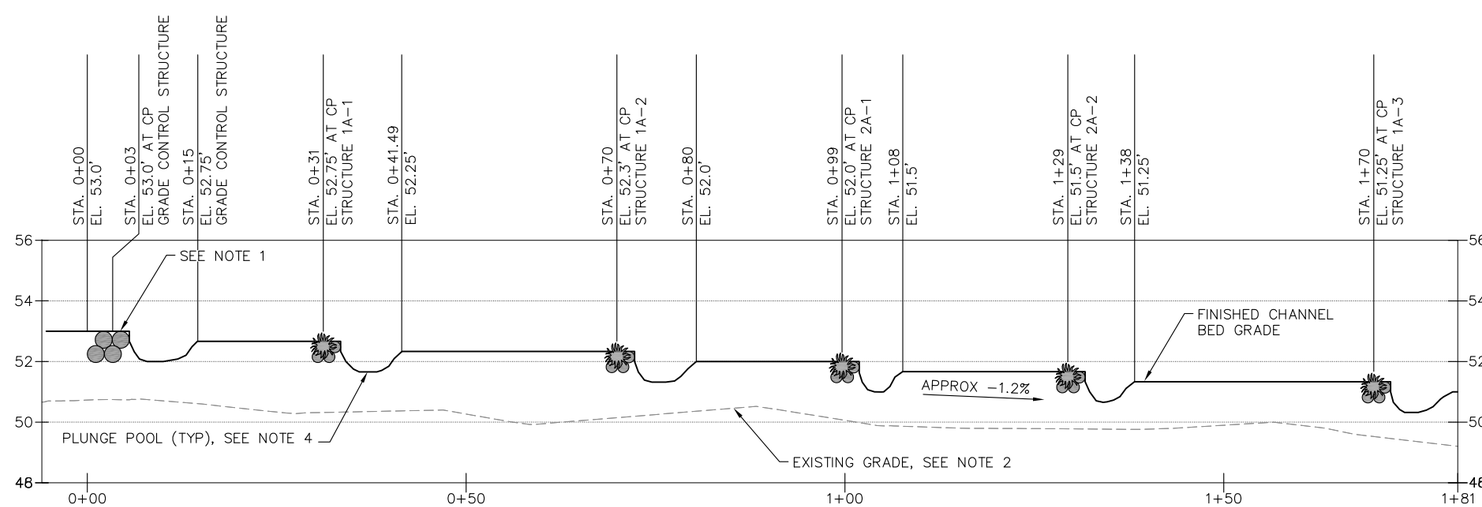
DRAWING C-2 | SHT 5 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-2.dwg
Plot Date: 7/14/2011 12:21 PM
Cad User: Laura Turnidge



NOTES:

1. PROPOSED GRADING TO TIE IN AT APPROX CONSTRUCTION STATIONING 0+00 AND ELEVATION 53.0 FT.
2. EXISTING CHANNEL GRADE SHOWN ON PROFILE IS BASED ON EXISTING CHANNEL CENTERLINE. EXISTING CHANNEL CENTERLINE HAS BEEN UPDATED TO MATCH PROPOSED CHANNEL STATIONING.
3. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF AND DURING CONSTRUCTION ACTIVITIES, UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
4. ALL PLUNGE POOLS SHALL BE OVEREXCAVATED 12" AND BACKFILLED WITH 12" THICKNESS OF STREAMBED COBBLES IN BOTTOM OF POOL.
5. BERM ALIGNMENT STATION 0+00 IS OFFSET 24 FT EAST OF CHANNEL ALIGNMENT STATION 0+52. BERM ALIGNMENT STATION PROGRESSES RIGHT TO LEFT STARTING WITH STATION 0+00.
6. UNSURVEYED STORM DRAIN OUTFALLS MAY BE PRESENT IN PROJECT LIMITS.
7. SEE DWG C-5, C-6, AND C-7 FOR LOCATION OF STRUCTURE CONTROL POINTS ON THE LARGE AND SMALL GRADE CONTROL STRUCTURES.



60% DESIGN - NOT FOR CONSTRUCTION

DATUM

NAVD 88/NAD 83

DRAFT

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-3.dwg
Plot Date: 7/14/2011 12:21 PM
Cad User: Laura Turnidge

NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER DATE

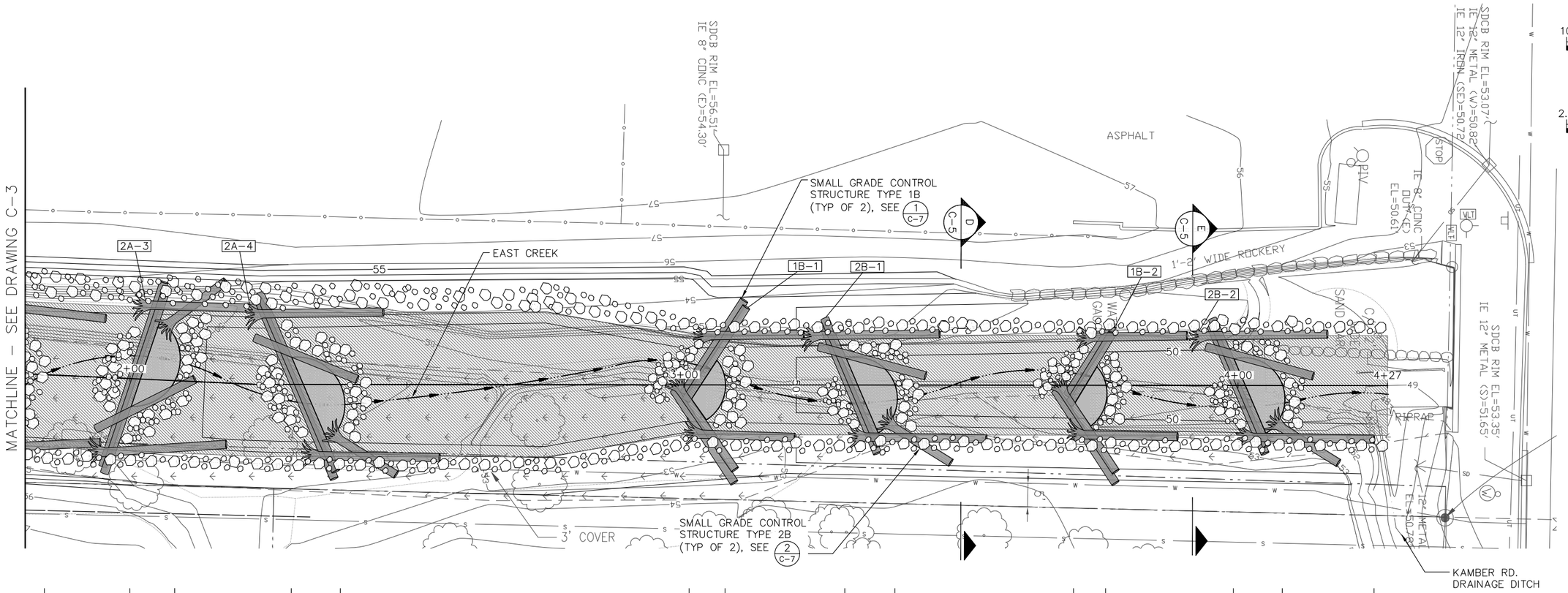
PROJECT MANAGER DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

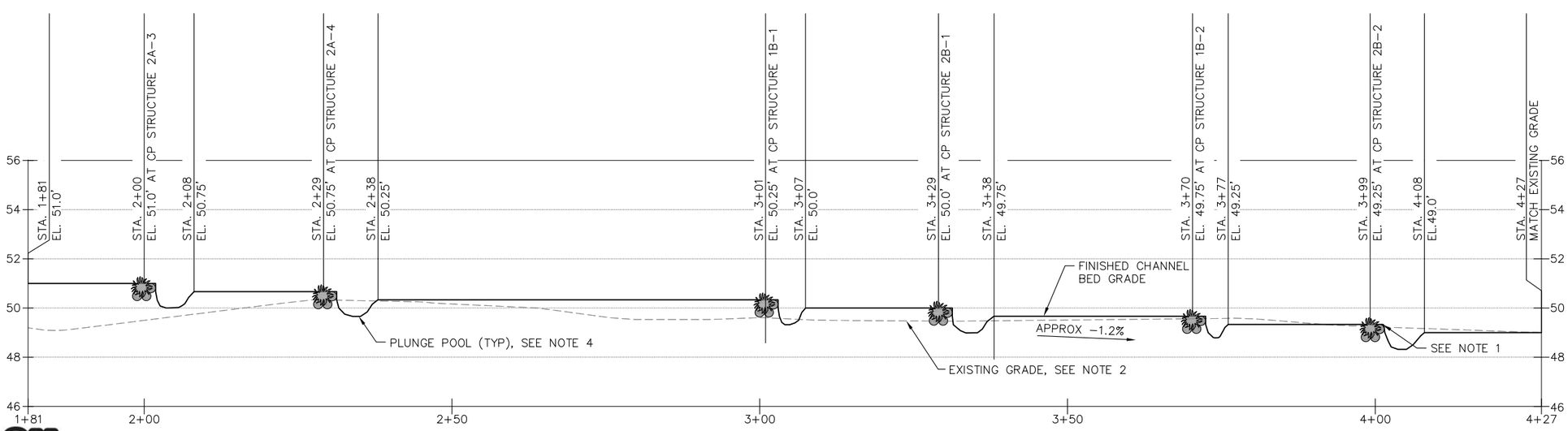
UPSTREAM EAST CREEK PLAN AND PROFILE

DRAWING C-3 SHT 6 OF 17



HORIZONTAL SCALE
10 0 10 20
1"=10'

VERTICAL SCALE
2.5 0 2.5 5
1"=2.5'



NOTES:

1. END GRADING AT STA 4+27 AND APPROX ELEVATION 49.0 FT.
2. EXISTING CHANNEL GRADE IS BASED ON EXISTING CHANNEL CENTERLINE. EXISTING CHANNEL CENTERLINE HAS BEEN UPDATED TO MATCH PROPOSED CHANNEL STATIONING.
3. LOCATE AND PROTECT ALL DRAINAGE OUTFALLS TO CHANNEL, BUILDING FOOTINGS, AND UTILITIES PRIOR TO COMMENCEMENT OF AND DURING CONSTRUCTION ACTIVITIES, UNLESS OTHERWISE INDICATED IN DRAWINGS. IF STORM DRAIN OUTFALLS MUST BE MOVED OR AMENDED, CONTRACTOR SHALL REPLACE SUCH STORM DRAINS IN-KIND PER THE PROJECT SPECIFICATIONS, AND ENGINEER'S DIRECTION.
4. ALL PLUNGE POOLS SHALL BE OVEREXCAVATED 12" AND BACKFILLED WITH 12" THICKNESS OF STREAMBED COBBLES IN BOTTOM OF POOL.
5. UNSURVEYED STORM DRAIN OUTFALLS MAY BE PRESENT IN PROJECT LIMITS.

DATUM
NAVD 88/NAD 83

DRAFT
MARK EWBANK STATE OF WASHINGTON 29434 REGISTERED PROFESSIONAL ENGINEER

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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City of Bellevue UTILITIES

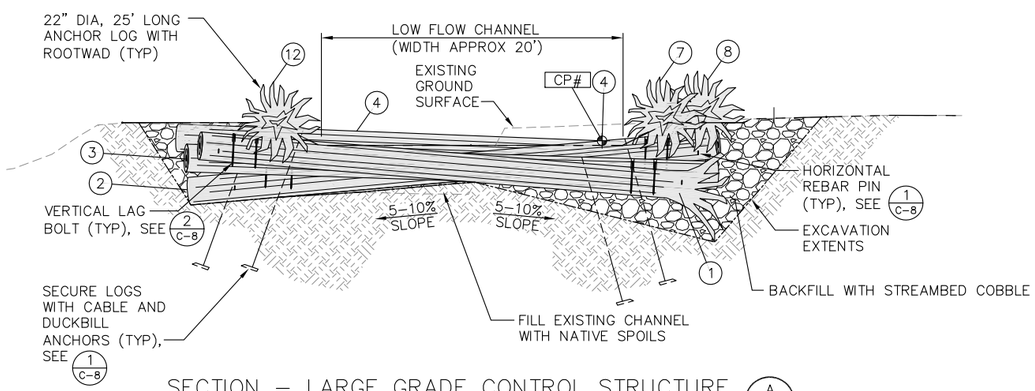
DOWNSTREAM EAST CREEK PLAN AND PROFILE

DRAWING C-4 SHT 7 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-4.dwg
Plot Date: 7/14/2011 12:21 PM
Cad User: Laura Turnidge

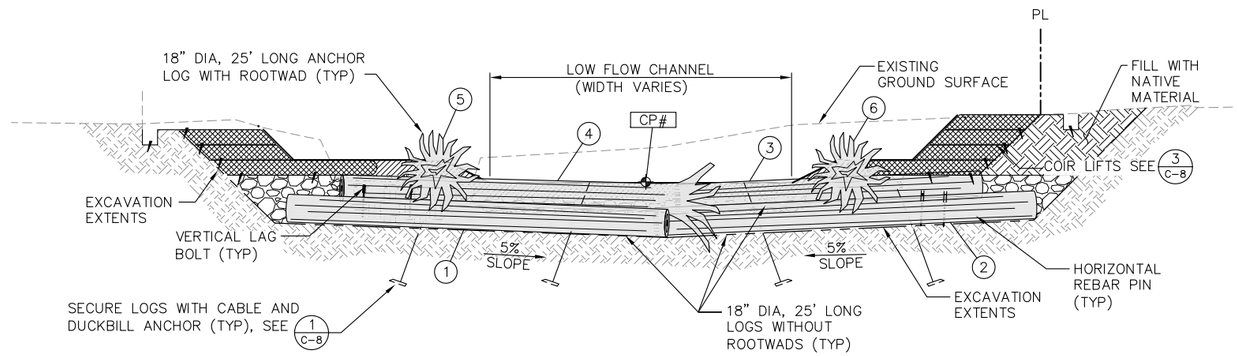
NOTES:

1. WHERE TOP TWO COIR WRAP LIFTS COME WITHIN 4 FEET OF BUILDINGS, CURB, OR PERMANENT ROCKERIES, INSTALLATION AND STAKING REQUIREMENTS TO BE PROVIDED BY THE ENGINEER.
2. TAPER LOW FLOW CHANNEL WIDTH FROM 20' TO 10' BETWEEN STA 2+75 AND 3+00.



