City of Bellevue
Development Services Department
Land Use Staff Report

Proposal Name:	Olympic Pipeline Kelsey Crossing
Proposal Address:	13808 NE 12th Street
Proposal Description:	The applicant requests a Critical Areas Land Use Permit for the stabilization of stream banks of Kelsey Creek to protect 16-inch diameter and 20-inch diameter petroleum pipelines that have been exposed due to stream bed and bank erosion. The proposal also includes the modification of existing weirs and the installation of a new weir to facilitate fish passage and control stream bed and bank erosion that could threaten the pipeline in the future.
File Number:	**09-119786-LO**
Applicant:	Tony Cotton, Olympic Pipe Line Co.
Decisions Included:	Critical Areas Land Use Permit (Process II. LUC 20.30P)
Planner:	Kevin LeClair, Planner
State Environmental Policy Act Threshold Determination:	**Determination of Non-Significance** Carol V. Helland, Environmental Coordinator Development Services Department
Director's Decision:	**Approval with Conditions** Carol V. Helland, Land Use Director Development Services Department

Application Date:	July 17, 2009
Notice of Application Publication Date:	August 6, 2009
Decision Publication Date:	August 27, 2009
Project/SEPA Appeal Deadline:	September 10, 2009

For information on how to appeal a proposal, visit Development Services Center at City Hall or call (425) 452-6800. Comments

on State Environmental Policy Act (SEPA) Determinations can be made with or without appealing the proposal within the noted comment period for a SEPA Determination. Appeal of the Decision must be received in the City's Clerk's Office by 5 PM on the date noted for appeal of the decision.

DEVELOPMENT SERVICES DEPARTMENT
ENVIRONMENTAL COORDINATOR
450 100th Ave NE., P.O. BOX 90012
BELLEVUE, WA 98009-9012

DETERMINATION OF NON-SIGNIFICANCE

PROPONENT: Tony Cotton, Olympic Pipe Line

LOCATION OF PROPOSAL: 13808 NE 12th Street

NAME & DESCRIPTION OF PROPOSAL:
Critical Areas Land Use Permit the stabilization of stream banks of Kelsey Creek to protect both 16-inch and 20-inch diameter petroleum pipelines that have been exposed due to stream bed and bank erosion. The proposal also includes the modification of two existing weirs and the installation of a new weir to facilitate fish passage and control stream bed and bank erosion that could threaten the petroleum pipelines in the future. All areas of temporary disturbance will be fully restored. Permanent disturbance, in the form of rip-rap bank installation, will be mitigated through the installation of large woody debris in the stream channel.

FILE NUMBER: 09-119786-GH

The Environmental Coordinator of the City of Bellevue has determined that this proposal does not have a probable significant adverse impact upon the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(C). This decision was made after the Bellevue Environmental Coordinator reviewed the completed environmental checklist and information filed with the Land Use Division of the Department of Planning & Community Development. This information is available to the public on request.

☐ There is no comment period for this DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's office by 5:00 p.m. on _____.

X This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's Office by 5 p.m. on September 10, 2009.

☐ This DNS is issued under WAC 197-11-340(2) and is subject to a 14-day comment period from the date below. Comments must be submitted by 5 p.m. on _____. This DNS is also subject to appeal. A written appeal must be filed in the City Clerk's Office by 5 p.m. on _____.

This DNS may be withdrawn at any time if the proposal is modified so that it is likely to have significant adverse environmental impacts; if there is significant new information indicating, or on, a proposals probable significant adverse environmental impacts (unless a non-exempt license has been issued if the proposal is a private project): or if the DNS was procured by misrepresentation or lack of material disclosure.

Environmental Coordinator

August 27, 2009
Date

OTHERS TO RECEIVE THIS DOCUMENT:
State Department of Fish and Wildlife
State Department of Ecology,
Army Corps of Engineers
Attorney General
Muckleshoot Indian Tribe

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1. Environmental Checklist
2. Critical Areas Report and Restoration Plan (Geoengineers, 2009)
3. Biological Evaluation (Geoengineers, 2009)
4. Geotechnical Design Report (Geoengineers 2009)

I. Proposal Description

The applicant requests a Critical Areas Land Use Permit for the stabilization of stream banks of Kelsey Creek to protect both 16-inch and 20-inch diameter petroleum pipelines that have been exposed due to stream bed and bank erosion. The proposal also includes the modification of two existing weirs and the installation of a new weir to facilitate fish passage and control stream bed and bank erosion that could threaten the petroleum pipelines in the future. All areas of temporary disturbance will be fully restored. Permanent disturbance, in the form of rip-rap bank installation, will be mitigated through the installation of large woody debris in the stream channel.

Land Use Code (LUC) 20.25H.055 characterizes the above described project as primarily a stabilization measure to protect the existing infrastructure. There is also a habitat improvement component to the project that serves largely as mitigation for the proposed bank stabilization measures. Bank stabilization and habitat improvement are both considered uses allowed in critical areas and critical area buffers provided specific performance standards are met and the decision criteria are satisfied.

The in-stream work, including the modifications of the existing weirs and the installation of the rock-drop structure, constitute modifications of the stream channel. LUC 20.25H.080.B specifies that the stream channel may be modified through a critical areas report in habitat improvement projects. The critical areas report is a mechanism by which certain LUC requirements may be modified for a specific proposal.

The critical areas report is intended to provide flexibility for sites where the expected critical areas functions and values are not present due to degraded conditions. Kelsey Creek, a Type F stream, is currently in degraded condition due to historic installation of concrete weir structures that are posing a fish passage obstacle to migrating fish.

II. Site Description, Zoning, Land Use and Critical Areas

A. Site Description

The site is located within the Olympic Pipe Line Co. (Olympic) easement at its crossing of Kelsey Creek, approximately 600 feet south of Bel-Red Road. The project is located in Tract E-Native Growth Protection Area of the Schoning Plat/PUD (Final Plat # 97-008688) in Section 27, Township 25N, Range 5E. The Olympic easement is located within an undeveloped utility corridor that also contains two electrical transmission circuits and a fiber optic line mounted on wooden H-poles, operated by Puget Sound Energy (PSE). The project location is shown in Figure 1 below.

The project site is characterized by Kelsey Creek crossing the undeveloped utility corridor. Topography within the vicinity of the project is flat to rolling. The low point along the alignment is at the crossing of Kelsey Creek at approximately 144 feet of elevation, while the high point is at approximately 208 feet of elevation at the end of

the paved access on 136th Avenue NE. There are no structures at the site. Photos showing site conditions are included in the attached critical areas report.

Vegetation in the utility corridor consists of a variety of native and exotic vegetation species such as shore pine (*Pinus contorta*), salmonberry (*Rubus spectabilis*), Himalayan blackberry (*Rubus armeniacus*) and Japanese knotweed (*Polygonum cuspidatum*). The areas east and west of the utility corridor are a typical urban forested riparian corridor consisting primarily of native species such as western red cedar (*Thuja plicata*), black cottonwood (*Populus balsamifera*), Douglas fir (*Pseudotsuga menziesii*), salmonberry (*Rubus spectabilis*) and sword fern (*Polystichum munitum*).

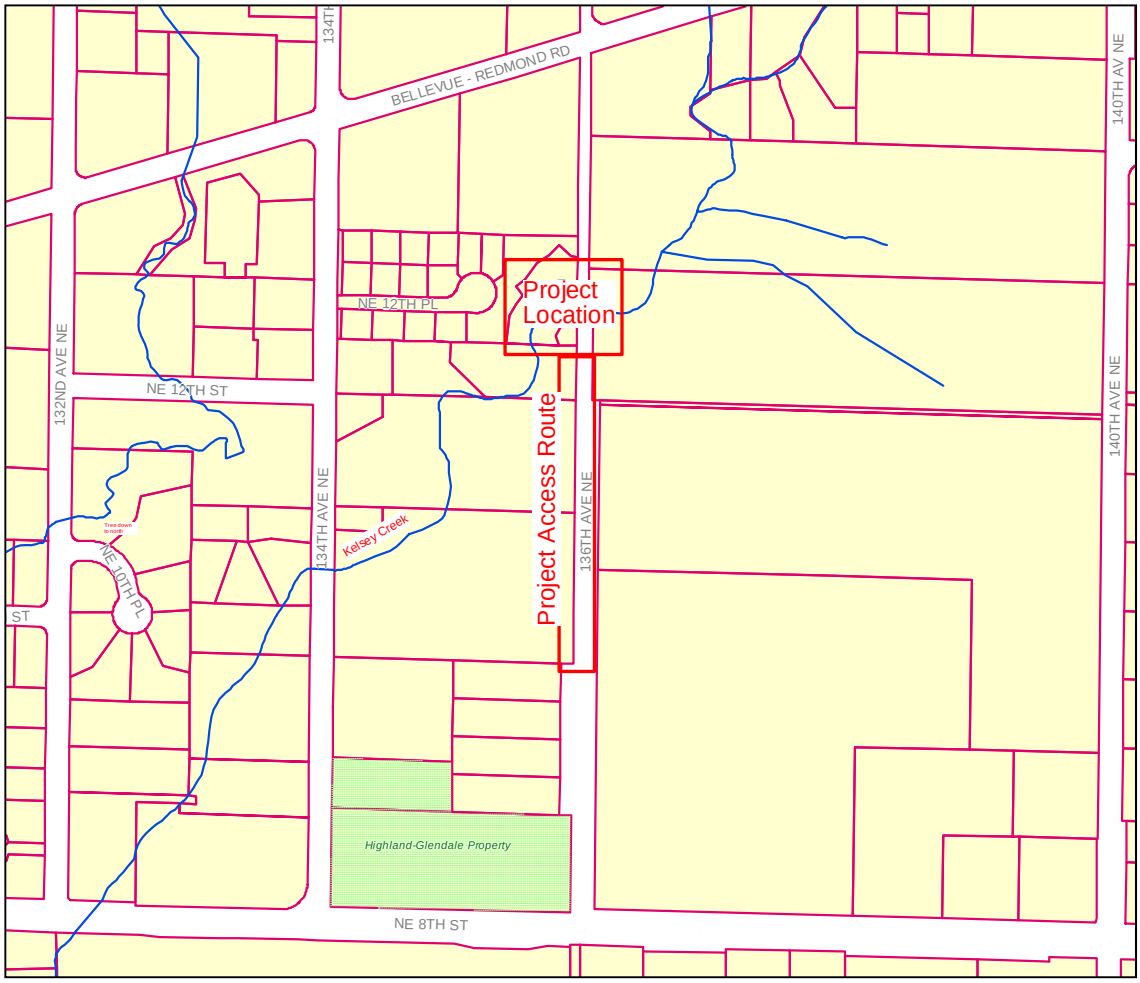


Figure 1: Project Location

B. Zoning

The property is zoned R-2.5. The zoning to the east of the project site is R-20. And the properties to the north are in the BR-ORT zoning district. Due to the presence of Kelsey Creek (a Type F stream), a .26 acre Category IV wetland, and geologic hazard-steep slope critical area; the site is in the Critical Areas Overlay District governed by the regulations in LUC 20.25H.

C. Land Use Context

The area to the west of the project site is a single-family residential neighborhood accessed from 134th Avenue NE. The neighboring properties to east are multi-family residential apartment complex accessed from 140th Avenue NE. The property to the north is developed with a low-rise office building accessed from Bel-Red Road. The project site is not visible from any public rights-of-way.

D. Critical Areas Functions and Values

i. Streams and Riparian Areas

A healthy aquatic environment relies on processes sustained by dynamic interaction between the stream and the adjacent riparian area. Riparian vegetation in floodplains and along stream banks provides a buffer to help mitigate the impacts of urbanization. Healthy riparian areas support healthy stream conditions.

Upland and wetland riparian areas retain sediments, nutrients, pesticides, pathogens, and other pollutants that may be present in runoff, protecting water quality in streams. The roots of riparian plants also hold soil and prevent erosion and sedimentation that may affect spawning success or other behaviors, such as feeding.

Both upland and wetland riparian areas reduce the effects of flood flows. Riparian areas and wetlands reduce and desynchronize peak crests and flow rates of floods. Upland and wetland areas can infiltrate floodflows, which in turn, are released to the stream as baseflow.

Vegetated riparian areas also provide a source of large woody debris that helps create and maintain diverse in-stream habitat, as well as create woody debris jams that store sediments and moderate flood velocities.

ii. Wetlands

Wetlands provide important functions and values for both the human and biological environment—these functions include flood control, water quality improvement, and nutrient production. The benefits provided depend on their size and location within a basin, as well as their diversity and quality. While Bellevue's wetlands provide various beneficial functions, not all wetlands perform all functions, nor do they perform all functions equally well. However, the combined effect of functional processes of wetlands within basins provides benefits to both natural and human environments. For example, wetlands provide significant stormwater control, even if they are degraded and comprise only a small percentage of area within a basin.

iii. Geologic Hazard Areas

Geologic hazards pose a threat to the health and safety of citizens when development is inappropriately sited in areas of significant hazard. Some geologic

hazards can be reduced or mitigated by engineering, design, or modified construction practices. When technology cannot reduce risks to acceptable levels, building in geologically hazardous areas is best avoided.

Steep slopes may serve several other functions and possess other values for the City and its residents. Some of Bellevue's remaining large blocks of forest are located in steep slope areas, providing habitat for a variety of wildlife species and important linkages between habitat areas in the City. These steep slope areas also act as conduits for groundwater, which drains from hillsides to provide a water source for the City's wetlands and stream systems. Vegetated steep slopes also provide a visual amenity in the City, providing a "green" backdrop for urbanized areas enhancing property values and buffering urban development.

iv. Floodplains

The value of floodplains can be described in terms of both the hydrologic and ecological functions that they provide. Flooding often occurs when either runoff exceeds the capacity of rivers and streams to convey water within their banks, or when engineered stormwater systems become overwhelmed. Studies have linked urbanization, specifically increases in impervious surface, with increased peak discharge and channel degradation. Floodplains diminish the effects of urbanization by temporarily storing water and mediating flow to downstream reaches. The capacity of a floodplain to buffer upstream fluctuations in discharge may vary according to valley confinement, gradient, local relief, and flow resistance provided by vegetation. Development within the floodplain can dramatically affect the storage capacity of a floodplain, impact the hydrologic regime of a basin and present a risk to public health and safety and to property and infrastructure.

III. Consistency with Land Use Code Requirements:

A. Zoning District Dimensional Requirements:

The site is located in the R-2.5 zoning district. Since no structural development is proposed as part of this project. The dimensional requirements for this zoning district are not applicable.

B. Consistency with Critical Areas Performance Standards LUC 20.25H:

i. Performance Standards for Construction Staging LUC 20.25H.055.C.1

Construction staging is considered an allowed activity in critical areas, critical area buffers or critical area structure setbacks provide the following performance standards are adhered to.

The work shall be consistent with all applicable City of Bellevue codes and standards. The work includes the construction of a 440 foot long by 20 foot wide temporary access route from the street end of 136th Ave NE, north of NE 8th St. The applicant is required to apply for and obtain a Right-of-Way Use Permit for the

mobilization and use of this access point. The applicant is also required to apply for and obtain a Clearing and Grading Permit to address temporary erosion and sedimentation control associated with the access route and the temporary construction impacts associated with the instream work. This permit also includes review and approval of a stream dewatering plan and turbidity monitoring during the course of the project. Because these permits must be applied for and obtained prior to the commencement of any construction activities, the applicable review department will ensure that all applicable codes and standards are being met.

The removal of significant trees is prohibited. The project is not proposing to remove any significant trees.

All areas of temporary disturbance associated with the work shall be restored to pre-project conditions, pursuant to a restoration plan meeting the requirements of LUC 20.25H.210. A restoration plan has been prepared that seeks to restore all areas of temporary disturbance.

ii. Performance Standards for Stabilization Measures LUC 20.25H.055.C.3.M
Proposed stabilization measures within a critical area or critical area buffer to protect against stream bank erosion may be approved in accordance with this subsection.

New or enlarged stabilization measures shall be allowed only to protect existing infrastructure. The Olympic Pipeline was legally installed and stream bank and bed erosion has occurred to a point that the existing 16-inch petroleum line is partially exposed and in danger of damage. Any structural damage to the 16-inch pipeline would be ecologically catastrophic to Kelsey Creek and the riparian resources.

Stabilization measures shall be allowed only where avoidance measures are not technically feasible. Based on the existing location of the pipeline, the extraordinary cost of relocating the pipeline and the high likelihood that storm water flows in Kelsey Creek will continue to be as strong or stronger than historic flows due to impervious surface percentages in the basin, there is no technically feasible alternative to stabilizing this section of the stream to prevent a catastrophic failure event of the pipeline.

When stabilization is allowed, soft stabilization measures shall be used, unless the applicant demonstrates that soft stabilization measures are not technically feasible. The applicant has proposed a mixture of soft stabilization and hard stabilization measures that will result in net improvement in ecological function of the critical area and critical area buffer.

The soft stabilization measures include the use of logs and root wads to stabilize the stream banks. The applicant is also proposing the use of vegetative enhancements along the banks to increase the plant species diversity and to establish more desirable bank stabilizing species in the area.

The hard stabilization measures in the project area include the addition of some segments of rip-rap bank stabilization. These banks have been designed with side slopes of 1 unit of rise for each 1.5 units of horizontal distance. This minimizes the impact by not creating a vertical interface with the water. The hard stabilization is

further minimized through the use of coir-reinforced soil lifts in place of existing gabion basket walls that have failed in the project area.

iii. Performance Standards for Habitat Improvement Projects LUC 20.25H.055.C.3.j

The project is also classified as a habitat improvement project. It is classified as such because it has been approved by the Director in accordance with the provisions of an approved Critical Areas Report. The primary habitat improvement component of the project is the modification of three of five existing weirs to facilitate fish passage over the concrete drop structures.

iv. Performance Standards for Stream Critical Areas LUC 20.25H.080.B

The proposed project has met the criteria of an "allowed use" under LUC 20.25H.055. It includes activities consistent with the uses of a habitat improvement project and in-stream structures. An approved Critical Areas Report has been prepared and submitted to support the design of the project and its desired objectives.

v. Performance Standards for Wetland Critical Areas LUC 20.25H.100

The following applicable performance standards have been considered and incorporated into the design of proposed project.

There is no current or additional lighting associated with the project that will affect the wetland. The project is not proposing the creation of any noise generating activities other than those temporary noises associated with the construction activity. There will be no new impervious surface as part of the project. The wetland area that will be temporarily disturbed will be planted with dense vegetation to limit pet or human use. The site will be actively monitored and maintained for a period of 5 years to ensure success of the restoration effort. The 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.

vi. Performance Standards for Areas of Special Flood Hazard LUC 20.25H.180

The use is allowed pursuant to LUC 20.25H.055, therefore the following general performance standards apply.

Intrusion Over the Area of Special Flood Hazard Allowed. This standard does not apply because the proposal does not include the construction of any structures. No structure is proposed; therefore no elevation certificate is required to be submitted to the Development Services Department.

No allowed use is allowed to result in a rise in the base flood elevation (BFE). The applicant has provided a hydraulic analysis that shows through HEC-RAS modeling that there is expected to be a rise in the BFE of nearly two feet of elevation within the project area and approximately one foot of rise for a distance of approximately 300 feet upstream of the project area. Because the stream is deeply incised in its channel, the model indicates that all of the flood flow will be contained within the existing bank width of the existing channel. All flood storage

will occur within the banks of the stream.

The alteration of Kelsey Creek's open stream channel is considered unavoidable in order to protect the existing infrastructure of the petroleum pipeline. The proposed alteration requires a critical areas report per 20.25H.080.B and is allowed in accordance with the performance standards for a habitat improvement project. The modification will not result in blockage of any side channels.

Adjacent communities and the state departments of Ecology and Fish and Wildlife were notified at least 30 days prior to permit issuance that the applicant is proposing the modification to the stream channel and the area of special flood hazard.

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

The proposal is not reducing the effective base flood storage volume of the area of special flood hazard. The grading that is proposed is anticipated to raise BFE, but adequate storage is provided within the existing banks of the creek and will extend the flood elevation upstream approximately 300 feet above the first weir. The conclusions are supported by a detailed hydraulic analysis that was prepared by a licensed engineer. The hydraulic analysis demonstrates that the proposed compensatory storage does not adversely affect the BFE and meets all other critical areas rules subject to this part.

C. Consistency with Critical Areas Report LUC 20.25.230:
The applicant supplied a complete critical areas report prepared by Geoengineers, a qualified professional. The report met the minimum requirements in LUC 20.25H.250.

D. Consistency with Critical Areas Report – Additional provisions LUC 20.25H.090:
Additional provisions required in a critical areas report for streams are required when the applicant is proposing to reduce the regulatory critical area buffer for the stream. The proposal includes no request to reduce or modify the prescribed critical area buffer or structure setback from Kelsey Creek.

E. Consistency with Critical Areas Report – Additional provisions LUC 20.25H.110:
The Land Use Code specifies additional provisions for critical areas reports for wetlands. This information includes an analysis of wetlands and wetland buffers that may occur within 300 feet of the project area. This section requires a discussion of avoidance and minimization measures, which is included in the applicant's critical areas report.

IV. Public Notice and Comment

Application Date:	July 23, 2009
Public Notice (500 feet):	August 6, 2009
Minimum Comment Period:	August 20, 2009

The Notice of Application for this project was published in the City of Bellevue weekly permit bulletin on August 6, 2009. It was mailed to property owners within 500 feet of the project site. No comments have been received from the public as of the writing of this staff report.

V. Summary of Technical Reviews

Clearing and Grading:
The Clearing and Grading Division of the Development Services Department has reviewed the proposed development for compliance with Clearing and Grading codes and standards. The Clearing and Grading staff found no issues with the proposed development.

Utilities:
The Utilities Department's has reviewed the proposed development for compliance with Bellevue Utilities' codes and standards.

Scott Taylor, a City engineer, expressed concern about streambed-stability due to notching of the weirs. He suggested annual monitoring to ensure that the change in streambed elevation does not create problems with existing or proposed bank stabilization features. The annual monitoring of weir and bank stability should be done in accordance with the attached Geotechnical Design Report. The monitoring report should be supplied to the city for confirmation that the structures are stable. See corresponding condition of approval #11 in Section X.

The City engineer has found that the plunge pool typically forms with a depth of about three-to-four times the drop height of the structure, and that many rock structures fail as the plunge pool undermines the key stones. The key stones should be enlarged and placed deeper than currently shown on the drawings. The applicant's engineer should ensure the designed drops elevations are maintained over time, and pool scour does not under cut the structure itself. Tolerance thresholds should be clearly identified in the monitoring plan for the stabilization measures. See corresponding condition of approval #11 in Section X.

The stream cross-Section D-D at the rock drop structure, narrows the channel at this point. To ensure the cross section is not constricted any further than designed, the side slopes on the rock structure shall be measure to ensure the specified side slopes are the steepest possible.

There are existing Bellevue utilities in the project area per Utilities Development Review staff. Bellevue Utilities has a storm pipe (18") and AC water mains (6" and 8") in the 136th alignment where the temporary road will be constructed. AC pipe tends to be very brittle. These pipes must be identified on the plans. The pipes must be located and marked in the field prior to mobilization and clearing and grading activities commence. Of specific concern is the water main under the creek. See corresponding condition of approval #10 in Section X.

Turbidity monitoring is required for this project, because Kelsey Creek is a significant salmon spawning stream and the project will be constructed very late in the fish window. See corresponding condition of approval # 9 in Section X.

The 6-foot center shrub spacing is insufficient in the restoration planting plan. The plant densities should be increased to obtain sufficient cover with a variety of native shrubs. Additionally, the mulch shall be kept out of the ordinary high water mark limits to avoid washing into the stream. See corresponding condition of approval #13 in Section X.

Although improvements to fish passage will be achieved, there is substantial additional rip-rap and bank/bed stabilization. Additional mitigation for these impacts, in the form of additional wood or riparian improvements should be considered. See condition of approval #14 in Section X.

Transportation:
A representative of the Transportation Department was notified of the project proposal. Their review determined that a Right-of-Way Use Permit is required for the use of the public right-of-way on 136th Ave NE for construction staging and access. This permit must be obtained prior to commencement of project activity.

VI. State Environmental Policy Act (SEPA)

The environmental review indicates no probability of significant adverse environmental impacts occurring as a result of the proposal. The Environmental Checklist submitted with the application adequately discloses expected environmental impacts associated with the project. The City codes and requirements, including the Clear and Grade Code, Utility Code, Land Use Code, Noise Ordinance, Building Code and other construction codes are expected to mitigate potential environmental impacts. Therefore, issuance of a Determination of Non-Significance (DNS) is the appropriate threshold determination under the State Environmental Policy Act (SEPA) requirements.

A. Earth and Water

A temporary erosion and sedimentation control plan is included in the project plans,

and addresses all requirements for restoring the site to its current condition as well as erosion and sedimentation management practices. Erosion and sediment control best management practices include the use of a dewatering plan to dry out as much as feasible during the proposed construction activity. The proposal also includes the installation of silt fencing around the work area and covering exposed soils to prevent migration of soils to the adjacent stream and wetland. Final approval of the temporary erosion and sedimentation control plan will happen with the required Clearing and Grading Permit. The applicant will also be required to submit information regarding the use of pesticides, insecticides, and fertilizers to avoid impacts to water resources. See Section X for related conditions of approval.

