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.	09-130506-XE / 09-130501-XQ
Project Name/Address:	City of Bellevue Utilities Department Kelsey Creek Channel Improvements SEPA Checklist 13300 SE 8th Street / 13440 Main Street / 12020 SE 8th Street / 12250 SE 9th Street
Planner:	David Pyle / dpyle@bellevuewa.gov
Phone Number:	425-452-2973
Minimum Comment Period:	**January 19, 2009**

Materials included in this Notice:

- ☒ Blue Bulletin
- ☒ Checklist
- ☒ Vicinity Map
- ☒ Plans
- ☐ Other:

City of Bellevue File Number 09-130506-XE / 09-130501-XQ 12/17/2009

City of Bellevue Utilities Department Kelsey Creek Channel Improvements SEPA Checklist 13300 SE 8th Street/13440 Main Street/12020 SE 8th Street/12250 SE 9th Street

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

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C Restricted Co
all governmental agencies to consider the environmental impacts of a pro
environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

A. BACKGROUND

1. Name of proposed project, if applicable:

Kelsey Creek Stream Channel Modification Improvements Project

2. Name of applicant:

City of Bellevue

Applicant is City of Bellevue Utilities Department

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

Applicant and contact:
Stephen Noeske, P.E.
City of Bellevue, Utilities/Engineering Department
450 110th Avenue Northeast
Bellevue, Washington 98009-9012
(425) 452-5271

4. Date checklist prepared:

November 10, 2009

5. Agency requesting checklist:

City of Bellevue

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

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

The City of Bellevue (City) anticipates constructing the Kelsey Creek Stream Channel Modification Improvements Project (Project) in a single phase during the summer and fall of 2010. To protect Endangered Species-listed (ESA) fish species, in-water work in the Project area is typically timed annually from July 1 to August 31, under the U.S. Army Corps of Engineers (Corps) work window. This window can be expanded to mid-June through September 30 under Washington State Department of Fish

and Wildlife (WDFW) Hydraulic Project Approval (HPA) authorization. In-water work is proposed to occur during this expanded work window when streamflows are lowest, and salmonids are unlikely to be present or would be present only in low numbers in the Action Area. The City expects construction of Project improvements to take approximately 12 weeks for in-water work activities and 18 weeks total to complete the entire project, including mobilization, all improvements, final stabilization, and landscape restoration. Plantings would ideally be completed in the frost-free portions of October, the first month of the dormant season. The schedule for Project construction activities will be coordinated with Glendale Country Club representatives for compatibility with summer golf course operations. Construction activities affecting adjacent private property will also be scheduled with those property owners. This schedule is dependent on completion of the Project final design, securing required construction easements from the affected parties, and attainment of required agency environmental permits and approvals. In water work windows would be subject to Corps and WDFW permit conditions.

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

Yes, the City is evaluating other projects on Kelsey Creek and recently completed restoration improvements on selected tributaries (i.e., the West Tributary) to improve fish passage and improve wetland and other aquatic and terrestrial habitats. Although these other projects are not immediately adjacent to or contiguous with this Project, they are intended to improve the fish and wildlife use and overall habitat values along Kelsey Creek. In addition, the City plans to continue ongoing efforts for invasive plant species control along the stream corridor and in adjacent wetlands using various experimental techniques. Any future planned work would require permit review, including public notice and open comment periods.

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

The following documents have been prepared relating to this proposal:

- Anchor Environmental, LLC (Anchor). Kelsey Creek Fish Passage and Habitat Restoration Project – Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations. March 2008.
- Anchor. Kelsey Creek Fish Passage and Habitat Restoration Project – Fish Passage Investigation, Evaluation, and Recommendations. March 2008.
- Anchor. Kelsey Creek Fish Passage and Habitat Restoration Project – Geomorphic Investigation, Evaluation, and Recommendations. March 2008.
- Anchor QEA, LLC (Anchor QEA). Kelsey Creek Stream Channel Modification Improvements Project –Biological Evaluation. November 2009
- Anchor QEA. Kelsey Creek Stream Channel Modification Improvements Project— Critical Areas Report. November 2009
- Anchor QEA. Joint Aquatic Resource Permit Application. November 2009.
- Anchor QEA. Kelsey Creek Stream Channel Modification Improvements Project —Wetland Delineation Report. November 2009.

- Anchor QEA. Kelsey Creek Stream Channel Modification Improvements Project —Stream Type Analysis. November 2009.

Yes, an adjacent property owner has submitted application for stream riparian area restoration to resolve a code violation that was issued for unpermitted removal of riparian area vegetation. See file 09-129504-LO.

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

No known applications are pending for other proposals directly affecting the property.

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

The following government approvals or permits will be need for this proposal:

- Clean Water Act (CWA) Section 404 Permit, Corps
- ESA Section 7 Consultation, U.S. Fish and Wildlife Service/National Marine Fisheries Service (USFWS/NMFS)
- CWA Section 401 Water Quality Certification, Washington State Department of Ecology (Ecology)
- Notice of Intent (NOI) for compliance with Ecology National Pollution Discharge Elimination System (NPDES) Construction Stormwater General Permit
- Hydraulic Project Approval authorization WDFW
- Clearing and Grading Permit, City of Bellevue
- Critical Areas Land Use Permit, City of Bellevue
- Shoreline Substantial Development Permit (SSDP), City of Bellevue
- SEPA Threshold Determination, City of Bellevue

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The City Utilities/Engineering Department plans to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use within lower Kelsey Creek in Bellevue, Washington. The Project will provide benefits to water quality, habitat structure and complexity, conditions for passage, spawning, and rearing of resident and anadromous fish species that currently use the creek, and will improve or have only localized in-channel effects on floodplain elevations in the improvement areas. No wetland impacts will result and the project will be self-mitigating. The Project reach under consideration extends approximately 2.3 stream miles from the Burlington Northern Santa Fe (BNSF) Railroad Wilburton Trestle, located just upstream of Interstate 405 (I-405), to Northeast 8th Street at the north end of the Glendale Country Club (GCC).

For restoration planning and preliminary design, the lower mainstem of Kelsey Creek has been divided into four reaches::

- Reach 1 (Southeast 8th Street Reach) – Lower gradient reach between the BNSF Railroad Wilburton Trestle and the Lake Hills Connector roadway crossings

- Reach 2 (Park Reach) – Lower gradient reach between the Lake Hills Connector roadway crossings and the east limit of Kelsey Creek Park
- Reach 3 (Farm Reach) – Lower to intermediate gradient reach between the west limit of Kelsey Creek Farm and its north limit at the south boundary of the golf course
- Reach 4 (GCC Reach) – Intermediate gradient reach through the golf course, extending to its north limit at Northeast 8th Street (but not including that crossing)

For this highly productive salmonid stream system, the City's primary goals and objectives are to:

- Improve fish passage where limitations to adult and juvenile salmonid mobility and upstream migration currently exist
- Enhance fish and wildlife habitat features within the Kelsey Creek channel and riparian corridor in the GCC reach

Secondary objectives include:

- Maintaining reasonably stable and sustainable channel morphology and sediment transport without excessive scour or deposition
- Improving or have no adverse affect on the floodplain in the affected Project reaches
- Enhancing Kelsey Creek Park and Farm reach stream and wetland habitats through LWD placement and invasive species control (vegetation management in these reaches is a separate initiative being handled by the City)
- Maintaining consistency of recommended improvements with the Kelsey Creek Park Master Plan

The reaches described above have distinct physical characteristics and associated restoration and enhancement needs. Therefore, a variety of restoration and enhancement strategies has been considered in formulating improvement recommendations.

The stream modification improvements proposed within Reaches 1 and 2 are limited to improvements in Reach 1, downstream from 121st Avenue Southeast, and include:

- Removal of the existing angular rock immediately downstream from the existing box culvert, over-addition of buried hydraulic control logs at the culvert outlet, and placement of a section of roughened channel backfill (cobble/boulder mix) to create a stable, fish-passable riffle at the downstream approach to the culvert
- Placement of large woody debris (LWD; approximately 7 pieces total, logs with rootwad and rootwads) in the cobble/boulder backfill (anchored and partially buried) for increased instream hydraulic roughness and habitat complexity

Proposed restoration/enhancement strategies in Reach 3 are focused on adding LWD to promote creation and maintenance of pool habitats along with increased habitat complexity. LWD placements would include a total of approximately 13 pieces (logs with rootwads, rootwads, fallen trees) and 2 engineered

log jams (ELJs, a collection of multiple LWD pieces with small woody debris racking material) are proposed at eight locations along the stream channel banks. Two beaver dams were documented in the lower section of Reach 3 in October 2008. No response actions have been identified by the City for their removal at this time. Future options beyond this project may include controlled breaching of the dams with possible beaver deceiver installations to discourage continued beaver dam building activities at those locations (although under this approach, beaver relocation to other sections of the creek could result).

The City plans to independently develop and implement solutions for removal of undesirable invasive vegetation such as Japanese knotweed (*Polygonum cuspidatum*) and Himalayan blackberry (*Rubus armeniacus*). Those vegetative management program actions are not part of the current stream modifications improvements proposal for this reach.

Restoration and enhancement activities proposed for Reach 4 are focused on improving fish passage at the concrete weirs, installation of a section of roughened channel downstream from the lower weir in each weir pair (to eliminate the weir excessive jump heights), placement of instream LWD to increase hydraulic roughness and habitat complexity, and expansion of riparian corridor vegetation and stream canopy cover using native species where possible (without affecting golf course playability). More specifically, the stream modification improvements proposed within Reach 4 will include:

- Placement of LWD (approximately 16 pieces total, logs with rootwads and rootwads, anchored and partially buried) in existing pools and in sculpted channel and bank areas with new pools, located within the downstream 800 foot section of Reach 4; benefits include improved pool habitat complexity and cover, pool scour maintenance, and increased instream hydraulic roughness
- Modification of the existing concrete weirs (17 total, one single weir, eight weir pairs), including raising the downstream weir crest elevations to achieve a maximum of 0.5 foot of weir crests elevation difference with the upper weir (to reduce jump height), and modification of weir notch geometries for improved juvenile fish passage across the weirs
- Creating roughened channel sections through placement of cobble/boulder mix and anchored and partially buried LWD (approximately 46 pieces total, logs with rootwads and rootwad, anchored and partially buried) in the downstream weir pair tailout areas and at the single weir
- Placement of supplemental channel bank toe rock (covered with cobble/boulder mix) at selected locations where existing channel down-cutting has the potential to destabilize existing rock revetments
- Re-vegetation of selected channel banks and riparian buffer areas local to the stream channel where not in conflict with the playability of the golf course

Because Reach 4 is located on private properties, restoration and enhancement opportunities will require the concurrence and cooperation of the GCC and various adjacent, affected property owners. That will include the need for temporary construction easements for access through and improvements to be made on those properties.

12. 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 improvements are located along the lower reaches of Kelsey Creek, between the BNSF Railroad crossing just upstream of I-405 and the downstream side of Northeast 8th Street in Bellevue, Washington. Those stream alignments in the project reach are within Sections 33 and 34, Township 25N, Range 5E and Sections 3 and 4, Township 24N, Range 5E (Figure 1).

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other:

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

The Project site area has slopes ranging from very flat to steep. Reaches 1 and 2 are located on the historical fringes of Lake Washington and are nearly level (0 to 2 percent typical); however, the channel banks adjacent to Kelsey Creek are typically near vertical. In Reach 3, the overall gradient surface is more variable and sloped (0 to 5 percent typical), and creek cut banks are typically not as steep. Reach 4 terrain gradients are steeper than Reach 2 (2 to 10 percent typical), and the stream is incised at some locations (30 percent or greater).

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.

Soils in the project area (Figure 2) are all generally derived from alluvium. Surficial soils in Reaches 1 and 2 are overlain on a lacustrine delta and plain that was formally inundated by Lake Washington. Surficial soils in Reaches 3 and 4 are valley fill soils derived from glacial deposits. The surficial soil mapping units found adjacent to the creek in Reaches 1 and 2 are Norma sandy loam and Everett-Alderwood gravelly sandy loam 6 to 15 percent; Reach 3 has Everett-Alderwood gravelly sandy loam 6 to 15 percent and Bellingham silt loam; and Reach 4 has Bellingham silt loam (NRCS 2006). Both the Bellingham and Norma soils are considered prime farmland if drained; the Everett-Alderwood soils are not considered prime, farmlands of statewide or local importance, or unique farmlands (NRCS 2006). The Norma and Bellingham series are all hydric, and the Everett-Alderwood series is partially hydric (USDA 2001).

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Yes, in Reaches 1 and 2 Kelsey Creek has historically changed course after the lowering of Lake Washington and as manipulated for agricultural purposes, although those reaches are generally aggrading

and not eroding. Some channel erosion and realignment has occurred in recent years in Reach 3, and the channel in Reach 4 was previously actively eroding prior to stabilization (some limited erosion continues to occur). In 1993, concrete weirs were installed in Reach 4 to control bed erosion. Large rock revetments have also been installed by others at various locations throughout Reach 4 to stabilize the channel banks. The channel erosion that has occurred is related to fluvial/geomorphic stream processes. Stream geomorphic processes are discussed in more detail in *Kelsey Creek Fish Passage and Habitat Restoration Project–Geomorphic Investigation, Evaluation, and Recommendations* (Anchor 2008) There is no observed evidence of landslides or mass wasting of channel banks in the Project reach.

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

Grading in the dewatered stream channel and roughened channel streambed substrate fill placement will be required in Reaches 1 and 4 for construction of improvements. The purpose of this channel grading and substrate fill placement is to sculpt channel banks in selected areas for stream restoration benefit, to key in and place the roughened channel sections downstream of the concrete weir pairs for improved fish passage, to enlarge or create new pools, and to help stabilize the channel bed and banks from existing and potential scour that could jeopardize existing stream corridor infrastructure (i.e., rock revetments). The estimated quantity of collective substrate fill placement in Reaches 1 and 4 totals approximately 1,020 cubic yards, and a smaller volume of total excavation (approximiately 420 cubic yards) is expected. Of that total, the estimated quantities of excavation and fill for stream channel improvements within Reach 1 waterbodies (non-wetland) are 50 cubic yards and 160 cubic yards; within Reach 4, those quantities total 370 cubic yards and 860 cubic yards respectively. In the lower section of Reach 4, excavation and fill placement for channel and bank sculpting improvements totals approximately 160 cubic yards and 260 cubic yards respectively (as a portion of the total Reach 4 volumes stated above). The source of fills will likely be local quarries for imported substrate material. Other fill materials beyond earthwork and imported substrate include LWD for fish habitat and hydraulic roughness (approximately 85 pieces collectively), and treated timbers (those acceptable for instream use) or partial log round sections used to adjust weir elevations and to add to and/or replace the top concrete beam section of the existing weirs (at 17 locations). Both of those components would likely be imported to the site by the construction contractor from local suppliers.

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

Erosion could occur during clearing and excavation of selective site areas during construction, while disturbed soils may be exposed to the weather or streamflows. However, areas will be exposed for only short periods prior to temporary cover or permanent stabilization (typically less than two weeks for a particular improvement area), and the exposure would occur in July through September when the lowest precipitation amounts occur. Also, the disturbed areas interface with streamflows will be minimized by streamflow bypass installation prior to construction in a given work area. Some localized streambed disturbance would likely occur during cofferdam installation and removal as required for temporary streamflow bypass. No streamflow diversions are proposed in Reach 3 for installation of proposed LWD. As such, some temporary local erosion could occur during or after streambed and bank adjustments in

response to the LWD placements. See Item B1h for best management practice (BMP) measures that will be taken to limit or control erosion potential.

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

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

Existing impervious area in the overall Project reach along the stream corridor is very small (estimated at less than 2 percent), as is associated with public roadways and bridge crossings and private accesses (i.e., golf cart access paths and bridges in Reach 4). The proposed improvements do not include construction of buildings, additional paving of pervious areas, or installation of other facilities, so no effective increase in impervious area would occur. Roughened channel streambed substrate mix backfills will be primarily submerged by streamflow within the ordinary high water (OHW) limits (areas that are already regularly inundated or saturated).

No change in impervious is expected.

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

The following minimum measures will be taken to reduce or minimize erosion potential:

- In-water work will be restricted to the WDFW in-water work window, set for when salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*) are unlikely to be present or would be present in low numbers. The typical Corps in-water work window extends from July 1 to August 31, but may be expanded by WDFW to extend between mid-June and September 30.
- Clearing limits will be defined on the restoration design plans with requirements to flag those limits prior to initiation of grading activities. The contract documents will include provisions to confine construction activities to the minimum area necessary to complete the improvements within the flagged clearing limits.
- A site-specific Temporary Erosion and Sedimentation Control (TESC) Plan along with a Stormwater Pollution Prevention Plan (SWPPP) will be prepared as guidance for implementation of contractor TESC measures.

Construction phase BMP measures to reduce erosion and sedimentation will include:

- Installing temporary cofferdams and streamflow gravity bypass piping for instream work areas within Reaches 1 and 4; combined work area incidental run-on, cofferdam leakage, and dewatering water will be pumped to upland dispersal, treatment (as required), and recharge.
- Providing TESC BMPs (i.e., inlet protection, silt fences, vegetative filter strips, and filter bags) outside of the stream corridor to minimize impacts to critical areas and other riparian areas.
- Installation of materials that require streambed or low bank excavation would occur only after the affected stream sections have been isolated or at least partially dewatered.
- Reuse of any excavated soils or streambed materials on site shortly after excavation or stored temporarily at an approved upland location. Temporary material stockpiles will be covered with plastic sheeting when not in active use and prior to storms to minimize their erosion potential.

- Requiring the contractor to have backup equipment, including pumps and extra TESC materials, readily available during storm events.
- Covering any temporarily disturbed or otherwise modified streambanks with a biodegradable erosion control fabric and replanted with native species as designated in the approved planting plan.
- Implementing the approved native planting plan during the first month of frost-free portions of the first dormant season (in October) following completion of grading work.
- Having a designated representative of the City conduct construction observation for the duration of the restoration work. The construction contractor will be required to implement the TESC Plan and SWPPP, and will develop and implement a Spill Prevention Control and Countermeasures Plan (SPCCP) that maintains compliance with the Washington State water quality standards (Washington Administrative Code [WAC] 173.201A).

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.

All TESC practices and measures will be consistent with the NPDES Construction Stormwater General Permit (Ecology 2005a), the Stormwater Management Manual for Western Washington (Ecology 2005b), and with applicable Project permit conditions.

2. Air

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

Some dust and standard exhaust emissions from construction equipment would be present during construction of this Project. Because the work areas are typically within the stream corridor, adjacent wetlands (where they exist), or within the riparian stream corridor, the soil should typically not be dry enough to create dusty conditions. Construction machinery such as track hoe excavators, trucks, and temporary pumps would emit exhaust gasses. As the quantity of dust and standard exhaust emissions likely to be present is related to weather conditions, unanticipated site conditions, type of equipment used, and/or duration of on-site activities, a specific quantity cannot be estimated. However, such emissions, if present, would be temporary in nature and generally of short duration.

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 off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odor that would affect this proposal.

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

Standard emission control devices would be utilized by construction equipment during construction phases of this Project. As necessary, temporary measures will be implemented by the construction contractor to limit fugitive dust generation within the Project site during construction phases of the proposed Project. Such temporary control measures may include, but are not limited to, use of water

trucks on unimproved surfaces, use of street sweepers on improved roadway surfaces, and installation of stabilized construction entrances to minimize track-out that could be mobilized as fugitive dust.

3. Water

a. Surface:

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

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, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The proposed Project restoration improvements are located within the bed and banks of lower Kelsey Creek. Kelsey Creek is a tributary to Mercer Slough and ultimately Lake Washington.

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

Yes, the proposed Project restoration improvements are located within the bed and banks of lower Kelsey Creek. Plans for the various proposed instream restorations improvement areas are included as Figures 3 through 13.

Work is also proposed adjacent to wetlands related to Kelsey Creek.

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.

Subject to final design refinements, the estimated amount of fill material and excavation (no in-water dredging will occur) that would be placed in and removed from waterbodies (the Kelsey Creek streambed within the ordinary high water (OHW) limits is approximately 1,020 cubic yards and 420 cubic yards respectively. The National Wetlands Inventory (NWI)wetland mapping for the project reach is shown in Figure 14. Based on wetland field reconnaissance investigations completed for the proposed work areas and construction accesses (Anchor QEA 2009) , only one wetland (Wetland A) was identified in the Reach 3 improvements area. That wetland is avoided by the proposed Reach 3 improvements and construction accesses. No wetlands were identified within the Reach 1 or Reach 4 proposed improvements work areas or within the associated proposed construction accesses. The estimated cumulative area of proposed restoration improvements impact within the stream channel OHW limits, based on preliminary design layout, is approximately 0.24 acre, as shown on Figures 3 through 13.

The fill materials within the OHW limits would be primarily comprised of a rounded cobble-boulder streambed mix placed in the channel to construct the roughened channel sections and re-establish appropriate channel substrate conditions where the existing channel section is affected by regrading for improvements installation. In other areas, smaller streambed mix gradations would be used in newly constructed pools or lower gradient restored channel areas. The source of fills would likely be local quarries for imported substrate material. Other fill materials beyond earthwork and imported substrate include LWD for fish habitat and hydraulic roughness (approximately 85 pieces collectively) and wood or cast-in-place concrete components for proposed modifications to the existing concrete

weirs (17 locations). Both of those components would likely be imported to the site by the construction contractor from local suppliers.

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

Yes, to facilitate safe and efficient construction, the proposal will require temporary surface water diversions around the site-specific work areas in Reaches 1 and 4. Figure 15 illustrates a typical construction phase streamflow diversion concept applicable to Reach 4 weir improvements. No streamflow diversions are proposed for LWD placement within Reach 3.

Cofferdams will likely be constructed of a combination of plastic sheeting and sandbags (or similar materials). Streamflows will be conveyed around dewatered work areas through the use of a temporary gravity diversion pipe (streamflow quantities are expected to be too high for pumped diversions that would also require fish screening). Water will be returned to the active channel immediately downstream of the active work area and downstream cofferdam. Streamflow quantities vary depending on groundwater contributions and seasonal precipitation/runoff effects throughout the restoration reach. Based on streamflow flow-duration analyses conducted using long-term precipitation records, average streamflow quantities during the summer construction months are expected to range between 1 to 5 cubic feet per second (cfs) throughout the Project reach. Significantly higher streamflow rates could occur during storm events. Monthly flow-duration guidance will be provided to the construction contractor with final design documents as guidance for temporary flow diversion facilities sizing needs.

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

The proposal lies within the 100-year floodplain of Kelsey Creek as shown on Federal Emergency Management Agency (FEMA) Effective Map 53033C0656 F (May 16, 1995). The base (100-year) flood elevation (BFE) varies from 24 feet at the Lake Hills Connector to 111 feet at Northeast 8th Street. Figure 16 shows the FEMA regulatory floodplain limits within the project area limits. The City has completed more recent updates in Kelsey Creek hydraulic modeling, and the Project reach was analyzed in greater detail using updated stream topography as part of this project. Comparative 100-year flood profiles were developed using an updated HEC-RAS model for the Reach 4 under existing and improved conditions, but associated floodplain limits were not mapped.

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.

The proposal does not involve any discharges of waste materials to surface waters.

b. Ground:

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

No groundwater withdrawals are expected. If encountered, groundwater interflow to the channel will be intercepted upstream of the construction work areas and will be temporarily diverted along

with surface waters with direct discharge to the stream channel downstream of the work area (see B.3.a.4]). Groundwater contributions between work area cofferdams (combined with potential cofferdam leakage and incidental runoff within the work area) will be pumped to a vegetated upland dispersal area for treatment (as required) and recharge via infiltration. Where full infiltration is not possible, partial return of treated water to the stream channel may be required. It is not possible to estimate the specific quantities of groundwater that may be intercepted at each proposed Project improvement area, but the quantities are expected to be low during summer months. In Reach 4, adjacent golf course irrigation operations will likely influence groundwater quantities contributed to the stream channel through interflow. Selection and implementation of specific methods to control and groundwater encountered within work areas will be the responsibility of the construction contractor.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; 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.

No waste material will be discharged into the ground from any source.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) 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.

Runoff in Kelsey Creek is from natural and urban areas within the watershed. Runoff is collected via curb and gutters and discharged to the creek and numerous locations. Various on-site and regional detention basins exist within the watershed area, which control the runoff rates to Kelsey Creek from the watershed. The proposed Project restoration improvements will not create additional runoff volume or modify runoff rates.

The City has developed a continuous simulation model (Hydrologic Simulation Program Fortran [HSPF]) to accurately simulate watershed runoff response as calibrated to stream historic stream gage flows along Kelsey Creek. That modeling tool has been used as the basis of predicting Kelsey Creek runoff quantities in response to watershed precipitation. Streamflows and creek water levels at Reach 4 weirs have also been directly measured over the range of required fish passage flows, and that information has been used as a basis for hydraulic model calibration and preliminary design of restoration improvements.

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

Waste materials are not expected to be discharged to groundwater or surface waters as a result of construction, but construction-related waste materials (i.e., fuel, lubricants, coolant, etc.) could be spilled if appropriate practices are not implemented as required of the construction contractor.

The surveyed or approximate locations of wet utilities (e.g., sewer) that could be damaged during construction will be shown on the restoration design plans. The construction contractor will be required to provide location confirmation of all utilities potentially affected by the restoration work prior to the start of construction to confirm the actual locations of potential utility conflicts in the field. This would minimize the potential for unexpected waste discharges from wet utilities (if damaged by construction) within the restoration reach.

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

The contractor will be required to install and maintain all TESC measures necessary to prevent/control sediment from leaving the construction, protect fish during care and diversion of streamflow and dewatering activities, and prevent any hydrocarbon spills from entering the waterway. At a minimum, these measures will include:

- Restricting in-water work to the WDFW in-water work window, set for when salmon, steelhead, and bull trout are unlikely to be present or would be present in low numbers. The typical Corps in-water work window extends from July 1 to August 31, but may be expanded by WDFW to extend between mid-June and September 30.
- Defining clearing limits on the restoration design plans with requirements to flag those limits prior to initiation of grading activities. The contract documents will include provisions to confine construction activities to the minimum area necessary to complete the improvements within the flagged clearing limits.
- Preparing a site-specific TESC Plan and SWPPP as guidance for contractor TESC measures implementation.

Construction phase BMP measures to protect streamflow water quality will include:

- Installing temporary cofferdams and streamflow gravity bypass piping for instream work areas within Reaches 1 and 4; combined work area incidental run-on, cofferdam leakage, and dewatering water will be pumped to upland dispersal, treatment (as required), and recharge.
- Providing TESC BMPs (i.e., inlet protection, silt fences, vegetative filter strips, and filter bags) outside of the stream corridor to minimize impacts to critical areas and other riparian areas.
- Installing materials that require streambed or low bank excavation would occur only after the affected stream sections have been isolated or at least partially dewatered.
- Reusing any excavated soils or streambed materials on site shortly after excavation or stored temporarily at an approved upland location. Temporary material stockpiles will be covered with plastic sheeting when not in active use and prior to storms to minimize their erosion potential.
- Requiring the contractor to have backup equipment, including pumps and extra TESC materials readily available during storm events.
- Covering any temporarily disturbed or otherwise modified streambanks with a biodegradable erosion control fabric and replanted with native species as designated in the approved planting plan.
- Implementing the approved native planting plan during in October, the first month of frost-

free portions of the first dormant season. following completion of grading work.

- Having a designated representative of the City conduct construction observation for the duration of the restoration work. The construction contractor will be required to implement the TESC Plan and SWPPP, and will develop and implement an SPCCP that maintains compliance with the Washington State water quality standards (WAC 173.201A).

All water quality control BMP measures will be consistent with the NPDES Construction Stormwater General Permit (Ecology 2005a), the Stormwater Management Manual for Western Washington (Ecology 2005b), and with applicable Project permit conditions.

4. Plants

a. Check or circle types of vegetation found on the site:

X___ deciduous tree: alder, maple, aspen, other: black cottonwood, Pacific willow, black hawthorn, Oregon ash, and Scouler willow

X___ evergreen tree: fir, cedar, pine, other: western red cedar, Douglas fir, Sitka spruce

X___ shrubs: Himalayan blackberry, trailing blackberry, Scot's broom, red elderberry, and red-osier dogwood, Japanese knotweed

X___ grass: various blends of turf grass for golf course use

____ pasture

____ crop or grain

X___ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other: reed canarygrass, yellow-flag iris, pointed rush, and arrow-head

____ water plants: water lily, eelgrass, milfoil, other:

X___ other types of vegetation: English ivy

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

Selective vegetation will be cleared or pruned prior to construction to gain access to the instream restoration sites. In proposed excavation areas, the upper soil horizon with root mass will also be stripped and hauled off site to an acceptable upland disposal site. To the extent possible, construction access will be set up to avoid removal or damage to native riparian species and significant trees, and focus disturbance on areas dominated by invasive species such as English ivy, Himalayan blackberry, and Japanese knotweed. Significant trees will be located and identified as part of the Critical Areas Report (CAR) submitted with City permit applications. If significant trees need to be removed, they will be designated for removal on the final design plans, and will be used as woody debris habitat features (if suitable) within the Project work areas.

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

No threatened or endangered plant species are known to exist on or near the Project site.

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

To increase the number and variety of vegetation communities along Kelsey Creek, invasive species will be removed where encountered in the restoration work areas, and emergent wetland and upland portions of the sites will be replanted with appropriate native plant species. Native species will also be planted in designated stream corridor areas (as are deemed acceptable to the GCC and affected private property owners during the final design process) to create a more continuity in riparian corridor. If significant trees are removed as noted in Item B.4.b., appropriate mitigation in the form of native replacement trees will be included in the Project landscape plans consistent with City code requirements. Plant species will be selected that are known to occur naturally in the Project area, that will provide cover for wildlife, that are tolerant to the site conditions, that will not affect the playability of the Reach 4 GCC golf course, and that will have a high likelihood of success.

Table 1 provides a list of typical native plants that may be included for planting in the designated vegetative restoration areas. Plant species and locations will be specified as part of landscape plans to be fully developed during final design.

Table 1
Typical Native Plant Species for Potential Use in Restoration Areas

Scientific Name	Common Name	Indicator Status
Forested/Shrub Wetland		
Alnus rubra	Red alder	FAC
Fraxinus latifolia	Oregon ash	FACW
Salix lasiandra	Pacific willow	FACW+
Salix scouleriana	Scouler willow	FAC
Cornus sericea	Red-osier dogwood	FACW
Shallow-emergent		
Eleocharis acicularis	Needle spike-rush	OBL
Juncus oxymeris	Pointed rush	FACW+
Scirpus acutus	Hardstem bulrush	OBL
Mid-emergent		
Sagittaria latifolia	Arrow-head	OBL

Notes:
FAC Facultative
FACW Facultative Wet
FACW+ Facultative Wet plus
OBL Obligate

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: ducks and geese

mammals: deer, bear, elk, beaver, other: mice, voles, moles, rats, raccoons, and opossums

fish: bass, salmon, trout, herring, shellfish, other: Peamouth minnow

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

Puget Sound Chinook salmon are known to use Kelsey Creek; steelhead trout and bull trout have the potential to use Kelsey Creek.

Critical habitat for Puget Sound Chinook salmon was designated on September 2, 2005 (50 Code of Federal Regulations [CFR] Part 226). Bull trout critical habitat was designated on September 26, 2005 (50 CFR Part 17; USFWS 2005). Bull trout and Chinook salmon designated critical habitat in the action area includes Lake Washington. Kelsey Creek is not designated critical habitat for either species.

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

The site lies within the Pacific Flyway bird migration route. Historically, salmon used Kelsey Creek for spawning and rearing, but numbers have been declining (Kerwin 2001). Kelsey Creek provides for annual returns of Chinook, coho (*O. kisutch*), and sockeye (*O. nerka*) salmon as well as migratory cutthroat trout (*O. clarki*).

The project area is part of an essential fish spawning linkage to Lake Washington and the Puget Sound.

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

A primary purpose of the Project is to enhance and preserve aquatic and riparian habitat for the benefit of fishes and other animals. The Project will improve fish passage/migration, create new or expanded pools inclusive of habitat features, remove non-native vegetation where encountered within designated restoration areas, plant riparian vegetation to provide more continuity in canopy, and add LWD to increase habitat complexity.

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 (electric, 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.

No energy sources will be used or needed for the completed Project. Fuel will be used for equipment during construction.

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

This Project would not affect the potential use of solar energy by adjacent properties. Although planting of woody riparian species is planned to provide additional shading of the creek, the plantings would be located to the east of the residential parcels adjacent to the golf course. Thus, additional vegetation would not be located in the direction that solar collectors on adjacent properties would be aimed for optimum performance.

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:

Energy will not be used to operate the finished Project; therefore, no energy conservation measures are proposed.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, 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.

While minor, there is a potential risk from the normal hazards associated with machinery operation and general construction practices. Spills of machine fluids, risk of fire or explosion, and other similar and normal circumstances would exist during construction phases of the proposed Project. Diesel fuel, hydraulic fluid, or oils could be discharged to the surrounding environment if a piece of construction equipment were accidentally damaged, vandalized, or improperly maintained. Additionally, chemical toilets used by construction workers could leak human wastes and disinfectants to the environment if accidentally damaged, vandalized, or improperly maintained.

1) Describe special emergency services that might be required.

No special emergency services will be needed. Normal emergency medical services may be needed in the event of an accident during construction.

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

An SPCCP for the Project will be prepared and submitted by the contractor to the City's designated representative prior to commencing any construction. In addition, all construction equipment used on the Project will be properly maintained. Construction site safety equipment and procedures (to be determined by the construction contractor) will be utilized during construction phases of the Project. The construction contractor will be required to have an adequate supply of oil-absorbent pads, booms, and erosion control material to control possible inadvertent spills of oil from construction equipment.

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

b. Noise

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

Noise would not affect the Project. The Project area currently experiences normal urban noise such as traffic, yard and golf course maintenance equipment, etc. Because much of the Project is located in Kelsey Creek Park and on private properties, the traffic sound levels may be somewhat lower than in adjacent neighborhoods.

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

Short-term Noise: Short-term noise impacts would occur during construction, but this area is already exposed to levels of ambient noise from normal operations of the golf course and nearby roads.

Long-term Noise: There would be no post-construction noise related to implementation of the Project.

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

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

Construction activities will be limited to normal construction contractor work hours as permitted under City Code. In some cases, pumps may be required to operate beyond those hours for continuous dewatering of the restoration work areas. Construction will be scheduled, if possible, to limit pump operation to the minimum time necessary to complete the task.

8. Land and shoreline use

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

Most of the land is in open space or recreation. Reach 1 and 3 improvements are primarily within the City's right-of-way and the Kelsey Creek Farm City property ownership. Reach 4 improvements are within the GCC golf course property and four adjacent single family residential parcels to the west of the golf course and south of Northeast 8th Street.

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

Yes, portions of the Project site have been used for agriculture in the past. Kelsey Creek Park and Farm are located on the site of the prior Twin Valley Dairy Farm. The dairy was operated until 1968. The City acquired the site in 1969 and maintains the dairy barns and some of the pastures as part of the farm facilities. The Project site is not currently used for agriculture

c. Describe any structures on the site.

Outside of structures located on Kelsey Creek Park and Farm as described in B.8.b, there are no other buildings in the project work areas. There are residential structures near selected improvements, but beyond the designated work areas. Other instream structures in the Project area include rock revetments

and concrete plank weirs that were installed to control bank and bed erosion of Kelsey Creek. In addition, there are several bridges as part of the GCC golf course and several bridges that provide access from private residences to the golf course. These existing bridges will not be affected by installation of the stream corridor improvements.

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

No structures will be demolished, but the top section of each concrete weir will be modified as part of the restoration improvements to improve fish passage.

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

The Project site and adjacent parcels (Figure 17) are generally zoned as Residential 1 unit per acre (R-1) and Residential 3.5 units per acre (R-3.5).

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

Figure 18 shows the current comprehensive plan designations for the Project site and adjacent parcels are Single Family Low Density (SF-L), Park/Single Family Low Density (P/SF-L), and Park/Single Family Medium Density (P/SF-M).

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

The City has identified that portions of the Project improvements are located within designated shoreline under the City's Shoreline Master Program. The specific shoreline master program designation is unknown (City staff will need to verify).

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The Project features will be located within areas designated by the City as Critical Areas, including within a salmon bearing stream, within or adjacent to wetlands (Reach 3), and within frequently flooded areas.

See attached critical areas report for stream and wetland typing.

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

No one would reside in or work within the boundaries of the completed Project.

j. Approximately how many people would the completed project displace?

No one would be displaced by the completed Project.

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

No displacement impacts are anticipated, so no avoidance or reduction measures are proposed.

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

In addition to improving habitat, the Project will be designed to provide continued erosion control along Kelsey Creek and will not destabilize the channel, thus minimizing potential damages to the adjacent landowners.

9. Housing

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

No housing units would be provided by this Project.

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

No housing units would be eliminated by this Project.

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

No housing impacts are anticipated, so, no reduction or control measures are proposed.

10. Aesthetics

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

The tallest height expected for any structure constructed will be 3 feet. These structures will be in-channel and comprised of rock and wood. Most of the structures will be submerged in the creek.

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

Views in the immediate vicinity of the Project could be altered by removal of vegetation for construction or the addition of riparian vegetation. Views of the creek and/or golf course from the residential lots west of the creek might be partially obstructed by native vegetation that is denser and/or of greater height than what currently exists. Those changes (if any are anticipated) will be coordinated between the City and affected property owners for concurrence during the final design process.

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

No permanent aesthetic impacts are anticipated. To reduce temporary aesthetic impacts resulting from the removal or pruning of existing stream corridor riparian vegetation during construction, restoration of disturbed areas will occur within 1 to 2 months after improvements are installed. It is anticipated that this Project will improve aesthetic values through the replacement of non-native, invasive, weedy vegetation in selected riparian areas with native trees, shrub, and emergent riparian vegetation. The

additional vegetation will be native to the region and would be representative of what would have been found prior to development.

11. Light and glare

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

The proposal will not produce light or glare.

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

The proposal will not produce light or glare, so light and/or glare should not be a safety hazard or interfere with views.

c. What existing off-site sources of light or glare may affect your proposal?

There are no existing known sources of light or glare that may affect this proposal.

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

No light and glare impacts are proposed, so no reduction or control measures are proposed.

12. Recreation

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

The Project improvements are located within the GCC golf course and the City's Kelsey Creek Park and Farm. The park provides informal opportunities to observe wildlife along the creek corridor.

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

The Project would not displace any existing recreational uses. While portions of the Project are within a golf course, revegetation plans will be carefully developed in cooperation with Glendale Country Club representatives so as to not interfere with the playability of the golf course. Proposed restoration actions, such as the LWD addition), within Kelsey Creek Farm (Reach 3) are consistent with the master plan and long-term management of that public facility.

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

Construction activities would not affect golf course operations.

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.

The Wilburton Trestle crosses lower Kelsey Creek in Reach 1, downstream of the proposed improvement area.

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

The Wilburton Trestle is a wooden railroad trestle that is still in use by the BNSF Railroad. The trestle was constructed by the Northern Pacific Railway in 1904.

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

No major earth disturbance or water diversion is proposed near the trestle. In the unlikely event that any cultural artifacts are encountered during construction, work will stop immediately in that area and the State Office of Archaeology and Historic Preservation will be immediately informed.

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 restoration sites are accessed from I-405 at Southeast 8th Street, via 121st Avenue Southeast (for Reach 1), Southeast 4th Place (for Reach 3), and from Northeast 8th Street and the GCC clubhouse access road, located at the west end of Main Street at 136th Avenue Northeast (for Reach 4). Those access locations are shown on Figure 19.

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

No, the site is not currently served by public transit.

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

The Project would not provide or eliminate any parking spaces.

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, the Project will not require any new streets or improvements to existing streets. A temporary construction access will be created from an existing GCC gated access at Northeast 8th Street, then along the periphery of Kelsey Creek within the GCC property (for the northern portion of Reach 4 weirs). Existing GCC roads and golf cart access paths in the southeast portion of the golf course are proposed for

construction access to south end improvements in Reach 4 (as requested by the GCC). The Kelsey Creek Farm existing, non-paved maintenance access road along the west side of Kelsey Creek will be used for construction access to locations of LWD placement. Potential damage to existing construction access routes through City and GCC golf course property that result from construction will be restored consistent with existing conditions.

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

No, the project not use (or occur in the immediate vicinity of) water, rail, or air transportation

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

No vehicular trips would be generated by the completed Project.

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

No impacts on transportation are anticipated, so no reduction or control measures are proposed.

15. Public services

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

The Project would not result in an increased need for public services.

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

No impacts on public services are anticipated, so no reduction or control measures are proposed.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

All utilities typical of urban areas are currently available at the site.

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 which might be needed.

No utilities are planned for the proposed Project.

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: _____

Title: Senior Utilities Engineer

Date Submitted: 11/24/09

Reviewed by: _____

Title: _____ Division: _____

Date: _____

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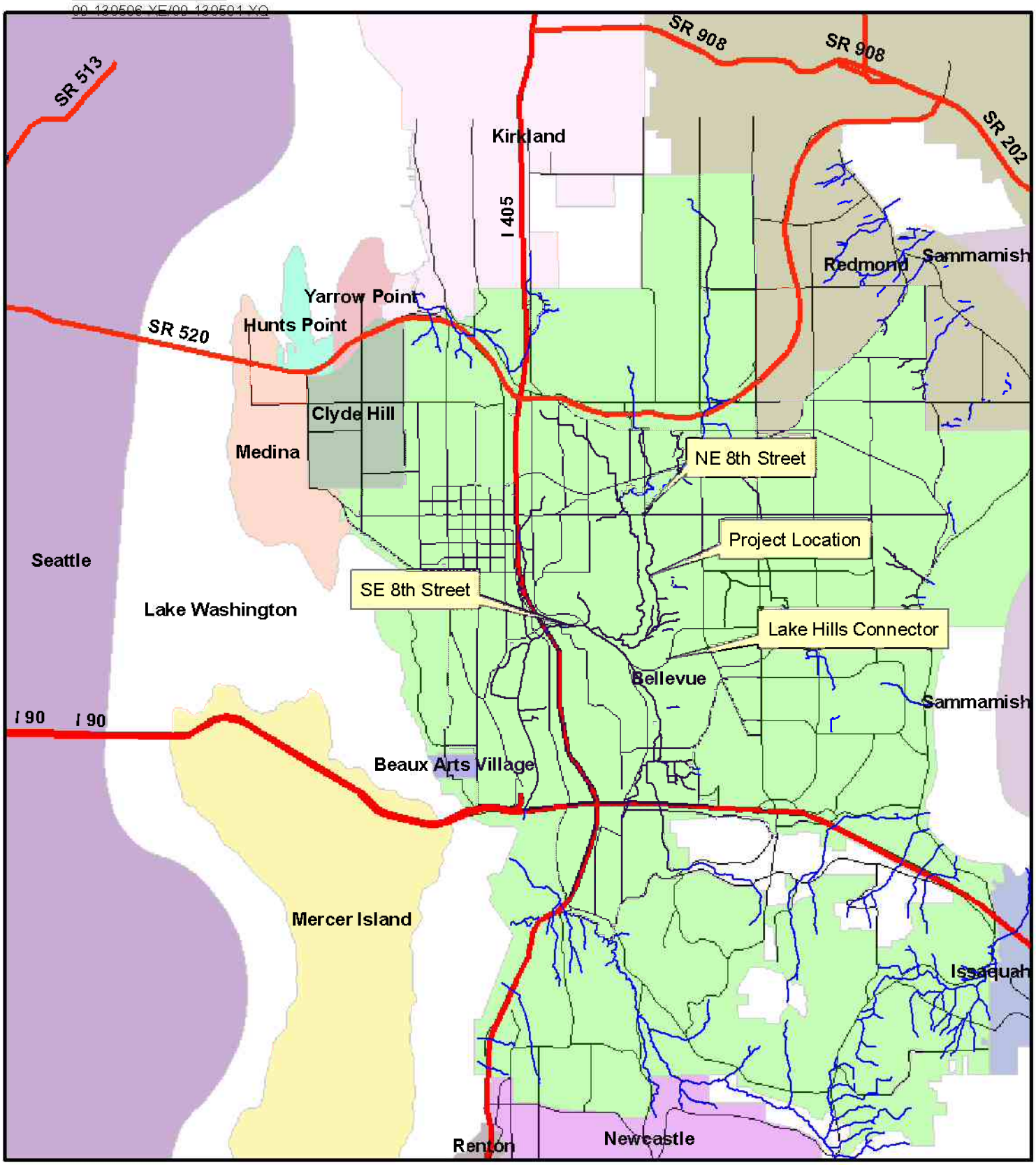

ANCHOR QEA

0 2,500 5,000 Feet

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Figure 1
Project Location
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

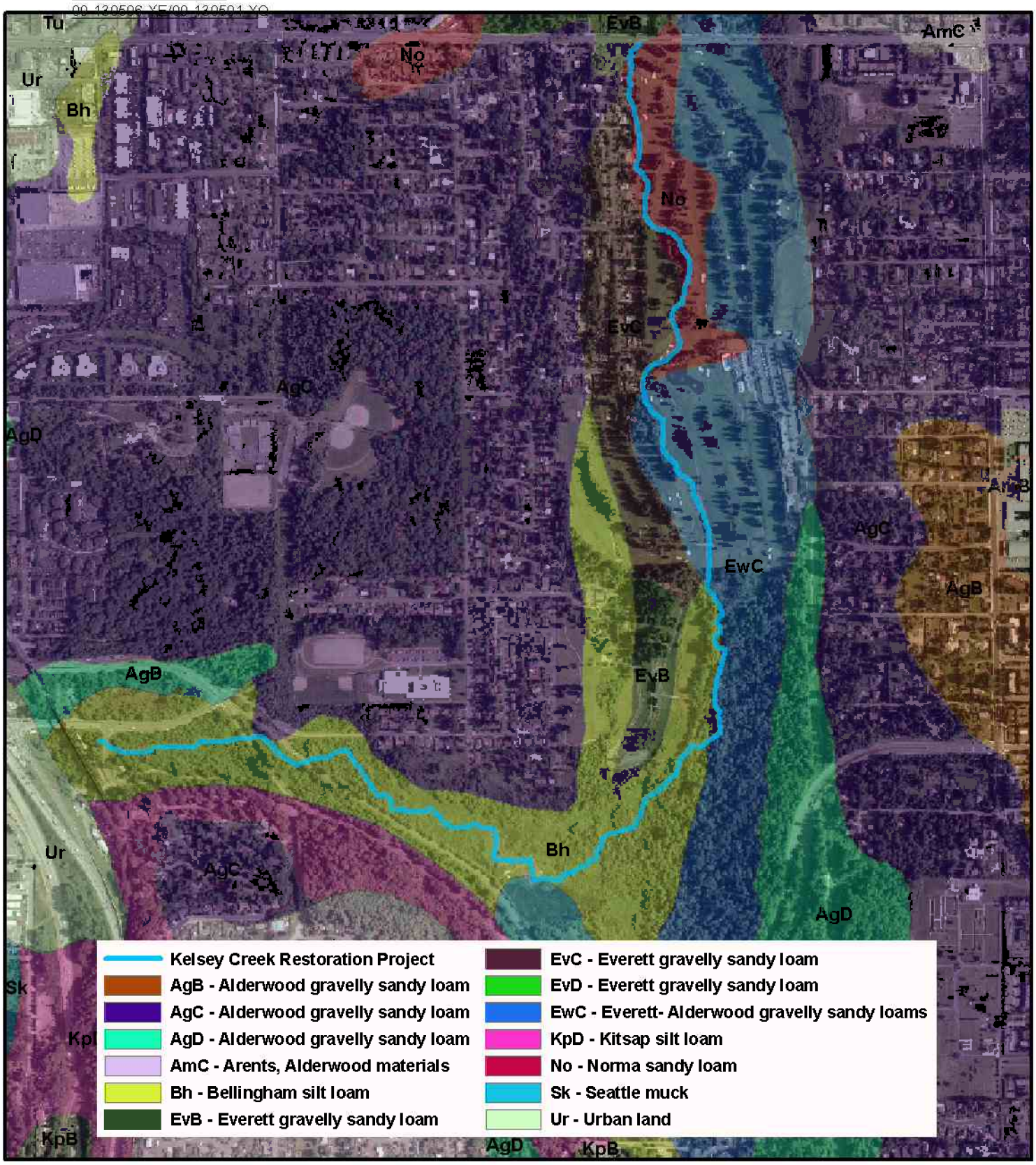

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Figure 2
Project Area Soils
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

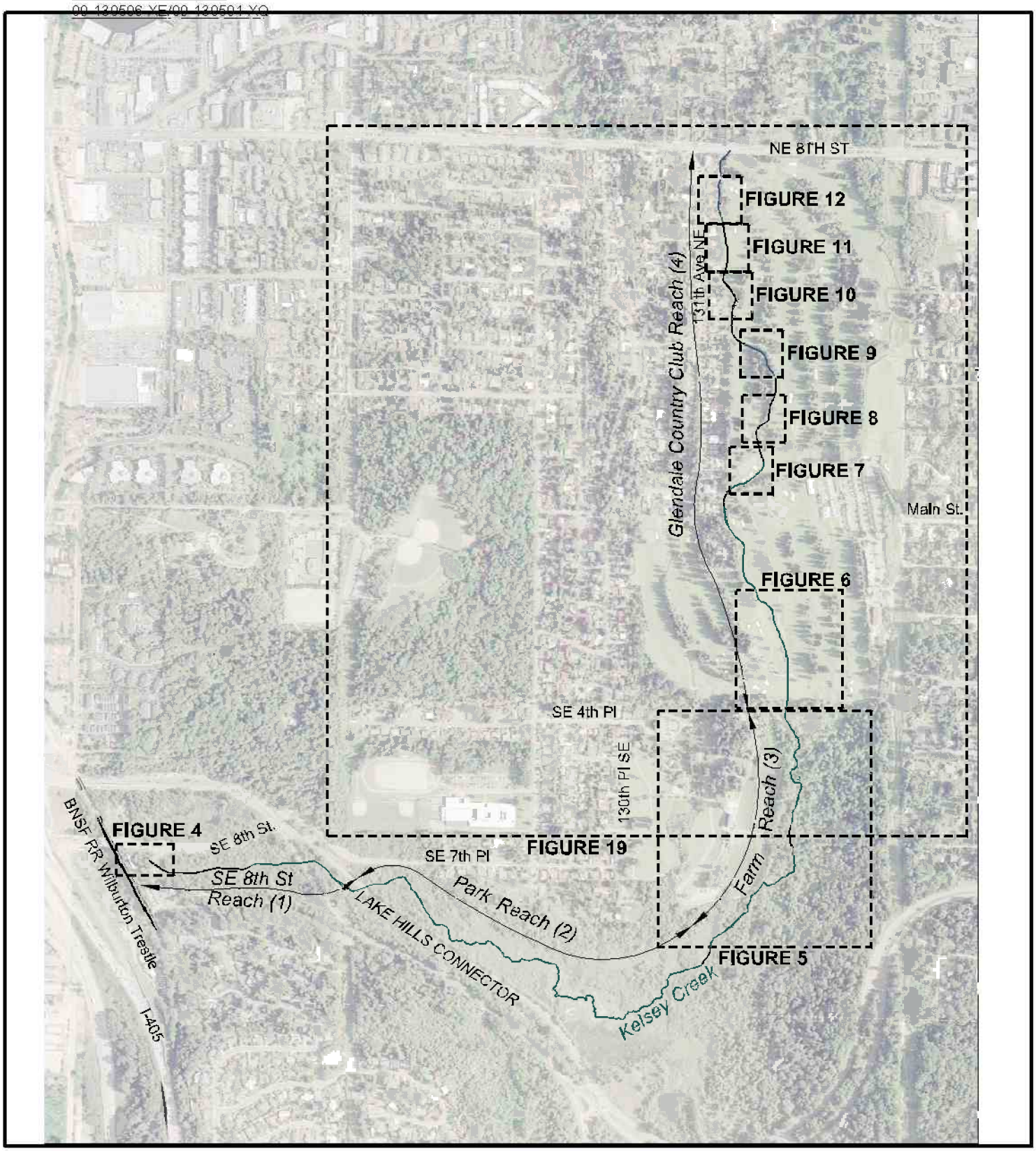

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Figure 3
Project Reaches and Site Plans Index
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

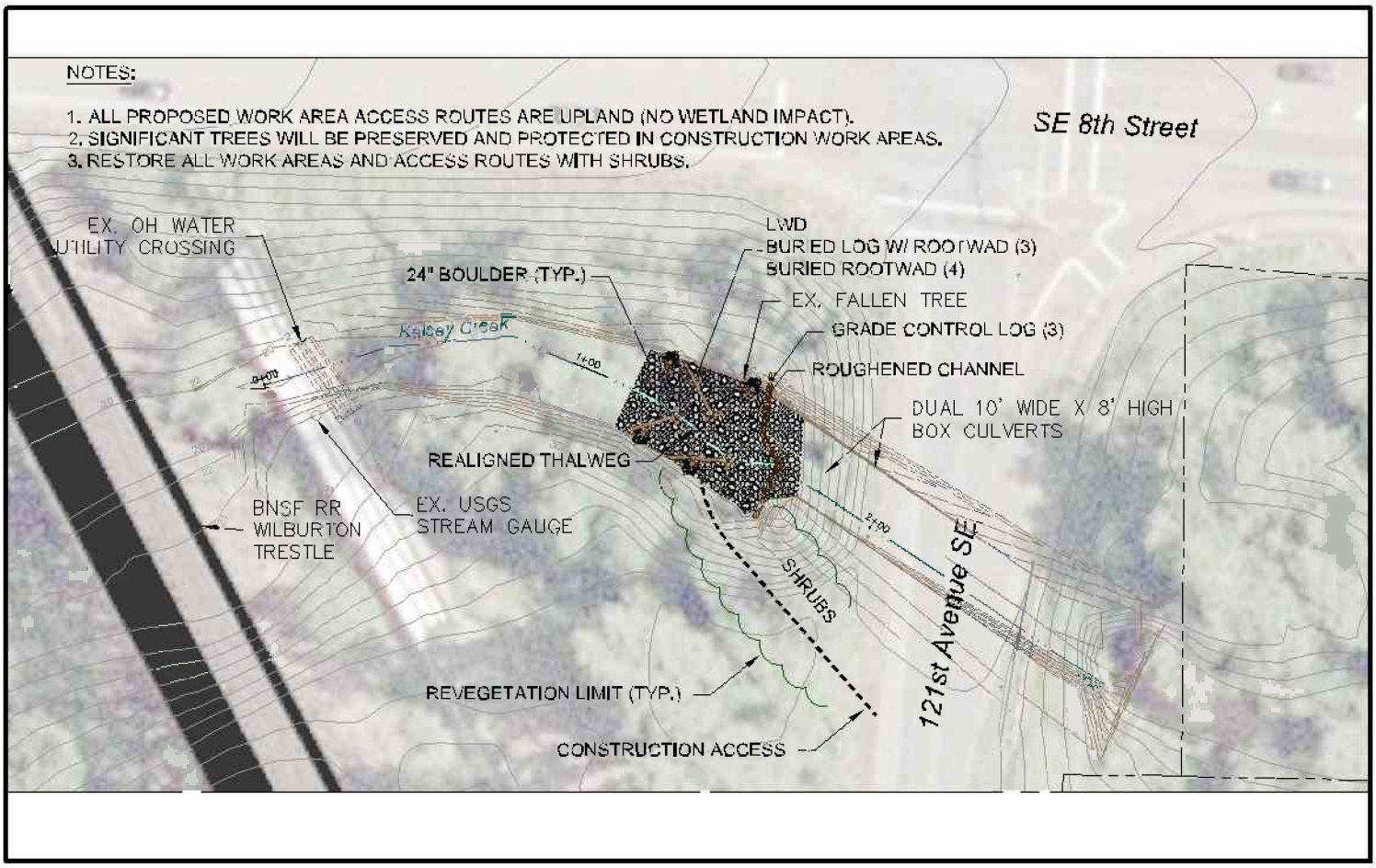

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Figure 4
Site Plan–Reach 1–Channel Improvements
Kelsey Creek Stream Channel Modification Improvements