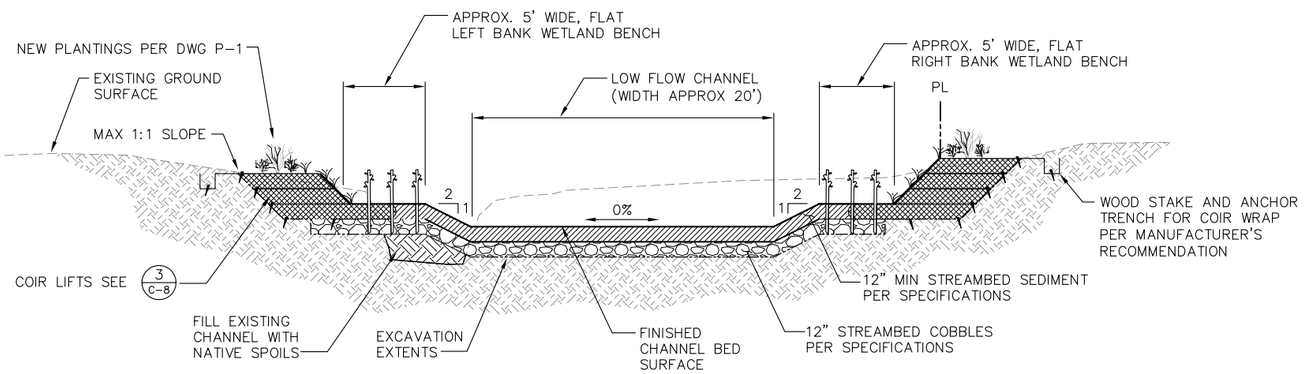
SECTION – LARGE GRADE CONTROL STRUCTURE (A / C-3,C-6)

SCALE: 1"=5'



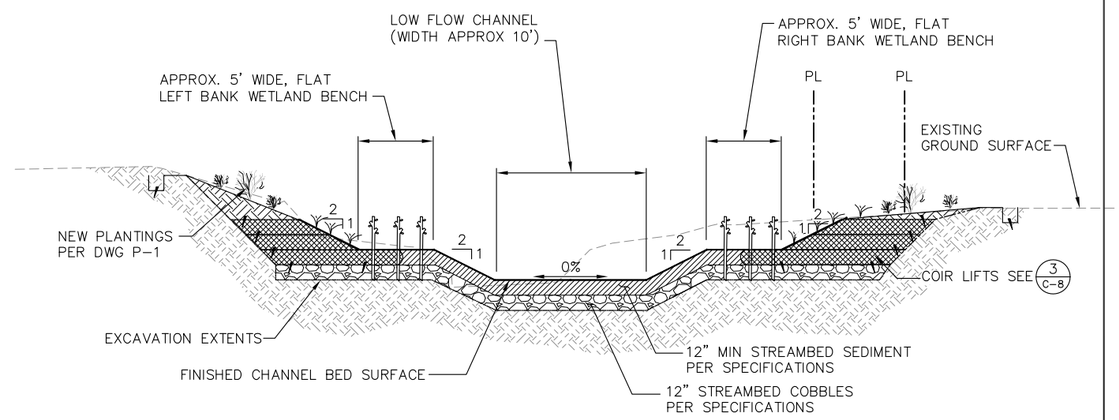
SECTION – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPES 1A AND 1B (B / C-3, C-4)

SCALE: 1"=5'



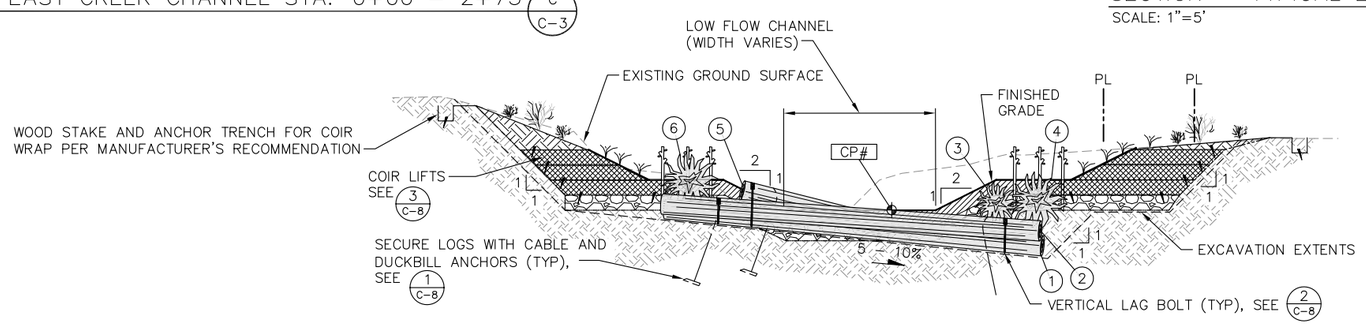
SECTION – TYPICAL EAST CREEK CHANNEL STA: 0+00 – 2+75 (C / C-3)

SCALE: 1"=5'



SECTION – TYPICAL EAST CREEK CHANNEL STA: 3+00 – 4+27 (D / C-4)

SCALE: 1"=5'



SECTION – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPES 2A AND 2B (E / C-3, C-4)

SCALE: 1"=5'

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DATUM

NAVD 88/NAD 83

MARK EWBANK STATE OF WASHINGTON 29434 REGISTERED PROFESSIONAL ENGINEER

DRAFT

ONE INCH — AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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DESIGNED BY	DATE
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CHECKED BY	DATE

City of Bellevue UTILITIES

SECTIONS

DRAWING C-5 — SHT 8 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-5.dwg Cad User: Laura Turnidge
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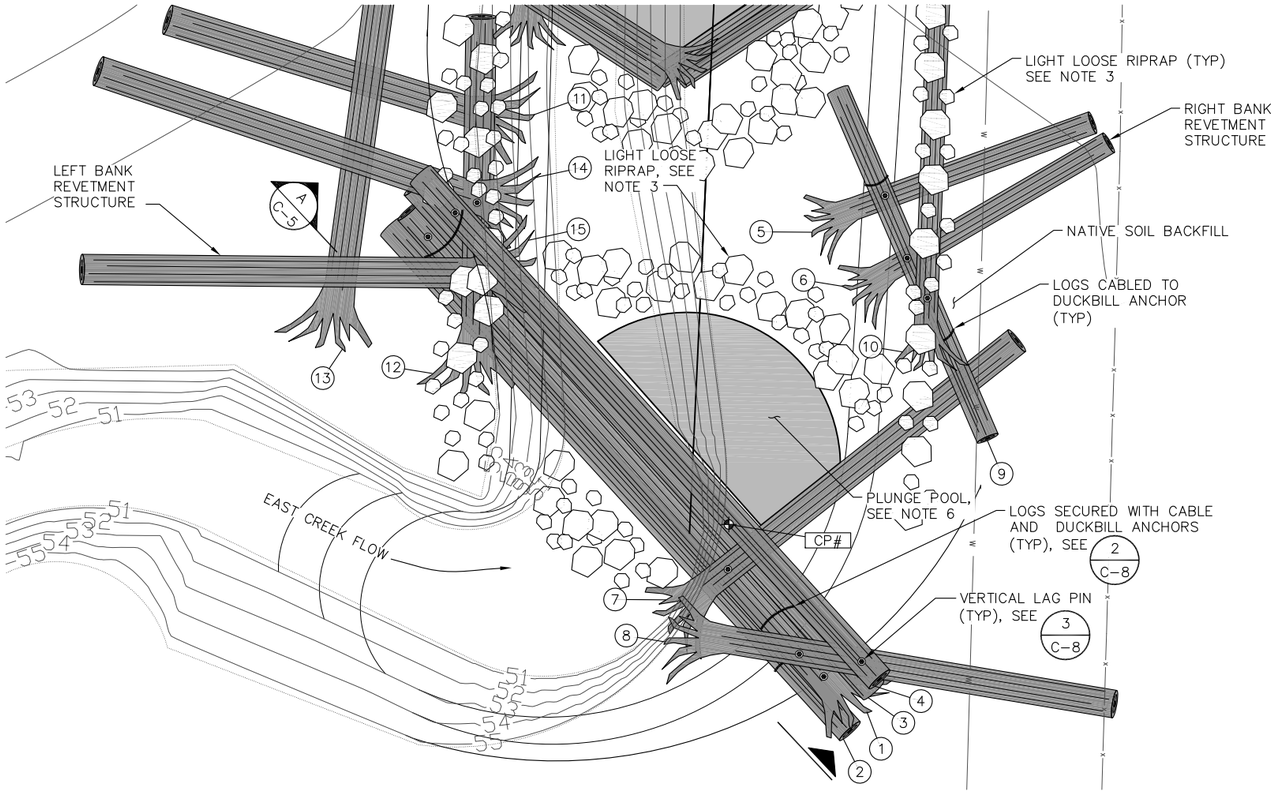


PLAN – LARGE GRADE CONTROL STRUCTURE & LEFT & RIGHT BANK REVETMENT STRUCTURES (1 / C-3)

SCALE: 1" = 5'

LOG TABLE – LARGE GRADE CONTROL STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	22	45	YES
2	22	45	NO
3	22	45	NO
4	22	45	NO
7	24	25	YES
8	18	20	YES
12	22	25	YES

LOG TABLE – RIGHT BANK REVETMENT STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
5	22	30	YES
6	22	30	YES
9	18	20	YES
10	18	30	YES

LOG TABLE – LEFT BANK REVETMENT STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
11	18	25	YES
13	24	30	YES
14	24	30	YES
15	24	25	YES

LOG TABLE –SMALL GRADE CONTROL STRUCTURE TYPE 1A STA: 0+00 TO 3+00

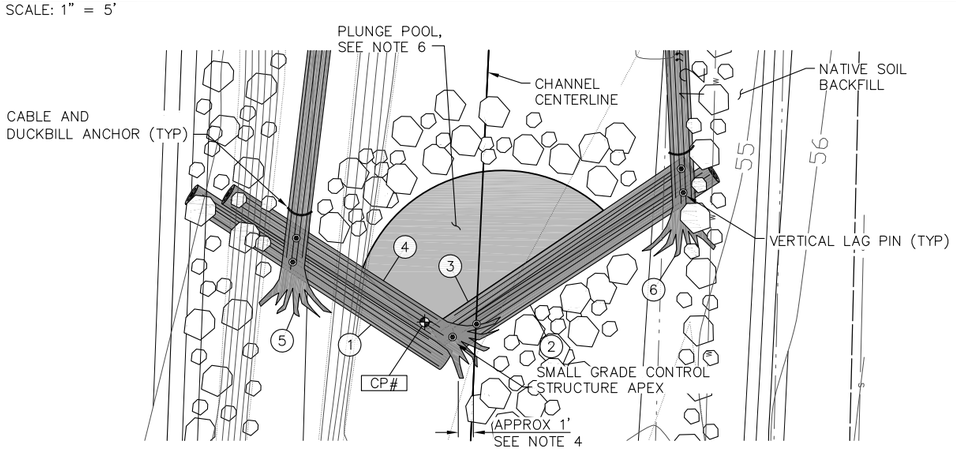
LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	25	NO
2	18	25	NO
3	18	25	NO
4	18	20	YES
5	18	25	YES
6	18	20	YES

LOG TABLE – SMALL GRADE CONTROL STRUCTURE TYPE 2A STA: 0+00 TO 3+00

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	35	NO
2	18	35	NO
3	18	15	YES
4	18	25	YES
5	18	20	NO
6	18	25	YES

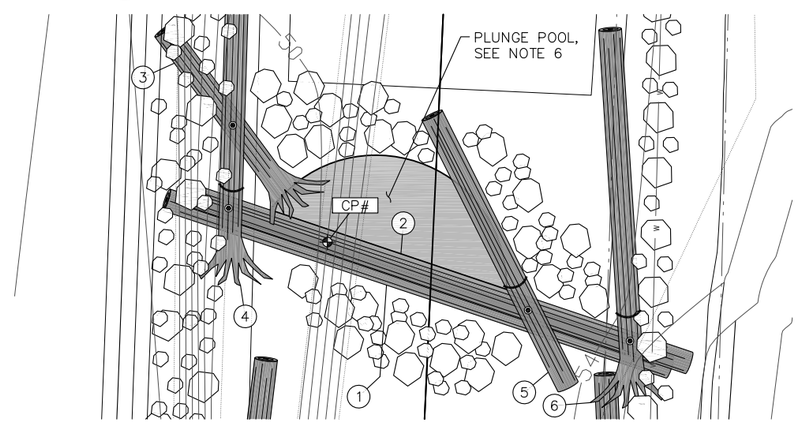
NOTES:

1. CONTRACTOR SHALL MINIMIZE EXCAVATION INTO EXISTING BANK. MATERIAL EXCAVATED TO PLACE LOGS CAN BE REUSED ON REGRADED BANKS. CONTRACTOR SHALL PUSH LOGS INTO BANK USING EXCAVATOR WHEREVER POSSIBLE TO MINIMIZE EXCAVATION.
2. LOG IDENTIFICATION NUMBERS REPRESENT AN ORDER OF PLACEMENT/INSTALLATION. CORRESPONDING LOG DIMENSIONS SHOWN IN THE LOG SCHEDULE TABLE.
3. LIGHT LOOSE RIPRAP SHALL BE PLACED AND BURIED AMIDST THE INTERLOCKED LOGS AS DIRECTED BY THE ENGINEER.
4. SMALL GRADE CONTROL STRUCTURE TYPE A APEXES ARE OFFSET 1.0' TO THE SIDE OF THE CHANNEL CENTERLINE. THE SIDE TO WHICH A GRADE CONTROL STRUCTURE IS OFFSET OF THE CENTERLINE IS OPPOSITE THE STRUCTURES UPSTREAM AND DOWNSTREAM OF IT.
5. LOG #5 IN SMALL GRADE CONTROL STRUCTURE TYPE 2A TO BE SET AND BURIED IN CHANNEL BOTTOM AT ONE END AS DIRECTED BY THE ENGINEER.
6. PLUNGE POOL TO BE EXCAVATED TO APPROXIMATE DIMENSIONS SHOWN ON PLAN AND IN PROFILES ON DWGS. C–3 AND C–4.



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 1A 0+00–3+00 (2 / C-3)

SCALE: 1" = 5'



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 2A 0+00–3+00 (3 / C-3)

SCALE: 1" = 5'

Know what's below. Call before you dig.

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NAVD 88/NAD 83

DRAFT

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NO	DATE	BY	APPR	REVISIONS

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

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EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER — DATE
PROJECT MANAGER — DATE

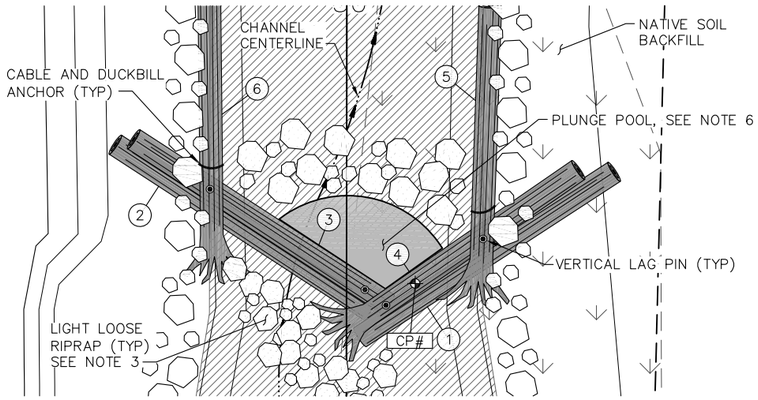
M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

WOOD STRUCTURES INSTALLATION PLANS 1

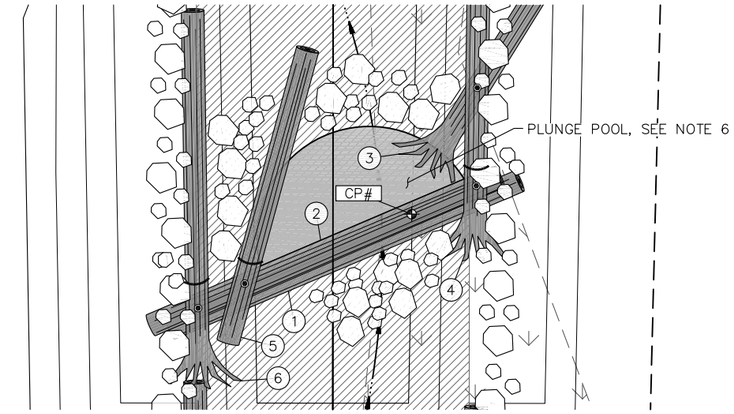
DRAWING C-6 — SHT 9 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C6.dwg
Plot Date: 7/14/2011 12:22 PM
Cad User: Laura Turnidge



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 1B 3+00–4+27 (1 / C–4)

SCALE: 1" = 5'



PLAN – TYPICAL SMALL GRADE CONTROL STRUCTURE TYPE 2B 3+00–4+27 (2 / C–4)

SCALE: 1" = 5'

LOG TABLE –SMALL GRADE CONTROL STRUCTURE TYPE 1B STA: 3+00 TO 4+27

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	20	NO
2	18	20	NO
3	18	20	NO
4	18	20	YES
5	18	20	YES
6	18	20	YES

LOG TABLE – SMALL GRADE CONTROL STRUCTURE TYPE 2B STA: 3+00 TO 4+27

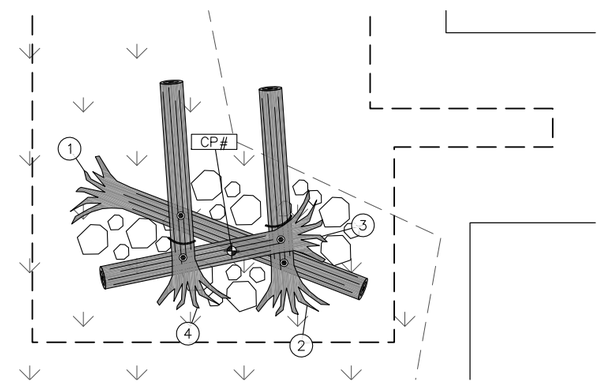
LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	25	NO
2	18	25	NO
3	18	15	YES
4	18	25	YES
5	18	20	NO
6	18	25	YES

LOG TABLE – WOOD ROUGHENING STRUCTURE:

LOG #	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
1	18	20	YES
2	18	15	YES
3	18	15	YES
4	18	15	YES

NOTES:

1. CONTRACTOR SHALL MINIMIZE EXCAVATION INTO EXISTING BANK. MATERIAL EXCAVATED TO PLACE LOGS CAN BE REUSED ON REGRADED BANKS. CONTRACTOR SHALL PUSH LOGS INTO BANK USING EXCAVATOR WHEREVER POSSIBLE TO MINIMIZE EXCAVATION.
2. LOG IDENTIFICATION NUMBERS REPRESENT AN ORDER OF PLACEMENT/INSTALLATION. CORRESPONDING LOG DIMENSIONS SHOWN IN THE LOG SCHEDULE TABLE.
3. LIGHT LOOSE RIPRAP SHALL BE PLACED AND BURIED AMIDST THE INTERLOCKED LOGS AS DIRECTED BY THE ENGINEER.
4. SMALL GRADE CONTROL STRUCTURE APEXES ARE OFFSET 1.0' TO THE SIDE OF THE CHANNEL CENTERLINE. THE SIDE TO WHICH A GRADE CONTROL STRUCTURE IS OFFSET OF THE CENTERLINE IS OPPOSITE THE STRUCTURES ABOVE AND BELOW IT.
5. LOG #5 IN SMALL GRADE CONTROL STRUCTURE TYPE 2B TO BE SET AND BURIED IN CHANNEL BOTTOM AT ONE END AS DIRECTED BY THE ENGINEER.
6. PLUNGE POOL TO BE EXCAVATED TO APPROXIMATE DIMENSIONS SHOWN ON PLAN AND IN PROFILES ON DWGS. C–3 AND C–4.