B. Animals

The project site is a Type F, fish-bearing, stream and is part of a habitat corridor. The proposed modifications to the existing concrete weirs are expected to enhance habitat functions and values by reducing the height of the water drops. This will make it easier for migrating salmon to navigate and pass the structures. The mature vegetation on the site provides habitat to several species listed in the critical areas report. However, no impacts are anticipated since no significant trees will be removed. The restoration plan for areas of temporary disturbance has been designed to further enhance the vegetation structure on the site, which is expected to have a positive impact on the wildlife resource.

C. Plants

Mitigation for temporary and permanent disturbance will be approved pursuant to an approved re-vegetation and monitoring plan. A complete restoration plan with monitoring performance standards and contingency plan has been submitted. It will be implemented as a condition of the subsequent clearing and grading permit. See Section X for related conditions of approval.

D. Noise

The site is adjacent to single-family residences whose residents are most sensitive to disturbance from noise during evening, late night and weekend hours when they are likely to be at home. Construction noise will be limited by the City's Noise Ordinance (Chapter 9.18 BCC) which regulates construction hours and noise levels. See Section X for a related condition of approval.

VII. Changes to proposal as a result of City review

The City conducted a review of the applicant's proposed plan for bank stabilization and fish passage enhancement of this segment of Kelsey Creek. The following is brief summary of modifications that were made to the applicant's proposal as a result of the City's review.

- Additional large woody debris in the project area to mitigation for additional rip rap installation for protection of the 20-inch petroleum pipeline crossing.
- Monitoring of channel for 5 years following construction including weir cuts and bank

stabilization.

- Turbidity Monitoring and a Stormwater Pollution Prevention Plan.
- Increased plant density for restoration to ensure higher percentage of native plant coverage earlier in the establishment period.

VIII. Decision Criteria

A. Critical Areas Report Decision Criteria- General Criteria LUC 20.25H.255

The Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;

Finding: The applicant has provided a complete critical areas report that demonstrates that the proposal leads to levels of protection of critical area functions and values that area at least as protective as the regulations and standards of this code.

The applicable regulation and standards of the code prohibit all clearing and grading in the stream, the riparian zone or disturbance in the wetland. Through the critical areas report process, it is clear that habitat functions will likely be improved, the riparian functions will improve because native plants will be brought into replace the invasive species, the inclusion of large woody debris in the rock drop structure will enhance the Instream habitat in the project reach.

2. Adequate resources to ensure completion of any required mitigation and monitoring efforts;

Finding: The applicant, Olympic Pipeline, has adequate resources to complete the required mitigation and monitoring efforts. To ensure this, the City of Bellevue will require maintenance and monitoring security devices to be held until successful completion of the proposed restoration and monitoring plan.

3. The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and

Finding: The proposal complies with all of the applicable performance standards for streams and wetlands. The only deviation for a performance standard is that of the rise of the base flood elevation within the project area. As discussed above, and in greater detail in the attached hydraulic analysis, the rise in the base flood elevation is completely confined to the banks of Kelsey Creek and there is no anticipated impact to

any critical area or critical area buffer off-site. There is also no risk of flooding to any developed property upstream or downstream of the site.

4. The resulting development is compatible with other uses and development in the same land use district.

Finding: The construction of the stream work is consistent with the surrounding land uses. There is no change in use on the site or any of the adjacent sites.

B. Critical Areas Land Use Permit Decision Criteria 20.30P

The Director may approve or approve with modifications an application for a critical areas land use permit if:

1. The proposal obtains all other permits required by the Land Use Code;

Finding: The proposed activity is required to obtain a clearing and grading permit and right-of-way use permit from the City of Bellevue. The activity is also required to obtain permission from the Washington State Departments of Ecology and Fish & Wildlife, as well as the Army Corps of Engineers.

2. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer;

Finding: The proposal has been designed by qualified professionals from Geoengineers with consultation with City of Bellevue and Washington Department of Fish and Wildlife Habitat Biologists, in order to ensure the best available design and techniques have been incorporated.

3. The proposal incorporates the performance standards of Part 20.25H to the maximum extent applicable, and ;

Finding: Section III above discusses how, the proposal incorporates the applicable performance standards.

4. The proposal will be served by adequate public facilities including street, fire protection, and utilities; and;

Finding: The project area is within a utility corridor containing both above ground and underground utilities. The area is adequately serviced by public facilities. The proposal will not change the need for public facilities.

5. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC Section 20.25H.210; and

Finding: A mitigation and restoration plan consistent with the requirement of LUC 20.25H.210 has been prepared and submitted along with the project's critical areas report.

6. The proposal complies with other applicable requirements of this code.

Finding: As discussed in Section IV & V of this report, the proposal complies with all other applicable requirements of the Land Use Code.

IX. Conclusion and Decision

After conducting the various administrative reviews associated with this proposal, including Land Use Code consistency, SEPA, City Code and Standard compliance reviews, the Development Services Director does hereby **approve with conditions** the proposal to stabilize the stream banks of Kelsey Creek to protect a 16-inch diameter and 20-inch diameter petroleum pipeline that has been exposed due to stream bank erosion. The proposal also includes the modification of two existing weirs and the installation of a new weir to facilitate fish passage and control stream bed and bank erosion that could threaten the pipeline in the future.

Note- Expiration of Approval: In accordance with LUC 20.30P.150 a Critical Areas Land Use Permit automatically expires and is void if the applicant fails to file for a Clearing and Grading Permit or other necessary development permits within one year of the effective date of the approval.

X. Conditions of Approval

The applicant shall comply with all applicable Bellevue City Codes and Ordinances including but not limited to:

Applicable Ordinances	Contact Person
Clearing and Grading Code- BCC 23.76	Janney Gwo, 425-452-6190
Land Use Code- BCC 20.25H	Kevin LeClair, 425-452-2928
Noise Control- BCC 9.18	Kevin LeClair, 425-452-2928
Transportation Code	Jon Regalia, 425-452-4599

The following conditions are imposed under the Bellevue City Code or SEPA authority referenced:

1. Restoration for Areas of Temporary Disturbance: A restoration plan for all areas of temporary disturbance is required to be submitted for review and approval by the City of Bellevue prior to the issuance of the Clearing and Grading Permit. The plan shall include the documentation of existing site conditions and shall identify the restoration measures to return the site to its existing conditions per LUC 20.25H.220.H.

Authority: Land Use Code 20.25H.220.H
Reviewer: Kevin LeClair, Development Services Department

2. Rainy Season restrictions: Due to the proximity to Kelsey Creek, a Type F Stream Critical Area, no clearing and grading activity may occur during the rainy season, which is defined as November 1 through April 30 without written authorization of the Development Services Department. Should approval be granted for work during the rainy season, increased erosion and sedimentation measures, representing the best available technology must be implemented prior to beginning or resuming site work.

Authority: Bellevue City Code 23.76.093.A,
Reviewer: Janney Gwo, Development Services Department

3. Pesticides, Insecticides, and Fertilizers: The applicant must submit as part of the required Clearing and Grading Permit information regarding the use of pesticides, insecticides, and fertilizers in accordance with the City of Bellevue's "Environmental Best Management Practices".

Authority: Land Use Code 20.25H.220.H
Reviewer: Kevin LeClair, Development Services Department

4. Noise Control: Noise related to construction is exempt from the provisions of BCC 9.18 between the hours of 7 am to 6 pm Monday through Friday and 9 am to 6 pm on Saturdays, except for Federal holidays and as further defined by the Bellevue City Code. Noise emanating from construction is prohibited on Sundays or legal holidays unless expanded hours of operation are specifically authorized in advance. Requests for construction hour extension must be done in advance with submittal of a construction noise expanded exempt hours permit.

Authority: Bellevue City Code 9.18
Reviewer: Kevin LeClair, Development Services Department

5. Right-of-Way Use: The proposed habitat improvement project will likely require the use of a portion of the right-of-way adjacent to the subject property, specifically as a haul route for excavated material and imported fill and materials. If required, a right-of-way use permit from the Transportation Department should be obtained.

Authority: Bellevue City Code 14.30
Reviewer: Jon Regalia, Transportation Department

6. Elevation Flood Certificate Following Construction: A signed and stamped elevation certificate must be submitted to the Development Services Department to document the base flood elevation is consistent with those described on the approved permit plans for the Clearing and Grading Permit.

Authority: Land Use Code 20.25H.180.C.2
Reviewer: Kevin LeClair, Development Services Department

7. Obtain All Other Applicable State and/or Federal Permits: Before work can be allowed to proceed, all applicable state and federal permits must be presented to the Development Services Department.

Authority: Land Use Code 20.25H.180.C.2
Reviewer: Kevin LeClair, Development Services Department

8. In-Water Work Window: Work in the active channel approved by the underlying Clearing and Grading Permit must be completed during an in-water work window of July 1 through September 15. Exception to the closure of the in-water work window may be granted by the Washington Department of Fish and Wildlife's Habitat Biologist.

Authority: Land Use Code 20.25H.160
Reviewer: Kevin LeClair, Development Services Department

9. Storm Water Pollution Prevention Plan: A Storm Water Pollution Prevention Plan shall be approved by the Clearing and Grading Division prior to commencement of construction activities. The storm water pollution prevention plan shall also included a turbidity monitoring plan.

Authority: Clearing and Grading Code BCC 23.76

Reviewer: Janney Gwo, Development Services Department

10. Locate Existing Utilities: The City of Bellevue has knowledge of several existing underground utilities in the project vicinity. As a part of the required clearing and grading permit for the access road and Instream and bank stabilization work, these facilities should be field located and shown on the clearing and grading plans. Appropriate protection measures should also be noted on the plans that depict intersections between the proposed work and the existing Utilities.

Authority: Utilities Code BCC 24
Reviewer: Joy Ramsur, Bellevue Utilities

11. Instream and Bank Stabilization Monitoring: In order ensure the proposed modifications to the weir devices, the bank stabilization and the rock drop structure are satisfactorily stabilized and performing to design expectation a 5-year monitoring plan must be submitted for review and approval with the required clearing and grading permit for work in the critical area. The monitoring plan should include prescribed performance standards for pool scour and material transport and relocation in the channel. The plan should also include contingency provisions if performance standards are not being achieved.

Authority: LUC 20.25H.220
Reviewer: Kevin LeClair, Development Services Department

12. Performance Assurance Device: The ensure the approved mitigation, restoration and monitoring program, contingency plan and conditions of approval are fully implemented an assurance device in an amount equal to 150% of the material and construction cost of the project shall be held for the duration of the 5-year monitoring plan reviewed and approved by the City of Bellevue. The assurance device may be a nonrevocable letter of credit, set-aside letter, assignment of funds, certificate of deposit, deposit account, bond, or other readily accessible source of funds. After the work or improvements covered by a performance assurance device have been completed to the satisfaction of the City, the applicant may request the City to release the device.

Authority: LUC 20.40
Reviewer: Kevin LeClair, Development Services Department

13. Restoration Planting Density: To ensure adequate early coverage and better long-term protection for invasive species encroachment into area being restored from temporary disturbance, the quantity of containerized plant materials shall be increased increase by 33% and the on-center spacing reduced from 6 feet down to 4 feet.

Authority: LUC 20.25H.055.C.3.m.iii (5)
Reviewer: Kevin LeClair, Development Services Department

14. Large Woody Debris: As mitigation for the additional rip-rap at the undercrossing of the 20-inch petroleum pipeline and the removal of assorted vegetation for the purposes of the proposed weir modifications and rock drop structure, the applicant shall add a minimum of 4 pieces of large woody debris into the stream bank stabilization measures. The logs should be placed in a manner to protect the existing

and proposed structures and stabilization measures. The large woody debris shall be anchored in a manner to ensure the wood stays in place during a 100-year storm event. The placement of the large woody debris shall be included as an element of the monitoring plan required in condition #11.

Authority: LUC 20.25H.055.C.3.m.iii (5)
Reviewer: Kevin LeClair, Development Services Department

15. Rock Drop Structure Foundation Rocks: To ensure the rock drop structure is adequately designed for depth of scour during high flows, the project engineer or their designee shall provide field recommendations to extend the depth and downstream extent of scour protection to reduce the potential for undermining of the rock drop key based on stream bottom conditions observed during excavation of the keyway for the rock drop structure. Rock used will be sized based on hydraulic modeling results. Any failure of the structure in excess of the performance standards identified in the annual monitoring plan shall be redesigned and submitted for subsequent review as a revision to this approval by the applicant. Revisions will be subject to public renoticing. The approved repair shall be implemented in the immediately following in-water work window season and be accompanied by all necessary temporary disturbance restoration measures.

Authority: LUC 20.30P.140
Reviewer: Kevin LeClair, Development Services Department

ENVIRONMENTAL CHECKLIST 4/18/02

If you need assistance in completing the checklist or have any questions regarding the environmental review process, please visit or call the Permit Center (425-452-6864) between 8 a.m. and 4 p.m., Monday through Friday (Wednesday, 10 to 4). Our TTY number is 425-452-4636.

BACKGROUND INFORMATION

Property Owner:
Olympic Pipe Line Company (see attached drawings).

Proponent:
Olympic Pipe Line Company (Olympic)

Contact Person:
(If different from the owner. All questions and correspondence will be directed to the individual listed.)

Tony Cotton, Olympic

Address:
2319 Lind Ave. SW
Renton, WA 98057

Phone:
(425)-981-2541

Proposal Title:
Olympic MP99 – Kelsey Creek Pipeline Crossing and Fish Passage Mitigation Project

Proposal Location:
(Street address and nearest cross street or intersection) Provide a legal description if available.
Please attach an 8 ½" x 11" vicinity map that accurately locates the proposal site.

The Olympic Pipe Line Company (Olympic) operates 16-inch diameter and 20-inch diameter petroleum products pipelines that extend generally north-south through King County. The cleared pipeline easement is approximately 100 feet wide (within an open easement) that runs north-south through residential and business properties within the City of Bellevue. A small section of the Olympic 16-inch diameter product pipeline, approximately 1 foot in length, has recently been exposed by stream scour at the Kelsey Creek crossing in Bellevue, Washington (see Figure 1). The exposed section of the pipeline is near the left bank of the Kelsey Creek crossing about 600 feet south of Bellevue-Redmond Road (Bel-Red Road) in Bellevue, Washington (see Figure 2).

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

1. General description:

The purpose of the project is to protect the exposed pipeline from corrosion, impact from rocks or other objects, vandalism, the elements, or other possible hazards from exposure. Active erosion is occurring along the left bank where the 20-inch pipeline crosses the creek, therefore additional bank protection measures will be completed at that location. Lastly, fish passage concerns will be addressed by notching two of the existing concrete weirs and installing a rock drop structure downstream of the last weir. The work

will require bypassing stream flows and dewatering segments of the stream where work is to occur.

Federal pipeline safety regulations found in 49CFR195 require that the pipeline be buried or be covered with equivalent protective measures. BP, the owner-manager of Olympic, has concluded that a concrete river weight, such as that proposed for this project, provides equivalent protection. Therefore, Olympic is proposing to protect the pipeline by installing a river weight (concrete half-round pipe) over the exposed section of the 16-inch pipeline. The total length of river weight will be about 8 feet so that the protection extends into the bank approximately 7 feet. In order to install the river weight, it will be necessary to stage a trackhoe on the left bank to remove the rip rap from over and around the 16-inch pipeline along the left bank, then place the river weight over the pipeline. The rip rap will be replaced to its original configuration along the left bank over the pipeline.

Stabilization of the left bank in the vicinity of the 20-inch pipeline crossing will be accomplished by regrading the slope to a more stable inclination and protecting the slope with rip rap. Rip rap will be placed below the stream bed to reduce the potential for erosion at the toe of the bank. Soil lifts will be incorporated into the rip rap to allow planting of live stakes.

Fish passage across the existing weirs will be accomplished by cutting notches in Weir #2 and Weir # 5 and by installing a rock drop structure downstream of Weir #5. The notch in Weir #2 will be approximately 2 feet wide and 0.25 feet deep. The notch in Weir #5 will be approximately 2 feet wide and 0.5 feet deep. The rock drop structure will be constructed about 60 feet downstream of Weir #5, with a crest height about 0.5 feet below the base of the notch in Weir #5. Construction of the rock drop structure will require removal of a segment of gabion that is in poor condition. The extent of gabion to be removed will be determined at the time of construction, but will extend no more than 25 feet downstream from the rock drop structure. Where the pipeline is close to the stream bank, the protective function of the gabion system will be replaced by a buried wing wall, extending downstream a maximum of 25 feet from the rock drop structure along the alignment of existing gabions at the top of the bank.

During the time that work is being accomplished to address fish passage concerns, sediment upstream of Weir # 5 will be removed so that a grocery cart embedded in the stream bottom can be removed. The remainder of sediment and any armoring will be removed upstream and downstream of the weir. Any voids will be backfilled with native glacial soils excavated for the construction of the rock drop structure. A geomembrane will be placed along the upstream and downstream faces of the weir, and then rip rap will be placed with gravel covering the rip rap. In addition, rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and upstream of the rock drop structure in areas where the bottom of the gabions are corroded and not protected by rip rap placed in 1995.

The site will be accessed from 136th Avenue NE along a utility corridor the pipeline shares with electrical transmission lines owned and operated by Puget Sound Energy.

2. **Acreage of site:**

   Approximately 0.82 acres for the access and proposed staging areas, most of which will occur within an approximately 100 feet wide easement.

3. **Number of dwelling units/buildings to be demolished:**

   None

4. **Number of dwelling units/buildings to be constructed:**

   None

5. **Square footage of buildings to be demolished:**

N/A

6. **Square footage of buildings to be constructed:**
   N/A

7. **Quantity of earth movement (in cubic yards):**
   Total amount of earth movement:
   Approximately 475 cubic yards,

8. **Proposed land use:**
   Continued use as utility corridor. Use will not change.

9. **Design features, including building height, number of stories and proposed exterior materials:**
   None, does not apply.

10. **Other**

Estimated date of completion of the proposal or timing of phasing:

Olympic anticipates beginning construction between August 15th and September 30, 2009 or will postpone work to a similar time frame in 2010. Construction activities may last into early fall depending on contractor schedule and allowed work windows.

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

No.

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

As part of the design and/or permitting for this project, a biologic evaluation, critical areas report, a hydraulic analysis report, and design report were prepared.

Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. List dates applied for and file numbers, if known.

None known

List any government approvals or permits that will be needed for your proposal, if known. If permits have been applied for, list application date and file numbers, if known.

- Clearing and grading permit – City of Bellevue.
- JARPA for Section 10 permit from US Army Corps of Engineers

- Hydraulic Project Approval from the Washington State Department of Fish and Wildlife.
- Coastal Zone Management compliance and Water Quality Certification from the Washington State Department of Ecology.
- Street right-of-way use permit – City of Bellevue. This will be submitted once the actual schedule is known.
- A Turbidity Monitoring Plan will be prepared for approval by the City of Bellevue.
- A noise variance may be sought to allow work beyond normal hours to reduce the total duration on-site requiring diversion of the stream.

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

- ☐ Land Use Reclassification (rezone) Map of existing and proposed zoning
- ☐ Preliminary Plat or Planned Unit Development Preliminary plat map
- ☒ Clearing & Grading Permit Plan of existing and proposed grading Development plans
- ☐ Building Permit (or Design Review) Site plan Clearing & grading plan
- ☐ Shoreline Management Permit Site plan

A. ENVIRONMENTAL ELEMENTS

1. EARTH

a) General description of the site:
☒ flat ☒ hilly ☐ steep slopes ☐ mountainous ☐ other

Topography within the vicinity of the project consists of flat, rolling and steep stream banks. The topography north and south of the creek crossing slopes towards the creek. The existing access route, located south of Kelsey Creek, gently slopes towards the northwest. The associated wetland located immediately east and south of the left bank of Kelsey Creek, is situated in a generally flat area that slopes towards the northwest.

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

Most of the project work area is on gently (0 to 15 percent) to moderately inclined (15 to 30 percent) gradients. The steepest slopes are inclined at gradients of greater than 100 percent to near vertical along the left bank of Kelsey Creek towards the western portion of the project area.

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

The majority of the soils in the project area have been mapped as Alderwood gravelly sandy loams of varying slopes (AgC) (United States Department of Agriculture Web Soil Survey).

The project does not cross farmland.

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

Excavation quantities include:

- Approximately 171 cubic yards will be excavated to install temporary access, route a water bypass pipe beneath an access route, regrade the stream bank at the 20-inch pipeline crossing for bank stabilization, excavation to install a concrete river weight at the 16-inch pipeline crossing, excavation to inspect potential scour beneath an existing weir (Weir #5) located within Kelsey Creek, excavation for installation of a new weir consisting of rock, and removal of a portion of an existing gabion located in the vicinity of the new weir.

Fill quantities include:

- Approximately 410 cubic yards of fill. A significant portion (about 210 cubic yards) will be placed temporary (and as needed) for construction staging areas, the construction entrance, and to address potential erosion along the access route. Some of this material may consist of hog fuel in lieu of quarry spalls or crushed rock which can be spread on-site and supplement mulch for restoration purposes. In addition, excavated material will be re-used on-site (e.g. rip rap removed for installation of the river weight and for inspection of Weir #5). Imported rock will be used to construct the new weir for fish passage and to protect the bank at the 20-inch petroleum product pipeline crossing. Additional rock may be needed to reduce the potential for future scouring beneath existing concrete Weir #5. Temporary fill for access will be pulled back or will be removed at the end of the project

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

The majority of the project site gently to moderately sloped (less than 30 percent). There is short-term potential for erosion during construction, particularly during periods of precipitation and for a period after construction as vegetation becomes re-established. Measures will be taken during construction to reduce the potential for erosion to occur and to capture and retain and stabilize sediment that becomes mobilized. The work will also be timed during periods where precipitation rates are low.

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

No change will be made.

g) Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

The potential for erosion will be reduced by implementing temporary erosion and sedimentation controls (TESC) in accordance with Best Management Practices (BMPs) as described in the Western Washington Stormwater Manual (Washington State Department of Ecology (2005) as well as those approved by the City of Bellevue. Erosion will be reduced by utilizing existing access, where possible, driving directly overland to access work sites, and by implementing temporary erosion and sediment control (TESC) measures along access and in work areas, as appropriate. The project will require equipment to track into the work area located along the left bank of Kelsey Creek beyond the existing access road. The Contractor shall review access plans with the Project Engineer or Project Geologist prior to driving into the project area, potential erosion hazard areas, wetlands, or stream buffer and wetland buffers.

Potential stormwater, erosion and sediment impacts during construction will be addressed using best management practices (BMPs) that are detailed in, but not limited to, the TESC Plan incorporated in the Grading Plans prepared for this project. These include erosion control barriers (i.e., silt fence), temporary construction entrances and temporary cover. In addition, the stream flow will be routed around work areas so that in-stream work can be accomplished in the dry. Olympic will monitor and review the use and maintenance of TESC measures employed throughout construction, and if needed, monitoring and maintenance of TESC measures may be transferred to **Olympic's** operating section upon completion of construction and restoration activities.

Permanent techniques and measures include hydroseeding with a native seed mix, replanting buffers with native vegetation and incorporating species such as willow (*Salix sp.*) stakes in areas where rip rap is used for bank protection.

The project will also maintain compliance with the following City of Bellevue performance standards:

- General Performance Standards for Repair and Maintenance (LUC 20.25H.055.C.1),
- Performance Standards for Streams (LUC 20.25H.080.A)

2. AIR

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

Construction Phase

Sources of emissions during construction include fugitive dust and construction equipment exhaust. Sources of dust will result from equipment traveling on the unimproved access road south of the project area. The quantities of emissions generated and transported off-site from the construction corridor will depend upon wind and weather conditions, but are anticipated to be minor and of short duration. Areas of exposed soils, created as a result of this project, outside of the existing corridor access road will be planted and mulched, eliminating future potential sources of dust.

Operational Phase

There are no long-term sources of air emissions associated with the operational phase of this project.

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

None, does not apply.

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

Standard emission control devices, in conformance with federal and state air quality standards for the specific class and type of equipment, will be utilized during construction phases of the project. As needed, dust control BMPs, including wetting of exposed soil surfaces and/or use of approved soil tackifiers, will be implemented by Olympics' contractor to limit dust-generating sources on unimproved road surfaces. Likewise, efficient construction practices and timely restoration of temporary disturbances will further reduce dust-generating sources. Olympic representatives will monitor dust-generating sources during construction and when necessary will address excessive emissions with appropriate control techniques.

3. WATER

a) Surface

- **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.**

  All aquatic resources identified within and adjacent to the project area lie within the Upper Lake Washington Basin. The project area is situated within the Kelsey Creek drainage basins. Kelsey Creek and associated wetlands are located within the project area. The mainstem of Kelsey Creek originates at Phantom Lake, located east of the project area; from the project area Kelsey Creek flows west to Lake Washington.