Revised Draft Report Dated 10/16/2009

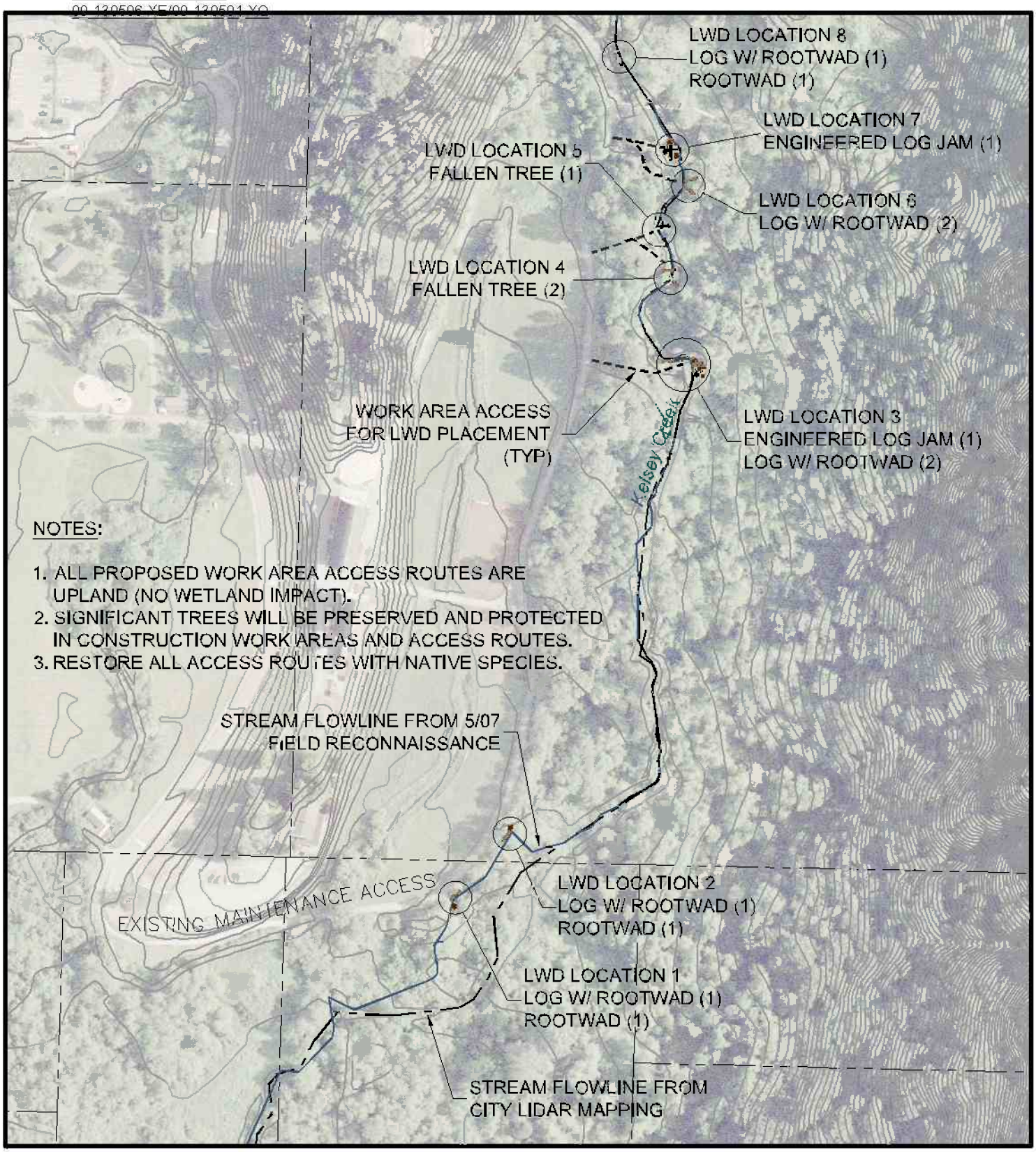

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Figure 5
Site Plan–Reach 3–LWD Placement Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

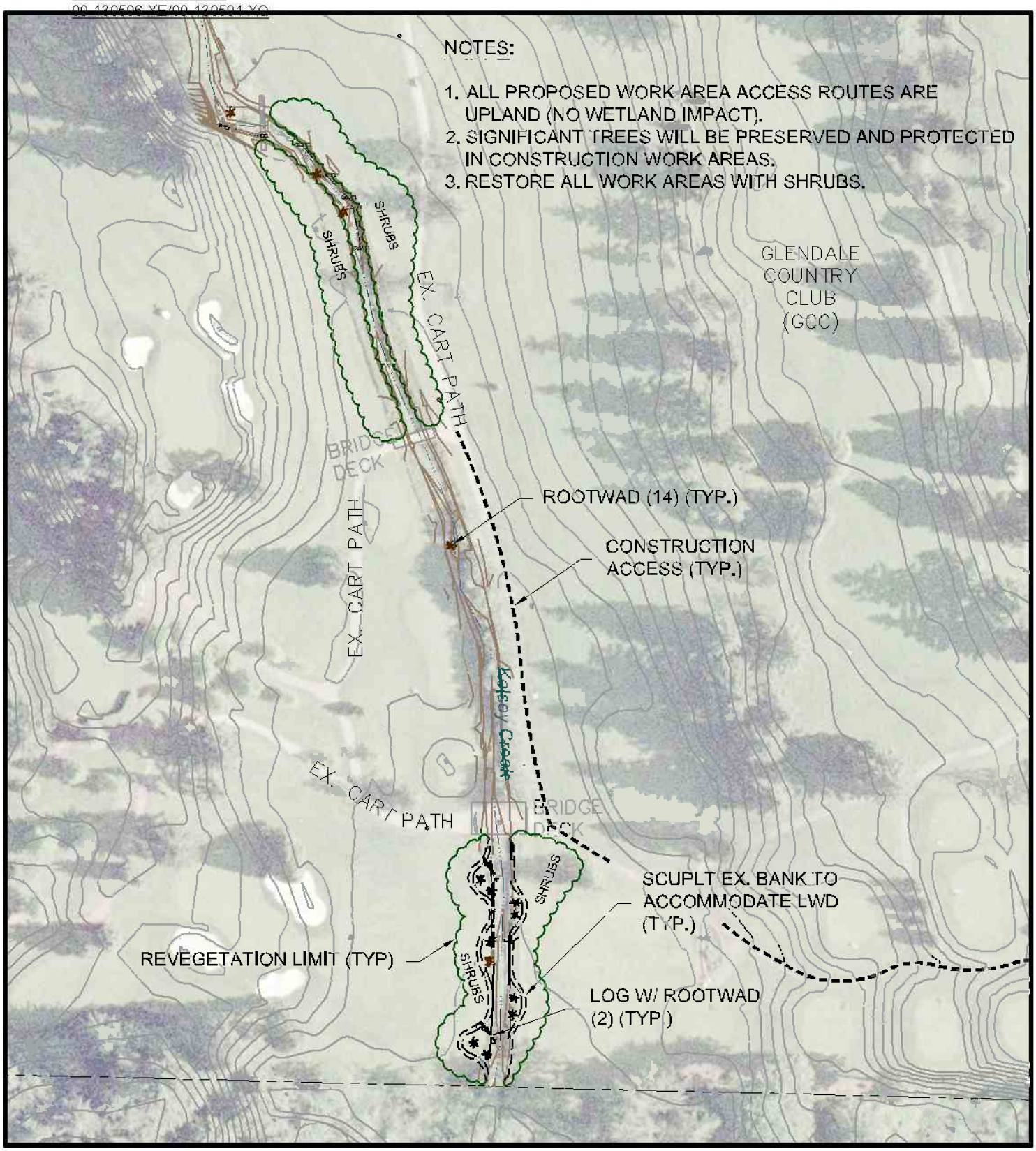

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Figure 6
Site Plan–Reach 4–South Channel Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

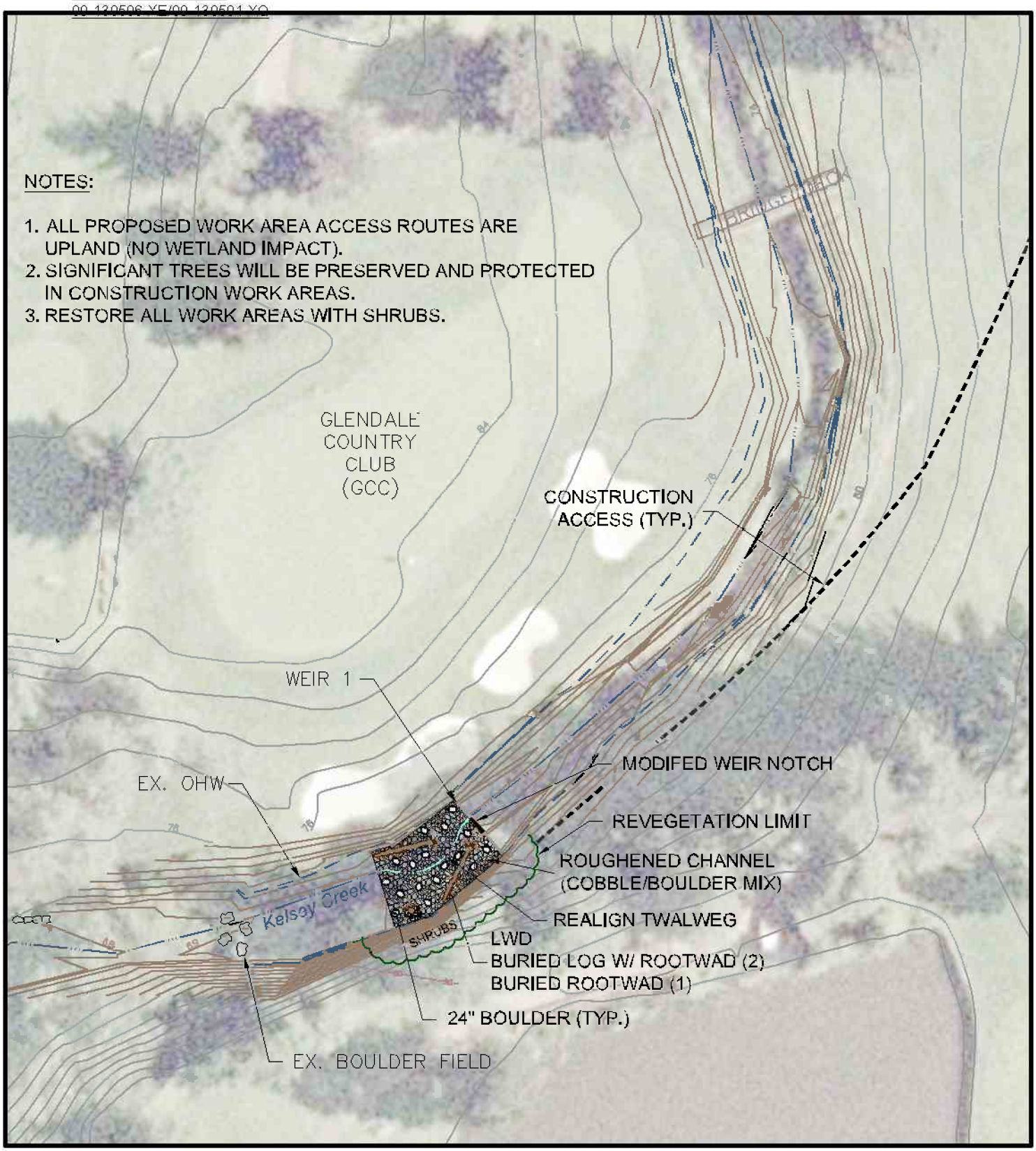

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Figure 7
Site Plan–Reach 4–Weir 1 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

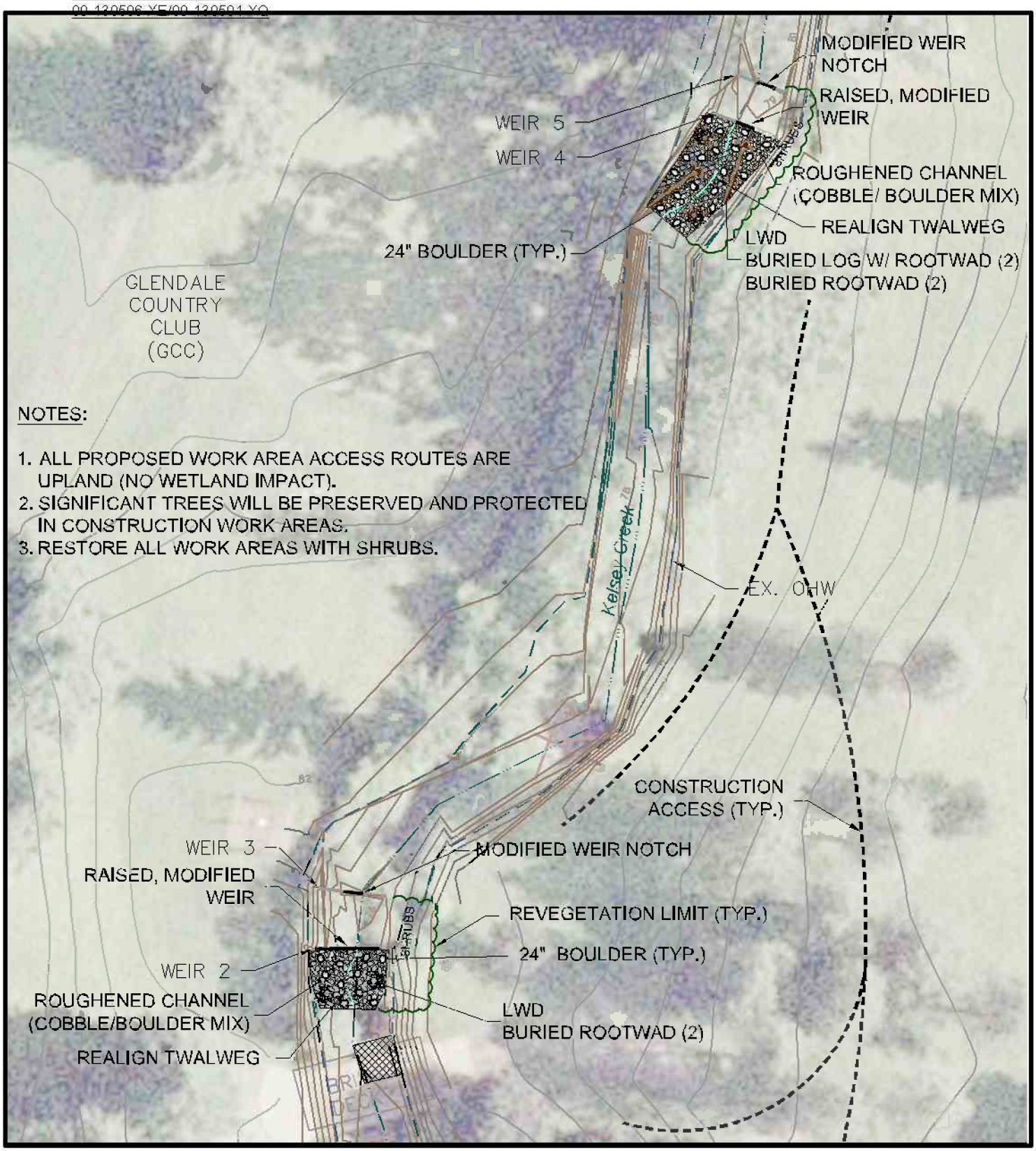

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Figure 8
Site Plan–Reach 4–Weir Pairs 2-3, 4-5 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

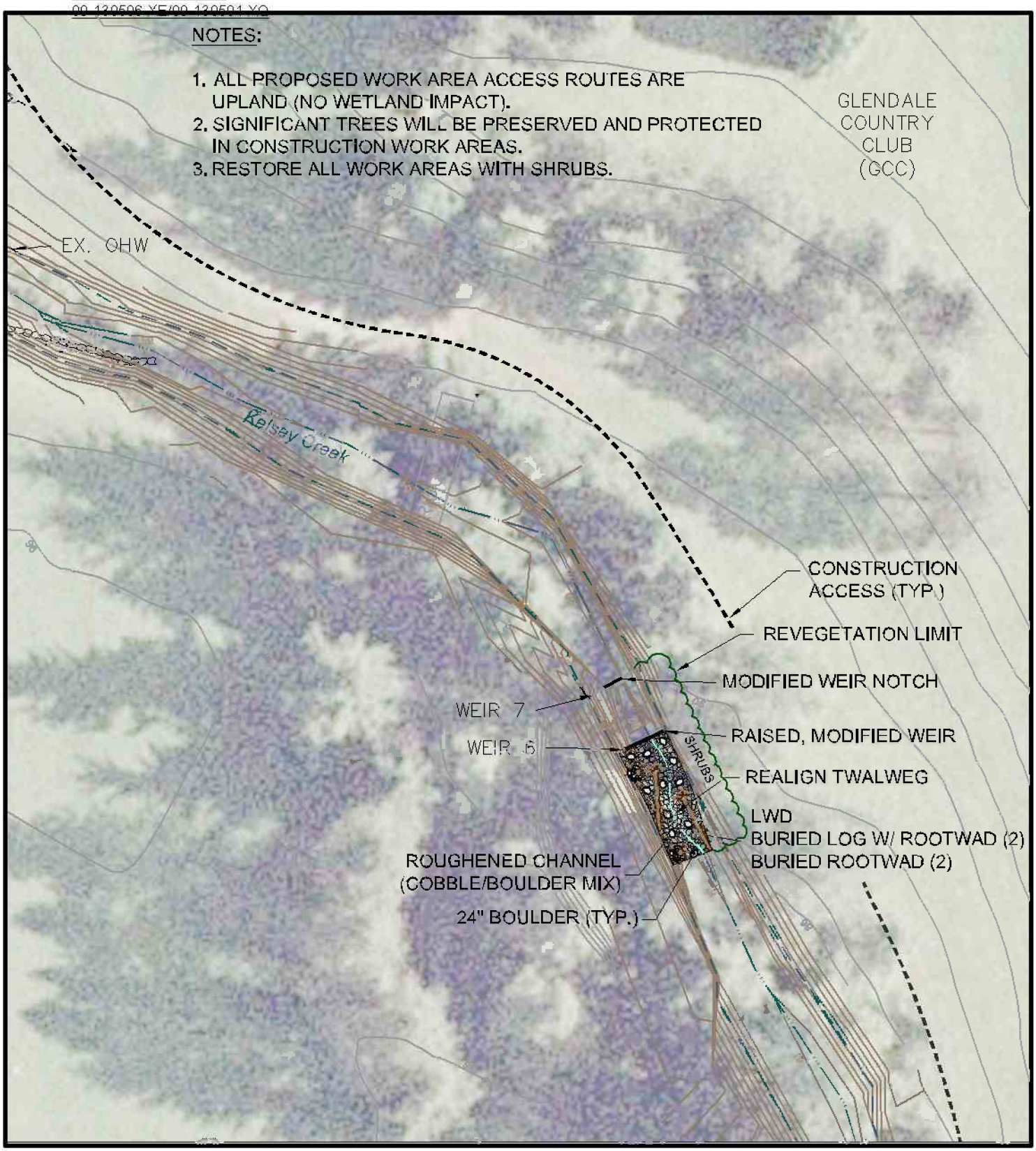

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Figure 9
Site Plan–Reach 4–Weir Pair 6-7 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

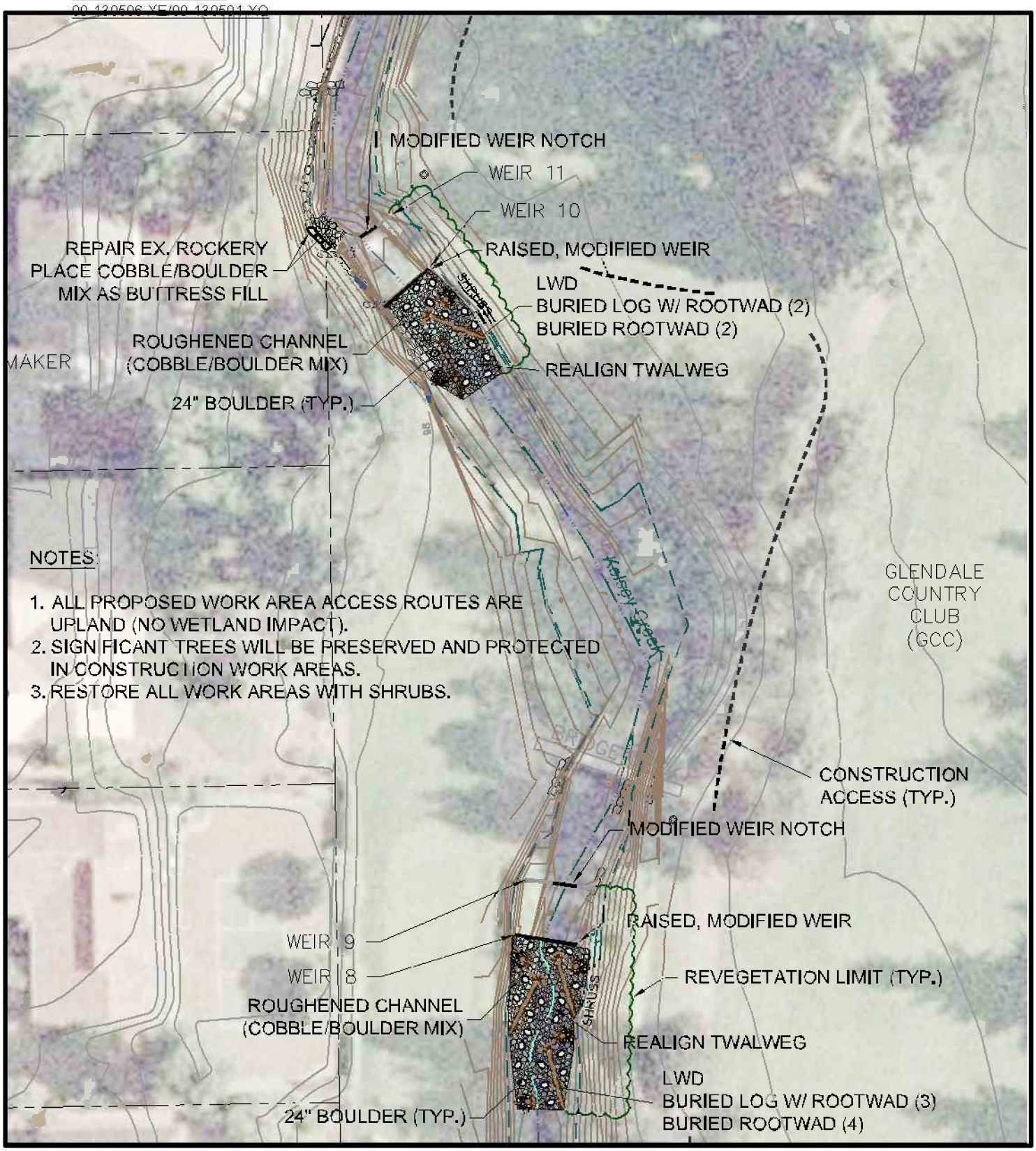

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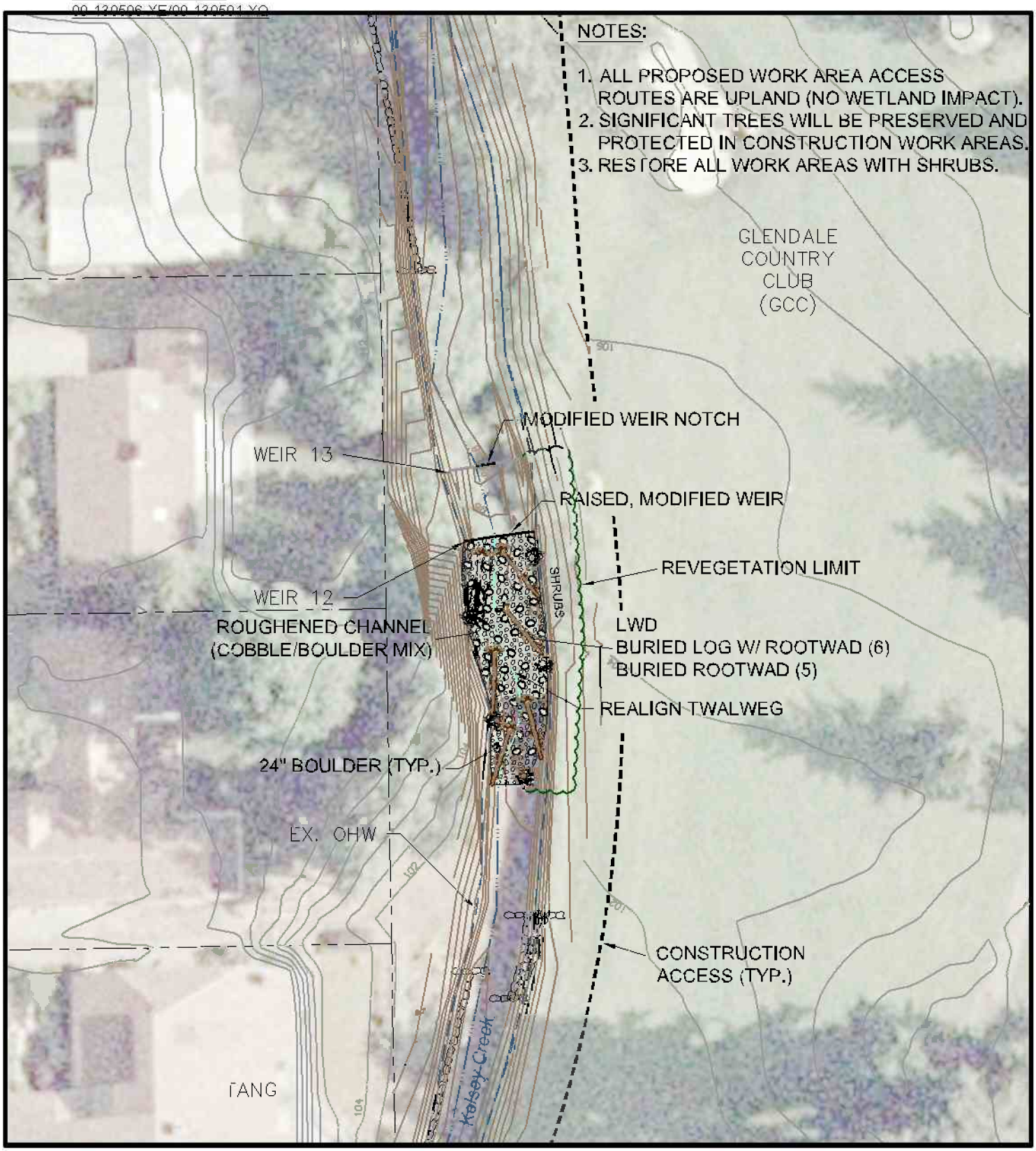
Figure 10
Site Plan–Reach 4–Weir Pairs 8-9, 10-11 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



ANCHOR QEA

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Figure 11
Site Plan–Reach 4–Weir Pair 12-13 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

Reviewed By:David Pyle 12/16/2009

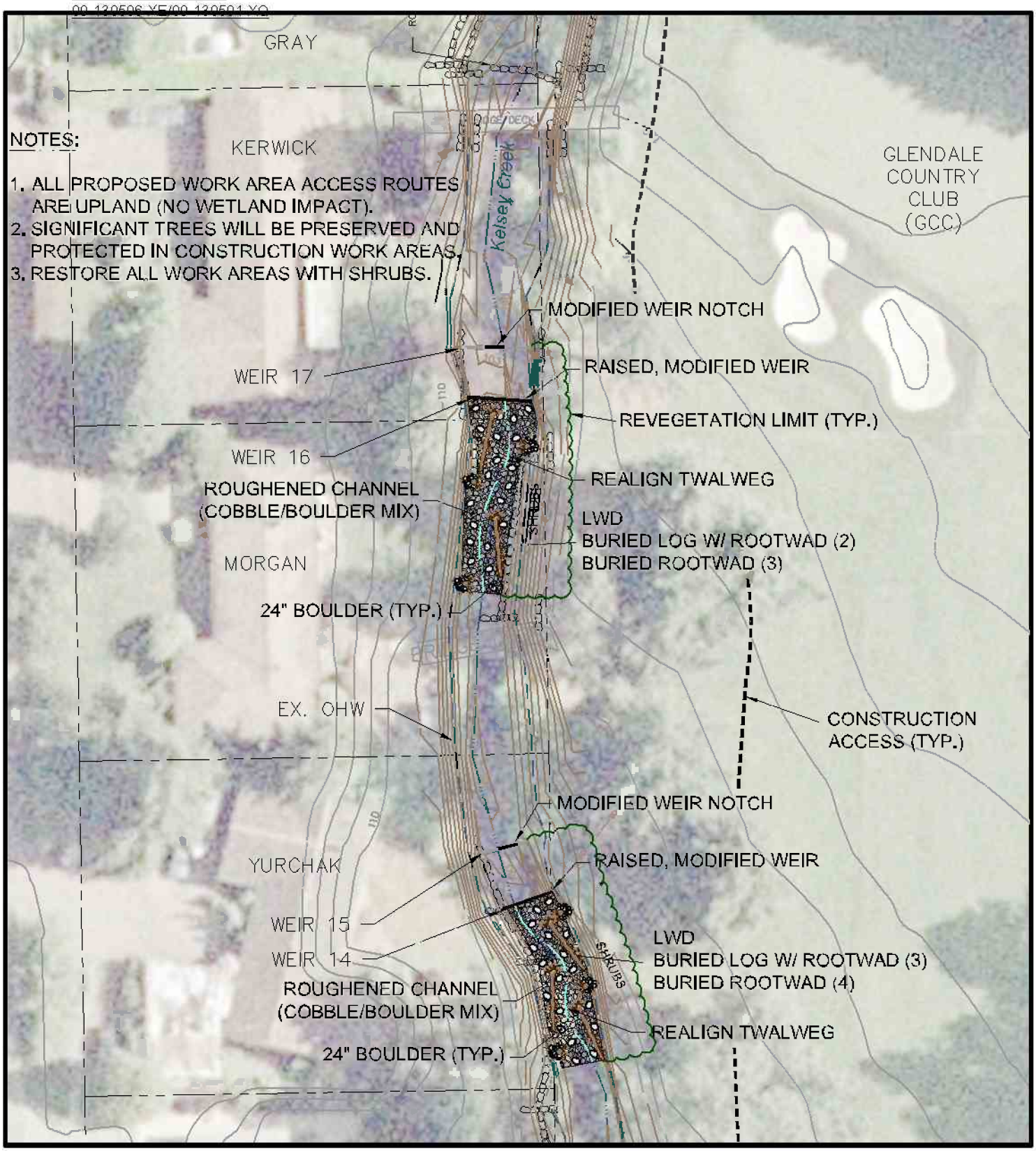

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Figure 12
Site Plan–Reach 4–Weir Pairs 14-15, 16-17 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

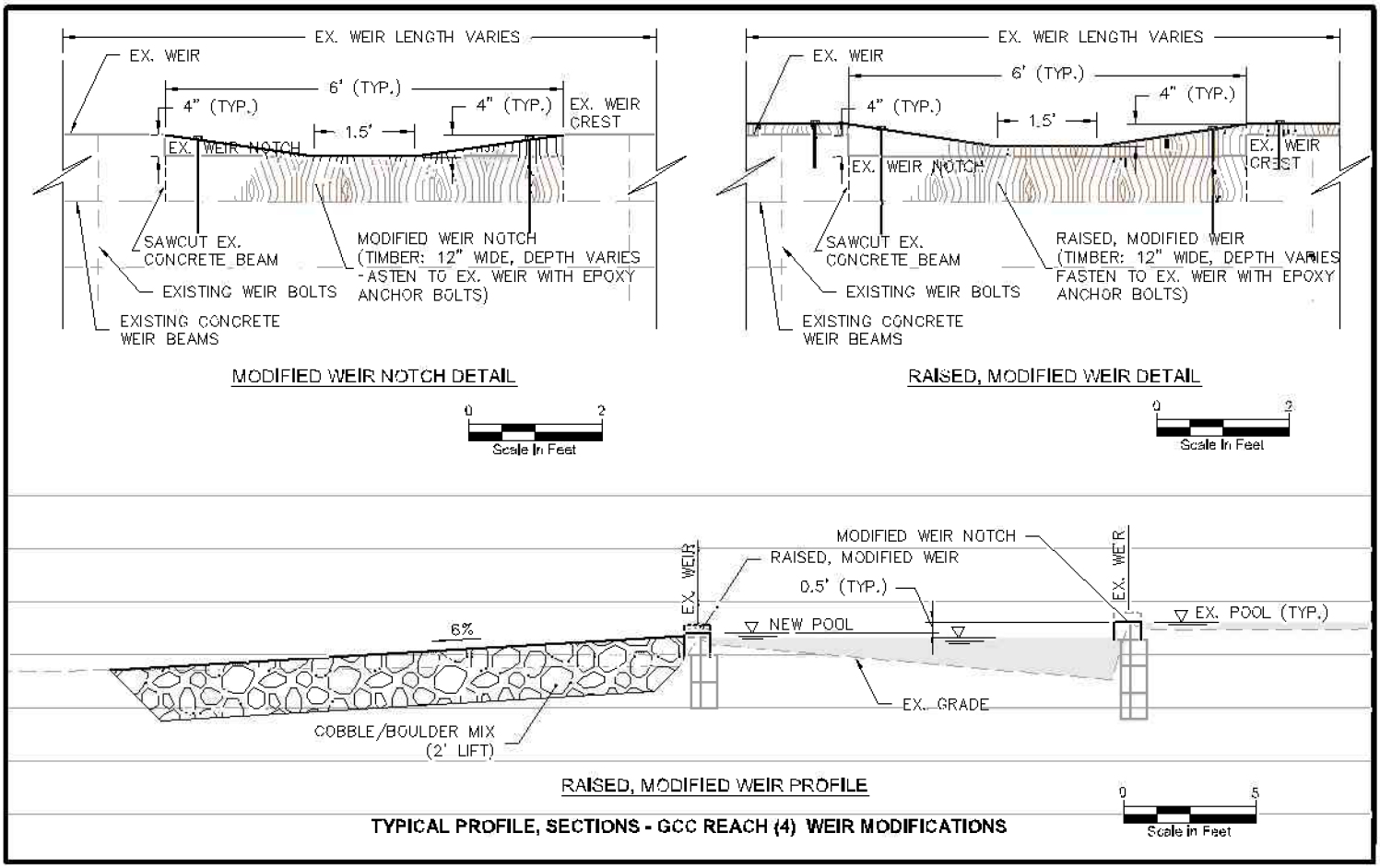

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Figure 13
Reach 4–Weir Modifications
Kelsey Creek Stream Channel Modification Improvements

Prepared by/Date: 10/16/2009

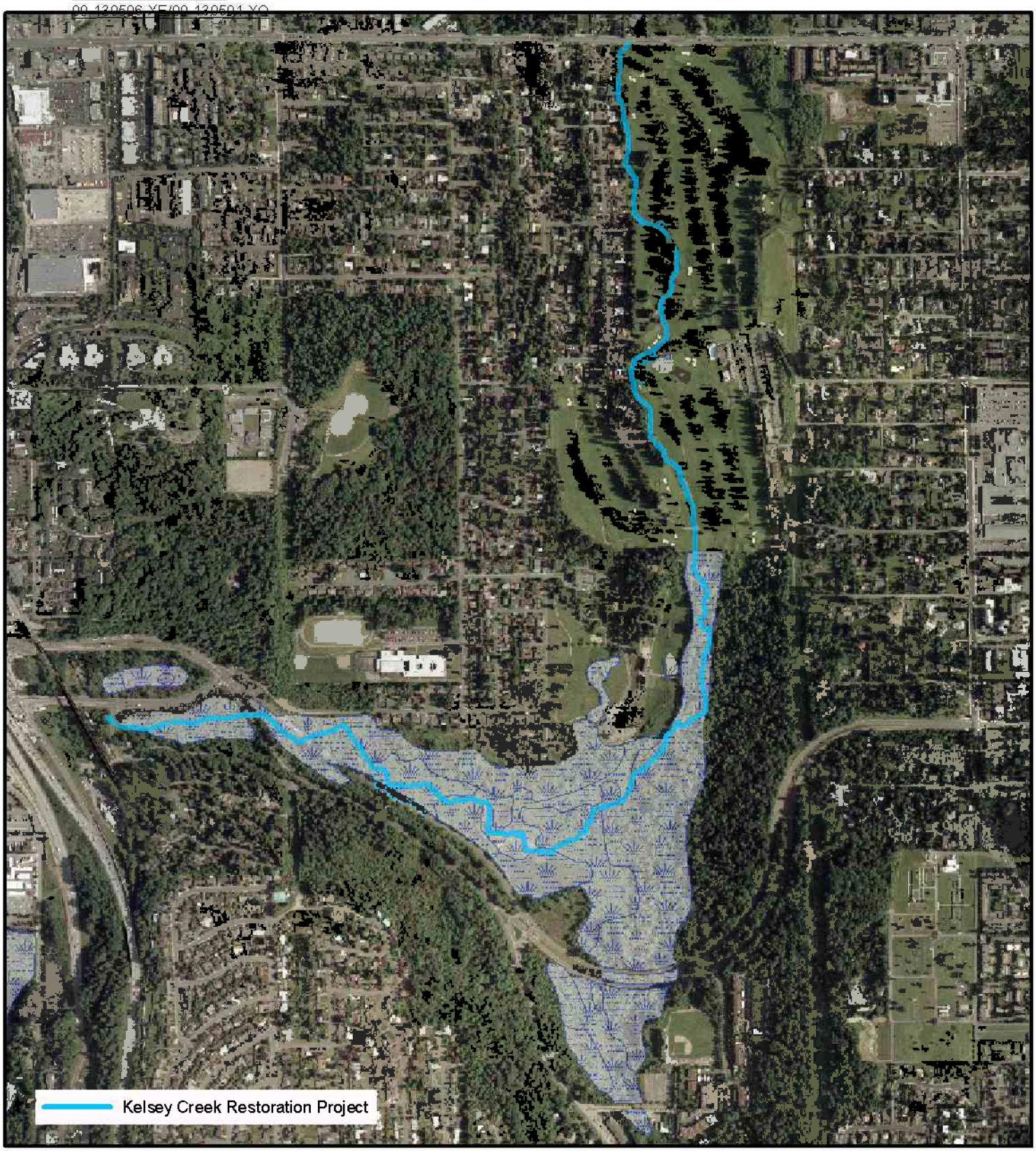

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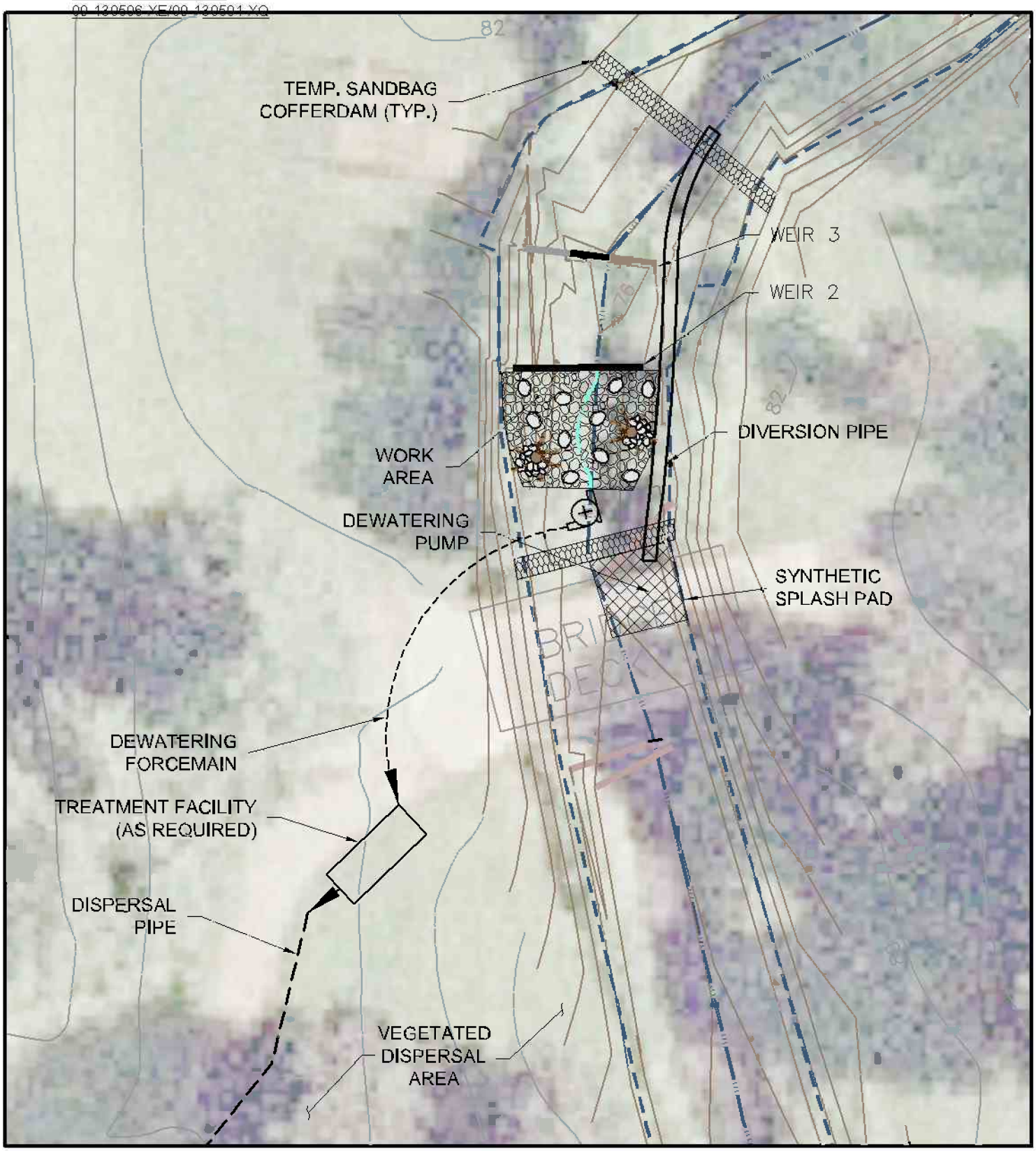
Figure 14
Project Area Wetlands
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



ANCHOR QEA

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Figure 15
Typical TESC/Stream Flow Bypass and Dewatering Plan
Kelsey Creek Stream Channel Modification Improvements

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ANCHOR QEA

0 500 1,000 Feet

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Figure 16
FEMA Special Flood Hazard Areas
Kelsey Creek Stream Channel Modification Improvements

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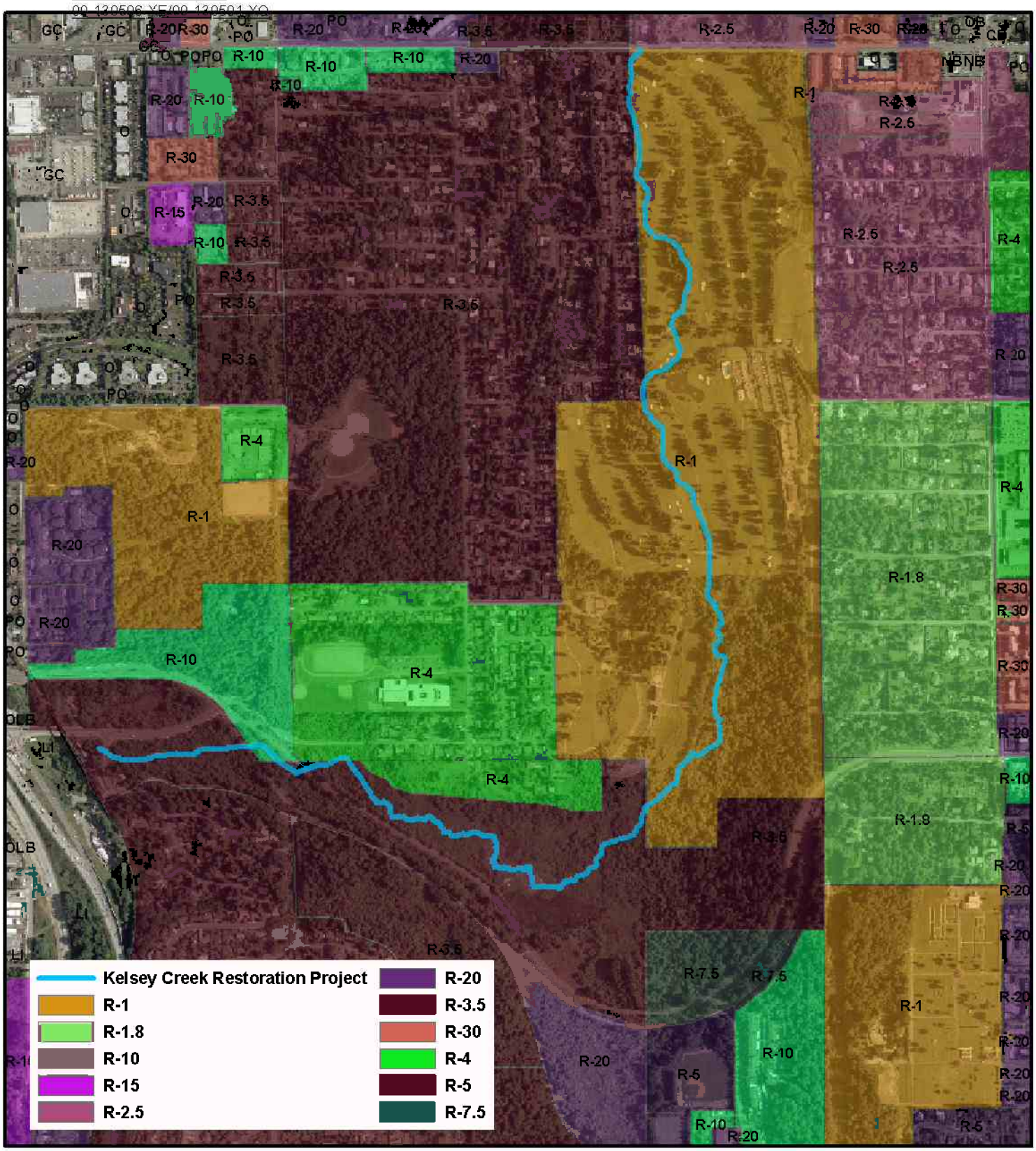

ANCHOR QEA

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Figure 17
Project Area Zoning
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

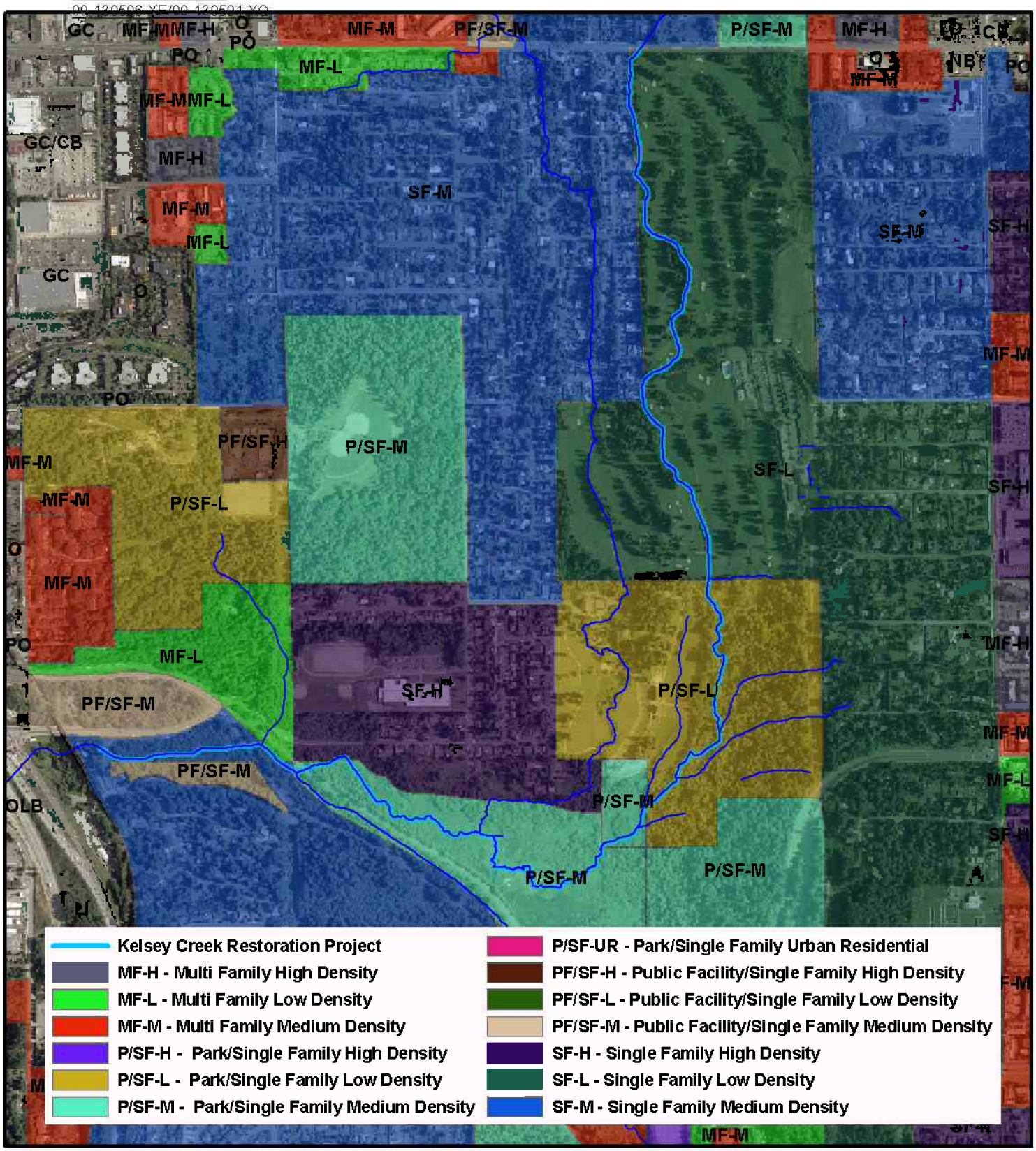

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Figure 18
Project Area Comprehensive Plan Land Use
Kelsey Creek Stream Channel Modification Improvements

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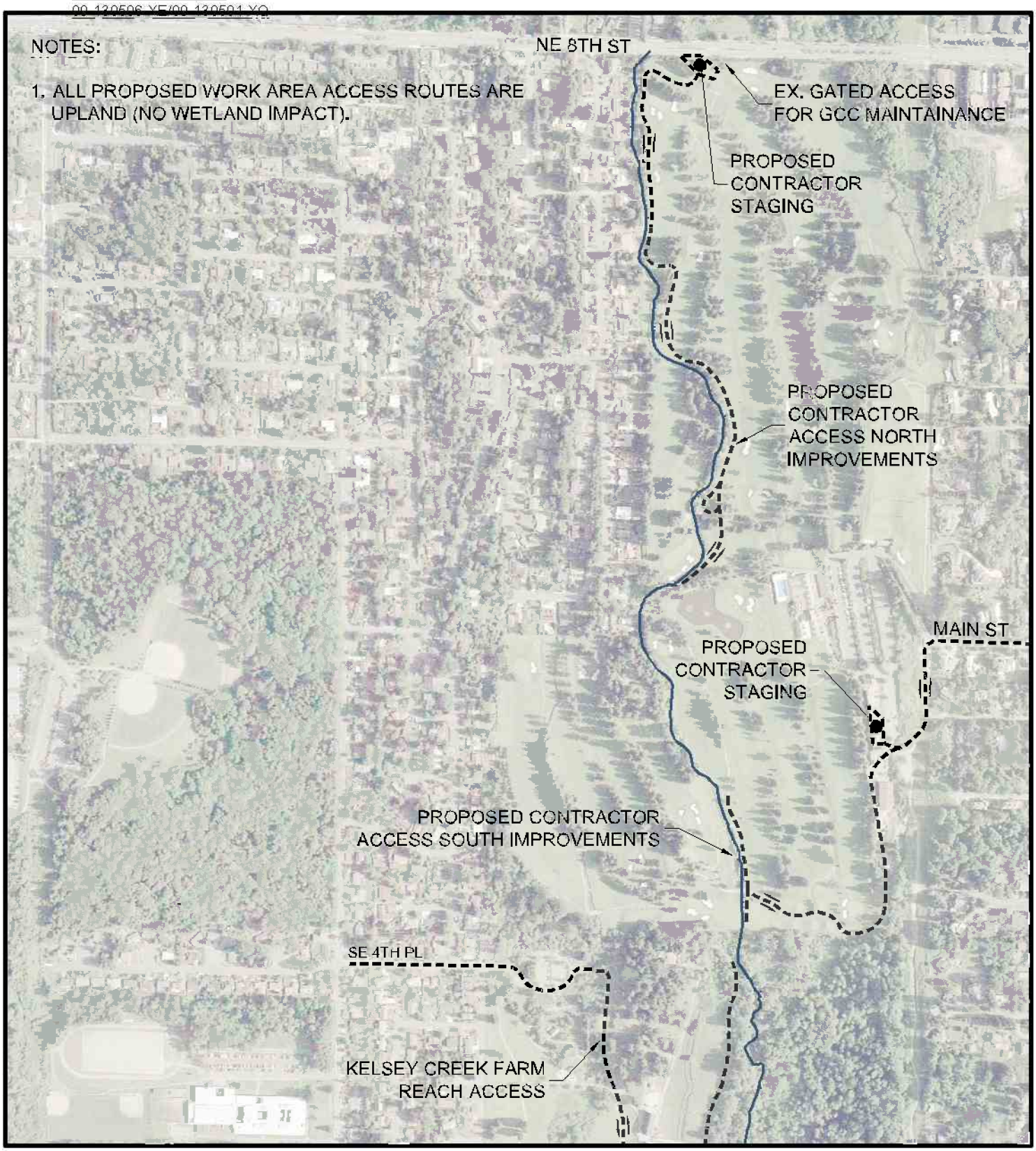

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Figure 19
Reach 4–Site Access Plan
Kelsey Creek Stream Channel Modification Improvements

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1 PROJECT NARRATIVE

The following sections provide the location, history and background, timing, and project description for the proposed work.

1.1 Location

The proposed stream modification improvements are located in the City of Bellevue, King County, Washington, along Kelsey Creek, within Sections 33 an 34, Township 25N, Range 5E and Sections 3 and 4, Township 24N, Range 5E. The project reach under consideration extends approximately 2.3 stream miles from the Burlington Northern Santa Fe (BNSF) Railroad Wilburton Trestle, located just upstream of Interstate 405 (I-405), to Northeast 8th Street at the north end of the Glendale Country Club (GCC) golf course. Surrounding properties include residential and park areas.

1.2 Purpose of the Project

The purpose of the Kelsey Creek Stream Channel Modification Improvements Project (Project) is to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use of Kelsey Creek within the City of Bellevue (City). The Project will provide benefits to water quality; habitat structure and complexity; conditions for passage, spawning, and rearing of resident and anadromous fish species that currently use the creek; and will have only minor, in-channel effects on local floodplain elevations within the improvement areas but not extending further upstream.

For this highly productive salmonid stream system, the City's primary goals and objectives are to:

- Improve fish passage where limitations to adult and juvenile salmonid mobility and upstream migration currently exist
- Enhance fish and wildlife habitat features within the Kelsey Creek channel and riparian corridor in Reach 4 (see Section 1.3)

Secondary objectives include:

- Maintaining reasonably stable and sustainable channel morphology and sediment

transport without excessive scour or deposition

- Improving or having no adverse affect on the floodplain in the affected project reaches
- Enhancing Kelsey Creek Park and Farm reach stream and wetland habitats through large woody debris (LWD) placement and invasive species control (vegetation management in these reaches is a separate initiative being handled by the City)
- Maintain consistency of recommended improvements with the Kelsey Creek Park Master Plan

1.3 Existing Conditions and Proposed Improvements

For restoration planning and preliminary design, the lower mainstem of Kelsey Creek has been divided into four reaches:

- Reach 1 (Southeast 8th Street Reach)—Lower gradient reach between the BNSF Railroad Wilburton Trestle and the Lake Hills Connector roadway crossings
- Reach 2 (Park Reach)—Lower gradient reach between the Lake Hills Connector roadway crossings and the east limit of the City's Kelsey Creek Park
- Reach 3 (Farm Reach)—Lower to intermediate gradient reach between the west limit of Kelsey Creek Farm and its north limit at the south boundary of the golf course
- Reach 4 (GCC Reach)—Intermediate gradient reach through the golf course, extending to its north limit at Northeast 8th Street, but not including that crossing

The reaches have distinct physical characteristics and associated restoration and enhancement needs; therefore, a variety of restoration and enhancement strategies has been considered in formulating improvement recommendations.

1.3.1 Reaches 1 and 2—Southeast 8th Street and Kelsey Creek Park

For Reaches 1 and 2, changes in historic site conditions have affected existing conditions. Prior to 1916, when the Montlake Cut was completed as part of the Lake Washington Ship Canal Project, the portions of the Project below approximately 30 feet (North American Vertical Datum [NAVD] 88) were part of Lake Washington. With the completion of the Montlake Cut, the historic Lake Washington level was lowered approximately 9 feet. The lake level is currently managed to maintain a water level between 18.75 and 20.75 feet

(NAVD88). Consequently, Reach 1 consists of a lacustrine plain and delta that cannot be restored to the prior historic condition. Under undisturbed natural conditions, a transition from lake bottom to emergent wetland to primary forest and then to secondary forest would be expected. In that scenario, Kelsey Creek would have migrated across the lacustrine plain depending on various factors, including the composition of the lacustrine sediments, the stream flow and alluvial sediment characteristics delivered from upstream, and the establishment of vegetation. Until recently, the fertile areas were used actively for agriculture, delaying and affecting that natural succession process. Currently, reed canarygrass (*Phalaris arundinacea*) is the dominant vegetation along much of the reach on the lacustrine plain. This invasive plant effectively out-competes the native plants that would be expected to colonize the area. Consequently, the habitat diversity in the lower emergent wetland areas has been adversely affected without sufficient opportunity for primary forest establishment. As a result, there is limited source of LWDs to naturally recruit to the channel that would otherwise help stabilize it and provide for greater habitat variability and complexity. Further upstream in Reach 2, some primary forest species established themselves on the lacustrine delta, but adequate time has not passed to provide significant LWD input.

The City has previously undertaken some habitat restoration and enhancement activities in Reach 2 to maintain fish passage and improve the quality of habitat along it. This has included actions to maintain an adequate depth channel for fish passage at low flows, and placement of LWD in upland areas of Reach 2. The City has also attempted localized control of reed canarygrass in the Reach 2 through selected area native plantings of emergent and primary forest species (using various techniques). Those past and ongoing restoration and enhancement activities have been focused on maintaining the active channel for fish passage given the current hydrologic regime, controlling reed canarygrass invasive plant spread, and establishing primary forest species. City staff are managing the vegetative management program as an experimental program, and future planned actions to address those identified needs are not part of the current stream modification improvements proposal.