PLAN – WOOD ROUGHENING STRUCTURE ON UPPER EAST CREEK (3 / C–1)

SCALE: 1"=5'

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-7.dwg
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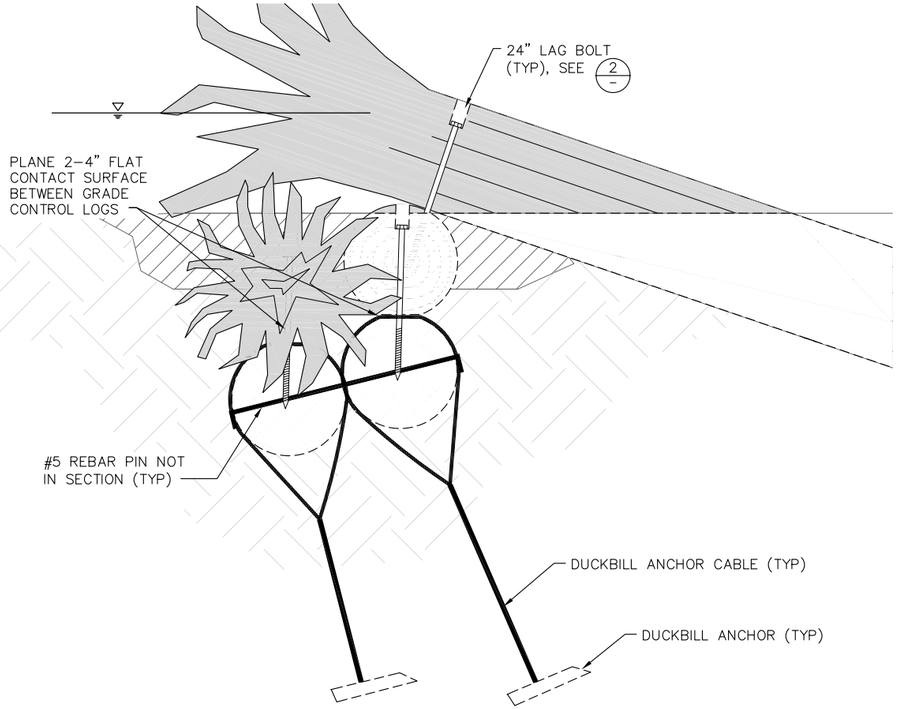
City of Bellevue UTILITIES

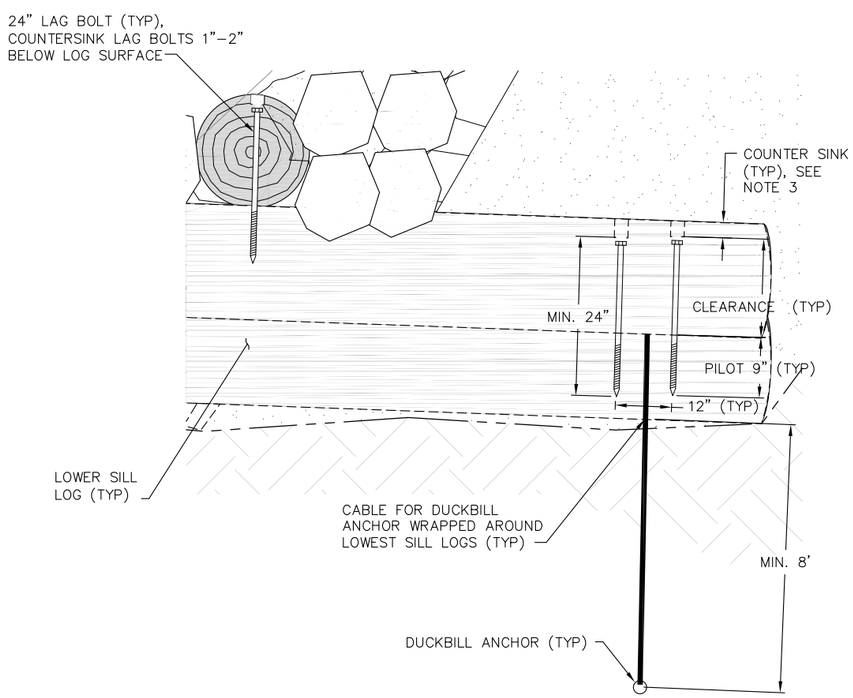
WOOD STRUCTURES INSTALLATION PLANS 2

DRAWING C-7 SHT 10 OF 17



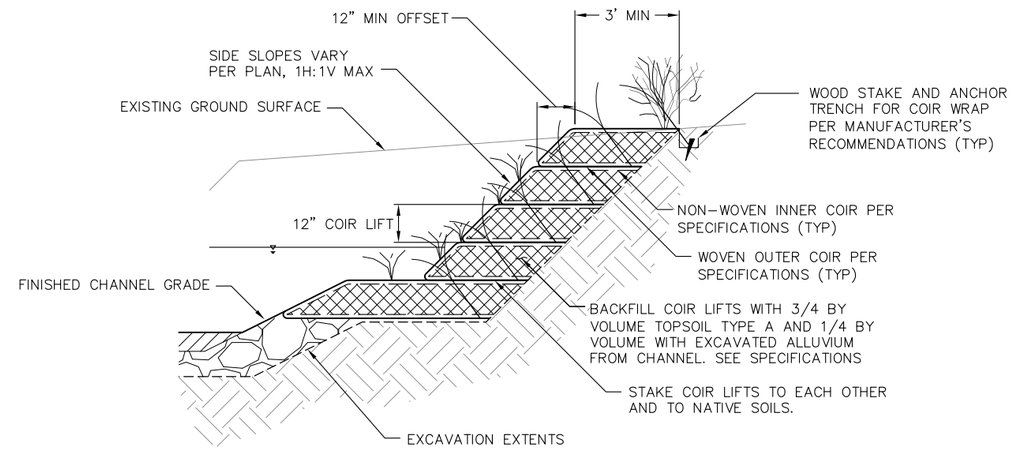
SECTION–LARGE GRADE CONTROL STRUCTURE LAG/PIN DETAIL (1 / C-5)

SCALE: 1"=1'



DETAIL–TYPICAL LAG BOLT INSTALLATION DETAIL (2 / C-5)

SCALE: 1"=1'



DETAIL – COIR LIFTS (3 / C-5)

SCALE: 1"=2'

COIR WRAP PREPARATION

(SEE SPECIAL PROVISIONS)

STEP 1
- PLACE WOVEN OUTER COIR
- PLACE NON–WOVEN INNER COIR
- STAKE COIR FABRIC TO NATIVE SOIL

STEP 2
- PLACE 12" SOIL COMPOSED OF TOPSOIL TYPE A AMENDED WITH ALLUVIUM

STEP 3
- PLACE SEED MIX PER PLANTING PLAN

STEP 4
- WRAP WOVEN OUTER COIR AND NONWOVEN INNER COIR AROUND SOIL LIFT

STEP 5
- STAKE PER COIR MANUFACTURER'S RECOMMENDATION

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City of Bellevue UTILITIES

DETAILS

DRAWING C-8 — SHT 11 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\C-8.dwg Cad User: Laura Turnidge
Plot Date: 7/14/2011 12:22 PM

TABLE – GRADE CONTROL STRUCTURES CONTROL POINT TABLE:

STRUCTURE NUMBER	STRUCTURE TYPE	CHANNEL STA	NORTHING	EASTING

TABLE – PROPOSED CHANNEL CONTROL ALIGNMENT TABLE:

CHANNEL STA	NORTHING	EASTING	ELEVATION

TABLE – CONTROL POINT TABLE:

BERM STA	NORTHING	EASTING	ELEVATION

CONTROL POINT AND ALIGNMENT TABLES TO BE COMPLETED FOR 100% DESIGN

60% DESIGN - NOT FOR CONSTRUCTION

NAVD 88/NAD 83

DRAFT

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City of Bellevue UTILITIES

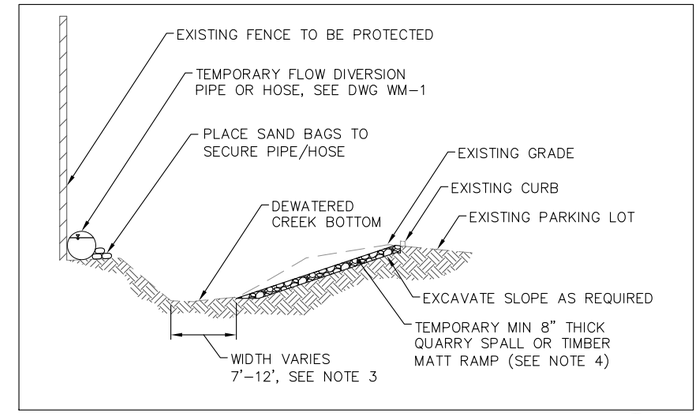
CONTROL POINT AND ALIGNMENT TABLES

DRAWING C-9 SHT 12 OF 17

NOTES:

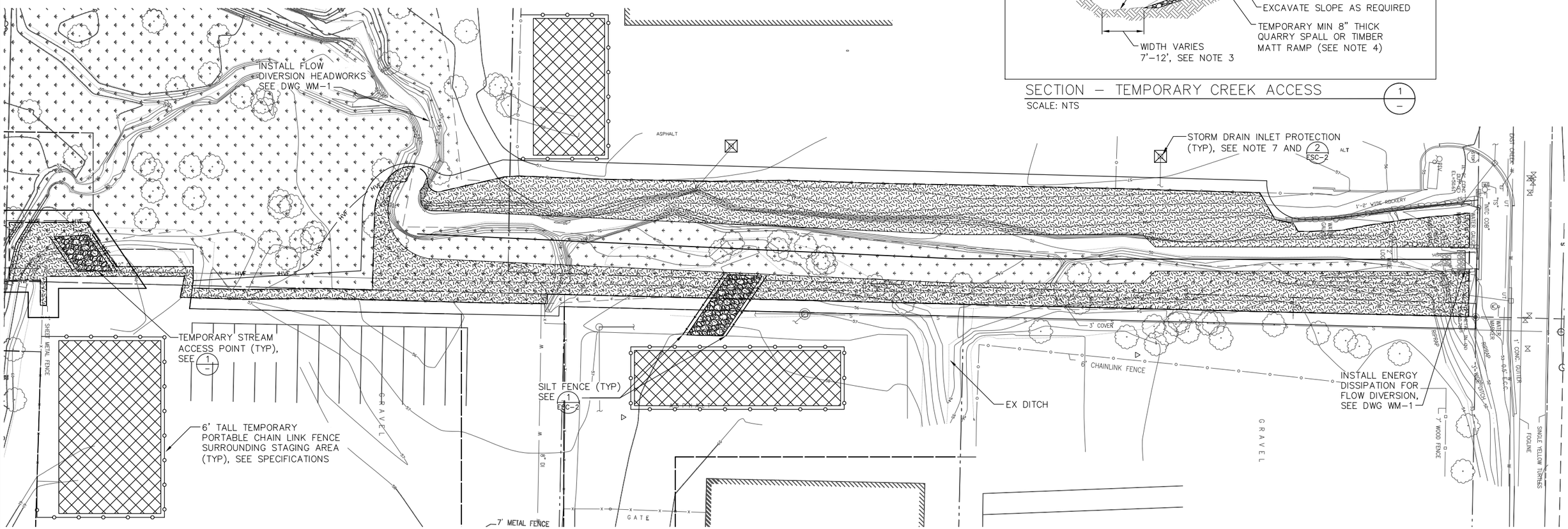
1. NO MECHANIZED EQUIPMENT SHALL BE STORED WITHIN 100' OF CREEK.
2. HIGH VISIBILITY FENCE AND SILT FENCE SHALL BE INSTALLED PRIOR TO COMMENCING CLEARING AND GRUBBING. A MINIMUM OF 2 DAYS NOTICE WILL BE GIVEN TO THE ENGINEER TO ALLOW FOR APPROVAL OF CLEARING LIMITS PRIOR TO ANY CLEARING OR GRUBBING ACTIVITIES.
3. TEMPORARY ACCESS FOR TRACKED EQUIPMENT ON CHANNEL ALIGNMENT MAY REQUIRE TEMPORARY GRADING OF CHANNEL BOTTOM.
4. QUARRY SPALLS OR TIMBER MATT FOR TEMPORARY STREAM ACCESS SHALL BE REMOVED UPON COMPLETION OF STREAM WORK.
5. TURBIDITY MONITORING SHALL BE PERFORMED IN ACCORDANCE WITH EPA METHOD 180.1 AND THE CONTRACT SPECIFICATIONS. SEE DWG WM-1 FOR MONITORING LOCATIONS.
6. CONTRACTOR SHALL PUMP CREEK FLOWS AS SHOWN ON DWG WM-1DURING INSTALLATION AND REMOVALS OF DIVERSION HEADWORKS AND OUTLET ENERGY DISSIPATERS, AND DURING ALL IN-STREAM CONSTRUCTION ACTIVITIES.
7. CONTRACTOR SHALL INSTALL STORM DRAIN INLET PROTECTION ON ALL CATCH BASINS IN PROJECT AREA AS DIRECTED BY ENGINEER.
8. DIRT AND MUD ON CONTRACTOR'S VEHICLE TIRES AND ON MATERIAL DELIVERY VEHICLE TIRES SHALL BE WASHED OFF AND RETAINED ONSITE, SUBJECT TO OTHER SEDIMENT CONTROL BMP'S, PRIOR TO VEHICLES EXITING THE SITE ON TO KAMBER ROAD.

20 0 20 40
1"=20'



SECTION – TEMPORARY CREEK ACCESS (1/–)

SCALE: NTS



Know what's below. Call before you dig.

DATUM

NAVD 88/NAD 83

DRAFT

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

60% DESIGN - NOT FOR CONSTRUCTION

NO	DATE	BY	APPR	REVISIONS
				City of Bellevue File # 11-122119-LO
				East Creek/Richards Creek Stream Channel Improvements

HERRERA ENVIRONMENTAL CONSULTANTS
2200 Sixth Avenue
Suite 1100
Seattle, Washington
98121-1820
206-441-9080
206-441-9108 FAX
http://www.herrerainc.com

EAST CREEK / RICHARDS CREEK STREAM MODIFICATION PROJECT

Approved By

DESIGN MANAGER DATE

PROJECT MANAGER DATE

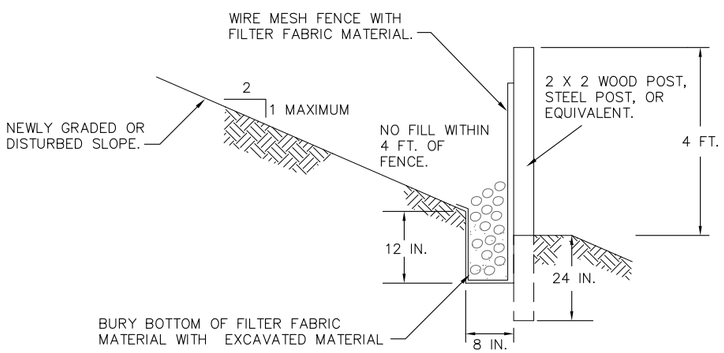
M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

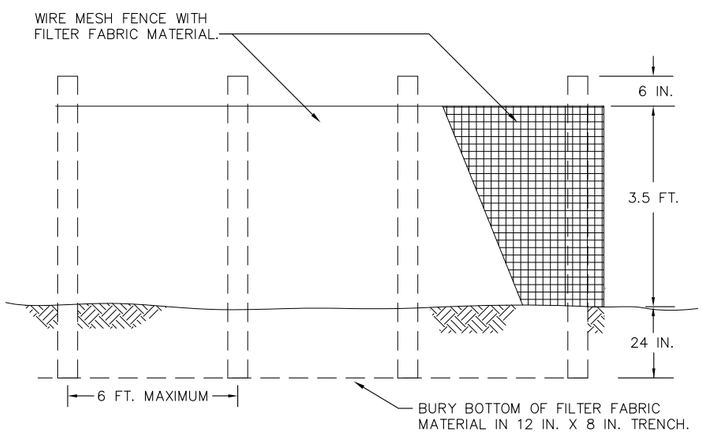
TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DRAWING ESC-1 SHT 13 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\ESC-1.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge



TYPICAL CROSS SECTION



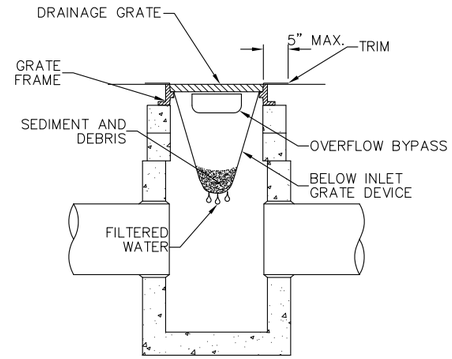
ELEVATION

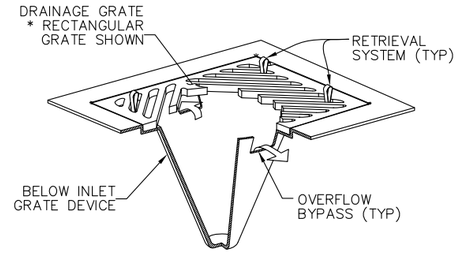
NOTES:

1. FENCE SHALL NOT BE INSTALLED ON SLOPES STEEPER THAN 2:1.
2. JOINTS IN FILTER FABRIC SHALL BE OVERLAPPED 6 INCHES AT POST.
3. USE STAPLES, WIRE RINGS, OR EQUIVALENT TO ATTACH FABRIC TO WIRE FENCE.
4. REMOVE SEDIMENT WHEN IT REACHES 1/3 FENCE HEIGHT.