- **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, stabilization of the left bank in the vicinity of the 20-inch pipeline crossing will be accomplished by regrading the slope to more stable inclination and protecting the toe of the slope with rip rap. Rip rap will be placed below the stream bed to reduce the potential for erosion at the toe of the bank. The remainder of sediment and any armoring will be removed upstream and downstream of the Weir #5 to evaluate if scour occurred beneath the concrete weir. If scour appears to have occurred, any voids will be backfilled with native glacial soils excavated for the construction of the rock drop structure or imported from off-site.. A geomembrane will be placed along the upstream and downstream faces of the weir, and then gravel and rip rap will be placed over the rip rap. In addition, rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and the rock drop structure in areas where the bottom of the gabions are corroded and not protected by rip rap placed in 1995.

  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.

  Approximately 50 cubic yards for excavation and 80 cubic yards of fill is estimated within the channel of Kelsey Creek within the Ordinary High Water lines. Some excavated material will be re-used (e.g. existing rip rap and suitable stream bed material) but imported rock will be placed along the bank at the 20-inch pipeline crossing, for construction of the rock drop weir and to supplement existing rip rap along the bank and in the channel. Imported gravel for stream beds will also likely be imported.

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

  During construction, a temporary sand bag and concrete block barrier dam will be installed upstream of the project area to divert the stream around the project area and will be routed through a bypass system (pipe/hose) and discharge directly back into the stream through a tee-diffuser. It is anticipated that a 4- and 6-inch pump will be required to bypass the expected 4 cubic feet per second of stream flow.

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

  Yes, the proposed pipeline protection measures and fish passage mitigation measures are within the 100 year floodplain. The staging areas and access route are outside of the presently mapped 100-year floodplain.

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

  No waste will be discharged into surface waters. Temporary erosion and sediment control BMPs will prevent any discharges of waste materials to surface waters.

b) Ground

- **Will ground water be withdrawn, or will water be discharged to ground water? Give general description.**

  No groundwater will be withdrawn.

- **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.).

  No waste material will be generated.

- **Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

  Not applicable.

c) Water Runoff (including storm water):

- **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.**

  Storm water runoff is possible and quantities are unknown. Control of storm water runoff will be addressed using typical construction and erosion control techniques as detailed in project TESC Plan (i.e., silt fences, jute mats and hay/straw bales). Permanent techniques and measures include installing blankets/netting, mulching, straw wattles, seeding and/or replanting. It is anticipated that there will be no change in runoff patterns or rates after site restoration. The runoff, if any, will not flow into other waters.

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

  No waste materials will be generated by construction or operation of this project that could enter ground or surface waters with the exception from cutting concrete.

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

Runoff will be reduced by limiting the area of brushing and soil disturbance to the smallest area required for safe working conditions. Surface water is best controlled by installing filter fences, straw bales, sediment traps, trench and slope breakers or other erosion control devices as needed depending on site specific conditions. An additional measure to control runoff from disturbed areas would be to revegetate (hydroseed) disturbed area as soon as possible after project has been completed. Spill containment will be used for pumps used to bypass and dewater the stream channel during construction. Best management practices will be implemented for fueling equipment, storage of potential contaminants and to collect fluids and/or dust from saw cutting of concrete. Work areas where concrete cutting will occur will be dewatered prior to cutting, and wet/dry vacuum systems per best management practices will be implemented to control and collect fluids with concrete cuttings.

4. PLANTS

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

- ☑ deciduous tree: alder, bigleaf maple and cottonwood
- ☑ evergreen tree: Douglas fir, western red cedar and shore pine
- ☑ shrubs: Himalayan blackberry, sitka willow, hardhack and salmonberry
- ☑ grass: reed canarygrass
- ☐ pasture
- ☐ crop or grain
- ☑ wet soil plants: Sitka willow, hardhack, salmonberry, small-fruited bulrush and soft rush
- ☐ water plants:
- ☒ other types of vegetation: Japanese knotweed

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

Clearing activities will be limited to brushing access along the existing route to the project area. The most common types of vegetation that will be removed will be invasive reed canary grass and noxious Japanese knotweed and Himalayan blackberry.

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

There are no threatened or endangered plant species known to be on or adjacent to the project site according to the Washington Natural Heritage Program (2006), and no sensitive plant species were observed during the wetland delineation survey.

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

Vegetation removal will be limited to the minimum required for access. Brushing will be limited in areas where vegetation conditions allow construction equipment to track over noxious and invasive species. Staging areas will be located outside of sensitive areas. All disturbed stream and wetland buffer areas will be revegetated using native vegetation appropriate for the on-site wetland and habitats.

To prevent the spread of noxious weeds, insects and soil-borne pests, construction equipment will be thoroughly cleaned prior to mobilization and prior to removal. If working within known weed and/or soil-borne pest infested area, special attention will be paid to preventing the spread of the weed and/or pest. Existing area of the site that is infested with noxious species will be cleared and the plant material will be removed from the site and disposed of at an appropriate facility.

5. ANIMALS

a) Check or 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: songbirds, other: woodpeckers, waterfowl
☑ Mammals: deer, squirrels, raccoons, mice, rats, opossums, gophers, moles, rabbits, skunks
☑ Fish: salmon, other:

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

National Marine Fisheries Service lists Chinook (*Oncorhynchus tshawytscha*) as a federally threatened species. There are no other threatened or endangered species known to be on or near the site.

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

Yes, Kelsey Creek support populations of anadromous fish that use these creeks for migration, spawning and rearing.

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

Any impacted areas within the wetland buffers will be replanted and/or seeded with native species or species that will promote the colonization by native plants. The seed mix will be selected based on availability and appropriateness of the mix for the time of application.

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 need? Describe whether it will be used for heating, manufacturing, etc.

The completed project will not require any energy.

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

No impacts on solar energy.

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

No energy conservation features are included.

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.

There is a potential risk from the normal hazards associated with machinery operation and general construction practices. Spills of machine fluids and/or similar and other normal construction hazards exist.

b) Describe special emergency services that might be required.

No special emergency services will be required for the completed project. In the event of a construction and/or operational emergency, appropriate response personnel may be required including, but not limited to personnel from Olympic, local police, fire, aid or rescue units.

c) Proposed measures to reduce or control environmental health hazards, if any.

Safety equipment and procedures will be utilized at the Olympic **contractor's discretion as required** by the Washington Industrial Safety and Health Act (WISHA), Occupational Safety and Health Administration (OSHA) and WAC 296-155 (*Safety Standards for Construction Work*). Sound engineering and construction techniques will ensure the proposed project is installed properly.

8. Noise

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

No noise will affect this project.

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

Short-term noise from the equipment.

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

All construction equipment will be equipped with standard sound attenuation devices and will meet **Ecology's noise guidelines and City of Bellevue's** noise standards. It is anticipated that construction will be limited to normal working hours as required **City of Bellevue's code**. However, to meet permit work windows, to reduce the amount of time spent dewatering on a daily basis (and thus overall project work time), it may be necessary to extend work over a weekend or weekends and/or to operate pumps to bypass water overnight.

9. LAND AND SHORELINE USE

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

Current land uses of properties within the project corridor include the existing pipeline and Puget Sound Energy (PSE) transmission line corridor that is situated within single family and multi family residential areas, office and commercial zoned areas.

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

No

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

There are no structures on site.

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

No

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

According to the City of Bellevue Generalized Zoning Map, the project corridor is situated in single family and multi family residential, office, commercial and light industrial designated areas.

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

N/A

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

This portion of Kelsey Creek is not within the Shoreline Master Program.

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

Yes, landslide hazard and steep slope hazard areas, a wetland and Kelsey Creek which is documented spawning and rearing habitats for federally listed threatened Chinook salmon, occurs within the project area.

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

No habitable structures will be constructed as a part of this project.

j) **Approximately how many people would the completed project displace?**
None, does not apply.

k) **Proposed measures to avoid or reduce displacement impacts, if any:**
None proposed.

l) **Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.**
None, does not apply.

10. Housing

a) **Approximately how many units would be provided, if any? Indicate whether high, middle or low-income housing.**
None, does not apply.

b) **Approximately how many units, if any, would be eliminated? Indicate whether high, middle or low-income housing.**
None, does not apply.

c) **Proposed measures to reduce or control housing impacts, if any:**
None, does not apply.

11. Aesthetics

a) **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**
None, does not apply.

b) **What views in the immediate vicinity would be altered or obstructed?**
None, does not apply.

c) **Proposed measures to reduce or control aesthetic impacts, if any:**
None, does not apply.

12. Light and Glare

a) **What type of light or glare will the proposal produce? What time of day would it mainly occur?**
None, except incidental glare form equipment during work; should not impact anyone.

b) **Could light or glare from the finished project be a safety hazard or interfere with views?**
None, does not apply.

c) **What existing off-site sources of light or glare may affect your proposal?**
None, does not apply.

d) **Proposed measures to reduce or control light or glare impacts, if any:**
None, does not apply.

13. Recreation

a) **What designated and informal recreational opportunities are in the immediate vicinity?**
None.

b) **Would the proposed project displace any existing recreational uses? If so, describe.**
None, does not apply.

c) **Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**
None, does not apply.

14. 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.
None known.

b) **Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.**
No known archaeological sites or historic properties are located within the project corridor.

c) **Proposed measures to reduce or control impacts, if any:**
The proposed project is located outside of known historic resources. If a potential site were encountered during construction, activities would be halted and local authorities and DAHP would be notified immediately. Construction would remain halted at the site until proper measures and procedures have been taken. Prior to resuming construction, mitigation measures would be undertaken as deemed necessary by consultation with DAHP.

15. 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.**
See the attached Figures for the location of adjacent public streets and highways serving the site. The site will be accessed off of 136th Ave. NE, within the utility easement and along a portion of the unimproved 136th Avenue NE right-of-way owned by the City of Bellevue.

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

No.

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

None, does not apply.

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).**

Access from public roads will be along the existing utility easement and unimproved street right-of-way. Any improvements to undeveloped lands will be temporary and lands will be restored.

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

None, does not apply.

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

Impacts will be temporary during the course of the project to mobilize and demobilize equipment, for delivery of materials, transport of workers to and from the site, and for export of soils excavated from on-site. It is anticipated to be an average of 5 and 10 trips per day over a 2 to 3 week period.

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

None, does not apply. A street-use permit will be applied for. No special traffic control plan is anticipated as the primary staging area is at the end of a dead end road.

16. 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.**

None, does not apply.

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

None, does not apply.

17. Utilities

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

Does not apply.

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.**

None; does not apply.

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: ..... Tony Cotton .....

Date Submitted: ..... 7/2/09 .....

REFERENCES

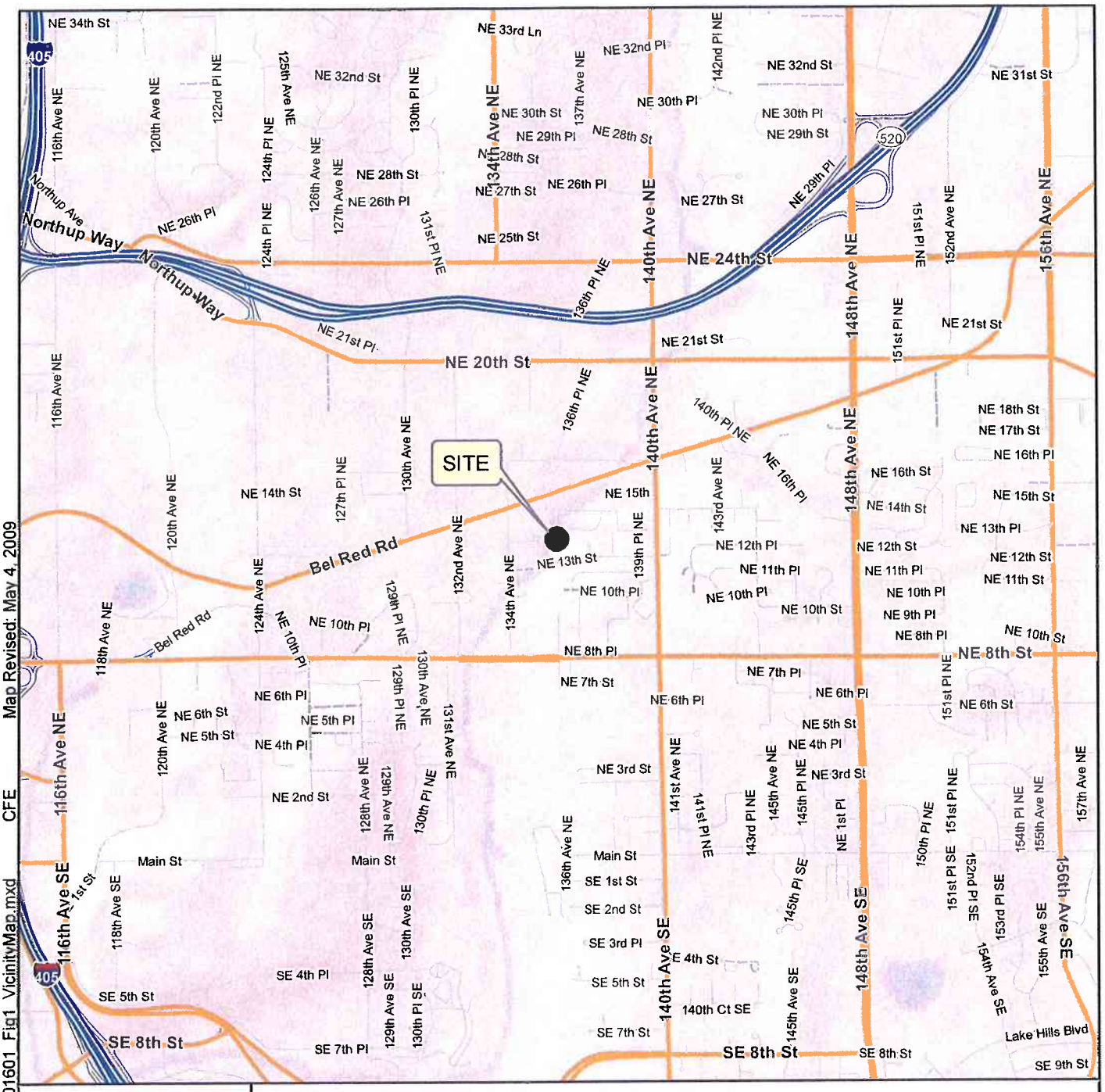
GeoEngineers, 2009a, "Geotechnical Design Report, M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation, Bellevue, Washington" (GeoEngineers, June 22, 2009).

GeoEngineers, 2009b,"Critical Areas Report, M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation, Bellevue, Washington" (GeoEngineers, June 22, 2009).

GeoEngineers, 2009c "Biological Evaluation, M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation, Bellevue, Washington" (GeoEngineers, June 22, 2009).

GeoEngineers, 2009d, "Hydraulic Engineering Report, M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation, Bellevue, Washington" (GeoEngineers, June 22, 2009).

United States Department of Agriculture Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/ (Accessed on April 2009)



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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

GEOENGINEERS

Figure 1

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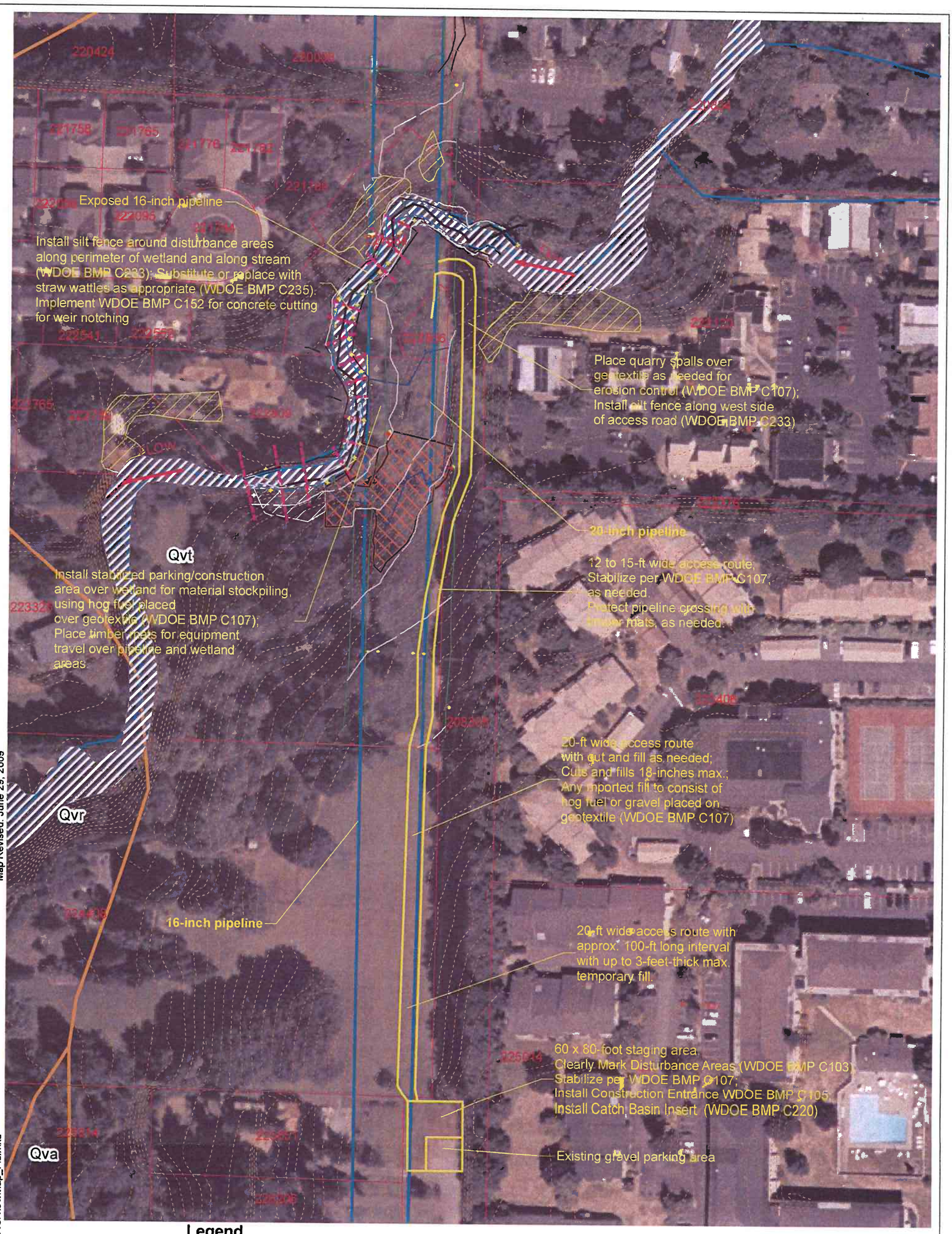

Legend

- Pipeline
- **Geohazards**
  - Landslide
  - Steep Slope
- **Wetland**
  - Delineated Wetland Edge
  - 100-Year Floodplain

N W E S

100 0 100
Feet

Notes:
1. The locations of all features shown are approximate.
2. Floodplain boundary from a GIS file titled "FLDPLAIN.shp" from City of Bellevue, dated April 21, 2009.
3. 2-Foot Topographic contours from a GIS shape file titled "CONTOUR2FT.shp," developed from LiDAR data from City of Bellevue, dated May 1, 2007.
4. Pipeline alignment from a GIS shape file titled "OILPIPES.shp." from City of Bellevue, dated May 1, 2007.
5. Steep slope and landslide hazards mapped by GeoEngineers (this study); May be limited to within approximately 300 feet of project.
6. Data presented using Washington State Plane North (feet), NAD1983.
7. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Overview Map

Olympic Pipe Line Company
MP 99 - Kelsey Creek Crossing
Belleive, Washington

GEOENGINEERS

Figure 2

Map Revised: June 29, 2009

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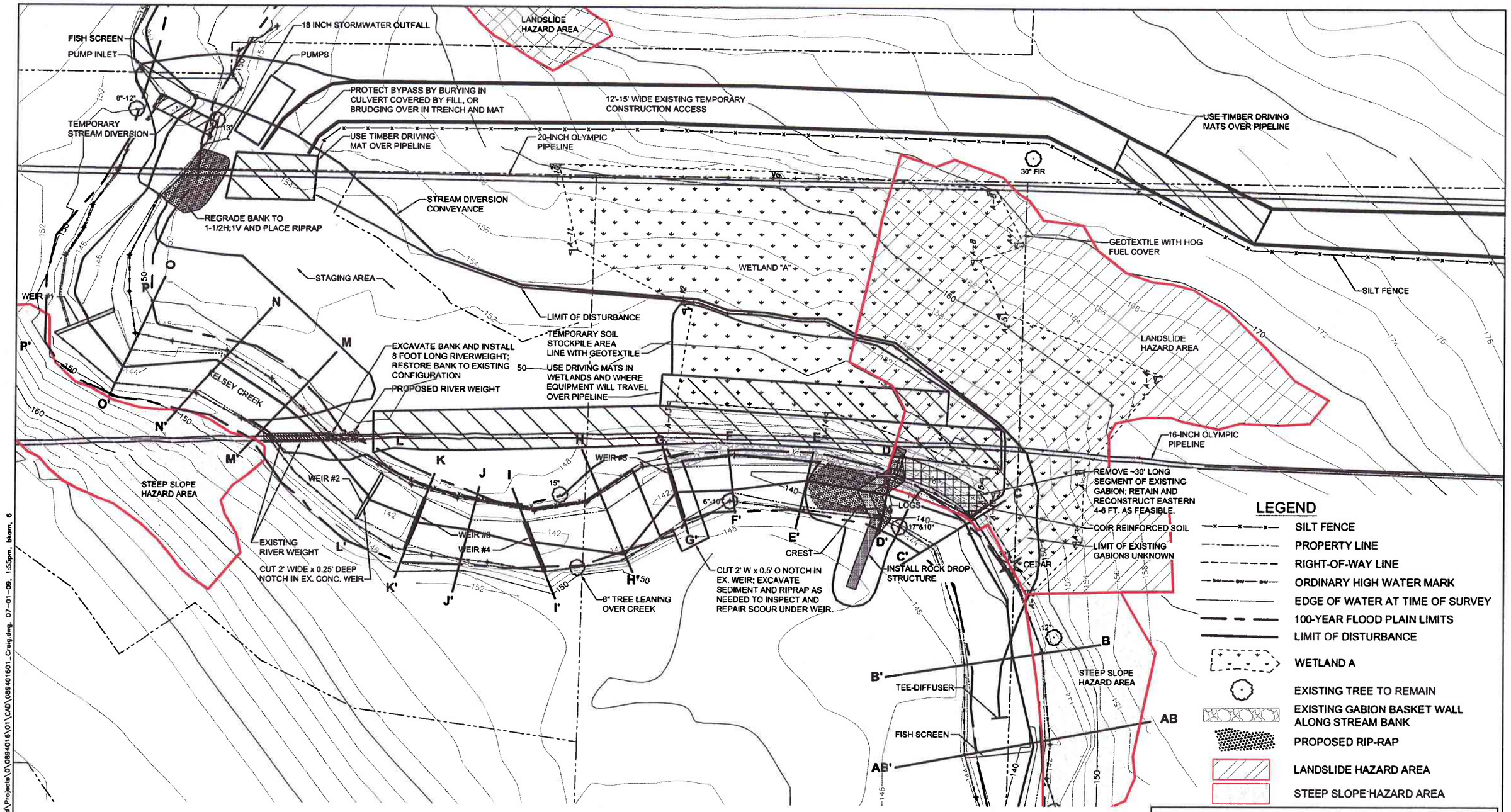

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Olympic Pipe Line Company.

Site Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

GEOENGINEERS

Figure 3

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CRITICAL AREA REPORT AND RESTORATION PLAN
M.P. 99 - KELSEY CREEK CROSSING AND FISH PASSAGE MITIGATION
BELLEVUE, WASHINGTON

JUNE 22, 2009

FOR
OLYMPIC PIPE LINE COMPANY

GEOENGINEERS

Critical Area Report and Restoration Plan
M.P. 99 - Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington
File No. 0894-016-01

June 22, 2009

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Associate Biologist

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Appendix B – Wetland Datasheets
Appendix C – Wetland Rating Form
Appendix D – Special Conditions for Instream Habitat Design Engineering Services

CRITICAL AREA REPORT AND RESTORATION PLAN
M.P. 99 - KELSEY CREEK CROSSING AND FISH PASSAGE MITIGATION
BELLEVUE, WASHINGTON
FOR
OLYMPIC PIPE LINE COMPANY

1.0 INTRODUCTION AND PROJECT UNDERSTANDING

This report presents the results of our critical area assessment and a restoration plan for the Olympic Pipe Line Company (Olympic) Kelsey Creek Crossing and Fish Passage Mitigation Project (project) located at Kelsey Creek about 600 feet south of Bellevue-Redmond Road (Bel-Red Road) in Bellevue, Washington (Figure 1). The purpose of this report is to assess critical areas, as defined by the City's Land Use Code (LUC) 20.25H, that occur within 300 feet of the site and evaluate the potential impacts of the project as required by LUC 20.25H.230. In accordance with LUC 20.25H.210, a restoration plan to restore the areas that will be temporarily disturbed as a result of the project is included within this report.