The stream modification improvements proposed within Reaches 1 and 2 are limited to improvements in Reach 1, downstream from 121st Place Southeast, and include:

- Removal of the existing angular rock immediately downstream from the box culvert,

addition of buried hydraulic control logs at the culvert outlet, and placement of a section of roughened channel backfill (cobble/boulder mix) to create a stable, fish-passable riffle at the downstream approach to the culvert

- Placement of LWD (approximately 7 pieces total, logs with rootwads) in the cobble/boulder backfill (anchored and partially buried) for increased roughness and habitat complexity

1.3.2 Reach 3—Kelsey Creek Farm

Reach 3 extends upstream from Reach 2 to the golf course. This reach of the creek is upstream of the former shoreline of Lake Washington, but it has been altered by past logging and channel maintenance activities (i.e., removal of LWD). Stream corridor vegetation in this reach includes a closed tree canopy, and secondary forest species are co-dominant. The channel is actively migrating within its floodplain in this reach given the increased gradient and alluvial character of the channel bed and banks along it. The field-mapped (2007) channel location is significantly different in some areas of this reach compared to the City's LiDAR coverage topographic mapping from 2000. This reach is also lacking LWD to add hydraulic roughness, maintain pools, and add habitat complexity. Much of the channel in this reach consists of hydraulic runs separated by short riffles, with limited pool habitat.

Proposed restoration and enhancement strategies in Reach 3 are focused on adding LWD to promote creation and maintenance of pool habitats along with increased habitat complexity. LWD placements would include a total of 13 pieces (logs with rootwads, rootwads, fallen trees). Two engineered log jams (ELJs) and a collection of multiple LWD pieces with small woody debris racking material are proposed at eight locations along the stream channel banks.

In an October 2008 site visit, two beaver dams were documented in the lower section of Reach 3, separated by approximately 250 feet. Those dams were not evident in prior site visits of this reach in 2007. The temporary dams and the estimated area of upstream submergence have been documented on the aerial base map for Reach 3. Overland flow in the west bank area between those dams was also evident. Those dams are not apparent full barriers to fish passage, but they may partially limit fish passage from Reach 2 to the upper section of Reach 3 through Reach 4. The City has not identified any response actions for

their removal at this time. Future options beyond this project may include controlled breaching of the beaver dams with possible beaver deceiver installations to discourage continued beaver dam building activities at those locations. Under this approach, however, beaver relocation to other sections of the creek could result.

More extensive actions are not proposed in Reach 3 because of the evolving natural succession processes, limited stream corridor access, and potential disturbance to the riparian corridor and stream channel that would be associated with more invasive improvement actions. The City plans to independently develop and implement solutions for removal of undesirable invasive vegetation such as Japanese knotweed (*Polygonum cuspidatum*) and Himalayan blackberry (*Rubus armeniacus*). Those vegetative management program actions are not part of the current stream modifications improvements proposal for this reach.

1.3.3 Reach 4—Glendale Country Club

Reach 4 extends to Northeast 8th Street and is aligned through the GCC golf course and through several single-family residential properties adjacent to the golf course. The riparian corridor vegetation in this reach has been modified by past logging practices, golf course construction and maintenance activities, and by certain streamside private property owner actions. In some cases, ornamental or non-native vegetation has been planted in the riparian corridor for landscaping purposes. The channel banks have typically been armored along many Reach 4 channel segments by rockeries or angular rock revetment installations, and a series of concrete weirs have been installed in the middle to upper segments of this reach in order to control channel down-cutting. These past vegetation and stream channel modifications have resulted in reduced instream habitat complexity, channel segments with little or no vegetative buffer and canopy cover, increased stream temperatures and other water quality effects, and increased limitations to resident and anadromous fish passage associated with the larger hydraulic drops (i.e., at weirs).

Restoration and enhancement activities proposed for Reach 4 are focused on improving fish passage at the concrete weirs, installation of a section of roughened channel downstream from the lower weir in each weir pair (to eliminate the weir excessive jump heights), placement of instream LWD to increase hydraulic roughness and habitat complexity, and

expansion of riparian corridor vegetation and stream canopy cover using native species where possible without affecting golf course playability.

More specifically, the stream modification improvements proposed within Reach 4 include:

- Placement of LWD (approximately 16 pieces total: logs with rootwads, and rootwads anchored and partially buried) in existing pools and in sculpted channel and bank areas with new pools, located within the downstream 800-foot section of Reach 4. Benefits include improved pool habitat complexity and cover, pool scour maintenance, and increased instream hydraulic roughness.
- Modification of the existing concrete weirs (17 total: one single weir and eight weir pairs), including raising the downstream weir crest elevations to achieve a maximum of 0.5-foot of weir crests elevation difference with the upper weir to reduce jump height, and modification of weir notch geometries for improved juvenile fish passage across the weirs.
- Creating roughened channel sections through placement of cobble/boulder mix and anchored and partially buried LWD (approximately 46 pieces total: logs with rootwads, and rootwads anchored and partially buried) in the downstream weir pair tailout areas and at the single weir
- Placement of supplemental channel bank toe rock, covered with cobble/boulder mix, at selected locations where existing channel down-cutting has the potential to destabilize existing rock revetments
- Re-vegetation of selected channel banks and riparian buffer areas local to the stream channel where not in conflict with the playability of the golf course

Because Reach 4 is located on private properties, restoration and enhancement opportunities will require the concurrence and cooperation of the GCC and various adjacent, affected property owners. That will include the need for temporary construction easements for access through and improvements to be made on those properties).

1.4 Key Benefits of Improvement Actions

Implementation of these proposed restoration and enhancement actions along the collective Kelsey Creek lower mainstem project reaches will improve salmonid passage and habitat by:

- Facilitating anadromous salmonid passage to upstream reaches, juvenile rearing, and adult spawning
- Creating more extensive instream habitat features, structure and complexity
- Providing improved functional interaction between channel and riparian corridor habitats
- Creating better isolation of selected stream channel segments
- Achieving incremental protection/improvement in instream water quality

Besides salmonids, these actions would also benefit other fish and wildlife in the project area, as appropriate substrates, riparian vegetation, and increased habitat connectivity would promote more diverse use of the stream corridor by other species.

1.5 Construction Requirements—Reaches 1 and 2

1.5.1 Access

Construction access for proposed improvements in Reach 1 (none are proposed in Reach 2) will be provided directly from 121st Place Southeast, on the southwest side of the Kelsey Creek box culvert crossing. It is expected that the width of temporary access disturbance in the riparian buffer would be up to 30 feet to facilitate trackhoe access, and the length of disturbance along that access would average approximately 80 feet. It is expected that other equipment needs required for proposed stream modifications (i.e., small loader and skiff for materials removal and replacement) would be provided by crane from a crane pad located within the 121st Place Southeast right-of-way. Partial or full short-term road closure with alternative public access detour (an alternative route is available) will be required during the period of crane operations. This access plan and other possible construction contractor access needs will be further evaluated and refined with final design of improvements.

1.5.2 Clearing and Grubbing

Clearing of selected trees that obstruct equipment access within the designated construction access will be required. No grubbing would be required. Based on initial observation, it appears that only a few smaller trees may need to be cleared. Significant trees will be avoided. Other smaller vegetation species, including shrubs and understory vegetation, within the work area access may be impacted by construction access over them. If deemed

acceptable through permit review, placement of hog fuel may be possible for temporary upland access routes to minimize the amount of vegetation removed, associated work area disturbance, and erosion potential. Small areas of existing vegetation immediately adjacent to the stream banks may need to be removed for control logs, LWD, and roughened channel fill placement. No streamside wetland habitats exist in the Reach 1 proposed work area based on wetland field reconnaissance previously conducted by Anchor QEA staff. Further refinement in the expected type and extent of vegetation clearing required for construction access and proposed stream channel improvements will be evaluated under the City's Critical Areas Land Use Permit Application review and with final design of improvements.

1.5.3 Installation

Construction of improvements will require the installation of temporary cofferdams and gravity or pumped with appropriate fish screening stream flow bypass through and around the Reach 1 work area. It is expected that a temporary sand bag cofferdam would be placed within the 121st Place Southeast culvert, and a temporary diversion pipe made of high-density polyethylene or equivalent would be routed from it through and around the work area. A similar temporary downstream cofferdam would need to be installed to capture any upstream cofferdam leakage plus any incident surface or groundwater contributions within the work area. Accumulated water within the work area between the cofferdams will need to be pumped upslope to an acceptable designated vegetated dispersal area or contractor-provided treatment system prior to recharge and/or return to Kelsey Creek.

Once the work area has been adequately dewatered, the unsuitable angular streambed substrate rock would be removed, along with over-excavating to key in the roughened channel cobble/boulder backfill. It is expected that removal and placement of rock substrate materials and placement of LWD pieces could be accomplished by a small trackhoe in combination with a crane using a skiff or other similar device to remove and place imported materials from temporary stockpiles along 121st Place Southeast. Truck access to the stream in Reach 1 will not be possible due to construction access grade constraints. Anchorage of the LWD (i.e., using duckbill anchors) within the constructed riffle areas would occur using small equipment to drive and load test the anchors, and attach the required cabling.

1.5.4 Construction Site Restoration

Restoration of stream corridor and riparian buffer areas temporarily impacted by construction will include placement of all specified instream materials required for channel stability, installation of steam-side slope toe protection and slope area erosion protection fabric (i.e., jute netting), and re-vegetation of the disturbed riparian buffer area with native facultative shrub and upland trees. A preliminary re-vegetation plan will be developed through project permit applications, and will be carried forward with landscape planting plans and specifications with final design of improvements. Hydroseed will be applied to all other pervious areas disturbed by construction and not requiring landscape plantings or otherwise restored with other cover materials. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

1.6 Construction Requirements—Reach 3

1.6.1 Access

Construction access for proposed improvements in Reach 3 will be provided from City-owned roadways and maintenance access roads within Kelsey Creek Park and Farm as accessed from Southeast 4th Street directly east of 130th Place Southeast. A maintenance access road/trail currently extends along the west periphery of Kelsey Creek from the south end of the Kelsey Creek Farm at the parking area. The proposed action for installation of approximately 13 pieces of LWD (i.e., logs with rootwads, rootwads, fallen trees) and 2 ELJs at eight locations within this stream reach will require controlled construction contractor access to the stream channel from that maintenance access road (i.e., for a small trackhoe). Three points of temporary construction access to proposed LWD placement sites (six total, two access locations serve two sites each) have been identified through field investigation, with a cumulative access length of approximately 500 feet. The expected width of temporary access disturbance along those access routes in the riparian buffer would be approximately 12 feet. Existing trees and wetlands will be avoided to the extent possible along those access alignments. Much of that area is covered with invasive species (i.e. Himalayan blackberry and Japanese knotwood). The LWD and other required materials, such as channel substrate rock mix for placement around LWD, can be hauled in by truck along the maintenance

access road to the stream access locations. A loader could be used to transport those materials to the stream channel LWD placement sites along the temporary access routes.

Use of high lead cable techniques to transport the LWD through the riparian area or aerial methods, such as a helicopter, could provide alternative, low impact methods of LWD placement in this reach, but trackhoe equipment access to the channel may still be required.

1.6.2 Clearing and Grubbing

Clearing of selected vegetation that obstructs equipment access to the designated LWD placement locations will be required. No grubbing will be required. Although some small trees may need to be removed, significant trees will be avoided and protected. Smaller vegetation species and grasses may be impacted by construction access, but may not require removal unless they are identified as invasive species, in which case, those areas would be cleared and restored with native species plantings after construction. Only one stream-side wetland (Wetland A) was found to exist adjacent to the Reach 3 proposed LWD placement areas (near location No. 36, west side of channel) based on wetland field reconnaissance and delineation previously conducted by Anchor QEA. Temporary clearing and construction access for that location could temporarily impact that wetland vegetation. Further refinement in the expected type and extent of vegetation clearing required for construction access and LWD placement will be evaluated under the City's Critical Areas Land Use Permit Application review and with final design of improvements.

Since the topography in this reach is relatively flat, temporary steel sheeting or construction mats laid flat on the surface may be an option to minimize temporary construction impacts within the riparian buffer and in proximity to the channel. Placement of hog fuel that could be spread along disturbed channel banks after construction may also be an option to minimize riparian area construction disturbance along access routes.

1.6.3 Installation

The LWD to be placed can be hauled by truck along the maintenance access road to the designated stream access locations. After off-load, the LWD would be carried by trackhoe or by alternative methods (see Section 1.6.1) to the stream channel for placement. Placement of

LWD would be completed by trackhoe. Rounded rock substrate mix would also be trucked to a similar location and would be off-loaded for placement by the trackhoe around the LWD. Soils conditions along the designated access paths to the channel will be reviewed in final design to establish the potential need for use of low tire/track pressure equipment to minimize native soils disturbance and compaction.

No flow diversion or localized dewatering of the stream channel is proposed for LWD placement. The construction contractor will be required to exercise appropriate diligence in the instream placement of the LWD rootwad pieces to avoid creating significant sediment plumes within Kelsey Creek during LWD placement. Final locations of LWD placement will be field adjusted in conjunction with field observation by a fisheries biologist to provide for the optimum channel pool formation, stabilization, and habitat benefits. Anchorage of the LWD may not be required for all LWD pieces (i.e., smaller members of ELG) in Reach 3 due to the limited risk of downstream problems with its potential movement. If the City desires LWD anchorage for most, if not all, of the LWD in Reach 3, use of duckbill anchors, load tested, and cabled to the LWD is proposed.

1.6.4 Construction Site Restoration

Restoration of stream corridor and riparian buffer areas temporarily impacted by construction will include placement of all specified LWD and associated instream materials required for channel stability, installation of steam-side slope toe protection and slope area erosion protection fabric (i.e., jute netting), and re-vegetation of the disturbed riparian buffer area with native wetland and upland trees and shrubs. Temporary recyclable hog fuel would be left in place or spread over adjacent areas prior to planting. A preliminary re-vegetation plan will be developed through project permit applications, and will be carried forward in landscape planting plans and specifications with final design of improvements. Hydroseed will be applied to all other pervious areas disturbed by construction and not requiring landscape plantings, or they will otherwise be restored with other cover materials. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

1.7 Construction Requirements – Reach 4

1.7.1 Access

Construction access for proposed improvements in Reach 4 would be provided from two locations. A temporary construction access will be created from an existing GCC gated access at Northeast 8th Street, then along the periphery of Kelsey Creek within the GCC property, for the northern portion inclusive of Reach 4 weirs. That access is proposed to be extended along an alignment in close proximity to the east bank of the existing channel. The route would typically follow turf fringe areas of the golf course, including fairway fringes or other non-playable areas, except where tree-covered riparian areas exist. In those areas, the temporary access alignment would extend beyond those areas to preserve and protect the native riparian vegetation. A looped or hammerhead turn-around would be provided near the central portion of the primary access (upstream of Weir 1) unless an alternative or more efficient) truck access out along the golf course cart path and through the clubhouse parking area could be considered and found acceptable by GCC representatives. For the majority of the proposed north construction access over the golf course fairway fringe areas, temporary sheeting could be used to minimize construction impacts to golf course operations, avoid haul-in and haul-out of ballast material and associated site disturbance, and to minimize turf area restoration needs. If temporary sheeting of that portion of the access is determined by the City to not be acceptable or feasible, then temporary imported ballast fill (i.e., crushed rock) could be placed over a geotextile laid on the turf to stabilize the construction access road and minimize native soils disturbance. Under that option, however, removal and haul-out of those materials would then be required in addition to larger anticipated restoration needs for the disturbed areas.

Existing GCC roads and golf cart access paths in the southeast portion of the golf course are proposed for construction access to south end improvements in Reach 4, as requested by the GCC. For work in that subreach, which is limited to LWD placement and minor bank sculpting, it is anticipated that no tracked or dump truck equipment would be required, and that low-pressure, rubber-tire equipment could be used to import and distribute materials while minimizing the potential for cart path or turf area damage. Potential damage to proposed construction access routes through City and GCC golf course property that result from construction will be restored consistent with existing conditions.

Localized access to the various weir pairs in the north portion of this reach from the primary construction access alignment is required to accomplish the improvements. This will require import of considerable cobble-boulder substrate mix along with LWD (i.e., logs with rootwads, rootwads) for placement in the channel by a small trackhoe. That access could also be over temporary steel sheeting to minimize construction disturbance in proximity to the channel or over ballast fill with underlying geotextile similar to the primary construction access. Smaller tracked equipment such as a Morooka crawler-carrier could be used to move imported materials to and from the channel from the primary access road alignment.

The expected width of the temporary constructed accesses in Reach 4 within the riparian buffer would be variable, but is expected to average approximately 12 feet assuming a steel sheeting approach on existing grade is used for the majority of the north section of this reach. Otherwise, a wider access impact footprint would be needed to accommodate the temporary ballast fill. The required length of the primary construction access within Reach 4 is approximately 2,600 feet for the north section access beyond the existing cart path. For the south end golf course improvements access, the total length of temporary access from the GCC parking area over existing maintenance access roads and cart paths is approximately 2,300 feet. In addition, short segments of local access to each work area would be affected.

1.7.2 Clearing and Grubbing

No significant clearing or grubbing is anticipated to be needed within Reach 4 since construction accesses will avoid existing riparian vegetation areas where possible. No stream-side wetland habitats exist in the Reach 4 proposed work area based on wetland field reconnaissance previously conducted by Anchor QEA. Some incidental native and non-native stream bank vegetation removal may be required within the various improvement work areas associated with establishing construction access and excavation to channel subgrade in the roughened channel sections. Along the primary and local work area access routes, replacement of affected golf course turf would likely be required post-construction, immediately after removal of steel sheeting plates and/or temporary ballast fill and geotextile placed for equipment access. Native re-vegetation restoration actions would subsequently occur in selected areas—those riparian areas where golf course playability would not be affected—as mutually agreed to by the City staff and the GCC ownership. Placement of hog

fuel that could be spread along the disturbed channel banks after construction may also be an option to minimize construction disturbance in selected riparian areas in Reach 4.

Further evaluation of the expected type and extent of vegetation clearing required for construction access and installation of proposed stream channel improvements will be completed as part of the Critical Areas Land Use Application review and with final design of improvements.

1.7.3 Installation

Construction of proposed improvements in the south section of Reach 4 will entail limited channel bank excavation, such as sculpting, and upland fill placement local to the stream channel. Temporary sandbagging will be required along the channel fringes in those areas to avoid stream flow interface and potential water quality (turbidity) excursions during construction. Other construction activities in the south section of Reach 4 will include placement of in-channel LWD (rootwads) and streambed substrate materials within existing or expanded pools, and vegetative restoration of selected riparian areas, as mutually agreed to between the City and GCC representatives. All disturbed construction access areas will also require landscape restoration consistent with existing conditions.

In the north improvements section, repetitive construction activities would occur incrementally at each weir or weir pair. The existing weirs are constructed of 1-foot-deep concrete beams that are keyed into the channel banks and that are pinned together vertically. After locally diverting stream flow around each weir/weir pair work area using temporary gravity drainage pipe and sandbag cofferdams, the weirs would be modified by cutting out sections of the upper beam(s) and replacing that section with the modified notch weir section (i.e., notched cedar timber). The downstream weir in the weir pair would be raised using a timber or alternative material member cut to achieve the proper vertical drop across each weir pair (0.5-foot maximum between weir notches), using epoxy anchor bolts to connect it to the existing concrete top beam of each weir. Roughened channel sections would be constructed by keying sloped cobble/boulder mix rock blankets into the channel bed coupled with LWD (i.e., logs with roodwads, rootwads) placements partially buried within it. The roughened channels, LWD, and modified weir elevations will be set to adjust the hydraulic control downstream and between the weirs such that stream flow—with a

range as required for fish passage—conveyed through the project area has adequate depth, suitable velocities, and conforms to maximum jump height criteria for juvenile and adult fish passage. Larger boulders with cobble-boulder overburden may be placed by trackhoe at selected locations within the work areas where added scour protection is needed, such as near the base of existing stream bank rock revetments. At one location in Reach 4 (upstream west bank at weir 11), a short section of failed rockery will be restored with rock toe protection placed to stabilize an eroding streambank at that location.

Use of high lead cable techniques and aerial (helicopter) placement does not appear to be workable in Reach 4 since import of a significant volume of channel substrate rock is needed. In addition, there are a number of homes in close proximity to the stream channel work areas along the west periphery of the channel.

1.7.4 Construction Site Restoration

Restoration of stream corridor areas temporarily impacted by construction will include placement of all specified streambed substrate mix backfill, LWD, and associated instream materials required for channel pool maintenance and stability. In riparian stream buffer areas, erosion protection fabric (i.e., jute netting) would be placed where required on disturbed slope areas. Re-vegetation with native facultative shrubs and upland trees and golf course turf would occur in selected areas where mutual concurrence is achieved between the City and GCC representatives and other affected private property owners. Temporary hog fuel fill, if used, would be spread onto disturbed soils in areas to be re-vegetated. Existing golf course grades and drainage patterns will be re-established. Other non-recyclable ballast fill (i.e., crushed rock) would be hauled to a permitted off-site, upland disposal area.

Site-specific landscape restoration plan, specifications, and a plant schedule will be developed with final design of improvements for all native planting restoration areas. Sports turf will be installed in all other golf course pervious areas disturbed by construction or as agreed to with GCC representatives, and if not currently vegetated, they will be restored consistent with existing conditions. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

1.8 Avoidance and Minimization Measures

Minimization measures and best management practices (BMPs) will be used during project construction to limit impacts to Endangered Species Act-listed (ESA) species.

Minimization measures will include:

- Restricting in-water work to the Washington Department of Fish and Wildlife (WDFW) in-water work window, set for when salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*) are unlikely to be present or would be present in low numbers. The typical U.S. Army Corps of Engineers (Corps) in-water work window extends from July 1 to August 31 but may be expanded by WDFW to extend between mid-June and September 30.
- Defining clearing limits on the restoration design plans with requirements to flag those limits prior to initiation of grading activities. The contract documents will include provisions to confine construction activities to the minimum area necessary to complete the improvements within the flagged clearing limits.
- Staking existing wetlands within or adjacent to the construction areas and protecting those wetlands from access with temporary orange plastic fencing.
- Protecting trees to remain on site with temporary tree protection fencing during construction.
- Preparing a site-specific Temporary Erosion and Sedimentation Control (TESC) plan along with a Stormwater Pollution Prevention Plan (SWPPP) as guidance for contractor activities to protect Kelsey Creek water quality during construction.

Construction phase BMPs will include:

- Installing temporary cofferdams and stream flow gravity bypass piping for instream work areas within Reaches 1 and 4; pumping combined work area incidental run-on, cofferdam leakage, and dewatering water to upland dispersal, treatment as required; and recharging.
- Providing TESC BMPs (i.e., inlet protection, silt fences, vegetative filter strips, and filter bags) outside of the stream corridor to minimize impacts to critical areas and other riparian areas.

- Installing materials that require streambed or low bank excavation would occur only after the affected stream sections have been isolated or at least partially dewatered.
- Reusing any excavated soils or streambed materials on site shortly after excavation or stored temporarily at an approved upland location. Temporary material stockpiles will be covered with plastic sheeting when not in active use and prior to storms to minimize their erosion potential.
- Requiring the contractor to have backup equipment, including pumps and extra TESC materials readily available during storm events.
- Temporarily mulching and sowing any temporarily disturbed or otherwise modified streambanks with grass seed to minimize erosion, or covering the streambanks with a biodegradable erosion control fabric and replanted with native species as designated in the approved planting plan.
- Implementing the approved native planting plan during the first month of frost-free portions of the first dormant season (in October) following completion of grading work.
- Having a designated representative of the City conduct construction observation for the duration of the restoration work. The construction contractor will be required to implement the TESC plan and SWPPP, and will develop and implement a Spill Prevention, Control, and Countermeasures Plan (SPCCP) that maintains compliance with the Washington State water quality standards (WAC 173.201A).

Additional measures include maintaining consistency with:

- Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A Washington Administrative Code (WAC; updated 2006)
- The Western Washington National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit (from the Washington State Department of Ecology [Ecology]; effective February 16, 2007)
- NPDES Construction Stormwater General Permit (from Ecology, effective December 15, 2005)
- Stormwater Management Manual for Western Washington (Ecology 2005)
- General Occupation Health Standards (WAC 276-62)
- All regulatory permit conditions, including the Clean Water Act Section 404 permit,

Washington State Department of Ecology Section 401 Water Quality Certification, and WDFW Hydraulic Project Approval (HPA) to be issued for the project.

1.9 Project Schedule

The City anticipates constructing the Project in a single phase during the summer and fall of 2010. To protect ESA-listed fish species, timing for in-water work in the Project area typically extends annually from July 1 to August 31 during the Corps work window but can be expanded to mid-June through September 30 under WDFW HPA authorization. In-water work is proposed to occur during this expanded work window when streamflows are lowest, and salmonids are unlikely to be present in the Action Area, or present only in low numbers. The City expects construction of Project improvements to take approximately 12 weeks for in-water work activities and 18 weeks total to complete the entire project, including mobilization, all improvements, final stabilization, and landscape restoration. Plantings would ideally be completed in the frost-free portions in October, the first month of the dormant season. The schedule for Project construction activities will be coordinated with GCC representatives for compatibility with summer golf course operations. Construction activities affecting adjacent private property will also be scheduled with those property owners. This schedule is dependent on completion of the Project final design, securing required construction easements from the affected parties, and attainment of required agency environmental permits and approvals.

2 REFERENCES

Washington State Department of Ecology (Ecology). 2005. Stormwater Management Manual for the Western Washington, Water Quality Program, Publication Numbers 05-10-029 through 05-10-033 99-13. February 2005.

CRITICAL AREAS REPORT

KELSEY CREEK STREAM CHANNEL MODIFICATION IMPROVEMENTS PROJECT

Prepared for

City of Bellevue Utilities Department

450 110th Avenue NE

Bellevue, Washington 98009

Prepared by

Anchor QEA, LLC

1423 3rd Avenue, Suite 300

Seattle, Washington 98101

November 2009

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Appendix A Wetland Delineation Sample Plot Data
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LIST OF ACRONYMS AND ABBREVIATIONS

BCC	Bellevue City Code
BE	Biological Evaluation
BFE	Base Flood Elevation
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe
cfs	cubic feet per second
CAO	Critical Areas Ordinance
CAR	Critical Areas Report
City	City of Bellevue Utilities Department
Corps	U.S. Army Corps of Engineers
DPS	Distinct Population Segments
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ELJs	engineered log jams
ESA	Endangered Species Act
ESU	Evolutionary Significant Units
FAC or FAC+	facultative
FACW or FACW+	facultative wetland
GCC	Glendale Country Club
I-405	Interstate 405
LUC	Land Use Code
LWD	large woody debris
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
OBL	obligate wetland
OHWM	ordinary high water mark

PAB	palustrine aquatic bed
PEM	palustrine emergent
PFO	palustrine forest
PHS	Priority Habitat Species
PSS	palustrine scrub-shrub
Project	Kelsey Creek Stream Channel Modification Improvements Project
RCW	Revised Code of Washington
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Stormwater Pollution Prevention Plan
TESC Plan	Temporary Erosion and Sedimentation Control Plan
USFWS	*U.S. Fish and Wildlife Service*
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Resource Inventory Area

1 INTRODUCTION

The City of Bellevue Utilities Department (City) is currently in the process of developing plans for the Kelsey Creek Stream Channel Modification Improvements (Project) located in the City of Bellevue, in King County, Washington, Township 24 North, Range 5 East, Sections 3 and 4 and Township 25 North, Range 5 East, Sections 33 and 34. The purpose of the proposed Project is to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use of Kelsey Creek. The proposed Project will provide benefits to water quality; habitat structure and complexity; conditions for passage, spawning, and rearing of resident and anadromous fish species that currently use the creek; and will have only minor in-channel effects on local floodplain elevations within the proposed improvement areas, but not extending further upstream. Proposed Project elements include modification of portions of existing in-channel structures located in Kelsey Creek; placement of additional large boulders, large woody debris (LWD), and streambed gravels; removal of non-native invasive vegetation from stream banks; and replanting with native riparian species. The project area includes an approximately 2.3-mile-long reach of the mainstem of Kelsey Creek. Current preliminary design plans for the proposed improvements are provided as Figures 1 through 15. Aerial photographs of the project area are included on the various plan view figure bases.

This Critical Areas Report (CAR) is intended to support the proposed Project permitting and land use approvals by providing information regarding the presence of critical areas within the project area and identifying potential impacts to existing critical areas and associated regulated buffers. Critical areas are defined in the Bellevue City Code (BCC) Critical Areas Ordinance (CAO), contained in Chapter 20.25H of its Land Use Code (LUC; City of Bellevue 2009). Per Chapter 20.25H.250 of the LUC, this CAR identifies and classifies all critical areas and applicable critical area buffers present in the project area. Coordination with the City identified the following five types of critical areas within the project area: Habitat Associated with Species of Local Importance (LUC 20.25H.150), Wetlands (LUC 20.25H.095), Shorelines (LUC 20.25E.017), Streams (LUC 20.25H.075), and Areas of Special Flood Hazard (LUC 20.25H.075). No Geologic Hazard Areas (LUC 20.25H.120) have been identified within the project area.

Anchor QEA, LLC. (Anchor QEA) ecologists conducted a review of the Critical Areas chapter of the LUC , gathered and reviewed existing information, and visited the project area in April, May, and October 2007; October 2008; and October 2009 to identify and assess existing critical areas. In addition to this CAR, several documents associated with the proposed Project have been prepared that address and describe critical areas within the project area. Information from these companion documents are summarized and/or included by reference in this CAR. The companion documents include:

- *Kelsey Creek Stream Channel Modification Improvement Project Biological Evaluation* (Anchor 2008a)
- *Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations Kelsey Creek Fish Passage and Habitat Restoration Project* (Anchor 2008b)
- *Kelsey Creek Stream Channel Modification Improvement Project Wetland Delineation* (Anchor QEA 2009a)
- *Kelsey Creek Stream Channel Modification Improvement Project Stream Type Memorandum* (Anchor QEA 2009b)

This CAR is organized as follows:

- Introduction (Section 1)
- Project Description (Section 2)
- Project Area Description (Section 3)
- Habitat Associated with Species of Local Importance (Section 4)
- Wetland Study (Section 5)
- Shorelines, Streams, and Areas of Special Flood Hazard (Section 6)
- Critical Areas Impacts Assessment (Section 7)
- Avoidance, Minimization, and Mitigation Measures (Section 8)
- Project Compliance with City Code Performance Standards (Section 9)
- References (Section 10)
- Figures

- Wetland Delineation Sample Plot Data (Appendix A)
- Ecology Wetland Rating Forms (Appendix B)

1.1 Ecology Wetland Rating Forms Review of Existing Information

In order to identify and assess critical areas in the project area, Anchor QEA ecologists reviewed the following sources of information to support field observations:

- Bellevue City Code (City of Bellevue 2009)
- *Natural Resource Conservation Service (NRCS) Soil Series Mapping* (USDA 2009)
- *Hydric Soil List for King County, Washington* (USDA 2001)
- *Soil Survey of King County, Washington* (USDA 1973)
- *U.S. Fish and Wildlife Service (USFWS) Wetlands Mapper for National Wetlands Inventory (NWI) Map Information* (USFWS 2009)
- *Washington Department of Fish and Wildlife (WDFW) Priority Habitat Species (PHS) maps* (WDFW 2007)
- *WDFW Management recommendations for Washington's priority species, Volume III: Amphibians and Reptiles* (Larsen 1997)
- *WDFW Management recommendations for Washington's priority species, Volume IV: Bird* (Larsen et. al. 2005)
- Aerial photographs

2 PROJECT DESCRIPTION

The purpose of the proposed Project is to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use of Kelsey Creek within the City. The proposed Project will provide benefits to water quality; habitat structure and complexity; conditions for passage, spawning, and rearing of resident and anadromous fish species that currently use the creek; and will improve or have only localized in-channel effects on floodplain elevations in the project area. Proposed Project elements include modification of portions of existing in-channel structures located in Kelsey Creek; placement of additional large boulders, LWD, and streambed gravels; removal of non-native invasive vegetation from stream banks; and replanting with native riparian species. Current preliminary design plans for the proposed Project are provided in Figures 1 through 15. Aerial photographs of the project area are included on the various plan view figure bases.

Kelsey Creek is a highly productive salmon stream system. The City's primary goals and objectives of the proposed Project are to:

- Improve fish passage where limitations to adult and juvenile salmonid mobility and upstream migration currently exist
- Enhance fish and wildlife habitat features within the Kelsey Creek channel and riparian corridor in the upstream-most portions of the project area

Secondary objectives of the proposed Project include:

- Maintaining reasonably stable and sustainable channel morphology and sediment transport without excessive scour or deposition
- Improving or causing no adverse affect on the floodplain in the affected Project reaches
- Enhancing Kelsey Creek Park and Farm reach stream and wetland habitats through LWD placement and invasive species control (vegetation management in these reaches is a separate initiative being handled by the City)
- Maintaining consistency of recommended improvements with the Kelsey Creek Park Master Plan

2.1 Project Stream Reaches and Proposed Improvements

For restoration planning and preliminary design, an approximately 2.3-mile reach of the mainstem of Kelsey Creek is included in the project area. The project area has been divided into the following four reaches, beginning with the downstream reach located near the Burlington Northern Santa Fe (BNSF) Railroad Wilburton Trestle, just upstream of Interstate 405 (I-405) and the upstream reach located just south of the culvert beneath NE 8th Street at the north end of the Glendale Country Club (GCC) golf course:

- Reach 1 (SE 8th Street Reach) – Lower gradient reach between the BNSF Railroad Wilburton Trestle and the Lake Hills Connector roadway crossing
- Reach 2 (Park Reach) – Lower gradient reach between the Lake Hills Connector roadway crossing and the east limit of Kelsey Creek Park
- Reach 3 (Farm Reach) – Lower to intermediate gradient reach between the west limit of Kelsey Creek Farm and the south boundary of the GCC golf course
- Reach 4 (GCC Reach) – Intermediate gradient reach through the GCC golf course, extending to its north limit at NE 8th Street, but not including that crossing

The reaches have distinct physical characteristics and associated restoration and enhancement needs. Therefore, a variety of restoration and enhancement strategies has been considered in formulating improvement recommendations. Under the current design plan, proposed areas of work are located within Reaches 1, 3, and 4. While no construction activities are proposed within Reach 2, critical areas within Reach 2 have been identified as part of the analysis of the proposed Project.

2.1.1 Reach 1

The stream modification improvements proposed within Reach 1 include:

- Removal of the existing angular rock immediately downstream from the box culvert, addition of buried hydraulic control logs at the culvert outlet, and placement of a section of roughened channel backfill (cobble/boulder mix) to create a stable, fish-passable riffle at the downstream approach to the culvert

- Placement of LWD (approximately 7 pieces total: logs with rootwads) in the cobble/boulder backfill, anchored and partially buried for increased roughness and habitat complexity.

2.1.2 Reach 2

The City has previously undertaken some habitat restoration and enhancement activities in Reach 2 to maintain fish passage and improve habitat quality. These have included actions to maintain adequate channel depths for fish passage at low flows, and placement of LWD in upland areas. The City has also attempted localized control of reed canarygrass (*Phalaris arundinacea*) in Reach 2 through selected area native plantings of emergent and primary forest species (using various techniques). Those past and ongoing restoration/enhancement activities have been focused on maintaining the active channel for fish passage given the current hydrologic regime, controlling reed canarygrass invasive plant spread, and establishing primary forest species. The vegetative management program is being managed by City staff as an experimental program; future planned actions to address those identified needs are not part of the proposed Project.

2.1.3 Reach 3

Proposed restoration and enhancement strategies in Reach 3 are focused on adding LWD to promote creation and maintenance of pool habitats along with increased habitat complexity. LWD placements would include a total of approximately 13 pieces (logs with rootwads, rootwads, fallen trees) and 2 engineered log jams (ELJs), a collection of multiple LWD pieces with small woody debris racking material) are proposed at eight locations along the stream channel banks. Two beaver dams were documented in the lower section of Reach 3 in October 2008. While the dams do not appear to be full barriers to fish passage, they may partially limit fish passage from Reach 2 to Reach 3. No response actions have been identified by the City for their removal at this time. Future options beyond the proposed Project may include controlled breaching of the dams with possible beaver deceiver installations to discourage continued beaver dam building activities at those locations (although under this approach, beaver relocation to other sections of the creek could result).

More extensive actions are not proposed in Reach 3 because of the evolving natural succession processes, limited stream corridor access, and potential disturbance to the riparian corridor and stream channel that would be associated with more invasive improvement actions. The City plans to independently develop and implement solutions for removal of undesirable invasive vegetation such as Japanese knotweed (*Polygonum cuspidatum*) and Himalayan blackberry (*Rubus armeniacus*). Those vegetative management program actions are not part of the proposed Project.

2.1.4 Reach 4

Restoration and enhancement activities proposed in Reach 4 are focused on improving fish passage at the concrete weirs, installation of a section of roughened channel downstream from the lower weir in each weir pair in order to eliminate the weir excessive jump heights, placement of in-stream LWD to increase hydraulic roughness and habitat complexity, and expansion of riparian corridor vegetation and stream canopy cover using native species where possible, without affecting GCC golf course playability. More specifically, the stream modification improvements proposed within Reach 4 include:

- Placement of LWD (approximately 16 pieces total: logs with rootwads, and rootwads anchored and partially buried) in existing pools and in sculpted channel and bank areas with new pools, located within the downstream-most 800 feet of Reach 4; benefits include improved pool habitat complexity and cover, pool scour maintenance, and increased in-stream hydraulic roughness
- Modification of the existing concrete weirs (17 total; one single weir and eight weir pairs), including raising the downstream weir crest elevations to achieve a maximum of 0.5 foot of weir crests elevation difference with the upper weir (to reduce jump height), and modification of weir notch geometries for improved juvenile fish passage across the weirs
- Creating roughened channel sections through placement of cobble/boulder mix and anchored and partially buried LWD (approximately 46 pieces total: logs with rootwads, and rootwads anchored and partially buried) in the downstream weir pair tailout areas and at the single weir

- Placement of supplemental channel bank toe rock (covered with cobble/boulder mix) at selected locations and replacement of a short section of existing failed rockery where existing channel and bank erosion has the potential to destabilize existing rock revetments
- Re-vegetation of selected channel banks and riparian buffer areas local to the stream channel where not in conflict with the playability of the GCC golf course

Because Reach 4 is located on private properties, restoration and enhancement opportunities will require the concurrence and cooperation of the GCC golf course and various adjacent, affected property owners. Coordination on behalf of the proposed Project will include the need for temporary construction easements for access through and improvements to be made on those properties.

2.2 Key Benefits of Proposed Project

Implementation of these proposed restoration and enhancement actions along the collective Project reaches will improve salmonid passage and habitat by:

- Facilitating anadromous salmonid passage to upstream reaches, juvenile rearing, and adult spawning
- Creating more extensive in-stream habitat features, structure and complexity
- Providing improved functional interaction between channel and riparian corridor habitats
- Creating better isolation of selected stream channel segments
- Achieving incremental protection/improvement in in-stream water quality

Besides salmonids, these actions would also benefit other fish and wildlife in the project area, as appropriate substrates, riparian vegetation, and increased habitat connectivity would promote more diverse use of the stream corridor by other species.

3 PROJECT AREA DESCRIPTION

As described in Section 2, the project area includes an approximately 2.3-mile reach of Kelsey Creek, located in Bellevue, King County, Washington (Township 24 North, Range 5 East, Sections 3 and 4 and Township 25 North, Range 5 East, Sections 33 and 34). The downstream portion of the project area is located near the BNSF Railroad Wilburton Trestle, just upstream of Interstate 405 (I-405) and the upstream reach is located just south of the culvert beneath NE 8th Street at the north end of the GCC golf course. Within the project area, Kelsey Creek flows through the GCC golf course, which is adjacent to residential properties, and through Kelsey Creek Park, Kelsey Creek Farm, undeveloped property, and beneath Lake Hills Connector Road and 121st Avenue SE. The project area has been divided into four stream reaches, which are defined in Section 2.

3.1 Topography

The topography of the project area is relatively level with higher elevations located at its upstream (north) end and lower elevations at its downstream (west) end. From the upstream most portion of Reach 4 near NE 8th Street, there is a moderately gentle slope that decreases in elevation as the creek flows through the GCC golf course and the park. A topographic map of the project area is provided as Figure 16.

3.2 Soils

The *NRCS Web Soil Survey* (USDA 2009) identifies six soil series in the project area:

- Alderwood gravelly sandy loam 6 to 15 percent slopes (AgC)
- Bellingham silt loam (Bh)
- Everett gravelly sandy loam 0 to 5 percent slopes (EvB)
- Everett gravelly sandy loam 5 to 15 percent slopes (EvC)
- Everett-Alderwood gravelly sandy loam 6 to 15 percent slopes (EwC)
- Norma sandy loam (No)

The Bellingham silt loam and Everett-Alderwood gravelly sandy loam soils are the primary constituent within the project area. According to the *Hydric Soil List for King County,*

Washington, Bellingham silt loam and Norma sandy loam soils series are classified as hydric soils, while Alderwood gravelly sandy loam, Everett gravelly sandy loam, and Everett-Alderwood soil series are not classified as hydric soils (USDA 2001). A soil map of the project area is provided as Figure 17.

3.3 Hydrology

The project area is located in the Cedar-Sammamish Basin Water Resource Inventory Area (WRIA) 8 (Ecology 2009). Hydrologic characteristics in the project area are influenced by regional groundwater, direct precipitation, surface water runoff, and Kelsey Creek. The ordinary high water mark (OHWM) of Kelsey Creek was identified in the proposed Project's areas of work as part of the investigation. Kelsey Creek is identified by the City of Bellevue as a Type F Stream (City of Bellevue 2009). Kelsey Creek is further described in Section 6 of this CAR and in the *Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations Kelsey Creek Fish Passage and Habitat Restoration Project* (Anchor 2008b) and the *Kelsey Creek Stream Channel Modification Improvement Project Stream Type Memorandum* (Anchor QEA 2009b).

3.4 Plant Communities

The *USFWS Wetlands Mapper for NWI Map Information* identifies the Reach 3 portion of Kelsey Creek as flowing within palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forest (PFO) wetland systems. The NWI maps also identify a palustrine aquatic bed (PAB) wetland within the GCC golf course (USFWS 2009). WDFW PHS maps identify wetland habitat in the same area as the NWI maps (WDFW 2007). Vegetation within the project area includes a variety of tree, shrub, grass, and herbaceous species associated with upland, wetland, and riparian habitat along Kelsey Creek. A complete description of vegetation in the project area is described in Section 4. Wetland habitat in the project area is described in Section 5 and the *Kelsey Creek Stream Channel Modification Improvement Project Wetland Delineation* (Anchor QEA 2009a). The USFWS NWI map of the project area is provided as Figure 18.

4 HABITAT ASSOCIATED WITH SPECIES OF LOCAL IMPORTANCE (LUC 20.25H.150) AND HABITAT ASSESSMENT (LUC 20.25H.165)

This section was prepared based on the criteria identified in LUC 20.25H.150 (City of Bellevue 2009). This section also includes a Habitat Assessment LUC 20.25H.165, per critical areas reporting requirements of LUC 20.25H.230. Species of local importance are recognized populations of native species that are at risk of being lost from the City. The habitat assessment is an investigation of the site to evaluate the potential presence or absence of designated species of local importance or habitat for species of local importance. Information in the habitat assessment includes a description of vegetation communities and habitat conditions in the project area, the identification of species of local importance that occur or could potentially occur in the project area, and whether site conditions meet the needs of any species of local importance. Also included in the assessment is an analysis of federally-listed species protected under the Endangered Species Act (ESA) that may occur in the project area.

4.1 Methods

To document and describe habitat characteristics within the project area, Anchor QEA ecologists reviewed existing information (as described in Section 1.1), performed an aerial photograph assessment, and conducted site visits in April, May, and October 2007; October 2008; and October 2009. During the site visits, Anchor QEA ecologists documented general information regarding habitats and dominant plant species and communities while walking through the project area. The entire project area was accessible during the investigation. All wildlife species, tracks, and other signs observed during the site visits were documented. All observations were qualitative; no quantitative wildlife surveys were performed.

4.2 Results

4.2.1 Vegetation Communities

Because the project area includes habitat within and adjacent to Kelsey Creek, vegetation communities within the project area include upland and wetland habitats associated with the riparian habitat of the creek. Wetland habitat in the project area is described in Section 5.

Vegetation communities within Reach 1 are dominated by a forested canopy of red alder (*Alnus rubrus*) and big-leaf maple (*Acer macrophyllum*) with a shrub understory of vine maple (*Acer circinatum*) and Himalayan blackberry. The vegetation forms a relatively dense canopy of overhanging vegetation over both banks of the creek. Stinging nettle (*Urtica dioica*) is a dominant emergent plant with patches of the nonnative invasive plant reed canarygrass observed occasionally along both banks of the creek. No wetland conditions were documented within Reach 1 (see Section 5).

Reaches 2 and 3 contain similar vegetation communities associated with a large wetland system located within Kelsey Creek Park and Kelsey Creek Farm. Reach 2 is located entirely within wetland habitat. The majority of Reach 2 is dominated by reed canarygrass along both banks of the creek with patches of Douglas spirea (*Spiraea douglasii*), red-osier dogwood (*Cornus sericea*) and cattail (*Typha latifolia*) occasionally occurring. Beyond the banks, tree saplings have been planted at wide spacing as part of prior riparian corridor restoration efforts. Moving upstream toward Reach 3, more shrub and herbaceous species are present, such as bittersweet nightshade (*Solanum dulcamara*) and lady fern (*Athyrium filix-femina*). Dense tree and shrub vegetation is located north and south of the creek in this reach.

Dominant vegetation in Reach 3 includes a forested canopy with patches of red alder and Pacific willow (*Salix lasiandra*) with Scouler willow (*Salix scouleriana*) occasionally occurring. The shrub community is very dense, and is dominated by the nonnative invasive species Himalayan blackberry and Japanese knotweed (*Polygonum cuspidatum*) that form a nearly impenetrable barrier between the creek and the trail paralleling it to the west along Kelsey Farm. Small clusters of salmonberry (*Rubus spectabilis*) were also observed. Dominant emergent species include lady fern and stinging nettle. In the southern portion of Reach 3, wetland habitat is located along both banks of the creek. Moving upstream to the north, the left (east) bank of the creek includes wetland habitat while the right (west) bank, adjacent to Kelsey Farm, is dominated by upland habitat.

Vegetation communities within Reach 4 include isolated patches of forested canopy consisting primarily of red alder, willow (*Salix* spp.), and Douglas-fir (*Pseudotsuga menziesii*) on both sides of the channel through most of the length of the GCC golf course. Dominant

vegetation in Reach 4 also included patches of the nonnative invasive species Japanese knotweed and Himalayan blackberry. The southern half of Reach 4 is primarily devoid of tree or shrub habitat, consisting of mowed grass habitat consistent with the surrounding GCC golf course use. Table 1 includes a list of all vegetation species observed in each reach of the project area.

Table 1
Summary of Project Area Vegetation Species

Scientific Name	Common Name	Indicator Status	Reach 1	Reach 2	Reach 3	Reach 4
Trees						
Acer macrophylum	Big-leaf maple	FACU	x			x
Alnus rubra	Red alder	FAC	x	x	x	x
Crataegus douglasii	Black hawthorn	FAC	x			
Physocarpus capitatus	Pacific ninebark	FACW-				x
Picea sitchensis	Sitka spruce	FAC		x	x	
Populus trichocarpa	Black cottonwood	FAC	x	x	x	
Pseudotsuga menziesii	Douglas fir	FACU				x
Salix hookeriana	Hooker's willow	FACW-		x	x	
Salix lasiandra	Pacific willow	FACW+		x	x	x
Salix scouleriana	Scouler willow	FAC		x	x	
Thuja plicata	Western red cedar	FAC	x	x	x	x
Shrubs						
Acer circinatum	Vine maple	FAC-	x			
Cornus sericea	Red-osier dogwood	FACW		x	x	x
Corylus cornuta	Beaked hazelnut	FACU		x	x	
Gaultheria shallon	Salal	FACU				x
Oemleria cerasiformis	Indian plum	FAC-	x	x	x	x
Polygonum cuspidatum	Japanese knotweed	FACU		x	x	x
Rhamnus purshiana	Cascara	FACU		x	x	x
Rosa nutkana	Nootka rose	UPL	x			
Rubus armeniacus	Himalayan blackberry	FACU	x	x	x	x
Rubus parviflorus	Western thimbleberry	FACU	x			x
Rubus spectabilis	Salmonberry	FAC+		x	x	x
Rubus ursinus	Trailing blackberry	FAC-	x			
Sambucus racemosa	Red elderberry	FACU	x	x	x	

Scientific Name	Common Name	Indicator Status	Reach 1	Reach 2	Reach 3	Reach 4
Solanum dulcamara	Bittersweet nightshade	FAC+	x	x	x	x
Spiraea douglasii	Spirea	FACW		x	x	
Symphoricarpos albus	Snowberry	FACU	x	x	x	x
Ferns and Herbaceous						
Athyrium filix-femina	Lady fern	FAC+	x	x	x	x
Carex obnupta	Slough sedge	OBL		x	x	x
Cirsium arvense	Canadian thistle	FACU+	x			x
Deschampsia cespitosa	Tufted hairgrass					x
Epilobium watsonii	Watson's willow-herb	FACU-	x	x	x	x
Equisetum arvense	Field horsetail	FAC				
Equisetum hyemale	Scouring-rush	FACW	x	x	x	
Festuca arundinacea	Tall fescue	FAC-				x
Galium trifidum	Small bedstraw	FACW+	x	x	x	x
Geranium robertianum	Stinky bob	UPL				x
Hedera hibernica	English ivy	UPL				x
Iris pseudoacorus	Yellow-flag iris	FACW		x	x	
Juncus effusus	Soft rush	FACW	x			
Lotus corniculatus	Birds-foot trefoil	FAC			x	x
Lysichiton americanus	Skunk cabbage	OBL		x	x	
Oenanthe sarmentosa	Water-parsley	OBL		x	x	
Phalaris arundinacea	Reed canarygrass	FACW	x	x	x	x
Plantago lanceolata	English plantain	FAC				x
Polystichum munitum	Sword fern	FACU	x			x
Ranunculus repens	Creeping buttercup	FACW	x	x	x	x
Rumex crispus	Curly dock	FAC+				x
Taraxacum officinale	Common dandelion	FACU				x
Tolmiea menziesii	Piggyback plant	FAC	x	x	x	
Typha latifolia	Cattail	OBL		x	x	
Urtica dioica	Stinging nettle	FAC+	x	x	x	x
Vicia americana	American vetch	FAC		x	x	

Notes:

OBL	Obligate wetland
FACW or FACW+	Facultative wetland
FAC or FAC+	Facultative

4.2.2 Fish and Wildlife Habitat Assessment

Wildlife relies on vegetation for food, shelter, and cover from predators. Wildlife diversity is generally related to the structure and composition of plant species within vegetative communities. In general, vegetation communities that contain few species or vegetative layers (herbaceous, shrubs, or trees) support a low diversity of wildlife, whereas vegetation communities that are more complex and contain a wide variety of plant species and vegetative layers can support a greater diversity of wildlife. Forested and riparian areas with well developed shrub layers are likely to support the greatest number of species and populations of wildlife (Brown 1985).

Although a comprehensive wildlife survey has not been conducted within the project area, the mosaic of vegetation communities within the project area likely provides habitat for a variety of terrestrial and aquatic wildlife species common to King County and western Washington. The area provides native and nonnative bird, amphibian, reptile, insect, and mammal populations with diverse habitat in which to breed, forage, and rest. Wildlife habitats in the project area range in quality from low in the GCC golf course with mowed lawns to high in the forested and wetland habitats. Forest habitat in the project area provides habitat for a variety of wildlife species because of its vegetative diversity and the availability of forage and nest sites. Snags and downed trees provide potential habitat for perch sites and nesting areas for raptors and cavity-nesting birds.

Historically, there was significant spawning in Kelsey Creek by Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*), and sockeye salmon (*Onchorhynchus nerka*), as well as migratory cutthroat trout (*Oncorhynchus clarki clarki*; Jones and Stokes 2006). Currently, Chinook salmon are known to occur in and spawn in the mainstem of Kelsey Creek (Paulsen, personal communication 2007) and have been sighted as far upstream as the headwaters of the creek upstream of Larson Lake (Kerwin 2001).

Chinook returns to the Kelsey Creek mainstem have been variable in recent years. The Watershed Company conducted extensive spawner surveys in Kelsey Creek from 2000 to 2006. Survey results indicated the total Chinook run was between 0 and 15 fish from 2000 to 2005, but showed unusually large numbers of returns (200 Chinook) in 2006 (TWC 2007a). Of the more than 200 Chinook adults observed, greater than 80 percent were determined to

be hatchery-origin fish (TWC 2007a). Observations by volunteers of adult Chinook in Kelsey Creek provided the following data: from 1988 to 1989, returns averaged 114 Chinook per year; when counting was resumed from 1996 to 1998, returns averaged 38 Chinook per year; and from 1999 to 2006, returns averaged 19 Chinook per year (King County 1998 to 2006). WDFW spawner surveys indicated that the Chinook return was 228 in 1999 but only 23 Chinook in 2000 (Kerwin 2001).

Coho are known to inhabit areas of Chinook distribution, and spawning Chinook and sockeye have been reported in the creek in recent spawner surveys conducted for the City of Bellevue (TWC 2007b). Coho have also been observed in the creek in prior spawner surveys (Jones and Stokes 2006). Juvenile coho from the Issaquah Hatchery are released throughout the Kelsey Creek basin (Kerwin 2001). Sockeye salmon are known to spawn up to river mile 5.0 in Kelsey Creek (Kerwin 2001) and have been observed in the creek in recent years (Paulsen 2007).

Jones and Stokes (2006) indicates that eight non-anadromous fish species have been observed in the Kelsey Creek basin: cutthroat, coho, rainbow trout (*Oncorhynchus mykiss*), sculpins (*Cottus* spp.), lamprey (*Lampetra* spp.), dace (*Rhinichthys* spp.), sucker (*Catostomus* spp.), and bluegill (*Lepomis macrochirus*). Coho have been characterized as fairly ubiquitous, but few, and cutthroat have been abundant (Kerwin 2001).

4.2.3 Species of Local Importance

The City recognizes 23 species of local importance (LUC 20.25H.150; City of Bellevue 2009). As part of the analysis of species of local importance, Anchor QEA reviewed information from the WDFW PHS database on state priority species and habitats that may occur in or near the project area (WDFW 2007). Species of local importance that could occur within the project area were identified based on observations during the site visits, the WDFW PHS data, the presence of potential suitable habitat for priority species within the project area, and WDFW management recommendations for priority species (Larsen 1997, Larsen et. al. 2004, WDFW 2007).

No species of local importance were observed within the project area during the April, May, and October 2007; October 2008; and October 2009 site visits. The WDFW PHS database identifies the documented presence of two species of local importance within the project area: Chinook salmon and coho salmon. WDFW PHS maps do not document any other species of local importance within 0.5 miles of the project area (WDFW 2007). Species of local importance documented more than 0.5 mile from the project area include: great blue heron (*Ardea herodias*) colonies, osprey (*Pandion haliaetus*) nests, and bald eagle (*Haliaeetus leucocephalus*) nests located on the west side of I-5. WDFW priority habitats within the project area include priority riparian habitat associated with Kelsey Creek in Reaches 1, 2, and 3 and priority urban natural open space on the left (east) bank of Kelsey Creek in Reaches 2 and 3.

Table 2 identifies the 23 species of local importance by group (amphibians, birds, mammals, etc.), the presence or absence of potential suitable habitat within the project area, and the state and federal status of each species (LUC 20.25H.150; City of Bellevue 2009).

Table 2
Summary of City of Bellevue Designated Species of Local Importance Potential Presence within the Project Area

Common Name (Scientific Name)	Suitable Habitat	Potential Suitable Habitat Present Within Project Area	State Status	Federal Status
Amphibians				
Oregon spotted frog (*Rana pretiosa*)	Ponds and lakes with dense emergent vegetation	No	Endangered	Candidate
Western toad (*Bufo boreas*)	Still water in ponds and small lakes	No	Candidate	Species of concern
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	Mature trees near water and prey sources	Yes	Sensitive	Species of concern
Common loon (*Gavia immer*)	Marine and large lakes and rivers	No	Sensitive	None
Great blue heron (*Ardea herodias*)	Fresh and salt-water wetlands, rivers	Yes	Priority	Monitor

Common Name (Scientific Name)	Suitable Habitat	Potential Suitable Habitat Present Within Project Area	State Status	Federal Status
Green heron (*Butorides striatus*)	Fresh water wetlands with forested habitat	Yes	None	None
Merlin (*Falco columbarius*)	Prairies and conifer forests	No	Candidate	None
Osprey (*Pandion haliaetus*)	Marine coasts, lakes, and rivers	No	None	None
Peregrine falcon (*Falco peregrinus*)	Cliffs and vegetated slopes	No	Sensitive	Species of concern
Pileated woodpecker (*Dryocopus pileatus*)	Forest with snags and downed wood	Yes	Candidate	None
Purple martin (*Progne subis*)	Large dead trees or artificial nesting structures near wetlands, ponds, or marine systems	Yes	Candidate	None
Red-tailed hawk (*Buteo jamaicensis*)	Open habitat near forests	Yes	None	None
Vaux's swift (*Chaetura vauxi*)	Old growth forest	No	Candidate	None
Western Grebe (*Aechmophorus occidentalis*)	Large lakes	No	Candidate	None
Fish/Salmon				
Bull trout (*Salvelinus confluentus*)	Marine, rivers, and streams	Yes	Candidate	Threatened
Chinook salmon (*Oncorhynchus tshawytscha*)	Marine, rivers, and streams	Yes	Candidate	Threatened
Coho salmon (*Oncorhynchus kisutch*)	Marine, rivers, and streams	Yes	Candidate	Species of concern
River lamprey (*Lampetra ayresi*)	Rivers and streams	Yes	None	Species of concern
Mammals				
Keen's myotis (*Myotis keenii*)	Mature coniferous forest	No	Candidate	None
Long-eared myotis (*Myotis evotis*)	Mature coniferous forest	No	Monitored	None
Long-legged myotis (*Myotis volans*)	Mature coniferous forest	No	Monitored	None

Common Name (Scientific Name)	Suitable Habitat	Potential Suitable Habitat Present Within Project Area	State Status	Federal Status
Western big-eared bat (*Plecotus townsedii*)	Mature coniferous forest	No	None	None
Reptiles				
Western pond turtle (*Clemmys marmorata*)	Ponds, sloughs, small lakes	No	Endangered	Species of concern

Notes::
Sources: City of Bellevue 2009, WDFW 2007, Larsen et. al. 1995, Larsen 1997, and Larsen et. al. 2004

Of the 23 species identified on the City's species of local importance list, potential suitable habitat for the following 10 species is present within the project area:

- Six bird species: bald eagle, great blue heron, green heron, pileated woodpecker, purple martin, and red-tailed hawk
- Four fish species: bull trout, Chinook salmon, coho salmon, and river lamprey

The large wetland system that encompasses Reaches 2 and 3 provides potential perching and foraging habitat for the six bird species. Habitat in Reaches 1 and 4 are less likely to support these birds due to the constricted nature of the creek within developed areas. Large or mature trees that could be used by the bird species are generally located away from the banks of Kelsey Creek and no mature trees are located in the proposed work areas.