SILT FENCE DETAIL (1 / ESC-1)

SCALE: NTS





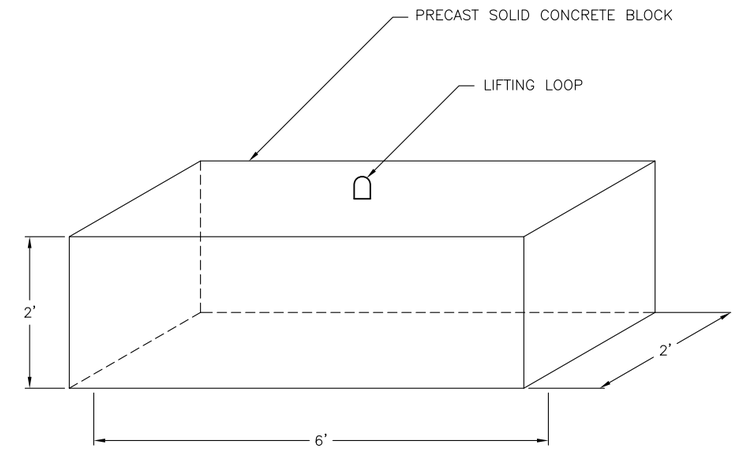
ISOMETRIC VIEW

NOTES:

1. SIZE THE BELOW INLET GRATE DEVICE (BIGD) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
2. THE BIGD SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BIGD WITHOUT SPILLING THE COLLECTED MATERIAL.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).

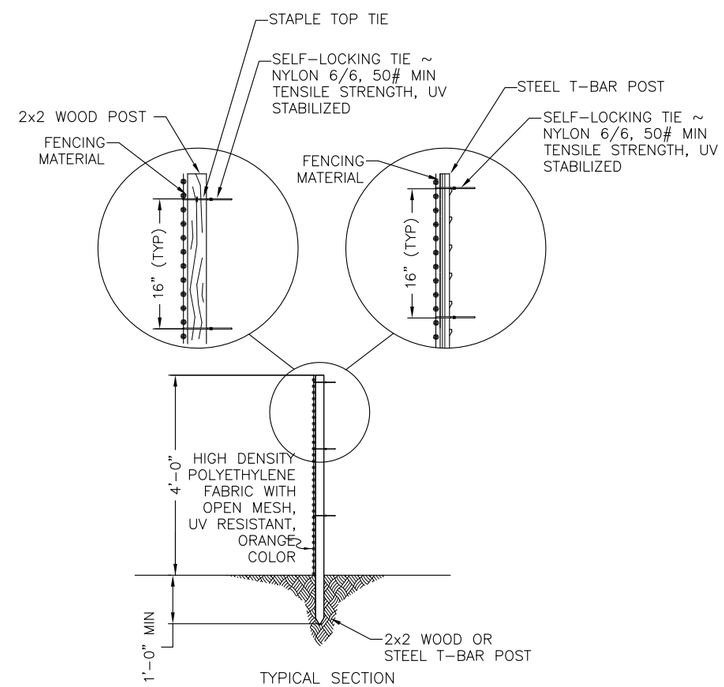
STORM DRAIN INLET PROTECTION (2 / ESC-1)

SCALE: NTS



DETAIL – ECOLOGY BLOCK (4 / WM-1)

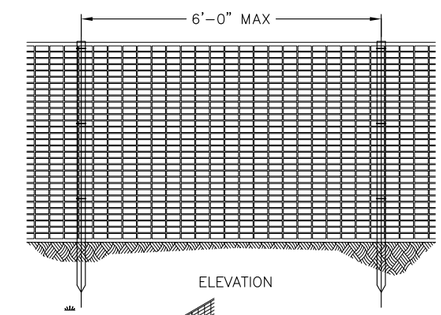
SCALE: NTS



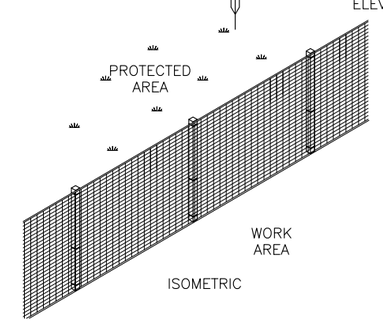
TYPICAL SECTION

HIGH VISIBILITY FENCE DETAIL (3 / ESC-1)

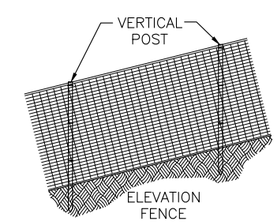
SCALE: NTS



ELEVATION



ISOMETRIC



ELEVATION FENCE ON SLOPE

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DATUM

NAVD 88/NAD 83

DRAFT

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M. EWBANK	07/2011
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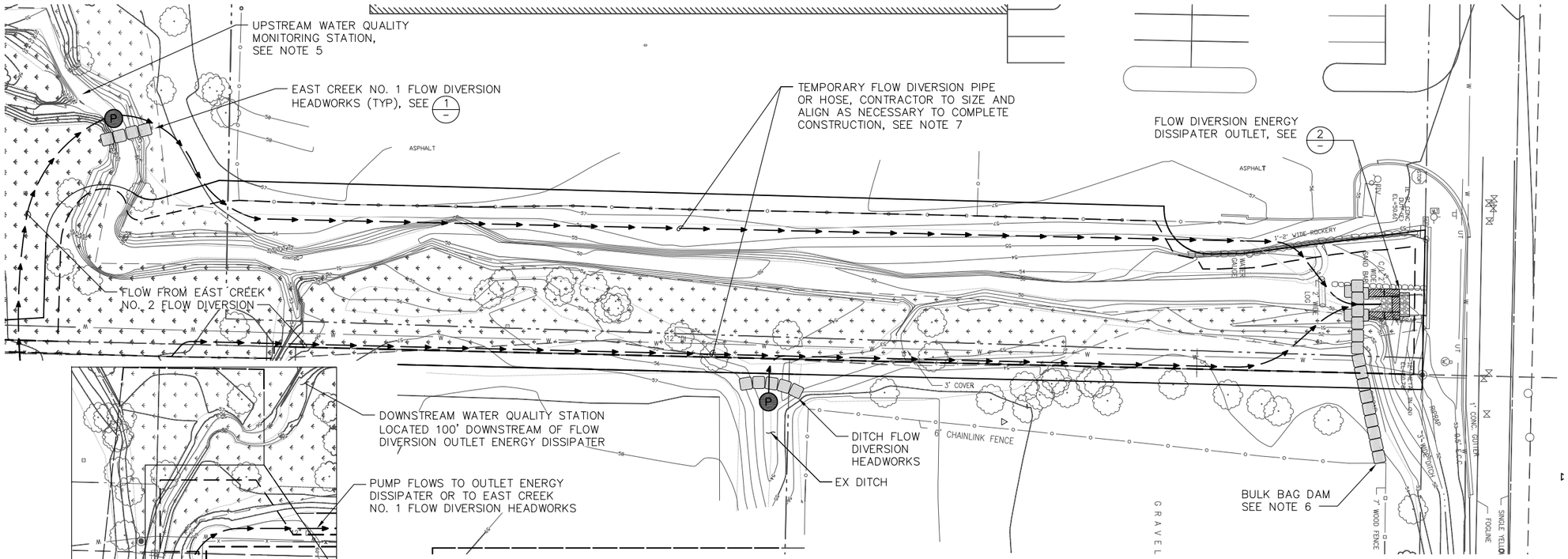
City of Bellevue UTILITIES

TESC DETAILS 1

DRAWING ESC-2 SHT 14 OF 17

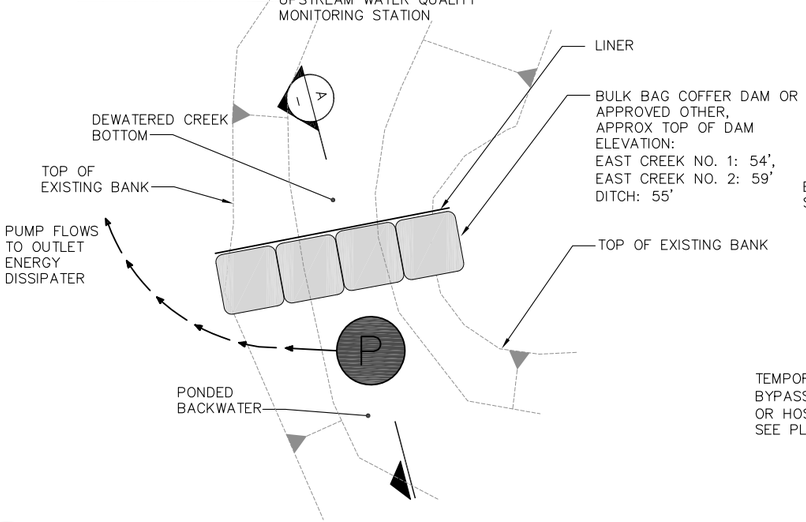
Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\ESC-2.dwg
Plot Date: 7/14/2011 12:22 PM Cad User: Laura Turnidge



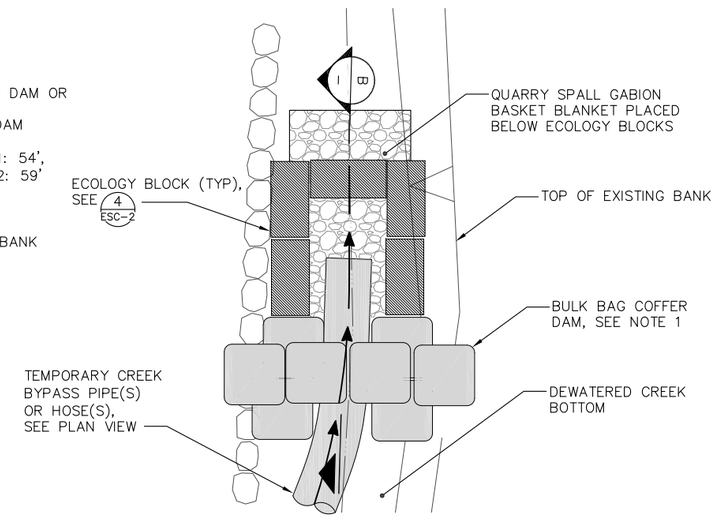
20 0 20 40
1"=20'

NOTES:

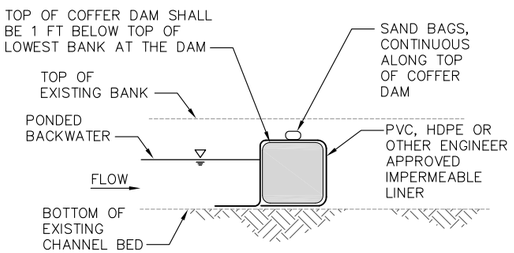
1. SIZE, QUANTITY AND CONFIGURATION OF BULK BAGS SHOWN FOR COFFER DAMS ARE CONCEPTUAL ONLY AND WILL VARY FROM THAT SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING APPROPRIATE SIZE, QUANTITY AND CONFIGURATION OF BULK BAGS NECESSARY TO DIVERT FLOW AND ISOLATE THE WORK AREA AND ENABLE SUCCESSFUL OPERATION OF PUMP BY-PASS SYSTEM AND MINIMIZE FLOW LEAKAGE TO THE EXTENT NECESSARY TO COMPLETE CONSTRUCTION AND CONFORM TO PERMIT REQUIREMENTS. MINOR EXCAVATION OF STREAM BANKS WILL BE ALLOWED TO KEY-IN BULK BAGS AS NECESSARY TO MINIMIZE FLOW LEAKAGE AND COMPLETE INSTALLATION OF COFFER DAM. ALL BULK BAGS SHALL BE FILLED WITH CLEAN WASHED ROUNDED GRAVEL.
2. PUMPING OF CREEK AND DITCH FLOWS DURING INSTALLATION AND REMOVAL OF UPSTREAM COFFERDAM AND DOWNSTREAM OUTFALL DISSIPATER, AND DURING ALL INSTREAM CONSTRUCTION, WILL BE REQUIRED AT ALL TIMES EXCEPT DURING HIGH FLOWS. SEE SPECIFICATIONS REGARDING FLOW BY-PASS REQUIREMENTS DURING HIGH FLOWS.
3. COORDINATE FISH EXCLUSION WITH CREEK DIVERSION PER THE WSDOT FISH EXCLUSION PROTOCOLS AND STANDARDS (AUGUST 2006) AND THE REQUIREMENTS OF THE HYDRAULIC PROJECT APPROVAL.
4. CONTRACTOR SHALL REMOVE ALL TEMPORARY FLOW DIVERSION MATERIALS FOLLOWING CONSTRUCTION AND FULLY RESTORE DISTURBED AREAS TO PRECONSTRUCTION CONDITIONS.
5. DOWNSTREAM WATER QUALITY MONITORING STATION TO BE LOCATED 100 FEET DOWNSTREAM OF FLOW DIVERSION OUTLET ENERGY DISSIPATER ON DOWNSTREAM SIDE OF KAMBER RD. BRIDGE.
6. CONSTRUCT TEMPORARY BULKBAG DAM AS SHOWN PRIOR TO STARTING INSTREAM WORK TO PREVENT BACKWATER EFFECTS FROM KAMBER RD. DRAINAGE. ENGINEER SHALL APPROVE ALIGNMENT PRIOR TO INSTALLATION.
7. ALL TEMPORARY FLOW DIVERSION EQUIPMENT, PIPES AND HOSES SHALL BE LOCATED AND ALIGNED WITHIN THE PERMANENT AND TEMPORARY CONSTRUCTION EASEMENTS.