Olympic operates a 16-inch-diameter and 20-inch-diameter petroleum products pipelines through the approximately 100-foot-wide pipeline easement (within an open easement) that runs north-south through residential and business properties within the City of Bellevue (City). The two underground pipelines run parallel to eachother and are approximately 80 feet apart within the 100-footwide easement. The ground surface is generally flat to gently rolling. Kelsey Creek crosses the easement roughly perpendicular to the 20-inch pipeline and at an oblique angle to the 16-inch pipeline (Figure 2). The channel and banks of Kelsey Creek have been highly modified in the past by development and urbanization. The creek has been confined within the vicinity of the pipeline crossings by bank stabilization measures including rip rap and gabion baskets.

In 1995, Olympic installed grade control structures and stream bank stabilization measures at the pipeline crossings to gain cover over the 16-inch pipeline, which was exposed at that time. Five precast concrete weirs were installed in Kelsey Creek to prevent erosion and enable sediment to build behind the weirs, raising the grade of the existing stream bed to gain cover over the pipeline. Shallow pools were constructed upstream of the weirs and deeper plunge pools were constructed downstream of the weirs. The bottoms of the pools were lined with geotextile fabric. The filter fabric was then covered with rip rap and/or gravel. Approximately 150 cubic yards of rip rap was placed along the left bank at least 1 foot above the high water elevation to reduce erosion and provide a buttress for the slope. Rip rap was also placed upstream of the weirs where the weirs are keyed into the bank.

A small section of the Olympic 16-inch diameter product pipeline, approximately 1-foot long, has recently been exposed in the channel by stream scour near the left (south) bank of the Kelsey Creek crossing. The pipeline was discovered to be exposed within Kelsey Creek by City of Bellevue representatives during spawning surveys in the early winter of 2007. It appears that significant storm events over the past two years have resulted in flood-level flows within the creek that have caused scour and erosion along the banks, including the areas of the 16-inch and 20-inch pipelines. In addition, it appears that some scour has occurred in proximity to at least one (Weir #5) of five weirs (Figure 3) installed in 1995.

In 1995, a river weight (concrete half-round pipe) was installed over a portion of the 16-inch pipeline at the creek crossing and protects the pipeline from stream flows and exposure to other elements. However the section of pipe along the left bank, which was previously buried within the bank and stream bed, does

not have the river weight protective measure and therefore needs additional protection (maintenance repair).

In addition to the exposed section of pipe, there is bank scour in the vicinity of the 20-inch line, just downstream from an existing 18-inch diameter concrete stormwater outfall pipe. Representatives from the Washington State Department of Fish and Wildlife (WDFW) have also expressed concern about fish passage across the weirs installed in 1995 by Olympic. In some areas, scour has also exposed and/or loosened geotextile placed over native soils during the weir installation project.

1.1 PROJECT LOCATION

The site is located in Section 27, Township 25N, Range 5E within the Olympic easement at the Kelsey Creek crossing, approximately 600 feet south of Bel-Red Road. The Olympic easement is located within an undeveloped utility corridor that also contains two electrical transmission circuits and a fiber optic line mounted on wooden H-poles, operated by Puget Sound Energy (PSE).

1.2 PROJECT DESCRIPTION

The purpose of the project is to protect the exposed 16-inch pipeline from corrosion, impact from rocks or other objects, vandalism, the elements, or other possible hazards from exposure. Since active erosion is also occurring along the left bank where the 20-inch pipeline crosses the creek, additional bank protection measures will be completed. Lastly, fish passage concerns will be addressed by notching two of the existing concrete weirs and installing a rock drop structure using rock (rip rap). The work will require bypassing stream flows and dewatering segments of the stream where work is to occur.

A temporary quarry spall construction entrance to the work area will be installed from the paved road and the primary staging area at the north end of 136th Avenue NE. The access along the pipeline right-of-way and existing access along City right-of-way will likely require temporary cuts and fills from the primary staging area for a distance of about 440 feet. The entire access route may be covered with geotextile and temporary gravel, quarry spall fill or hog fuel; the contractor may also select timber driving mats to provide a running surface and reduce ground disturbance. Timber mats will also be used along crossings of the pipelines. We anticipate at least two track-mounted excavators, dump trucks or track-mounted dump trucks (e.g. Morookas), a loader and other equipment (as needed) will be mobilized to the site via the temporary construction access road.

Federal pipeline safety regulations found in 49CFR195 require that the pipeline be buried or be covered with equivalent protective measures. BP, the owner-manager of Olympic, has concluded that a concrete river weight, such as that proposed for this project, provides equivalent protection. Therefore, Olympic is proposing to protect the 16-inch pipeline by installing an additional river weight (concrete half-round pipe) over the unprotected section of the 16-inch pipeline in the left (south) bank of the creek and south of the existing river weights. The total length of the new river weight will be about 8 feet so that the protection extends into the bank about 7 feet. In order to install the river weight, it will be necessary to stage a trackhoe on the left bank to remove the rip rap from over and around the 16-inch pipeline along the left bank, then place the river weight over the pipeline. The rip rap will be replaced to its original configuration along the left bank over the pipeline.

Concerns regarding fish passage across the existing weirs will be accomplished by cutting notches in Weirs #2 and #5 and installing a rock drop structure downstream of Weir #5. The notch in Weir #2 will be approximately 2 feet wide and 0.25 feet deep. The notch in Weir #5 will be approximately 2 feet wide and 0.5 feet deep. The rock drop structure will be constructed about 60 feet downstream of Weir #5, with a crest height about 0.5 feet below the base of the notch in Weir #5. Construction of the rock drop

structure will require removing a section of an existing gabion basket system to tie in the right bank key. Depending on the extent of gabion system removed and proximity of the stream bank to the pipeline, a buried wing wall will be constructed within the footprint of the gabion basket system between the pipeline and the top of stream bank. It is anticipated that the buried wing wall will extend downstream a maximum of about 25 feet from the rock drop structure. The extent of the gabion removed will be determined in the field at the time of construction. Woody debris consisting of two logs will be embedded in the rock drop structure extending downstream a maximum distance of 10 feet. One will be placed along the left bank and one with a small root wad will be placed in the right side of the rock drop structure, near the right bank.

During the time that work is being accomplished to address fish passage concerns, sediment upstream of Weir #5 will be removed so that a grocery cart embedded in the stream bottom can be removed. The remainder of sediment and any armoring will be removed upstream and downstream of the weir to evaluate any scour that might have occurred beneath the concrete weir. Any voids will be backfilled with native glacial soils excavated from on-site or using imported clay soils. Geomembrane will be placed along the upstream and downstream faces of the weir. Rip rap will be placed over the geomembrane, and the excavated stream sediments will be placed over the rip rap to pre-existing grades. In addition, rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and upstream of the rock drop structure in areas where the bottom of the gabions are corroded and not protected by the rip rap placed in 1995.

Pursuant to City LUC 20.25H.055.B, certain uses and development may be allowed inside a critical area, critical area buffer, or critical area setback. Among these uses and activities include repair and maintenance of existing utility facilities, utility systems, stormwater facilities, and essential public facilities. A portion of this work constitutes maintenance activities. It is our understanding that the work related to fish passage across the weirs may not be considered maintenance activity, although the weirs were installed in the mid-1990s in part to restore cover, to help protect the pipelines as well as to restore and maintain fish passage.

1.3 General Site Description

The area at the project site is characterized by a creek crossing the undeveloped utility corridor. Topography within the vicinity of the project is flat to rolling. The low point along the alignment is at the crossing of Kelsey Creek at approximate Elevation 144 feet, while the high point within the project area of approximate Elevation 208 feet is located the end of the asphalt concrete paved access on 136th Avenue NE. Land use surrounding the site is single-family and medium density residential and light commercial as shown on Figure 2. There are no structures at the site. Photos showing site conditions are included in Appendix A of this report.

The utility corridor contains a variety of native and exotic vegetation species such as shore pine (*Pinus contorta*), salmonberry (*Rubus spectabilis*), Himalayan blackberry (*Rubus armeniacus*) and Japanese knotweed (*Polygonum cuspidatum*). The areas east and west of the utility corridor are a typical urban forested riparian corridor consisting primarily of native species such as western red cedar (*Thuja plicata*), black cottonwood (*Populus balsamifera*), Douglas fir (*Pseudotsuga menziesii*), salmonberry (*Rubus spectabilis*) and sword fern (*Polystichum munitum*).

2.0 METHODS

2.1 WETLAND EVALUATION

To prepare for the wetland field investigations, GeoEngineers conducted a search for pertinent and applicable literature and digital data. Data sources that we reviewed for this wetland assessment included: National Wetlands Inventory (NWI) digital data from U.S Fish and Wildlife Service (USFWS) (USFWS, 2008); digital soils data from the Natural Resource Conservation Service (NRCS) (USDA, 2008a and 2008b); and the King County iMap GIS system (King County, 2008). We also reviewed the City of Bellevue's Sensitive Areas Notebook to determine the presence of known wetlands at or near the site that have been inventoried by the City (City of Bellevue, 1987).

A wetland boundary was delineated within the Olympic easement by a GeoEngineers wetland biologist on October 14, 2008. Where permission to access private property was not given, our wetland investigations were restricted to "over the fence" visual observations. The wetland delineation was conducted in general accordance with wetland delineation procedures outlined in the U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (USACE, 1987), *The Interim Regional Supplement* (USACE, 2008) and the Washington State Department of Ecology (Ecology) *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997). We gathered information on vegetation, soil and hydrology at plots located in the wetland and the adjacent upland area. Data obtained at these representative locations were recorded on standard wetland data sheets that are included in Appendix B. We identified the locations of the sample plots and the delineated wetland boundary with field flagging. The locations of the field flagging were subsequently professionally surveyed by Pacific Geomatic Services on October 20, 2008.

In accordance with LUC 20.25H.095 (B) and 20.25H.110 (B)(3), GeoEngineers conducted a wetland rating and functional assessment to determine regulatory requirements for the identified wetland area and to characterize and describe the functions, structures, and values exhibited by the wetland at the site. The wetland rating and functional assessment was determined with guidance from the *Washington State Wetland Rating System for Western Washington* (Hruby, 2006). A complete wetland rating form is included in Appendix C.

2.2 STREAMS

During the wetland delineation, GeoEngineers conducted a stream reconnaissance in the vicinity of the site. Prior to the field assessment, we reviewed the Washington Department of Natural Resources (WDNR) FPARS mapping system (WDNR, 2008), WDFW's SalmonScape system (WDFW, 2008), the King County iMap GIS system (King County, 2008) and the City of Bellevue's Sensitive Areas Notebook (City of Bellevue, 1987).

As part of our field work, we conducted a general stream survey of Kelsey Creek within the utility corridor and the areas immediately up and downstream of the project area. Data collected during the stream survey included observations of stream channel configuration; riparian structure including land use and vegetation; channel morphology and bank stability; substrate composition; observations of large woody debris and pool quality; observations of fish habitat and utilization; and digital photographs. We also delineated the Ordinary High Water Mark (OHWM) of Kelsey Creek within the project reach to determine the jurisdictional extent of Kelsey Creek. OHWM determinations were made using guidance from Olson and Stockdale (2008).

2.3 Geologic Hazard Areas

To determine the presence of potential Geologic Hazard Areas at the site we reviewed the Sensitive Areas Noteboook (City of Bellevue, 1987); and publicly available topographic data developed from LiDAR from the City of Bellevue (2007) and King County (2008). GeoEngineers obtained additional topographic data of the site from a survey conducted by Pacific Geomatic Services.

While on site to conduct the wetland and stream assessment, we also completed a geologic reconnaissance of the site and slopes adjacent to the pipeline crossing. The reconnaissance included observations and measurements of slope inclination, slope shape, vegetation, groundwater seepage, shallow landslides and other signs of potential slope or soil instability.

2.4 Habitats Associated with Species of Local Importance

We reviewed WDFW Priority Habitats and Species (PHS) data (2009) to determine the potential presence of priority fish and wildlife and their habitat near the site. While on site, GeoEngineers assessed the habitat that exists near the project area. This assessment included observations of vegetation type and structure; habitat connectivity and interspersion; and the proximity, frequency and magnitude of geomorphic and land use disturbance. Observations made during this site assessment were used to determine the presence of potential habitat that may have a primary association with the Species of Local Importance listed in LUC 20.25H.150 (A). Additional information regarding the presence of federally-listed threatened and endangered species is included in the Biological Evaluation (GeoEngineers, 2009a) that has been prepared for the project.

2.5 Areas of Special Flood Hazard

GeoEngineers has performed a flood hazard review of the site in accordance with LUC 20.25H.175. GeoEngineers has reviewed the Federal Emergency Management Agency (FEMA) Flood Insurance Rates Maps (FEMA, 1995). GeoEngineers was provided a copy of the HEC-RAS model of the subject reach by the City of Bellevue. We also obtained a copy of recent digital data in Geographic Information System (GIS) format that presents the 100-year floodplain mapping (City of Bellevue, 2009) (Figure 5).

GeoEngineers has determined areas at the site that are subject to the 100-year flood using a HEC-RAS modeling tool. Flood hazard review methods and results for the project are discussed in detail in the Hydraulics and Hydrology Report (GeoEngineers, 2009c).

3.0 RESULTS

3.1 Wetlands

Neither the NWI data (USFWS, 2009) (Figure 4) nor the King County iMap system (2009) indicates the presence of any wetlands on or near the site. The City of Bellevue (1987) has mapped an approximately 7-acre palustrine forested wetland, identified as the Crabapple Wetland, approximately 700 feet west of the project site. GeoEngineers identified one wetland at the project site during field investigations as shown on the Critical Area Map (Figure 5). For the purposes of regulatory application and in accordance with guidance set forth in *Washington State Wetland Rating System for Western Washington* (Hruby, 2006), we identified this slope wetland unit as Wetland A.

Wetland A is approximately 0.26 acres (11,477) square feet and is located immediately east of the left bank of Kelsey Creek. We have classified this wetland as a saturated, palustrine shrub and emergent wetland (PSSB/PEMB), based upon the dominant shrub community observed on the east side of the

wetland and the reed canarygrass (*Phalaris arundinacea*) dominated area on the west side of the wetland, as well as the apparent duration of inundation within the wetland (Cowardin et al., 1979).

3.1.1 Wetland Hydrology

The hydrology of Wetland A appears to be primarily driven by groundwater discharging from the slope along the southern and eastern edges of the wetland. Because of its position in the landscape, it also receives runoff from the surrounding area. With the exception of the maintained pipeline easement, the vegetative cover upgradient of the wetland consists of dense forest and shrub species, so overland flow into the wetland appears to be minimal. Surface water, discharging from several seeps in the hillside sheet flows down the slope towards the creek immediately west of the wetland. This flow infiltrates into the gabions that were installed to protect the pipeline on the left bank of the creek. Because the lowest surface elevation of the wetland is located approximately 6 vertical feet higher than the OHWM of the creek, it does not appear that the wetland is subject to overbank flooding from the creek. We observed standing water with iron deposits in the wetland during the October 14, 2009 wetland delineation and during a subsequent site visit on May 26, 2009. These iron deposits indicate a prolonged period of saturation within the wetland.

3.1.2 Hydric Soils

The NRCS soil data (USDA, 2008a) identifies the mapped soil unit as Alderwood gravelly sandy loam, 6 to 15 percent slopes. This soil is not listed as hydric by NRCS except in depressional landforms (USDA, 2008b). Soils mapped at the site by NRCS are shown in Figure 6. Within Wetland A, we observed very dark gray (10YR 3/1, according to Kollmorgen Corporation, 1988) loam with sand that was saturated to the surface. Redoximorphic features were present; however; their small size and soil saturation made it difficult to obtain a color of these features. Soil observed within the wetland is not consistent with the typical soil profile of the mapped soil series (USDA, 2008a). It should be noted that the soils within the wetland have been disturbed as a result of ongoing pipeline maintenance activities since the pipeline was installed in the mid 1960's. Hydric soils were not observed where gabions have been installed along the left bank of the creek, and as such, the wetland was not identified to extend to the creek.

3.1.3 Hydrophytic Vegetation

Vegetation observed within the maintained Olympic corridor portion of Wetland A is hydrophytic emergent species dominated by reed canarygrass. To a lesser extent, small-fruited bulrush (*Scirpus microcarpus*) and soft rush (*Juncus effusus*) also occurs within the maintained pipeline corridor. The wetland area outside of the maintained pipeline corridor is a well developed scrub/shrub wetland habitat characterized by Sitka willow (*Salix sitchensis*), salmonberry, hardhack (*Spirea douglasii*) and red-osier dogwood (*Cornus sericea*).

3.1.4 Wetland Buffer

The buffer surrounding Wetland A is relatively undisturbed with the exception of the 20-foot-wide corridor over both the 20-inch and 16-inch pipeline which is mowed annually by Olympic. PSE does manage the vegetation under the transmission lines within the buffer of Wetland A; however, only trees that could strike the transmission lines are selectively removed and this maintenance occurs infrequently. The wetland buffer within the utility corridor is well vegetated; however, invasive species such as Himalayan blackberry, reed canarygrass and Japanese knotweed dominate these areas. Outside of the maintained utility corridor, typical forested riparian habitat is found within the wetland buffer. Vegetation within the forested buffer consisting primarily of native species such as western red cedar

(*Thuja plicata*), black cottonwood, Douglas fir, salmonberry and sword fern. No structures or paved areas are found within approximately 80 feet of the wetland edge.

3.1.5 Wetland Rating and Functional Assessment

For the purpose of rating the wetland and assessing functions, we classify Wetland A as a slope wetland (Hruby, 2006). The principal function performed by Wetland A is to provide habitat benefits. Habitat scores are moderate; Wetland A scored 17 of a possible 36 points. Wetland A has two vegetation classes; shrub and emergent habitat (Cowardin, 1979). Native plant species are diverse and non-native vegetation species are generally not present within the wetland; however, invasive and exotic species are found throughout the buffer in the maintained utility corridor. Native species within the wetland include red alder (*Alnus rubra*), black cottonwood, Sitka willow, hardhack, small-fruited bulrush and soft rush. A number of red alder snags were observed within the wetland underneath the PSE transmission lines that were presumably being used by birds for foraging and nesting. Birds nest were also observed in the shrub layer of the wetland, particularly within the hardhack. The wetland is connected to other fish habitats and does not provide fish habitat within the wetland. While the wetland does not provide fish habitat within the wetland, it is part of the vegetated riparian corridor that contains spawning and rearing habitat for salmonids.

We scored Wetland A 6 points for water quality functions of a possible 32 points on the rating form. Slope wetlands, such as Wetland A, generally score very low for water quality functions because their sloped configuration does not provide adequate residency time to remove pollutants and their groundwater source of hydrology generally does not contain pollutants that provide the wetland the opportunity to perform water quality functions. Average slope in the wetland is between 2-5 percent and groundwater discharge is the primary source of hydrology.

Similar to water quality functions, slope wetlands typically score very low for hydrologic function because they do not attenuate flows and they do not typically receive stormwater input and as a result, hydrologic scores for Wetland A are low (5 points). Wetland A does have dense, uncut, rigid vegetation that would slow flood waters in greater than 50 percent of the wetland; however the wetland does not receive overbank flow from the creek. Wetland A does drain through the gabions to Kelsey Creek which has flooding problems downstream of the site; however, according to Hruby (2006), Wetland A does not have the opportunity to reduce flooding and erosion because the major source of water in the wetland are groundwater seeps.

Applying the rating criteria, Wetland A was rated a Category IV wetland, scoring 28 points on the rating form (Hruby, 2006). The complete rating form is provided in Appendix C. According to LUC 20.25H.095 (C)(1)(a)(i), the City requires a standard wetland buffer width of 40 feet landward from the delineated edge of Wetland A.

3.2 STREAMS

GeoEngineers scientists conducted site reconnaissance to confirm the presence of streams as defined by LUC 20.25H.075 (A) located within the immediate vicinity of the project area. Kelsey Creek is the single stream feature identified during our site investigation.

Kelsey Creek is the primary stream system that drains the heavily urbanized area of eastern Bellevue. The Kelsey Creek Basin is composed of several streams which flow to Mercer Slough south of SE 8th Street and immediately west of Interstate 405. The mainstem Kelsey Creek has its headwaters in the Phantom and Larsen Lake wetlands, approximately 3.5 miles southeast of the project site. The

contributing basin to the stream is approximately 10,870 acres (Kerwin, 2001) and land use within the watershed is a mix of residential and commercial development. Tributaries to Kelsey Creek include Valley Creek, the west tributary of Kelsey Creek and Richards Creek (WDFW, 2008 and 2009).

The subject reach of Kelsey Creek, shown on the site plan (Figure 3) is a highly altered, confined Type F stream (Rosgen, 1996) with a 1.3 sinuosity ratio and approximately 0.5 percent channel slope in the project reach. The substrate within the subject reach is predominantly cobble, gravel and sand. The banks have been armored with rip rap and concrete grade control weirs have been installed in the project reach as a protective measure for the Olympic pipelines. The result is a stable series of plunge and backwater pools immediately upstream and downstream of the weirs and low gradient riffles and glides between the weirs. Where the banks have not been armored, the banks are composed of erodible alluvial soils or compact glacial outwash over the native glacial till. The glacial till is exposed in portions of the channel. The compact glacial outwash soils are more resistant to erosion than the alluvial deposits, but less resistant than the glacial till. The till is extremely hard and resistant to erosion from the creek.

The section of stream channel just downstream of the 16-inch pipeline is also highly altered and controlled by concrete weirs. This reach is characterized by a broadly bending channel with pools below each weir and sand and gravel depositional pockets upstream of each weir. In particular, Weir #4 and #5 have created backwater conditions within the sections immediately upstream of the weirs, allowing sediment deposition and development of a stable, armored channel bed. Due to the presence of these depositional sections, the drop heights at Weirs #3, and #4 are all within WDFW regulations (0.8 feet or less). The drop height at Weir #2 was surveyed as being acceptable, but is marginal.

Weir #5 is approximately 340 feet downstream of the 16-inch pipeline crossing. A 130-foot-long pool has formed downstream of Weir #5. The drop height at this weir is approximately 1.4 feet, which is approximately 0.6 feet greater than the WDFW standard of 0.8 feet (Fisher, L., 2008). The channel gradient within the reach is much higher relative to the upstream and downstream reaches at approximately 1 to 5 percent with little to no sediment deposition within the reach. The channel may have been straightened during the installation of the pipeline to keep the channel oriented parallel to the pipeline rather than bending towards or across the pipeline. The relatively straight and narrow channel configuration generates higher-energy flows because the flow energy is not dissipated over a wider cross-sectional area, meander bends, or obstructions. The channel is confined by glacial till and man-placed bank armoring. Granular soil overlying the glacial till consists of gravel and sand with silt and occasional cobbles. The coarser material is relatively resistant to erosion. We observed near vertical exposures in the stream banks. The left bank is armored primarily downstream of Weir #5 for a distance of about 90 feet with gabion baskets, which create a 6-foot-high near-vertical wall along the stream channel. The armoring helps to protect the 16-inch pipeline from stream migration. Some deterioration of the gabion baskets, loss of rock from the baskets, and undermining of the baskets is occurring along the left bank. The relatively straight channel configuration, higher peak flows from upstream urbanization without stormwater controls, in conjunction with armoring of the banks, has promoted channel incision and slight increases in erosion of the right bank within this reach.

The concrete grade control weirs that are dispersed throughout middle reaches of Kelsey Creek (including the project area) may affect salmonid spawning distribution downstream by partially blocking upstream access. Riparian vegetation and structure is present, however it is characterized by small willows (*Salix spp.*) and non-native noxious species such as Himalayan blackberry and Japanese knotweed. Large woody debris is not present in the subject reach and there is little opportunity for recruitment because of the bank armoring and immature woody vegetation along the banks of the subject reach. Pool habitat quality is good because of the consistent overhanging vegetation and deep pool depths.

WDFW identifies the subject reach of Kelsey Creek as documented habitat for Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), sockeye (*O. nerka*) salmon, and cutthroat trout (*O. clarkii clarkii*) (WDFW, 2008 and 2009). During the April 2009 site reconnaissance, GeoEngineers staff observed salmonid fry within the subject reach but we were unable to determine the species.

According to LUC 20.25H.075 (B) (2) Kelsey Creek is regulated as a Type F Water. Type F waters include all waters that are not shorelines of the state and contain fish or fish habitat. On undeveloped sites (sites that do not contain a primary structure), a 100-foot-wide buffer is established from the top of the bank of Type F waters, in accordance with LUC 20.25H.075 (C)(1)(a)(i).

3.3 GEOLOGIC HAZARDS

According to LUC 20.25H.120.A, Geologic hazards are defined as follows:

1. Landslide Hazards. Areas of slopes of 15 percent or more with more than 10 feet of rise, which also display any of the following characteristics:
    - **a.** Areas of historic failures, including those areas designated as Quaternary slumps, earthflows, mudflows or landslides.
    - **b.** Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits.
    - **c.** Slopes that are parallel or subparallel to planes of weakness in subsurface materials.
    - **d.** Slopes exhibiting geomorphologic features indicative of past failures, such as hummocky ground and back-rotated benches on slopes.
    - **e.** Areas with seeps indicating a shallow groundwater table on or adjacent to the slope face.
    - **f.** Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.
2. Steep Slopes. Slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.