Chinook salmon and coho salmon have been documented as occurring in Kelsey Creek. As described in Section 4.2.2., lamprey species have also been observed in the creek. For the proposed Project's ESA analysis, potential bull trout use of Kelsey Creek was assumed (Anchor 2008a).

4.2.4 Federally Protected Species and Critical Habitats

A Biological Evaluation (BE) was prepared for the proposed Project to evaluate the potential effects on ESA-listed species and critical habitat in compliance with Section 7(a)(2) and Section 3(5)(A) of the ESA (Anchor 2008a). Information from the BE is summarized in this CAR. Table 3 presents the federally-listed species identified in the BE as potentially occurring in the project area. ESA-listed species under National Marine Fisheries Service

(NMFS) and USFWS jurisdiction are identified based on the geographic boundaries of Distinct Population Segments (DPSs) and Evolutionary Significant Units (ESUs). The table also identifies whether critical habitat has been designated by NMFS or USFWS for those species within the vicinity of the project area.

Table 3
ESA-Listed Species and Critical Habitats That May Occur in the Project Area

Common Name (Scientific Name)	Jurisdiction	ESA Status	Critical Habitat
Bull trout (*Salvelinus confluentus*) Coastal-Puget Sound DPS	USFWS	Threatened	Designated; Project area outside Critical Habitat boundary
Chinook salmon (*Oncorhynchus tshawytscha*) Puget Sound ESU	NMFS	Threatened	Designated; Lake Washington tributaries excluded
Steelhead (*O. mykiss*) Puget Sound ESU	USFWS	Threatened	Not Designated

Notes:
Source: Anchor 2008a

As shown in Table 3, the BE prepared for the proposed Project did not identify the potential presence of terrestrial species in the vicinity of the project area; fish species were the only federally listed species identified with documented presence in or potential to use Kelsey Creek. The ESA analysis in the BE concluded that the proposed Project will result in temporary adverse impacts to fish and salmon. However, these impacts are minimized via Project timing and other avoidance and minimization measures. The net effect of the proposed Project will be improved access to better-quality habitat. As a result, the BE analysis determined that the proposed Project may affect, but is not likely to adversely affect, bull trout, Puget Sound Chinook salmon, or Puget Sound steelhead. Kelsey Creek is excluded from the bull trout, Chinook salmon, and steelhead critical habitat designation (Anchor 2008a).

The BE also performed an analysis for Essential Fish Habitat (EFH) consultation with NMFS, in compliance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The BE analysis concluded that the overall effect of the proposed Project is expected to be a net benefit to EFH because it will improve fish passage and

riparian vegetation conditions, and will improve habitat complexity and large woody debris cover. As a result, the proposed Project will not adversely affect EFH for salmonid species (Anchor 2008a). The effect determination results of the BE are presented in Table 4.

Table 4
ESA-Listed Species and Critical Habitats BE Effects Determination

Common Name (Scientific Name)	Jurisdiction	ESA Status	Species Effect Determination	Critical Habitat	Critical Habitat Effect Determination
Bull trout (*Salvelinus confluentus*) Coastal-Puget Sound DPS	USFWS	Threatened	Not likely to adversely affect	Designated; Project area outside Critical Habitat boundary	Not applicable
Chinook salmon (*Oncorhynchus tshawytscha*) Puget Sound ESU	NMFS	Threatened	Not likely to adversely affect	Designated; Lake Washington tributaries excluded	Not applicable
Steelhead (*O. mykiss*) Puget Sound ESU	USFWS	Threatened	Not likely to adversely affect	Not Designated	Not applicable

Notes:
Source: Anchor 2008a

5 WETLAND STUDY (LUC 20.25H.095)

The wetland study was performed based on the criteria identified in LUC 20.25H.095 (City of Bellevue 2009). In October 2008, Anchor QEA ecologists performed a wetland delineation of proposed work areas that could be affected by the proposed Project. Wetland habitat outside the proposed Project's areas of work areas was not delineated as part of the investigation. As described in Section 2, the proposed work areas are within Reaches 1, 3, and 4; therefore, the wetland delineation did not include Reach 2. In October 2009, Anchor QEA ecologists visited the site to perform a wetland rating and functional analysis of wetland habitat delineated within the project area. Because wetland habitat in the project area is part of a large wetland system, the wetland rating and functional analysis included wetland habitat outside of the proposed Project's areas of work. The results of the wetland study are presented in the *Kelsey Creek Stream Channel Modification Improvement Project Wetland Delineation Memorandum* (Anchor QEA 2009a). Information from that document is summarized in this CAR.

5.1 Methods

Anchor QEA ecologists visited the site on October 22 and 30, 2008 to perform the wetland delineation. Soils, hydrology, and vegetation characteristics were examined throughout the proposed Project's areas of work to identify wetland conditions according to the methods defined in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Interim Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual* (Corps 2008), and the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997).

Anchor QEA ecologists examined the soils at proposed work areas for hydric indicators and layers, visually and texturally estimated its organic content, and determined its color using a Munsell soil color chart (Munsell Color 1994). Anchor QEA ecologists assessed hydrology by observing levels of inundation or saturation. They also identified and characterized vegetation communities, estimated the percent cover for each plant species, and determined dominant species. Trees within a 30-foot radius, shrubs within a 15-foot radius, and emergents within a 3-foot radius were identified and recorded. A plant indicator status, designated by the U.S. Fish and Wildlife Service (USFWS; Reed 1988 and 1993), was assigned

to each species and a determination was made as to whether the vegetation in the plot was hydrophytic. To meet the hydrophytic parameter, more than 50 percent of the dominant species (20 percent or greater cover) must have an indicator of obligate wetland (OBL), facultative wetland (FACW or FACW+), or facultative (FAC or FAC+).

In October 2009, Anchor QEA ecologists performed a wetland rating and functional analysis of wetland habitat delineated within the project area. Wetland ratings were determined using the most current version of the Washington State Department of Ecology (Ecology) guidance in *Washington State Wetland Rating System – Western Washington: Revised* (Ecology 2004) and *Wetland Rating Form – Western Washington, Version 2* (Ecology 2008a), and according to City wetland rating criteria, as defined in the BCC CAO (City of Bellevue 2009).

5.2 Wetland Study Results

This section describes the results of the wetland delineations. The wetland delineation did not include Reach 2; however, because wetland habitat in the project area is part of a large wetlands system, the wetland rating and functional analysis in Section 5.3 includes wetland habitat within all four reaches. Vegetation communities within the project area are described in Section 4 and are not repeated in this section. A complete list of all plant species observed in each reach of the project area is provided in Table 1 . A soil map of the project area and the USFWS NWI map of the project area are provided as Figures 17 and 18, respectively.

5.2.1 Reach 1

In Reach 1, the proposed work area is located immediately west of 121st Street Southeast (see Figure 19). The investigation was conservatively extended to approximately 100 feet downstream (west) from where the Wilburton Trestle crosses over Kelsey Creek, covering approximately 500 linear feet of stream channel. In general, the stream banks are deeply incised and supported on both banks with riprap, angular rock, and fill material positioned for support of the trestle crossing and the adjacent road (Southeast 8th Street).

No wetland conditions were identified within Reach 1. Three sample plots were established in this reach at locations with potential wetland characteristics, such as areas near the stream with a predominance of vegetation typically associated with wetland habitat. The majority of this reach is dominated by upland vegetation species (see Table 1). Dominant vegetation associated with wetland habitat was generally limited to small patches of reed canarygrass. Wetland soil and hydrology characteristics were not observed in the investigated area. Sample plot locations for Reach 1 are shown in Figure 19, and wetland delineation sample plot data is provided in Appendix A.

The USFWS NWI map identifies PSS wetland habitat associated with Kelsey Creek in Reach 1, east of the proposed work areas evaluated in the wetland investigation (Figure 18). As a result, wetland conditions were not confirmed in this area of Reach 1.

5.2.2 Reach 2

While the wetland delineation did not include Reach 2, it is included in the wetland rating and functional analysis in Section 5.3. In addition, vegetation present within Reach 2 is described in Table 1.

The USFWS NWI map identifies a large wetland system associated with Kelsey Creek with PFO, PSS, and PEM wetland habitats in Reach 2 (Figure 18). Based on observations during the site visit, the NWI map appears to be an accurate representation of wetland condition along Reach 2.

5.2.3 Reach 3

Reach 3 originates at the southern end of the GCC golf course and extends in a southerly direction approximately 1,500 feet to the terminus of Southeast 4th Street in Kelsey Creek Park. The wetland study along Reach 3 was limited to four specific areas on the right (west) bank where temporary construction access from the existing trail in Kelsey Creek Farm to the creek channel would be required for proposed LWD placement (see Figure 20).

Moving from north to south, the first three of the four proposed work areas were identified as upland habitat. The fourth and southern most proposed work area is located within

Wetland A, which is part of a large wetland system associated with Kelsey Creek. Wetland A extends south along the creek through Reach 2. Along the right bank the wetland is relatively narrow, typically less than 50 feet wide between the right bank and the trail in Kelsey Creek Farm. Wetland A appears to be much wider on the left bank of the creek, but the width of the wetland was not confirmed during as part of the investigation. Within Reach 2, Wetland A remains relatively narrow along the right bank but appears to extend several hundred feet from the left bank of the creek.

Wetland A is a riverine and slope wetland with PEM, PSS, and PFO habitats. Dominant vegetation in the area of proposed impacts includes Pacific willow, salmonberry, stinging nettle, lady fern, and reed canarygrass. Vegetation in the upland habitat between Wetland A and the trail is dominated by very dense Japanese knotweed and Himalayan blackberry. A complete list of vegetation present within Reach 3 is presented in Table 1. A total of eight sample plots were established in Reach 3. Sample Plot locations for Reach 3 are shown on Figure 20. Wetland delineation sample plot data is provided in Appendix A.

The USFWS NWI map identifies a large wetland system associated with Kelsey Creek with PFO, PSS, and PEM wetland habitats in Reach 3 (see Figure 18). Based on the delineation results and observations during the site visit, wetland conditions in Reach 3 do not extend as far to the north and the wetland is not as wide on the right bank as identified on the NWI map.

5.2.4 Reach 4

In Reach 4, Kelsey Creek flows approximately 4,000 linear feet through the GCC golf course in a north to south orientation. The wetland study occurred intermittently along this reach at the locations of the proposed in-channel work areas. In those areas, wetland identification was conducted within the expected construction limits both upstream and downstream of the existing concrete weirs and at other areas proposed for channel modification.

No wetland conditions were identified within the proposed improvement areas investigated within Reach 4. Six sample plots were established within Reach 4 in areas that resembled potential wetland characteristics. While a dominant presence of vegetation associated with

wetland habitat was present in several sample plots, wetland soil and hydrology characteristics were not observed within the areas investigated. Vegetation present within Reach 1 is described in Table 1. Sample Plot locations for Reach 4 are shown on Figure 21. Wetland delineation sample plot data is provided in Appendix A.

The USFWS NWI map identifies PAB wetland habitat within the GCC golf course (see Figure 18). Based on observation during the site visit, the area identified as PAB habitat is a man-made pond with mowed lawn around the perimeter of the pond and features such pumps and sprinklers associated with use of the pond.

5.3 Wetland Classification, Rating, and Functional Assessment

Guidance from USFWS, Ecology, and the City was used to determine the wetland classifications and ratings under those agency standards. The wetland system identified in the project area has been classified using the system developed by Cowardin and others (1979) for use in the NWI. Wetland A is a riverine and slope PEM, PSS, and PFO wetland system. The boundary of Wetland A was not delineated as part of this investigation. Wetland A is approximated to be greater than 30 acres in size.

According to the BCC (City of Bellevue 2009), wetland ratings are determined using Ecology's *Washington State Wetland Rating System – Western Washington: Revised* (Ecology 2004) and *Wetland Rating Form – Western Washington: Revised* (Ecology 2008a).

The Ecology system was developed to differentiate wetlands based on their sensitivity to disturbance, their significance in the watershed, their rarity, our ability to replace them, and the beneficial functions they provide to society. The Ecology rating system requires the user to collect specific information about the wetland in a step-by-step process. Three major functions are analyzed: water quality improvement, flood and erosion control, and wildlife habitat. Ratings are based on a point system where points are given if a wetland meets specific criteria related to the wetland's potential and opportunity to provide certain benefits.

Per Ecology's rating system, wetlands are categorized according to the following criteria and on points given:

- Category I wetlands (70 to 100 points) represent a unique or rare wetland type, or are more sensitive to disturbance, or are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime.
- Category II wetlands (51 to 69 points) are difficult, though not impossible, to replace, and provide high levels of some functions.
- Category III (30 to 50 points) wetlands have moderate levels of functions. They have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- Category IV wetlands (0 to 29 points) have the lowest levels of functions and are often heavily disturbed.

Under the Ecology system, Wetland A is rated as a Category I wetland. Table 5 lists the Ecology and local (City of Bellevue) wetland rating and classification. Water quality, hydrologic, and habitat functional values for Wetland A is shown in Table 6. Ecology wetland rating forms are provided in Appendix B.

Table 5
Summary of Wetland Classes and Rating Scores Using Ecology Wetlands Rating System

Wetland	Area (acres)	Hydrogeomorphic Classification	State Rating (Ecology)	Local Rating (City of Bellevue)
Wetland A	>30	Riverine and Slope	I	I

Table 6
Summary of Functions and Values Wetland Rating Scores

Wetland	Water Quality Functions Potential Score	Water Quality Opportunity (Yes/No)	Hydrologic Functions Potential Score	Hydrologic Functions Opportunity (Yes/No)	Habitat Functions Potential Score	Habitat Functions Opportunity Score	Total Functions Score
Total Maximum Score	**16**	No = 1 Yes = 2	**16**	No = 1 Yes = 2	**18**	**18**	**100**
Wetland A	8	2	16	2	15	10	73

Notes:

Calculated as (Water Quality Functions Potential Score times Water Quality Opportunity Score) plus (Hydrologic Functions Potential Score times Hydrologic Functions Opportunity Score) plus Habitat Functions Potential Score plus Habitat Functions Opportunity Score

Based on the rating scores, the overall functions of each of the three wetland rating categories of water quality, hydrologic, and wildlife habitat were rated as low, moderate, or high, in accordance with Ecology methods for comparing functions between impacted wetlands and wetland mitigation sites. Wetland function rating categories are summarized in Table 7 (Ecology 2008b).

Table 7
Summary of Wetland Function Rating Categories

Qualitative Rating of Function	Improving Water Quality Potential (Point Range)	Improving Water Quality Potential (Point Range)	Habitat Functions Potential (Point Range)	Habitat Functions Opportunity (Point Range)
High	12 to 16	12 to 16	15 to 18	15 to 18
Moderate	6 to 11	6 to 11	7 to 14	6 to 13
Low	0 to 5	0 to 5	0 to 6	0 to 5

Source: Ecology 2008b

5.3.1 Water Quality Functions

Wetland A has a moderate function score for the potential to improve water quality functions. Wetland characteristics that provide the potential to improve water quality include the relative area of depressions within the wetland that influences its ability to trap sediments during a flooding event. The characteristic of vegetation within the wetland to trap sediments and pollutants also contributes to a moderate function score.

Wetland A provides opportunities to improve water quality due to its proximity to developed residential areas and the GCC golf course.

5.3.2 Hydrologic Functions

Wetland A has a high function score for the potential to reduce flooding and erosion due to the large overbank storage the wetland provides (average width of the wetland/width of the creek) and the types of vegetation that can reduce surface flows during floods.

Wetland A provides opportunities to reduce flooding and erosion due to the presence of downstream manmade structures and natural resources that can be damaged by flooding.

5.3.3 Habitat Functions

Potential to provide habitat is a measure of whether a wetland has the necessary structure to provide habitat to species. Wetland A has a high function score for the potential to provide habitat due to the presence of diverse vegetative structure (three Cowardin [1979] vegetation classes), several water regimes or hydroperiods, plant richness (more than 19 native species observed), habitat diversity, and special habitat features such as snags and downed woody debris.

Opportunity to provide habitat is a measure of whether the wetland is in a position in the landscape to provide habitat. Wetland A has a moderate score for habitat opportunity due to the characteristics of the wetland buffers (developed verses undisturbed conditions), the quality of habitat conditions near or adjacent to the wetlands, and its close proximity to other wetlands.

Habitat functions of wetlands are further defined by their Cowardin Classification. Wetland A includes a combination of PFO, PSS, and PEM systems. Wetlands with mixed classifications are generally of higher value than wetlands with a single classification. PFO wetlands are generally considered to be of higher value than PEM or PSS wetlands because of the functional values they provide. Wetland A is also a large wetland, estimated at greater than 30 acres in size, increasing the overall functional value.

5.4 City of Bellevue Wetland Buffer Guidance

Appropriate minimum wetland buffers have been identified according to the current BCC (City of Bellevue 2009). The BCC identifies minimum protective buffer widths based on the

wetland category, per the Ecology rating system, and the Ecology water quality and habitat rating score. Based on the City wetland buffer criteria, a Category I wetland with a habitat rating score of 20 to 28 points requires a 110 foot buffer. The City will determine the final wetland ratings and minimum buffers. Table 8 provides City ratings and buffer widths as they relate to Wetland A.

Table 8

City of Bellevue City Code Wetland Rating and Standard Buffer Width

Study Area Wetlands	State Rating (Ecology)	Local Rating (City of Bellevue)	Ecology Habitat Rating Score	City of Bellevue City Code Buffer Width (feet)
Wetland A	Category I	Category I	20 to 28	110

Source: City of Bellevue 2009

6 SHORELINES (LUC 20.25E.017), STREAMS (LUC 20.25H.075), AND AREAS OF SPECIAL FLOOD HAZARD (LUC 20.25H.175)

Shorelines, streams, and areas of special flood hazard were assessed based on the criteria identified in LUC 20.25H.075, LUC 20.25E.017, and LUC 20.25H.175, respectively (City of Bellevue 2009). Anchor QEA ecologists performed site visits to characterize existing habitat conditions of Reaches 1 through 4 of Kelsey Creek and to identify habitat opportunities to benefit salmon and other resident fish and wildlife. The results of the stream assessment are presented in the *Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations Kelsey Creek Fish Passage and Habitat Restoration Project Memorandum* (Anchor 2008b). In October 2009, Anchor QEA ecologists visited the project area to supplement stream information collected during previous site visits and perform a stream typing study of the portion of Kelsey Creek in the project area. The results of the stream typing study are presented in the *Kelsey Creek Stream Channel Modification Improvement Project Stream Type Memorandum* (Anchor QEA 2009b). Information from these documents is summarized in this CAR.

6.1 Methods

To document and describe stream characteristics and classifications within the project area, Anchor QEA ecologists reviewed existing information, performed an aerial photograph assessment, and conducted site visits in April, May, and October 2007; October 2008; and October 2009. During the site visits, Anchor QEA ecologists documented stream characteristics including hydrologic functions, channel bed and bank conditions, substrate composition, and riparian vegetation. Documentation was completed by walking the stream channel. The entire project area was accessible during the investigation.

The designation of shoreline critical areas for the portion of Kelsey Creek that is in the project area was identified based on criteria defined in LUC 20.25E.017 and LUC 20.25H.115 and City natural resource maps (City of Bellevue 2009).

The stream system was typed using the following City stream designation criteria defined in LUC 20.25H.075.B:

- Type S water means all waters, other than shoreline critical areas designated under

LUC 20.25E.017, within their bankfull width, as inventoried as "shorelines of the state" under chapter 90.58 RCW and the rules promulgated pursuant to chapter 90.58 RCW, including periodically inundated areas of their associated wetlands.

- Type F water means all segments of natural waters that are not type S waters, and 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 water means all segments of waters that are not type S or type F waters and that are physically connected to a type S or F waters by an above ground channel system, steam or wetland.
- Type O water means all segments of waters 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, steam or wetland.

During the October 2008 site visit, the OHWM boundary of proposed work areas was delineated and mapped using a portable GPS, consistent with Chapter 90.58 of the Revised Code of Washington (RCW) and Chapter 173-22 of the Washington Administrative Code (WAC). The WAC defines the OHWM as:

> *"Ordinary high water line" means the mark on the shores of all waters 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 ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland: Provided, that in any area where the ordinary high water line cannot be found the ordinary high water line adjoining saltwater shall be the line of mean higher high water and the ordinary high water line adjoining freshwater shall be the elevation of the mean annual flood."*

The City defines the OHWM in Chapter 20.50.010 of the BCC (City of Bellevue 2009) as follows:

*"**Ordinary High Water Mark**. On all lakes, streams, and tidal water, 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 as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by the City or the Department of Ecology; provided, that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining fresh water shall be the line of mean high water. (Ord. 4055, 3914, 9-25-89, § 27)."*

6.2 Shorelines Results

LUC 20.25E.017.D identifies water bodies within the City that are designated as shoreline critical areas (City of Bellevue 2009). The portion of Kelsey Creek identified as Lower Kelsey Creek is designated as a shoreline critical area. Based on City natural resource maps, Kelsey Creek's shoreline critical area designation extends upstream of I-405 to about 400 feet east of Lake Hills Connector Road (City of Bellevue 2009). Therefore, the portion of Kelsey Creek that is both designated shoreline critical area and in the project area includes Reach 1 and about 400 feet of the downstream-most extent of Reach 2. The majority of Reach 2 and all of Reaches 3 and 4 are upstream of shoreline critical areas designation.

The BCC identifies minimum protective buffer widths of shoreline critical areas. Based on the City criteria, a buffer of 50 feet applies to all undeveloped shoreline critical areas. The City will determine the final minimum buffers. City shoreline critical areas designations and buffer widths as they relate to the portion of Kelsey Creek in the project area is provided in Table 9. As is discussed further in Section 6.3, Kelsey Creek is a fish bearing stream throughout the project area; as such, its associated stream critical area buffer widths are more restrictive than shoreline critical area buffer widths.

Table 9
City of Bellevue City Code Shoreline Critical Areas Designation and Standard Buffer Widths

Kelsey Creek Reaches	City of Bellevue Designated Shoreline Critical Area	City of Bellevue City Code Buffer Width Undeveloped Site (feet)
Reach 1	Yes	50
Reach 2	Yes, about 400 feet of downstream extent	50
Reach 3	No	NA
Reach 4	No	NA

Source: City of Bellevue 2009

6.3 Stream Results

This section describes the results of the Kelsey Creek stream assessment. Vegetation communities associated with the riparian habitat of each reach of Kelsey Creek in the project area are described in the Habitat Assessment, included in Section 4. The OHWM survey results within the proposed work areas are shown on the current preliminary design plans for the proposed project (see Figures 1 through 15).

6.3.1 Reach 1

In Reach 1 the stream banks are deeply incised and supported on both banks with riprap, angular rock, and fill material positioned for support of the trestle crossing and the adjacent road (Southeast 8th Street). Under these developed conditions, potential channel movement in this reach is constrained. Substrate in Reach 1 contains suitable spawning gravels. Based on a U.S. Geological Survey (USGS) stream gage located in this reach, its recorded stream flow during the October 2008 site visits was determined to be between approximately 8 and 10 cubic feet per second (cfs).

6.3.2 Reach 2

In Reach 2 the stream is low gradient with a nearly continuous sand substrate. Based on probing conducted through the streambed, sand was found to be at least 10 inches deep in most areas. Drawing closer to Reach 3 and approximately 1,500 feet upstream from the Lake Hills Connector, the gradient steepens and pockets of gravel are present in the channel, usually associated with woody debris accumulations and scour pockets. The first larger

pockets of gravel were observed near the northern end of a former beaver dam pool area. The sand substrate in Reach 2 would not be expected to provide high quality feeding habitat for juveniles, as it likely shifts too often to provide suitable habitat for epibenthic invertebrate colonization. Juveniles do use these areas for holding and rearing.

The forested sections of Reach 2 contain occasional small to medium wood debris accumulations under which localized scour areas appear to be forming, especially in areas occurring just before restrictive stream channel sections. Sand is still the primary substrate in the scour areas, but the water is deeper there, thus providing better rearing habitat opportunities. Occasional undercut banks appear to have formed by erosion and high peak flows near channel meander bends. These undercut banks and scour pools provide some habitat value and refuge at lower flows, although the substrate instability and small wood size in these habitats probably renders them as poor high-flow refuge or holding areas.

Water depths in Reach 2 are likely shallow and warm during summer months, especially near the reed canarygrass meadow area just west of the Kelsey Creek Farm. During the site visits, several small trickling side channels were observed that connect to the mainstem creek in this meadow area. These small side channels are presumed to be carrying flow from localized tributary drainage areas and groundwater interflow. They do not likely provide enough flow for habitat during low flow conditions, but they may provide refuge habitat at higher flows.

6.3.3 Reach 3

Substrate in Reach 3 contains suitable spawning gravels and has historically supported and currently supports Chinook salmon spawning (Anchor 2008b). The topography in Reach 3 generally extends from higher to lower from east to west, and thus, the stream channel naturally migrates westward toward the lower floodplain near the Kelsey Creek Farm. However, channel movement is constrained on the Kelsey Creek Farm side by the improved walking path and the Kelsey Creek Farm property, and it is not necessarily desirable for the stream to continue to migrate west because of the proximity to the Kelsey Creek Farm and its current land uses. Meanwhile, there is a relatively extensive floodplain available on the east

side of the creek, and while the west side riparian zone is relatively narrow (20 feet to 100 feet wide), the east side riparian zone is often in excess of 200 feet wide.

6.3.4 Reach 4

Reach 4 generally contains gravel and cobble substrate but otherwise offers little habitat complexity due to minimal in-stream LWD presence, reduced or eliminated riparian buffer, and channel migration constraints from intermittent bank hardening. One exception to this is near the fourth GCC golf course access bridge (counting from the south within Reach 4), where LWD and cobbles/boulders exist from apparent prior restoration work. The constructed habitat structures have created scour pools and habitat diversity in addition to providing a backwater that maintains fish passage at the concrete weirs. Spawning substrates are heavily used in Reach 4, as documented in recent redd surveys (Anchor 2008b). However, the spawning area is limited and redd superimposition is common below weirs that have the highest hydraulic drop. Rearing habitat quality is also low in Reach 4 due to the habitat homogeneity and lack of in-stream and overhead cover, as well as riparian corridor deficiencies as described in Section 4. The channel has incised in the upper section of this reach. During discussions with land owners, Anchor QEA ecologists discovered the channel had incised to such a degree that the foundations of many of the houses were cracking and the land was settling into the creek. The concrete weirs were installed to prevent channel incision, but the recent surveyed profile shows the channel continues to downcut.

6.3.5 Stream Rating and Buffers

Based on observations during the investigation and City stream typing criteria, Kelsey Creek appears to meet the minimum criteria as a Type F stream. Type F streams are defined as waters that are not type S waters, and that contain fish or fish habitat. Kelsey Creek is not inventoried as a shoreline of the state under Chapter 90.58 RCW, and therefore does not meet City criteria as a Type S stream. The BCC requires protective buffers to preserve stream and riparian functions. The appropriate minimum stream buffers on a Type F stream are 100 feet on either side of the stream (LUC 20.25H.075.C; City of Bellevue 2009). Those buffers would apply to the OHWM limits as surveyed. A summary of the stream rating and buffer distance is provided in Table 10.

Table 10
Bellevue City Code Stream Rating and Standard Buffer Distance

Project Area Stream	City of Bellevue Code Rating	City of Bellevue Code Buffer Width (feet)
Kelsey Creek	Type F Stream	100

Source: City of Bellevue 2009

6.4 Areas of Special Flood Hazard Results

The proposed Project is located on land subject to the 100-year flood; therefore, under LUC 20.25H.175, it is considered an area of special flood hazard area. In accordance with 20.25H.035, no buffer applies to these critical areas.

7 CRITICAL AREAS IMPACTS ASSESSMENT

As a stream modification and improvement project, the project area occurs within Kelsey Creek. As a result, while impacts to critical areas have been avoided wherever possible, the proposed Project includes impacts to the following City critical areas: habitat associated with species of local importance, wetlands, shoreline, stream, and areas of special flood hazard. In-water work activities, such as dewatering, excavation, placement of LWD and rock, are proposed only in areas where they are critical to the proposed Project's design. The following sections describe potential impacts associated with the proposed Project to City critical areas, potential cumulative impacts, and the functional lift analysis. Current preliminary design plans for the proposed Project are provided as Figures 1 through 15.

7.1 Potential Impacts to Habitat Associated with Species of Local Importance

As described in Section 4, of the twenty-three species identified on the City's species of local importance list, potential suitable habitat for 10 species (six bird and four fish species), is present within the project area. Potential impacts associated with the proposed Project to these species or habitat that supports these species will be short term in nature and associated with construction including noise, turbidity, limitations to habitat access while the creek is diverted around the project area, and vegetation clearing to access the creek.

Noise levels will not be injurious to fish or birds because impact equipment will not be used. Additionally, in-stream work will occur during approved in-water work windows and will be limited to the minimum necessary to construct the proposed Project. A temporary gravity stream flow diversion will be installed at work area where in-stream construction is required (except for LWD placement in existing pools in Reaches 3 and 4). This will provide for temporary downstream passage of fish during the short-term construction window for each weir. Fish will be collected from between the proposed upstream and downstream cofferdams for each work area prior to dewatering (inclusive of incidental work area runoff and cofferdam leakage). Fish removal will be performed according to appropriate agency (WDFW and City) guidelines.

Vegetation clearing to access the creek will be minimized. Existing vegetation in the project area includes a combination of native and nonnative plant species, with a dominant presence

of nonnative vegetation such as reed canarygrass, Japanese knotweed, and Himalayan blackberry, in several of the proposed work areas. In Reach 4, mowed lawn associated with the GCC golf course and residential property is a dominant feature of the project area. Small areas of existing vegetation immediately adjacent to the stream banks may need to be removed for control logs, LWD, and roughened channel fill placement. Following construction, native facultative vegetation will be planted, replacing the existing nonnative vegetation. Overhanging riparian plantings will improve prey availability for fish in localized areas along the creek.

Potential water quality impacts will be limited to temporary turbidity during construction. Proposed Project elements will not result in negative water quality impacts following construction. Enhancing riparian vegetation will create shade that will likely result in cooling of water temperatures, leading to an improvement in Kelsey Creek's water quality.

Long-term effects of the proposed Project would provide a net benefit to species of local importance and their habitat as fish passage and overall habitat conditions will be improved. By modifying the existing weirs and restoring pool habitat via LWD installation, the proposed Project will increase the habitat value to species of local importance. Fish passage partial barriers at culverts and weir steps with drop distances exceeding WDFW and NMFS standards will be reconfigured to allow for fish passage under the required range of flow conditions (approximately 1 to 49 cfs for Reach 4). LWD placed as part of the proposed Project will encourage the formation of pools (also contributing to cooler water), influence channel scour, and roughen the channel so as to reduce flow energy and subsequent erosion. Placement of spawning gravel mixes along with larger substrate mixes (i.e., cobble-boulder fill) in disturbed areas will temporarily improve sediment conditions.

Because the proposed Project will not result in development (i.e., impervious surfaces) or long-term adverse impacts to habitat for species of local importance and will improve habitat over existing conditions, the implementation of WDFW management recommendations for species on the City's list of species of local importance is not applicable (Larsen 1997; Larsen et. al. 2005).

7.2 Potential Impacts to Wetlands and Wetland Buffer

Potential wetland impacts have been avoided. No wetland habitat was identified in the areas of proposed work in Reaches 1 and 4. In Reach 3, wetland habitat is not located within three of the four proposed work areas. The fourth, southernmost proposed work area was originally located within a large wetland system identified as Wetland A. Potential wetland impacts were avoided by modifying the project design in Reach 3 for access to Kelsey Creek for LWD placement. The proposed access area was moved to the north to avoid impacts to Wetland A. Within the project area, Wetland A includes all of Reach 2 and the southern portion of Reach 3. Wetland A is a large (estimated to be greater than 30 acres in size) wetland system associated with Kelsey Creek. Based on Ecology and City wetland rating criteria, Wetland A is rated as a Category I wetland with moderate water quality and habitat opportunity functions and high hydrologic and habitat for species functions.

Wetland A has a protective wetland buffer width of 110 feet. Potential impacts to the Wetland A buffer are limited to the southernmost proposed work area in Reach 3. Because this is the only area of the project that includes wetland buffer impacts and the wetland buffer overlaps stream buffer, and all of the proposed project impacts will occur within the stream buffer of Kelsey Creek, the wetland buffer impacts are accounted for under stream buffer disturbance (Section 7.3). The disturbed wetland buffer area contains a mixture of native and nonnative vegetation species. Once construction access is no longer needed in the wetland buffer (approximately 18 weeks), the disturbed area will be revegetated with native plant species. Wetland buffer impacts will be limited to clearing of vegetation, no ground clearing or grading is proposed.

Vegetation clearing to access this portion of the creek will avoid significant trees located in the wetland and wetland buffer area. Significant trees are defined in LUC 20.50 as "a healthy evergreen or deciduous tree, eight inches in diameter or greater, measured four feet above existing grade."

7.3 Potential Impacts to Shorelines, Streams, and Areas of Special Flood Hazard

Kelsey Creek is identified as a Type F stream with a protective stream buffer width of 100 feet throughout the project area. Proposed impacts to the streambed in Reach 1 include removing angular rock, adding roughened channel cobble/boulder backfill, and placement of LWD. Impacts to the creek in Reach 3 include placement of LWD. In Reach 4, streambed impacts will include placement of LWD, placement of cobble/boulder and round rock, and modifying existing concrete weirs.

Construction impacts to the streambed habitat (between the OHWM) will include a total impact area of 10,320 square feet (0.24 acre). Constrution impacts will be short term (approximately 12 weeks) and post construction conditions will improve the habitat of the creek compared to that of existing conditions.

Existing vegetation in the project area includes a combination of native and nonnative plant species, with a dominant presence of nonnative vegetation in several of the proposed work areas in Reaches 1, 3, and 4. In Reach 4, mowed lawn associated with the GCC golf course and residential property is also a dominant feature of the stream buffer. Following construction native facultative vegetation will be planted, replacing the existing nonnative vegetation and mowed lawn.

Potential stream buffer impacts in Reach 1 are limited to clearing an approximately 1,400 square foot area (0.03 acre) for access to Kelsey Creek for in-stream work and LWD placement. Stream buffer impacts in Reach 3 will include clearing an approximately 5,600 square foot area (0.13 acre) for access to Kelsey Creek for LWD placement. Stream buffer impacts in Reach 4 will include clearing an approximately 9,250 square foot area (0.21 acre) for access to Kelsey Creek for in-stream work and LWD placement. Stream buffer impacts in the golf course include areas with existing vegetation that will be replanted with native vegetation and do not include mowed lawn. Total stream buffer impacts include 16,250 square feet (0.37 acre). Once construction access is no longer needed in the stream buffer (approximately 18 weeks), the disturbed area will be revegetated with native wetland species. No ground clearing or grading outside of the creek channel is proposed.

Stream buffer impacts will be minimized as much as possible by avoiding existing native vegetation and accessing the creek through disturbed areas or areas with mowed lawn when possible. Vegetation clearing to the creek will avoid significant trees located in the stream buffer area. Significant trees are defined in LUC 20.50 as "A healthy evergreen or deciduous tree, eight inches in diameter or greater, measured four feet above existing grade."

The portion of Kelsey Creek that is both in the project area and designated shoreline critical area includes Reach 1 and about 400 feet of the downstream-most extent of Reach 2. The majority of Reach 2 and all of Reaches 3 and 4 are upstream of shoreline critical areas designation. The City identifies a 50 foot buffer to all undeveloped shoreline critical areas. The City stream protective buffer width of 100 feet is more restrictive than the shoreline critical areas buffer. Impacts to designated shoreline critical areas and areas of special flood hazard would be the same as those addressed above for stream buffer habitat.

7.4 Potential Cumulative Impacts to Critical Areas

The City is evaluating other projects on Kelsey Creek and its tributaries (i.e., the West Tributary), as well as Mercer Slough to improve fish passage and improve wetland and other aquatic and terrestrial habitats. Although these other projects may not all be immediately adjacent to or contiguous with the proposed Project, they are intended to improve the overall habitat values along Kelsey Creek. In addition, the City plans to continue ongoing efforts for invasive plant species control along the stream corridor and in adjacent wetlands using various experimental techniques.

7.5 Critical Areas Functional Lift Analysis

Per LUC 20.25H.250.B.5, an analysis of the critical areas functional lift resulting from the Project was performed. As described previously, the overall result of the proposed Project will improve fish passage and restore and enhance fish and wildlife habitat. The result of the functional lift analysis is presented in Table 11.

Table 11
Critical Areas Functional Lift Analysis

Critical Area Functions	Existing Conditions	Standard Code Application (No Impacts)	Proposed Modification	Functional Improvement with Proposed Modification
Stream				
Provides habitat for a variety of fish species	Degraded habitat conditions due to past land use and development activities	No change to stream habitat	Modify and restore stream bed substrate, in-stream habitat features, structure, and complexity	Yes; Facilitate anadromous salmonid passage to upstream reaches, juvenile rearing, and adult spawning
Stream Buffer				
Provides habitat for terrestrial wildlife and prey (insects) for fish and shade cover of the creek	Degraded habitat conditions such as dominant presence of nonnative plants and mowed lawn along stream banks	No change to stream buffer habitat	Plant native tree and shrub species following construction	Yes; Improve riparian habitat for wildlife and provide shade to lower creek temperatures and improve water quality
Wetland				
Provides habitat for a variety of wildlife and stormwater flows slowed by woody plant stems	Vegetation includes native and nonnative species	No change to vegetation communities	No wetland impacts proposed	No; Wetland impacts avoided
Wetland Buffer				
Provides habitat for a variety of wildlife and stormwater flows slowed by woody plant stems	Vegetation includes native and nonnative species	No change to vegetation communities	Replant cleared vegetation with native facultative trees and shrubs	Yes; Improve habitat conditions for wildlife, stormwater flows slowed by increase in tree and shrub density, sediment in creek decreases, water quality improves
Habitat Associated with Species of Local Importance				
Provides habitat for a variety of wildlife and fish	Same as above for stream, stream buffer, wetland, and wetland buffer	No change to habitat	Same as above for stream, stream buffer, wetland, and wetland buffer	Yes; Same as above for stream, stream buffer, wetland, and wetland buffer

8 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

In accordance with LUC 20.25H.165.A, this section provides a discussion of avoidance, minimization, and mitigation measures and ongoing management practices proposed to preserve existing critical habitats and restore any habitat that was degraded prior to the currently proposed Project.

8.1 Avoidance Measures

Impacts to critical areas have been avoided wherever possible. However, as a stream modification and improvement project, the project area occurs within critical areas associated with Kelsey Creek. Native tree and shrub vegetation communities and significant trees will be avoided when possible when creating access points to the creek.

8.2 Minimization Measures

Minimization measures to be used will include:

- Restricting in-stream work to the WDFW in-water work window, set for when Chinook salmon, steelhead, and bull trout are unlikely to be present or would be present in low numbers. The typical U.S. Army Corps of Engineers (Corps) in-water work window extends from July 1 to August 31, but may be expanded by WDFW to extend between mid-June and September 30.
- Defining clear limits on the restoration design plans with requirements to flag those limits prior to initiation of grading activities. The contract documents will include provisions to confine construction activities to the minimum area necessary to complete the improvements within the flagged clearing limits.
- Staking and protecting existing wetlands adjacent to the construction areas will be from access with temporary orange plastic fencing.
- Protecting trees to remain on site with temporary tree protection fencing during construction.
- Preparing a site-specific Temporary Erosion and Sedimentation Control (TESC) Plan along with a Stormwater Pollution Prevention Plan (SWPPP) as guidance for contractor activities to protect Kelsey Creek water quality during construction.

Construction phase Best Management Practices (BMPs) to be used will include:

- Installing temporary cofferdams and gravity (or pumped with appropriate fish screening) stream flow bypass piping for in-stream work areas within Reaches 1 and 4; combined work area incidental run-on, cofferdam leakage, and dewatering water will be pumped to upland dispersal, treatment (as required), and recharge.
- Providing TESC BMPs (i.e., inlet protection, silt fences, vegetative filter strips, and filter bags) outside of the stream corridor, to minimize impacts to critical areas and other riparian areas.
- Installating of materials that require streambed or low bank excavation only after the affected stream sections have been isolated or at least partially dewatered.
- Reusing any excavated soils or streambed materials on site shortly after excavation or stored temporarily at an approved upland location. Temporary material stockpiles will be covered with plastic sheeting when not in active use and prior to storms to minimize their erosion potential.
- Requiring the contractor to have backup equipment, including pumps and extra TESC materials readily available during storm events.
- Temporarily mulching and sowing any temporarily disturbed or otherwise modified streambanks with grass seed to minimize erosion, or covered with a biodegradable erosion control fabric and replanted with native facultative species as designated in the approved preliminary re-vegetation plan.
- Implementing the approved preliminary re-vegetation plan during October, the first month of frost-free portions of the first dormant season, following completion of grading work.
- Having a designated representative of the City conduct construction observation for the duration of the restoration work. The construction contractor will be required to implement the TESC plan and SWPPP, and will develop and implement a Spill Prevention, Control, and Countermeasures Plan (SPCCP) that maintains compliance with the Washington State water quality standards (WAC 173.201A).

Additional minimization measures that will be employed include consistency with:

- Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A Washington Administrative Code (WAC; updated 2006)
- Western Washington National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit (Ecology; effective February 16, 2007) and the NPDES Construction Stormwater General Permit (Ecology, effective December 15, 2005)
- Stormwater Management Manual for Western Washington (Ecology 2005)
- General Occupation Health Standards (WAC 276-62)
- All regulatory permit conditions, including the Clean Water Act Section 404 permit, Ecology Section 401 Water Quality Certification, and WDFW Hydraulic Project Approval to be issued for the proposed Project.

8.3 Mitigation Measures

Per LUC 20.25H.055, habitat improvement projects are allowable activities in critical areas. Because the proposed Project's design and purpose is to improve and restore fish and wildlife habitat, impacts to streams, wetlands, and associated buffers will be self-mitigating. The proposed Project will add significantly more habitat value to the critical areas present in the project area than under existing conditions. The primary goals and objectives of the proposed Project are to improve fish passage where limitations to adult and juvenile salmonid mobility and upstream migration currently exist and to enhance fish and wildlife habitat features within the stream channel and its riparian corridor. In addition, the proposed Project will maintain reasonably stable and sustainable channel morphology and sediment transport without excessive scour or deposition, improve or have no adverse affect on the floodplain, enhance Kelsey Creek Park and Farm reach wetlands through invasive species control, and maintain consistency with recommended improvements laid out in the Kelsey Creek Park Master Plan. The City is not proposing a formal mitigation plan as part of this application.

8.4 Ongoing Management Practices

The City has previously undertaken some habitat restoration and enhancement activities in Reach 2 to maintain fish passage and improve habitat quality. This has included actions to

maintain adequate channel depths for fish passage at low flows and placement of LWD in the upland areas of Reach 2.

The City has also attempted localized control of reed canarygrass in Reach 2 through planting selected areas with native emergent and primary forest species (using various techniques). These past and ongoing restoration and enhancement activities have focused on maintaining the active channel for fish passage given the current hydrologic regime, controlling invasive reed canarygrass from spreading, and establishing primary forest species. The vegetative management program is being managed by City staff as an experimental program, and future planned actions to address identified needs are not part of the proposed Project.

Habitat management practices specific to the proposed Project are still being developed by the City.

9 PROJECT COMPLIANCE WITH CITY CODE PERFORMANCE STANDARDS

In accordance with LUC 20.25H.055, habitat improvement projects may be allowed in a critical area or its buffer if all applicable performance standards are met. In addition, this code section requires habitat improvement projects to be sponsored or cosponsored by a public agency or federally recognized tribe whose primary function is habitat restoration. This Project is sponsored by the City. Performance standards applicable to habitat restoration projects in the types of critical areas present in the project area are identified in Table 12 and discussed in the following sections.

Table 12
Performance Standards for Habitat Improvement Projects in Critical Areas

Critical Area	Performance Standards
Wetland	LUC 20.25H.055.C.3.j LUC 20.25H.100
Stream	LUC 20.25H.055.C.3.j LUC 20.25H.080.A
Shoreline	LUC 20.25H.055.C.3.j LUC 20.25E.080.B LUC 20.25E.080.G
Areas of Special Flood Hazard	LUC 20.25H.055.C.3.j LUC 20.25H.180.C

9.1 LUC 20.25H.055.C.3.j

The proposed Project meets the performance standard described in LUC 20.25H.055.C.3.j, which reads as follows:

Disturbance, clearing and grading are allowed in the critical area or critical area buffer for habitat improvement projects demonstrating an improvement to functions and values of a critical area or critical area buffer. Habitat improvement projects shall be:

- Sponsored or cosponsored by a public agency or federally recognized tribe and whose primary function is habitat restoration; or

- Approved by the Director pursuant to LUC 20.25H.230.

The proposed Project is being undertaken by the City and in obtaining the Critical Areas Permit, will be approved by the Director.

9.2 LUC 20.25H.100

The proposed Project meets the performance standard described in LUC 20.25H.100, which reads as follows:

Development on sites with a wetland or wetland critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

A. Lights shall be directed away from the wetland.

Activity that generates noise such as parking lots, generators, and residential uses, shall be located away from the wetland, or any noise shall be minimized through use of design and insulation techniques.

Toxic runoff from new impervious area shall be routed away from the wetlands.

Treated water may be allowed to enter the wetland critical area buffer.

The outer edge of the wetland critical area buffer shall be planted with dense vegetation to limit pet or human use.

Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended. (Ord. 5680, 6-26-06, § 3)

The proposed Project will not add lighting, permanent noise-generating machines or activities, or imperious surfaces to the site. Any wetland buffer areas impacted as part of the proposed Project will be revegetated with native wetland buffer species. The proposed Project will comply with state, federal and City of Bellevue standards for herbicide, pesticide and fertilizer use.

9.3 LUC 20.25E.080.B

The proposed Project meets the performance standard described in LUC 20.25E.080.B, which reads as follows:

1. Where applicable, all federal and state water quality and effluent standards shall be met.
2. If a property extends into the Shoreline Overlay District, the Shoreline Master Program Policies and these use regulations shall apply only to that portion of the property lying within the Shoreline Overlay District.
3. All development within the Shoreline Overlay District shall be accompanied by a plan indicating methods of preserving shoreline vegetation and for control of erosion during and following construction in accordance with Part 20.25H LUC, City of Bellevue Clearing and Grading regulations, Chapter 23.76 BCC, and the Comprehensive Plan.
4. Special care shall be exercised to preserve vegetation in wetland, shoreline and stream corridor bank areas in order to prevent soil erosion. Removal of vegetation from or disturbance of shoreline critical areas and shoreline critical area buffers, and from other critical area and critical area buffers shall be prohibited, except in conformance with Part 20.25H LUC and the specific performance standards of this section.
5. Maximum height limitation for any proposed structure within the Shoreline Overlay District shall be 35 feet, except in land use districts with more restrictive height limitations. The method of measuring the maximum height is described in WAC 173-14-030(6). Variances to this height limitation may be granted pursuant to Part 20.30H LUC.
6. The Bellevue Shoreline Master Program, in conjunction with existing Bellevue land use ordinances and Comprehensive Plan policies, shall guide all land use decisions in the Shoreline Overlay District.
7. Any development within the Shoreline Overlay District shall comply with all applicable Bellevue ordinances, including but not limited to the Bellevue Land Use Code, Sign Code, and clearing and grading regulations.
8. The dead storage of watercraft seaward of the ordinary high water mark of the shoreline is prohibited.
9. Where applicable, state and federal standards for the use of herbicides, pesticides and/or fertilizers shall be met, unless superseded by City of Bellevue ordinances. Use

of such substances in the shoreline critical area and shoreline critical area buffer shall comply with the City's "Environmental Best Management Practices."

10. Adequate storm drainage and sewer facilities must be operational prior to construction of new development within the Shoreline Overlay District. Storm drainage facilities shall be separated from sewage disposal systems.

The proposed Project will comply with all federal and state water quality standards. Removal of vegetation in wetlands, shorelines, and their buffers within the project area will be minimized as much as possible. While it is anticipated that some vegetation (understory and shrubs) may need to be cleared to provide access to the project area, these areas will be revegetated with native wetland and riparian species. No buildings will be constructed as part of the proposed Project. It will comply with the Bellevue Shoreline Master Program, Land Use Code, Sign Code, and clearing and grading regulations, as well as state, federal and City of Bellevue standards for herbicide, pesticide and fertilizer use. Before commencing construction, all storm drains will be checked to ensure they are operational.

9.4 LUC 20.25E.080.G

The proposed Project meets the performance standard described in LUC 20.25E.080.G, which reads as follows:

1. All clearing, grading, excavating, and fill in the Shoreline Overlay District shall comply with the provisions of Chapter 23.76 BCC, now or as hereafter amended.
2. No clearing, grading, excavating, or fill shall be allowed within the shoreline critical area or shoreline critical area buffer except as permitted by this Part 20.25E, or in association with activities allowed under Part 20.25H LUC.
3. Wherever the City determines that the act or intended act of clearing, grading, excavation or fill has become or will constitute a hazard to life or limb, or endangers property, or adversely affects the safety, use of, or stability of a public way, drainage channel or natural stream corridor, including siltation and sedimentation therein, the owner of the property upon which the clearing, excavation or fill is located or other person or agent in the City shall, within the period specified therein, terminate such clearing, grading, excavation, embankment or fill, or eliminate the same from the development plan, or modify the plans, as may be required so as to eliminate the hazard and be in conformance with the requirements of this Code.

The proposed Project will comply with City of Bellevue code provisions on clearing, grading, excavation, or fill in the Shoreline Overlay District. If ever departments within the City find the proposed Project poses safety issues to people, property, public ways, or the stream corridor, the City will direct its contractor to stop work so that the issues may be resolved before resuming construction of the Project.

9.5 LUC 20.25E.180.C

The proposed Project meets the performance standard described in LUC 20.25E.180.C, which reads as follows:

> Where use or development is allowed pursuant to LUC 20.25H.055, the following general performance standards apply.
>
> 1. Intrusion Over the Area of Special Flood Hazard Allowed. Any structure may intrude over the area of special flood hazard if:
>
> a. The intrusion is located above existing grade, and does not alter the configuration of the area of special flood hazard; and
>
> b. The intrusion is at an elevation and orientation which maintains the existing vegetation of the area of special flood hazard in a healthy condition. Solar access to vegetation must be maintained at least 50 percent of daylight hours during the normal growing season.
>
> Development not meeting the requirements of this subsection C.1 may be allowed pursuant to LUC 20.25H.055 and only in accordance with the requirements set forth in the remainder of this section C.
>
> 2. Elevation Certificate Following Construction. Following construction of a structure within the area of special flood hazard, where the base flood elevation is provided, the applicant shall obtain an elevation certificate. The elevation certificate shall be completed by a surveyor or engineer licensed in the state of Washington and shall be submitted to City of Bellevue, Utilities Department. The Director of Planning and Community Development shall obtain and transmit to the Director of the Utilities Department the elevation in relation to City of Bellevue vertical datum (NAVD 88) of the lowest floor, including basement, and attendant utilities of a new or substantially improved structure permitted by this part.

3. Construction Materials and Methods.
   a. Site Design. All structures, utilities, and other improvements shall be located on the buildable portion of the site out of the area of special flood hazard unless there is no buildable site out of the area of special flood hazard. For sites with no buildable area out of the area of special flood hazard, structures, utilities, and other improvements shall be placed on the highest land on the site, oriented parallel to flow rather than perpendicular, and sited as far from the stream and other critical areas as possible. Located in flood-fringe where flood flow velocities are less than three feet per second and flood depths are less than three feet. If the Director detects any evidence of active hyporheic exchange on a site, the development shall be located to minimize disruption of such exchange.
   b. Methods that Minimize Flood Damage. All new construction and substantial improvements shall be constructed using flood-resistant materials and using methods and practices that minimize flood damage.
   c. Utility Protection. Electrical, heating, ventilation, plumbing, air-conditioning equipment, and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
   d. Anchoring. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
4. No Rise in the Base Flood Elevation (BFE). Any allowed use or development shall not result in a rise in the BFE.
5. Modification of Stream Channel. Alteration of open stream channels shall be avoided, if feasible. If unavoidable, the following provisions shall apply to the alteration:
   a. Modifications shall only be allowed in accordance with the habitat improvement projects.
   b. Modification projects shall not result in blockage of side channels.
   c. The City of Bellevue shall notify adjacent communities, the state departments of Ecology and Fish and Wildlife, and the Federal Insurance Administration about the proposed modification at least 30 days prior to permit issuance.

d. The applicant shall maintain the altered or relocated portion of the stream channel to ensure that the flood-carrying capacity is not diminished. Maintenance shall be bonded for a period of five years, and be in accordance with an approved maintenance program.

6. Compensatory Storage. Development proposals must not reduce the effective base flood storage volume of the area of special flood hazard. Grading or other activity that would reduce the effective storage volume must be mitigated by creating compensatory storage on the site. The compensatory storage must:
    a. Provide equivalent elevations to that being displaced;
    b. Be hydraulically connected to the source of flooding;
    c. Be provided in the same construction season and before the flood season begins on September 30th;
    d. Occur on-site or off-site if legal arrangements can be made to assure that the effective compensatory storage volume will be preserved over time;
    e. Be supported by a detailed hydraulic analysis that:
        i. Is prepared by a licensed engineer;
        ii. Demonstrates that the proposed compensatory storage does not adversely affect the BFE; and
    f. Meet all other critical areas rules subject to this part. If modification to a critical area or critical area buffer is required to complete the compensatory storage requirement, such modification shall be mitigated pursuant to an approved mitigation and restoration plan, LUC 20.25H.210.

No new structures will be constructed as part of the proposed Project. The existing weirs will be modified but their overall size in terms of volume will not change from existing conditions. The City intends to anchor and/or partially bury majority of the LWD pieces that will be placed as part of the proposed project; anchoring is only not proposed in Reach 3, where LWD movement is not anticipated to be problematic. If the City desires LWD anchorage for most (if not all) of the LWD in Reach 3, use of duckbill anchors, load tested, and cabled to the LWD is proposed. The proposed Project will not result in a rise in the base flood elevation or affect the base flood storage volume of Kelsey Creek. Adjacent property owners, Ecology and WDFW are being notified of design details as part of the permitting process for the proposed Project. The City will maintain the modified channel to ensure its flood-carrying capacity remains at existing levels or higher.