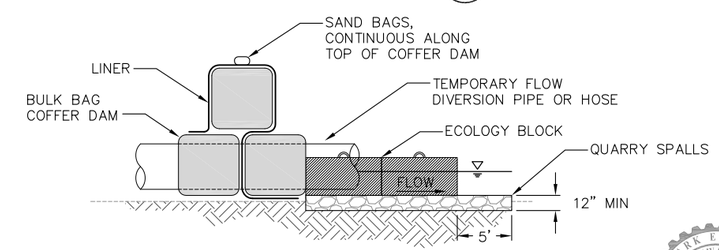
FLOW DIVERSION HEADWORKS, TYP (1)
SCALE: 1" = 5'



FLOW DIVERSION OUTLET ENERGY DISSIPATER (2)
SCALE: 1" = 5'



FLOW DIVERSION HEADWORKS SECTION (A)
SCALE: NTS



FLOW DIVERSION OUTLET ENERGY DISSIPATER SECTION (B)
SCALE: SCALE: 1"=5'

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City of Bellevue UTILITIES

FLOW DIVERSION AND FISH EXCLUSION PLAN

DRAWING WM-1 SHT 15 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\WM-1.dwg
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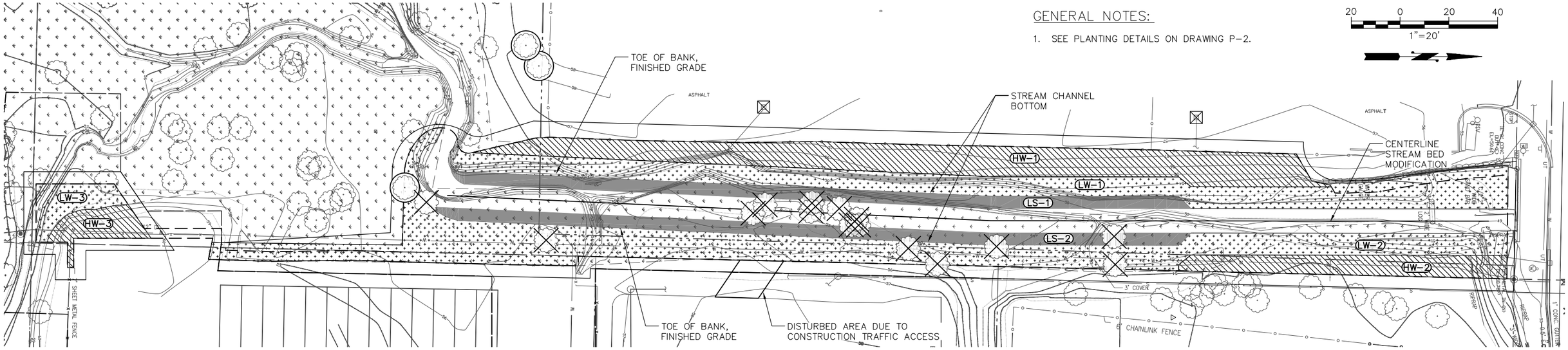

GENERAL NOTES:

1. SEE PLANTING DETAILS ON DRAWING P-2.

20 0 20 40
1"=20'

PLANTING NOTES:

1. SEEDING AND PLANTING SHALL OCCUR AFTER ELEVATIONS HAVE BEEN APPROVED BY ENGINEER.
2. NATIVE SEED MIX SHALL BE APPLIED TO ALL DISTURBED AREAS.
3. NATIVE SEED MIX SHALL BE APPLIED BY HAND TO FACES OF SOIL LIFTS AND TOP OF UPPERMOST LIFT PRIOR TO WRAPPING WITH ORGANIC EROSION CONTROL BLANKET. ALL OTHER AREAS SHALL BE HYDROSEEDED.
4. PLANTING OF ALL TREES, SHRUBS, AND EMERGENTS SHALL TAKE PLACE DURING THE DORMANT SEASON (OCTOBER 1 – FEBRUARY 28).
5. ALL PLANTS SHALL CONFORM TO THE STANDARDS OF THE CURRENT EDITION OF AMERICAN STANDARD FOR NURSERY STOCK AS APPROVED BY THE AMERICAN STANDARDS INSTITUTE (ANSI Z60.1–2004).
6. ALL CONTAINERIZED PLANTS SHALL BE NURSERY CONTAINER GROWN A MINIMUM OF ONE YEAR. PLANT MATERIAL IS TO BE SUPPLIED BY COMMERCIAL NURSERIES THAT SPECIALIZE IN NATIVE PLANTS.
7. PLANT SUBSTITUTIONS ARE SUBJECT TO APPROVAL BY THE ENGINEER.
8. PLANTS SHALL BE TAGGED FOR IDENTIFICATION WHEN DELIVERED.
9. ALL TREE AND SHRUB PLANTINGS SHALL BE SETBACK A MINIMUM OF 5 FEET FROM ALL FENCES AND PAVEMENT EDGES.
10. KEEP PLANTS SHADED UNTIL THE ACTUAL TIME OF PLANTING. DO NOT LET PLANT MATERIAL SIT IN SUN OR DRY OUT BEFORE PLANTING.
11. ENGINEER SHALL APPROVAL ALL PLANT ZONE BOUNDARIES AND PLANT LAYOUT PRIOR TO PLANTING.
12. THOROUGHLY WATER ALL PLANTED AREAS IMMEDIATELY AFTER PLANTING AND WATER FOR OPTIMUM HEALTH DURING DRY PERIODS DURING PLANT ESTABLISHMENT PERIOD.
13. AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AND NOT SHOWN TO BE PLANTED ON THESE PLANS SHALL BE RESTORED AND SEEDED AS DIRECTED BY THE ENGINEER.
14. SEE SPECIFICATIONS FOR ADDITIONAL SOIL PREPARATION, SEEDING, PLANTING, AND MAINTENANCE INFORMATION.

PLANT SCHEDULE

STRATUM	SCIENTIFIC NAME	COMMON NAME	MATERIAL TYPE AND SIZE	ON CENTER (O.C.) SPACING	HIGH WETLAND (HW) PLANT ZONE QUANTITIES			LOW WETLAND (LW) PLANT ZONE QUANTITIES			LIVE STAKE (LS) ONLY PLANT ZONE QUANTITIES		NOTES
					HW-1	HW-2	HW-3	LW-1	LW-2	LW-3	LS-1	LS-2	
TREE													
	ALNUS RUBRA	RED ALDER	1 GALLON, 12–18" HEIGHT	10' O.C.	14	4	2						PLANT IN SOIL ONLY
	CRATAEGUS DOUGLASII	DOUGLAS HAWTHORN	1 GALLON, 12–18" HEIGHT	10' O.C.	14	4	2						PLANT IN SOIL ONLY
	FRAXINUS LATIFOLIA	OREGON ASH	1 GALLON, 12–18" HEIGHT	10' O.C.				24	23	3			PLANT IN SOIL ONLY
	POPULUS BALSAMIFERA	BLACK COTTONWOOD	1 GALLON, 12–18" HEIGHT	10' O.C.					23				PLANT IN SOIL ONLY
	MALUS FUSCA	CRABAPPLE	1 GALLON, 12–18" HEIGHT	10' O.C.	14	4	2						PLANT IN SOIL ONLY
	SALIX LUCIDA	PACIFIC WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	10' O.C.				24	23	3	18	18	PLANT IN STREAMBED SEDIMENT AND SOIL
SHRUB													
	LONICERA INVOLUCRATA	BLACK TWINBERRY	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7						PLANT IN SOIL ONLY
	PHYSOCARPUS CAPITATUS	PACIFIC NINEBARK	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7						PLANT IN SOIL ONLY
	ROSA PISOCARPA	SWAMP ROSE	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7						PLANT IN SOIL ONLY
	SYMPHORICARPOS ALBUS	SNOWBERRY	1 GALLON, 12–18" HEIGHT	4' O.C.	54	17	7						PLANT IN SOIL ONLY
	CORNUS SERICEA	RED–OSIER DOGWOOD	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	4' O.C.				59	87	7			PLANT IN STREAMBED SEDIMENT AND SOIL
	SALIX GEYERIANA	GEYER WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	4' O.C.				59	87	7	30	30	PLANT IN STREAMBED SEDIMENT AND SOIL
	SALIX HOOKERIANA	HOOKER WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	4' O.C.				59	87	7	30	30	PLANT IN STREAMBED SEDIMENT AND SOIL
	SALIX SITCHENSIS	SITKA WILLOW	LIVE STAKE, 36"–48" LENGTH, 0.5–1" DIA. BASE	4' O.C.				59	87	7	30	30	PLANT IN STREAMBED SEDIMENT AND SOIL
EMERGENT													
	CAREX AMPLIFOLIA	BIGLEAF SEDGE	PLUG	1' O.C.				1066	1566	117			PLANT IN SOIL ONLY
	CAREX OBNUPTA	SLOUGH SEDGE	PLUG	1' O.C.				1066	1566	117			PLANT IN SOIL ONLY
	CAREX STIPATA	SAWBEAK SEDGE	PLUG	1' O.C.				1066	1566	117			PLANT IN SOIL ONLY
	SCIRPUS MICROCARPUS	SMALL–FRUITED BULRUSH	PLUG	1' O.C.				1066	1566	117			PLANT IN SOIL ONLY

LEGEND

- HIGH WETLAND PLANTING ZONE
- LOW WETLAND PLANTING ZONE
- LIVE STAKE ONLY PLANTING ZONE
- TREES TO BE RETAINED AND PROTECTED DURING CONSTRUCTION. SEE DRAWING C-2 FOR SPECIFICATIONS

DATUM

NAVD 88/NAD 83

MARK EWBANK STATE OF WASHINGTON 29434 REGISTERED PROFESSIONAL ENGINEER

DRAFT

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City of Bellevue UTILITIES

PLANTING PLAN AND SCHEDULE

DRAWING P-1 SHT 16 OF 17

Path: O:\proj\Y2009\09-04503-000\CAD\Dwgs\P-1.dwg Cad User: Todd Prescott
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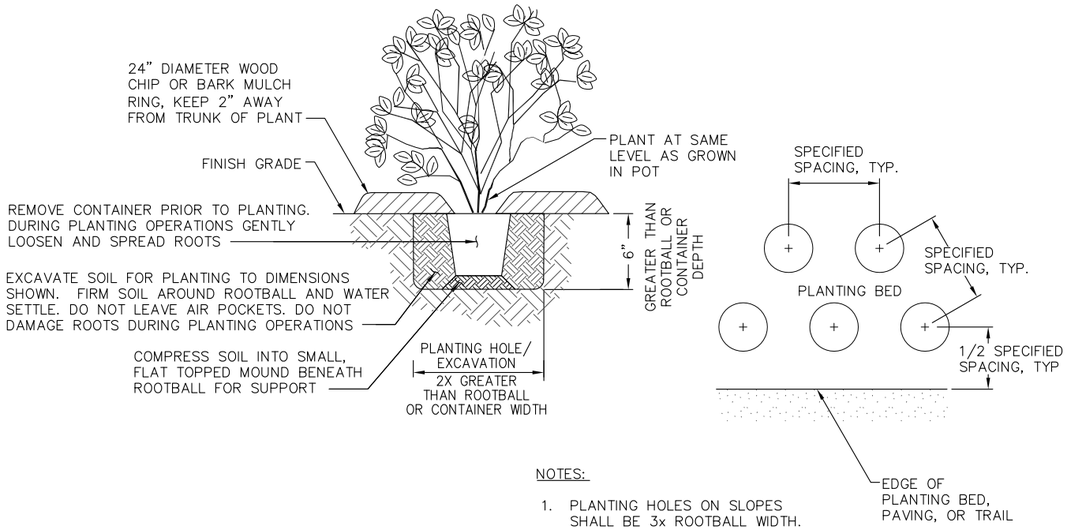
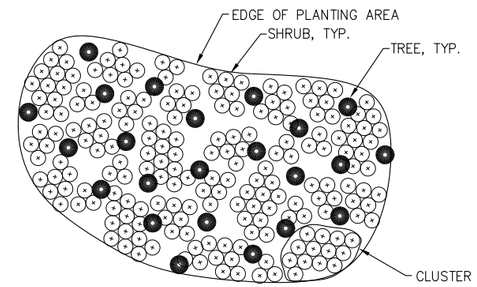


NOTES:

1. PLANTING HOLES ON SLOPES SHALL BE 3x ROOTBALL WIDTH.

TREE AND SHRUB PLANTING (1 / –)

SCALE: NTS

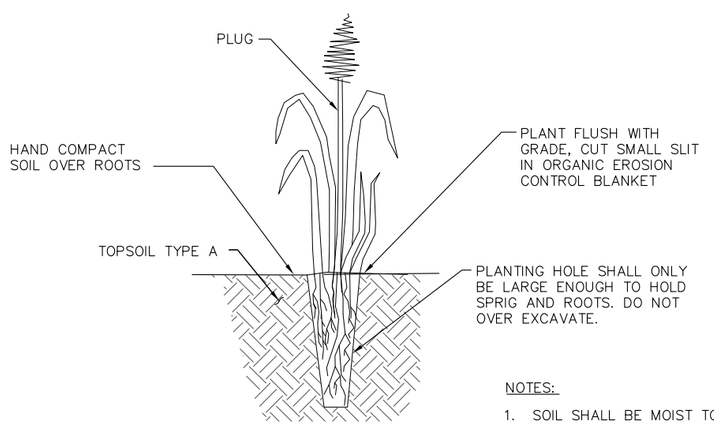


NOTES:

1. PLANT SHRUBS IN CLUSTERS OF THREE, FIVE, OR SEVEN SHRUBS.
2. IN CLUSTERS OF THREE, FIVE OR SEVEN SHRUBS PLANT ONE SPECIES.
3. EVENLY SPACE CLUSTERS THROUGHOUT PLANTING AREA.
4. INTENT OF SHRUB PLANTING IS TO APPEAR NATURAL AND INFORMAL.

SHRUB SPACING AROUND TREES (2 / –)

SCALE: NTS

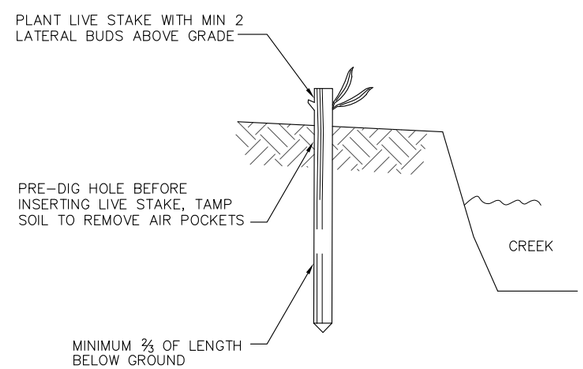


NOTES:

1. SOIL SHALL BE MOIST TO WET AT TIME OF PLANTING.

LIVE STAKE INSTALLATION (3 / –)

SCALE: NTS



LIVE STAKE PLANTING (4 / –)

SCALE: NTS

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Cad User: Laura Turnidge

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PROJECT MANAGER	DATE

M. STRAZER	07/2011
DESIGNED BY	DATE
L. TURNIDGE	07/2011
DRAWN BY	DATE
M. EWBANK	07/2011
CHECKED BY	DATE

City of Bellevue UTILITIES

PLANTING DETAILS

DRAWING P-2

SHT 17 OF 17

APPENDIX B

Plant List

Table B-1. Plant species observed in the study area of the East Creek/Richards Creek Stream Modification Project.

Vegetation Stratum	Scientific Name	Common Name	Wetland Indicator Status [a]
Trees			
	Alnus rubra	Red alder	FAC
	Fraxinus latifolia	Oregon ash	FACW
	Populus balsamifera	Black cottonwood	FAC
	Pseudotsuga menziesii	Douglas fir	FACU
	Tsuga heterophylla	Western hemlock	FACU-
Shrubs			
	Acer circinatum	Vine maple	FAC-
	Acer macrophyllum	Big-leaf maple	FACU
	Cornus sericea	Red-osier dogwood	FACW
	Crataegus montogyna	White hawthorn	NI
	Lonicera involucrata	Black twinberry	FAC+
	Ilex aquifolium	European holly	NI (invasive)
	Oemleria cerasiformis	Indian plum	FACU
	Rubus armeniacus	Himalayan blackberry	FACU (invasive)
	Rubus parviflorus	Thimbleberry	FAC-
	Rubus spectabilis	Salmonberry	FAC+
	Salix lucida spp. lasiandra	Pacific willow	FACW+
	Salix sitchensis	Sitka willow	FACW
	Sorbus scopulina	Mountain ash	FACU
	Spiraea douglasii	Hardhack	FACW
Herbaceous Species			
	Athyrium filix-femina	Lady fern	FAC
	Calystegia sylvatica	Giant morning glory	NI (invasive)
	Carex amplifolia	Big leaf sedge	FACW+
	Carex obnupta	Slough sedge	OBL
	Carex deweyana	Dewey's sedge	FAC+
	Equisetum telmateia	Giant horsetail	FACW
	Hedera helix	English ivy	NI (invasive)
	Lysichiton americanum	Skunk cabbage	OBL

Vegetation Stratum	Scientific Name	Common Name	Wetland Indicator Status [a]
Herbaceous Species (continued)			
	Maianthemum dilatatum	False lily-of-the-valley	FAC
	Oenanthe sarmentosa	Pacific water parsley	OBL
	Phalaris arundinacea	Reed canarygrass	FACW
	Polygonum x bohemicum	Hybrid Japanese knotweed	FACU (invasive)
	Polystichum munitum	Sword fern	FACU
	Ranunculus repens	Creeping buttercup	FACW
	Scirpus microcarpus	Small-fruited bulrush	OBL
	Tolmiea menziesii	Piggyback plant	FAC*
	Urtica dioica	Stinging nettle	FAC+
	Veratrum viride	Corn lily	FACW

Note: The - suffix after the indicator symbol FAC indicates a species with a somewhat lower probability of occurring in wetlands. The + suffix after the indicator symbol FAC indicates a species with a somewhat higher probability of occurring in wetlands.

NI = no indicator.

[a] The wetland indicator status is from the National List of Plant Species that Occur in Wetlands (USFWS 1993).

* An asterisk (*) identifies tentative assignments based on limited information from which to determine the indicator status.

APPENDIX C

Wetland Delineation Methods

Wetland Delineation Methods

This wetland delineation was performed in accordance with the Washington State Wetlands Identification and Delineation Manual (Ecology 1997) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region (Environmental Laboratory 2010). These methods use a three-parameter approach for identifying and delineating wetlands, based on the presence of field indicators for hydrophytic vegetation, hydric soils, and hydrology. The specific methods using these three parameters are described in Appendix C. This wetland delineation was performed according to procedures specified for the routine wetland determination method (Environmental Laboratory 1987).

Hydrophytic Vegetation

Hydrophytic vegetation is characterized by the ability to grow, effectively compete, reproduce, and persist in anaerobic soil conditions resulting from periodic or long-term saturation (Environmental Laboratory 1987). Vegetation must meet at least one of the four indicators (described below) that are used to determine the presence of hydrophytic vegetation in wetlands. Problematic and atypical situations for hydrophytic vegetation are also described in the Corps manual and supplement (Environmental Laboratory 1987 and 2010).