Inclinations at the site predominantly range from 0 to 15 percent, with short slope segments inclined at 15 to 40 percent, with near-vertical banks present along portions of the stream channel. Slopes inclined greater than 40 percent are located to the north of Kelsey Creek adjacent to the 16-inch pipeline crossing, on the north side of Kelsey Creek and just west of the 20-inch pipeline, along the stream bank about 60 to 90 feet downstream of Weir #5.

One area along the right bank of Kelsey Creek at the 16-inch product pipeline crossing consists of slopes inclined at gradients of greater that 40 percent, with portions of the slope inclined at gradients close to 100 percent. The slope is vegetated predominantly with Himalayan blackberry shrubs. Per LUC 20.25H.120.A (2006), this area meets the definition of a steep slope hazard. LUC 20.25H.120 (B)(1)(b) requires a 50-foot buffer from the top of this slope and LUC 20.25H.120 (C)(2)(b) requires a structure setback of 75 feet from the toe without further evaluation. The 16-inch pipeline was installed in the 1960s or early 1970s across this slope. The cut to install the pipeline may have resulted in slightly steeper slopes as standard construction practices at that time did not usually result in contouring the ground back to original shape. The lower portion of this slope is armored with rip rap that was placed at the time the weirs were installed in 1995. Because the toe of the slope, which is located along the right bank of Kelsey Creek, has been armored with riprap, there is a low potential for bank failure or lateral channel migration of the creek in this area. We observed no indications that this slope has moved. We observed no geomorphic evidence of past movement, failure or erosion. We did not observe any seeps or saturated

areas on the slope that would indicate slope instability associated with groundwater discharge. Based on the evaluation of the slope by GeoEngineers (2009b), the distance from the excavation planned on the south side of Kelsey Creek is sufficient.

A potential landslide hazard exists within the utility corridor and to the west of the temporary access road. The slope is inclined at gradients of 15 to about 30 percent. Wetland A is located at the base of this slope. Wetland conditions are driven by groundwater discharge from this slope. Based on these characteristics, this area meets the City of Bellevue definition (LUC 20.25H.120.A) of a landslide hazard area. The slope rises at an approximate 50 percent grade from a deep pool on the outside bend of the creek. A 32 inch western red cedar tree is located at the top of the stream bank where the downslope edge of the wetland boundary is mapped. This tree is leaning towards the creek which would indicate bank failure at the toe of the slope due to lateral stream channel migration. However, because of the size of this tree and typical growth rates, the pistol-butted trunk of the tree indicates that the movement of the tree has been slow and ongoing. There is no indication of movement up slope of the tree which would suggest that the tree has shifted catastrophically over its estimated 50 to 75-year life span. We observed no other indication of ground movement. The bank where the tree is located is on the outside of a bend, and the bank is being undercut. However, the bank consists of till overlain by a relatively compact gravel and sand with cobbles. LUC 20.25H.120 (B)(1)(a) requires a 50-foot buffer from the top of the landslide hazard and a 75-foot buffer at the toe. The toe of the landslide area and a steep slope located downstream are lateral to construction activities, with the exception of placement of the stream bypass pipe. The bypass pipe will be placed by hand, reducing the potential for impacts.

Steep slope hazard areas are located along the left stream bank upstream and downstream of the mapped landslide hazard area. The proposed work area is located within the steep slope hazard area upstream of the mapped landslide area (see Figure 2 and Figure 3). This area could also be classified as a landslide hazard, but is protected by gabions installed along top and face of the stream bank to protect the pipeline from erosion of the stream bank. The gabion system is present along the left stream bank and extends about 12 feet (or more in places) back from the top of bank where most of the equipment will be operated. We did not observe any seeps or saturated areas on the slope that would indicate slope instability associated with groundwater discharge. The native glacial till found at this location is very resistant to failure and rapid stream bank erosion. A short segment of the gabion system will be partially removed and replaced with the rock drop structure and associated bank key. Olympic proposes to remove as short of a segment of the gabion system as possible to maintain protection of the pipeline. Where the gabion is removed and protection of the pipeline is needed, a buried rock wing wall will be constructed that extends downstream from the rock drop structure along the alignment of the removed gabion system. The extent of the gabion system to be removed will depend on conditions encountered in the field, but will extend no more than about 25 feet downstream from the rock drop structure (just upstream of cross section C-C'). It is our opinion that the planned construction activities along the top of the steep slope hazard area will not impact stability, provided appropriate construction measures are implemented during construction. This area is a regulated steep slope as defined by LUC 20.25H.0120 (A)(2). LUC 20.25H.120 (B)(1)(b) requires a buffer of 50 feet to be measured from the top of the steep slope hazard area and LUC 20.25H.120 (C)(2)(b) requires a 75-foot setback of structures from the toe.

The steep slope downstream of the landslide hazard area consists of slopes inclined at an overall gradient of about 50 percent from the toe to the top of bank, with gradients of about 40 percent upslope. The bypass pipe for the project will be placed across this area. However, we do not anticipate that the proposed project will impact this regulated steep slope hazard area or its associated buffer.

A detailed analysis of Geologic Hazards at the site can be found in the Geotechnical Design Report (GeoEngineers, 2009b).

3.4 Habitats Associated with Species of Local Importance

GeoEngineers determined the presence of habitat at the site that may have a primary association with the Species of Local Importance listed in LUC 20.25H.150 (A). Those species include:

- **Pileated woodpecker** – Habitat includes various forest structures; broadleaved, coniferous, mature and old-growth, or mixed canopy forest. Habitat areas include suburbs where there are large trees to roost and nest in. Typical roost trees are western hemlock and western red cedar (Birdweb, 2009).
- **Vaux's swift** – Commonly found foraging in woodland habitat near lakes and rivers. Vaux's swift usually nest and roost in old-growth or snag habitat, but are also are found in habitats with suitable nesting trees such as coniferous or mixed forests where snag cavities with vertical entrance are present. They have been know to establish communal roosts in large man-made structures, such as, non-operating industrial smoke stacks and old school chimneys (Fisher, C., 1996).
- **Merlin** – Merlin habitat varies from forest edges to farmland. Merlins are found in urban areas during winter and migration. Nests are primarily constructed in conifers between 18 and 36 feet high or in old crows' nests (Bell and Kennedy, 2006).
- **Great blue heron** – Great blue herons are found in a variety of habitats including marshes, swamps, river and lake edges, tidal flats, and riparian areas (Stokes, 1996).
- **Red-tailed hawk** – Habitat is extremely varied ranging from open fields, urban areas and roadsides. Any habitat with open areas combined with patches of trees or other elevated perches can potentially be red-tailed hawk habitat. Nests are built in tall trees, often the tallest tree available (Fisher, C., 1996).

3.5 Areas of Special Flood Hazards

The FEMA Flood Insurance Rate Map (FEMA, 1995), that includes the site indicates that portions of the project are within the area subject to inundation during a 100-year flood event. The City has determined the 100-year floodplain for the subject reach and has provided GeoEngineers this recent digital data in Geographic Information System (GIS) format. We have presented the extents of the 100-year floodplain, determined by the City, on Figure 5. In general, the 100-year floodplain through the project reach is confined within the banks of Kelsey Creek.

4.0 ANTICIPATED PROJECT-RELATED IMPACTS

This project has been designed to avoid and minimize impacts to environmentally sensitive areas to the maximum extent feasible while installing the necessary pipeline protection measures. However, temporary impacts to some of these areas are unavoidable.

4.1 Wetland Impacts

The project will result in approximately 1,618 square feet of short-term temporary impacts to vegetation within Wetland A. These wetland vegetation impacts will be isolated to the work area and temporary soil stock pile area located primarily within the maintained Olympic pipeline corridor on the left bank of Kelsey Creek, downstream of Weir #5 (Figure 3). This area is dominated by reed canarygrass which will not be removed as an erosion and sediment control measure. Because there is no excavation or permanent fill occurring within the wetland we anticipate that temporary impacts will be limited to the existing vegetation within the emergent and shrub wetland habitat. The temporarily impacted wetland areas will be revegetated with native species to restore and enhance their pre-project habitat conditions.

Soil structure within the wetland will not be affected other than some superficial compaction as a result of the excavator operating from timber mats in the emergent wetland area. This impact is expected to be temporary because of the mitigating soil decompaction measures discussed in Section 5.3.1.

The topography in temporarily impacted wetland area will be restored to the pre-construction contours and elevations and no changes to wetland hydrology and /or surface water flow paths are anticipated.

4.2 IMPACTS TO KELSEY CREEK

The project will result in approximately 1,828 square feet of temporary construction impacts to the Kelsey Creek channel below the OHWM. At the location of the 20-inch pipeline crossing, approximately 817 square feet of the stream channel bed and the left bank will be excavated to install rip rap to provide additional pipeline protection. At the location of the 16-inch pipeline crossing, approximately 261 square feet of the stream channel bed and the left bank will be excavated to install an additional 8-foot long by 4-inch thick concrete river weight over the pipeline. We do not anticipate that any additional fill will be required at the 16-inch pipeline crossing. The excavated stream bed material will be sidecast in the channel next to the excavation and this material will be returned to the channel bed after completion of the pipeline protection measures. This will effectively restore the existing channel material at the pipeline crossings. The stream channel at these locations will be restored to their pre-project cross sectional contours and no change in flow or hydraulics are anticipated at these locations.

Olympic is proposing to cut notches in Weir #2 and Weir #5 in addition to installing a rock drop structure (rock weir) about 60 feet downstream of Weir #5 to enhance fish passage. HEC–RAS modeling indicates that notching of the weirs will result in a lowering of the surface water elevations behind (upstream) Weirs #2 and #5 by 0.05 feet 0.29 feet, respectively (GeoEngineers, 2009c). We consider this lowering of the surface water elevation to be negligible and will have no significant effect on stream dynamics or in-stream habitat.

Installation of the rock drop structure will result in a negligible loss of slow water pool habitat and a change in the cross sectional area of the stream at the location of the rock drop structure. The rock drop structure has been designed to raise the surface water elevation (backwater) and to deepen the pool downstream of Weir #5. These minor impacts to the aquatic habitat near the rock drop structure will be self mitigating because they will result in a reduction in hydraulic drop at Weir #5. Reducing the hydraulic drop at this location will enhance fish passage through the project reach. Additionally, the rock drop structure will provide greater diversity in habitat type and complexity by providing refugia within the interstitial spaces of the rocks and by breaking up the long glide downstream of Weir #5 into different gradients (WDFW, 2003).

The construction of the rock drop structure will require demolition of the gabion exposed in the bank of the stream and at the top of the bank to allow construction of the bank key. A join in the gabion baskets is present at the upstream edge of the bank key. The extent of gabion baskets to be removed will be established based on conditions in the field, but will extend downstream no more than about 30 feet from the upstream join. A buried rock wing wall with a heavy coir-reinforced soil facing will be installed along the footprint of the gabion system that is removed. The soft-bioengineered soil lifts, about 12 inches thick, will be installed along the stream bank commencing near the toe of the old gabion system. The soil lifts will be planted with native riparian species. The log installed in the rock drop structure along the left bank will be angled up to provide some protection for the soil lifts closest to the rock drop structure. By removing the gabion armoring and installing the soil lifts with native vegetation and the log, Olympic will improve stream habitat and vegetative cover downstream of the rock drop structure while maintaining the pool habitat that exists within this reach.

Modeling indicates that the proposed rock drop weir structure will locally increase flood elevations by slightly more than 1 foot, from near the proposed rock drop structure upstream to below Weir #5. The modeled horizontal extent will be confined by the existing stream banks, and will not impact the adjacent residence on the property where the work will be completed. The change is expected because of the installation of a structure with a crest about 2.5 feet above the existing stream bottom. Elsewhere, modeling indicates the proposed changes to weirs and the addition of the new weir will result in increases that are less than 1 foot in elevation and locally result in lower 100-year flood elevations.

4.3 IMPACTS TO GEOLOGIC HAZARD AREAS

As a matter of practicality and safety, this project has been designed to avoid steep slopes and landslide hazards to the greatest extent feasible. However, temporary impacts to the areas are unavoidable. Approximately 1,352 square feet of Geologic Hazard Areas will be temporarily impacted as a result of the proposed project. Installation of the construction access road will result in 999 square feet of temporary impacts within the 50-foot buffer upgradient of the identified landslide hazard within the utility corridor (See Figure 5).

4.4 CRITICAL AREA BUFFER IMPACTS

The project is expected to result in 15,530 square feet of unavoidable temporary impacts to the overlapping buffer areas associated with Wetland A, Kelsey Creek and the landslide hazard located near Wetland A. Most of the impacts of the project within these critical area buffers will be limited to ground and vegetation disturbances. As a result of past and ongoing land use, these buffer areas have been disturbed and are characterized by non-native invasive shrubs and noxious weeds, such as Himalayan blackberry and Japanese knotweed. Olympic has purposely sited their access road and staging area in these degraded habitats with the intention of removing the problematic vegetation species and replanting with native species at the completion of the project. Impacts to the critical area buffers as a result of the project will be temporary and will result in the establishment of an appropriate buffer habitat characterized by native vegetation species.

Temporary impacts to Critical Areas are summarized below in Table 1.

Table 1. Temporary Critical Area Impacts.

Impacted Habitat	Area of Temporary Impact
Category IV Wetland	1,618 ft^2
Kelsey Creek Channel and Banks	1,828 ft^2
Geologic Hazard Areas	1,352 ft^2
Wetland, Stream and Geologic Hazard Area Buffers	15,530 ft^2

5.0 IMPACT MINIMIZATION AND RESTORATION PLAN

To install the necessary pipeline protection measures and enhance fish passage through the project reach, impacts to Kelsey Creek, Wetland A and their overlapping buffers are unavoidable. Olympic intends to fully restore the areas that are temporarily disturbed by the project and enhance them beyond their pre-construction conditions. Olympic will restore approximately 1,618 square feet of Wetland A, approximately 1,828 square feet within the bed and banks of Kelsey Creek and approximately 15,530 square feet of critical area buffers at the site. Disturbed portions of the site outside of the

regulated critical areas will be stabilized at the completion of the project, in accordance with the Land Use Permit issued by the City.

5.1 Restoration Goals and Objectives

The goals and objectives of this on-site and in-kind restoration plan are outlined in this section and are discussed in further detail below. These goals and objectives include:

- Avoid impacts to the well-developed forest community east and west of the site by limiting construction activities to the maintained utility corridor.
- Avoid impacts to Wetland A by adjusting the temporary construction access to circumvent the wetland. The temporary construction access has been sited through upland areas infested with invasive vegetation as opposed to traversing the relatively undisturbed wetland.
- Minimize impacts to Wetland A and the banks of Kelsey Creek by reducing the work area to the minimum area necessary to complete the project.
- Restore the temporarily disturbed vegetation structure and function of the emergent and shrub habitats of Wetland A by revegetating with native plants.
- Avoid construction impacts to the stream channel by preventing excavators and other heavy equipment from entering the stream channel.
- Restore the streambank downstream of the new rock-drop structure by replacing the degraded rip rap and gabions with soft bio-engineered soil lifts and large woody debris. The soil lifts will be replanted with native species with the goal of enhancing instream and riparian habitat.
- Improve fish passage through the project reach by adjusting the hydraulic jump of Weir #5 and Weir #2. Notches will be cut into the existing concrete weirs and a rock drop structure will be placed in the channel downstream of Weir #5.
- Enhance the stream, wetland and landslide hazard buffers by removing invasive species and planting native vegetation in the buffer areas impacted by construction site.

- These restoration goals and objectives of this restoration plan were developed to restore disturbed areas at the project site and are consistent with the restoration goals for temporary impacts outlined in Ecology (2006).

5.2 Impact Avoidance and Minimization

The City requires that Olympic demonstrate that all reasonable efforts have been examined to avoid and minimize impacts to critical areas as a result of the project. Direct impacts to the critical areas identified in this report will be avoided to the maximum extent practicable. However, temporary impacts to Kelsey Creek and Wetland A are unavoidable. Olympic and its contractors have incorporated a number of low impact designs and construction techniques that will minimize the magnitude, duration and areal extent of impacts to the site and the surrounding environment. Other permit conditions attached to the City of Bellevue Land Use Permit, the WDFW Hydraulic Project Approval, the Ecology Section 401 Water Quality Certification, and the Corps of Engineers Section 404 permit are expected to include project requirements that will directly or indirectly control temporary and permanent impacts to Kelsey Creek, Wetland A and their associated buffers.

5.2.1 Project Layout

The project layout, shown in Figure 3, has been designed to avoid wetland impacts by utilizing an existing access route around Wetland A that was used for the work in 1995. The contractor will clear and

utilize a route around Wetland A along the eastern edge of the utility easement and south of Kelsey Creek that is vegetated with invasive species. The vegetation consists of Japanese knotweed and Himalayan blackberry. The primary temporary construction staging area will be constructed at the north end of 136th Avenue NE, about 900 feet south of the creek. An existing gravel-surfaced parking area will be altered by removing border timbers to level the area. Geotextile fabric such as Mirafi 150N will be placed across the surface and covered with crushed rock, quarry spalls or hog fuel. A quarry spall construction entrance will extend from the paved road surface for a distance of at least 100 feet along the access route to the work area. The remainder of the access will be accomplished by driving overland to the extent possible. The route will be brushed out as needed. It is possible that relatively small cut and fill slopes (18 inches high or less) will be required for a distance of about 440 feet along the southern portion of the access route where it crosses a slight side slope of about 5 to 10 percent. This segment of access includes a slight concave slope that could require up to about 3 feet of fill. Access and work areas will be brushed out by hand or by self-propelled mowing equipment mounted on skid steers or tractors. The primary temporary staging area and the temporary access route will be utilized to facilitate movement of equipment and materials to the work areas next to the creek and within Wetland A. Upon completion of the project, these areas will be restored according to the Restoration Plan (see Figures 7 and 8).

5.2.2 Temporary Erosion and Sediment Control (TESC)

In order to minimize and avoid impacts, the work will be completed over a relatively short period in the summer and early fall when precipitation is typically low. Anticipated work schedule is between August 15th and September 30th. None of the work activities are expected to cause any increase in water turbidity or sedimentation to Kelsey Creek or sensitive wetland areas beyond the construction site. Olympic has developed a Turbidity Monitoring Plan for Kelsey Creek at the request of the City. In accordance with the TESC plan (GeoEngineers, 2009d) that has been prepared for the project, the contractor will install temporary erosion and sediment control (TESC) measures prior to any earth disturbing work or clearing of vegetation. TESC measures will be inspected, maintained and augmented if necessary to prevent impacts to the stream and wetland. After completion of the project, TESC controls will be removed from the area for offsite disposal. Temporary access routes will be re-graded, and revegetated according to the Restoration Plan (Figures 7 and 8). Other impact avoidance and minimization measures include:

- Silt fence will be installed to prevent migration of sediment off site or into the stream channel. Orange construction fencing will also serve to establish the limits of construction activities. The boundaries will be located to minimize direct and indirect impacts to vegetation to the extent practicable. The contractor will not to operate beyond the identified construction limits.
- Site preparation, grading, and project work will be completed during drier summer weather to the extent practicable. Precipitation and runoff will be monitored during construction so that any exposed material or equipment can be protected or, if necessary, work can be suspended.
- Native vegetation at the site will be maintained to the maximum extent feasible.
- Any denuded areas will not remain exposed for more than seven days during the construction period. Denuded areas will be covered with composted mulch or erosion control fabrics as appropriate to reduce rain and runoff impacts.
- If excavated soils are very wet, a filter/straw containment area for the soil stockpile will be prepared.
- Straw wattles will be used, if necessary, to prevent sediment from entering the wetland from the adjacent disturbed areas. Water generated during excavation activities will be directed through filter socks or sediment traps prior to release in upland vegetated areas.
- Timber driving mats will be used in the wetland to reduce impacts to the soils and vegetation.

- Geotextile covered with hog fuel will be used for stockpiling of materials in the Weir #5/rock drop structure work area to identify the pre-construction elevation in Wetland A and reduce impacts to the soil and vegetation that will be covered by the temporary soil stockpile.
- Daily inspections of the erosion control measures will be conducted throughout the construction period. This will ensure the effectiveness of the measures and determine the need for maintenance, repairs, or additional measures.
- Construction equipment will be refueled using a refueling truck and fueling will not be completed within 100 feet of aquatic environments, with the exception of the bypass pump system. If a separate fuel tank cannot be used, all refueling will occur within a secondary containment area suitably sized to contain the volume in the pump/generator and the refueling vehicle. All fuels and hazardous liquids will be stored in secondary containment to avoid spills and leaks. The contractor will have the necessary resources on-site, including spill kits, to address both major and minor spills at the site.

5.2.3 Stream Bypass

The Integrated Stream Bank Protection Guidelines (WDFW, 2003)ISGP recommends that the method selected for dewatering an in-stream work area be capable of passing at least the one-year flow event. However, it is anticipated that the in-stream work will be less than two weeks in duration, and will be completed during in late August or September, typically the driest time of the year. Therefore, we used estimated flows used for the water bypass system design for the weir installation project in 1995. The estimated flows were approximately 4 cubic feet per second (cfs) in September 1994 and 7.5 cfs in April 1995. The one year flow is estimated to be on the order of 150 cfs. The selected means of bypassing water will consist of pumping the water from upstream of the work area to a point downstream of the work area. The bypass will require installation of a temporary diversion dam (cofferdam) upstream of the work area and discharging the water to a suitable location downstream. Fish screens would be established upstream of the diversion structure and downstream of the discharge point.

The bypass will require a pump or pumps with a recommended pumping capacity of about approximately 4 to 7.5 cfs (about 1800 to 3400 gallons per minute). One 4-inch pump and one 6-inch pump were used in 1995. The outlet line will have to be routed across the access route through a culvert covered with fill to protect the culverts. The line then can be routed along the eastern boundary of the work area, then downstream to a point where the discharge will not flow back into the work area. It is anticipated that the pumps will be operated only during work hours, with the cofferdam system removed at the end of each work day, provided the upstream and downstream fish barriers are maintained. Otherwise, fish removal will have to occur each day.

Alternatively, the pumps will need to be operated 24-hours a day, seven days a week during construction. The use of a full-time pump would require observation at all times of the day and night, and require storage of a significant amount of fuel in close proximity to the stream. It is possible that a noise variance will be required. To reduce time during the day for dewatering of work areas, the contractor may have to operatee the pumps overnight for at least two consecutive days.

The diversion pump(s) should not be operated at full capacity at diversion start up. The pump should not remove more than one-half the stream flow at the start of dewatering the work area, to allow for the capture and relocation of fish from within the work area. This should also help maintain water quality during start up of the bypass. Fish screens should be located upstream of the pump intake. A fish screen should also be located downstream of the diversion system until the work area has been cleared of fish.

Discharge from the pumped bypass should be returned to the stream at a point where water will not flow back into the work area. It will be necessary to install an energy dissipater at the outfall to prevent erosion and turbidity. This can most effectively be accomplished by installing a Tee-shaped diffuser constructed using a 4-foot-long, 36-inch diameter section of pipe capped at the ends. Holes 3-inches in diameter should be drilled into the downstream face. It will be necessary to secure the outlet pipe and diffuser Tee for the bypass using staking consisting of steel fence posts or #8 rebar perhaps augmented with sand bags. Additional holes may be needed and can be assessed as the flows are gradually increased. If necessary, sand bags could be used to protect stream bottom and banks around the diffuser Tee.

It may be necessary to use a smaller pump to dewater the area downstream of Weir #2 and the area in the vicinity of the proposed rock drop structure. This water should be discharged to the same area as the full stream bypass. During start up, it may necessary to use a filter bag to reduce potential turbidity. The work area in the vicinity of the new weir is within a long pool that would have to be dewatered to work in the dry. Therefore, to reduce the volume of water to be pumped, it may be desirable to install a cofferdam downstream of the work area.

During construction, it is anticipated that the stormwater outfall just below the diversion structure will be dry. However, the contractor should be prepared to collect and route flows from the storm drain around work areas. The contractor may be able to time work close to the outfall such that any flows are minimal or non-existent. Otherwise, piping may need to be temporarily installed to collect and route the water around the nearby excavation. Small pumps may be needed in the immediate area of work areas to help collect and route water downstream.

5.3 Approaches to Restoration

Restoration of disturbed areas will be conducted in accordance with the procedures discussed in the following sections and shown on Figures 7 and 8. A site-specific restoration approach and has been developed for each identified impacted habitat at the site.

5.3.1 Wetland Restoration

All temporarily impacted wetland areas will be restored to the pre-project topography and elevations and revegetated. Because of the impact minimization measures employed by Olympic, we do not anticipate a significant impact to the soil structure within Wetland A. Upon completion of the work within Wetland A, the contractor will remove the soil stockpile with the protective geosynthetic fabric and the timber driving mats. The compacted soils will be scarified with an excavator to decompact the soil.