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FIGURES

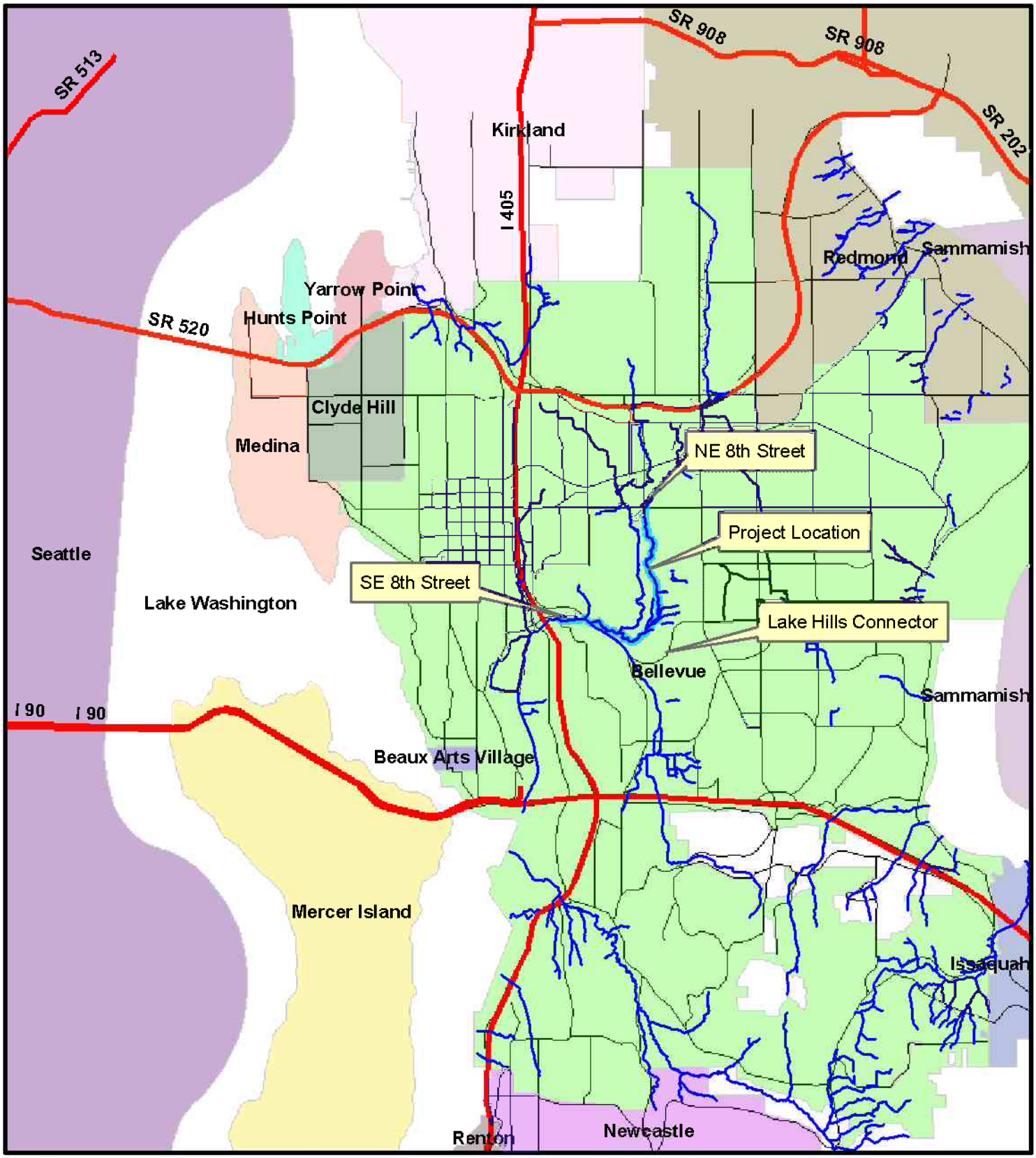

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Figure 1
Project Location
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

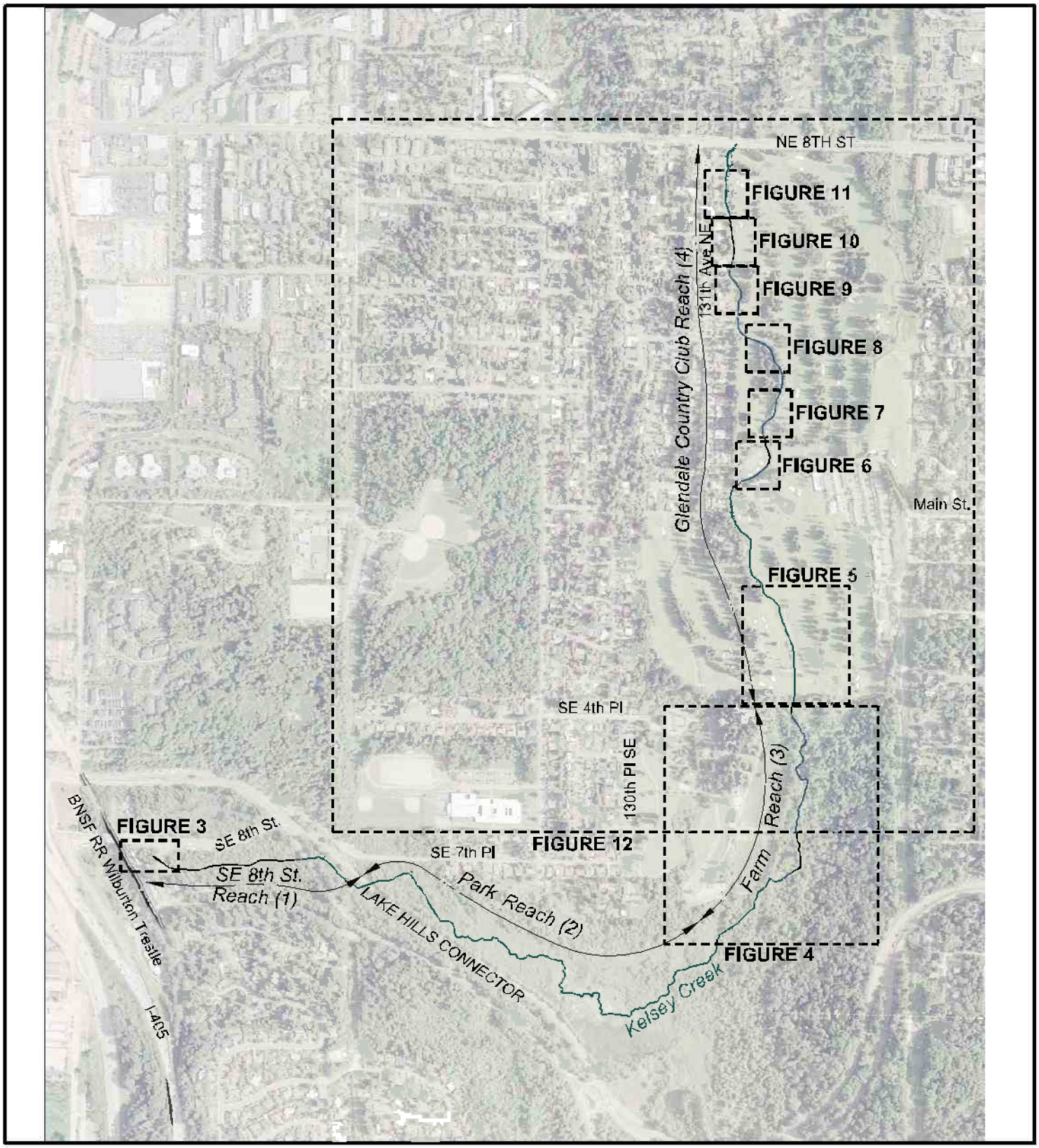

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Figure 2
Project Reaches and Site Plans Index
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

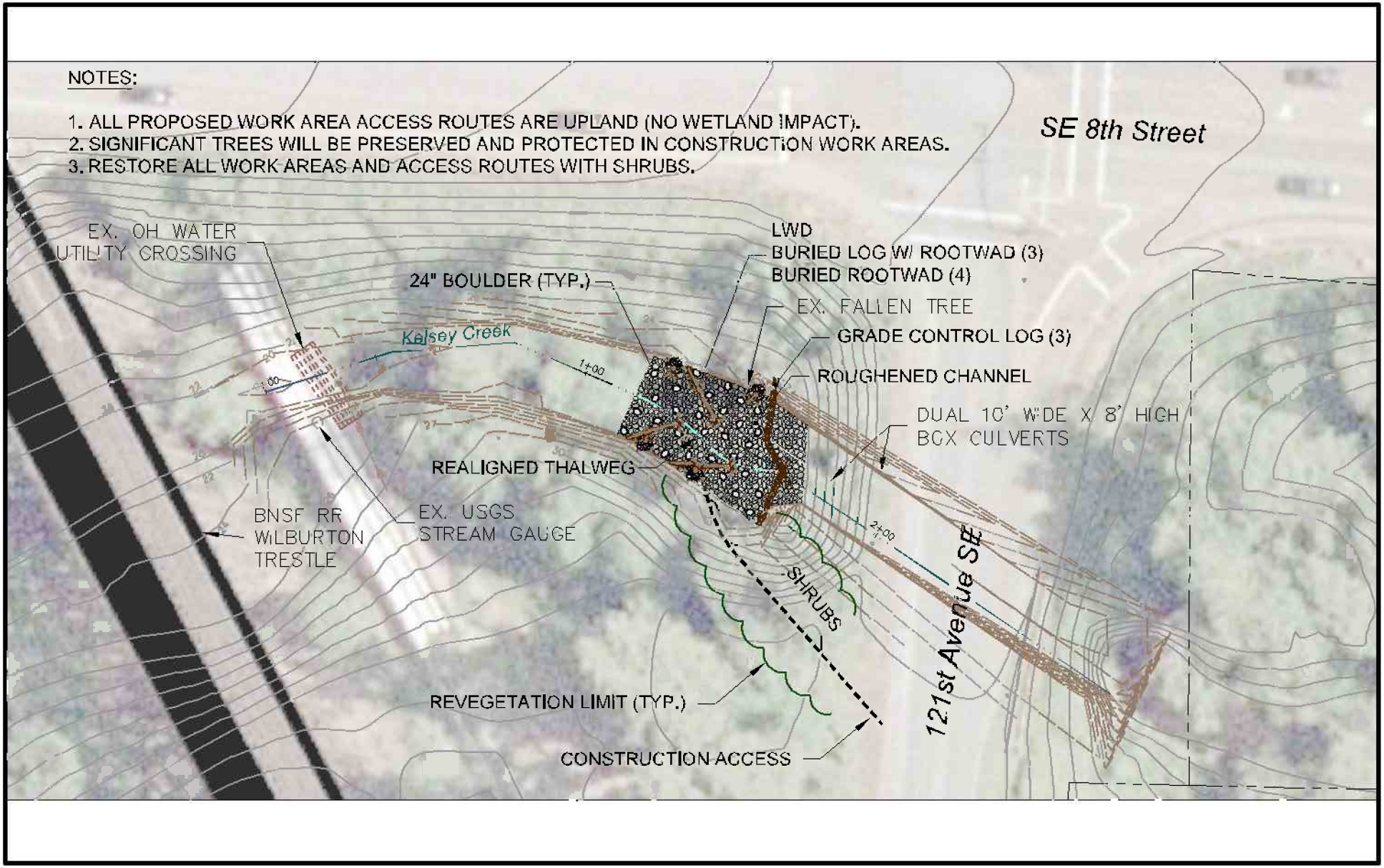

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Figure 3
Site Plan–Reach 1–Channel Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

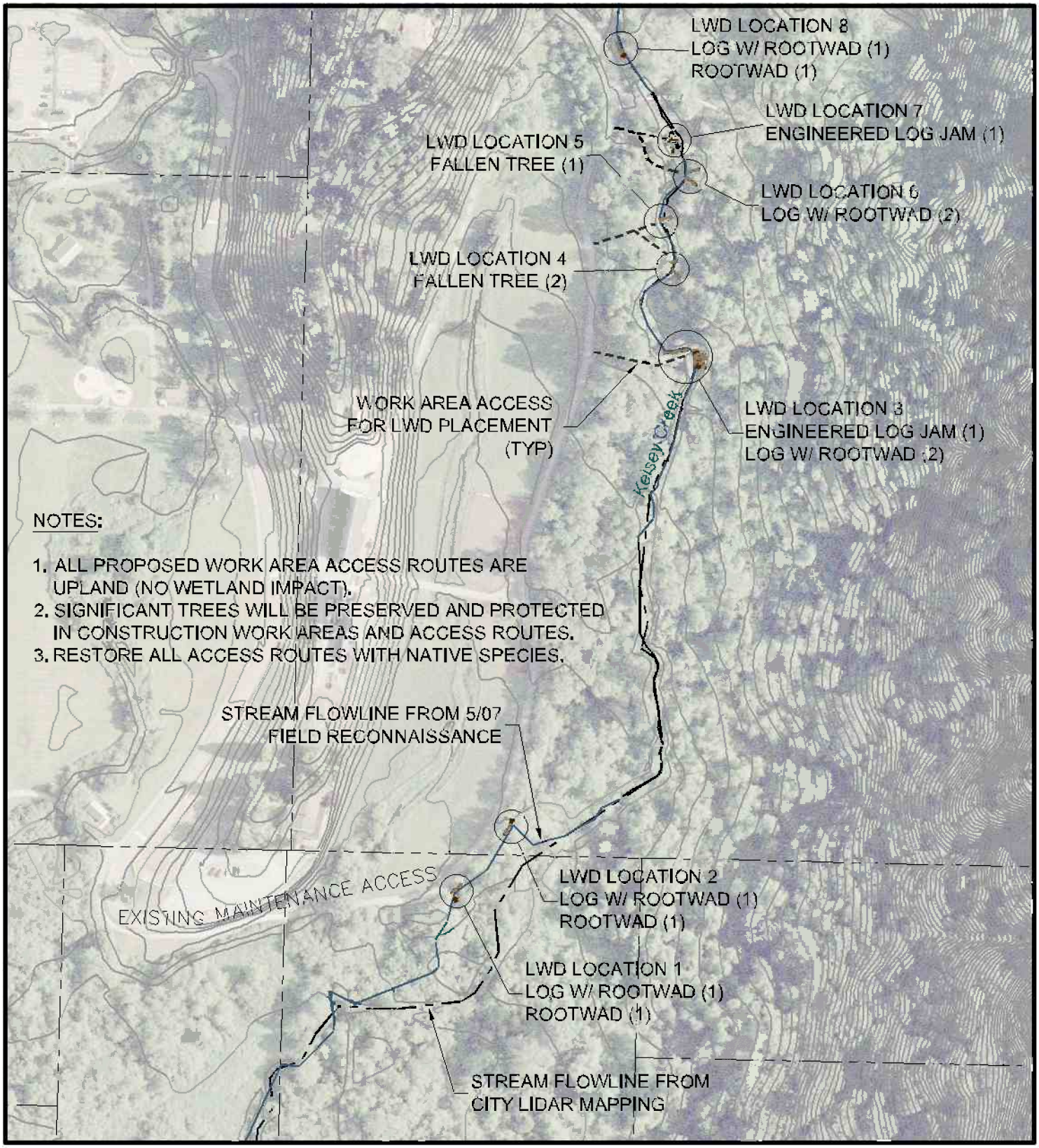

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Figure 4
Site Plan–Reach 3–LWD Placement Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

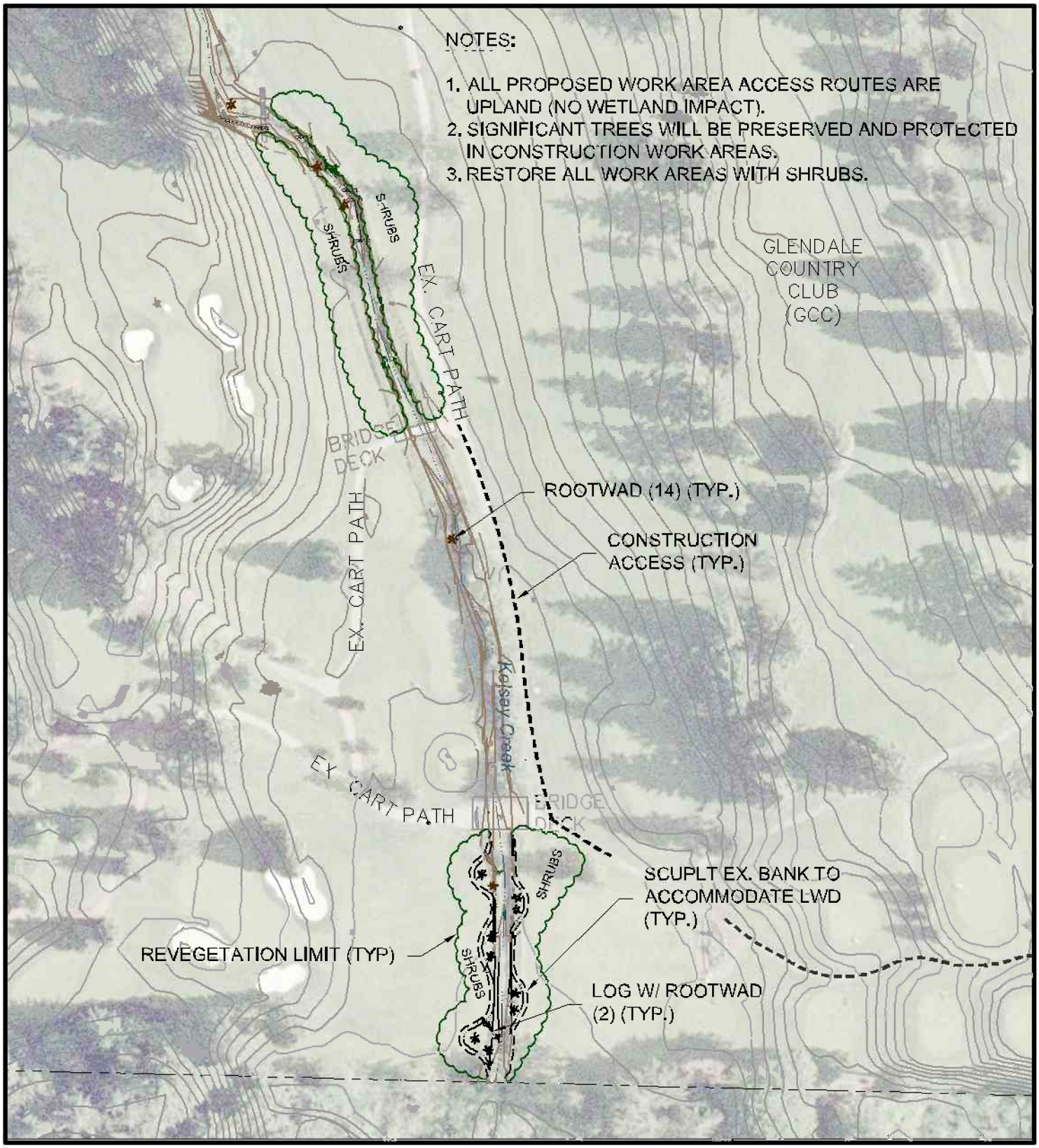

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Figure 5
Site Plan–Reach 4–South Channel Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

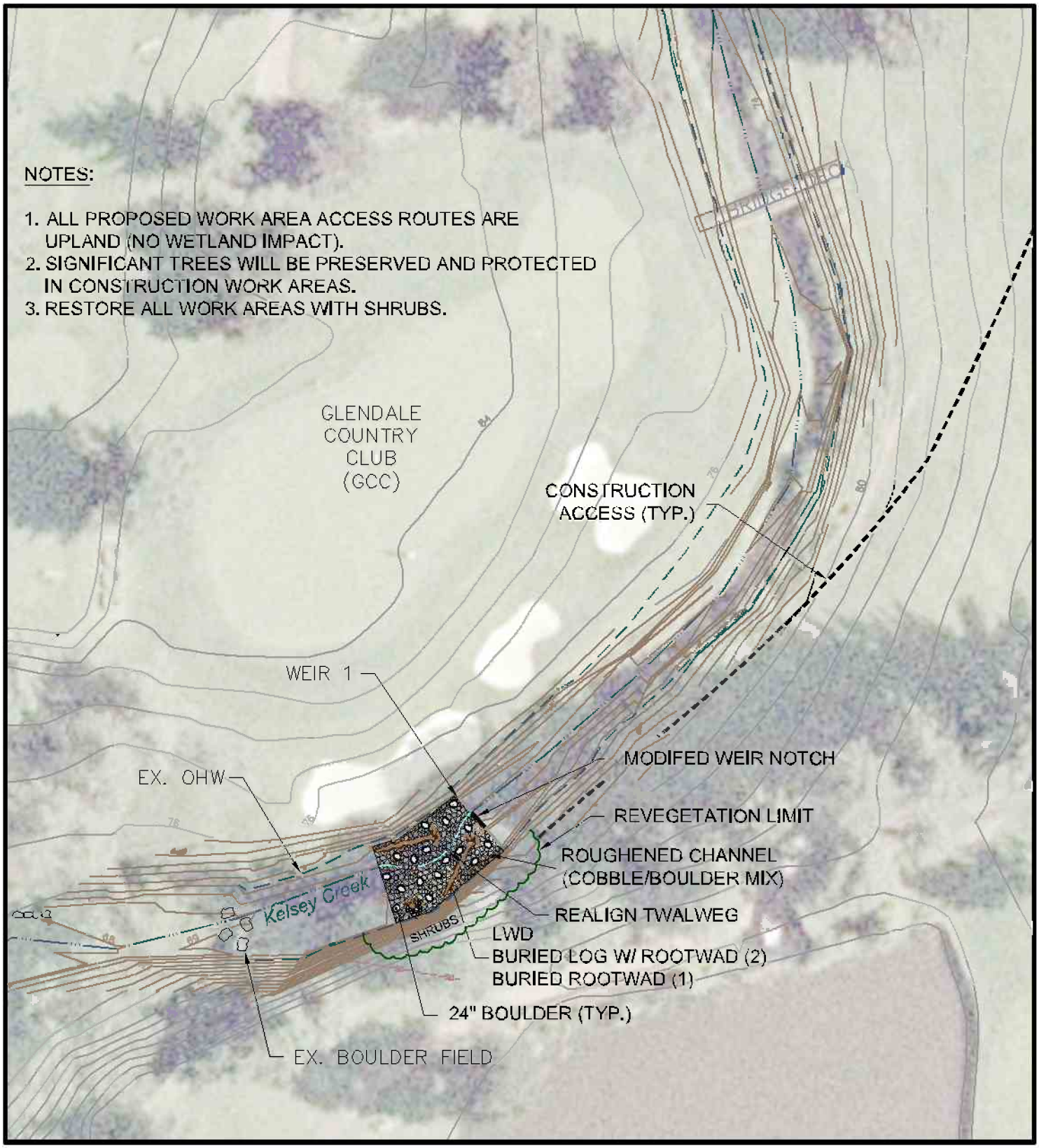

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Figure 6
Site Plan–Reach 4–Weir 1 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

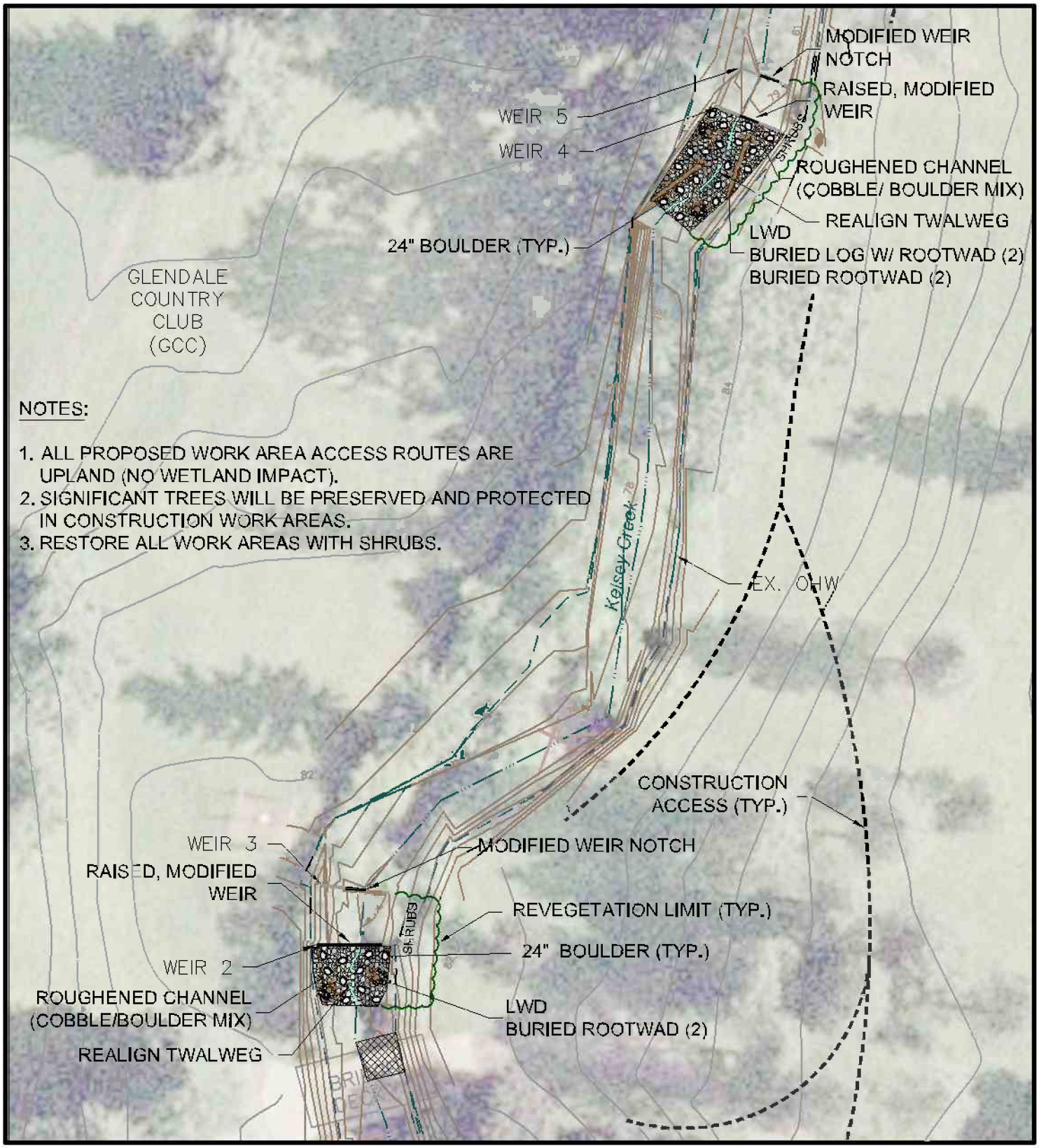

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Figure 7
Site Plan–Reach 4–Weir Pairs 2-3, 4-5 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

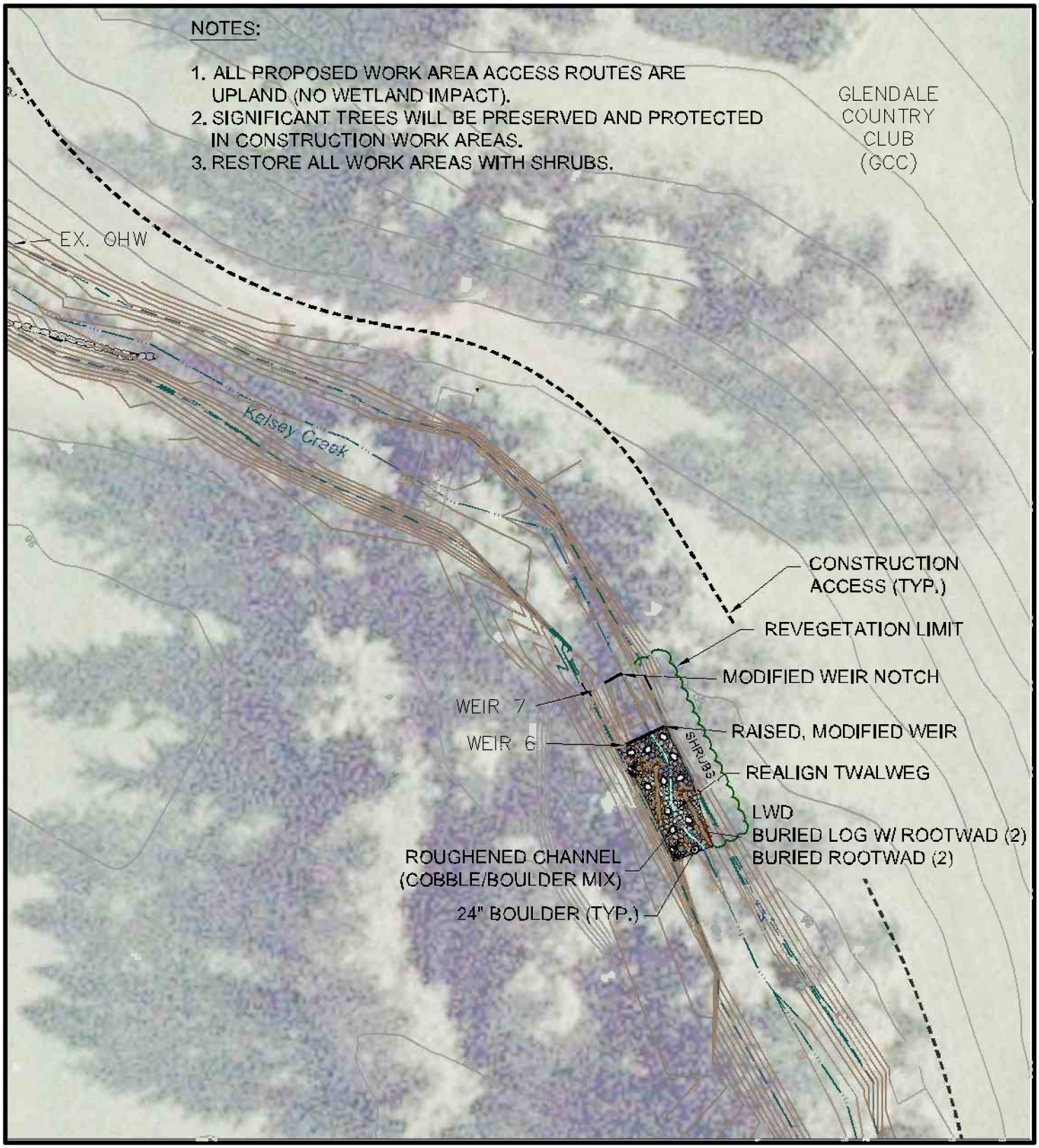

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Figure 8
Site Plan–Reach 4–Weir Pair 6-7 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

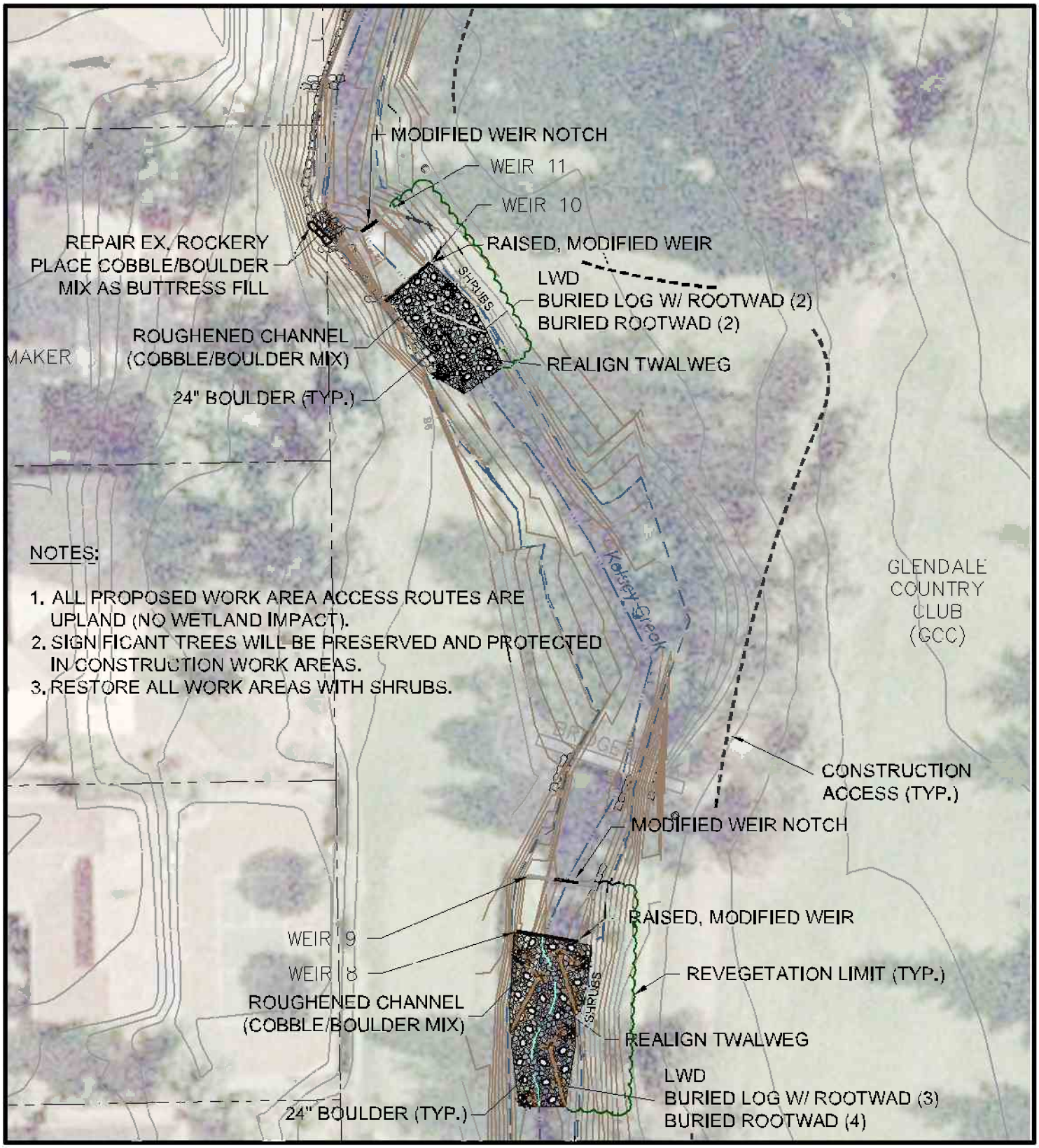

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Figure 9
Site Plan–Reach 4–Weir Pairs 8-9, 10-11 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

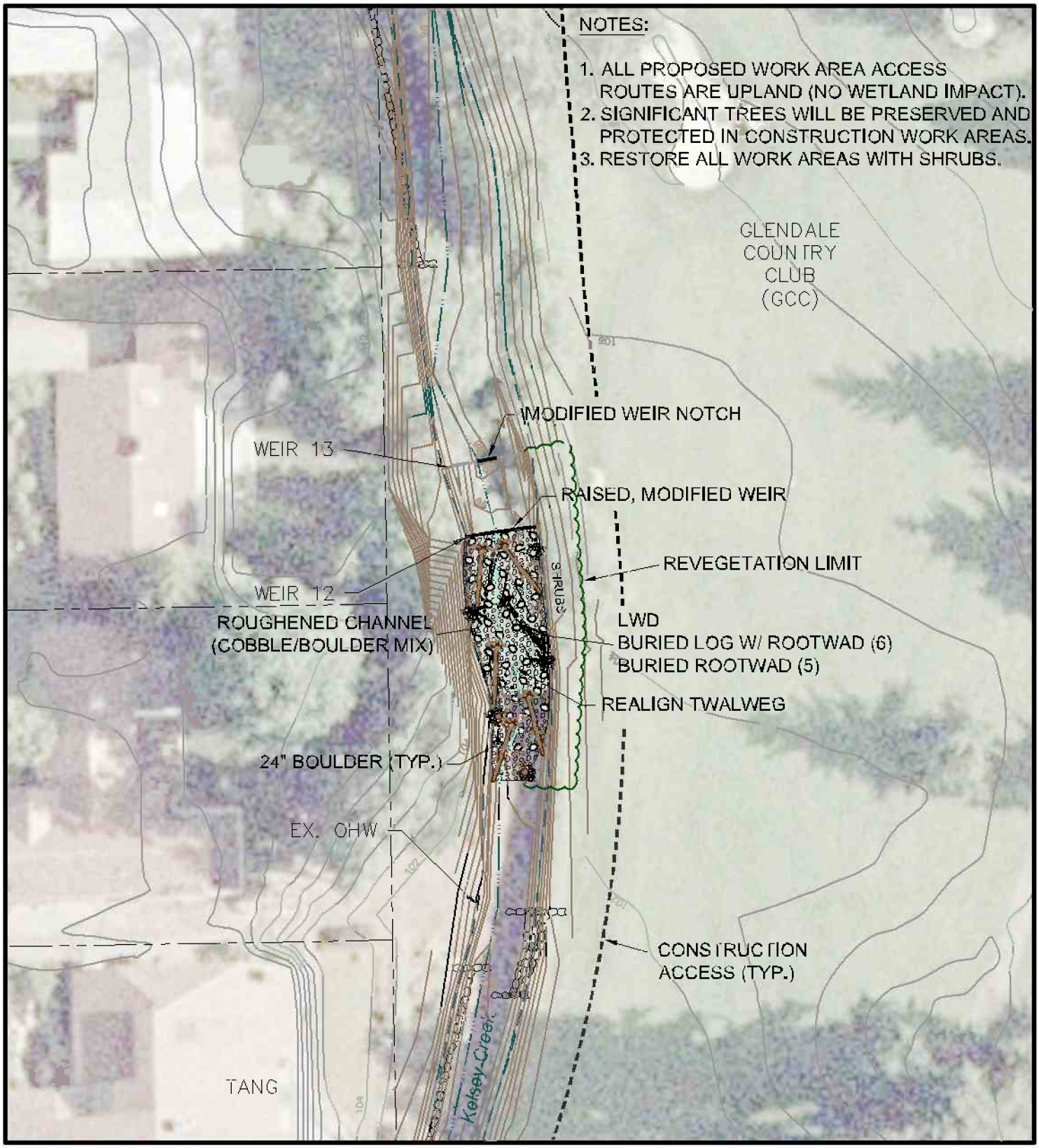

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Figure 10
Site Plan–Reach 4–Weir Pair 12-13 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

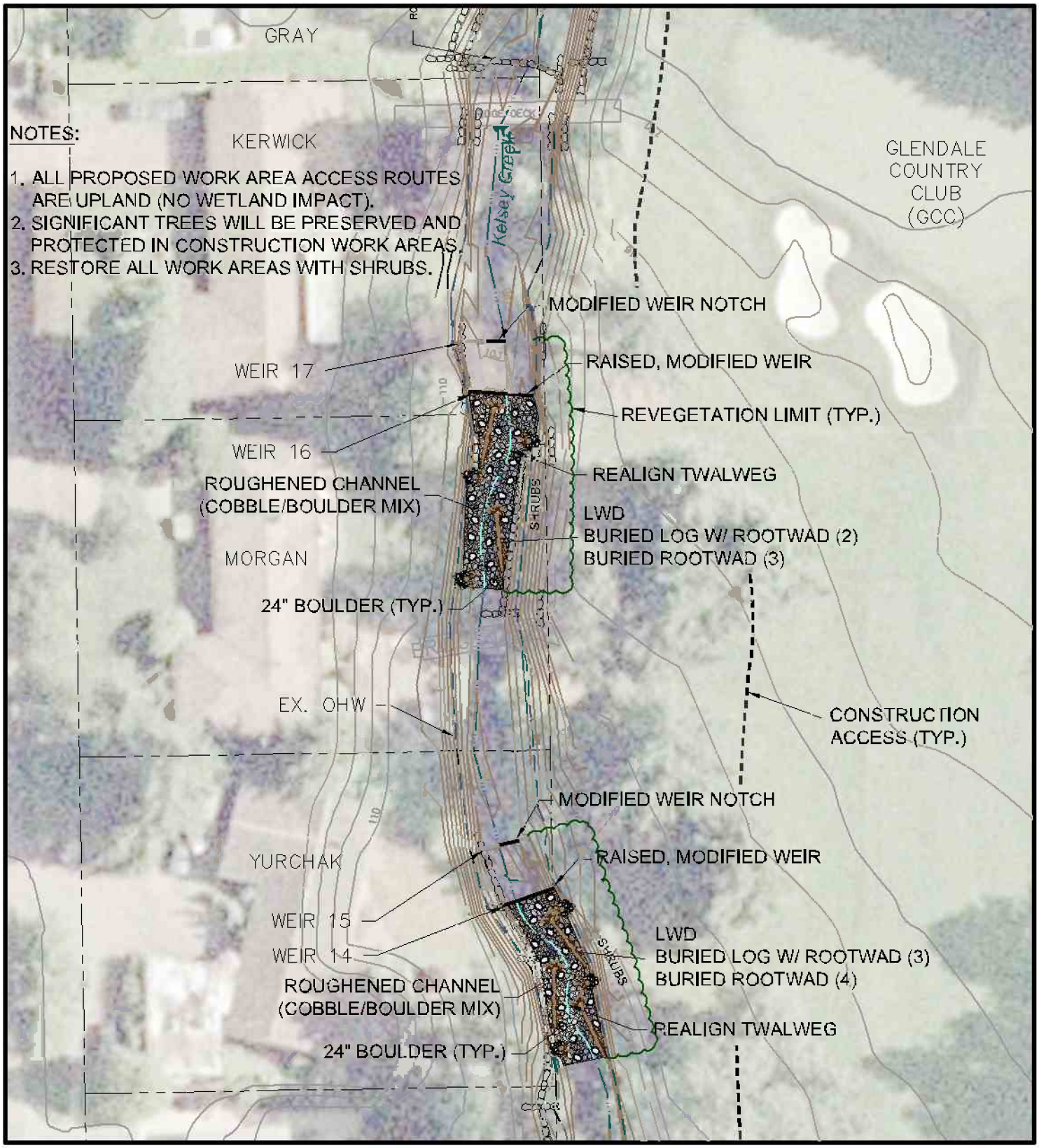

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Figure 11
Site Plan–Reach 4–Weir Pairs 14-15, 16-17 Improvements
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

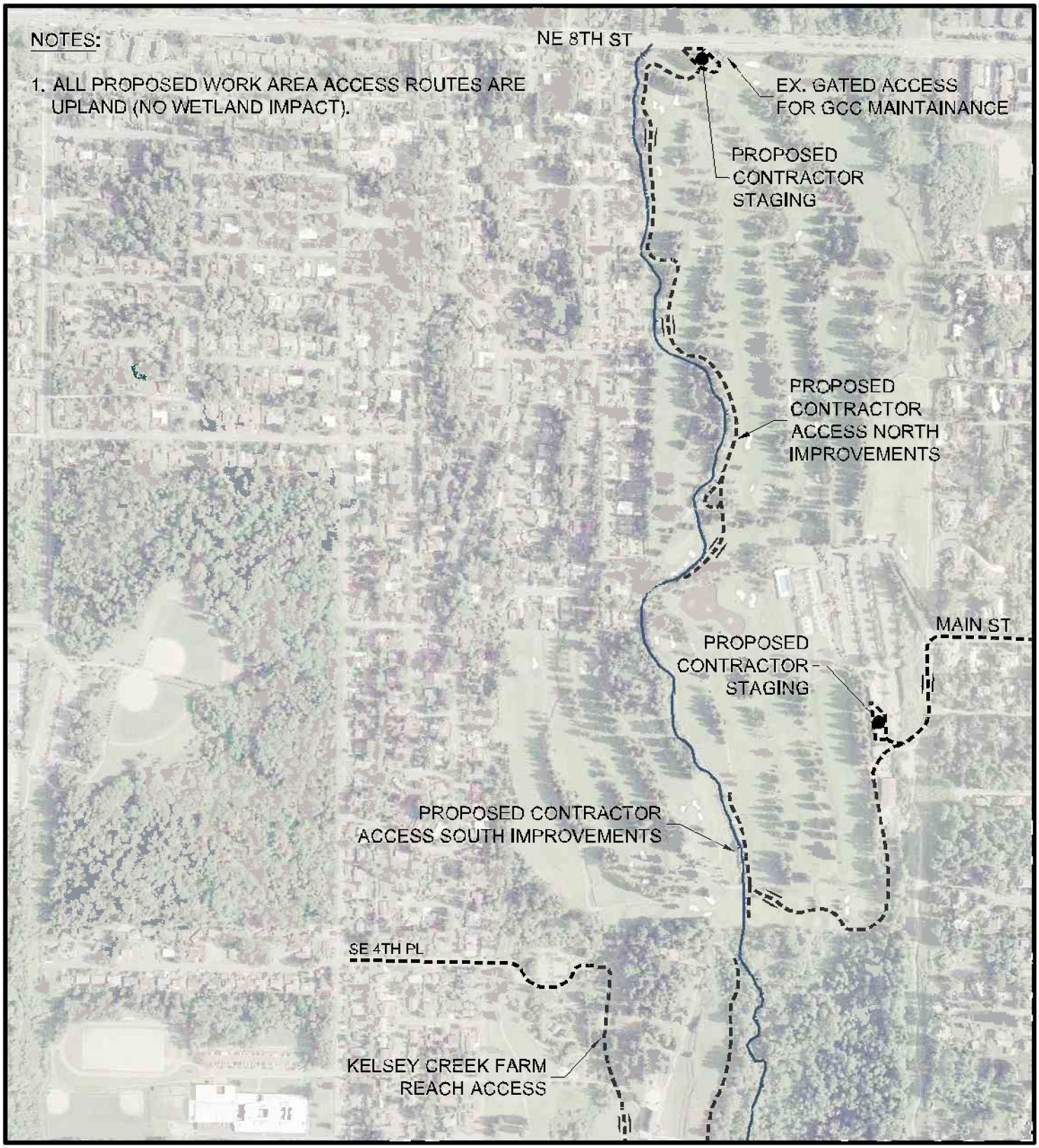

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Figure 12
Reach 4–Site Access Plan
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

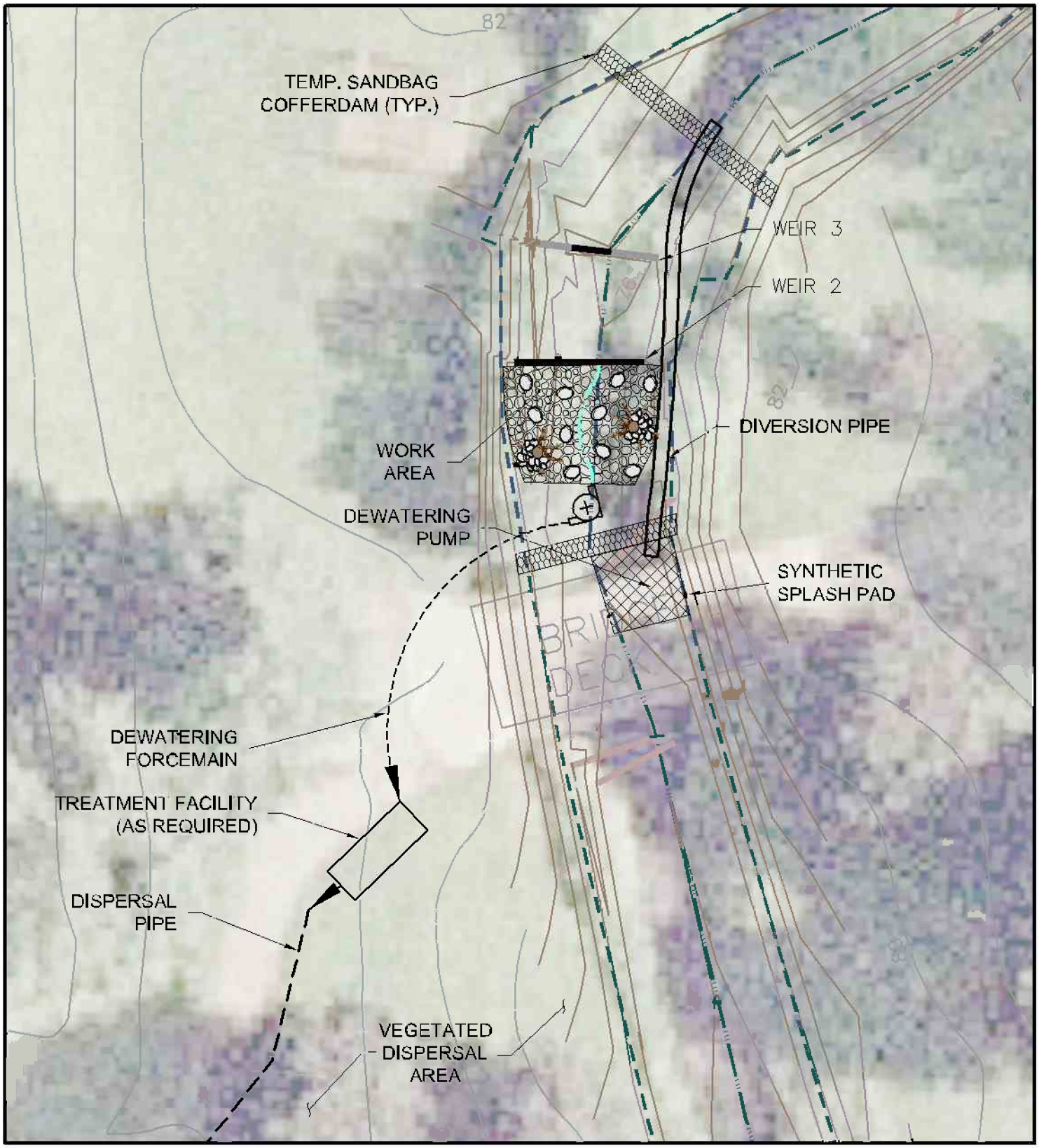

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Figure 13
Typical TESC/Stream Flow Bypass and Dewatering Plan
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

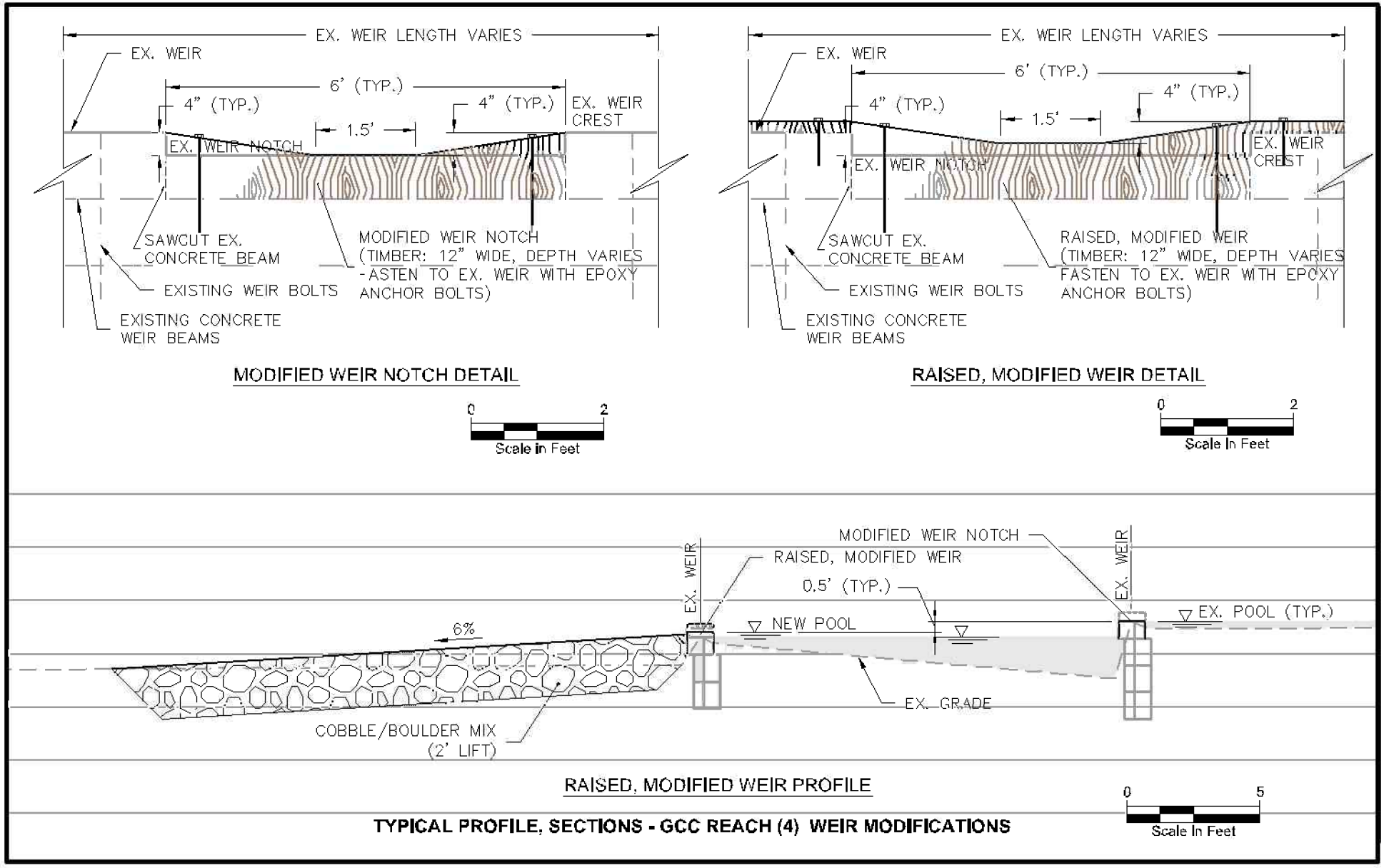

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Figure 14
Sections–Reach 4–Weir Modifications
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

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Figure 15
Project Study Reaches
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

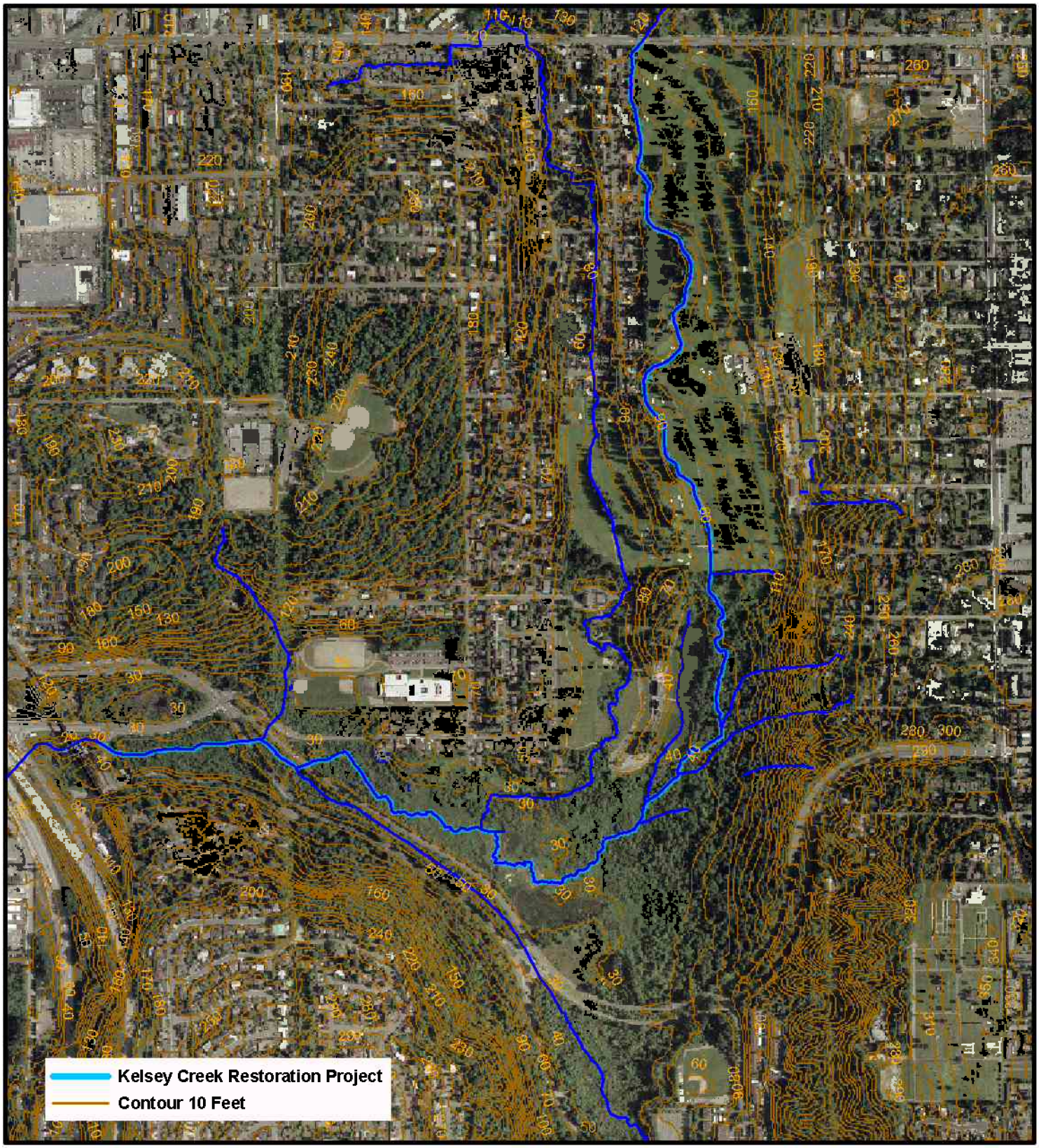

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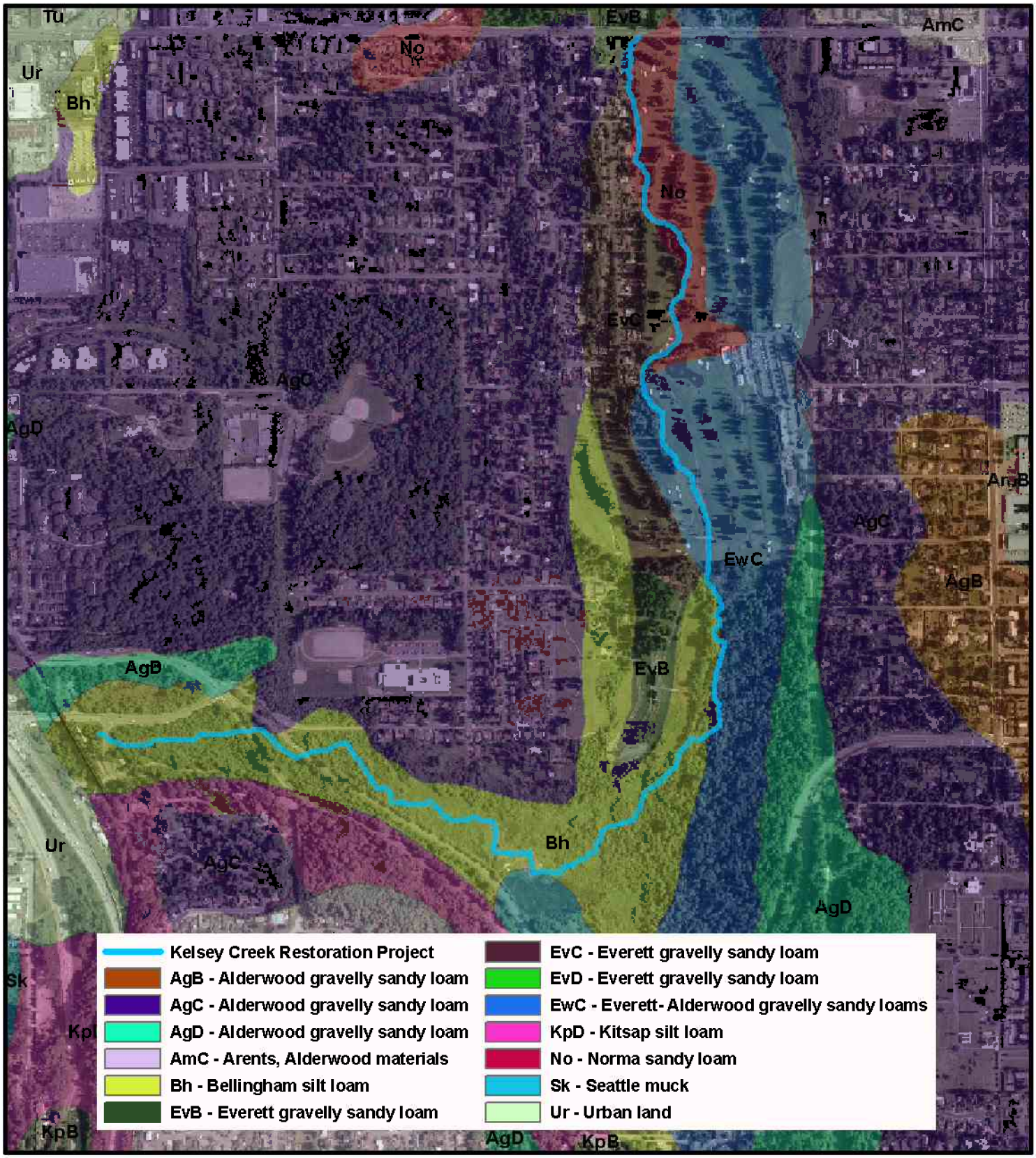
Figure 16
Topographic Map
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