Plant Species Identification

Plant species were identified using *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1987) and *A Field Guide to the Common Wetland Plants of Western Washington and Northwestern Oregon* (Cooke 1997). The indicator status of each plant species is based on the *National List of Plant Species That Occur in Wetlands: Washington* (Reed 1988) and the 1993 *Supplement to the List of Plant Species That Occur in Wetlands: Northwest (Region 9)* (Reed 1993).

Dominant Species Determination

Dominant species are those that contribute more than other species to the character of a plant community. To determine dominance, a vegetation sampling area is determined by the field biologist to accurately characterize the plant community that occurs in the area to be evaluated. These are commonly circular sampling areas, centered on the location of the test plot (where soil and hydrologic data is also collected). The radius of the circle is determined in the field, based on site conditions. In large wetlands, a typical sampling radius would be 2 to 5 meters for tree and sapling/shrub species, and 1 meter for herbaceous species. In a small or narrow wetland (or upland), the radius might be reduced to accurately sample wetland (upland) areas, thereby avoiding an overlap into an adjacent community having different vegetation, soils, or hydrologic conditions (Environmental Laboratory 2010).

Within the vegetation sampling area, a complete list of plant species that occur in the sampling area is compiled and the species divided into four strata: tree, shrub (including saplings, see criteria below), herb, and woody vines. A plant is included in the tree stratum if it is a woody plant 3 inches diameter at breast height (dbh) or greater; in the shrub stratum if it is a woody plant less than 3 inches dbh (including tree saplings under 3 inches dbh); in the herb stratum if it is an herbaceous (non-woody) plant; and in the woody vine stratum if it is a woody vine of any height (Environmental Laboratory 2010). To be included in the sampling, 50 percent or more of the plant base must be within the radius of the sampling area. For trees specifically, more than 50 percent of the trunk (diameter) must be within the sampling radius to be included.

A rapid test, dominance test (e.g., the 50/20 rule), or prevalence index are commonly used to determine which species are considered dominant and to assess whether the criteria for hydrophytic vegetation are met at each test plot (Environmental Laboratory 2010). Additional hydrophytic vegetation indicators are discussed in the following section.

To conduct a rapid test (Indicator 1 on the wetland determination data form), the dominant species are evaluated visually and if all are FACW or OBL, the vegetation data passes the rapid test. To conduct a dominance test (Indicator 2 on the wetland determination data form), the absolute areal coverage of the plant species within a stratum are totaled, starting with the most abundant species and including other species in descending order of coverage, until the cumulative coverage exceeds 50 percent of the total coverage for the stratum. The plant species that constitute this first 50 percent of areal coverage are considered the dominant species in the stratum. In addition, any other any single plant species that constitutes at least 20 percent of the total percent cover in the stratum is also considered a dominant species (Environmental Laboratory 2010). The indicator status category for each plant (shown in Table C-1) is also listed on the wetland determination form. If more than 50 percent of the dominant species across all strata are rated OBL, FACW, or FAC, the hydrophytic vegetation dominance test (Indicator 2) is met.

Table C-1. Plant indicator status categories.

Indicator Status	Indicator Symbol	Definition
Obligate wetland plants	OBL	Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions but also occur rarely (estimated probability <1%) in upland areas
Facultative wetland plants	FACW	Plants that usually occur (estimated probability >67%) in wetlands under natural conditions but also occur (estimated probability 1% to 33%) in upland areas
Facultative plants	FAC	Plants with a similar likelihood (estimated probability 33% to 67%) of occurring in both wetlands and upland areas
Facultative upland plants	FACU	Plants that sometimes occur (estimated probability 1% to 33%) in wetlands but occur more often (estimated probability >67% to 99%) in upland areas
Obligate upland plants	UPL	Plants that rarely occur (estimated probability <1%) in wetlands under natural conditions
WET ⟵ *OBL – FACW – FAC – FACU – UPL* ⟶ *DRY*		

Source: Environmental Laboratory (1987).

The prevalence index (Indicator 3 on the wetland determination data form) is a weighted-average wetland indicator status of all plant species in the sampling plot, where weighting is by abundance (Environmental Laboratory 2010). This method is used where indicators of hydric soil and wetland hydrology are present, but the vegetation initially fails the rapid and dominance tests (Indicators 1 and 2). To determine the prevalence index, the absolute cover of each species in each stratum is determined. All species (across all strata) are organized into wetland indicator status groups (i.e., OBL, FACW, FAC, FACU, or UPL) and their cover values are summed within the groups. The formula for the prevalence index is applied. If the prevalence index (which ranges from 1.0 to 5.0) equals 3.0 or less, this hydrophytic vegetation indicator is met.

Additional Hydrophytic Vegetation Indicators

The presence of morphological adaptations to wetland conditions in plants that lack a published hydrophytic vegetation indicator status or with an indicator status of FACU or drier is also a hydrophytic vegetation indicator (Indicator 4). Evidence of physiological, morphological, or reproductive adaptations indicating growth in hydrophytic conditions can include, but are not limited to, buttressed roots, adventitious roots, multi-stemmed trunks, or tussocks. To determine whether Indicator 4 is met, the morphological features must be observed on more than 50 percent of the individuals of a FACU species (or species without a published indicator status) living in an area where hydric soil and wetland hydrology are present. On the wetland determination data form, the indicator status of the species with morphological adaptations would be changed to FAC (with supporting notes), and the dominance test (Indicator 2) and/or prevalence index (Indicator 3) would then be recalculated.

Wetland non-vascular plants, referred to as bryophytes and consisting of mosses, liverworts, and hornworts, may also meet the hydric vegetation criteria, under Indicator 5 (Environmental Laboratory 2010). These plants must be present in areas containing hydric soils and wetland hydrology. The percent cover of wetland specialist bryophytes is determined in 10-inch by 10-inch square plots placed at the base of hummocks, if present. The summed cover of wetland specialist bryophytes must be more than 50 percent of the total bryophyte cover in the vegetation sampling area.

The “problematic hydrophytic vegetation” indicator section in the Corps regional supplement further explains how to interpret situations in which hydric soils and wetland hydrology are present but hydrophytic vegetation Indicators 1 through 5 are lacking (Environmental Laboratory 2010). Procedures for looking at settings such as areas with active vegetation management (e.g. farms), areas dominated by aggressive invasive species, active floodplains, and low terraces are described, as well as explanations for specific situations, such as seasonal shifts in plant communities, extended drought conditions, and riparian areas.

Hydric Soils

A hydric soil is a soil that is saturated, flooded, or inundated long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic

vegetation (Environmental Laboratory 1987, 2010). The evaluation of existing soil maps (developed by NRCS and other sources) is used to understand hydric soil distribution and to identify the likely locations of hydric soils (by verifying their inclusion on the hydric soils list [NRCS 2010a]). Comparison of these mapped soils to conditions found on site help verify the presence of hydric soils.

For on-site soils characterization, hydric soils data were obtained generally by digging test pits at least 20 inches deep and 4 inches wide. Hydric soil conditions were evaluated using indicators outlined in *Field Indicators of Hydric Soils in the United States* (NRCS 2006), and adopted by the *Regional Supplement to the U.S. Army Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys, and Coast Region* (Environmental Laboratory 2010).

Hydric soil indicators applicable to the Western Mountains, Valleys, and Coast region include, but are not limited to, the presence of: organic soils (i.e., histosols or histic epipedons); sulfidic material (i.e., hydrogen sulfide); depleted, gleyed, or reduced soil matrices; and/or the presence of iron or manganese concretions (Environmental Laboratory 2010). Soil color characterization (i.e., hue, value, and chroma) is a critical tool in determining depleted, gleyed, and reduced soil conditions. Soil color was evaluated by comparing soil colors at test plots to standardized color samples in *Munsell Soil Color Charts* (Munsell Color 2000).

Wetland Hydrology

Wetland hydrology is indicated by site conditions that demonstrate the periodic inundation or saturation to the soil surface for a sufficient duration during the total growing season. A "sufficient duration" during the growing season is defined as 14 or more consecutive days of flooding, ponding, or presence of a water table at 12 inches or less from the soil surface (Environmental Laboratory 2010). The growing season is the period of consecutive frost-free days, or the longest period during which the soil temperature stays above biological zero (41°F), when measured at 12 inches below the soil surface.

Two indicators of biological activity can be used to determine whether the growing season has begun and is ongoing (Environmental Laboratory 2010):

- Occurrence of aboveground growth and development of at least two non-evergreen vascular plant species growing within the wetland. Examples of this growth include the emergence or elongation of leaves on woody plants and the emergence or opening of flowers.

- Soil temperature, which can be measured once during a single site visit, should be at least 41°F or higher at a depth of 12 inches.

For this assessment, onsite hydrologic indicators were examined at the test plots. Hydrologic indicators include the presence of surface water, standing water in the test pit at a depth of 12 inches or less, saturation in the root zone, watermarks, drift lines, sediment deposits, drainage

patterns within wetlands, oxidized rhizospheres surrounding living roots, and water-stained leaves.

Note: References for this appendix are included at the end of the main text

APPENDIX D

Wetland Delineation Data Forms

HERRERA ENVIRONMENTAL CONSULTANTS

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

Project Site:	East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project	City/County:	Bellevue/King	Sampling Date:	4-27-10
Applicant/Owner:	City of Bellevue	State:	WA	Sampling Point:	WLA -TP1
Investigator(s):	Kris Lepine, George Iftner, Katheryn Seckel	Section, Township, Range:	S 10, T 24 N, R 5 E		
Landform (hillslope, terrace, etc.):	Flat with Depression	Local relief (concave, convex, none):	concave	Slope (%):	1%
Subregion (LRR):	LRR A	Lat: 47.585	Long: 122.162	Datum:	
Soil Map Unit Name:	Urban land	NWI classification:	PSSC		

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland? YES ☒ NO ☐**
Hydric Soil Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: **All three parameters are met.**

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size: **5 meters**)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix sitchensis*	50	Y	FACW
2. *Alnus rubra*	20	Y	FAC
3.			
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot Size: **5 meters**)			
1. *Rubus armeniacus*	20	Y	FACU
2. *Salix sitchensis*	15	Y	FACW
3.			
4.			
5.			
	35	= Total Cover	
Herb Stratum (Plot Size: **1 meter**)			
1. *Ranunculus repens*	40	Y	FACW
2. *Urtica dioica*	15	Y	FAC+
3. *Athyrium filix-femina*	15	Y	FAC
4. *Equisetum telmateia*	10	N	FACW
5. *Tolmiea menziesii*	10	N	FAC*
6. *Geum macrophyllum*	5	N	FACW-+
7. *Phalaris arundinacea*	5	N	FACW
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum = **0**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	6	(A)
Total Number of Dominant Species Across All Strata:	7	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	85	(A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x1 =
FACW species	x2 =
FAC species	x3 =
FACU species	x4 =
UPL species	x5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Wetland Non-Vascular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: **The vegetation community is hydrophytic based on the dominance test.**

Project Site: East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project

SOIL

Sampling Point: WLA - TP1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/2	93	2.5 Y/R 3/6	7	C	PL	Silt loam	
16-18+	10YR 4/2	100					Sandy loam	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☒ **No** ☐

Remarks: **Meets the criteria for Redox Dark Surface indicator (F6).**

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):	
Water Table Present?	Yes	☒	No	☐	Depth (inches):	18
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks: **Meets the criteria for saturation indicator A3.**

HERRERA ENVIRONMENTAL CONSULTANTS

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

Project Site:	East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project	City/County:	Bellevue/King	Sampling Date:	4-27-10
Applicant/Owner:	City of Bellevue	State:	WA	Sampling Point:	WLA –TP2
Investigator(s):	Kris Lepine, George Iftner, Katheryn Seckel	Section, Township, Range:	S 10, T 24 N, R 5 E		
Landform (hillslope, terrace, etc.):	Terrace	Local relief (concave, convex, none):	none	Slope (%):	3%
Subregion (LRR):	LRR A	Lat: 47.585	Long: -122.162	Datum:	
Soil Map Unit Name:	Urban land	NWI classification:	PSSC		

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?** **YES** ☐ **NO** ☒
Hydric Soil Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: **None of the parameters were met.**

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size: **5 meters**)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Alnus rubra*	30	Y	FAC
2. *Sorbus scopulina*	10	Y	FACW
3. *Pseudotsuga menziesii*	5	N	FACU
4.			
	45	= Total Cover	
Sapling/Shrub Stratum (Plot Size: **5 meters**)			
1. *Oemleria cerasiformis*	5	Y	FACU
2. *Ilex aquifolium*	5	Y	FACU
3. *Rubus armeniacus*	5	Y	FACU
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot Size: **1 meter**)			
1. *Equisetum telmateia*	5	Y	FACW
2. *Polystichum munitum*	5	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1. *Hedera helix*	50	Y	NL
2.			
	50	= Total Cover	

% Bare Ground in Herb Stratum = **0**

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	8	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	37	(A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x1 =
FACW species	x2 =
FAC species	x3 =
FACU species	x4 =
UPL species	x5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is $\leq$3.0[1]
- Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Wetland Non-Vascular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks: **The criteria for hydrophytic vegetation indicators are not met.**

Project Site: East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project

SOIL

Sampling Point: WLA – TP2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					Silty clay loam	
5-16	10YR 5/2	100					Sandy clay loam	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☐ **No** ☒

Remarks: **No hydric soil indicators were met**

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks: **No wetland hydrology indicators were present.**

HERRERA ENVIRONMENTAL CONSULTANTS

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

Project Site:	East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project	City/County:	Bellevue/King	Sampling Date:	1-28-11
Applicant/Owner:	City of Bellevue	State:	WA	Sampling Point:	WLA-TP3
Investigator(s):	Kris Lepine, Katheryn Seckel	Section, Township, Range:	S 10, T 24 N, R 5 E		
Landform (hillslope, terrace, etc.):	Flat	Local relief (concave, convex, none):	none	Slope (%):	1%
Subregion (LRR):	LRR A	Lat: 47.585	Long: 122.162	Datum:	
Soil Map Unit Name:	Urban Land	NWI classification:	N/A		

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland? YES ☒ NO ☐**
Hydric Soil Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: **All three parameters are met.**

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1. *Salix lasiandra*	20	Y	FACW+
2.			
3.			
4.			
5.			
	20	= Total Cover	
Herb Stratum (Plot Size:)			
1. *Phalaris arundinacea*	80	Y	FACW
2. *Ranunculus repens*	10	N	FACW
3. *Scirpus microcarpus*	10	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum =

Dominance Test Worksheet:

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x1 =
FACW species	x2 =
FAC species	x3 =
FACU species	x4 =
UPL species	x5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: **The vegetation community is hydrophytic based on the dominance test.**

Project Site: East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project

SOIL

Sampling Point: WLA-TP3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/1	100					Gravelly, loamy sandy muck	
14-16+	10YR 5/2	90		10	CS	PL	Cobbly, gravelly, loamy sand	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☒ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☒ **No** ☐

Remarks: **Meets the criteria for Sandy Mucky Mineral indicator (S1).**

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):	
Water Table Present?	Yes	☒	No	☐	Depth (inches):	20
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks: **Meets the criteria for saturation indicator A3.**

HERRERA ENVIRONMENTAL CONSULTANTS

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

Project Site:	East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project	City/County:	Bellevue/King	Sampling Date:	1-28-11
Applicant/Owner:	City of Bellevue	State:	WA	Sampling Point:	WLA-TP4
Investigator(s):	Kris Lepine, Katheryn Seckel	Section, Township, Range:	S 10, T 24 N, R 5 E		
Landform (hillslope, terrace, etc.):	Flat	Local relief (concave, convex, none):	concave	Slope (%):	1 %
Subregion (LRR):	LRR A	Lat: 47.585	Long: 122.162	Datum:	
Soil Map Unit Name:	Urban Land	NWI classification:	N/A		

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, Or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland? YES ☒ NO ☐**
Hydric Soil Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: **All three parameters are met.**

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	20	Y	FAC
2. *Salix lasiandra*	10	N	FACW+
3.			
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot Size:)			
1. *Alnus rubra*	5	Y	FAC
2. *Rubus spectabilis*	5	Y	FAC+
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot Size:)			
1. *Phalaris arundinacea*	80	Y	FACW
2. *Ranunculus repens*	15	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	
Woody Vine Stratum (Plot Size:)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum =

Dominance Test Worksheet:

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x1 =
FACW species	x2 =
FAC species	x3 =
FACU species	x4 =
UPL species	x5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: **The vegetation community is hydrophytic based on the dominance test.**

Project Site: East Creek and Richards Creek Fish Passage Improvement and Stream Modification Project

SOIL

Sampling Point: WLA-TP4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2						Organic silty clay loam	
9-15+	10YR 5/1	90	5YR 5/8	10	CN	M	sand	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ☒ **No** ☐

Remarks: **Meets the criteria for Depleted Below Dark Surface indicator (A11).**

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):	
Water Table Present?	Yes	☒	No	☐	Depth (inches):	13
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks: **Meets the criteria for saturation indicator A3.**

APPENDIX E

Wetland Rating Forms

Wetland name or number: A

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): A Date of site visit: 4/27/10

Rated by : Katheryn Seckel Trained by Ecology? Yes ☑ No ☐ Date: 6/18/08

SEC: 10 TWNSHP: 24 N RNGE: 5 E Is S/T/R in Appendix D? Yes ☐ No ☑

Map of wetland unit: Figure 4 **Estimated size:** 4.5 acres

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	20
Score for Hydrologic Functions	26
Score for Habitat Functions	19
TOTAL score for functions	**65**

Category based on SPECIAL CHARACTERISTICS of wetland

I ☐ **II** ☐ **Does not Apply** ☐

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

Check the appropriate type and class of wetland being rated.