Disturbed wetland areas will be re-planted with native wetland species appropriate to the habitat, and to accommodate the degree and duration of inundation that is expected. Recommended species are listed in Table 2. Figure 7 illustrates the proposed wetland plant communities: Palustrine Emergent Wetland (PEM) and Palustrine Scrub-Shrub Wetland (PSS). An estimated quantity of each species that will be needed and a typical layout for each plant community is included on Figure 8. The proposed wetland plant communities are comprised of, facultative (FAC) and facultative wetland (FACW) shrubs; and of facultative wetland and obligate (OBL) wetland emergent species. The disturbed shrub wetland areas will be immediately stabilized by applying 2 inches of composted mulch to the affected areas and will be with the species listed in the Shrub Wetland Plant Schedule on Figure 8. The emergent portions of Wetland A that will be temporarily impacted by construction will be reseeded with a custom wetland seed mix, as specified on Figure 8, prior to adding 2 inches of composted mulch.

Table 2. Wetland Planting Palette

Common Name	Scientific Name	Indicator Status	Habitat Community
Small-fruited bulrush	*Scirpus microcarpus*	OBL	PEM
Creeping spikerush	*Eleocharis palustris*	OBL	PEM
Soft rush	*Juncus effusus*	FACW+	PEM
Tufted hairgrass	*Deschampsia caespitosa*	FACW	PEM
Nootka rose	*Rosa nutkana*	FAC	PSS
Red-osier dogwood	*Cornus sericea*	FACW	PSS
Salmonberry	*Rubus spectabilis*	FAC+	PSS
Pacific ninebark	*Physocarpus capitatus*	FACW-	PSS
Hardhack	*Spirea douglasii*	FACW	PSS
Sitka Willow	*Salix sitchensis*	FACW	PSS

Species listed in Table 2 are suggestions only and can be modified based on availability, provided that any substitutions are appropriate to the community and degree of saturation. All deviations from the restoration plan and plant substitutions will be approved by a GeoEngineers wetlands biologist.

The temporary soil stockpile area is partly located within a shrub wetland habitat that is dominated by red-osier dogwood and Sitka willow. These two species have a high coppice potential; i.e. they have the ability to propagate from cuttings. It is recommended that impacted areas that contain these two species be harvested prior to impacts. Cutting from these species should be approximately ¾ inch in diameter and approximately 4 to 5 feet long. The leaves should be stripped and the cuttings should be immersed in water until they are installed during site restoration activities.

It is not anticipated that the plantings in the wetland will require supplemental irrigation given the prolonged duration of soil saturation at the site. However, supplemental irrigation may be required in revegetated areas outside of the wetland during the summer months (July through September) to promote plant survival.

5.3.2 Stream Channel Restoration and Fish Passage Enhancement

In order to restore the spawning and rearing habitat conditions that currently exist in the stream channel, impacts to the stream will be the minimum necessary to install the pipeline protection and fish passage enhancement measures. We do not anticipate heavy equipment, such as an excavator will need to operate below the top of the existing banks of Kelsey Creek. As a result we expect that disturbances to the stream channel will be limited to an 8-foot-wide area at the location of the 16- and 20-inch pipeline crossing, the channel in the vicinity of Weir #5, the area of channel around the proposed rock drop structure and in the area of the bioengineered soil lifts downstream of the rock drop structure.

Olympic is proposing to cut notches in Weir #2 and Weir #5 to enhance fish passage. Based on modeling results by GeoEngineers (2009c), a notch 0.25 feet deep and 2 feet wide centered at the low point of Weir # 2 will improve the drop height at this weir to a range acceptable by WDFW. For Weir #5, the notch will be 0.5 feet deep and 2 feet wide. Based on modeling by GeoEngineers (2009c), notching Weir #5 alone will not improve the drop adequately to meet fish passage criteria. Therefore, a rock drop structure (rock weir) is proposed about 60 feet downstream of Weir #5 to elevate the surface water elevation downstream of Weir #5, as shown in Table 3.

Table 3. Weir Crest Elevations and the Resulting Hydraulic Drop at each Weir.

	Existing			Proposed		
	Downstream Water Surface Elev.	Weir Crest	Drop	Downstream water Surface Elev.	Weir Crest	Drop
Weir	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	145.79	146.41	0.62	145.71	146.41	0.70
2	144.82	145.46	0.64	144.82	145.21	0.39
3	143.83	144.42	0.59	143.83	144.42	0.59
4	143.36	143.43	0.07	143.15	143.43	0.28
5	141.43	142.94	1.51	142.38	142.44	0.06
Rock Drop	NA	NA	NA	141.43	141.84	0.41

*Note: Surface water elevations reflect low flow conditions, or 4 cfs, as measured in the channel in 2005.

Notching will be accomplished using standard concrete cutting tools. Cutting the concrete will create dust that will need to be controlled and kept out of the stream channel. Notching will be accomplished while the stream is dewatered; however, it will likely be necessary to install temporary pumps to lower the water on the downstream side of each weir (and potentially the upstream side as well). The contractor will use suction as means to control dust and/or wet slurry from the hand operated concrete saw.

During the time that work is being accomplished to address fish passage concerns, sediment upstream of Weir #5 will be removed so that a grocery cart embedded in the stream bottom can be removed. The remainder of sediment and any armoring will be removed upstream and downstream of the weir to evaluate if scour has occurred beneath the concrete weir. If scour appears to have occurred, any voids will be backfilled with native glacial soils excavated for the construction of the rock drop structure. Gravel and rip rap will be placed over the rip rap. In addition, rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and the rock drop structure in areas where the bottom of the gabions are corroded and not protected by rip rap placed in 1995.

The concept of the rock weir structure was considered based on suggestions made by Alex Uber at WDFW in a telephone conversation with Craig Erdman of GeoEngineers (Uber, 2009). The WDFW representative also suggested incorporating large woody debris in the design to provide habitat. The design of the rock drop structure has been developed based on concepts and guidance presented in the Integrated Streambank Protection Guidelines [ISPG] (WDFW, 2003) (see Figure 9). Additional stream habitat restoration guidance was obtained from the Stream Habitat Restoration Guidelines (Saldi-Caromile et al., 2004). The proposed rock drop structure consists of a V-shaped weir that points upstream and is constructed out of properly sized rock. A "V"-shaped structure creates greater channel diversity than a straight weir, in part by focusing flows towards the center of the "V" where a scour pool is expected to form. The weir also has the benefit of slowing the high flows through this segment of the stream. A conceptual plan and profile view of the weir, as presented in the ISPG (WDFW, 2003), is shown in Figure 4. Each arm of the "V" is angled at approximately 45 degrees from the bank in an upstream direction. The arms are constructed to slope very gently down from the banks to the crest at the apex of the "V." The length of the structure between upstream and downstream ends is typically less than 15 feet. In an upstream-downstream profile view, the height of the rock fill decreases in an upstream direction to match the existing stream bed elevation. The structure is keyed into the bank, typically to a point 1 foot or more above the 100-year flood elevation.

Woody debris consisting of two logs will be embedded to project from the downstream side of the rock drop structure to provide additional habitat structure for fish. All woody debris should consist of Douglas fir, western red cedar, or hemlock fir. The logs should be sound and have a minimum diameter of 18 inches, but typically range from about 18 to 24 inches. The logs should be at least 20 to 30 feet long, with at least two-thirds of the length buried within the rock drop structure. To install the logs it may be necessary to remove and replace some of the existing rip rap along the left bank just upstream of where the rock drop structure is keyed into the bank.

It may be necessary to place bed gravel over rip rap bank protection or in areas where stream bed material is removed and not reused. Based on prior recommendations by WDFW representatives for other projects, we anticipate that imported bed gravel shall consist of clean, rounded, uniformly-graded gravel with a size composition of:

15 percent	4.0 to 3.0 inches;
40 percent	3.0 to 1.5 inches;
45 percent	1.5 to 0.25 inches;
< 3 percent	Fines less than 0.25 inches.

In most areas, we expect that about an 8-inch-thick layer will be placed; however, we anticipate that a thickness of 18 inches over the toe of the rip rap placed along the bank at the 20-inch pipeline crossing will be required.

5.3.3 Streambank and Riparian Habitat Restoration

Currently, the streambanks within the project reach are vegetated, however, the riparian areas within and adjacent to the utility corridor are infested with invasive Japanese knotweed. Japanese knotweed will be mechanically removed from the site. To minimize the chance of inadvertently spreading Japanese knotweed throughout the site, the infested areas will be chemically treated to kill this particular species. Approximately two weeks prior to construction at the site, each knotweed stem, larger than 0.5 inches in diameter, will be injected with concentrated glyphosate formulation, registered for use near wetlands and streams, just above the second node with a J.K Injection Tool (http://jkinjectiontools.com). For canes less than 0.5 inches in diameter, an 8 percent glyphosate solution registered for use near wetlands and streams will be directly applied to the leaves with a backpack sprayer. The glyphosate will be applied by a licensed aquatic pesticide applicator and great care will be taken to ensure that the product does not migrate into Kelsey Creek either through drift or by overland flow. No chemical will be applied in Wetland A. Weather conditions must be monitored carefully to avoid applying a chemical to Kelsey Creek immediately before heavy rains. Soil conditions and site topography must also be carefully studied to determine the appropriate timing of a chemical application.

An excavator will scalp the root masses and stems of Japanese knotweed and this material will be removed from the site and disposed of at an appropriate facility. The scalped areas will immediately be covered with a composted mulch and will be revegetated at the completion of the project according to the Restoration Plan (Figures 7 and 8).

The existing rip rap armoring along the left bank of the stream immediately downstream of the rock drop structure will be removed and the bank will be rebuilt with bio-engineered soil lifts and revegetated with native plants listed in Table 2. The soil lifts will be approximately 12 inches thick and constructed with native material wrapped in bio-degradable coir. The soil lifts will be installed above the two logs

installed in the channel substrate below the rock drop structure. Details of the soil lift construction are illustrated on Figure 10.

5.3.4 Wetland Buffer and Stream Buffer Enhancement

The project will result in approximately 14,531 square feet of temporary impacts to the overlapping stream and wetland buffers at the site. Currently the buffers are infested with invasive and exotic species which reduces the functional capacities of these areas. Olympic will restore and enhance these critical area buffers with native planting to increase the functional capacities of the buffers. Buffer restoration and enhancement will include:

- Removing illegally dumped trash and debris found in the buffers;
- Removing invasive vegetation in the buffers; and
- Installing native shrubs as shown on Figures 7 and 8.

5.3.5 Access Route and Staging Area

As mentioned previously, the temporary access route and staging area have been sited in the previously disturbed utility corridor to avoid impacts to Wetland A and Kelsey Creek. At the completion of the project, any fill along the route will be removed and revegetated in accordance with the Restoration Plan and Details on Figures 7 and 8.

6.0 MAINTENANCE AND MONITORING

6.1 MAINTENANCE PLAN

Maintenance of the site will greatly improve the vegetation performance at the restoration areas. Maintenance will be determined based on recommendations in the monitoring reports (see Section 6.2.4 below).

Irrigation of the restored areas is not planned, but may be required as determined during monitoring. If lack of irrigation is limiting plant growth and survival within the first year after planting, a temporary irrigation system may be required or a regular watering schedule established. During the dry months, usually July through September, it may be necessary to provide supplemental irrigation to the site. Extremely warm weather may necessitate watering on a more frequent basis. However it is not expected that supplemental irrigation will be necessary in the wetland because of the prolonged naturally occurring flow from the groundwater seeps within the wetland.

Control of undesirable species will be maintained by physically removing these plants from the revegetated areas using hand tools. These species include, but are not limited to, Himalayan blackberry, and reed canarygrass. Japanese knotweed in the restoration area may require ongoing chemical treatment to eradicate it from the revegetated areas. Native volunteer species that already exist on and within the vicinity of the site, in addition to those already proposed for planting will not be removed from the site. Other possible maintenance responsibilities such as the removal of trash will be evaluated and performed on an as-needed basis.

6.2 MONITORING PLAN

To gauge the performance of the restored areas, vegetation monitoring will be conducted at the site. Performance of the restoration of the site will be determined based upon an established performance standard discussed in Section 6.3. LUC 20.25H220 (D) requires a three-year monitoring period for a plan involving only restoration. Most likely, conditions of the federal permit authorization for the project will

require a monitoring period of no less than 5 years, which is the standard utilized in this monitoring plan. Monitoring events will be conducted according to the schedule in Section 6.2.3.

6.2.1 As-Built Design Report

The as-built plan and report will be prepared by a wetlands biologist immediately after replanting of the restoration areas. The report will include the following information:

- Responsible parties (designer, construction contractors, planting contractor) and whether a qualified wetland scientist or other responsible party was on site during construction;
- Construction timeline (including completion date);
- Any alterations to the original plan;
- Any problems encountered during construction and what was done to correct them;
- Any follow-up actions needed, with a schedule and who is responsible for them; and
- An as-built plan drawing that illustrates the extents of the restored areas and the locations of vegetation monitoring stations (discussed below).

The as-built report will also identify the elevations of the crest of each weir drop to verify that the hydraulic drop at each weir, including the proposed rock drop structure is in compliance with WDFW's fish passage criteria of less than 0.8 feet at each weir. Hydraulic drop of each weir will be determined by surveying the as-built crest elevations of each weir and verifying that each was installed or modified to the design elevation, as specified in the Hydraulics Analysis Report (GeoEngineers, 2009c).

6.2.2 Monitoring Plan

Vegetation establishment within the restored areas will be monitored over a 5-year period following site planting. The first monitoring event will document that restoration actions were implemented as specified in this restoration plan. Following the first monitoring event, inspections will be conducted for the remainder of the 5-year period as scheduled in following section. Following the final monitoring event in 2014, the City, the US Army Corps of Engineers (the Corps) and WDFW staff will be notified of site conditions at the end of the monitoring period.

Monitoring efforts will be conducted at fixed locations and data collected will include observations regarding plant survival and growth, hydrologic conditions and wildlife occurrences. Results from each monitoring event will be compared to the performance standards identified in Section 6.3. Monitoring will be conducted as follows:

- One wetland monitoring station will be established in the wetland restoration area to monitor performance parameters. The wetland monitoring station will consist of a monitoring area to be determined in the as-built report. The monitoring station will be located so that it includes only wetland area and excludes the portion of the wetland that is annually mowed by Olympic.
- A second monitoring station will be located in the overlapping stream and wetland buffer restoration area to monitor restoration performance in the upland buffers. Similar to the wetland monitoring station, the buffer monitoring station will consist of a monitoring area to be determined in the as-built report and will be located so that it excludes the portion of the wetland that is annually mowed by Olympic.
- Monitoring will be accomplished by determining the survival rate of the plantings within the monitoring stations. Counts of both dead and live plants will be conducted for each species. The general condition of each plant, such as observations of new growth and signs of stress or

disease, will also be noted. If plant survival falls below the threshold performance standards (Section 6.3) at any time during the monitoring period, additional plantings will be recommended to Olympic to be installed within the restoration area.

- Estimation of percent plant cover by species within the monitoring stations will be recorded. General observations regarding the proportion of cover as a result of natural recruitment of each species, including both desirable and invasive species, will be noted. If invasive species coverage exceeds the performance standard (Section 6.3) at any time during the monitoring period, control measures will be undertaken within the restoration area.
- Hydrologic factors including depth to ground water, soil saturation, and/or inundation will be measured at the wetland monitoring station.
- Wildlife recordings are to be made as general notes by the monitoring biologist during the monitoring events. Observations may include sighting of individual species, nests, burrows, droppings or other indicators. The results will be recorded and included in the monitoring report.
- Maintenance requirements such as trash removal and vandalism repair will also be noted. These observations will be included in the monitoring report.
- Photographs will be taken during each monitoring event to document the progression of the site over the monitoring period. Photographs will be taken in appropriate locations that show vegetation development through the 5-year monitoring period.
- At the completion of the project, the crest elevations of Weir #3, Weir #5 and the rock drop structure will be surveyed to ensure that hydraulic drop of these structures are within the design parameters provided by WDFW. The hydraulic drop of these structures will be monitored during each site visit.

6.2.3 Monitoring Schedule

Because of the extent of aggressive and noxious vegetation species at the site and surrounding areas; and the presence of documented habitat of a federally listed threatened species, the revegetation of the site will be monitored semi-annually. This increased level of monitoring will allow Olympic to rapidly identify a potential infestation and to expeditiously address the problem so that it does not compromise restoration goals. Monitoring will be conducted in the month of May of each year of the monitoring period. The informal results of this monitoring event will be reported to Olympic immediately following the May monitoring event. Monitoring will be conducted again near the end of the growing season of each year of the 5-year monitoring period.

6.2.4 Monitoring Reports

A monitoring report that presents the results of the spring and autumn monitoring events will be submitted annually to the City, the Corps and to WDFW. The monitoring reports will summarize the condition of the restoration site with respect to the performance standards identified below.

Monitoring reports will contain the following elements:

- Project information (project name and location, name and address of responsible party, any applicable project permit numbers, date project was constructed);
- Restoration site information (location of the restoration site, size and type(s) of habitats included in the restoration plan, date restoration site construction was completed);
- A description of monitoring requirements (name and address of party conducting the monitoring, map of the restoration site including locations of monitoring stations, dates of previous monitoring events, date of the current or most recent monitoring event);

- A brief summary of previous monitoring results, maintenance performed and contingency actions undertaken at the restoration site, including a description of any significant events that occurred on the site that may affect ultimate restoration success;
- A list of performance standards;
- Data from the current monitoring event;
- Discussion of wildlife utilization of the site, vegetation establishment, hydric soil development, observations of hydrology, wildlife utilization and existing or potential problem areas;
- A description of whether performance standards were met based on analysis of data collected during the current monitoring event; and
- Photographs of the site taken from each monitoring station during the most recent monitoring event.

6.3 PERFORMANCE STANDARDS

The success of the restoration will be judged against a performance standard defined in Section 6.2.2 to evaluate post-installation conditions at the site. The performance standard will be evaluated during all monitoring events. Failure to meet the performance standard at any point will trigger immediate corrective action. The performance standards for the restoration site is as follows:

- There shall be a minimum of 80 percent survival of all planted materials within the monitoring station throughout the monitoring period. Survival of the plantings at the site will be determined by counting and documenting the numbers of dead versus live plants within the monitoring station. Native volunteer species may count as an appropriate substitute for lost planted species within the appropriate stratum.
- Invasive species will not represent more than 15 percent cover within the monitoring stations in any of the monitoring events.

6.4 CONTINGENCY PLAN

As noted above, corrective actions taken to address failures to meet performance standards will be documented in monitoring reports submitted for review and approval by the City, the Corps and WDFW. Failures may include a higher than 20 percent plant mortality rate due to human activity, wildlife predation, or disease within the restoration area. Immediate corrective actions, such as replanting with different species or undertaking more aggressive invasive species removal, will likely remedy these failures without jeopardizing the overall success of the restoration project. An adaptive management strategy allows this contingency plan flexibility in response to unanticipated site conditions that negatively affect restoration goals. The course of action to be taken in the event of sub-standard performance will be based on the goals and objectives for the restoration project and the evolving physical characteristics of the restoration site.

7.0 PERFORMANCE AND MAINTENANCE SECURITIES

Pursuant to LUC 20.25H.260 and 20.40.490 (D) the project activity may require an assurance device or other security in a form and amount deemed acceptable by the City to ensure that the applicant performs all permit conditions, including the restoration plan. The City will review the estimate and , if acceptable, will establish the financial guarantee at 150 percent of the estimated total cost of installation plus 20 percent of the estimated total cost of maintenance and monitoring for 5 years, as required by LUC 20.25H.220 (D).

Table 4 presents estimated total costs of implementing the restoration plan including estimates of plant cost, delivery and installation, monitoring and maintenance, and contingency measures. These estimated costs are based upon supplier and contractor provided information at the time this report was prepared. Labor costs have been derived from experience in the field with projects of a similar nature. This estimate of probable costs may change depending on market conditions at the time of implementation and is not a commitment for GeoEngineers to perform the work.

Table 4. Estimated Costs to Implement Restoration Plan

Restoration Component	Cost
Total Estimated Critical Area Restoration Installation Cost	Approximately $80,000
Monitoring and Maintenance of the Restoration Area (5 years)	Approximately $12,000
Estimated Financial Guarantee Required by the City	Approximately $122,400

8.0 CONCLUSIONS

GeoEngineers has identified numerous critical areas at the site that are regulated by the City under LUC 20.25H. Those areas include one wetland (Wetland A), one stream (Kelsey Creek), areas subject to a 100-year flood event and three geologic hazard areas. These regulated critical areas have associated buffers which overlap each other and cover much of the project area. The project will temporarily impact approximately 1,618 square feet of the Category IV wetland, approximately 1,352 square feet of Geologic Hazard Areas and approximately 1,828 square feet of the bed and banks of Kelsey Creek below OHWM. A restoration plan has been presented to restore the critical areas and their buffers that are temporarily disturbed by the project. Restoration of the areas disturbed by the project will be monitored and maintained for five years to ensure restoration success.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of the Olympic Pipe Line Company, their authorized agents and regulatory agencies following the described methods and information available at the time of the work. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field for critical area reports, habitat restoration plans, stream and river habitat enhancement, stabilization and restoration design engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

No other party may rely on the product of our services unless we agree in advance to such reliance in writing. The information contained herein should not be applied for any purpose or project except the one originally contemplated.

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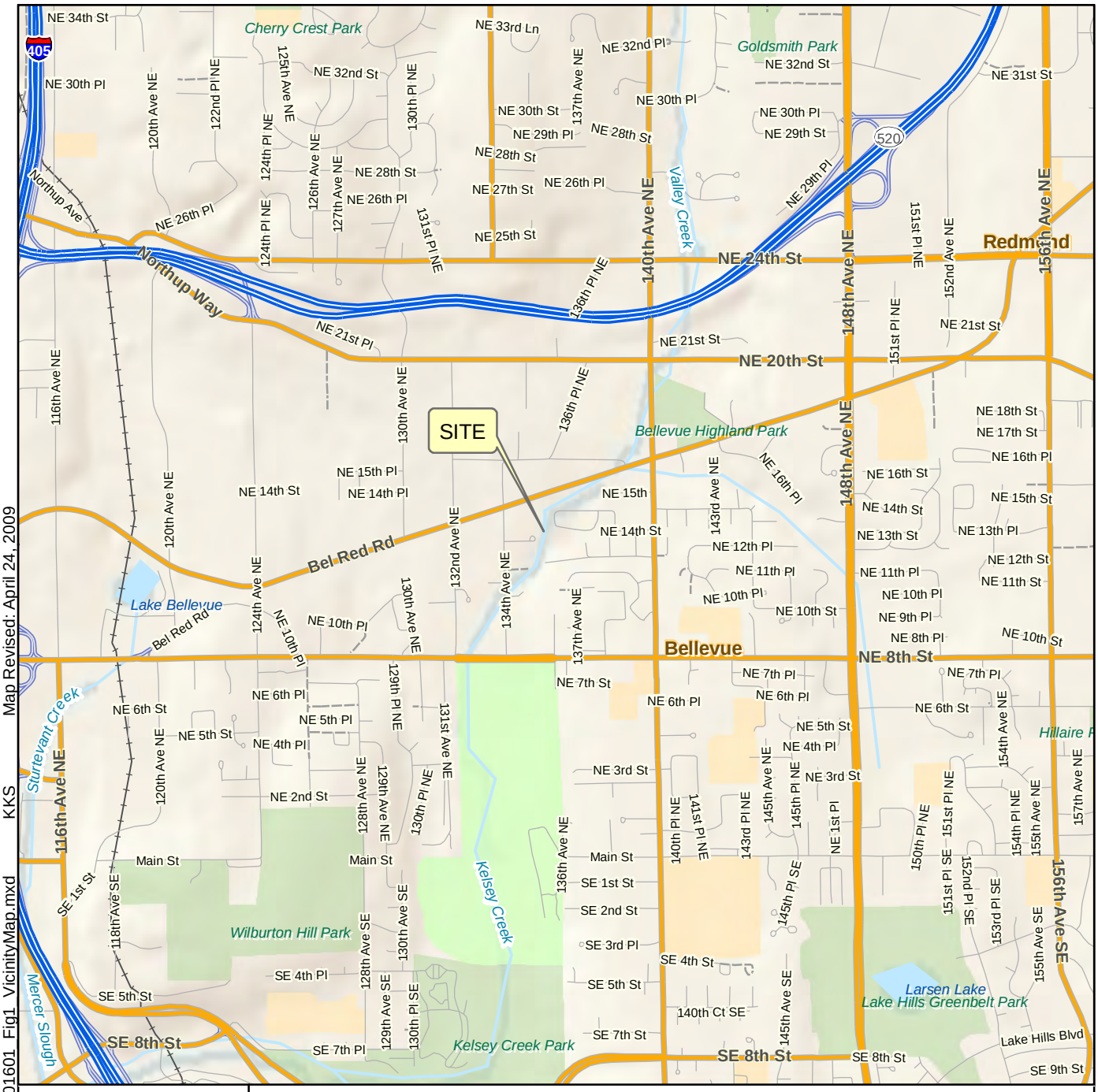

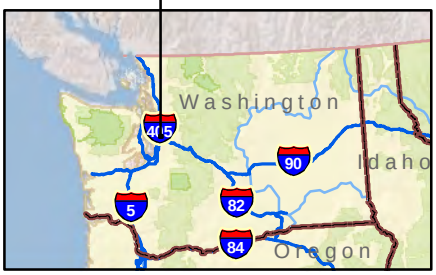

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Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