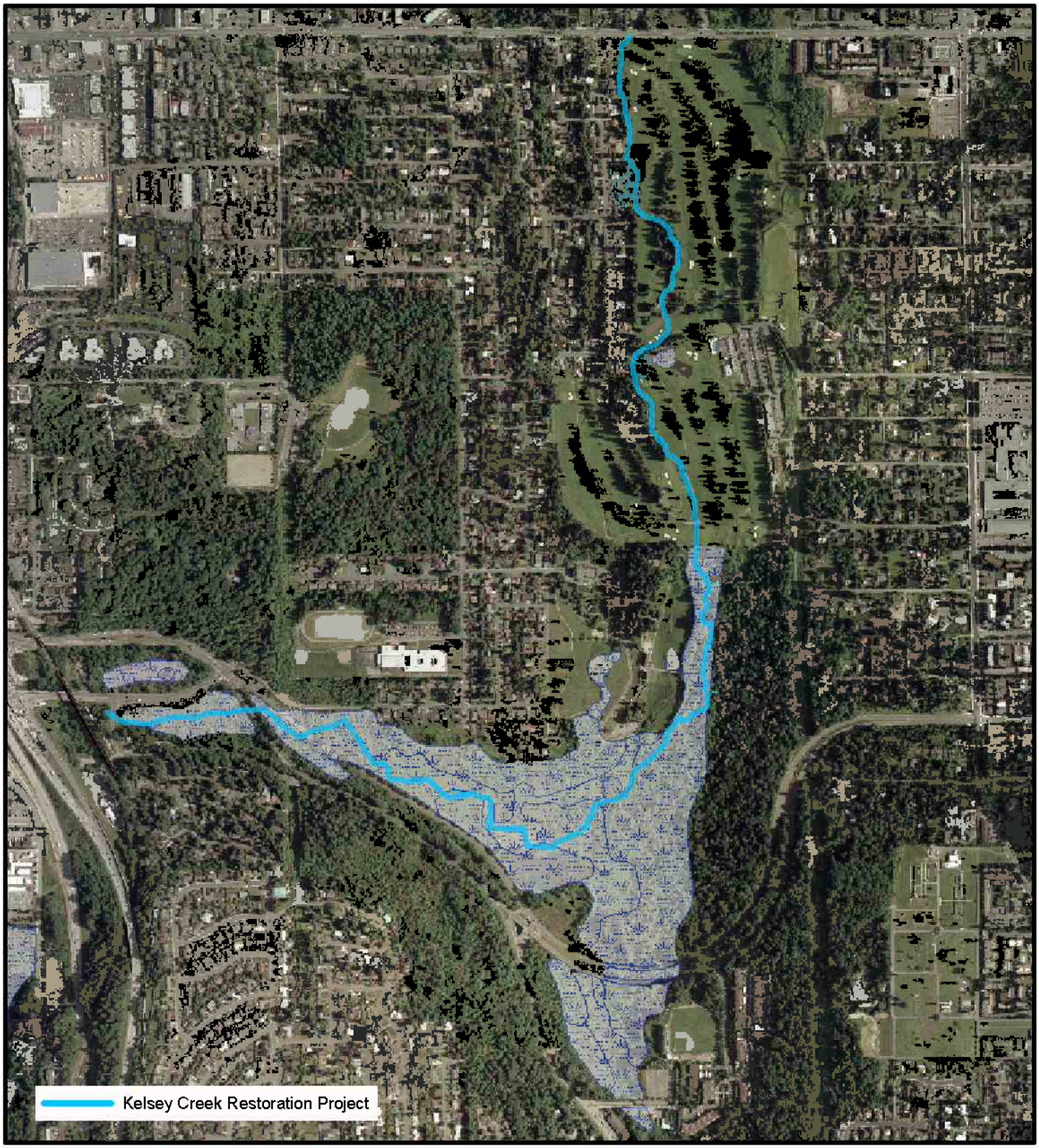
ANCHOR QEA

0 400 800 Feet

N

Figure 17
Project Area Soils
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



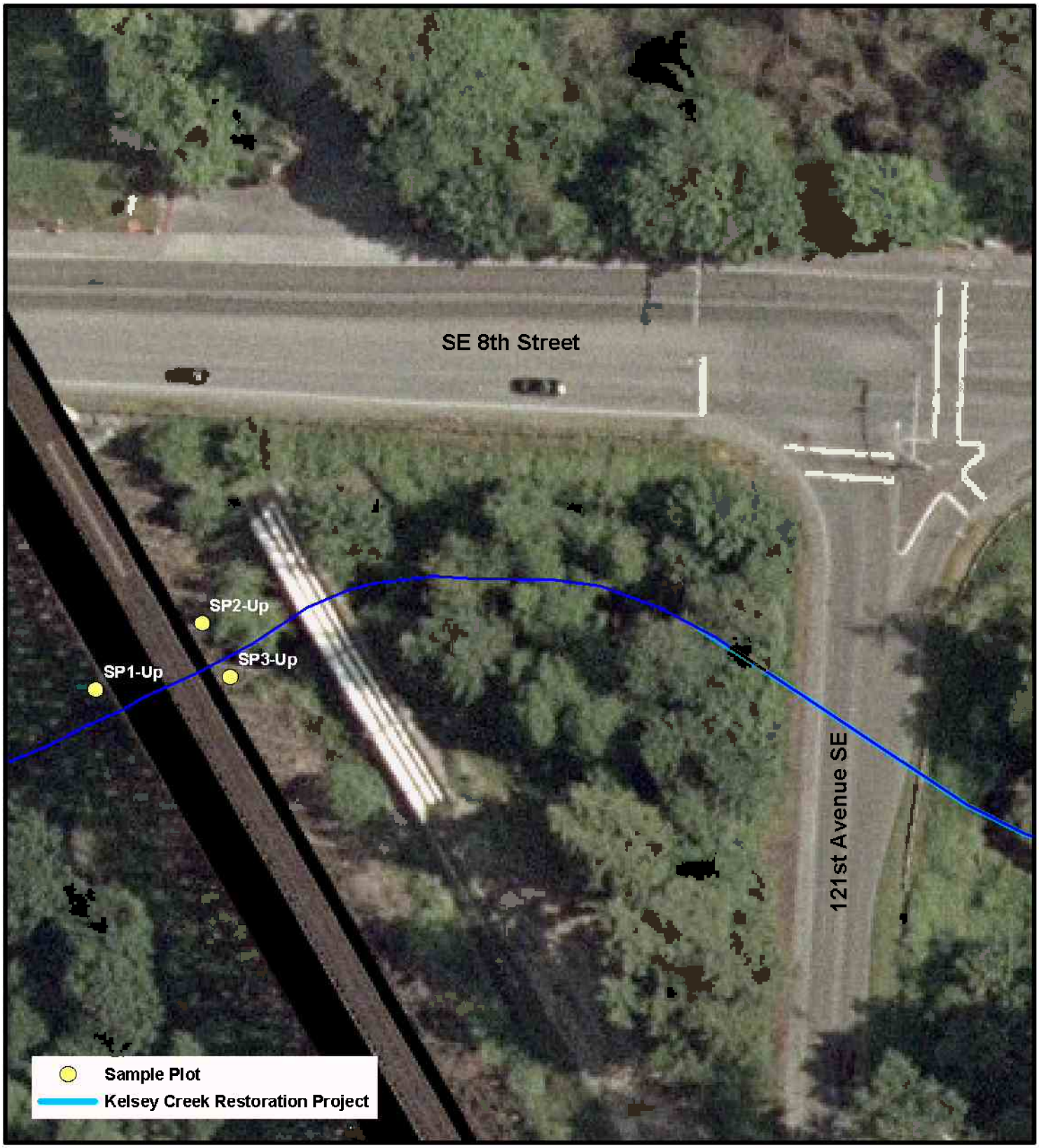
ANCHOR QEA

0 400 800 Feet

N

Figure 18
Project Area Wetlands
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



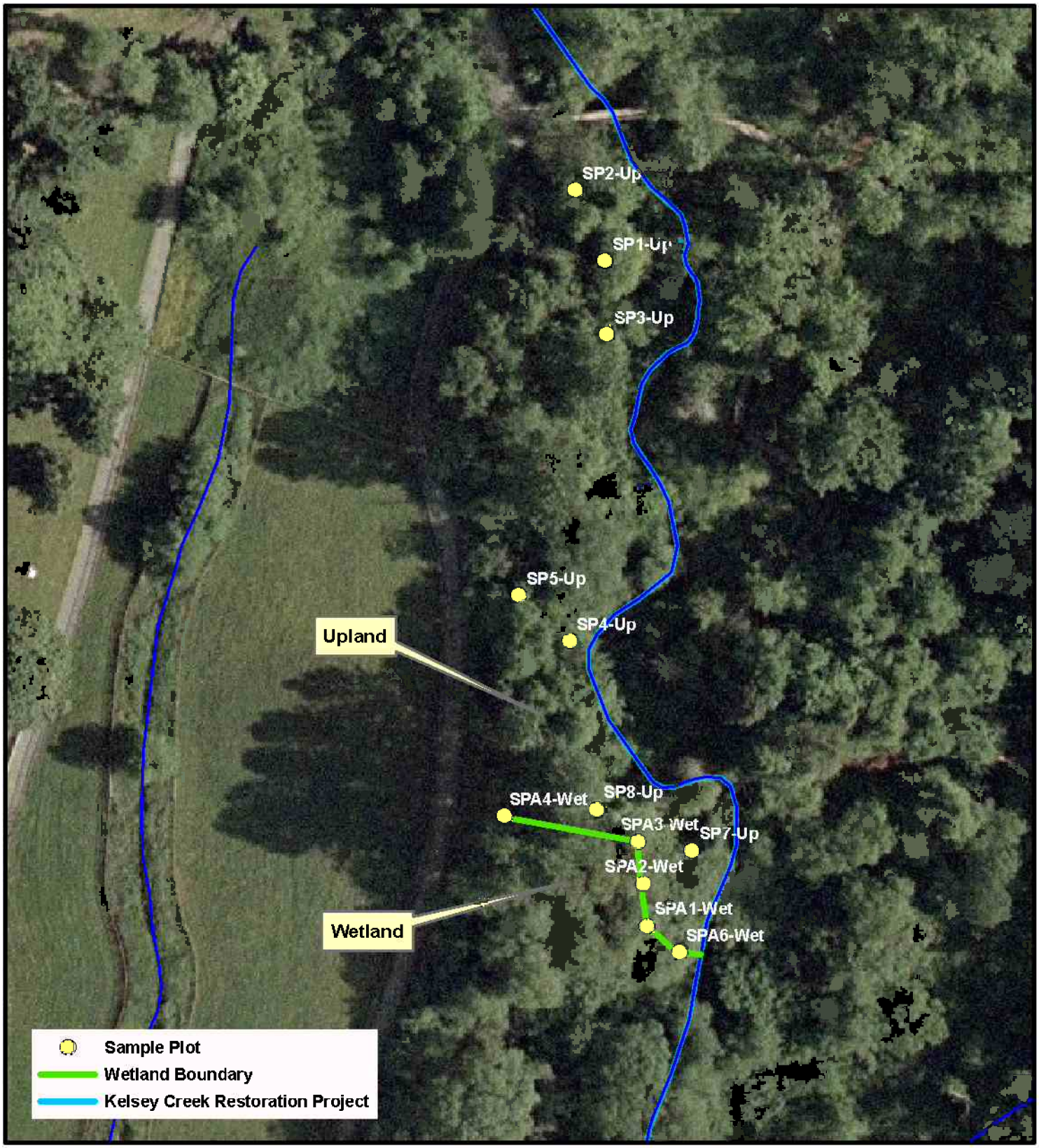
ANCHOR QEA

0 25 50 Feet

N

Figure 19
Wetland Delineation Sample Plot Locations–Reach 1
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



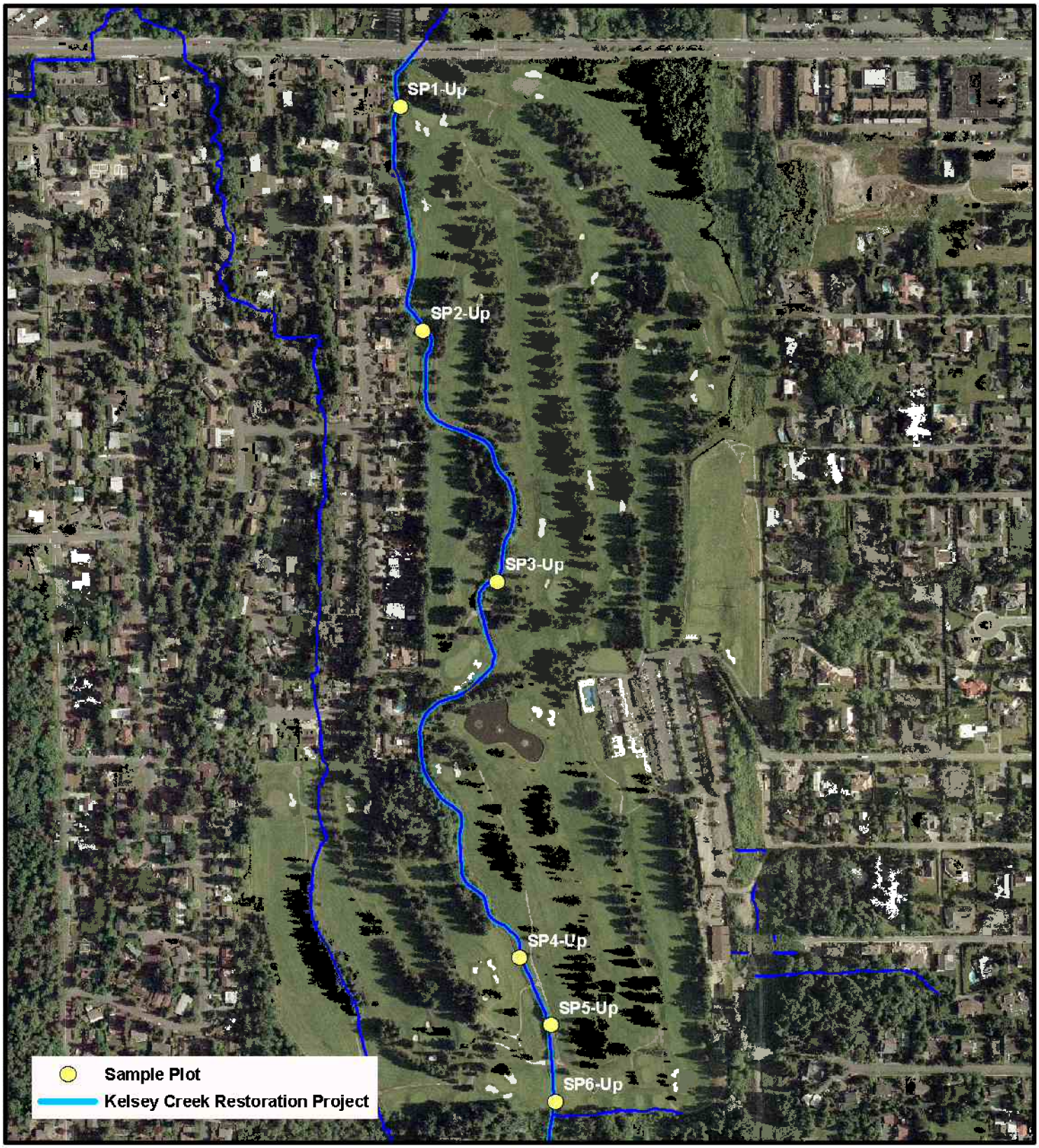
ANCHOR QEA

0 25 50 Feet

N

Figure 20
Wetland Boundary and Sample Plot Locations–Reach 3
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



ANCHOR QEA

0 250 500 Feet

N

Figure 21
Wetland Delineation Sample Plot Locations–Reach 4
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

APPENDIX A
WETLAND DELINEATION SAMPLE PLOT DATA

Table A-1
Reach 1 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (percent)
1Up	Phalaris arundinacea	Reed canarygrass	FACW	80
	Rubus armeniacus	Himalayan blackberry	FACU	30
	Urtica dioica	Stinging nettle	FAC+	20
2Up	Equisetum arvense	Field horsetail	FAC	10
	Phalaris arundinacea	Reed canarygrass	FACW	70
	Rubus armeniacus	Himalayan blackberry	FACU	40
	Urtica dioica	Stinging nettle	FAC+	30
3Up	Alnus rubra	Red alder	FAC	40
	Phalaris arundinacea	Reed canarygrass	FACW	60
	Rubus armeniacus	Himalayan blackberry	FACU	30
	Urtica dioica	Stinging nettle	FAC+	20

Notes:

OBL	Obligate wetland
FACW or FACW+	Facultative wetland
FAC or FAC+	Facultative

Table A-2
Reach 1 Sample Plot Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 18 +	10 YR 3/2	None	Silt loam
2Up	0 to 18+	10 YR 3/2	None	Silt loam
3Up	0 to 8	10 YR 3/2	None	Sandy loam

Table A-3

Reach 1 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water to 20 inches
2Up	No saturation or freestanding water to 20 inches
3Up	No saturation or freestanding water to 20 inches

Table A-4

Reach 1 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Hydrophytic	Non-hydric	Negative	Upland
2Up	Hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland

Table A-5
Reach 3 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (percent)
1Up	*Alnus rubra*	Red alder	FAC	80
	Polygonum cuspidatum	Japanese knotweed	FACU	70
	Rubus armeniacus	Himalayan blackberry	FACU	50
	Salix scouleriana	Scouler willow	FAC	20
2Up	*Alnus rubra*	Red alder	FAC	70
	Polygonum cuspidatum	Japanese knotweed	FACU	60
	Rubus armeniacus	Himalayan blackberry	FACU	40
	Salix scouleriana	Scouler willow	FAC	10
3Up	*Alnus rubra*	Red alder	FAC	70
	Athyrium filix-femina	Lady fern	FAC+	10
	Phalaris arundinacea	Reed canarygrass	FACW	90
	Polygonum cuspidatum	Japanese knotweed	FACU	30
	Populus trichocarpa	Black cottonwood	FAC	20
	Rubus armeniacus	Himalayan blackberry	FACU	40
	Rubus spectabilis	Salmonberry	FAC+	20
4Up	*Alnus rubra*	Red alder	FAC	60
	Phalaris arundinacea	Reed canarygrass	FACW	80
	Polygonum cuspidatum	Japanese knotweed	FACU	30
	Rubus armeniacus	Himalayan blackberry	FACU	30
	Salix lasiandra	Pacific willow	FACW+	30
	Urtica dioica	Stinging nettle	FAC+	40
5Up	*Alnus rubra*	Red alder	FAC	60
	Polygonum cuspidatum	Japanese knotweed	FACU	70
	Rubus armeniacus	Himalayan blackberry	FACU	40
6Wet	*Phalaris arundinacea*	Reed canarygrass	FACW	60
	Polygonum cuspidatum	Japanese knotweed	FACU	10
	Rubus armeniacus	Himalayan blackberry	FACU	20
	Rubus spectabilis	Salmonberry	FAC+	20
	Salix lasiandra	Pacific willow	FACW+	80
	Urtica dioica	Stinging nettle	FAC+	40
7Up	*Polygonum cuspidatum*	Japanese knotweed	FACU	80
	Rubus armeniacus	Himalayan blackberry	FACU	40
	Salix lasiandra	Pacific willow	FACW+	30

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (percent)
8Up	*Polygonum cuspidatum*	Japanese knotweed	FACU	90
	Populus trichocarpa	Black cottonwood	FAC	30
	Rubus armeniacus	Himalayan blackberry	FACU	20
	Salix scouleriana	Scouler willow	FAC	20

Notes:
OBL Obligate wetland
FACW or FACW+ Facultative wetland
FAC or FAC+ Facultative

Table A-6
Reach 3 Sample Plots Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 7	10 YR 3/2	None	0
	7 to 18+	10 YR 3/2	None	0
2Up	0 to 6	10 YR 3/2	None	0
	6 to 18+	10 YR 3/2	None	0
3Up	0 to 9	10 YR 3/3	None	0
	9 to 18+	10 YR 3/3	None	0
4Up	0 to 6	10 YR 4/3	None	0
	6 to 18+	10 YR 4/3	None	0
5Up	0 to 7	10 YR 3/4	None	0
	7 to 18+	10 YR 3/4	None	0
6Wet	0 to 5	10 YR 3/1	None	0
	5 to 8	10 YR 6/2	7.5 YR 5/6	15
	8 to 18+	10 YR 3/1	2.5 YR 4/6	20
7Up	0 to 10	10 YR 3/2	None	0
	10 to 18+	10 YR 3/2	None	0
8Up	0 to 8	10 YR 3/2	None	0
	8 to 18+	10 YR 3/2	None	0

Table A-7

Reach 3 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water in pit to 20 inches
2Up	No saturation or freestanding water in pit to 20 inches
3Up	No saturation or freestanding water in pit to 20 inches
4Up	No saturation or freestanding water in pit to 20 inches
5Up	No saturation or freestanding water in pit to 20 inches
6Wet	Saturation at 10 inches and no freestanding water in pit to 20 inches
7Up	No saturation or freestanding water in pit to 20 inches
8Up	No saturation or freestanding water in pit to 20 inches

Table A-8

Reach 3 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Non-hydrophytic	Non-hydric	Negative	Upland
2Up	Non-hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland
4Up	Non-hydrophytic	Non-hydric	Negative	Upland
5Up	Non-hydrophytic	Non-hydric	Negative	Upland
6Wet	Hydrophytic	Hydric	Positive	Wetland
7Up	Non-hydrophytic	Non-hydric	Negative	Upland
8Up	Non-hydrophytic	Non-hydric	Negative	Upland

Table A-9
Reach 4 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (percent)
1Up	*Athyrium filix-femina*	Lady fern	FAC+	10
	Cirsium arvense	Canadian thistle	FACU+	20
	Phalaris arundinacea	Reed canarygrass	FACW	40
	Polygonum cuspidatum	Japanese knotweed	FACU	20
	Ranunculus repens	Creeping buttercup	FACW	30
	Rosa nutkana	Nootka rose	FAC	30
	Rubus armeniacus	Himalayan blackberry	FACU	25
	Symphoricarpos albus	Snowberry	FACU	25
2Up	*Carex obnupta*	Slough sedge	OBL	40
	Lotus corniculatus	Birds-foot trefoil	FAC	10
	Phalaris arundinacea	Reed canarygrass	FACW	30
	Polygonum cuspidatum	Japanese knotweed	FACU	20
	Ranunculus repens	Creeping buttercup	FACW	10
	Rubus armeniacus	Himalayan blackberry	FACU	40
	Urtica dioica	Stinging nettle	FAC+	10
3Up	*Alnus rubra*	Red alder	FAC	30
	Epilobium watsonii	Watson's willow-herb	FACU-	10
	Phalaris arundinacea	Reed canarygrass	FACW	50
	Polygonum cuspidatum	Japanese knotweed	FACU	30
	Rubus armeniacus	Himalayan blackberry	FACU	20
	Salix lasiandra	Pacific willow	FACW+	30
	Symphoricarpos albus	Snowberry	FACU	10
4Up	*Carex obnupta*	Slough sedge	OBL	10
	Epilobium watsonii	Watson's willow-herb	FACU-	5
	Festuca arundinacea	Tall fescue	FAC-	10
	Holcus lanatus	Common velvet grass	FAC	10
	Phalaris arundinacea	Reed canarygrass	FACW	20
	Polygonum cuspidatum	Japanese knotweed	FACU	20
	Rubus ursinus	Trailing blackberry	FACU	25
	Taraxacum officinale	Common dandelion	FACU	15
	Urtica dioica	Stinging nettle	FAC+	10
5Up	*Festuca arundinacea*	Tall fescue	FAC-	20

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (percent)
	Holcus lanatus	Common velvet grass	FAC	30
	Lotus corniculatus	Birds-foot trefoil	FAC	20
	Phalaris arundinacea	Reed canarygrass	FACW	10
	Polygonum cuspidatum	Japanese knotweed	FACU	20
	Rubus armeniacus	Himalayan blackberry	FACU	25
	Solanum dulcamara	Bittersweet nightshade	FAC+	20
	Urtica dioica	Stinging nettle	FAC+	20
6Up	*Festuca arundinacea*	Tall fescue	FAC-	30
	Holcus lanatus	Common velvet grass	FAC	20
	Lotus corniculatus	Birds-foot trefoil	FAC	10
	Phalaris arundinacea	Reed canarygrass	FACW	25
	Plantago lanceolata	English plantain	FAC	15
	Ranunculus repens	Creeping buttercup	FACW	25
	Rumex crispus	Curly dock	FAC+	5
	Taraxacum officinale	Common dandelion	FACU	20
	Urtica dioica	Stinging nettle	FAC+	20

Notes:
OBL Obligate wetland
FACW or FACW+ Facultative wetland
FAC or FAC+ Facultative

Table A-10
Reach 4 Sample Plot Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 8	10 YR 3/2	None	Sandy loam with gravel
	8 to 18+	10 YR 3/2	None	Loamy sand with gravel and cobble
2Up	0 to 2	10 YR 2/3	None	Sandy loam
	2 to 18+	10 YR 4/3	None	Loamy sand
3Up	0 to 18+	10 YR 4/3	None	Loamy sand with gravel
4Up	0 to 4	10 YR 3/3	None	Sandy loam
	4 to 18+	10 YR 3/2	None	Sandy loam
5Up	0 to 6	10 YR 3/2	None	Sandy loam
	6 to 18+	10 YR 4/3	None	Loamy sand
6Up	0 to 4	10 YR 3/2	None	Sandy loam
	4 to 18+	10 YR 4/3	None	Sandy loam with gravel

Table A-11
Reach 4 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water in pit to 20 inches
2Up	Saturation at 14 inches and no freestanding water in pit to 20 inches
3Up	No saturation or freestanding water in pit to 20 inches
4Up	No saturation or freestanding water in pit to 20 inches
5Up	No saturation or freestanding water in pit to 20 inches
6Up	No saturation or freestanding water in pit to 20 inches

Table A-12

Reach 4 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Hydrophytic	Non-hydric	Negative	Upland
2Up	Hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland
4Up	Non-hydrophytic	Non-hydric	Negative	Upland
5Up	Hydrophytic	Non-hydric	Negative	Upland
6Up	Hydrophytic	Non-hydric	Negative	Upland

APPENDIX B
ECOLOGY 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): Kelsey Creek Wetland Date of site visit: 10/1/09

Rated by C. Douglas Trained by Ecology? Yes X No___ Date of training May 07

SEC: ~~26~~ 33 & 34 TWNSHP: 25 RNGE: 5 Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size 7.32 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I X **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	16
Score for Hydrologic Functions	32
Score for Habitat Functions	25
TOTAL score for Functions	73

Category based on SPECIAL CHARACTERISTICS of wetland

I___ **II**___ **Does not Apply** X

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

Summary of basic information about the wetland unit

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

Wetland name or number A

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

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

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

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

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

Wetland name or number A

Classification of Wetland Units in Western Washington

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

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

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

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

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

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

NO – go to 3 **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;

___At least 30% of the open water area is deeper than 6.6 ft (2 m)?

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

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

X The wetland is on a slope (*slope can be very gradual*),

X 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.

X 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**

Wetland name or number A

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

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

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

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

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

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM clases. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

Wetland name or number A

R	**Riverine and Freshwater Tidal Fringe Wetlands** WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	**Points** (only 1 score per box)
R	**R 1. Does the wetland unit have the potential to improve water quality?**	*(see p.52)*
R	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: Depressions cover >3/4 area of wetland — points = 8 Depressions cover > 1/2 area of wetland — points = 4 If depressions > ½ of area of unit draw polygons on aerial photo or map Depressions present but cover < 1/2 area of wetland — points = 2 No depressions present — points = 0	Figure ___ 2
R	R 1.2 Characteristics of the vegetation in the unit (areas with >90% cover at person height): Trees or shrubs > 2/3 the area of the unit — points = 8 Trees or shrubs > 1/3 area of the unit — points = 6 Ungrazed, herbaceous plants > 2/3 area of unit — points = 6 Ungrazed herbaceous plants > 1/3 area of unit — points = 3 Trees, shrubs, and ungrazed herbaceous < 1/3 area of unit — points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 6
R	*Add the points in the boxes above*	8
R	**R 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft X Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 feet of wetland X A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging X Residential, urban areas, golf courses are within 150 ft of wetland X The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above standards for water quality — Other _____ YES multiplier is 2 NO multiplier is 1	*(see p.53)* multiplier 2
R	**TOTAL - Water Quality Functions** Multiply the score from R 1 by R 2 *Add score to table on p. 1*	16

Comments

Wetland name or number A

R	**Riverine and Freshwater Tidal Fringe Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
	R 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.54)*
R	R 3.1 Characteristics of the overbank storage the unit provides: *Estimate the average width of the wetland unit perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of unit)/(average width of stream between banks).* If the ratio is more than 20 — points = 9 If the ratio is between 10 – 20 — points = 6 If the ratio is 5 - <10 — points = 4 If the ratio is 1 - <5 — points = 2 If the ratio is < 1 — points = 1 Aerial photo or map showing average widths	Figure ___ 9
R	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub". Choose the points appropriate for the best description.* ~~(polygons need to have >90% cover at person height NOT Cowardin classes).~~ Forest or shrub for >1/3 area OR herbaceous plants > 2/3 area — points = 7 Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area — ~~points = 4~~ Vegetation does not meet above criteria — points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 7
R	*Add the points in the boxes above*	16
R	**R 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* X There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. X There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding — Other_____ *(Answer NO if the major source of water to the wetland is controlled by a reservoir or the ~~wetland is tidal fringe~~ along the sides of a dike)* **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.57)* multiplier 2
R	**TOTAL - Hydrologic Functions** Multiply the score from R 3 by R 4 ***Add score to table on p. 1***	32

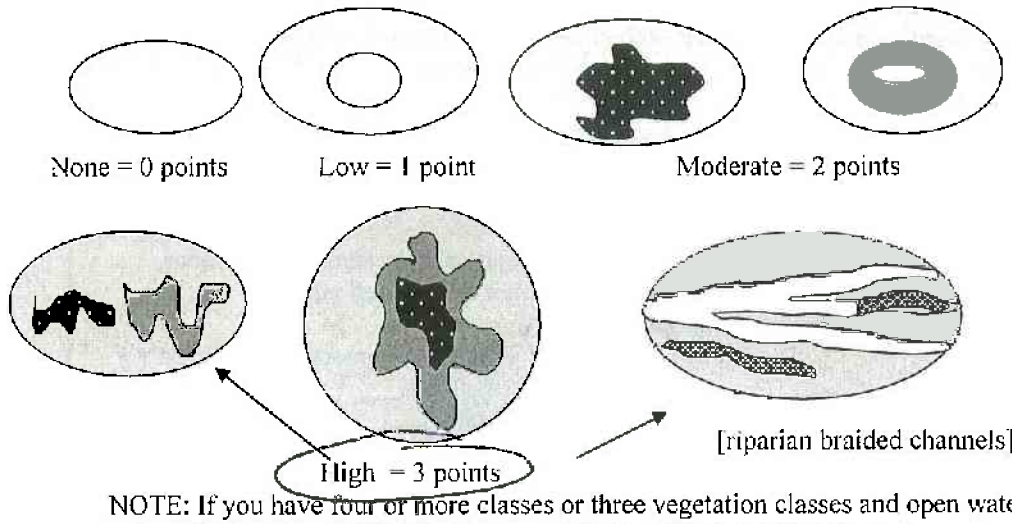
Comments

Wetland name or number A

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

Total for page 7

Wetland name or number A

	Figure ___
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 classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	3
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland X Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) X 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)* X At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated. *(structures for egg-laying by amphibians)* ___ Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	5
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	15

Comments

Wetland name or number A

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

Total for page 4

Wetland name or number A

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*** Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). X **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. X **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question II 2.4)*	3

Wetland name or number _____

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with **little** disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2 4*	10
TOTAL for H 1 from page 14	15
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	25

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

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

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands ***(see p. 86)*** Does the wetland unit meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt. YES = Go to SC 1.1 NO ___	
SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated ~~under WAC~~ 332-30-151? YES = Category I NO go to SC 1.2	**Cat. I**
SC 1.2 Is the wetland unit at least 1 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

SC 2.0 Natural Heritage Wetlands *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ___ or accessed from WNHP/DNR web site ___ YES____ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO ___ SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO X not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs *(see p. 87)* Does the wetland unit (**or any part of the unit**) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog.* ***If you answer yes you will still need to rate the wetland based on its functions.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to Q. 3 No - go to Q. 2 2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? Yes - go to Q. 3 No - Is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes – Is a bog for purpose of rating No - go to Q. 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. *1.* Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cover)?* 2. YES = Category I No X Is not a bog for purpose of rating	**Cat. I**

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

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

ANCHOR QEA

1423 Third Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131
www.anchorqea.com

TECHNICAL MEMORANDUM

To:	Stephen Noeske, P.E.; City of Bellevue	**Date:**	November 10, 2009
From:	Katie Chamberlin; Anchor QEA, LLC	**Project:**	070078-01
Cc:	Jerry Bibee; Anchor QEA, LLC		
Re:	Kelsey Creek Stream Channel Modification Improvements Project – Shoreline Substantial Development Permit Requirements		

The City of Bellevue (City) Utilities/Engineering Department, in coordination with their project consultant, Anchor QEA, LLC (Anchor QEA), is developing plans for the Kelsey Creek Stream Channel Modification Improvements Project (Project), located in Bellevue, King County, Washington (Township 24 North, Range 5 East, Sections 3 and 4 and Township 25 North, Range 5 East, Sections 33 and 34). The purpose of the proposed Project is to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use of Kelsey Creek. Specific Project activities requiring environmental permitting approvals include:

- Modification to portions of existing instream hydraulic structures (weirs) for improved fish passage consistent with current state and federal standards
- Streambed excavation for key-in and placement of cobble/boulder streambed mix with projecting boulder fill and with partially buried and anchored large woody debris (LWD) for roughened channel segments
- Strategic placement of LWD (logs with rootwads, rootwads, or fallen trees) and engineered log jams for stream processes and habitat enhancement; selective channel grading and bank restoration including pools creation
- Removal of non-native invasive vegetation from selected stream banks within proposed work areas and replanting disturbed areas with native plant species

This technical memorandum has been prepared in support of the City's Land Use Division Shoreline Substantial Development Permit (SSDP) review. In response to the City's Land

Use Division letter dated March 12, 2009, this technical memorandum includes a discussion of how the proposed Project will both meet the Bellevue City Code (BCC) criteria for issuance of a SSDP and comply with specific performance standards contained in Chapter 20.25E of its Land Use Code (LUC; City of Bellevue 2009a).

PROJECT COMPLIANCE WITH SSDP ISSUANCE CRITERIA

Issuance of a SSDP is the primary mechanism by which the City administers the Shoreline Master Program (SMP) in a manner consistent with the policies of the Shoreline Management Act (SMA). The primary policies of the SMA are to encourage water-dependent uses, protect shoreline natural resources, and promote public access. The criteria used by the City in issuing a SSDP are contained in LUC 20.30R.155.B and read as follows (City of Bellevue 2009b):

> The Director of Planning and Community Development may approve or approve with modifications if:
>
> 1. The applicant has carried the burden of proof and produced evidence sufficient to support the conclusion that the application merits approval or approval with modifications; and
> 2. The applicant has demonstrated that the proposal complies with the applicable decision criteria of the Bellevue City Code; and
> 3. The applicant has demonstrated that the proposal is consistent with the policies and procedures of the Shoreline Management Act and the provisions of Chapter 173-14 WAC and the Master Program.
>
> In all other cases, the applicable Department Director shall deny the application.

The benefits of the proposed Project attest to its merit and are presented in detail in the *Kelsey Creek Stream Modification Improvement Project Critical Areas Report* (Anchor QEA 2009). The proposed Project will comply with the applicable decision criteria for issuance of a SSDP, as noted in LUC 20.30R, and Critical Areas Land Use Permit, as noted in LUC 20.30P. In addition, the *Kelsey Creek Stream Modification Improvement Project Critical Areas Report* includes descriptions of how the proposed Project will comply with the BCC required performance standards listed in Table 1.

Table 1
Performance Standards for Habitat Improvement Projects in Critical Areas

Critical Area	Performance Standards
Wetland	LUC 20.25H.055.C.3.j LUC 20.25H.100
Stream	LUC 20.25H.055.C.3.j LUC 20.25H.080.A
Shoreline	LUC 20.25H.055.C.3.j LUC 20.25E.080.B LUC 20.25E.080.G
Areas of Special Flood Hazard	LUC 20.25H.055.C.3.j LUC 20.25H.180.C

Notes:
Source: City of Bellevue 2009b

The proposed Project is consistent with the policies of the SMA, the provisions of Chapter 173-14 WAC, and the City's SMP. It protects shoreline natural resources by the improving the habitat quality of select reaches of Kelsey Creek. The proposed Project does not affect the ability for water-dependent or public access uses to develop in shoreline areas.

PROJECT COMPLIANCE WITH CITY CODE PERFORMANCE STANDARDS

The March 12, 2009, letter from the City's Land Use Division specifically noted that the proposed Project must comply with LUC 20.25E.080.E (Shoreline Stabilization, Including Existing Bulkheads) and LUC 20.25H.080.G, in addition to the performance standards listed in Table 1. The text of these performance standards and a description of how the proposed Project will comply with them are provided in the following sections.

LUC 20.25E.080.E

The proposed Project meets the performance standard described in LUC 20.25E.080.E, which reads as follows:

> Shoreline stabilization is allowed in the shoreline critical area and shoreline critical area buffer in compliance with this subsection E. The requirements of this subsection E may be modified through a critical areas report, LUC 20.25H.230.

1. Definitions.
   a. Hard Shoreline Stabilization Measures. As used in this part, "hard shoreline stabilization measures" include: rock revetments, gabions, concrete groins, retaining walls, bulkheads and similar measures which present a vertical or nearly vertical interface with the water.

   b. Soft Shoreline Stabilization Measures. As used in this part, "soft shoreline stabilization measures" include: biotechnical measures, beach enhancement, anchor trees, gravel placement, stepped back rockeries, shoreline plantings and similar measures that use natural materials engineered to provide shoreline stabilization while mimicking or preserving the functions and values of the shoreline critical area.

   c. Shoreline Stabilization Measures. As used in this part, "shoreline stabilization measures" refers collectively to both hard and soft shoreline stabilization measures.

   d. Avoidance Measures. As used in this part, "avoidance measures" refer to techniques used to minimize or prevent shoreline erosion that do not involve modification of the shoreline at the interface of land and water. "Avoidance measures" include vegetation enhancement, upland drainage control, and protective walls or embankments placed outside of the shoreline critical area and critical area buffer.

e. Technically Feasible. The determination of whether a technique or stabilization measure is "technically feasible" shall be made by the Director as part of the decision on the underlying permit after consideration of a report prepared by a qualified professional addressing the following factors:

   i. Site conditions, including topography and the location of the primary structure in relation to the ordinary high water mark;

   ii. The location of existing infrastructure necessary to support the proposed measure or technique;

   iii. The level of risk to the primary structure, public facility or public use structure or land area presented by shoreline erosion and ability of the proposed measure to mitigate that risk;

   iv. Whether the cost of avoiding disturbance of the shoreline critical area or shoreline critical area buffer is disproportionate as compared to the environmental impact of proposed disturbance, including any continued impacts on functions and values over time; and

   v. The ability of both permanent and temporary disturbance to be mitigated.

f. Allowed Land Area. As used in this part, "allowed land area" is the land area located within 25 feet of the existing primary structure landward of the ordinary high water mark, or for public and city parks, that land area used for an active recreational use or developed with recreation facilities, including trails, picnic areas, and playfields.

g. Minor Repair. As used in this part, "minor repair" refers to modifications or improvements to an existing shoreline stabilization measure that are designed to ensure the continued function of the stabilization measure by preventing failure of any part of the stabilization measure. A repair that is proposed after a significant portion of the stabilization measure has collapsed, eroded away or otherwise demonstrated a loss of structural integrity is not a minor repair.

2. New or Enlarged Shoreline Stabilization Measures.

   a. When Allowed. New or enlarged shoreline stabilization measures shall be allowed only to protect existing primary structures, public facility or public use structures, and allowed land area. Shoreline stabilization measures shall be allowed only where avoidance measures are not technically feasible.

   b. Type of Shoreline Stabilization Measure Used. Where a new or enlarged shoreline stabilization measure is allowed, soft shoreline stabilization measures shall be used, unless the applicant demonstrates that soft shoreline stabilization measures are not technically feasible. An applicant asserting that soft stabilization measures are not technically feasible shall provide the information relating to each of the factors set forth in subsection E.1.e of this section for a determination of technical feasibility by the director. Only after a determination that soft shoreline stabilization measures are not technically feasible shall hard shoreline stabilization measures be permitted.

   c. Location. Shoreline stabilization measures shall be located at or behind the ordinary high water mark. Soft shoreline stabilization measures may also be located waterward of the ordinary high water mark.

   d. Height limit. The height of any new or expanded hard shoreline stabilization measure shall not exceed 30 inches from average grade of actual or existing topography or, if at the ordinary high water mark, the ordinary high water mark; except that bulkhead heights may be increased if approved by the Director if the following criteria are satisfied:

      i. Increased height does not negatively impact abutting properties; and

      ii. Increased height is necessary to protect the existing primary structure or allowed land area because of:

         1. Slopes of 40 percent or greater at and immediately landward of the ordinary high water mark. In such instances, increased height shall be limited to the minimum height necessary to protect the existing primary structure and allowed land area, or

         2. Extraordinary wave action as demonstrated in a report prepared by a qualified professional. In such instances, increased height shall be limited to the minimum height necessary to protect the

existing primary structure and allowed land area or 45 inches, whichever is less.

e. Mitigation and Restoration. Areas of new permanent disturbance and all areas of temporary disturbance within the shoreline critical area and shoreline critical area buffer shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.

3. Repair and Replacement of Existing Shoreline Stabilization. This section allows repair and replacement of existing legally established shoreline stabilization measures.

   a. Minor Repair. Minor repair is permitted. Areas of temporary disturbance within the shoreline critical area or shoreline critical area buffer are restored pursuant to a restoration plan meeting the requirements of LUC 20.25H.210.

   b. Major Repair or Replacement. Major repair or replacement shall be treated as a new shoreline stabilization measure, subject to the provisions of subsection E.2 above.

4. Bulkheads shall be designed to minimize the transmission of wave energy to other properties.

5. Critical Area Buffer Modification. Where an applicant replaces a legally established existing hard shoreline stabilization measure with a soft shoreline stabilization measure or an avoidance measure, the critical area buffer and any applicable structure setback shall continue to be measured from the ordinary high water mark that existed with the hard shoreline stabilization measure. Such ordinary high water mark shall be located by a survey prior to removal of the hard shoreline stabilization measure.

The proposed Project does not include shoreline stabilization measures, as defined in LUC 20.25E.080.E, within the portion of Kelsey Creek designated as a shoreline critical area. The Reach 1 (SE 8th Street Reach) improvements in the channel bed riffle downstream of 121st Avenue Southeast —intended for fish passage and instream habitat improvements—and should not classify as hard or soft shoreline stabilization measures, as defined in LUC 20.25E.080.E. Some channel bank and construction access disturbance revegetation will occur but that will not involve installation of revetments or engineered bank stabilization approaches. Assuming that Reach 3 (Farm Reach) is confirmed to be in the shoreline critical

area, placement of LWD for instream habitat enhancement also should not classify as hard or soft shoreline stabilization measures, as defined in LUC 20.25E.080.E. It is understood that the shoreline critical area does not extend into Reach 4 (Glendale Country Club Reach) where some limited channel bank revetment work is proposed.

LUC 20.25E.080.G

The proposed Project meets the performance standard described in LUC 20.25E.080.G, which reads as follows:

1. All clearing, grading, excavating, and fill in the Shoreline Overlay District shall comply with the provisions of Chapter 23.76 BCC, now or as hereafter amended.
2. No clearing, grading, excavating, or fill shall be allowed within the shoreline critical area or shoreline critical area buffer except as permitted by this Part 20.25E, or in association with activities allowed under Part 20.25H LUC.
3. Wherever the City determines that the act or intended act of clearing, grading, excavation or fill has become or will constitute a hazard to life or limb, or endangers property, or adversely affects the safety, use of, or stability of a public way, drainage channel or natural stream corridor, including siltation and sedimentation therein, the owner of the property upon which the clearing, excavation or fill is located or other person or agent in the City shall, within the period specified therein, terminate such clearing, grading, excavation, embankment or fill, or eliminate the same from the development plan, or modify the plans, as may be required so as to eliminate the hazard and be in conformance with the requirements of this Code.

The proposed Project will comply with the BCC provisions on clearing, grading, excavation, or fill in the Shoreline Overlay District. If ever departments within the City find the proposed Project poses safety issues to people, property, public ways, or the stream corridor, the City will direct its contractor to stop work so that the issues may be resolved before resuming construction of the Project.

REFERENCES

Anchor QEA, LLC (Anchor QEA). 2009. *Kelsey Creek Stream Channel Modification Improvement Project Critical Areas Report*. Prepared for City of Bellevue, Bellevue, Washington.

City of Bellevue. 2009a. Letter Re: Kelsey Creek Stream Channel Improvements 09-104712 DB. March 12, 2009.

City of Bellevue. 2009b. City of Bellevue City Code. Bellevue, Washington. Accessed online at http://www.bellevuewa.gov/bellcode/bellevuent.html September 24, 2009.

ANCHOR QEA

1423 Third Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131
www.anchorqea.com

TECHNICAL MEMORANDUM

To:	Stephen Noeske, P.E.; City of Bellevue	**Date:**	November 10, 2009
From:	Calvin Douglas, Anchor QEA, LLC Jerry Bibee, Anchor QEA, LLC	**Project:**	070078-01
Re:	Kelsey Creek Stream Channel Modification Improvement Project – Stream Type Analysis		

The City of Bellevue (City) Utilities/Engineering Department in coordination with their project consultant, Anchor QEA, LLC (Anchor QEA), is developing plans for the Kelsey Creek Stream Channel Modification Improvements Project (Project) located in Bellevue, King County, Washington (Township 24 North, Range 5 East, Sections 3 and 4 and Township 25 North, Range 5 East, Sections 33 and 34). The purpose of the proposed Project is to improve fish passage and to restore and enhance aquatic and riparian habitat for fish and wildlife use of Kelsey Creek.

This technical memorandum has been prepared to support the analysis of potential impacts associated with the proposed Project by providing information regarding the classification of streams in the project area. One stream system, Kelsey Creek, is located within the project area. This memorandum describes the analysis of existing information, methods used in the field investigation, and the findings of Anchor QEA ecologists. Additional analysis of Kelsey Creek that has been performed includes an assessment of stream habitat features and characteristics and an ordinary high water mark (OHWM) delineation of areas of proposed Project impacts. The results of the stream assessment are presented in the *Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations Kelsey Creek Fish Passage and Habitat Restoration Project Memorandum* (Anchor 2008). The OHWM delineation results are presented in the *Kelsey Creek Stream Channel Modification Improvements Project Critical Areas Report* (Anchor QEA 2009).

PROJECT AREA DESCRIPTION

For restoration planning and preliminary design, an approximately 2.3 mile reach of Kelsey Creek is included within the project area. Within the project area, specific proposed work areas have been identified. The project area has been divided into the following four reaches, beginning with the downstream reach located near the Burlington Northern Santa Fe (BNSF) Railroad Wilburton Trestle, just upstream of Interstate 405 (I-405) and the upstream reach located just south of the culvert beneath NE 8th Street at the north end of the Glendale Country Club (GCC) golf course:

- Reach 1 (SE 8th Street Reach) – Lower gradient reach between the BNSF Railroad Wilburton Trestle and the Lake Hills Connector roadway crossing
- Reach 2 (Park Reach) – Lower gradient reach between the Lake Hills Connector roadway crossing and the east limit of Kelsey Creek Park
- Reach 3 (Farm Reach) – Lower to intermediate gradient reach between the west limit of Kelsey Creek Farm and the south boundary of the golf course
- Reach 4 (Glendale Country Club Reach) – Intermediate gradient reach through the golf course, extending to its north limit at NE 8th Street (but not including that crossing)

An aerial photograph of the project area with the identified four stream reaches is attached to this technical memorandum as Figure 1.

METHODS

To document stream classifications within the project area, Anchor QEA ecologists reviewed existing information, performed an aerial photograph assessment, and conducted a site visit on October 1, 2009. During the site visit, Anchor QEA ecologists identified the stream classification by walking the stream channel. The entire project area was accessible during the investigation.

Critical areas are defined in the Bellevue City Code (BCC) Critical Areas Ordinance (CAO), contained in Chapter 20.25H of its Land Use Code (LUC) (City of Bellevue 2009).
The stream system was typed using the following City stream designation criteria defined in LUC 20.25H.075.B:

- Type S water means all waters, other than shoreline critical areas designated under LUC 20.25E.017, within their bankfull width, are inventoried as "shorelines of the state" under chapter 90.58 Revised Code of Washington (RCW)and the rules promulgated pursuant to chapter 90.58 RCW, including periodically inundated areas of their associated wetlands.
- Type F water means all segments of natural waters that are not Type S waters, and 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 water means all segments of waters that are not Type S or Type F waters and that are physically connected to a Type S or F waters by an above ground channel system, steam, or wetland.
- Type O water means all segments of waters 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, steam, or wetland.

The designation of shoreline critical areas for the reach of Kelsey Creek within the project area was also identified as part of this analysis based on criteria defined in LUC 20.25E.017 and LUC 20.25H.115 and City natural resource maps (City of Bellevue 2009).

Results

Based on observations during the investigation and City stream typing criteria, the reach of Kelsey Creek within the project area appears to meet the minimum criteria as a Type F stream. Type F streams are defined as waters that are not Type S waters, and that contain fish or fish habitat. Kelsey Creek is not inventoried as a shoreline of the state under Chapter 90.58 RCW, and therefore does not meet City criteria as a Type S stream. The BCC requires protective buffers to preserve stream and riparian functions. The appropriate minimum stream buffers on a Type F stream are 100 feet on either side of the stream (LUC 20.25H.075.C; City of Bellevue 2009). Those buffers would apply to the OHWM limits as surveyed. A summary of the stream rating and buffer distance is provided in Table 1.

Table 1
Bellevue City Code Stream Rating and Standard Buffer Distance

Project Area Stream	City Code Rating	City Code Buffer Width (feet)
Kelsey Creek	Type F Stream	100

Source: City of Bellevue 2009

LUC 20.25E.017.D identifies water bodies within the City that are designated as shoreline critical areas (City of Bellevue 2009). The reach of Kelsey Creek identified as Lower Kelsey Creek is designated as a shoreline critical area. Based on City natural resource maps, the reach of Kelsey Creek with shoreline critical area designation extends upstream of I-405, to about 400 feet east of Lake Hills Connector Road (City of Bellevue 2009). Therefore, the reach of Kelsey Creek within the project area that is designated shoreline critical area includes Reach 1, and about 400 feet of the downstream reach of Reach 2. The majority of Reach 2 and all of Reaches 3 and 4 are upstream of shoreline critical areas designation.

The BCC identifies minimum protective buffer widths of shoreline critical areas. Based on the City criteria, a buffer of 50 feet applies to all undeveloped shoreline critical areas and a buffer of 25 feet applies to all developed shoreline critical areas. Reach 1 is located within the development associated with roads and the trestle and Reach 2 is in an undeveloped area. The City will determine the final minimum buffers. City shoreline critical area designations and buffer widths as they relate to the reach of Kelsey Creek within the project area are provided in Table 2.

Table 2
Bellevue City Code Shoreline Critical Areas Designation and Standard Buffer Widths

Kelsey Creek Reaches	City Designated Shoreline Critical Area	City Code Buffer Width Developed Site (feet)	City Code Buffer Width Undeveloped Site (feet)
Reach 1	Yes	25	50
Reach 2	About 400 feet of downstream reach	25	50
Reach 3	No	NA	NA
Reach 4	No	NA	NA

Source: City of Bellevue 2009

CONCLUSIONS

On October 1, 2009, Anchor QEA ecologists performed a stream classification of the reach of Kelsey Creek within the project area. Based on observations during the investigation and City stream typing criteria, the reach of Kelsey Creek within the project area appears to meet the minimum criteria as a Type F stream. Based on City natural resource maps, the reach of Kelsey Creek within the project area that is designated shoreline critical area includes Reach 1, and about 400 feet of the downstream reach of Reach 2. The majority of Reach 2 and all of Reaches 3 and 4 are upstream of City shoreline critical areas designation.

REFERENCES

Anchor Environmental, LLC. (Anchor). 2008. *Fish and Wildlife Habitat Investigation, Evaluation, and Recommendations Kelsey Creek Fish Passage and Habitat Restoration Project*. Prepared for City of Bellevue, Bellevue, Washington.

Anchor QEA, LLC (Anchor QEA). 2009. *Kelsey Creek Stream Channel Modification Improvements Project Critical Areas Report*. Prepared for City of Bellevue, Bellevue, Washington.

Bellevue, City of. 2009. City of Bellevue City Code. Bellevue, Washington. Accessed online at http://www.bellevuewa.gov/bellcode/bellevuent.html September 24, 2009.

LIST OF FIGURES

Figure 1 Project Study Reaches

FIGURES

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0 500 1,000 Feet

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Figure 1
Project Study Reaches
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

ANCHOR QEA

1423 Third Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131
www.anchorqea.com

MEMORANDUM

To:	Stephen Noeske, P.E.; City of Bellevue	**Date:**	November 10, 2009
From:	Calvin Douglas; Adam Gale; and Jerry Bibee, P.E.; Anchor QEA, LLC	**Project:**	070078-01
Re:	Kelsey Creek Stream Channel Modification Improvements Project – Wetland Delineation		

The City of Bellevue (City) Utilities Department, in coordination with their project consultant, Anchor QEA, LLC (Anchor QEA), is proposing selected restoration activities along approximately 2.3 stream miles of Kelsey Creek from the Burlington Northern Santa Fe (BNSF) Railroad Wilburton Trestle, located just upstream of Interstate 405 (I-405), to Northeast 8th Street at the north end of the Glendale Country Club (GCC) golf course, in Bellevue, King County, Washington. Specific Kelsey Creek Stream Channel Modification Improvements Project (Project) activities requiring environmental permitting approvals include:

- Modification to portions of existing in-stream hydraulic structures (weirs) for improved fish passage consistent with current state and federal standards
- Streambed excavation for key-in and placement of cobble/boulder streambed mix with projecting boulder fill and with partially buried and anchored large woody debris (LWD) for roughened channel segments
- Strategic placement of LWD (logs with rootwads, rootwads, or fallen trees) and engineered logjams (ELJs) for stream processes and habitat enhancement; selective channel grading and bank restoration including pools creation
- Removal of non-native invasive vegetation from selected stream banks within proposed work areas and replanting disturbed areas with native plant species

The purpose of the wetland delineation was to identify and evaluate proposed work areas that would classify as sensitive areas, specifically wetland habitat. As part of the field investigation, ordinary high water limits within proposed work areas were also identified

and their boundaries were mapped using portable GPS equipment, but these boundaries are not discussed further in this memorandum. Methods used in the wetland field investigation and Anchor QEA's findings are included herein. The results of the investigation are described below for three of the four separate reaches of Kelsey Creek identified as the project area (Reaches 1, 3, and 4). Reach 2 was not investigated for wetland habitat because no work is proposed within its boundaries. While the wetland delineation did not include the area within Reach 2, the proposed Project's wetland rating and functional analysis does include Reach 2 wetland habitat because it is part of a large wetland system connected to wetland habitat in proposed work areas. An aerial photograph of the project area with the identified four stream reaches is attached to this technical memorandum as Figure 1.

METHODS

To assess wetland conditions, Anchor QEA ecologists visited the site on October 22 and 30, 2008 to perform wetland delineation. In the proposed work areas, soils, hydrology, and vegetation characteristics were examined to identify wetland conditions according to the methods defined in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Interim Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual* (Corps 2008), and the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997).

Anchor QEA ecologists examined the soils at proposed work areas for hydric indicators and layers, visually and texturally estimated the organic content, and determined the color using a Munsell soil color chart (Munsell Color 1994). Anchor QEA ecologists assessed hydrology by observing levels of inundation or saturation. They also identified and characterized vegetation communities, estimated the percent cover for each plant species, and determined dominant species. Trees within a 30-foot radius, shrubs within a 15-foot radius, and emergents within a 3-foot radius were identified and recorded. A plant indicator status, designated by the U.S. Fish and Wildlife Service (USFWS; Reed 1988, 1993), was assigned to each species and a determination was made as to whether the vegetation in the plot was hydrophytic. To meet the hydrophytic parameter, more than 50 percent of the dominant species (20 percent or greater cover) must have an indicator of obligate wetland (OBL), facultative wetland (FACW or FACW+), or facultative (FAC or FAC+). Table 1 shows the wetland indicator status categories.