Wetland Type	
Estuarine	☐
Natural Heritage Wetland	☐
Bog	☐
Mature Forest	☐
Old Growth Forest	☐
Coastal Lagoon	☐
Interdunal	☐
None of the above	☑

Wetland Class	
Depressional	☐
Riverine	☑
Lake-fringe	☐
Slope	☐
Flats	☐
Freshwater Tidal	☐
Check if multiple HGM classes are present	☐

Comments:

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 Special 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 (T/E)* ***plant or animal*** *species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	☐	☑
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.	☐	☑
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.	☐	☑

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.

Classification of Vegetated Wetlands 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, indentify 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 Saltwater 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 being kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. xx).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface

☑ 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 open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);

☐ At least 30% of the open water area is deeper than 6.6 feet (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 <3 feet in 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?

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

☑ The overbank flooding occurs once every two years.

☐ 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 of 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 stream or river running through it and providing water? The wetland seems to be maintained by higher ground water in the area. The wetland may be ditched, but has no obvious natural outlet.

☐ NO - go to 8 ☐ YES - the wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide.) Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within 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 second class 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 a Delineated Wetland Boundary	***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	☐
Saltwater 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 you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

R Riverine and Freshwater Tidal Fringe Wetlands	
WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality.	
R 1. Does the wetland unit have the <u>potential</u> to improve water quality? ***(see p. 52)***	**Points**
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** ☐ Depresssions cover >1/2 area of wetland **Points = 4** If depressions >1/2 of area of unit, draw polygons on aerial photo or map ☑ Depressions present but cover <1/2 area of wetland **Points = 2** ☐ No depressions are present **Points = 0** Provide photo or drawing	2 **Figure __**
R 1.2 Characteristics of the vegetation in the unit (areas with >90% cover at person height): ☑ Trees or shrubs >2/3 area of the unit **Points = 8** ☐ Trees or shrubs >1/3 area of the unit **Points = 6** ☐ Ungrazed, herbaceous plants >2/3 area of the unit **Points = 6** ☐ Ungrazed, herbaceous plants >1/3 area of the 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	8 **Figure __**
Total for R 1 *Add the points in the boxes above*	10
R 2. Does the wetland unit have the <u>opportunity</u> to improve water quality? ***(see p. 53)*** Answer YES if you know or believe there are pollutants in ground water or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes, or ground water 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 an opportunity.* ☐ Grazing in the wetland or within 150 feet ☑ Untreated stormwater discharges to wetland ☐ Tilled fields or orchards within 150 feet 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 feet of wetland ☐ The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediments, toxic compounds, or nutrients in the river water above standards for water quality ☐ Other:	Multiplier 2
YES - multiplier is **2** NO - multiplier is **1**	
TOTAL - Water Quality Functions Multiply the score from R 1. by R 2. ***Add score to table on p. 1***	20

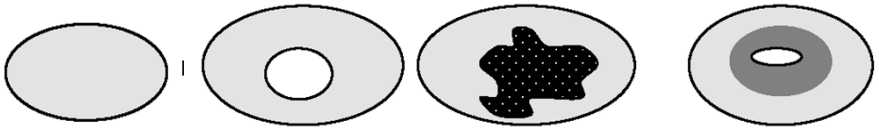
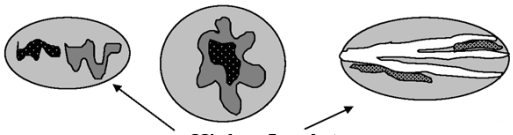
R Riverine and Freshwater Tidal Fringe Wetlands HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding/stream erosion.	
R 3. Does the wetland unit have the <u>potential</u> to reduce flooding/erosion? ***(see p. 54)***	**Points**
R 3.1 Characteristics of the overbank storage the 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**	6
Aerial photo or map showing average widths	**Figure __**
R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub". Choose 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**	7
Aerial photo or map shoing polygons of different vegetation types	**Figure __**
Total for R 3 *Add the points in the boxes above*	13
R 4. Does the wetland unit have the opportunity to reduce flooding/erosion? ***(see p.57)***	
Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following indicators of opportunity apply:* ☑ 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:	Multiplier
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**	2
TOTAL - Hydrologic Functions Multiply the score from R 3. by R 4. ***Add score to table on p. 1***	26

These questions apply to wetlands of all HGM classes

HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat.

H 1.	**Does the wetland unit have the <u>potential</u> to provide habitat for many species?**	**Points**
H 1.1	<u>Vegetation structure</u> ***(see p. 72)*** *Check the types of vegetation classes present (as defined by Cowardin). Size threshold for class is 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres.* ☐ Aquatic bed ☐ Emergent plants ☐ Scrub/shrub (areas where shrubs have >30% cover) ☑ Forested (areas where trees have >30% cover) *If the unit has a forested class, check if:* ☑ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon. *Add the number of vegetation types that qualify. If you have:* 4 structures or more **Points = 4** 3 structures **Points = 2** 2 structures **Points = 1** 1 structure **Points = 0** Map of Cowardin vegetation classes	1 **Figure __**
H 1.2	<u>Hydroperiods</u> ***(see p. 73)*** *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland if less than 2.5 acres in size or 1/4 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** ☑ Occasionally flooded or inundated — 2 types present **Points = 1** ☐ Saturated only — 1 type present **Points = 0** ☑ Permanently flowing stream or river in, or adjacent to, the wetland ☐ Seasonally flowing stream in, or adjacent to, the wetland ☐ ***Lake-fringe wetland = 2 points*** ☐ ***Freshwater tidal wetland = 2 points*** Map of hydroperiods	2 **Figure __**
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 sq. ft. (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** *List species below if you want to:* <5 species **Points = 0**	2

Total for page 5

		Points
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.*  None = **0 points** Low = **1 point** Moderate = **2 points**  [riparian braided channels] High = **3 points** NOTE: If you have four or more vegetation types or three vegetation types and open water, the rating is always "high". **Use map of Cowardin classes**	2
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.* ☑ Large, downed, woody debris within the wetland (>4 inches in diameter and 6 feet long). ☑ Standing snags (diameter at the bottom >4 inches) in the wetland. ☑ Undercut banks are present for at least 6.6 feet (2 m) and/or overhanging vegetation extends at least 3.3 feet (1 m) over a stream (or ditch) in or contiguous with the wetland, for at least 33 feet (10 m). ☑ Stable steep banks of fine material that might be used by beaver/muskrat for denning (>30° slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet turned brown/gray*). ☐ At least 1/4 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.	4
	Note: The 20% stated in early printings of the manual on page 78 is an error.	
	H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	11
Comments:		

H 2.	**Does the wetland unit have the opportunity to provide habitat for many species?**	**Points**
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 (330 feet) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within undisturbed part of buffer (*relatively undisturbed also means no grazing, no landscaping, no daily human use*). **Points = 5** ☐ 100 m (330 feet) of relatively undisturbed vegetated areas, rocky areas, or open water >50% of circumference. **Points = 4** ☐ 50 m (170 feet) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** ☐ 100 m (330 feet) of relatively undisturbed vegetated areas, rocky areas, or open water for >25% circumference. **Points = 3** ☐ 50 m (170 feet) 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 (80 feet) of wetland >95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** ☐ No paved areas or buildings within 50 m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** ☐ Heavy grazing in buffer. **Points = 1** ☐ Vegetated buffers are <2 m wide (6.6 feet) for more than 95% of the circumference (e.g., tilled fields, paving, basalt bedrock extend to edge of wetland). **Points = 0** ☑ Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	1 **Figure __**
H 2.2 H 2.2.1	Corridors and Connections ***(see p. 81)*** Is the wetland part of a relatively undisturbed/unbroken vegetated corridor (riparian or upland) at least 150 feet 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, and paved roads are considered breaks in the corridor.*) YES = **4 points** (*go to H 2.3*) NO = *go to H 2.2.2*	0
H 2.2.2	Is the wetland part of a relatively undisturbed/unbroken vegetated corridor (either riparian or upland) at least 50 feet 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 = *go to H 2.2.3*	
H 2.2.3	Is the wetland: ☐ within 5 miles (8 km) of a brackish or salt water estuary **OR** ☐ within 3 miles of a large field or pasture > 40 acres in size **OR** ☐ within 1 mile of a lake greater than 20 acres in size? YES = **1 point** NO = **0 points**	

Total for page 1

H 2.3	Near or Adjacent to Other Priority Habitats Listed by WDFW ***(see p. 82)***	**Points**
	Which of the following priority habitats are within 330 feet (100 m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed. These are DFW definitions. Check with your local DFW biologist if there are any questions* ☐ **Aspen stands:** Pure or mixed stands of aspen >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 than 100%; decay, decadence, number of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ☐ **Oregon white Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is 25% (*full descrptions in WDFW PHS report p. 158*). ☑ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each ☐ **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*). ☑ **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 Coastal 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**: 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 occuring below 5,000 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. ☑ **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+** priority habitats = **4 points** **1** priority habitat = **1 point** **2** priority habitats = **3 points** 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

Choose the **one** description of the landscape around the wetland that best fits. ☐ There are at least 3 other wetlands within 1/2 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 1/2 mile. **Points = 5** ☑ There are at least 3 other wetlands within 1/2 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 wetlands within 1/2 mile. **Points = 3** ☐ There is at least 1 wetland within 1/2 mile. **Points = 2** ☐ There are no wetlands within 1/2 mile. **Points = 0**	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	8
Total Score for Habitat Functions - add the points for H1 and H2, and record the result on p. 1	19

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

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

Wetland Type *Check off any criteria that apply to the wetland. Check the appropriate 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 - not an estuarine wetland	
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*	
SC 1.2 Is the wetland unit at least 1 acre in size and meeting at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has <10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover >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 3/4 of the landward edge of the wetland has a 100 foot buffer of shrub, forest, or ungrazed or unmowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or continguous freshwater wetlands. ☐ YES = **Category I** ☐ NO = **Category II**	

		Category
SC 2.0	**<u>Natural Heritage Wetlands</u>** ***(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 3.2* ☐ NO SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as a site with state Threatened or Endangered plant species? ☐ YES = **Category I** ☑ NO - not a Heritage wetland	
SC 3.0	**<u>Bogs</u>** ***(see p. 87)*** Does the wetland unit (or any part of the unit) meet both the criteria for soils and vegetations 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 function.*** 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 oils.) ☐ YES - *go to Q. 3* ☑ NO - *go to Q. 2* 2. Does the unit have organic soils, either peats or mucks, that are <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 - 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 (>30% of 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. 4. Is the unit forested (>30% cover) with sitka spruce, subalpine fir, western redcedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on bog species plant list in Table 3 as a significant component of the ground cover (*>30% coverage of total shrub/herbaceous cover*)? ☐ YES = **Category I** ☐ NO - not a bog for purpose of rating	

		Category
SC 4.0	**Forested Wetlands** ***(see p. 90)*** Does the wetland unit have at least 1 acre of forest that meets one of these criteria for the Department of Fish and Wildlife's forests as priority habitat? *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 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20/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. 200-year-old trees in wetlands will often have a smaller dbh because their growth rates are often smaller. The DFW criterion is an "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 (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. ☐ YES = **Category I** ☑ NO - not a forested wetland w/ special characteristics	
SC 5.0	**Wetlands in Coastal Lagoons** ***(see p. 91)*** Does the wetland meet all of the following criteria of a wtland 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 (>.5 ppt) during most of the year in at leat a portion of the lagoon (*needs to be measured near the bottom*). ☐ YES = *go to SC 5.1* ☑ NO - not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following 3 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 3/4 of the landward edge of the wetland has a 100 foot buffer of shrub, forest, or ungrazed or unmowed grassland. ☐ The wetland is larger than 1/10 acre (4,350 square feet). ☐ YES = **Category I** ☐ NO = **Category II**	

SC 6.0 **Interdunal Wetlands** *(see p. 93)*	Category
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 1115 and SR 109. SC 6.1 Is wetland 1 acre or larger, or is it in a mosaic of wetlands that is 1 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**	
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 F

Wetland Compensatory Mitigation Forms

Wetland name or number A

SCORING FORM

Scoring functions for calculating mitigation requirements in Western Washington

Name of wetland (if known): A Date of site visit: 4-27-10

Scored by Kris Lepine
SEC: 10 TWNSHP: 24N RNGE: 5E Estimated size: 2.5ac. Aerial photo included? Yes

These scores are for:
✓ Wetland being altered
✓ Mitigation site before mitigation takes place
✓ Mitigation site after goals and objectives are met

SUMMARY OF SCORING

FUNCTION	Improving Water Quality	Hydrologic	Habitat
Rating of Site Potential	M	H	M
Rating of Landscape Potential	M	M → H	M
Rating of Value	M	H	H
Score based on ratings (see table below)	6	8 → 9	7

before → after

	Wetland HGM Class used for Rating	
	Depressional	
	Riverine	✓
	Lake-fringe	
	Slope	
	Flats	
	Freshwater Tidal	
	Check if unit has multiple HGM classes present	☐

Scores
(*Order of ratings is not important*)
9 =H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

NOTE: Some of the questions require you to include figures. Please attach these to the form.

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

Wetland name or number A

Classification of Wetland Units in Western Washington

For questions 1-7 the criteria described must apply to the entire unit being rated.

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

1. Are the water levels in the entire unit usually controlled by tides (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 an **Estuarine** wetland and not scored. This method cannot be used for estuarine wetlands.

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

NO – go to 3

YES – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface) at 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?

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

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

City of Bellevue File # 11-122119-LO
East Creek/Richards Creek Stream Channel Improvements

Wetland name or number A

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 of depression	Depressional
Depressional + Lake-fringe	Depressional
Riverine + Lake-fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are 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.