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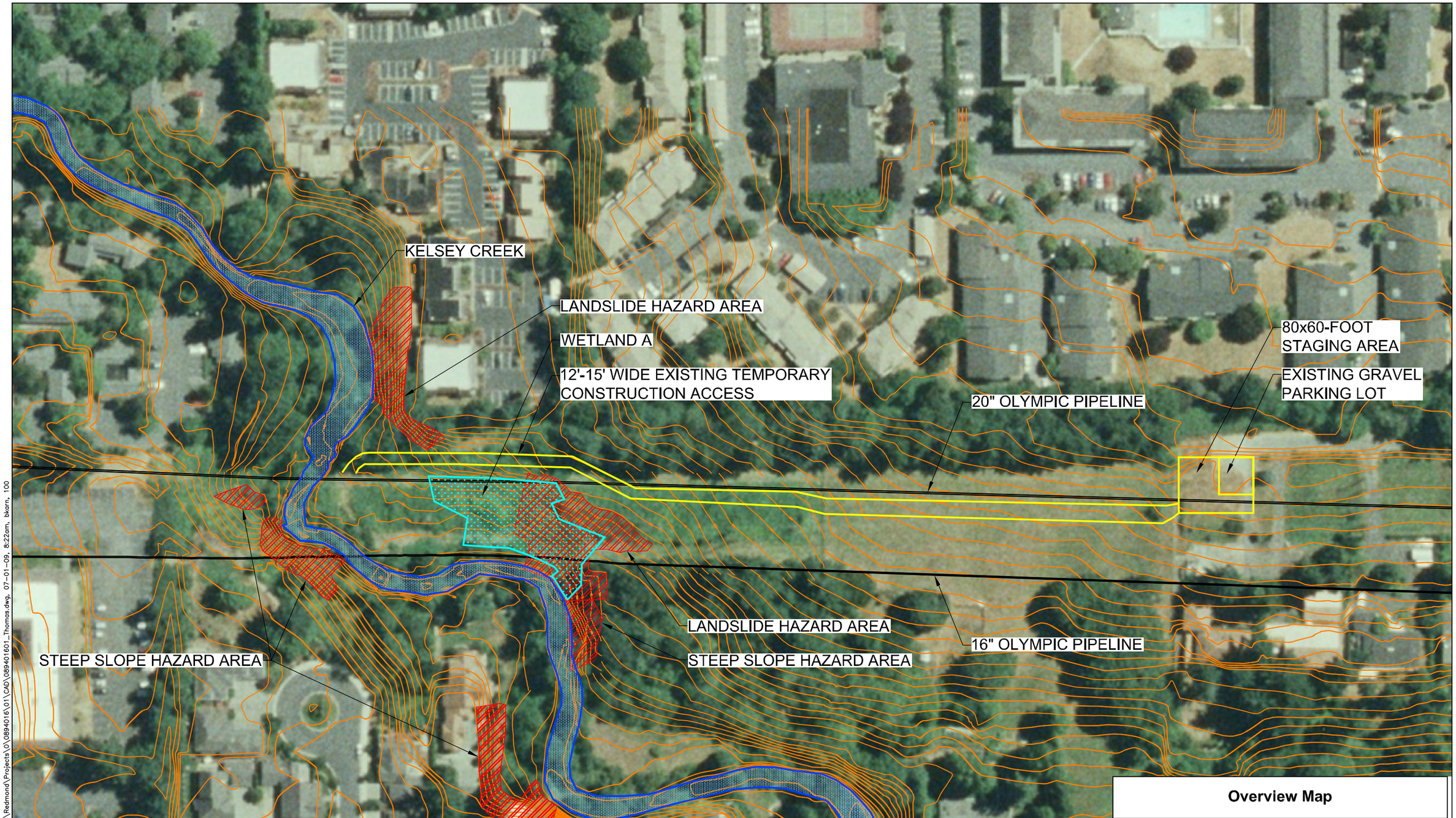
Figure 1

Office: RED Path: \\Red\projects\0\0894016\GIS\089401601 Fig1 VicinityMap.mxd KKS Map Revised: April 24, 2009



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N E S W

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Overview Map

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 2

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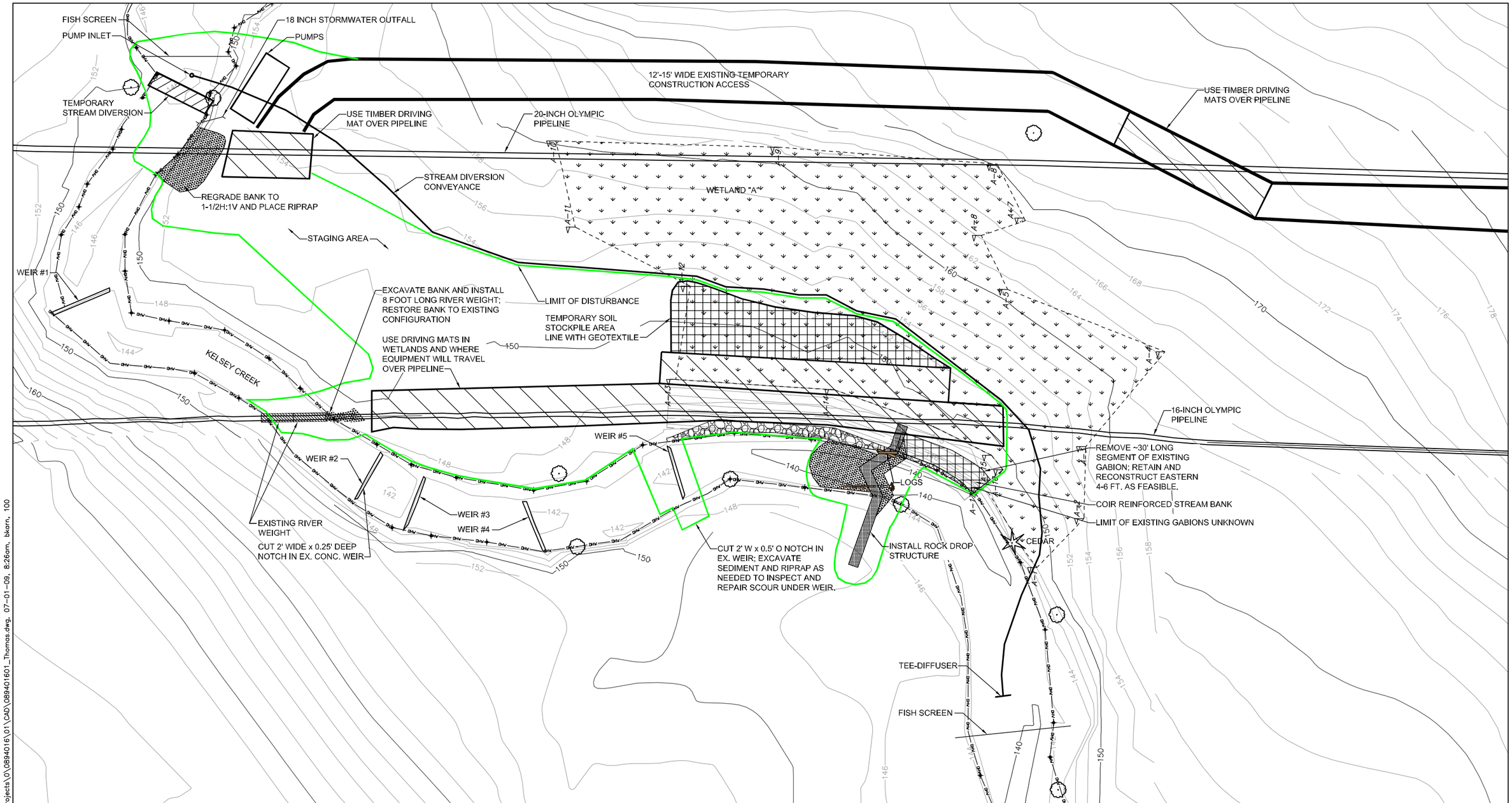

LEGEND

- ORDINARY HIGH WATER MARK
- LIMIT OF DISTURBANCE
- WETLAND A
- EXISTING TREE TO REMAIN
- EXISTING GABION BASKET WALL ALONG STREAM BANK
- PROPOSED RIP-RAP

30 0 30
FEET

Notes:
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Site Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 3

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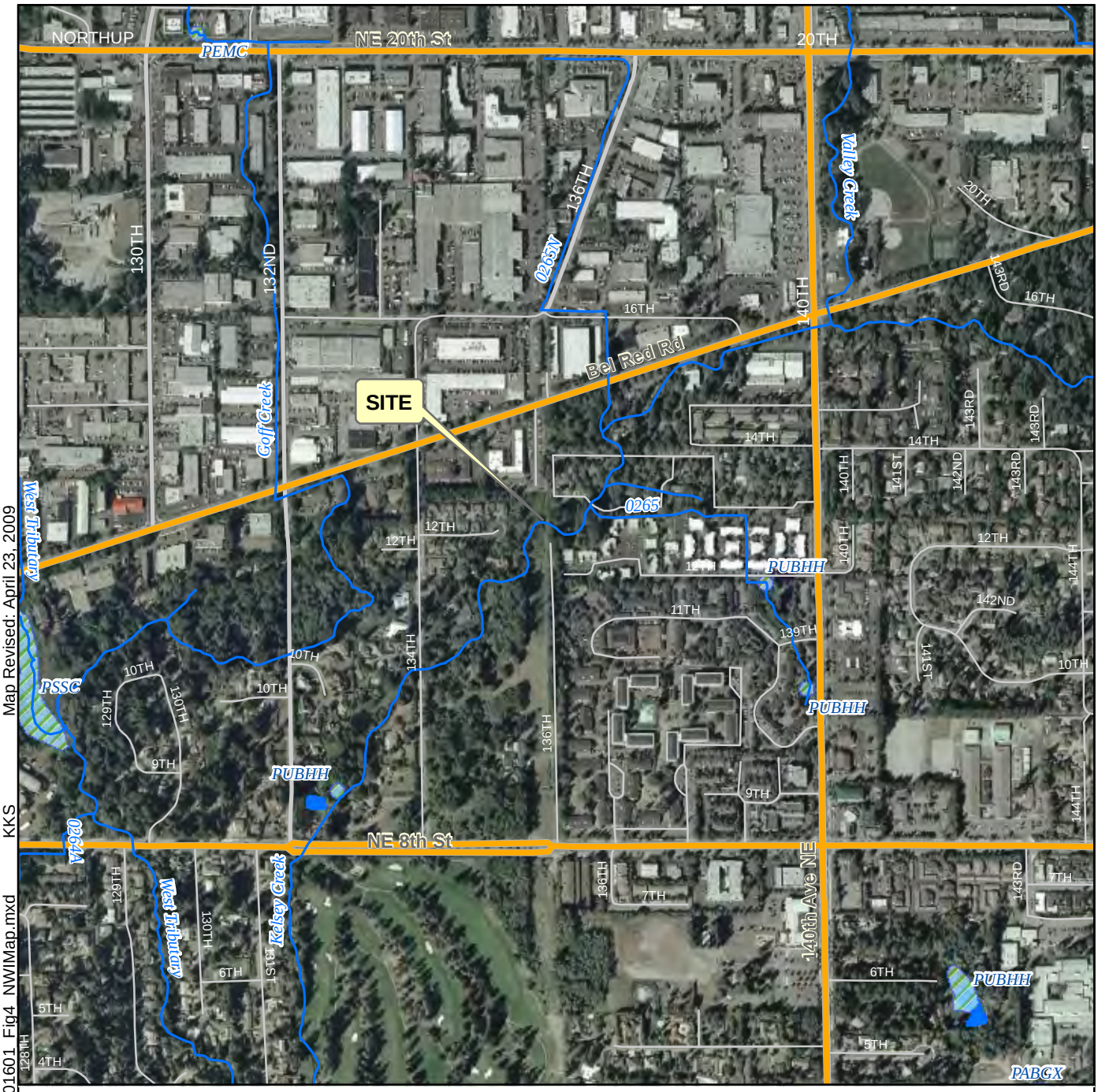

Explanation

- Streams
- National Wetland Inventory
- Water Bodies

N
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Feet

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Data Sources: NWI (WDFW 2005), streams, waterbodies and minor streets (King County 2008), major streets and 2005 aerial imagery (ESRI 2009).

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

National Wetland Inventory Map

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

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Figure 4

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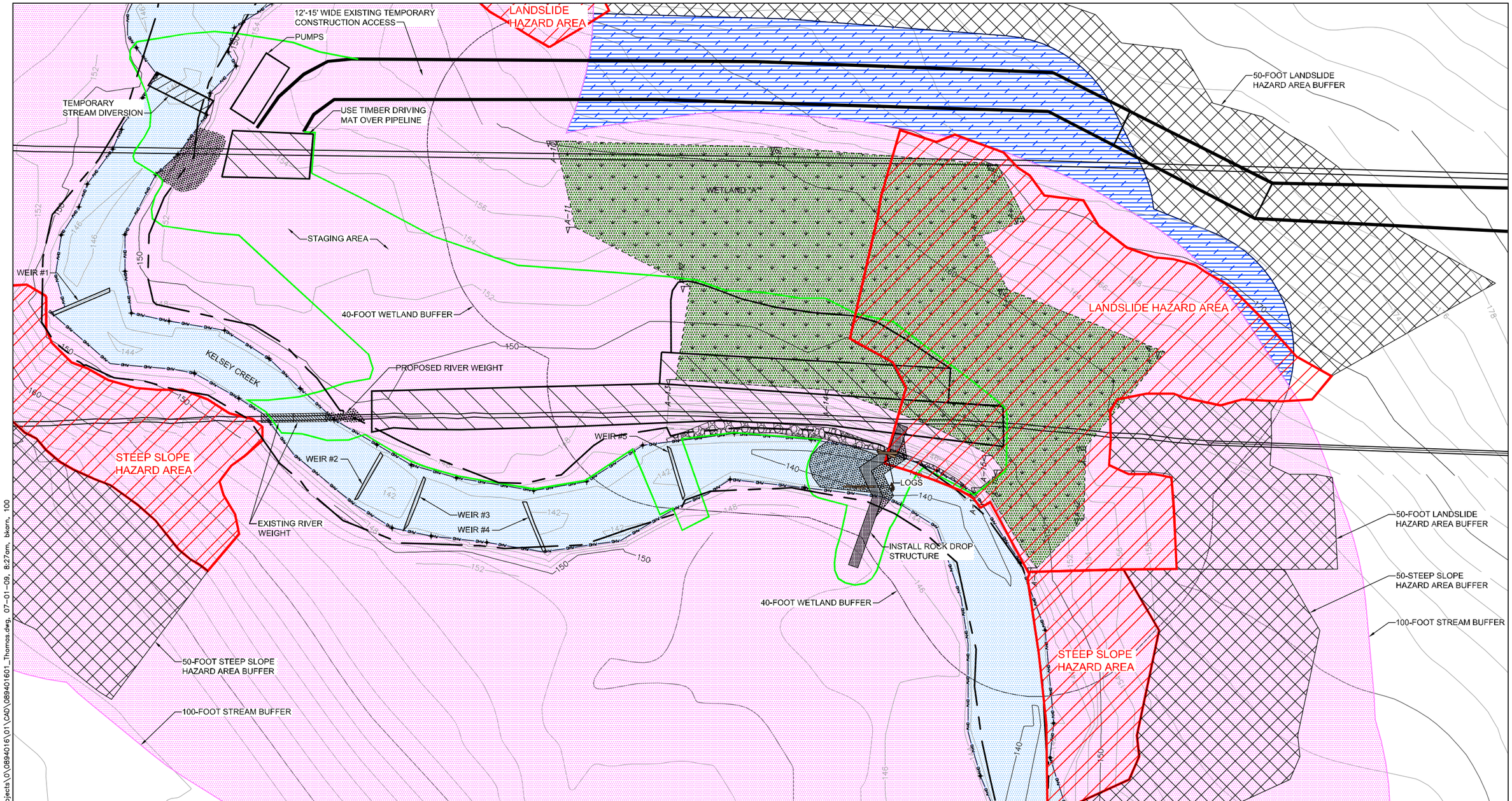

LEGEND

- ORDINARY HIGH WATER MARK
- 100-YEAR FLOOD PLAIN LIMITS
- LIMIT OF DISTURBANCE
- WETLAND A
- EXISTING GABION BASKET WALL ALONG STREAM BANK
- PROPOSED RIP-RAP
- 100-FOOT STREAM BUFFER
- 50-FOOT LANDSLIDE BUFFER
- LANDSLIDE HAZARD AREA AND STEEP SLOPE HAZARD AREAS
- WETLAND A BUFFER

30 0 30
FEET

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Critical Areas Map

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 5

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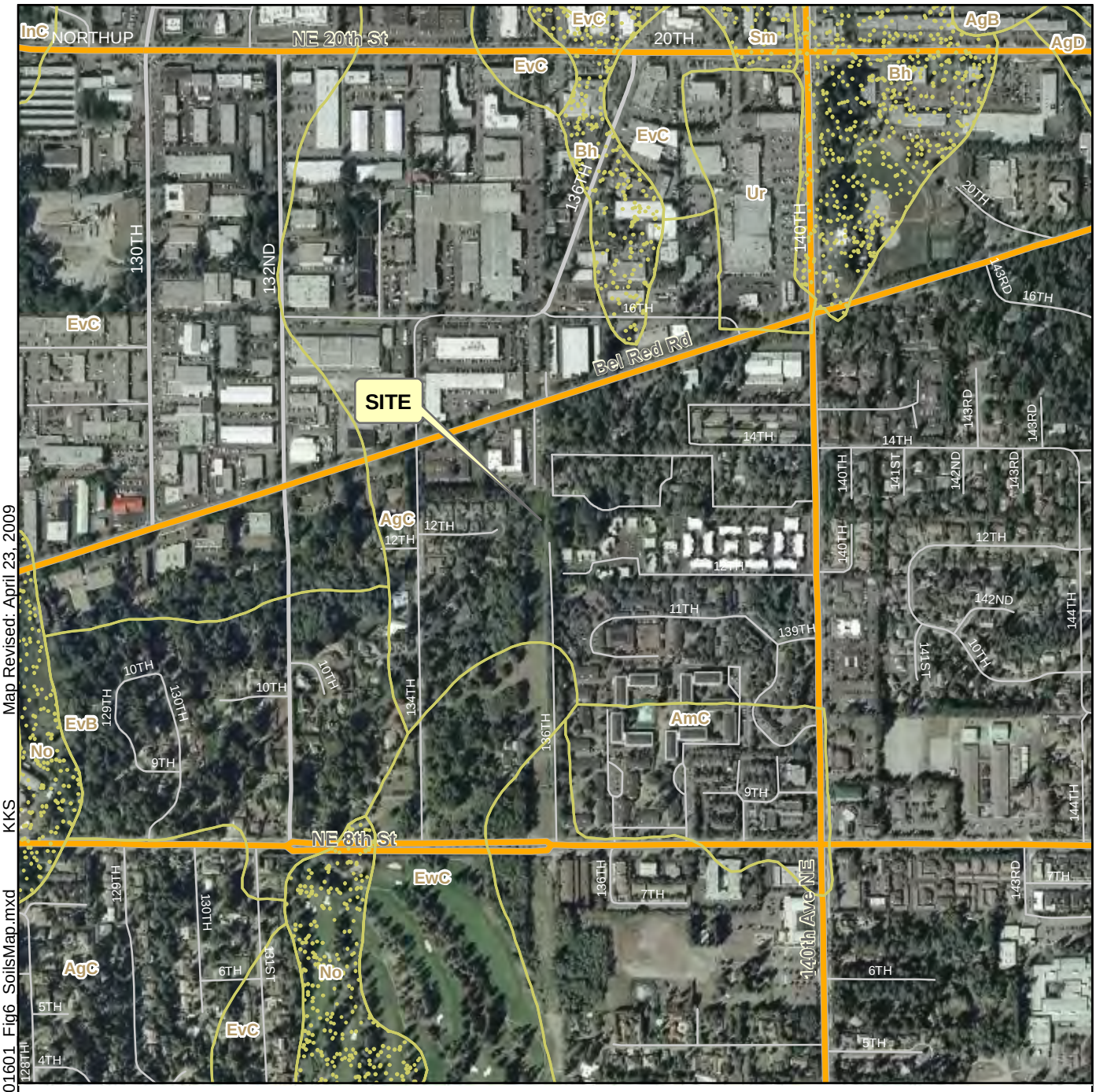

Soils Data

AgC - Alderwood gravelly sandy loam, 6 to 15% slopes
AmC - Arents, Alderwood material, 6 to 15% slopes
Bh - Bellingham silt loam
EvB - Everett gravelly sandy loam 0 to 5% slopes
EvC - Everett gravelly sandy loam 5 to 15% slopes
EwC - Everett-Alderwood gravelly sandy loams, 6 to 15% slopes
No - Normal sandy loam
Ur - Urban land

Explanation

Soils Data
Hydric Soils

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Feet

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Data Sources: soils data (NRCS 2003), minor streets (King County 2008), major streets and 2005 aerial imagery (ESRI 2009).
Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Soils Map

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

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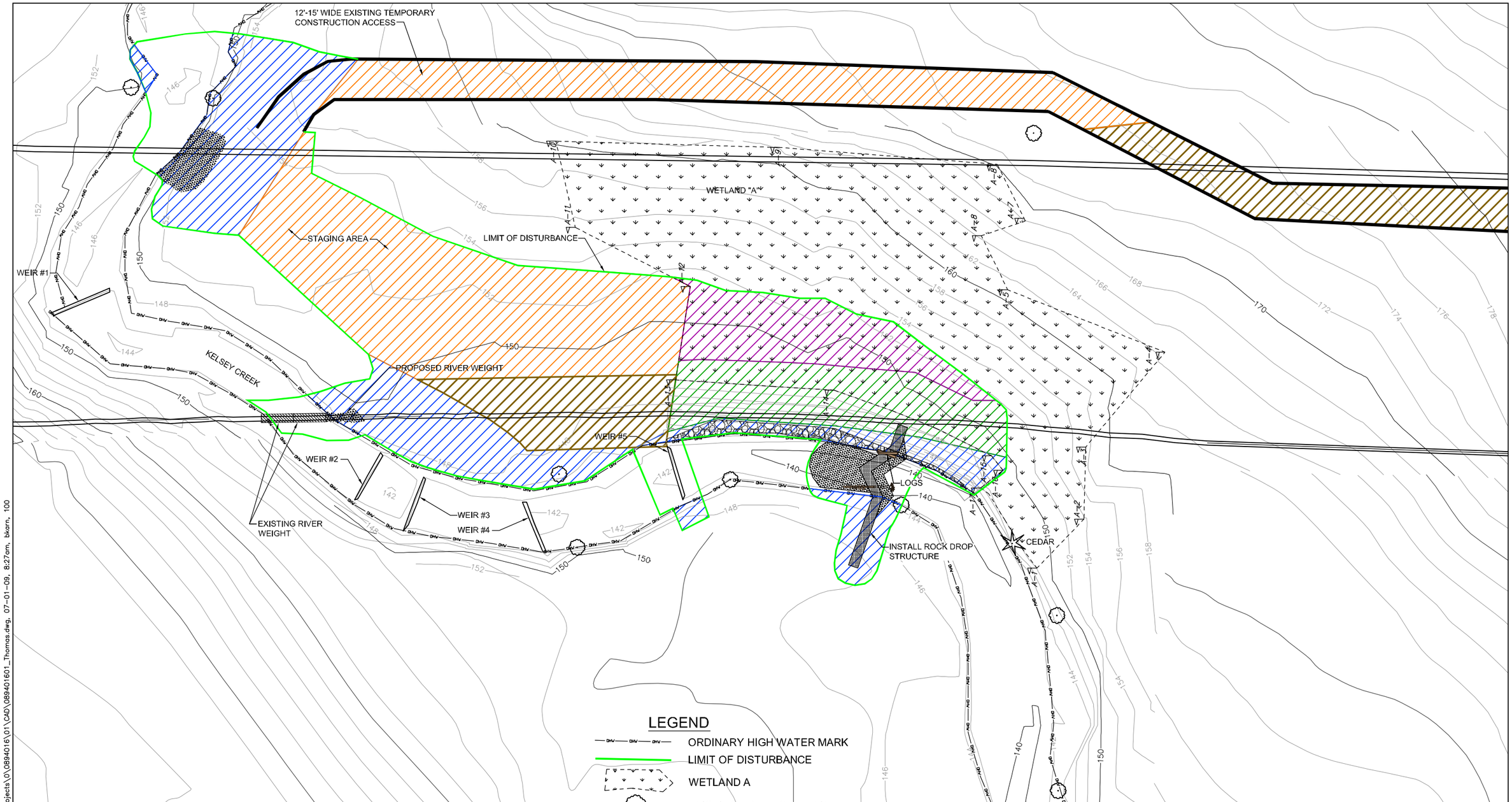
Figure 6

Office: RED Path: \\Red\projects\0\0894016\GIS\089401601 Fig6 SoilsMap.mxd KKS Map Revised: April 23, 2009



LEGEND

- ORDINARY HIGH WATER MARK
- LIMIT OF DISTURBANCE
- WETLAND A
- EXISTING TREE TO REMAIN
- GABION BASKET WALL
- PROPOSED RIP-RAP
- EMERGENT WETLAND (PEM)
- SHRUB WETLAND (PSS)
- RIPARIAN
- EMERGENT UPLAND
- SHRUB UPLAND

30 0 30
FEET

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Site Restoration Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 7

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Kelsey Creek Planting Schedule

Plant Species		Indicator Status
Common Name	**Scientific Name**	
Small-fuited bulrush	*Scirpus microcarpus*	OBL
Creeping spikerush	*Eleocharis palustris*	OBL
Soft rush	*Juncus effusus*	FACW+
Tufted hairgrass	*Deschampsia caespitosa*	FACW
Snowberry	*Symphoricarpos albus*	FACU
Oceanspray	*Holodiscus discolor*	UPL
Nootka rose	*Rosa nutkana*	FAC
Red-osier dogwood	*Cornus sericea*	FACW
Salmonberry	*Rubus spectabilis*	FAC+
Pacific ninebark	*Physocarpus capitatus*	FACW-
Hardhack	*Spirea douglasii*	FACW
Sitka willow	*Salix sitchensis*	FACW

Shrub Wetland Planting Schedule (1,571 sq. ft.)