Table 1
Wetland Plant Indicator Definitions

Indicator Status	Description
Obligate wetland (OBL)	Occur almost always in wetlands (estimated probability greater than 99 percent) under natural conditions
Facultative wetland (FACW)	Usually occur in wetlands (estimated probability 67 to 99 percent), but occasionally found in non-wetlands
Facultative (FAC)	Equally likely to occur in wetlands or non-wetlands (estimated probability 34 to 66 percent)
Facultative upland (FACU)	Usually occur in non-wetlands (estimated probability 67 to 99 percent), but occasionally found in wetlands
Obligate upland (UPL)	Occur almost always in non-wetlands (estimated probability greater than 99 percent) under natural conditions

In October 2009, Anchor QEA ecologists performed a wetland rating and functional analysis of wetland habitat delineated within the project area. Wetland ratings were determined using the most current version of Washington State Department of Ecology (Ecology) guidance in *Washington State Wetland Rating System – Western Washington: Revised* (Ecology 2004) and *Washington State Wetland Rating Form – Western Washington, Version 2* (Ecology 2008), and according to City wetland rating criteria, as defined in the Bellevue City Code (BCC) Critical Areas Ordinance (CAO), contained in Chapter 20.25H of its Land Use Code (LUC; City of Bellevue 2009). The Ecology wetland rating forms are provided as Attachment 1 to this memorandum.

WETLAND DELINEATION RESULTS

The three investigated reaches of Kelsey Creek (Reaches 1, 3, and 4) are described in the following sections. A complete list of all plant species observed during the investigation within each reach is provided in Table 2.

Table 2
Plant Species Observed in Proposed Work Areas

Scientific Name	Common Name	Indicator Status[1]	Reach 1	Reach 3	Reach 4
Trees					
Acer macrophyllum	Big-leaf maple	FACU	x		x
Alnus rubra	Red alder	FAC	x	x	x

Scientific Name	Common Name	Indicator Status[1]	Reach 1	Reach 3	Reach 4
Crataegus douglasii	Black hawthorn	FAC	x		
Physocarpus capitatus	Pacific ninebark	FACW-			x
Populus trichocarpa	Black cottonwood	FAC	x	x	
Pseudotsuga menziesii	Douglas fir	FACU	x		x
Salix lasiandra	Pacific willow	FACW+		x	x
Salix scouleriana	Scouler willow	FAC		x	
Thuja plicata	Western red cedar	FAC	x		x
Shrubs					
Acer circinatum	Vine maple	FAC-	x	x	x
Cornus sericea	Red-osier dogwood	FACW			x
Corylus cornuta	Beaked hazelnut	FACU			x
Cytisus scoparius	Scot's broom	UPL	x		
Gaultheria shallon	Salal	FACU			x
Oemleria cerasiformis	Indian plum	FACU	x		x
Polygonum cuspidatum	Japanese knotweed	FACU		x	x
Rhamnus purshiana	Cascara	FAC-	x		
Rosa nutkana	Nootka rose	FAC			x
Rubus armeniacus	Himalayan blackberry	FACU	x	x	x
Rubus parviflorus	Western thimbleberry	FAC-	x		
Rubus spectabilis	Salmonberry	FAC+	x	x	
Rubus ursinus	Trailing blackberry	FACU			x
Sambucus racemosa	Red elderberry	FACU	x		
Symphoricarpos albus	Snowberry	FACU	x		x
Ferns and Herbaceous					
Athyrium filix-femina	Lady fern	FAC+	x	x	x
Carex obnupta	Slough sedge	OBL			x
Cirsium arvense	Canadian thistle	FACU+	x		x
Epilobium watsonii	Watson's willow-herb	FACU-	x		x
Equisetum arvense	Field horsetail	FAC	x	x	
Festuca arundinacea	Tall fescue	FAC-			x
Galium trifidum	Small bedstraw	FACW+	x	x	
Geranium robertianum	Stinky bob	UPL	x		
Hedera hibernica	English ivy	UPL			x
Juncus effusus	Soft rush	FACW	x		
Lotus corniculatus	Birds-foot trefoil	FAC			x
Phalaris arundinacea	Reed canarygrass	FACW	x	x	x
Plantago lanceolata	English plantain	FAC			x
Polystichum munitum	Sword fern	FACU	x		x
Ranunculus repens	Creeping buttercup	FACW	x	x	x

Scientific Name	Common Name	Indicator Status[1]	Reach 1	Reach 3	Reach 4
Rumex crispus	Curly dock	FAC+			x
Solanum dulcamara	Bittersweet nightshade	FAC+	x		x
Taraxacum officinale	Common dandelion	FACU			x
Tolmiea menziesii	Piggyback plant	FAC	x		
Urtica dioica	Stinging nettle	FAC+	x	x	x

Notes:
1 These categories, referred to as the "wetland indicator status" (from the wettest to driest habitats) are as follows: obligate wetland (OBL) plants, facultative wetland (FACW) plants, facultative (FAC) plants, facultative upland (FACU) plants, and obligate upland (UPL) plants.

Reach 1

Reach 1 was investigated for wetland characteristics within the proposed work area located immediately west of 121st Street Southeast. The investigation was conservatively extended to approximately 100 feet downstream (west) from where the Wilburton Trestle crosses over Kelsey Creek, covering approximately 500 linear feet of stream channel. In general, the stream banks are deeply incised and supported on both banks with riprap, angular rock, and fill material positioned for support of the trestle crossing and adjacent road (Southeast 8th Street). Three sample plots were established in this reach, at locations with potential wetland characteristics, such as areas near the stream with a predominance of vegetation typically associated with wetland habitat. Sample plot locations for Reach 1 are shown on Figure 2.

Vegetation

In general, Reach 1 includes a riparian canopy with overhanging vegetation over both banks of Kelsey Creek, dominated by red alder (*Alnus rubra*) and big-leaf maple (*Acer macrophyllum*), with a scrub-shrub understory dominated by vine maple (*Acer circinatum*) and Himalayan blackberry (*Rubus armeniacus*). Patches of reed canarygrass (*Phalaris arundinaceae*) were observed occasionally along both banks of Kelsey Creek. A complete list of all plant species observed during the investigation in Reach 1 is provided in Table 2, and sample plot vegetation results for this reach are provided in Table 3.

Table 3
Reach 1 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (%)
1Up	*Phalaris arundinacea*	Reed canarygrass	FACW	80%
	Rubus armeniacus	Himalayan blackberry	FACU	30%
	Urtica dioica	Stinging nettle	FAC+	20%
2Up	*Equisetum arvense*	Field horsetail	FAC	10%
	Phalaris arundinacea	Reed canarygrass	FACW	70%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
	Urtica dioica	Stinging nettle	FAC+	30%
3Up	*Alnus rubra*	Red alder	FAC	40%
	Phalaris arundinacea	Reed canarygrass	FACW	60%
	Rubus armeniacus	Himalayan blackberry	FACU	30%
	Urtica dioica	Stinging nettle	FAC+	20%

Soils

Soil profiles, which are generally consistent throughout Reach 1, are considered to be non-hydric because they have high matrix chroma and no redoximorphic features. Table 4 provides a summary of soil conditions determined at a soil pit within each sample plot.

Table 4
Reach 1 Sample Plot Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 18+	10 YR 3/2	None	Silt loam
2Up	0 to 18+	10 YR 3/2	None	Silt loam
3Up	0 to 8	10 YR 3/2	None	Sandy loam

Hydrology

In general, the incised nature of the banks along Reach 1 limits the potential for wetland hydrology indicators, particularly due to the anthropogenic alterations of this reach, including the placement of riprap, angular rock, and fill material along both banks. Since this reach contains a U.S. Geological Survey (USGS), the recorded stream flow for this reach during the investigation was determined to be between approximately 8 and 10 cubic feet

per second (cfs). No evidence of wetland hydrology was observed in the sample plots. Table 5 provides a summary of wetland hydrology indicators at each sample plot within this reach.

Table 5
Reach 1 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water to 20 inches
2Up	No saturation or freestanding water to 20 inches
3Up	No saturation or freestanding water to 20 inches

Wetland/Upland Determination

No wetland conditions were documented within Reach 1. The majority of this reach is dominated by upland vegetation species. Dominant vegetation associated with wetland habitat was generally limited to small patches of reed canarygrass. Wetland soil and hydrology characteristics were not observed in the investigated area. Table 6 provides a summary of sample plot data and the wetland/upland determination made for each location.

Table 6
Reach 1 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Hydrophytic	Non-hydric	Negative	Upland
2Up	Hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland

Reach 3

Reach 3 originates at the southern end of the GCC golf course and extends in a southerly direction approximately 1,500 feet to the terminus of Southeast 4th Street in Kelsey Creek Park. Wetland reconnaissance along this reach was limited to the right (west) bank and to four specific areas where temporary construction phase access from the existing trail to the channel will be required for proposed LWD placement. A total of eight sample plots were established along this reach of Kelsey Creek. Sample plot locations for Reach 3 are shown on Figure 3.

Vegetation

Overall, riparian habitat in this reach includes a forested canopy with patches of red alder and Pacific willow (*Salix lasiandra*) with Scouler willow (*Salix scouleriana*) occasionally occurring. The shrub community is very dense, and is dominated by the non-native invasive species Himalayan blackberry and Japanese knotweed (*Polygonum cuspidatum*) that form a nearly impenetrable barrier between the trail that parallels the stream to the west and the stream. Small clusters of salmonberry (*Rubus spectabilis*) were also observed.

Depressional topographic features were observed in the southern portion of this reach supporting a riparian canopy consisting of higher concentrations of willows, although Japanese knotweed and Himalayan blackberry were still prevalent. A complete list of all plant species observed in Reach 3 during the investigation for each proposed LWD placement access point is provided in Table 7. Table 7 also identifies the plant species' presence within each of the access points as dominant, common, few, or not observed. Reach 3 sample plot vegetation results are provided in Table 8.

Table 7
Summary of Plant Species Observed for LWD Placement Access Points in Reach 3

Scientific Name	Common Name	Indicator Status	T2	T3	T4 and T5	T6
Trees						
Alnus rubra	Red alder	FAC	D	D	D	D
Populus trichocarpa	Black cottonwood	FAC	N	C	N	N
Salix lasiandra	Pacific willow	FACW+	N	N	C	D
Salix scouleriana	Scouler willow	FAC	C	C	C	F
Shrubs						
Acer circinatum	Vine maple	FAC-	F	N	N	N
Polygonum cuspidatum	Japanese knotweed	FACU	D	D	D	D
Rubus armeniacus	Himalayan blackberry	FACU	D	D	D	D
Rubus spectabilis	Salmonberry	FAC+	F	C	F	C
Ferns and Herbaceous						
Athyrium filix-femina	Lady fern	FAC+	F	F	N	N
Equisetum arvense	Field horsetail	FAC	F	N	N	N
Galium trifidum	Small bedstraw	FACW+	F	N	N	N
Phalaris arundinacea	Reed canarygrass	FACW	F	F	F	C
Ranunculus repens	Creeping buttercup	FACW	F	N	N	C
Urtica dioica	Stinging nettle	FAC+	F	N	C	D

Notes:

D = dominant

C = common

F = few

N = not observed

Table 8
Reach 3 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (%)
1Up	*Alnus rubra*	Red alder	FAC	80%
	Polygonum cuspidatum	Japanese knotweed	FACU	70%
	Rubus armeniacus	Himalayan blackberry	FACU	50%
	Salix scouleriana	Scouler willow	FAC	20%
2Up	*Alnus rubra*	Red alder	FAC	70%
	Polygonum cuspidatum	Japanese knotweed	FACU	60%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
	Salix scouleriana	Scouler willow	FAC	10%
3Up	*Alnus rubra*	Red alder	FAC	70%
	Athyrium filix-femina	Lady fern	FAC+	10%
	Phalaris arundinacea	Reed canarygrass	FACW	90%
	Polygonum cuspidatum	Japanese knotweed	FACU	30%
	Populus trichocarpa	Black cottonwood	FAC	20%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
	Rubus spectabilis	Salmonberry	FAC+	20%
4Up	*Alnus rubra*	Red alder	FAC	60%
	Phalaris arundinacea	Reed canarygrass	FACW	80%
	Polygonum cuspidatum	Japanese knotweed	FACU	30%
	Rubus armeniacus	Himalayan blackberry	FACU	30%
	Salix lasiandra	Pacific willow	FACW+	30%
	Urtica dioica	Stinging nettle	FAC+	40%
5Up	*Alnus rubra*	Red alder	FAC	60%
	Polygonum cuspidatum	Japanese knotweed	FACU	70%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
6Wet	*Phalaris arundinacea*	Reed canarygrass	FACW	60%
	Polygonum cuspidatum	Japanese knotweed	FACU	10%
	Rubus armeniacus	Himalayan blackberry	FACU	20%
	Rubus spectabilis	Salmonberry	FAC+	20%
	Salix lasiandra	Pacific willow	FACW+	80%
	Urtica dioica	Stinging nettle	FAC+	40%
7Up	*Polygonum cuspidatum*	Japanese knotweed	FACU	80%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
	Salix lasiandra	Pacific willow	FACW+	30%
8Up	*Polygonum cuspidatum*	Japanese knotweed	FACU	90%
	Populus trichocarpa	Black cottonwood	FAC	30%
	Rubus armeniacus	Himalayan blackberry	FACU	20%
	Salix scouleriana	Scouler willow	FAC	20%

Soils

Wetland soils were observed in the southern portion of Reach 3 in the area described as the depressional topographic features above. The wetland soils consisted of very dark gray, sandy loam to more than 5 inches in depth overlain with strong brown mottles contrasting the light brownish gray matrix to 8 inches. Very dark gray, silty loam (10 YR 3/2) was observed in the deeper layers (8 to 18 inches) with red mottles (2.5 YR 4/6). Table 9 provides a summary of soil conditions determined at a soil pit within each sample plot.

Table 9
Reach 3 Sample Plots Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 7	10 YR 3/2	None	0
	7 to 18+	10 YR 3/2	None	0
2Up	0 to 6	10 YR 3/2	None	0
	6 to 18+	10 YR 3/2	None	0
3Up	0 to 9	10 YR 3/3	None	0
	9 to 18+	10 YR 3/3	None	0
4Up	0 to 6	10 YR 4/3	None	0
	6 to 18+	10 YR 4/3	None	0
5Up	0 to 7	10 YR 3/4	None	0
	7 to 18+	10 YR 3/4	None	0
6Wet	0 to 5	10 YR 3/1	None	0
	5 to 8	10 YR 6/2	7.5 YR 5/6	15
	8 to 18+	10 YR 3/1	2.5 YR 4/6	20
7Up	0 to 10	10 YR 3/2	None	0
	10 to 18+	10 YR 3/2	None	0
8Up	0 to 8	10 YR 3/2	None	0
	8 to 18+	10 YR 3/2	None	0

Hydrology

An earthen berm was constructed adjacent to the trail that parallels Kelsey Creek, presumably to protect the public use areas of Kelsey Creek Farm from overflows or potential channel avulsion during high-flow events. The berm ranges from 4 to 6 feet in height, and extends the entire length of the reach. On the stream side of the berm there is evidence of a meandering channel influenced by beaver activity and the natural replenishment following high flows. The depressional topographic features were observed in the southern portion of

the reach, with evidence of saturated soils in that area at an approximate depth below ground surface of approximately 10 inches. Observations at the site indicate that downstream beaver dams (two) and a log jam backs up the creek and is causing overflow over the right (west) bank. The remainder of the upstream portions of this reached lacked any wetland hydrology indicators. Table 10 summarizes wetland hydrology indicators at each sample plot within this reach.

Table 10
Reach 3 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water in pit to 20 inches
2Up	No saturation or freestanding water in pit to 20 inches
3Up	No saturation or freestanding water in pit to 20 inches
4Up	No saturation or freestanding water in pit to 20 inches
5Up	No saturation or freestanding water in pit to 20 inches
6Wet	Saturation at 10 inches and no freestanding water in pit to 20 inches
7Up	No saturation or freestanding water in pit to 20 inches
8Up	No saturation or freestanding water in pit to 20 inches

Wetland/Upland Determination

Moving from north to south, the first three of the four proposed work areas in this reach were identified as upland habitat. The fourth, southernmost proposed work area is located within wetland habitat. The wetland, identified as Wetland A, is part of a large wetland system associated with Kelsey Creek. Wetland A extends to the south along the creek through Reach 2. Along the right bank the wetland is relatively narrow, typically less than 50 feet wide between the right bank and the trail in Kelsey Farm. Wetland A appears to be much wider on the left bank of the creek, but the width of the wetland was not confirmed during as part of the investigation. Within Reach 2, Wetland A remains relatively narrow along the right bank but appears to extend several hundred feet from the left bank of the creek.

Wetland A is a riverine and slope wetland with palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forest (PFO) wetland habitats. Table 11 provides a summary of sample plot data and the wetland/upland determination made for each location.

Table 11
Reach 3 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Non-hydrophytic	Non-hydric	Negative	Upland
2Up	Non-hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland
4Up	Non-hydrophytic	Non-hydric	Negative	Upland
5Up	Non-hydrophytic	Non-hydric	Negative	Upland
6Wet	Hydrophytic	Hydric	Positive	Wetland
7Up	Non-hydrophytic	Non-hydric	Negative	Upland
8Up	Non-hydrophytic	Non-hydric	Negative	Upland

Reach 4

Kelsey Creek flows approximately 4,000 linear feet through the GCC golf course in a north-to-south orientation. The field investigation occurred intermittently along this reach at the locations of the proposed in-channel work areas. In those areas, wetland identification was conducted within the expected construction limits both upstream and downstream of the existing concrete weirs and at other areas proposed for channel modification. Six sample plots were established in this reach, at locations with potential wetland characteristics, such as areas near the stream with a predominance of vegetation typically associated with wetland habitat. Sample plot locations for Reach 4 are shown on Figure 4.

Vegetation

A riparian canopy consisting primarily of red alder, willow, and Douglas fir (*Pseudotsuga menziesii*) was observed in patches on both sides of the channel through most of Reach 4. Riparian habitat in the golf course was also dominated by the non-native invasive species Japanese knotweed and Himalayan blackberry. Two sections of Kelsey Creek in the southern half of the reach were mostly devoid of tree or shrub habitat and consisted mostly of mowed grass habitat consistent with the surrounding golf course use. Sample plot vegetation results for Reach 4 are provided in Table 12.

Table 12
Reach 4 Sample Plot Vegetation Data

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (%)
1Up	*Athyrium filix-femina*	Lady fern	FAC+	10%
	Cirsium arvense	Canadian thistle	FACU+	20%
	Phalaris arundinacea	Reed canarygrass	FACW	40%
	Polygonum cuspidatum	Japanese knotweed	FACU	20%
	Ranunculus repens	Creeping buttercup	FACW	30%
	Rosa nutkana	Nootka rose	FAC	30%
	Rubus armeniacus	Himalayan blackberry	FACU	25%
	Symphoricarpos albus	Snowberry	FACU	25%
2Up	*Carex obnupta*	Slough sedge	OBL	40%
	Lotus corniculatus	Birds-foot trefoil	FAC	10%
	Phalaris arundinacea	Reed canarygrass	FACW	30%
	Polygonum cuspidatum	Japanese knotweed	FACU	20%
	Ranunculus repens	Creeping buttercup	FACW	10%
	Rubus armeniacus	Himalayan blackberry	FACU	40%
	Urtica dioica	Stinging nettle	FAC+	10%
3Up	*Alnus rubra*	Red alder	FAC	30%
	Epilobium watsonii	Watson's willow-herb	FACU-	10%
	Phalaris arundinacea	Reed canarygrass	FACW	50%
	Polygonum cuspidatum	Japanese knotweed	FACU	30%
	Rubus armeniacus	Himalayan blackberry	FACU	20%
	Salix lasiandra	Pacific willow	FACW+	30%
	Symphoricarpos albus	Snowberry	FACU	10%
4Up	*Carex obnupta*	Slough sedge	OBL	10%
	Epilobium watsonii	Watson's willow-herb	FACU-	5%
	Festuca arundinacea	Tall fescue	FAC-	10%
	Holcus lanatus	Common velvet grass	FAC	10%
	Phalaris arundinacea	Reed canarygrass	FACW	20%
	Polygonum cuspidatum	Japanese knotweed	FACU	20%
	Rubus ursinus	Trailing blackberry	FACU	25%
	Taraxacum officinale	Common dandelion	FACU	15%
	Urtica dioica	Stinging nettle	FAC+	10%

Sample Plot	Scientific Name	Common Name	Indicator Status	Cover (%)
5Up	*Festuca arundinacea*	Tall fescue	FAC-	20%
	Holcus lanatus	Common velvet grass	FAC	30%
	Lotus corniculatus	Birds-foot trefoil	FAC	20%
	Phalaris arundinacea	Reed canarygrass	FACW	10%
	Polygonum cuspidatum	Japanese knotweed	FACU	20%
	Rubus armeniacus	Himalayan blackberry	FACU	25%
	Solanum dulcamara	Bittersweet nightshade	FAC+	20%
	Urtica dioica	Stinging nettle	FAC+	20%
6Up	*Festuca arundinacea*	Tall fescue	FAC-	30%
	Holcus lanatus	Common velvet grass	FAC	20%
	Lotus corniculatus	Birds-foot trefoil	FAC	10%
	Phalaris arundinacea	Reed canarygrass	FACW	25%
	Plantago lanceolata	English plantain	FAC	15%
	Ranunculus repens	Creeping buttercup	FACW	25%
	Rumex crispus	Curly dock	FAC+	5%
	Taraxacum officinale	Common dandelion	FACU	20%
	Urtica dioica	Stinging nettle	FAC+	20%

Soils

Soil profiles, which are generally consistent throughout Reach 4, are considered to be non-hydric, because they have high matrix chroma and no redoximorphic features. Soils are typically sandy loam to loamy sand with gravel frequently occurring. Table 13 provides a summary of soil conditions determined at a soil pit within each sample plot.

Table 13
Reach 4 Sample Plot Soil Data

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
1Up	0 to 8	10 YR 3/2	None	Sandy loam with gravel
	8 to 18+	10 YR 3/2	None	Loamy sand with gravel and cobble
2Up	0 to 2	10 YR 2/3	None	Sandy loam
	2 to 18+	10 YR 4/3	None	Loamy sand
3Up	0 to 18+	10 YR 4/3	None	Loamy sand with gravel

Sample Plot	Soil Horizon (inches)	Matrix Color	Mottle Color	Texture
4Up	0 to 4	10 YR 3/3	None	Sandy loam
	4 to 18+	10 YR 3/2	None	Sandy loam
5Up	0 to 6	10 YR 3/2	None	Sandy loam
	6 to 18+	10 YR 4/3	None	Loamy sand
6Up	0 to 4	10 YR 3/2	None	Sandy loam
	4 to 18+	10 YR 4/3	None	Sandy loam with gravel

Hydrology

Kelsey Creek (08.0259) is within the Lake Washington/Cedar/Sammamish watershed (Water Resources Inventory Area [WRIA] 8) and is one of the many small tributaries that contribute to Lake Washington. The headwaters to Kelsey Creek originate in the Phantom and Larsen Lake wetland complex west of Lake Sammamish and continue several miles through open- and closed-channel segments prior to entering Reach 4 through an arch culvert under Northeast 8th Street. Within the proposed work areas in this reach, Kelsey Creek is typically confined between stabilized bank sections (typically rockeries) several feet high in the northern two-thirds of the golf course with several privately-owned bridge crossings. In some instances, the stream was contained within 12- to 15-foot-tall vertical rockery walls with no potential of overbank flooding. In the southern one-third of the golf course, the stream is less confined, and flows through open channel typically without high flow containment. In some areas, low earth berms exist along its banks. This section would likely experience at least some overbank flooding during larger runoff events.

Low flow was observed during the wetland investigation. Based on hourly flows recorded at the downstream USGS Stream Gage No. 12120000, Mercer Creek Near Bellevue (the Reach 4 location represents approximately 55 to 60 percent of drainage area contribution at the gage), it is expected that base flows averaged between approximately 4 to 6 cfs during the investigation. In areas with the hardened banks (described above), terraced sections were observed within the channel that support herbaceous grass and sedge species (*Carex* spp.); however, it is likely that these features are ephemeral and will disappear with the first large runoff event each year. Hydrology sources can be attributed to stream base flow from upstream sources along with golf course irrigation return flow during the dry summer months and precipitation-driven runoff during the fall/winter/spring wet season. No

evidence of wetland hydrology was observed in the sample plots. With the exception of Sample Plot 2, which had saturated conditions at about 12 inches below the surface, no saturation or standing water was observed within 20 inches of the surface at the sample plots. Table 14 provides a summary of sample plot hydrology data.

Table 14
Reach 4 Sample Plot Hydrology Data

Sample Plot	Hydrology
1Up	No saturation or freestanding water in pit to 20 inches
2Up	Saturation at 14 inches and no freestanding water in pit to 20 inches
3Up	No saturation or freestanding water in pit to 20 inches
4Up	No saturation or freestanding water in pit to 20 inches
5Up	No saturation or freestanding water in pit to 20 inches
6Up	No saturation or freestanding water in pit to 20 inches

Wetland/Upland Determination

No wetland conditions were documented within the targeted improvement areas investigated within the approximately 4,000-foot length of Reach 4. While a dominant presence of vegetation associated with wetland habitat was present in several sample plots, wetland soil and hydrology characteristics were not observed within the areas investigated. Table 15 provides a summary of sample plot data and the wetland/upland determination made for each location.

Table 15
Reach 4 Sample Plot Data Summary and Determination

Sample Plot	Vegetation	Soils	Hydrology	Determination
1Up	Hydrophytic	Non-hydric	Negative	Upland
2Up	Hydrophytic	Non-hydric	Negative	Upland
3Up	Hydrophytic	Non-hydric	Negative	Upland
4Up	Non-hydrophytic	Non-hydric	Negative	Upland
5Up	Hydrophytic	Non-hydric	Negative	Upland
6Up	Hydrophytic	Non-hydric	Negative	Upland

WETLAND CLASSIFICATION, RATING, AND FUNCTIONAL ASSESSMENT

Guidance from USFWS, Ecology, and the City was used to determine the wetland classifications under those agency standards. The wetland system identified in the project area has been classified using the system developed by Cowardin and others (1979) for use in the National Wetland Inventory (NWI). Wetland A is a riverine and slope PEM, PSS, and PFO wetland system. The boundary of Wetland A was not delineated as part of this investigation. Wetland A is approximated to be greater than 30 acres in size.

According to the BCC (City of Bellevue 2009), wetland ratings are determined using Ecology's *Washington State Wetland Rating System – Western Washington: Revised* (Ecology 2004) and *Washington State Wetland Rating Form – Western Washington: Revised* (Ecology 2008).

The Ecology system was developed to differentiate wetlands based on their sensitivity to disturbance, their significance in the watershed, their rarity, our ability to replace them, and the beneficial functions they provide to society. The Ecology rating system requires the user to collect specific information about the wetland in a step-by-step process. Three major functions are analyzed: water quality improvement, flood and erosion control, and wildlife habitat. Ratings are based on a point system where points are given if a wetland meets specific criteria related to the wetland's potential and opportunity to provide certain benefits. Per Ecology's rating system, wetlands are categorized according to the following criteria and on points given:

- Category I wetlands (70 to 100 points) represent a unique or rare wetland type, are more sensitive to disturbance, or are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime.
- Category II wetlands (51 to 69 points) are difficult, though not impossible, to replace, and provide high levels of some functions.
- Category III (30 to 50 points) wetlands have moderate levels of functions. They have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- Category IV wetlands (0 to 29 points) have the lowest levels of functions and are often heavily disturbed.

Under the Ecology system, Wetland A is rated as a Category I wetland. Table 16 lists the Ecology and local (City) wetland rating and classification. Water quality, hydrologic, and habitat functional values for Wetland A are shown in Table 17. Ecology wetland rating forms are provided as Attachment 1 to this memorandum.

Table 16
Summary of Wetland Classes and Rating Scores

Wetland	Area (acres)	Hydrogeomorphic Classification	State Rating (Ecology)	Local Rating (City)
A	>30	Riverine and Slope	I	I

Table 17
Summary of Functions and Values Wetland Rating Scores

Wetland	Water Quality Functions Potential Score	Water Quality Opportunity (Yes/No)	Hydrologic Functions Potential Score	Hydrologic Functions Opportunity (Yes/No)	Habitat Functions Potential Score	Habitat Functions Opportunity Score	Total Functions Score[1]
Total Maximum Score	**16**	**No = 1 Yes = 2**	**16**	**No = 1 Yes = 2**	**18**	**18**	**100**
A	8	2	16	2	15	10	73

1 Calculated as: (Water Quality Functions Potential Score * Water Quality Opportunity Score) + (Hydrologic Functions Potential Score * Hydrologic Functions Opportunity Score) + Habitat Functions Potential Score + Habitat Functions Opportunity Score

Appropriate minimum wetland buffers have been identified according to the current BCC (City of Bellevue 2009). The BCC identifies minimum protective buffer widths based on the wetland category, per the Ecology rating system, and the Ecology water quality and habitat rating score. Based on the City wetland buffer criteria, a Category I wetland with a habitat rating score of 20 to 28 points requires a 110-foot buffer. The City will determine the final wetland ratings and minimum buffers. Ratings and City buffer width, as they relate to Wetland A, are provided in Table 18.

Table 18
Wetland Rating and Standard Buffer Widths

Wetland	State Rating (Ecology)	Local Rating (City)	Ecology Habitat Rating Score	City Code Buffer Width (feet)
A	Category I	Category I	20 to 28	110

CONCLUSIONS

Anchor QEA performed wetland investigation and delineation (where wetlands were encountered) on October 22 and 30, 2008 within three Kelsey Creek stream reaches at locations where stream channel improvements are proposed by the City. Information on soil, hydrology, and vegetation collected in the investigated areas indicates wetland conditions exist only at a single proposed improvement area (temporary access for LWD placement) in the southern portion of Reach 3. No wetland conditions were observed at targeted improvement areas in Reaches 1 or 4.

In October 2009, Anchor QEA ecologists performed a wetland rating and functional analysis of wetland habitat delineated within the project area. Under the Ecology system and the City wetland rating criteria, Wetland A is rated as a Category I wetland. Based on the City wetland buffer criteria, a Category I wetland with a habitat rating score of 20 to 28 points requires a 110-foot buffer.

Wetland identification is an inexact science and differences of professional opinion often occur between trained individuals. Final determinations are the responsibility of the regulating resource agency. Wetlands are, by definition, transitional areas; their boundaries can be altered by changes in hydrology or land use. In addition, the definition of jurisdictional wetlands may change. If a physical change occurs in the basin or 3 years pass before the proposed Project is undertaken, another wetland survey should be conducted.

The results and conclusions expressed herein represent our professional judgment based on the information available. No other warranty, expressed or implied, is made.

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LIST OF FIGURES

Figure 1 Project Study Reaches
Figure 2 Wetland Delineation Sample Plot Locations–Reach 1
Figure 3 Wetland Delineation Sample Plot Locations–Reach 3
Figure 4 Wetland Delineation Sample Plot Locations–Reach 4

LIST OF ATTACHMENTS

Attachment 1 Wetland Rating Forms

FIGURES

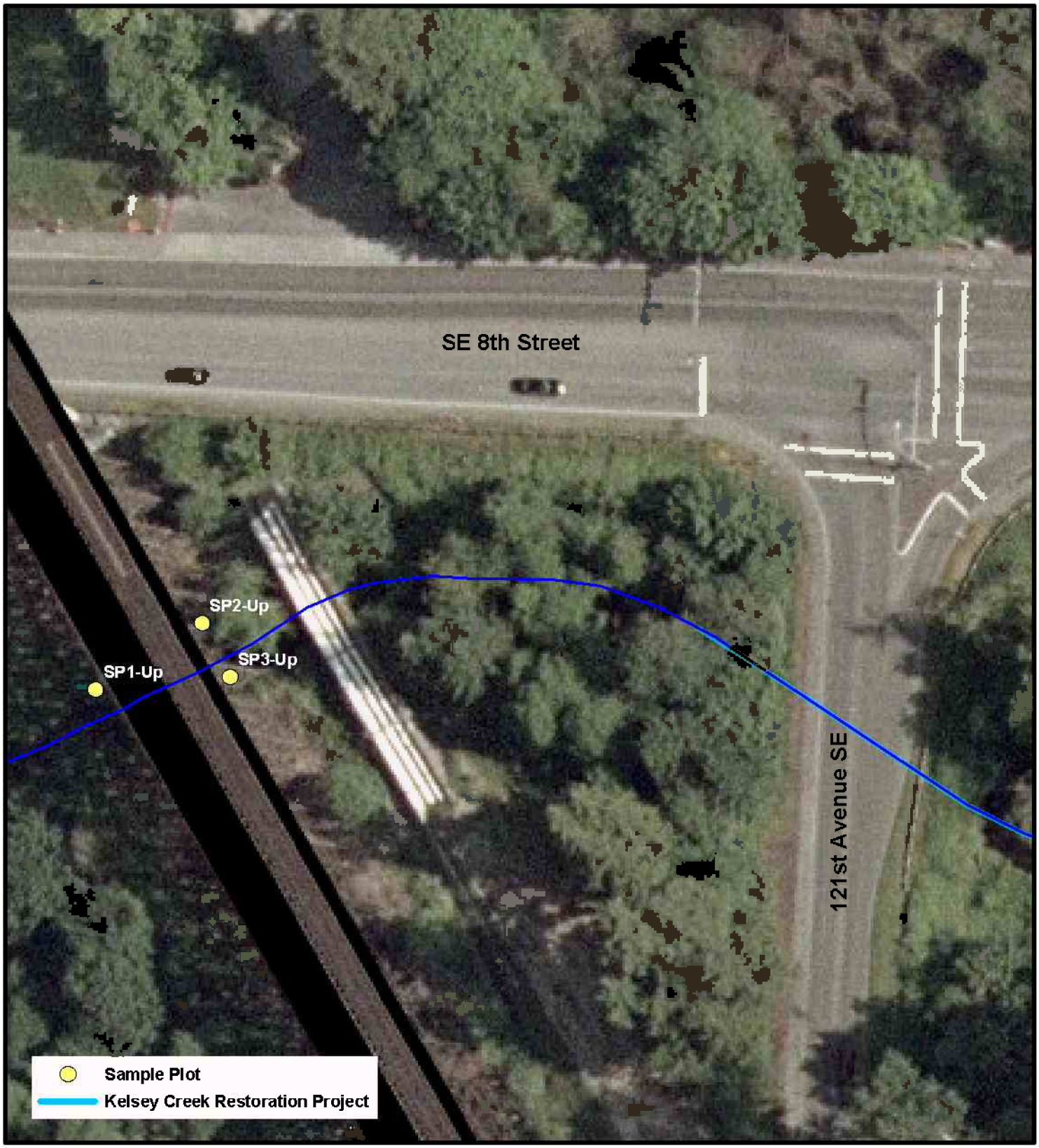
ANCHOR QEA

0 500 1,000 Feet

N

Figure 1
Project Study Reaches
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



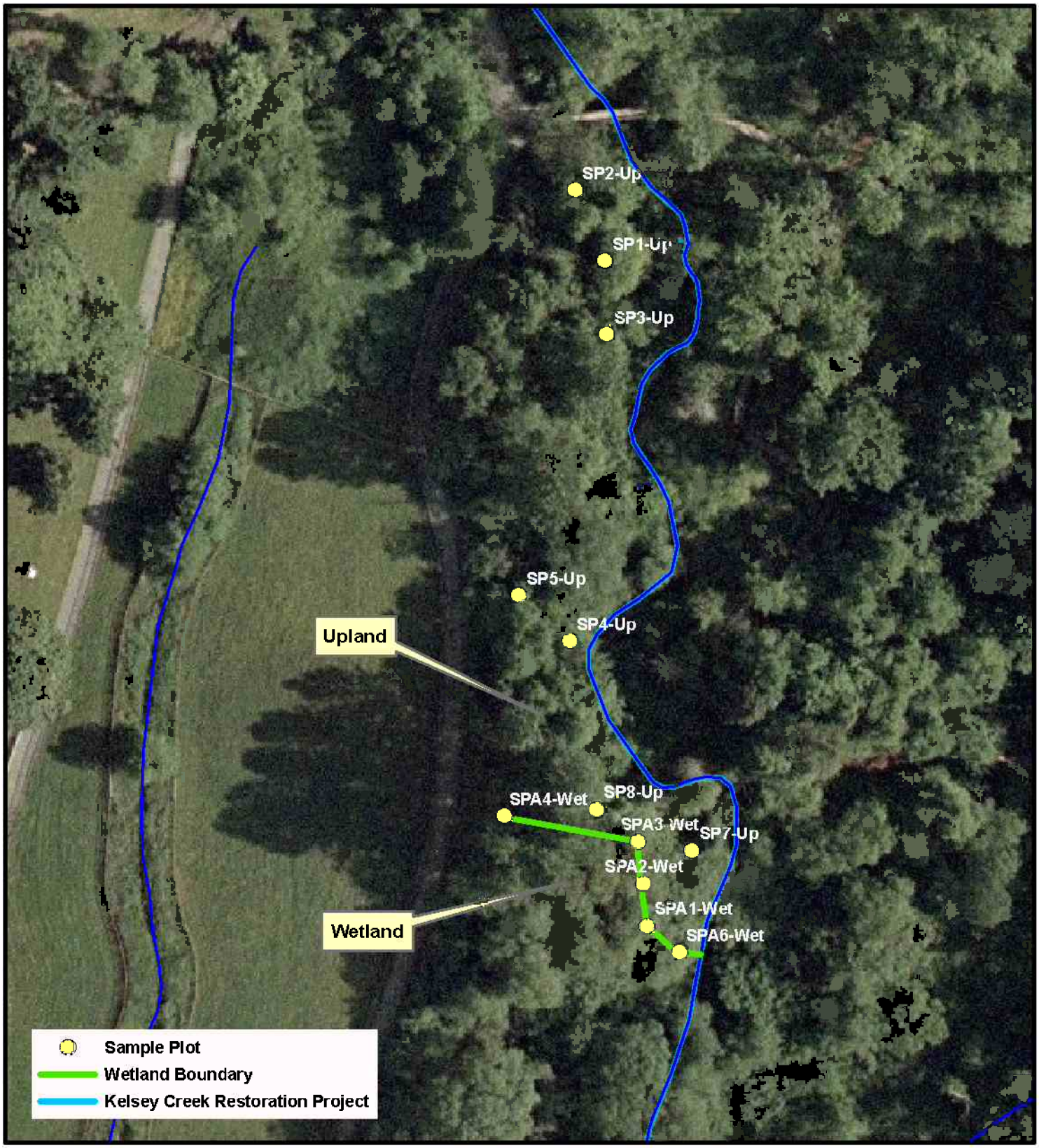
ANCHOR QEA

0 25 50 Feet

N

Figure 2
Wetland Delineation Sample Plot Locations–Reach 1
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



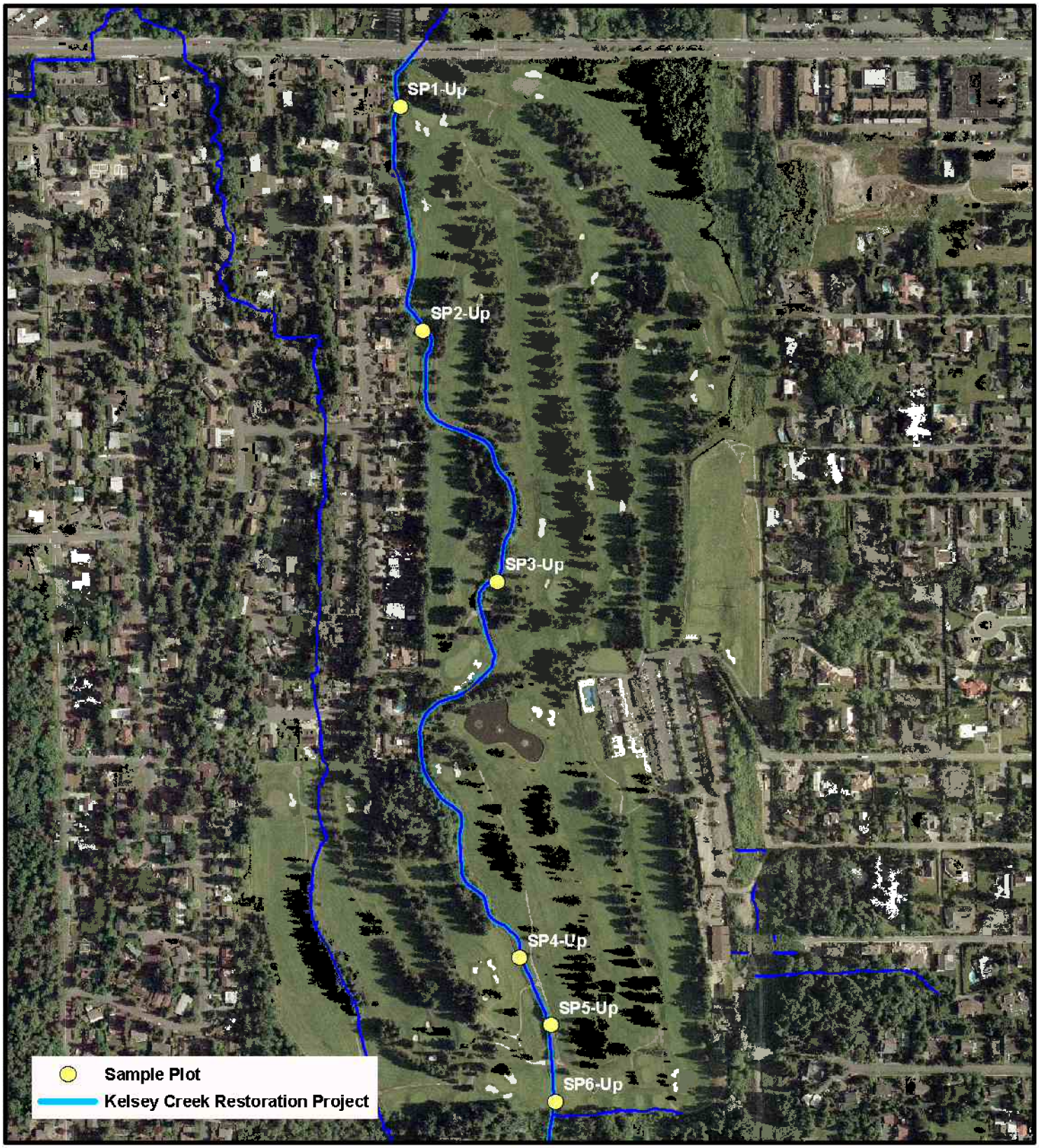
ANCHOR QEA

0 25 50 Feet

N

Figure 3
Wetland Boundary and Sample Plot Locations–Reach 3
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON



ANCHOR QEA

0 250 500 Feet

N

Figure 4
Wetland Delineation Sample Plot Locations–Reach 4
Kelsey Creek Stream Channel Modification Improvements

CITY OF BELLEVUE WASHINGTON

ATTACHMENT 1
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): Kelsey Creek Wetland Date of site visit: 10/1/09

Rated by C. Douglas Trained by Ecology? Yes X No___ Date of training May 07

SEC: ~~26~~ 33 & 34 TWNSHP: 25 RNGE: 5 Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size 7.32 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I X **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	16
Score for Hydrologic Functions	32
Score for Habitat Functions	25
TOTAL score for Functions	73

Category based on SPECIAL CHARACTERISTICS of wetland

I___ **II**___ **Does not Apply** X

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

Summary of basic information about the wetland unit

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

Wetland name or number A

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

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

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

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

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

Wetland name or number A

Classification of Wetland Units in Western Washington

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

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

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

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

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

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

NO – go to 3 **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;

___At least 30% of the open water area is deeper than 6.6 ft (2 m)?

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

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

X The wetland is on a slope (*slope can be very gradual*),

X 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.

X 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**

Wetland name or number A

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

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

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

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

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

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM clases. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

Wetland name or number A

R	**Riverine and Freshwater Tidal Fringe Wetlands** WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	**Points** (only 1 score per box)
R	**R 1. Does the wetland unit have the potential to improve water quality?**	*(see p.52)*
R	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: Depressions cover >3/4 area of wetland — points = 8 Depressions cover > 1/2 area of wetland — points = 4 If depressions > ½ of area of unit draw polygons on aerial photo or map Depressions present but cover < 1/2 area of wetland — points = 2 No depressions present — points = 0	Figure ___ 2
R	R 1.2 Characteristics of the vegetation in the unit (areas with >90% cover at person height): Trees or shrubs > 2/3 the area of the unit — points = 8 Trees or shrubs > 1/3 area of the unit — points = 6 Ungrazed, herbaceous plants > 2/3 area of unit — points = 6 Ungrazed herbaceous plants > 1/3 area of unit — points = 3 Trees, shrubs, and ungrazed herbaceous < 1/3 area of unit — points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 6
R	*Add the points in the boxes above*	8
R	**R 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft X Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 feet of wetland X A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging X Residential, urban areas, golf courses are within 150 ft of wetland X The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above standards for water quality — Other _____ YES multiplier is 2 NO multiplier is 1	*(see p.53)* multiplier 2
R	**TOTAL - Water Quality Functions** Multiply the score from R 1 by R 2 *Add score to table on p. 1*	16

Comments

Wetland name or number A

R	**Riverine and Freshwater Tidal Fringe Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
	R 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.54)*
R	R 3.1 Characteristics of the overbank storage the unit provides: *Estimate the average width of the wetland unit perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of unit)/(average width of stream between banks).* If the ratio is more than 20 — points = 9 If the ratio is between 10 – 20 — points = 6 If the ratio is 5 - <10 — points = 4 If the ratio is 1 - <5 — points = 2 If the ratio is < 1 — points = 1 Aerial photo or map showing average widths	Figure ___ 9
R	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub". Choose the points appropriate for the best description.* ~~(polygons need to have >90% cover at person height NOT Cowardin classes).~~ Forest or shrub for >1/3 area OR herbaceous plants > 2/3 area — points = 7 Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area — ~~points = 4~~ Vegetation does not meet above criteria — points = 0 Aerial photo or map showing polygons of different vegetation types	Figure ___ 7
R	*Add the points in the boxes above*	16
R	**R 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* X There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. X There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding — Other_____ *(Answer NO if the major source of water to the wetland is controlled by a reservoir or the ~~wetland is tidal fringe~~ along the sides of a dike)* **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.57)* multiplier 2
R	**TOTAL - Hydrologic Functions** Multiply the score from R 3 by R 4 ***Add score to table on p. 1***	32

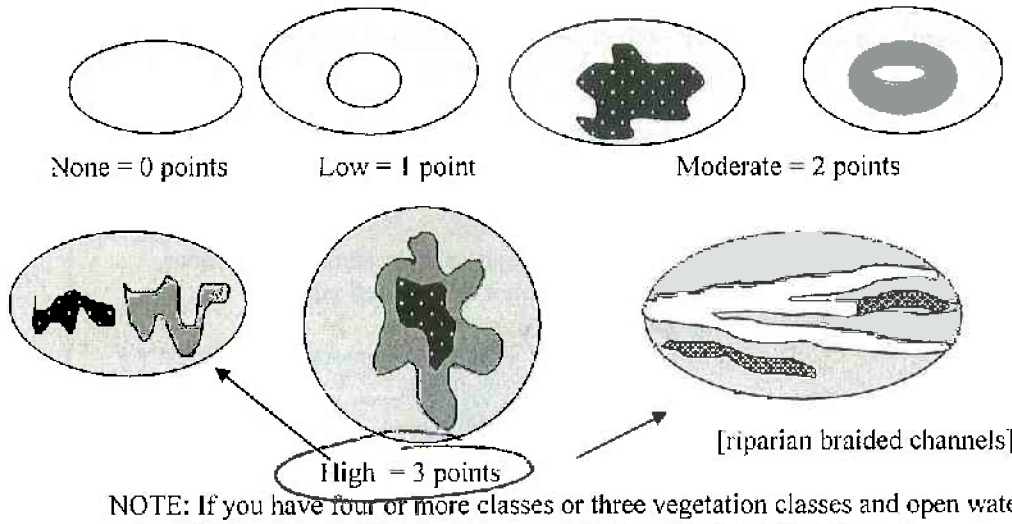
Comments

Wetland name or number A

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

Total for page 7

Wetland name or number A

	Figure ___
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 classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	3
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland X Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) X 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)* X At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated.*(structures for egg-laying by amphibians)* ___ Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	5
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	15

Comments

Wetland name or number A

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

Total for page 4

Wetland name or number A

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*** Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). X **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. X **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question II 2.4)*	3

Wetland name or number _____

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with **little** disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2 4*	10
TOTAL for H 1 from page 14	15
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	25

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

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

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands ***(see p. 86)*** Does the wetland unit meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt. YES = Go to SC 1.1 NO ___	
SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated ~~under WAC~~ 332-30-151? YES = Category I NO go to SC 1.2	**Cat. I**
SC 1.2 Is the wetland unit at least 1 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

SC 2.0 Natural Heritage Wetlands *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ___ or accessed from WNHP/DNR web site ___ YES____ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO ___ SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO X not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs *(see p. 87)* Does the wetland unit (**or any part of the unit**) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog.* ***If you answer yes you will still need to rate the wetland based on its functions.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to Q. 3 No - go to Q. 2 2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? Yes - go to Q. 3 No - Is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes – Is a bog for purpose of rating No - go to Q. 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. *1.* Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cover)?* 2. YES = Category I No X Is not a bog for purpose of rating	**Cat. I**

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

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

BIOLOGICAL EVALUATION

KELSEY CREEK STREAM CHANNEL MODIFICATION IMPROVEMENTS PROJECT

Prepared for

City of Bellevue Utilities Department

450 110th Avenue NE

Bellevue, Washington 98009

Prepared by

Anchor QEA, LLC

1423 3rd Avenue, Suite 300

Seattle, Washington 98101

November 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

BE	Biological Evaluation
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe
cfs	cubic feet per second
City	City of Bellevue Utilities Department
Corps	U.S. Army Corps of Engineers
DPS	Distinct Population Segments
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ELJs	engineered log jams
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionary Significant Units
GCC	Glendale Country Club
HDPE	high density polyethylene
HPA	Hydraulic Project Approval
I-405	Interstate 405
LiDAR	Light Detection and Ranging
LUC	Land Use Code
LWD	large woody debris
NAVD	North American Vertical Datum
NBEMG	National Bald Eagle Management Guidelines
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
Project	Kelsey Creek Stream Channel Modification Improvements Project
RCW	Revised Code of Washington
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Stormwater Pollution Prevention Plan
TESC Plan	Temporary Erosion and Sedimentation Control Plan
USFWS	*U.S. Fish and Wildlife Service*

USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

1 INTRODUCTION

This document is the Biological Evaluation (BE) for the Kelsey Creek Stream Channel Modification Improvements Project (Project), a proposed restoration project to benefit salmon and other resident fish and wildlife in the lower mainstem of Kelsey Creek in Bellevue, Washington (Figure 1). The City of Bellevue (City), Washington, intends to improve fish passage and enhance fish and wildlife habitat in the lower mainstem reach of Kelsey Creek (the portion of Kelsey Creek extending upstream from the Burlington Northern Santa Fe [BNSF] Railroad Trestle to Northeast 8th Street, and flowing through Kelsey Creek Park, Kelsey Creek Farm, and the Glendale Country Club (GCC) golf course). Kelsey Creek is a tributary to Lake Washington and outfalls to Mercer Slough immediately south of Southeast 8th Street on the west side of Interstate 405 in Bellevue, Washington. The end result of this Project will be improved fish and wildlife use of Kelsey Creek, including benefits to water quality, habitat structure and complexity, and conditions for salmon rearing and spawning. Besides salmon, these measures would also benefit other fish and wildlife in the area, as appropriate substrates, riparian vegetation, and an overall healthier environment resulting from the Project would promote more diverse use by songbirds, shorebirds, and non-Endangered Species Act-listed(ESA) fish species.

1.1 Project Overview

The purpose of the Project is to restore degraded instream and riparian habitat in the Project area. Key elements of the Project include:

- Removal of existing angular rock with fish passage limitations in selected stream reaches, and installation of stable, rounded rock substrate mixes with embedded large woody debris to achieve roughened channel design conditions for fish passage, provide additional hydraulic roughness and habitat complexity, and to elevate hydraulic profiles downstream of existing weirs
- Placement of large woody debris (LWD) within existing and created pools to maintain localized pool scour and to increase instream hydraulic roughness and habitat complexity
- Minor grading (sculpting) of stream channel banks with associated restoration, including buffer re-vegetation in the south end of the GCC golf course

- Minor adjustments to the existing concrete plank weirs (raising lower weir and modifying both weir notches) to improve fish passage
- Placement of rounded rock substrate mixes and replacement of a short section of damaged rockery to maintain localized channel and bank stability with those modifications
- Installation of native plantings in selected areas to infill open areas in the riparian zone and to stabilize areas temporarily impacted by construction activities (where not in conflict with the playability of the golf course)
- Removal of reed canarygass (*Phalaris arundinacea*), Japanese knotweed (*Polygonum cuspidatum*) and other invasive species where encountered in designated work areas, and revegetation of those areas with native plants (consistent with the City's independent program for invasive species control within the Project limits)
-

To assess the effects of the proposed Project on ESA-listed species, impacts to physical, chemical, and biological indicators have been evaluated in this BE and are addressed in Section 5.

1.2 ESA-Listed Species and Summary of Evaluation Findings

This BE evaluates the potential effects on ESA-listed species and critical habitat for compliance with Section 7(a)(2) and Section 3(5)(A) of the ESA. Table 1 presents a summary of threatened and endangered species potentially occurring in the Action Area (NMFS 2007a; NMFS 2007b; USFWS 2007) with ESA-listed species under National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) jurisdiction identified based on the geographic boundaries of Distinct Population Segments (DPSs) and Evolutionary Significant Units (ESUs). The table also identifies whether critical habitat has been designated by NMFS or USFWS for those species within the Project vicinity. Section 5 of this document provides details on these species and potential Project effects.

Table 1
ESA-Listed Species and Critical Habitat that May Occur in the Action Area

Common Name (Scientific Name)	Federal Agency Jurisdiction	ESA Status	Species Effects Determination	Critical Habitat	Critical Habitat Effects Determination
Chinook salmon (*Oncorhynchus tshawytscha*) Puget Sound ESU	NMFS	Threatened	Not likely to adversely affect	Designated; Lake Washington tributaries excluded	Not applicable
Steelhead trout (*Oncorhynchus mykiss*) Puget Sound ESU	NMFS	Threatened	Not likely to adversely affect	Not designated	Not applicable
Bull trout (*Salvelinus confluentus*) USA, conterminous Coastal-Puget Sound DPS	USFWS	Threatened	Not likely to adversely affect	Designated; Lake Washington tributaries excluded	Not applicable

Bald eagles have been removed from the endangered species list, the final de-listing rule went into effect on August 8, 2007, and are now primarily protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act and the National Bald Eagle Management Guidelines (NBEMG; USFWS 2007). Because the closest bald eagle nest is more than 1.5 miles from the project area (WDFW 2007), this Project will be in compliance with the NBEMG, and no actions to protect eagles will be necessary.

The presence of bull trout (*Salvelinus confluentus*) has not been documented in Kelsey Creek in recent years; however, because they have been documented in the past and there is suitable habitat for bull trout, their presence is assumed.

This BE also serves as a resource document for concurrent Essential Fish Habitat (EFH) consultation with NMFS in compliance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). EFH consultations are required under the Magnuson-Stevens Act for federally managed fishery species, including Chinook (*Oncorhynchus tshawytscha*), pink (*O. gorbuscha*), and coho (*O. kisutch*) salmon habitat as part of the Pacific salmon EFH composite. Chinook and coho salmon may occur in the

Project vicinity and are part of the Pacific salmon composite. This BE determines that the proposed Project will have no adverse effect on Pacific salmon EFH (Appendix A).

2 PROJECT INFORMATION

The following sections provide the location, history and background, timing, and Project description for the proposed work.

2.1 Location

The Project site is located in the City of Bellevue, King County, Washington, within and along Kelsey Creek in Sections 3 and 4 of Township 24N, Range 5E and in Sections 33 and 34 of Township 25N, Range 5E (see Figure 1). The Project reach under consideration extends approximately 2.3 stream miles from the BNSF Railroad Wilburton Trestle, located just upstream of Interstate 405 (I-405), to Northeast 8th Street at the north end of the golf course. Surrounding properties include residential and park areas.

2.2 Purpose of the Project

The purpose of the Project is to improve fish passage and restore and enhance aquatic and riparian habitats for fish and wildlife within and along Kelsey Creek within the City of Bellevue, Washington. The Project will provide benefits to water quality; habitat structure and complexity; and conditions for passage, spawning, and rearing of resident and anadromous fish species that currently use the creek. It will have only minor, in-channel effects on local floodplain elevations within the improvement areas, but not extending further upstream.

For this highly productive salmonid stream system, the City's primary goals and objectives are to:

- Improve fish passage where limitations to adult and juvenile salmonid mobility and upstream migration currently exist
- Enhance fish and wildlife habitat features within the Kelsey Creek channel and riparian corridor in the GCC Reach

Secondary objectives include:

- Maintaining reasonably stable and sustainable channel morphology and sediment transport without excessive scour or deposition

- Enhancing Kelsey Creek Park and Farm reach stream and wetland habitats through LWD placement and invasive species control (vegetation management in these reaches is a separate initiative being handled by the City)
- Maintaining consistency of recommended improvements with the Kelsey Creek Park Master Plan

2.3 Existing Conditions and Proposed Improvements

For restoration planning and preliminary design, the lower mainstem of Kelsey Creek has been divided into four reaches as follows (Figure 2):

- Reach 1 (Southeast 8th Street Reach) – Lower gradient reach between the BNSF Railroad Wilburton Trestle and the Lake Hills Connector roadway crossings
- Reach 2 (Park Reach) – Lower gradient reach between the Lake Hills Connector roadway crossings and the east limit of the City's Kelsey Creek Park
- Reach 3 (Farm Reach) – Lower to intermediate gradient reach between the west limit of Kelsey Creek Farm and its north limit at the south boundary of the golf course
- Reach 4 (GCC Reach) – Intermediate gradient reach through the golf course, extending to its north limit at Northeast 8th Street (but not including that crossing)

The reaches described above have distinct physical characteristics and associated restoration and enhancement needs. Therefore, a variety of restoration and enhancement strategies has been considered in formulating the proposed recommendations for habitat improvements. The following sections describe existing conditions and restoration and enhancement strategies for the various reaches.