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Wetland name or number A

Riverine and Freshwater Tidal Fringe Wetlands **WATER QUALITY FUNCTIONS** - Indicators that site functions to improve water quality Questions R1.1 – R1.2 are from wetland rating system (Hruby 2004b).	Points (only 1 score per box)
R 1. 0Does the wetland unit have the potential to improve water quality?	
R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: *Provide drawing or photo* 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 1.2 Characteristics of the plants in the unit (areas with >90% cover at person height): *Include photo or map showing polygons of different plants types* 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	Figure __ 8
Add the points in the boxes above	10
Rating of Site Potential: If score is 12 – 16 = H **6 - 11 = M** **0 - 5 = L** *Record the rating on the first page*	M

R 2.0 Does the landscape have the potential to support the water quality function at the site?	
R 2.1 Does the upgradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.2 Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.3 Is more than 10% of the area within 150 ft of wetland unit in agricultural, pasture, residential, commercial, or urban? Yes = 1 No = 0	1
Total for R 2 Add the points in the boxes above	2
Rating of Landscape Potential: If score is 3 = H **1 or 2 = M** **0 = L** *Record the rating on the first page*	M

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Wetland name or number A

R 3.0 Is the water quality improvement provided by the site valuable to society?	
R 3.1 Is the unit along a stream or river that is on the 303 d list or on a tributary that drain to one? Yes = 1 No = 0	1
R 3.2 Does the river on stream have TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3 Has the site been identified in a watershed or local plan as important for maintaining water quality? Yes = 2 No = 0	0
Total for R 3 Add the points in the boxes above	1
Rating of Value: **If score is 2 - 4 = H** **1 = M** **0 = L** *Record the rating on the first page*	M

Riverine and Freshwater Tidal Fringe Wetlands **HYDROLOGIC FUNCTIONS** - Indicators that site functions to reduce flooding and stream erosion Questions R4.1 and R4.2 are from wetland rating system.	Points (only 1 score per box)
R 4.0 Does the wetland unit have the potential to reduce flooding and erosion?	
R 4.1 Characteristics of the overbank storage the unit provides: *Provide aerial photo showing average widths* 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	Figure __ 6
R 4.2 Characteristics of plants 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): *Provide photo or map showing polygons of different plants types* 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 Plants does not meet above criteria points = 0	Figure __ 7
Add the points in the boxes above	13
Rating of Site Potential: If score is 12 – 16 = H **6 - 11 = M** **0 - 5 = L** *Record the rating on the first page*	H

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Wetland name or number A

Revisions per conversation with Tom Hruby

	Before	After
R 5.0 Does the landscape have the potential to support the hydrologic functions at the site?		
R5.1 Is the stream/river adjacent to the unit downcut? Yes = ~~1~~ 0 No = ~~0~~ 1	0	1
R 5.2 Does the upgradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1	1
R 5.3 Is The upgradient stream or river controlled by dams? Yes = ~~1~~ 0 No = ~~0~~ 1	1	1
Total for R 5 Add the points in the boxes above	2	3
Rating of Landscape Potential: If score is 3 = H; 1 or 2 = M; 0 = L	M	H

Record the rating on the first page

R 6.0 Are the hydrologic functions provided by the site valuable to society?	
R 6.1 Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.* The sub-basin immediately down-gradient of site has surface flooding problems that results in $$ loss or loss of natural resources points = 2 Surface flooding problems are in a sub-basin further down-gradient points = 1 No flooding problems anywhere downstream points = 0	0
R 6.2 Has the site has been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	2
Total for R 6 Add the points in the boxes above	2
Rating of Value: If score is 2 – 4 = H; 1 = M; 0 = L	H

Record the rating on the first page

NOTES and FIELD OBSERVATIONS:

Wetland name or number A

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that site functions to provide important habitat Questions H1.1 – H1.5 are from wetland rating system (Hruby 2004b).	Points (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Plants structure Check the plants 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.* *Provide map of Cowardin plant classes* ___Aquatic bed ___Emergent plants ___Scrub/shrub (areas where shrubs have >30% cover) ✓Forested (areas where trees have >30% cover) If the unit has a forested class check if: ✓The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon Add the number of structures checked. If you have: 4 structures or more points = 4 3 structures points = 2 2 structures points = 1 1 structure points = 0	Figure_ 1
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (*see text for descriptions of hydroperiods*) *Provide map of hydroperiods* ✓Permanently flooded or inundated 4 or more types present points = 3 ___Seasonally flooded or inundated 3 types present points = 2 ✓Occasionally flooded or inundated 2 types present point = 1 ___Saturated only 1 type present points = 0 ✓ Permanently flowing stream or river in, or adjacent to, the wetland ___ Seasonally flowing stream in, or adjacent to, the wetland ___ **Lake-fringe wetland = 2 points** ___**Freshwater tidal wetland = 2 points**	Figure_ 2
H 1.3. Richness of Plant Species Count the number of plant species in the wetland that cover at least 10 ft². *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle If you counted: > 19 species points = 2 *List species below if you want to:* 5 - 19 species points = 1 < 5 species points = 0	2

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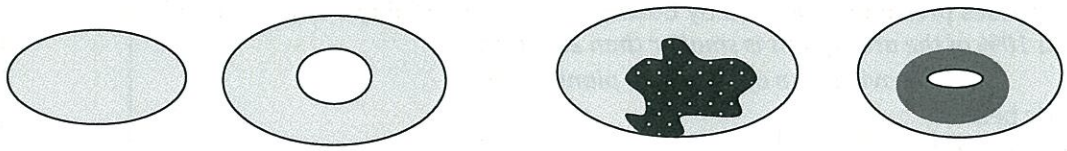
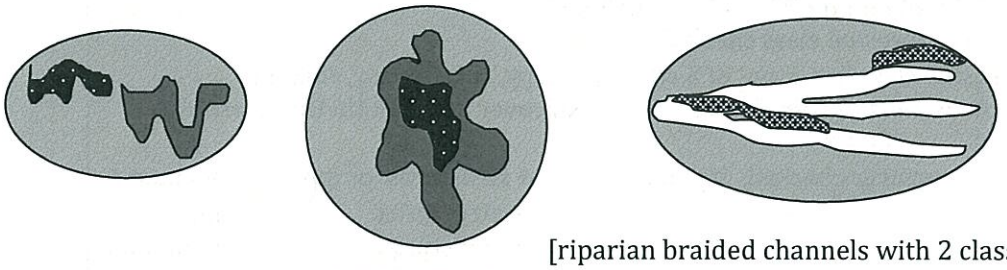
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion between Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none. *Provide map of Cowardin plant classes*  None = 0 points Low = 1 point Moderate = 2 points  [riparian braided channels with 2 classes] **High = 3 points** NOTE: If you have four or more classes or three plants classes and open water the rating is always "high".	Figure_ 2
H 1.5. Special Habitat Features: Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column. ✓ Large, downed, woody debris within the unit (>4in. diameter and 6 ft long). ✓ Standing snags (diameter at the bottom > 4 inches) in the unit ✓ Undercut banks are present for at least 6.6 ft (2m) **and/or** overhanging plants 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 where wood is exposed)* ___ At least ¼ acre of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated.*(structures for egg-laying by amphibians)* ___ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H1.1 for list of strata*)	3
H 1. TOTAL Score - potential for providing habitat Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5	10

Rating of Site Potential: If score is **15 - 18 = H**
7 – 14 = M
0 – 6 = L

M

Record the rating on the first page

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Wetland name or number A

accessible habitat : 2.8 ac.

H 2.0 . Does the landscape have the potential to support habitat at the site?		
H 2.1 Accessible habitat (only area of habitat abutting wetland unit). *Calculate:* % undisturbed habitat 1.1 + [(% moderate and low intensity land uses)/2] 0 = 1.1 *Provide map of land use within 1 km of unit edge* If total accessible habitat is:		Figure_
> 1/3 (33.3%) of 1km circle (~100 hectares)	points = 3	0
20 - 33% of 1km circle (247 ac.)	points = 2	
10- 19% of 1km circle	points = 1	
<10% of 1km circle	points = 0	
H2.2 Undisturbed habitat in 1km circle around unit. If:		
Undisturbed habitat > 50% of circle (55.6%)	points = 3	3
Undisturbed habitat 10 - 50% and in 1-3 patches	points = 2	
Undisturbed habitat 10 - 50% and > 3 patches	points = 1	
Undisturbed habitat < 10% of circle	points = 0	
H2.3 Land use intensity in 1 km circle. If:		
> 50% of circle is high intensity land use	points = (- 2)	- 2
Does not meet criterion above	points = 0	
Total for H 2 Add the points in the boxes above		1
Rating of Landscape Potential: If score is 4- 6 = H 1-3 = M < 1 = L		M

Record the rating on the first page

H 3.0 Is the Habitat provided by the site valuable to society?		
H3.1Does the site provides habitat for species valued in laws, regulations or policies? *(choose only one answer, the highest scoring one)*		
Site meets ANY of the following criteria:	points = 2	2
✓ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)		
— It is a "priority area" for an individual WDFW species		
— It is a Natural Heritage Site as determined by the Department of Natural Resources		
✓ It scores 4 on question H2.3 of the wetland rating system		
— It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan		
Site scores 1-3 on question H2.3 of the wetland rating system	points = 1	
Site does not meet any of the criteria above	points = 0	
Rating of Value: If score is 2 = H 1 = M 0 = L		11

Record the rating on the first page

"DEBIT" WORKSHEET

Wetland unit to be altered: A Date 7-16-11

Use the following tables to calculate the Debits for the impact site. Use a separate worksheet for each wetland unit being altered. In addition you will need to calculate the debits separately for forested areas and for emergent/shrub areas. Use the map of Cowardin plant types from question H 1.1 on the Scoring Form to determine the boundaries between forested areas and non-forested areas.

FUNCTION *From Scoring Form*	**Rating of Site Potential**	**Rating of Landscape Potential**	**Rating of Value**	**Score for Wetland Unit**
Improving Water Quality	M	M	M	6
Hydrologic	H	M	H	8
Habitat	M	M	H	7

CALCULATIONS for areas of emergent or shrub areas	Improving Water Quality	Hydrologic Function	Habitat Function
Score for wetland unit (see above)	6	8	7
Acres of **non-forested** areas impacted *(same for all functions)*	0.016 acres		
Basic mitigation requirement (BMR) = *Score for function x acres impacted*	0.096	0.128	0.112
Temporal loss factor (TLF- see table below)	1.5		
Mitigation required DEBITS = BMR x TLF	0.144	0.192	0.002
CALCULATIONS for forested areas	Improving Water Quality	Hydrologic Function	Habitat Function
Score for wetland unit (see above)	6	8	7
Acres of **forest** impacted *(Create a separate column for each type of forest impacted)* Deciduous (D), Evergreen (E), Cat. 1 deciduous (>50%cover) (CD) Cat. 1 evergreen (>50% cover)(CE)	0.05		
Basic mitigation requirement (BMR) = *Score x acres impacted*	0.3	0.4	0.35
Temporal loss factor (TLF- see table below)	2.0		
Mitigation required DEBITS = BMR x TLF	0.6	0.8	0.7

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Temporal Loss Factors:

Scientific studies have shown that it may take decades if not centuries to fully replace the functions lost at an impact site even if the mitigation is started concurrently with the impacts (reviewed in Sheldon and others 2005).

Timing of Mitigation	Temporal Loss Factor
Advance – At least two years has passed since plantings were completed or one year since "as-built" plans were submitted to regulatory agencies	1.25
Concurrent – Physical alterations at mitigation site are completed within a year of the impacts, but planting may be delayed by up to 2 years if needed to optimize conditions for success.	
For impacts to an emergent or shrub community	1.5
For impacts to a deciduous forested wetland community	2.0
For impacts to an evergreen forested wetland community	2.5
For impacts to a deciduous Category I forested wetland community	3
For impacts to an evergreen Category I forested wetland community	3.5
Delayed - Construction is not completed within one year of impact, but is completed (including plantings if required) within 5 growing seasons of impact.	
For impacts to an emergent or shrub community	3
For impacts to a deciduous forested wetland community	4
For impacts to an evergreen forested wetland community	5
For impacts to a deciduous Category I forested wetland community	6
For impacts to an evergreen Category I forested wetland community	7

NOTE: The ratings, scoring and calculations are valid for only five years because wetlands and their functions will change with time. If delays in the construction of the site are more than 5 years the mitigation plan will probably have to be re-negotiated and the calculation re-done. This time limit was chosen to be consistent with the validity of wetland delineations as established by the U.S. Army Corps of Engineer.

TOTAL DEBITS

DEBITS improving water quality 1.35

DEBITS hydrologic function 1.80

DEBITS habitat function 1.56

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"CREDIT" WORKSHEET

Mitigation Site: A Date 7-16-11

To calculate the CREDITS insert the appropriate numbers in the following table and do the calculations. Use additional tables if more than one wetland unit is being used for mitigation. Use the map of Cowardin plant types from question H 1.1 on the Scoring Form to determine the boundaries between forested areas and non-forested ones.

Note 1: B = 0 for all three functions in mitigation sites that not currently wetlands (creation or re-establishment).

Note 2: If you are increasing the size of an existing wetland the credits are calculated by rating the functions for the entire future wetland (original wetland + area created or re-established). However, you only get credits based on the area (footprint) of the area created or re-established.

Note 3: For enhancement and rehabilitation the entire wetland (area where mitigation takes place + area with no mitigation) needs to be scored as one unit. This is done for both "before" and "after" conditions. The score for the unit after mitigation [A] will be the same for either enhancement or rehabilitation, but the credits available will be different because there are different risk factors involved.

Note 4: If your mitigation involves creation/re-establishment (C/R), re-habilitation (Rehab) and enhancement (En) you will need to calculate credits for each type of mitigation separately.

Note 5: The **landscape potentials** of the **hydrologic and water quality functions** at a mitigation site have to be rated based on current conditions at the site, not future conditions. For example, the rating of landscape potential could decrease for a large mitigation project that removes sources of pollutants in the buffer. In this case the scores for the site might decrease even though positive actions are being taken. The converse is also true. A development could provide a source of pollutants or excess water to the mitigation site that would increase its level of flood storage and removal of pollutants. We do not want to give mitigation credits to increases in functioning of a wetland that are a result of the impacts associated with the project.

The **landscape potential** of the **habitat functions**, however, does not respond in the same way to either positive mitigation actions or to development. New corridors or habitat connections that are made as a result of the project should be given credit. Conversely, any on-site mitigation should be getting a lower rating for the landscape potential if development to which it is linked breaks corridors or reduces the area of undisturbed habitat. These reduce the effectiveness of the mitigation site as habitat.

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Scores for unit before any mitigation takes place (Score [B]efore)

B = 0 for creation and re-establishment

FUNCTION	Rating of Site Potential	Rating of Landscape Potential	Rating of Value	Score
Improving Water Quality	M	M	M	B = 6/0
Hydrologic	H	M	H	B = 8/0
Habitat	M	M	H	B = 7/0

Scores for unit based on the expected wetland ecosystem when all the vegetation has reached maturity and the water regime has stabilized (Score [A]fter)

FUNCTION	Rating of Site Potential	Rating of Landscape Potential	Rating of Value	Score
Improving Water Quality	M	Rating based on current conditions M	M	A = 6
Hydrologic	H	Rating based on current conditions H	H	A = 9
Habitat	M	Rating based on future conditions M	M	A = 7

Use the following table to calculate credits. The last line is in acre-points for comparison with the debits worksheet. Separate the project into areas that are created/re-established (C/R), re-habilitated (Rh),or enhanced (En) within a single wetland unit. These areas have different risk factors.

Calculations for Credits	Improving Water Quality			Hydrologic Function			Habitat Function		
	C/R	Rh	En	C/R	Rh	En	C/R	Rh	En
Increase in Score at mitigation site **(A – B) =**	6	0	0	8	1	—	7	0	—
Acres of mitigation (should be same for the 3 functions for each type of mitigation)	0.089	1.29	—	0.089	1.29	—	0.089	1.29	—
Basic mitigation credit (BMC) = Increase in Score x acres of mitigation	0.53	0	—	0.089	1.29	—	0.63	0	—
Risk factor (RF) (see table below)	0.67	0.67	—	0.67	0.67	—	0.67	0.67	—
Mitigation credits available for each area CREDITS = BMC x RF	0.35	0	—	0.59	0.86	—	0.42	0	—
TOTAL CREDITS AVAILABLE Add the credits from the different types of mitigation	0.35			1.45			0.42		

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Risk Factors:

Type of Mitigation	Risk Factor
Advance mitigation The site meets **criteria in Charts 1 and 3** of the site selection guidance [i.e. identified in a local plan and is sustainable] **AND** meets the **criteria in Charts 4-11** for the appropriate functions. (Ecology publication #09-06-032) ***Advance*** *means that at least two years has passed since plantings were completed or one year since "as-built" plans were submitted to regulatory agencies.*	1.0
Advance mitigation without meeting criteria in Ecology publication #09-06-032	0.83
Concurrent Mitigation Mitigation site meets **criteria in Charts 1 and 3** of the site selection guidance [i.e. identified in a local plan and is sustainable] **AND** meets the **criteria in Charts 4-11** for the appropriate functions. (All worksheets for Chart 3 and in Appendix D of Ecology publication #09-06-032 are submitted) *Risk factor applies to all types of mitigation.*	0.9
Mitigation site chosen meets the **criteria in Charts 2 and 3** of the site selection guidance [i.e. identified as a site with potential and that is sustainable] ; **AND** meets **criteria in Charts 4-11** for the appropriate functions. (All worksheets for Chart 3 and in Appendix D of Ecology publication #09-06-032 are submitted) *Risk factor applies to all types of mitigation.*	0.80
Site does not meet criteria in site selection guide, or guide was not used.	
Re-establishment, rehabilitation, or enhancement of an aquatic bed, shrub, or forest community	0.67
Re-establishment, rehabilitation, or enhancement of an emergent community	0.5
Creation of an aquatic bed, shrub, or forest community with data showing there is adequate water to maintain wetland conditions 5 years out of every 10.	0.67
Creation of an emergent community with data showing there is adequate water to maintain wetland conditions 5 years out of every 10.	0.5
Creation of an aquatic bed, shrub, or forest community <u>without</u> adequate hydrologic data.	0.5
Creation of an emergent community <u>without</u> adequate hydrologic data.	0.4

TOTALS

CREDITS improving water quality 0.35

CREDITS hydrologic function 1.45

CREDITS habitat function 0.42

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Summary of Credits and Debits

DEBITS	Improving Water Quality	Hydrologic Function	Habitat Function
Debits incurred in different areas of one wetland unit	Area #1 Area #2 Area#3	Area #1 Area #2 Area#3	Area #1 Area #2 Area#3
TOTAL (in acre-points)	0.6	0.8	0.7
CREDITS	**Improving Water Quality**	**Hydrologic Function**	**Habitat Function**
Creation/ re-establishment	Area #1 Area #2 Area#3 0.35	Area #1 Area #2 Area#3 0.59	Area #1 Area #2 Area#3 0.42
Rehabilitation	0	0.86	0
Enhancement	–	–	–
Preservation	Can score only if preservation is a Cat. I or II wetland –	Can score only if preservation is a Cat. I or II wetland –	–
TOTAL Credits available (In acre-points)	0.35	1.45	0.42
BALANCE Credits - Debits	−0.25	+0.65	−0.28

+0.12

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