2.3.1 Reaches 1 and 2 – Southeast 8th Street and Kelsey Creek Park

For Reaches 1 and 2, existing conditions have been affected by changes from historic site conditions. Prior to 1916, when the Montlake Cut was completed as part of the Lake Washington Ship Canal Project, the portions of the Project below approximately 30 feet (North American Vertical Datum [NAVD] 88) were part of Lake Washington. Upon completion of the Montlake Cut, the historic Lake Washington level was lowered by

approximately 9 feet. The lake level is currently managed to maintain a water level between 18.75 and 20.75 feet (NAVD 88). Consequently, Reach 1 consists of a lacustrine plain and delta that cannot be restored to the prior historic condition. Under undisturbed natural conditions, a transition from lake bottom to emergent wetland, primary forest, and then to secondary forest would be expected. In that scenario, Kelsey Creek would have migrated across the lacustrine plain depending on various factors, including the composition of the lacustrine sediments, the stream flow and alluvial sediment characteristics delivered from upstream, and the establishment of vegetation. Until relatively recently, the fertile areas were used actively for agriculture, delaying and affecting the natural succession process. Currently, reed canarygrass is the dominant vegetation along much of the reach on the lacustrine plain. This invasive plant effectively out-competes the native plants that would be expected to colonize the area under natural conditions. Consequently, the habitat diversity in the lower emergent wetland areas is lacking and little opportunity for primary forest establishment exists. As a result, there is limited source of LWD to naturally recruit to the channel that would otherwise help stabilize it and provide for greater habitat variability and complexity. Further upstream in Reach 2, some primary forest species have established on the lacustrine delta, but they are presently too small to provide significant LWD input.

The City has previously undertaken some habitat restoration/enhancement activities in Reach 2 to maintain fish passage and improve habitat quality. This has included actions to maintain adequate channel depths for fish passage at low flows and placement of LWD in the upland areas of Reach 2. The City has also attempted localized control of reed canarygrass in this reach through planting selected areas with native emergent and primary forest species (using various techniques). These past and ongoing restoration/enhancement activities have focused on maintaining the active channel for fish passage given the current hydrologic regime, controlling invasive reed canarygrass from spreading, and establishing primary forest species. The vegetative management program is being managed by City staff as an experimental program, and future planned actions to address identified needs are not part of this Project.

The stream modification improvements proposed for Reaches 1 and 2 are limited to improvements in Reach 1, downstream from 121st Avenue Southeast (Figure 3), and include:

- Removal of the existing angular rock immediately downstream from an existing box

culvert, addition of buried hydraulic control logs at the culvert outlet, and placement of a section of roughened channel backfill (cobble/boulder mix) to create a stable, fish-passable riffle at the downstream approach to the culvert

- Placement of LWD (approximately 7 pieces total, logs with rootwads) in the cobble/boulder backfill (anchored and partially buried) for increased roughness and habitat complexity.
-

2.3.2 Reach 3 – Kelsey Creek Farm

Reach 3 extends upstream from Reach 2 to the golf course (Figure 4). This reach of the creek is located upstream of the former shoreline of Lake Washington, but it has been altered by past logging and channel maintenance activities (e.g., removal of LWD). Stream corridor vegetation within this reach includes a closed tree canopy, and secondary forest species are co-dominant. The channel is actively migrating within its floodplain in this reach, given the increased gradient and alluvial character of the channel bed and banks along it. The field-mapped 2007 channel location is significantly different in some areas of this reach when compared to the City's Light Detection and Ranging (LiDAR) coverage topographic mapping (imagery from 2000). This reach is also lacking LWD that, under natural conditions, would add hydraulic roughness, maintain pools, and add habitat complexity. Much of the channel in this reach consists of hydraulic runs separated by short riffles, with limited pool habitat.

Proposed restoration/enhancement strategies in Reach 3 are focused on adding LWD to promote creation and maintenance of pool habitats along with increased habitat complexity. LWD placements would include a total of approximately 13 pieces (logs with rootwads, rootwads, fallen trees) and two engineered log jams (ELJs), a collection of multiple LWD pieces with small woody debris racking material) are proposed at eight locations along the stream channel banks. Two beaver dams were documented in the lower section of Reach 3 in October 2008. No response actions have been identified by the City for their removal at this time. Future options (beyond this Project) may include controlled breaching of the dams with possible beaver deceiver installations to discourage continued beaver dam building activities at those locations (although under this approach, beaver relocation to other sections of the creek could result).

More extensive actions are not proposed in Reach 3 because of the evolving natural succession processes, limited stream corridor access, and potential disturbances to the riparian corridor and stream channel that would be associated with more extensive improvement actions. The City plans to independently develop and implement solutions for removal of undesirable invasive vegetation such as Japanese knotweed and Himalayan blackberry (*Rubus armeniacus*). These vegetative management program actions are not part of the current stream modifications improvements proposal for this reach.

2.3.3 Reach 4 – Glendale Country Club (GCC)

Reach 4 extends upstream from Reach 3 to Northeast 8th Street and is aligned through the golf course and several single family residential properties adjacent to the golf course (Figures 5 through 11). The riparian vegetation in this reach has been modified by past logging practices, golf course construction and maintenance activities, and by actions taken by certain streamside private property owners. In some cases, ornamental (non-native) vegetation has been planted in the riparian corridor for landscaping purposes. The channel banks have typically been armored along many Reach 4 channel segments, including rockeries or angular rock revetment installations, and a series of concrete weirs have been installed in the middle to upper segments of this reach (to control channel down-cutting). These past vegetation and stream channel modifications have resulted in reduced instream habitat complexity, channel segments with little or no vegetative buffer and canopy cover, increased stream temperatures and other water quality effects, and limitations to resident and anadromous fish passage associated with hydraulic drops (i.e., at weirs).

Restoration and enhancement activities proposed for Reach 4 are focused on improving fish passage at the concrete weirs, installation of a section of roughened channel downstream from the lower weir in each weir pair (to eliminate the weir excessive jump heights), placement of instream LWD to increase hydraulic roughness and habitat complexity, and expansion of riparian corridor vegetation and stream canopy cover using native species where possible (without affecting golf course playability). More specifically, the stream modification improvements proposed within Reach 4 include:

- Placement of LWD (approximately 16 pieces total, logs with rootwads and rootwads, anchored and partially buried) in existing pools and in sculpted channel and bank

areas with new pools, located within the downstream 800 foot section of Reach 4; benefits include improved pool habitat complexity and cover, pool scour maintenance, and increased instream hydraulic roughness

- Modification of the existing concrete weirs (17 total, one single weir, eight weir pairs), including raising the downstream weir crest elevations to achieve a maximum of 0.5 feet of weir crests elevation difference with the upper weir (to reduce jump height), and modification of weir notch geometries for improved juvenile fish passage across the weirs
- Creating roughened channel sections through placement of cobble/boulder mix and anchored and partially buried LWD (approximately 46 pieces total, logs with rootwads and rootwad, anchored and partially buried) in the downstream weir pair tailout areas and at the single weir
- Placement of supplemental channel bank toe rock (covered with cobble/boulder mix) at selected locations where existing channel down-cutting has the potential to destabilize existing rock revetments
- Re-vegetation of selected channel banks and riparian buffer areas local to the stream channel where not in conflict with the playability of the golf course

Because Reach 4 is located on private properties, restoration and enhancement opportunities will require the concurrence and cooperation of the GCC and various adjacent, affected property owners. That will include the need for temporary construction easements for access through and improvements to be made on those properties.

2.4 Key Benefits of Improvement Actions

Implementation of these proposed restoration and enhancement actions along the collective Kelsey Creek lower mainstem Project reaches will improve salmonid habitat by:

- Facilitating anadromous salmonid passage to upstream reaches to provide for rearing and spawning opportunities
- Creating instream habitat features to provide structure and complexity
- Providing improved functional interaction between instream and riparian corridor

habitats

- Creating reduced direct access to selected stream channel segments through vegetative buffering of exposed stream segments (primarily in Reach 4)
- Achieving protection/improvement in instream water quality

Besides salmonids, these actions would also benefit other fish and wildlife in the project area, as appropriate substrates, riparian vegetation, and increased habitat connectivity would promote use of the stream corridor by a diverse array of species.

2.5 Construction Requirements – Reaches 1 and 2

2.5.1 Access

Construction access for proposed improvements in Reach 1 (none are proposed in Reach 2) will be provided directly from 121st Place Southeast, on the southwest side of the Kelsey Creek box culvert crossing. It is expected that the width of temporary access disturbance in the riparian buffer would be up to 30 feet to facilitate trackhoe access, and the length of disturbance along that access would average approximately 80 feet. It is expected that other equipment needs required for proposed stream modifications (i.e., small loader and skiff for materials removal and replacement) would be provided by crane from a crane pad located within the 121st Place Southeast right-of-way. Partial or full short-term road closure with alternative public access detour (an alternative route is available) will be required during the period of crane operations. This access plan and other possible construction contractor access needs will be further evaluated and refined with final design of improvements.

2.5.2 Clearing and Grubbing

Clearing of selected trees that obstruct equipment access within the designated construction access but not grubbing will be required. Based on initial observation, it appears that only a few smaller trees may need to be cleared (significant trees will be avoided). Other smaller vegetation species (shrubs and understory vegetation) within the work area access may be impacted by construction access over them. If deemed acceptable through permit review, placement of hog fuel may be possible for temporary upland access routes to minimize the amount of vegetation removed, associated work area disturbance, and erosion potential.

Small areas of existing vegetation immediately adjacent to the stream banks may need to be removed for control logs, LWD, and roughened channel fill placement. No streamside wetland habitats exist in the Reach 1 proposed work area based on wetland field reconnaissance previously conducted by Anchor QEA. Further refinement in the expected type and extent of vegetation clearing required for construction access and proposed stream channel improvements will be evaluated under the City's Critical Areas Land Use Permit Application review and with final design of improvements.

2.5.3 Installation

Construction of improvements will require the installation of temporary cofferdams and gravity (or pumped with appropriate fish screening) stream flow bypass through/around the Reach 1 work area. It is expected that a temporary sand bag cofferdam would be placed within the 121st Place Southeast culvert, and a temporary diversion pipe (high density polyethylene [HDPE] or equivalent) would be routed from it through/around the work area. A similar temporary downstream cofferdam would need to be installed to capture any upstream cofferdam leakage plus any incident surface or groundwater contributions within the work area. Accumulated water within the work area (between the cofferdams) will need to be pumped upslope to an acceptable designated vegetated dispersal area or contractor-provided treatment system prior to recharge and/or return to Kelsey Creek.

Once the work area has been adequately dewatered, removal of the unsuitable angular streambed substrate rock would occur along with over-excavation to key in the roughened channel cobble/boulder backfill. It is expected that removal and placement of rock substrate materials and placement of LWD pieces could be accomplished by a small trackhoe in combination with a crane using a skiff or other similar device to remove and place imported materials from temporary stockpiles along 121st Place Southeast. Truck access to the stream in Reach 1 will not be possible due to construction access grade constraints. Anchorage of the LWD (i.e., using duckbill anchors) within the constructed riffle areas would occur using small equipment to drive and load test the anchors, and attach the required cabling.

2.5.4 Construction Site Restoration

Restoration of stream corridor and riparian buffer areas temporarily impacted by construction will include placement of all specified instream materials required for channel stability, installation of steam-side slope toe protection and slope area erosion protection fabric (i.e., jute netting), and re-vegetation of the disturbed riparian buffer area with native facultative shrub and upland trees. A preliminary re-vegetation plan will be developed through Project permit applications, and will be carried forward with landscape planting plans and specifications with final design of improvements. Hydroseed will be applied to all other pervious areas disturbed by construction and not requiring landscape plantings or otherwise restored with other cover materials. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

2.6 Construction Requirements – Reach 3

2.6.1 Access

Construction access for proposed improvements in Reach 3 will be provided from City-owned roadways and maintenance access roads within Kelsey Creek Park and Farm as accessed from Southeast 4th Street directly east of 130th Place Southeast. From the south end of the Kelsey Creek Farm (at parking area), a maintenance access road/trail currently extends along the west periphery of Kelsey Creek. The proposed action for installation of approximately 13 pieces of LWD (i.e., logs with rootwads, rootwads, and fallen trees) and two ELJs at eight locations within this stream reach will require controlled construction contractor access to the stream channel from that maintenance access road (i.e., for a small trackhoe). Three points of temporary construction access to proposed LWD placement sites (six total; two access locations serve two sites each) have been identified through field investigation, with a cumulative access length of approximately 500 feet. The expected width of temporary access disturbance along those access routes in the riparian buffer would be approximately 12 feet. Existing trees and wetlands will be avoided to the extent possible along those access alignments (much of that area is covered with invasive species (i.e. *Himalayan blackberry, Japanese knotwood*). The LWD and other required materials (channel substrate rock mix for placement around LWD) can be hauled in by truck along the

maintenance access road to the stream access locations. A loader could be used to transport those materials to the stream channel LWD placement sites along the temporary access routes.

Use of high lead cable techniques to transport the LWD through the riparian area or aerial (helicopter) methods could provide alternative, low impact methods of LWD placement in this reach, but trackhoe equipment access to the channel may still be required.

2.6.2 Clearing and Grubbing

Clearing but not grubbing of selected vegetation that obstructs equipment access to the designated LWD placement locations will be required. Although some small trees may need to be removed, significant trees will be avoided and protected. Smaller vegetation species and grasses may be impacted by construction access, but may not require removal unless they are identified as invasive species, in which case, those areas would be cleared and restored with native species plantings after construction. Only one stream-side wetland (Wetland A) was found to exist adjacent to the Reach 3 proposed LWD placement areas (near location No. 3, west side of channel) based on wetland field reconnaissance and delineation previously conducted by Anchor QEA. Temporary clearing and construction access for that location could temporarily impact that wetland vegetation. Further refinement in the expected type and extent of vegetation clearing required for construction access and LWD placement will be evaluated under the City's Critical Areas Land Use Permit Application review and with final design of improvements.

Since the topography in this reach is relatively flat, temporary steel sheeting or construction mats laid flat on the surface may be an option to minimize temporary construction impacts within the riparian buffer and in proximity to the channel. Placement of hog fuel (that could be spread along disturbed channel banks after construction) may also be an option to minimize riparian area construction disturbance along access routes.

2.6.3 Installation

The LWD to be placed can be hauled by truck along the maintenance access road to the designated stream access locations. After off-load, the LWD would be carried by trackhoe

(or by alternative methods highlighted in Section 2.6.1) to the stream channel for placement. Placement of LWD would be completed by trackhoe. Rounded rock substrate mix would also be trucked to a similar location and would be off-loaded for placement by the trackhoe around the LWD. Soils conditions along the designated access paths (to the channel) will be reviewed in final design to establish the potential need for use of low tire/track pressure equipment to minimize native soils disturbance and compaction.

No flow diversion or localized dewatering of the stream channel is proposed for LWD placement. The construction contractor will be required to exercise appropriate diligence in the instream placement of the LWD (rootwad) pieces to avoid creating significant sediment plumes within Kelsey Creek during LWD placement. Final locations of LWD placement will be field adjusted in conjunction with field observation by a fisheries biologist to provide for the optimum channel pool formation, stabilization, and habitat benefits. Anchorage of the LWD may not be required for all LWD pieces (i.e., smaller members of ELJ) in Reach 3 due to the limited risk of downstream problems with its potential movement. If the City desires LWD anchorage for most if not all of the LWD in Reach 3, use of duckbill anchors, load tested, and cabled to the LWD is proposed.

2.6.4 Construction Site Restoration

Restoration of stream corridor and riparian buffer areas temporarily impacted by construction will include placement of all specified LWD and associated instream materials required for channel stability, installation of steam-side slope toe protection and slope area erosion protection fabric (i.e., jute netting), and re-vegetation of the disturbed riparian buffer area with native wetland and upland trees and shrubs. Temporary recyclable hog fuel would be left in place or spread over adjacent areas prior to planting. A preliminary re-vegetation plan will be developed through Project permit applications, and will be carried forward in landscape planting plans and specifications with final design of improvements. Hydroseed will be applied to all other pervious areas disturbed by construction and not requiring landscape plantings, or they will otherwise be restored with other cover materials. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

2.7 Construction Requirements – Reach 4

2.7.1 Access

Construction access for proposed improvements in Reach 4 is targeted to be provided from two locations. A temporary construction access will be created from an existing GCC gated access at Northeast 8th Street, then along the periphery of Kelsey Creek within the GCC property, for the northern portion inclusive of Reach 4 weirs. That access is proposed to be extended along an alignment in close proximity to the east bank of the existing channel. The route would typically follow turf fringe areas of the golf course (fairway fringes or other non-playable areas), except where tree-covered riparian areas exist. In those areas, the temporary access alignment would extend beyond those areas to preserve and protect the native riparian vegetation. A looped or hammerhead turn-around would be provided near the central portion of the primary access (upstream of Weir 1) unless an alternative (more efficient) truck access out along the golf course cart path and through the clubhouse parking area could be considered if found acceptable to GCC representatives. For the majority of the proposed north construction access over the golf course fairway fringe areas, temporary sheeting could be used to minimize construction impacts to golf course operations, avoid haul-in and haul-out of ballast material and associated site disturbance, and to minimize turf area restoration needs. If temporary sheeting of that portion of the access is determined by the City to not be acceptable or feasible, then temporary imported ballast fill (i.e., crushed rock) could be placed over a geotextile laid on the turf to stabilize the construction access road and minimize native soils disturbance. However, under that option, removal and haul-out of those materials would then be required in addition to larger anticipated restoration needs for the disturbed areas.

Existing GCC roads and golf cart access paths in the southeast portion of the golf course are proposed for construction access to south end improvements in Reach 4, as requested by the GCC. For work in that subreach (which is limited to LWD placement and minor bank sculpting), it is anticipated that no tracked or dump truck equipment would be required, and that low-pressure, rubber-tire equipment could be used to import and distribute materials while minimizing the potential for cart path or turf area damage. Potential damage to proposed construction access routes through City and GCC golf course property that result from construction will be restored consistent with existing conditions.

Localized access to the various weir pairs in the north portion of this reach from the primary construction access alignment is required to accomplish the improvements. This will require import of considerable cobble-boulder substrate mix along with LWD (i.e., logs with rootwads, rootwads) for placement in the channel by a small trackhoe. That access could also be over temporary steel sheeting to minimize construction disturbance in proximity to the channel (or alternatively ballast fill with underlying geotextile similar to the primary construction access). Smaller tracked equipment such as a Morooka crawler-carrier could be used to move imported materials to and from the channel from the primary access road alignment.

The expected width of the temporary constructed accesses in Reach 4 within the riparian buffer would be variable, but is expected to average approximately 12 feet assuming a steel sheeting approach on existing grade is used for the majority of the north section of this reach. Otherwise, a wider access impact footprint would be needed to accommodate the temporary ballast fill. The required length of the primary construction access within Reach 4 is approximately 2,600 feet for the north section access (beyond the existing cart path). For the south end golf course improvements access, the total length of temporary access from the GCC parking area over existing maintenance access roads and cart paths is approximately 2,300 feet. In addition, short segments of local access to each work area would be affected.

2.7.2 Clearing and Grubbing

No significant clearing or grubbing is anticipated to be needed within Reach 4 since construction accesses will avoid existing riparian vegetation areas where possible. No stream-side wetland habitats exist in the Reach 4 proposed work area based on wetland field reconnaissance previously conducted by Anchor QEA staff. Some incidental native and non-native stream bank vegetation removal may be required within the various improvement work areas associated with establishing construction access and excavation to channel subgrade in the roughened channel sections. Along the primary and local work area access routes, replacement of affected golf course turf would likely be required post-construction, immediately after removal of steel sheeting plates and/or temporary ballast fill and geotextile placed for equipment access. Native re-vegetation restoration actions would subsequently occur in selected areas as mutually agreed to by the City staff and the GCC ownership (those

riparian areas where golf course playability would not be affected). Placement of hog fuel (that could be spread along the disturbed channel banks after construction) may also be an option to minimize construction disturbance in selected riparian areas in Reach 4.

Further evaluation of the expected type and extent of vegetation clearing required for construction access and installation of proposed stream channel improvements will be completed as part of the Critical Areas Land Use Application review and with final design of improvements.

2.7.3 Installation

Construction of proposed improvements in the south section of Reach 4 will entail limited channel bank excavation (sculpting) and upland fill placement local to the stream channel. Temporary sandbagging will be required along the channel fringes in those areas to avoid stream flow interface and potential water quality (turbidity) excursions during construction. Other construction activities in the south section of Reach 4 will include placement of in-channel LWD (rootwads) and streambed substrate materials within existing or expanded pools, and vegetative restoration of selected riparian areas, as mutually agreed to between the City and GCC representatives. All disturbed construction access areas will also require landscape restoration consistent with existing conditions.

In the north improvements section, repetitive construction activities would occur incrementally at each weir or weir pair. The existing weirs are constructed of 1-foot depth concrete beams that are keyed into the channel banks and that are pinned together vertically. After locally diverting stream flow around each weir/weir pair work area using temporary gravity drainage pipe and sandbag cofferdams, the weirs would be modified by cutting out sections of the upper beam(s) and replacing that section with the modified notch weir section (i.e., notched cedar timber). The downstream weir in the weir pair would be raised using a timber or alternative material member cut to achieve the proper vertical drop across each weir pair (0.5-foot maximum between weir notches), using epoxy anchor bolts to connect it to the existing concrete top beam of each weir. Roughened channel sections would be constructed by keying sloped cobble/boulder mix rock blankets into the channel bed coupled with LWD (i.e., logs with roodwads, rootwads) placements partially buried within it. The roughened channels, LWD, and modified weir elevations will be set to adjust

the hydraulic control downstream and between the weirs such that stream flow conveyed through the project area (flow range as required for fish passage) has adequate depth, suitable velocities, and conforms to maximum jump height criteria for juvenile and adult fish passage. Larger boulders with cobble-boulder overburden may be placed by trackhoe at selected locations within the work areas where added scour protection is needed, such as near the base of existing stream bank rock revetments. At one location in Reach 4 (upstream west bank at weir 11), a short section of failed rockery will be restored with rock toe protection placed to stabilize an eroding streambank at that location.

Use of high lead cable techniques and aerial (helicopter) placement does not appear to be workable in Reach 4 since import of a significant volume of channel substrate rock is needed. In addition, there are a number of homes in close proximity to the stream channel work areas along the west periphery of the channel.

2.7.4 Construction Site Restoration

Restoration of stream corridor areas temporarily impacted by construction will include placement of all specified streambed substrate mix backfill, LWD, and associated instream materials required for channel pool maintenance and stability. In riparian stream buffer areas, erosion protection fabric (i.e., jute netting) would be placed where required on disturbed slope areas. Re-vegetation with native facultative shrubs and upland trees and golf course turf would occur in selected areas where mutual concurrence is achieved between the City and GCC representatives and other affected private property owners. Temporary hog fuel fill, if used, would be spread onto disturbed soils in areas to be re-vegetated. Existing golf course grades and drainage patterns will be re-established. Other non-recyclable ballast fill (i.e., crushed rock) would be hauled to a permitted off-site (upland) disposal area.

Site-specific landscape restoration plans, specifications, and plant schedules will be developed with final design of improvements for all native planting restoration areas. Sports turf will be installed in all other golf course pervious areas disturbed by construction or as agreed to with GCC representatives, and if not currently vegetated, they will be restored consistent with existing conditions. In areas with existing invasive species, a control strategy (i.e., approved chemical application) will be developed as part of the Critical Area Report

Vegetation Management Plan to be implemented in construction and monitored post-construction in attempt to limit the re-growth of invasive species.

2.8 Avoidance and Minimization Measures

Minimization measures and best management practices (BMPs) will be used during Project construction to limit impacts to ESA-listed species.

Minimization measures to be used will include:

- In-water work will be restricted to the Washington Department of Fish and Wildlife (WDFW) in-water work window, set for when Chinook salmon and bull trout are unlikely to be present or would be present in low numbers. The typical (U.S. Army Corps of Engineers (Corps) in-water work window extends from July 1 to August 31, but may be expanded by WDFW to extend between mid-June and September 30.
- Clearing limits will be defined on the restoration design plans with requirements to flag those limits prior to initiation of grading activities. The contract documents will include provisions to confine construction activities to the minimum area necessary to complete the improvements within the flagged clearing limits.
- Existing wetlands within or adjacent to the construction areas will be staked and protected from access with temporary orange plastic fencing.
- Trees to remain on site will be protected with temporary tree protection fencing during construction.
- A site-specific Temporary Erosion and Sedimentation Control (TESC) Plan along with a Stormwater Pollution Prevention Plan (SWPPP) will be prepared as guidance for contractor activities to protect Kelsey Creek water quality during construction. An example of this plan can be found in Figure 13.

Construction phase BMPs to be used will include:

- For instream work areas within Reaches 1 and 4, temporary cofferdams and stream flow gravity bypass piping will be installed; combined work area incidental run-on, cofferdam leakage, and dewatering water will be pumped to upland dispersal, treated (as required), and recharged (Figure 13).

- Outside of the stream corridor, TESC BMPs (i.e., inlet protection, silt fences, vegetative filter strips, and filter bags) will be provided to minimize impacts to critical areas and other riparian areas.
- Installation of materials that require streambed or low bank excavation would occur only after the affected stream sections have been isolated or at least partially dewatered.
- Any excavated soils or streambed materials would be reused on site shortly after excavation or stored temporarily at an approved upland location. Temporary material stockpiles will be covered with plastic sheeting when not in active use and prior to storms to minimize their erosion potential.
- The contractor will be required to have backup equipment, including pumps and extra TESC materials readily available during storm events.
- Any temporarily disturbed or otherwise modified streambanks will be temporarily mulched and sown with grass seed to minimize erosion, or covered with a biodegradable erosion control fabric and replanted with native species as designated in the approved planting plan.
- The approved native planting plan will be implemented during the first month of frost-free portions of the first dormant season (in October) following completion of grading work.
- A designated representative of the City would conduct construction observation for the duration of the restoration work. The construction contractor will be required to implement the TESC plan and SWPPP, and will develop and implement a Spill Prevention, Control, and Countermeasures Plan (SPCCP) that maintains compliance with the Washington State water quality standards (Washington Administrative Code [WAC] 173.201A).

Additional measures that will be employed include consistency with Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC (updated 2006); the Western Washington National Pollutant Discharge Elimination System (NPDES) Phase II municipal Stormwater Permit (effective February 16, 2007) and the NPDES Construction Stormwater General Permit (effective December 15, 2005); the Stormwater

Management Manual for Western Washington (2005); General Occupation Health Standards (WAC 276-62); and all regulatory permit conditions, including the Clean Water Act Section 404 permit, Washington State Department of Ecology (Ecology) Section 401 Water Quality Certification, WDFW Hydraulic Project Approval for the Project, and all applicable local permits for this Project.

2.9 Project Schedule

The City anticipates constructing the Project during the summer and fall of 2010 (in a single phase). To protect ESA-listed fish species, timing for in-water work in the Project area typically extends annually from July 1 to August 31 (Corps work window), but typically can be expanded to mid-June through September 30 under WFDW Hydraulic Project Approval (HPA) authorization. In-water work is proposed to occur during this expanded work window when streamflows are lowest, and salmonids are unlikely to be present in the Action Area, or present only in low numbers. The City expects construction of Project improvements to take approximately 12 weeks for in-water work activities and 18 weeks total to complete the entire Project, including mobilization, all improvements, final stabilization, and landscape restoration. Plantings would ideally be completed in the frost-free portions of the first month of the dormant season (October). The schedule for Project construction activities will be coordinated with GCC representatives for compatibility with summer golf course operations. Construction activities affecting adjacent private property will also be scheduled with those property owners. This schedule is dependent on completion of the Project final design, securing required construction easements from the affected parties, and attainment of required agency environmental permits and approvals.

3 ENVIRONMENTAL BASELINE

In general, Kelsey Creek is situated within the Lake Washington watershed where stream habitats have been partially degraded due to conversion of the landscape to residential, commercial, and industrial uses (Fresh and Lucchetti 2000). This has modified the flow regime to include more frequent and higher magnitude flows (although some upstream instream flow regulation exists [regional detention facilities]) and forest cover has largely been eliminated. Alteration of these habitats has ensued due to loss of living and fallen trees (reduced LWD inputs), reduction in channel complexity, hardening of stream banks, and installation of weirs for erosion protection.

The Kelsey Creek basin has been extensively modified from natural conditions, as it is located in a suburban environment surrounded by the Kelsey Creek Park, Kelsey Creek Farm, and the golf course. Approximately 50 percent of the basin is composed of residential areas (City of Bellevue Planning and Community Development 2000), with 42 percent of the basin covered in impervious surfaces as of 2000 (Kerwin 2001). Less than 25 percent of historic floodplain connectivity remains; however, approximately 25 percent of the basin's riparian wetlands remain (May 1996). There are a number of non-fish-passable culvert barriers within the Kelsey Creek basin (Kerwin 2001), and within the golf course in the project area, several concrete and rock weirs exist that are partial barriers to fish passage dependent on species, life stage (i.e., juvenile and adult), and stream flow rate (Anchor 2008). In addition, with upstream development, fine sediments have accumulated in Kelsey Creek; in 1982, fine sediment comprised 22 percent of the spawning substrate (Scott et al. 1982), and a 1995 to 1996 study found fine sediment amounts as high as 39 percent in the creek (May 1996). Fish habitat in Kelsey Creek is less complex compared to other streams with less development, with average pool frequency reported as less than 13 pools per mile and average LWD at less than 17 pieces per mile (May 1996). Kelsey Creek (mainstem) is currently on the Ecology 303(d) list for exceeding allowable water quality criteria for dissolved oxygen, fecal coliform bacteria, and temperature (Ecology 2004).

To evaluate the environmental baseline of the project area, site visits were conducted on April 19 and May 16, 2007, and state and federal information on habitat conditions were accessed and assessed. The site was typically reviewed from southwest to northeast in stream reaches beginning at the Lake Hills Connector and continuing along the creek to Northeast

8th Street at the northern extent of the golf course. The Kelsey Creek Project Area is discussed in terms of four reaches (Figure 2), which are differentiated due to differences in riparian and stream habitat characteristics between the reaches. These reaches are helpful for visualizing the various sections of the Project Area and include:

- Reaches 1 and 2: The stream reach extending upstream from the Lake Hills Connector and continuing to the Kelsey Creek Farm
- Reach 3: The stream reach adjacent to the Kelsey Creek Farm
- Reach 4: The stream reach within the golf course

This BE bases its assessment of Project effects (see Section 5) on a set of ecological conditions in the Action Area that may affect ESA-listed species. The following sections describe the environmental baseline relative to these ecological conditions, grouped below as biological, physical, and chemical conditions, discussed in the context of the four reaches listed above.

3.1 Biological Conditions

3.1.1 Vegetation

Table 1 provides a list of all vegetation observed in the Project Area during site visits. The table also highlights dominant plants, where they existed. Following the table, detailed descriptions are provided for the vegetation communities in the various design reaches of Kelsey Creek.

Table 2
Vegetation Present at Kelsey Creek

Scientific Name	Common Name	Reaches 1 and 2 Dominants	Reach 3 Dominants	Reach 4 Dominants
Trees				
Alnus rubra	Red alder	X Approaching Reach 3	X	
Picea sitchensis	Sitka spruce		X	
Thuja plicata	Western red cedar	X Approaching Reach 3	X	X
Shrubs				
Cornus stolonifera	Red-osier dogwood			
Polygonum cuspidatum	**Japanese knotweed**	**X** **First sighted upstream of old beaver dam**	**X** **Especially in disturbed areas near streambank**	**X** **Especially in disturbed areas near streambank**
Rubus armeniacus	**Himalayan blackberry**		**X**	**X**
Rhamnus purshiana	**Cascara**		**X**	
Rubus spectabilis	**Salmonberry**	**X** **Approaching Reach 3**	**X**	
Salix hookeriana	**Hooker's willow**	**X** **Especially upstream of old beaver dam**		
Salix lasiandra	**Pacific willow**	**X** **Especially upstream of old beaver dam**		
Salix scoulieriana	**Scouler's willow**	**X** **Especially upstream of old beaver dam**		
Solanum dulcamara	**European bittersweet**	**X** **Approaching Reach 3**	**X**	
Spiraea douglasii	**Douglas spirea**	**X**		
Herbaceous				
Athyrium felix-femina	Ladyfern	X Approaching Reach 3	X	

Scientific Name	Common Name	Reaches 1 and 2 Dominants	Reach 3 Dominants	Reach 4 Dominants
Deschampsia cespitosa	Tufted hairgrass			X
Equisetum arvense	Common horsetail			
Iris pseudoacorus	Yellow-flag iris	X		
Lysichiton americanum	Skunk cabbage			
Phalaris arundinacea	Reed canarygrass	X		
Tolmiea menziesii	Piggyback plant	X		
Typha latifolia	Cattail	X In ponded areas		
Urtica dioica	Stinging nettle	X		
Vicia americana	American vetch	X Approaching Reach 3	X	

Note:
Not every plant in this table was dominant.

The invasive plant reed canarygrass is the predominant species found on one or both banks in open areas along Reaches 1 and 2. On the open banks in this reach, there is often little to no other riparian vegetation present. The best example of this is the central part of Reach 1, which is dominated by a large reed canarygrass meadow. Beyond the banks, there are tree saplings that have been planted at wide spacing as part of prior riparian corridor restoration efforts. These riparian conditions and the lack of adequate tree and understory vegetation limit shade, cover, and detritus input to the stream, as well as limiting the opportunity for future wood sources for LWD. North and south of this meadow, shrub and tree species predominate, such as alder (*Alnus rubra*), Western red cedar (*Thuja plicata*), and willows (*Salix sp.*). Approaching Reach 3 from the south, there are more herbaceous species present, including vetch (*Vicia Americana*), European bittersweet (*Solanum dulcamara*), and ladyfern (*Athyrium felix-femina*). The invasive plant Japanese knotweed is essentially absent in the area downstream (west) of a beaver dam that has since been removed, but it is present upstream of that location in patches extending northward along the length of Reaches 3 and 4.

Overall, the riparian cover in Reach 3 is fairly abundant and is primarily composed of native species, with the exception of areas where Japanese knotweed exists. In these areas, knotweed has rapidly colonized along the streambank. Other dominant vegetation in Reach 3 includes alder, spruce (*Picea sp.*), and cedar trees, and shrubs such as willows, salmonberry (*Rubus spectabilis*), cascara (*Rhamnus purshiana*), and the invasive Himalayan blackberry. Shade-tolerant ladyfern is present among the trees, along with herbaceous plants such as vetch and European bittersweet.

Along Reach 4 in the golf course, riparian corridor cover is typically sparse to absent with invasive species present in some areas. Dominant vegetation in this reach includes Western red cedar in patches throughout the golf course, and the invasive plants reed canarygrass, Himalayan blackberry, and Japanese knotweed on the streambanks, with turfgrass (associated with the golf course) often extending to the streambank edge. However, the section between the second golf course bridge crossing (counting from the south) and just before the third bridge crossing, and between the fourth and fifth bridge crossings has well-vegetated banks, but there is little additional riparian corridor east of the channel (due to the golf course). Between the fifth bridge crossing and the culvert at Northeast 8th Street,

riparian cover is nearly absent except for the last 700 feet (approximately) before the culvert, which contains a thin strip of conifers on the golf course and residential sides of the creek. Opportunities for LWD input through natural recruitment are limited, and LWD in this area stems primarily from previous restoration efforts.

Washington State Department of Transportation (WSDOT) recently completed construction of a wetland restoration project at Kelsey Creek in close proximity to the site of the prior beaver dam in Reach 1. That project spans 2.4 acres of wetland north of the intersection of Richards Road and the Lake Hills Connector and provides environmental mitigation for projects along the I-405 corridor. Work performed at this site included removal of old fill material including old concrete and asphalt, planting of native vegetation, and installation of logs and woody debris to improve habitat. Plantings included scrub-shrub wetland plants, upland buffer plants, wetland forest plants, and upland riparian plants, as well as scrub-shrub and forested wetland seed mixtures. WSDOT plans to continue maintaining the site to prevent establishment of non-native species and ensure the success of planted species. The proximity of this wetland to Kelsey Creek increases flood storage and habitat connectivity near the creek for wildlife use.

3.1.2 Non-ESA-listed Fish and Wildlife

Non-ESA-listed fish and wildlife present in Kelsey Creek include a variety of salmonids and other wildlife. Historically, there was significant spawning in Kelsey Creek by coho and sockeye (*O. nerka*) salmon, as well as migratory cutthroat trout (*O. clarki*) (Jones and Stokes 2006). Jones and Stokes (2006) also indicates that eight non-anadromous fish species have been observed in the Kelsey Creek basin: cutthroat, coho, steelhead (*O. mykiss*), sculpins, lamprey (*Lampetra tridentata*), dace (*Mylocheilus caurinus*), sucker, and bluegill (*Lepomis macrochirus*). Wildlife would be expected to consist of urban wildlife species capable of existing within the park/farm/golf course context (Jones and Stokes 2006). A number of these wildlife species were observed on site visits in April and May 2007. Birds observed included American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), great blue heron (*Ardea herodias*), spotted towhee (*Pipilo maculates*), and grosbeak. Small mammals sighted included raccoon (*Procyon lotor*), beaver (*Castor canadensis*), river otter (*Lontra canadensis*), and opossum (*Didelphis virginiana*). Additional animals expected there would include aquatic and wetland species such as garter snake (*Thamnophis sirtalis*), red-

legged and chorus frogs (*Rana aurora* and *Pseudacris triseriata*), mice, voles, moles, and a variety of other resident and migratory songbirds and waterfowl (Jones and Stokes 2006).

3.2 Physical Conditions

3.2.1 Channel Conditions

Reaches 1 and 2 exhibit a nearly continuous sand substrate; this sand is at least 10 inches deep in most areas. Drawing closer to the Kelsey Creek Farm reach and approximately 1,500 feet upstream from the Lake Hills Connector, the gradient changes, and pockets of gravel are present in the channel, usually associated with woody debris accumulations and scour pockets. The first larger pockets of this gravel are near the northern end of the old beaver dam pool area. The sand substrate in Reaches 1 and 2 would not be expected to provide high quality feeding habitat for juveniles, as the substrate likely shifts too often to provide suitable habitat for epibenthic invertebrate colonization, but juveniles do use these areas for holding and rearing.

The forested sections of Reaches 1 and 2 contain occasional small to medium wood debris accumulations, which appear to be forming localized scour areas just below these accumulations, especially when the accumulation occurs just previous to a section of constrained stream channel. Sand is still the primary substrate in the scour areas, but the water is deeper there, providing better rearing habitat opportunities. There are also occasional undercut banks, which appear to have been formed by erosion, and high peak flows near channel meander bends. These undercut banks and scour pools provide some habitat value and refuge at lower flows, although the substrate instability and small wood size in these habitats probably renders them as poor high-flow hydraulic holding areas. Water depths are likely shallow and warm during summer months in this area, especially near the reed canarygrass meadow area just west of the Kelsey Creek Farm. There are several small side channels with minimal flow that connect to the mainstem creek in this meadow area that are presumed to be carrying flow from localized tributary drainage area and groundwater interflow.

The substrate in Reach 3 contains suitable spawning gravel substrates. It has historically and currently supports Chinook salmon spawning (K. Paulsen, personal communication 2007).

The topography in Reach 3 generally extends from higher to lower from east to west, and there is a relatively extensive floodplain and riparian zone available on the east side of the creek (often in excess of 200 feet), while the west side riparian zone is relatively narrow (20 to 100 feet).

The golf course reach (Reach 4) generally contains a gravel and cobble substrate, but otherwise offers little habitat complexity due to reduced instream LWD presence and bank hardening that constrains channel migration in many areas. One area near the fourth golf course access bridge (counting from the south within Reach 4) does contain LWD and cobbles/boulders from apparent prior restoration work. These habitat structures have created some scour pools and habitat diversity at that location in addition to providing a backwater, which maintains fish passage at the concrete weirs. In the golf course stream reach, spawning substrates are heavily used, as documented in recent redd surveys (K. Paulsen, personal communication 2007), but fish habitat area is limited and redd superimposition is common below weirs that have the highest hydraulic drop. Rearing habitat quality is also low in Reach 4 due to the habitat homogeneity and lack of instream and overhead cover, as well as riparian corridor deficiencies. The channel is incised in the upper section of this reach.

3.2.2 Habitat Access

In Reaches 1, 2, and 3, there do not currently appear to be significant barriers or limitations to salmonid passage, although recent beaver dams built in Reach 3, documented in October 2008 by Anchor QEA, may be limiting upstream fish passage. Juvenile salmonids may have some difficulty moving between reaches when water levels are low and cover is sparse, but the key limiting factor in these reaches is likely to be rearing habitat quality and not fish passage. However, in Reach 4, many of the large concrete weir pairs limit adult fish passage and are likely partial to full barriers to juvenile salmonids. A few of the weir drops are too large or difficult for juvenile or adult fish to negotiate, particularly at lower flow levels.

3.2.3 Fine Sediments

Fine sediments have been identified as a habitat limiting factor for salmonids in the Kelsey Creek Basin, with fine sediment comprising 22 percent of the spawning substrate.

Additional surveys have observed fine sediment amounts as high as 39 percent in Kelsey Creek tributaries (Kerwin 2001).

3.3 Chemical Conditions

3.3.1 Water Quality

Kelsey Creek is on Ecology's 2004 303(d) list for temperature, based on King County unpublished data showing temperature criterion was exceeded in all years between 1998 and 2002 (Ecology 2004). During synoptic summer temperature surveys conducted by staff from the University of Washington in 1998 to 1999, Kelsey Creek temperatures ranged from 61 to 63°F. (CUWRM 1999). Kelsey Creek is also on Ecology's 2004 303(d) list for dissolved oxygen, based on King County unpublished data showing excursions beyond the dissolved oxygen criterion in all years between 1998 and 2002. In addition, the creek is also on the 303(d) list for fecal coliform, based on King County unpublished data indicating that standards were not met each year in samples collected between 1998 and 2002 (Ecology 2004).

The City has studied stormwater chemistry at approximately 10-year intervals (City of Bellevue Utilities Department 1995). These studies indicate a stability of water pollutants with the exception of decreasing lead concentrations and increasing heavy metal concentrations. Storm flows are of greatest concern for heavy metals. Copper was noted as exceeding U.S. Environmental Protection Agency's (EPA's) acute toxicity criteria in 50 percent or more of the stormwater samples taken at each site. Zinc exceeded U.S. Environmental Protection Agency's (EPA's) acute toxicity criteria 61 percent of the time in storm flows (Bellevue Utilities 1995). In addition, staff from the U.S. Geological Service (USGS) examined urban stream for the presence of pesticides, including the West Tributary of Kelsey Creek and Mercer Slough. Eighteen pesticides were detected—some at levels that may be detrimental to aquatic life (Kerwin 2001).

4 PROJECT ACTION AREA

The Project Area is the area where work activities are proposed and includes all areas within which Project construction will occur. For this Project, this includes the proposed improvement areas within each reach as are shown on Figure 2.

The Action Area is defined as the area to be affected directly or indirectly by the federal action (50 Code of Federal Regulations [CFR] §402.02). The extent of the aquatic portion of the Action Area for this Project is defined on the basis of expected water quality impacts in aquatic areas. To be conservative about the extent of expected water quality impacts to ESA-listed fish species, the Action Area will include a water quality (i.e., turbidity) boundary—a linear distance of 200 feet downstream and 100 feet upstream from the point where in-water work will occur. The downstream distance defines a typical mixing zone as determined by Ecology for streams with discharge at the time of construction of 10 to 100 cubic feet per second (cfs) for the purpose of compliance with state water quality standards (WAC 173-201A-110). In addition, 100 feet upstream was added to this downstream boundary to conservatively address potential effects to upstream resources. The aquatic portion of the Action Area will therefore extend downstream 200 feet and upstream 100 feet from the terminus of in-water work (Figure 15).

The terrestrial portion of the Action Area is based on potential effects of in-air noise from construction activities related to the Project. There have been no noise studies in the vicinity of the Project; however, based on expected general background conditions in the area (e.g., automobile traffic) and considering that construction equipment will be the greatest source of temporary noise from the Project during construction, it is estimated that peak baseline noise levels at the Project site would be in a range similar to light automobile traffic (approximately 50 decibels [dB]). In addition, the following assumptions were used in the in-air noise analysis:

- According to the standard reduction for point source noise, airborne noise generated by the Project will attenuate at a rate of 6 dB per doubling distance.
- Typical Project airborne noise level (measured at 50 feet from the source) from construction equipment will be 90 dB (WSDOT 2006).

Based on these assumptions, peak airborne noise levels will decrease to ambient airborne noise levels within 3,200 feet (0.6 mile). Therefore, the in-air portion of the Action Area will extend laterally 0.6 mile from the extent of construction (Figure 15).

5 SPECIES INFORMATION, EFFECTS ANALYSIS, AND EFFECTS DETERMINATIONS

Species under both NMFS and USFWS jurisdiction are addressed in this BE. NMFS has identified threatened Chinook salmon as potentially occurring in the Project vicinity (NMFS 2007a; Table 1; Appendix B). The USFWS has identified threatened bull trout as potentially occurring in the Project vicinity (USFWS 2007; Table 1; Appendix B). No other ESA-listed or threatened species are expected to be present within the Action Area. In this section, general Project effects are considered, and then effects to ESA-listed species are addressed.

5.1 Project Effects to Fish

5.1.1 Short-term Effects During Construction

Effects during construction include noise, turbidity, and limitations to habitat access while the creek is diverted around the Project area. Noise levels will not be injurious to fish because no impact equipment will be used. Additionally, instream work will occur during approved in-water work windows and will be limited to the minimum necessary to construct the Project.

A temporary gravity stream flow diversion will be installed at each Reach 1 and 4 work area where instream construction is required (except for LWD placement in existing pools in Reaches 3 and 4). This will provide for temporary downstream passage of fish in the reach during the short-term construction window for each weir. Fish will be collected from between the proposed upstream and downstream cofferdams for each work area prior to dewatering (inclusive of incidental work area runoff and cofferdam leakage). Fish removal will be performed according to WSDOT's Fish Exclusion Protocols and Standards (Appendix C).

5.1.2 Long-term Project Effects

The overall effect of the proposed Project is expected to be a net benefit to salmonids because fish passage and overall habitat conditions will be improved through the modification of existing weirs and the restoration of pool habitat due to LWD installation. Effects to Chinook salmon from the proposed Project are related to the physical, chemical, and

biological indicators described in Section 3. These potential effects are discussed below within the context of the proposed activities.

5.1.2.1 Biological Indicators

5.1.2.1.1 Vegetation

Invasive vegetation is prevalent in all three reaches. Reed canarygrass, Japanese knotweed, and Himalayan blackberry are choking out native plants in many areas. Some of this invasive vegetation will be removed in order to clear the work area in Reach 4. Site restoration will include revegetation of work areas with native plants. Large-scale invasive plant control is not planned as part of this Project, but the City plans to do this work under an independent City program.

5.1.2.1.2 Salmonid Prey

Salmonids in the creek environment depend heavily on insect prey. Overhanging vegetation attracts insects to the creek, and fallen organic matter furnishes both epibenthic and insect prey (Meehan et al. 1977). Limited riparian planting will improve prey availability in localized areas.

5.1.2.2 Physical Indicators

5.1.2.2.1 Channel Conditions

Kelsey Creek contains many fish passage partial or full barriers that limit or obstruct passage under a variety of flow conditions, but especially during low flows. The creek lacks habitat complexity, especially pools, and does not recruit sufficient woody debris. Substrates in the creek have a high proportion of fine particles. This is less than ideal for spawning and rearing. The fine substrate is naturally occurring and fine sediments would continue to flow downstream even if the substrate were temporarily altered by placing spawning gravel.

Because of development and tree removal in the riparian areas, Kelsey Creek does not naturally recruit sufficient LWD to maintain habitat complexity. Woody debris placed as part of this Project will encourage the formation of pools, influence channel scour, and roughen the channel so as to reduce flow energy and subsequent erosion.

5.1.2.2.2 Habitat Access

Fish passage partial barriers at culverts and weir steps with drop distances exceeding WDFW and NMFS standards will be reconfigured to allow for fish passage under the required range of flow conditions (approximately 1 to 49 cfs for Reach 4).

5.1.2.2.3 Fine Sediments

Placement of spawning gravel mixes along with larger substrate mixes (i.e., cobble-boulder fill) in disturbed areas will temporarily improve sediment conditions; however, the high proportion of fine sediments is a naturally occurring condition and the gravel will likely eventually become silted in. Fine sediments reduce the survival of newly hatched salmon (alevin stage) because the alevins depend on the intersticial spaces in the gravel for refuge from predators (KRISweb 2008).

5.1.2.3 Chemical Indicators

Water Quality

Riparian improvements, especially overhanging vegetation, may result in measurable cooling of the water temperature in Kelsey Creek. An increase in deeper pool habitat will also contribute to water cooling. Water temperature is especially important to salmonids, which require colder water for survival than most native fish species.

The other water quality issues in Kelsey Creek (dissolved oxygen, fecal coliform, and agricultural pollutants) cannot be influenced by the activities associated with this Project as these conditions are likely caused by agricultural activities, farm and pet wastes, golf course operations, and residential use of lawn chemicals.

5.1.3 Impact Summary

Total area of Project impacts and improvements is summarized in Table 3.

Table 3
Summary of Project Impact and Improvement Quantities

Reaches 1 and 4 Roughened Channel Modifications	Affected Stream Length (Lineal Ft.)	Impact Area[1] (Sq. Ft./Ac.)	Excavation/Fill Volume (Cu. Yds.)
Streambed gravels/cobbles/boulder placement	470	7,420/0.171	270/760
Reach 4 Modified Channel Restoration (south end GCC)			
Channel grading and bank sculpting, substrate replacement	190/200[2]	2,900/.0666	150/260
Reaches 1, 3, and 4 Large Wood Placement			
Rootwads	45 pieces		
Logs with rootwads	34 pieces		
Fallen Trees	3 pieces		
Engineered log jams (Reach 3)	2 each		
Reaches 1 and 4 Riparian Re-vegetation			
Disturbed and re-vegetated/enhanced stream banks	625	9,450/0.217	NA
Reach 1 and 3 Construction Access Disturbance[3]			
Riparian vegetation temporary impact/restored	540	6,800/0.156	NA

Notes:
1 Excavation/fill within waterbodies ordinary high water limits
2 Existing and restored channel flow line lengths
3 Does not include GCC disturbed turf area along construction access routes that will be restored

5.2 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

5.2.1 Status and Presence in the Action Area

The Puget Sound ESU of Chinook is listed as threatened by the ESA, and includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River; eastward, including rivers and streams flowing into Hood Canal; South Sound; North Sound; and the Strait of Georgia in Washington; as well as 26 artificial propagation programs. Most Chinook salmon in this ESU exhibit an ocean-type life history.

Chinook returns to the Kelsey Creek mainstem have been variable in recent years. The Watershed Company has conducted extensive spawner surveys in Kelsey Creek from 2000 to 2006, indicating that the total Chinook run was between 0 and 15 fish from 2000 to 2005, but

there were unusually large numbers of returns in 2006 (200 Chinook; TWC 2007). Of the more than 200 Chinook adults observed, more than 80 percent were determined to be hatchery-origin fish (TWC 2007). Observations by volunteers of adult Chinook in Kelsey Creek provided the following data: in 1988 to 1989, returns averaged 114 Chinook per year; when counting was resumed from 1996 to 1998, returns averaged 38 Chinook per year; and from 1999 to 2006, observations averaged 19 Chinook per year (King County 1998 to 2006). WDFW spawner surveys indicated that the Chinook return was 228 in 1999 but only 23 Chinook in 2000 (Kerwin 2001).

Puget Sound Chinook that would occur in the Action Area are from the North Lake Washington stock. Chinook of this stock typically enter Mercer Slough near the beginning of September and proceed to spawning areas further upstream where spawning continues into early November (TWC 2007). Based on this information, adult Chinook salmon would be expected to be in the Action Area during the spawning season in the fall. Juveniles would be expected to use the Action Area until spring when they would be expected to move toward Lake Washington on their seaward migration.

5.2.2 Direct and Indirect Effects

Direct and indirect effects to salmonids are described in Section 5.1.

5.2.3 Effects Determination

This Project will result in a temporary adverse impacts to Chinook salmon. However, these impacts are minimized via Project timing and other avoidance and minimization measures. The net effect of the Project will be improved access to better-quality habitat. Because of the analysis of effects in Section 5.1 and the avoidance and minimization measures listed in Section 2.5, it is determined that this Project **may affect, but is not likely to adversely affect**, Puget Sound Chinook salmon.

5.2.4 Chinook Salmon Critical Habitat

Critical habitat for Puget Sound Chinook salmon was designated on September 2, 2005 (50 CFR Part 226). Kelsey Creek is a tributary to Lake Washington and therefore excluded from critical habitat designation for Puget Sound Chinook salmon (70 Fed. Reg. 52657).

5.2.5 Critical Habitat Effects Determination

Kelsey Creek is excluded from the Chinook salmon critical habitat designation. While the Project will result in habitat benefits to Puget Sound Chinook salmon, it is determined that this Project will have **no effect** on designated critical habitat for Puget Sound Chinook salmon.

5.3 Puget Sound Steelhead (*Oncorhynchus mykiss*)

5.3.1 Status and Presence in the Action Area

The winter steelhead population in the Cedar-Sammamish watershed is classified as "depressed" and has been declining steadily since the early 1980s (Kerwin 2001). Limiting factors to the steelhead population include barriers to passage, lack of LWD, and lack of channel complexity (Kerwin 2001). Steelhead are not documented to occur in Kelsey Creek (WDFW 2008). Steelhead have not been seen by King County's volunteer Salmon Watcher program (King County 1998 to 2006). However, because steelhead have been documented to occur in the watershed, and suitable habitat exists in Kelsey Creek, their presence is assumed.

5.3.2 Direct and Indirect Effects

Direct and indirect effects to salmonids are described in Section 5.1.

5.3.3 Effects Determination

This Project may result in temporary adverse impacts to steelhead if they are present in the action area. However, these impacts are minimized via Project timing and other avoidance and minimization measures. The net effect of the Project will be improved access to better-quality habitat and the possible return of steelhead to Kelsey Creek. Because of the analysis of effects in Section 5.1 and the avoidance and minimization measures listed in Section 2.5, it is determined that this Project **may affect, but is not likely to adversely affect**, Puget Sound steelhead.

5.3.4 Steelhead Critical Habitat

Critical habitat has not been designated for Puget Sound steelhead.

5.3.5 Critical Habitat Effects Determination

Critical habitat has not been designated for Puget Sound steelhead.

5.4 Coastal-Puget Sound Bull Trout (*Salvelinus confluentus*)

5.4.1 Status and Presence in the Action Area

The bull trout in the coterminous lower 48 states is listed as threatened under the ESA. Bull trout (*Salvelinus confluentus*) and Dolly Varden (*S. malma*) are the only char in the family Salmonidae native to Washington. Currently, information on the distribution and life history of each species is not yet distinct because the species are biologically similar and methods to separate them are new and not widely applied (Bonar et al. 1997). There is no survey protocol currently endorsed by the USFWS for establishing absence of bull trout, so its presence is assumed where there is suitable habitat (USFWS 1999).

The USFWS' critical habitat rule for bull trout states that the Lake Washington system has been identified as containing important foraging, migration, and over-wintering habitat necessary for bull trout recovery (USFWS 2005). Bull trout use of the lake has been documented, and bull trout are thus presumed to be present at the mouth of Mercer Slough; however, these locations are outside of the Action Area. It is presumed that bull trout could use Kelsey Creek due to its association with Lake Washington through Mercer Slough; however, due to the highly urbanized nature of Kelsey Creek in this area and the high summer water temperatures, bull trout use of Kelsey Creek is highly unlikely. If present, both adults and juvenile bull trout would occur in extremely low numbers (adults in fall and juveniles in spring) based on the above information.

5.4.2 Direct and Indirect Effects

Direct and indirect effects to salmonids are described in Section 5.1.

5.4.3 Effects Determination

This Project will result in temporary adverse impacts to bull trout. However, these impacts are minimized via Project timing and other avoidance and minimization measures. The net effect of the Project will be improved access to better-quality habitat. Because of the analysis of effects in Section 5.1 and the avoidance and minimization measures listed in Section 2.5, it

is determined that this Project **may affect, but is not likely to adversely affect**, Puget Sound bull trout.

5.4.4 Critical Habitat

Critical habitat was designated for bull trout on September 26, 2005 (50 CFR Part 17) (USFWS 2005). Designated critical habitat for bull trout does not include Kelsey Creek. Lake Washington is the closest designated critical habitat to the Action Area.

5.4.5 Critical Habitat Effects Determination

Kelsey Creek is excluded from the bull trout critical habitat designation. While the Project will result in habitat benefits to bull trout, it is determined that this Project will have **no effect** on designated critical habitat for bull trout.

5.5 Effects of Interrelated/Interdependent Actions

The Project will not result in additional actions that have no independent utility apart from the Project. The proposed Project is not part of a larger action and does not depend on a larger action for its justification. There are no other anticipated related actions that could impact threatened or endangered species in the Project area. The Project will not result in increased maintenance and will not result in additional related Projects.

The City proposes an invasive species control program in this area under a separate action. That program would further enhance the benefits of this Project. Neither Project depends on the other for justification.

5.6 Cumulative Effects

Cumulative effects are the incremental effects of an action on the environment when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions.

This Project contributes to the achievement of regional watershed management goals and salmon recovery goals.

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