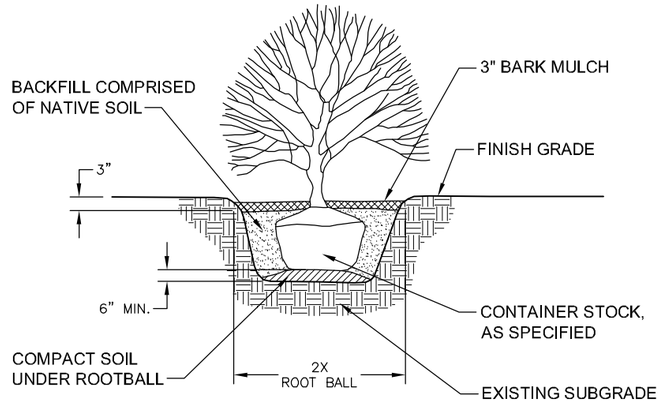
Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	8
Red-osier dogwood	*Cornus sericea*	FACW	2 Feet	Live Stakes	65
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	8
Pacific ninebark	*Physocarpus capitatus*	FACW-	6 Feet	5 GALLON	8
Hardhack	*Spirea douglasii*	FACW	6 Feet	5 GALLON	8
Sitka willow	*Salix sitchensis*	FACW	2 Feet	Live Stakes	65

Riparian Planting Schedule (4,799 sq. ft.)

Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	23
Red-osier dogwood	*Cornus sericea*	FACW	2 Feet	Live Stakes	200
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	23
Snowberry	*Symphoricarpos albus*	FACU	6 Feet	5 GALLON	23
Oceanspray	*Holodiscus discolor*	UPL	6 Feet	5 GALLON	23
Sitka willow	*Salix sitchensis*	FACW	2 Feet	Live Stakes	200

Shrub Upland Planting Schedule (8,075 sq. ft.)

Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	57
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	57
Snowberry	*Symphoricarpos albus*	FACU	6 Feet	5 GALLON	57
Oceanspray	*Holodiscus discolor*	UPL	6 Feet	5 GALLON	57



TYPICAL PLANTING DETAIL

NOT TO SCALE

Restoration Notes:

1. Disturbed areas of the site will be revegetated as shown on the Site Restoration Plan. Plant installation will be conducted on a vegetation community layout. Species will be grouped at the site based upon their specific hydrologic growing requirements. Vegetation communities are shown on the Site Restoration Plan.
2. Revegetation will be conducted immediately following construction during the relatively dry summer months to minimize sediment migration from the site and to rectify for actual construction impacts.
3. The contractor will leave the BMPs in place for the duration of the revegetation. The contractor will add additional BMPs to prevent sedimentation of the wetland, if necessary.
4. Once the pre-construction topography has been restored a layer of stockpiled native material, organic topsoil or compost will be incorporated into the finished grade to aid in the establishment of plant communities.
5. Revegetated areas at the completion of planting will be covered with composted mulch, arborist chips or similar.
6. Woody debris accumulated during the project will remain on site and contribute to habitat complexity and function at the site.
7. Plant material quantities shown on the plant schedules are estimates and actual quantities may vary.

SEED MIX SPECIFICATIONS

Emergent Upland Seed Blend: (15,005 SQ. FT.)	40% Rough bentgrass (*Agrostis scabra*)
	30% Red fescue (*Festuca Rubra*)
	30% Alaska brome (*Bromus sitchensis*)
Emergent Wetland Seed Blend: (1,918 SQ. FT.)	30% Small-fuited bulrush (*Scirpus microcarpus*)
	30% Soft rush (*Juncus effusus*)
	30% Tufted hairgrass (*Deschampsia caespitosa*)
	10% Creeping spikerush (*Eleocharis palustris*)
Seed Rate:	60 - 100 lbs per acre depending on the slope
Ground Prep:	Soil must be loose enough for the roots to establish
Mulching:	Apply 1-2 inches of composted mulch after broadcasting seed to protect seed from erosion and browsing by birds.

Notes:

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Restoration Details

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 8

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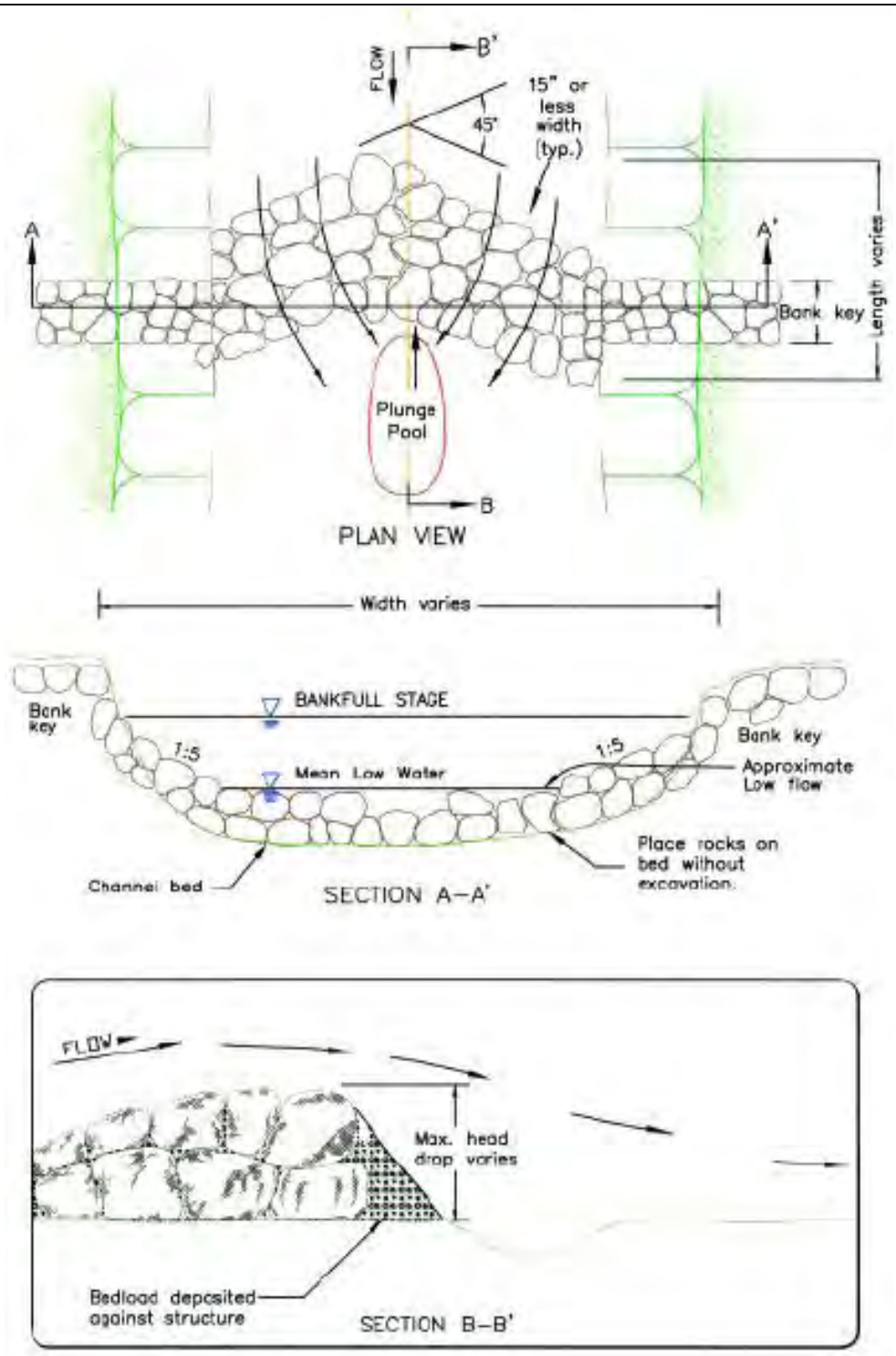

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Reference: Drawing provided by Washington State Department of Fish & Wildlife, 2003, "Washington State Aquatic Habitats Guidelines Program, integrated Streambank Protection Guidelines." 2003.

Conceptual Rock Drop Structure Design

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Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 9

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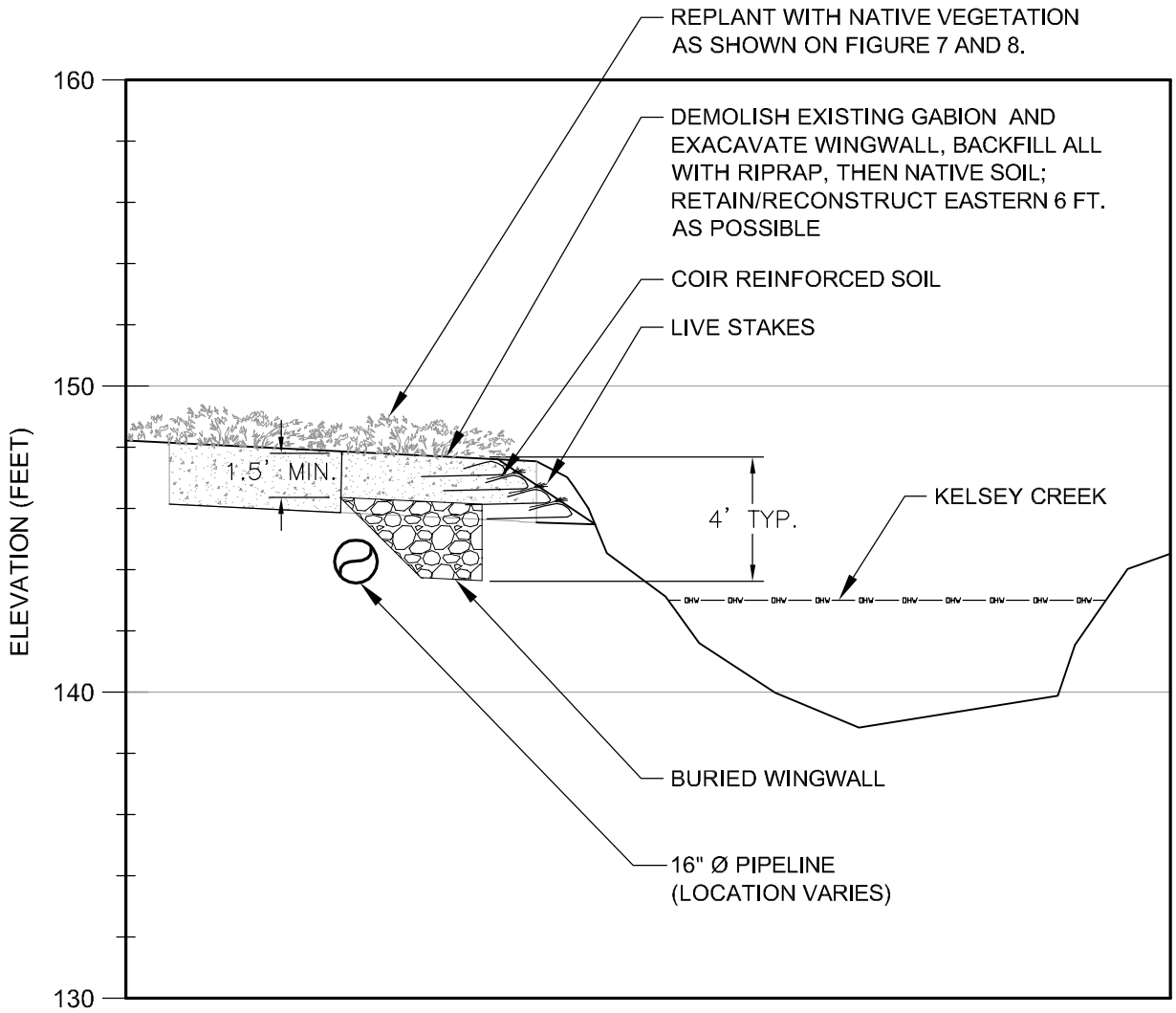

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Coir Reinforced Soil Lift Detail

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 10

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Appendix A
Site Photos

Photo 1: Typical site conditions within the utility corridor. Note the yellow pin flags which identify the location of the 20-inch pipeline and the maintained grass along the alignment of the pipeline.

Photo 2: The maintained 16-inch pipeline corridor, facing north. The emergent community of Wetland A is in the foreground and the shrub community is at right. Kelsey Creek is at left.

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Site Photographs

Appendix A

REDM:\0\0894016\01\Working\Critical areas\Appendix B - Site Photos\0894016 01Appendix B Site Photos.ppt TAB:bmw 04/27/09

Photo 3: Photo illustrates the sloping conditions of Wetland A and the ident5ified landslide hazard in the utility corridor.

Photo 4: Typical stream conditions within the subject reach of Kelsey Creek. Weir #3 is in the foreground and Weir #2 is in the background.

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Appendix B
Wetland Datasheets

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

Project/Site: Kelsey Creek City/County: Bellevue Sampling Date: 10/14/2008

Applicant/Owner: Olympic Pipe Line Company State: Washington Sampling Point: SP-1

Investigator(s): Thomas Bannister Section/Township/Range: Section 27, T25N, R5E

Landform (hillslope, terrace, etc.): hillslope Local Relief (concave, convex, none:) concave Slope (%): 5

Subregion (LLR): Lat: Long: Datum:

Soil Map Unit Name: Alderwood gravelly sandy loam, 6 to 15 percent slopes NWI Classification:

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

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed? Are "normal circumstances" present? ☑ Yes ☐ No

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

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	☑ Yes	☐ No	Is the sampled area within a Wetland? ☑ Yes ☐ No
Hydric Soil Present?	☑ Yes	☐ No	
Weltand Hydrology Present?	☑ Yes	☐ No	

Remarks:

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: 2,826 square feet)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size: 78.5 square feet)			
1. *Salix sitchensis*	35	Yes	FACW
2. *Rubus spectabilis*	25	Yes	FAC+
3. *Cornus sericea*	15	Yes	FACW
4.			
5.			
	75	= Total Cover	
Herb Stratum (Plot Size: 78.5 square feet)			
1. *Phalaris arundinacea*	70	Yes	FACW
2. *Athyrium filix-femina*	10	No	FAC
3. *Symphytum officinale*	5	No	NI
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85	= Total Cover	
Woody Vine Stratum (Plot Size: 2,826 square feet)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of dominant Species That are OBL, FACW, or FAC: **100** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL Species		x 1 =	0
FACW Species	120	x 2 =	240
FAC Species	35	x 3 =	105
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals:	155	(A)	345 (B)

Prevalence Index = B/A = 2.23

Hydrophytic Vegetation Indicators:

☑ Dominance test is >50%

☑ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet.

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? ☑ Yes ☐ No

Remarks:

SOIL

Sampling Point: SP-1

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 to 16 inches	**10YR 3/1**	**98**	**See Remarks**	**2**			**Loam with sand**	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):
Type: _____
Depth (inches): _____

Hydric Soil Present? ☑ Yes ☐ No

Remarks: Redox features were present; however; their small size and soil saturation made it difficult to obtain a color. Iron staining occurs at the surface.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	☑ Yes	☐ No	Depth (inches):	2
Water Table Present?	☐ Yes	☑ No	Depth (inches):	
Saturation Present? (includes capillary fringe)	☑ Yes	☐ No	Depth (inches):	at surface

Wetland Hydrology Present? ☑ Yes ☐ No

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

Remarks:

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

Project/Site: Kelsey Creek City/County: Bellevue Sampling Date: 10/14/2008

Applicant/Owner: Olympic Pipe Line Company State: Washington Sampling Point: SP-2

Investigator(s): Thomas Bannister Section/Township/Range: Section 27, T25N, R5E

Landform (hillslope, terrace, etc.): hillslope Local Relief (concave, convex, none:) Slope (%): 5

Subregion (LLR): Lat: Long: Datum:

Soil Map Unit Name: Alderwood gravelly sandy loam, 6 to 15 percent slopes NWI Classification:

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

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed? Are "normal circumstances" present? ☑ Yes ☐ No

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

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	☑ Yes	☐ No	Is the sampled area within a Wetland? ☐ Yes ☑ No
Hydric Soil Present?	☐ Yes	☑ No	
Weltand Hydrology Present?	☐ Yes	☑ No	

Remarks:

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: 2,826 square feet)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	5	Yes	FAC
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shurb Stratum (Plot Size: 78.5 square feet)			
1. *Rubus spectabilis*	50	Yes	FAC+
2. *Rubus parviflorus*	50	Yes	FAC-
3. *Rubus armeniacus*	10	No	FACU
4.			
5.			
	110	= Total Cover	
Herb Stratum (Plot Size: 78.5 square feet)			
1. *Phalaris arundinacea*	60	Yes	FACW
2. *Polystichum munitum*	5	No	FACU
3. *Pteridium aquilinium*	5	No	FACU
4. *Guem macrophyllum*	5	No	FACW-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75	= Total Cover	
Woody Vine Stratum (Plot Size: 2,826 square feet)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of dominant Species That are OBL, FACW, or FAC: **100** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL Species		x 1 =	0
FACW Species	60	x 2 =	120
FAC Species	105	x 3 =	315
FACU Species	20	x 4 =	80
UPL Species		x 5 =	0
Column Totals:	185	(A)	515 (B)

Prevalence Index = B/A = 2.78

Hydrophytic Vegetation Indicators:

☑ Dominance test is >50%

☑ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet.

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? ☑ Yes ☐ No

Remarks:

SOIL

Sampling Point: SP-2

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 to 16 inches	**10YR 3/2**	**100**					**Loam**	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? ☐ Yes ☑ No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	☐ Yes	☑ No	Depth (inches): _____
Water Table Present?	☐ Yes	☑ No	Depth (inches): _____
Saturation Present? (includes capillary fringe)	☐ Yes	☑ No	Depth (inches): _____

Wetland Hydrology Present? ☐ Yes ☑ No

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

Remarks:

GeoEngineers

Appendix C
Wetland Rating Form

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): **Kelsey Creek** Date of site visit: **10/14/08**

Rated by: **Thomas Bannister** Trained by Ecology? Yes ☒ No ☐ Date of training: **October 2008**

SEC: **27** TWNSHP: **25N** RNGE: **5E** Is S/T/R in Appendix D? Yes ☐ No ☒

Map of wetland unit: **Figure N/A** Estimated size: **0.25 acres**

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: I ☐ II ☐ III ☒ IV ☐

Category I =	Score > 70	Score for Water Quality Functions	**6**
Category II =	Score 51 - 69	Score for Hydrologic Functions	**5**
Category III =	Score 30 – 50	Score for Habitat Functions	**17**
Category IV =	Score < 30	TOTAL Score for Functions	**28**

Category based on SPECIAL CHARACTERISTCS of Wetland I ☐ II ☐ Does not apply ☒

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

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**	☐
Bog	☐	**Lake-fringe**	☐
Mature Forest	☐	**Slope**	☒
Old Growth Forest	☐	**Flats**	☐
Coastal Lagoon	☐	**Freshwater Tidal**	☐
Interdunal	☐		
None of the above	☒	Check if unit has multiple HGM classes present	☐

Does the wetland 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 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.	☐	☒
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 1 Natural Heritage Wetlands (see p. 19 of data form).	☐	☒
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*	☐	☒
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	☐	☒

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

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

Classification of Vegetated Wetlands for 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 a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were call 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 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 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) where at least 20 acres (8ha) in size;
   ☐ At least 30% of the open water area is deeper than 6.6 (2 m)?
   NO – go to 4 **YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?
   ☒ The wetland is on a slope *(slope can be very gradual)*.
   ☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
   ☒ The water leaves the wetland **without being impounded**?
   NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*
   NO – go to 5 **YES** – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?
   ☐ The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.
   ☐ The overbank flooding occurs at least once every two years.
   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 of the year. This means that any outlet, if present is higher than the interior of the wetland.
   NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.
   No – go to 8 YES – The wetland class is Depressional

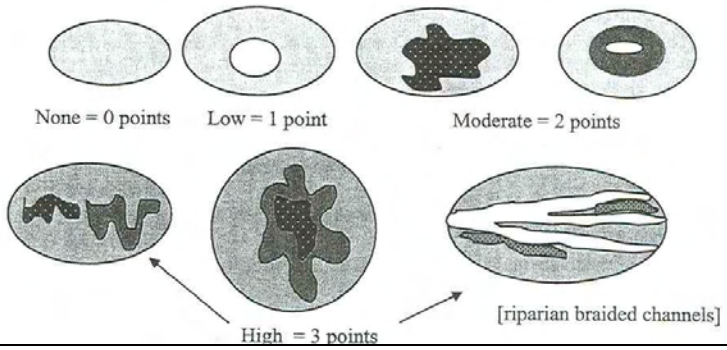
8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within 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 you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

S	Slope Wetlands	Points
	WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.	(only 1 score per box)
S 1	**Does the wetland have the <u>potential</u> to improve water quality?**	*(see p.64)*
	S 1.1 Characteristics of average slope of unit: • Slope is 1% or less *(a 1% slope has a 1 ft. vertical drop in elevation for every 100 ft. horizontal distance)*..... points = 3 • Slope is 1% - 2% ..... points = 2 • Slope is 2% - 5%. ..... points = 1 • Slope is greater than 5% ..... points = 0	**1**
	S 1.2 The soil 2 inches below the surface (or duff layer) is clay, organic *(Use NRCS definitions).* **YES** = 3 points **NO** = 0 points	**0**
	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.* • Dense, uncut, herbaceous vegetation > 90% of the wetland area..... points = 6 • Dense, uncut, herbaceous vegetation > 1/2 of area ..... points = 3 • Dense, woody, vegetation > 1/2 of area..... points = 2 • Dense, uncut, herbaceous vegetation > 1/4 of area ..... points = 1 • Does not meet any of the criteria above for vegetation ..... points = 0 **Aerial photo or map with vegetation polygons**	**Figure ___** **2**
	Total for S 1 *Add the points in the boxes above*	**3**
S 2	**Does the wetland have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields, logging, or orchards within 150 ft. of wetland ☒ Residential, urban areas, or golf courses are within 150 ft. upslope of wetland ☐ Other _____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 67)* Multiplier **2**
◆	**<u>TOTAL</u> – Water Quality Functions** Multiply the score from S1 by S2; then ***add score to table on p. 1***	**6**
	HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.	
S 3	**Does the wetland have the <u>potential</u> to reduce flooding and stream erosion?**	*(see p.68)*
	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms: *Choose the points appropriate for the description that best fits conditions in the wetland (stems of plants should be thick enough (usually > 1/8in), or dense enough to remain erect during surface flows).* • Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland ..... points = 6 • Dense, uncut, **rigid** vegetation> 1/2 area of wetland ..... points = 3 • Dense, uncut, **rigid** vegetation > 1/4 area..... points = 1 • More than 1/4 of area is grazed, mowed, tilled, or vegetation is not rigid ..... points = 0	**3**
	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows. The slope has small surface depressions that can retain water over at least 10% of its area. **YES** = 2 points **NO** = 0 points	**2**
	Add the points in the boxes above	**5**
S 4	**Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?** Is the wetland in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows? *Note which of the following conditions apply.* ☐ Wetland has surface runoff that drains to a river or stream that has flooding problems ☐ Other _____ *(Answer NO if the major source of water is controlled by a reservoir (e.g. wetland is a seep that is on the downstream side of a dam)* **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 70)* Multiplier **1**
◆	**<u>TOTAL</u> – Hydrologic Functions** Multiply the score from S3 by S4; then ***add score to table on p. 1***	**5**

Comments:

These questions apply to wetlands of all HGM classes.		**Points** (only 1 score per box)
	HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.	
H 1	**Does the wetland 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 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres.* ☐ Aquatic Bed ☒ Emergent plants ☒ Scrub/shrub (areas where shrubs have > 30% cover) ☐ Forested (areas where trees have > 30% cover) *If the unit has a forested class check if:* ☐ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon. *Add the number of vegetation types that qualify. If you have:* **Map of Cowardin vegetation classes** 4 structures or more ..... points = 4 — 3 structures ..... points = 2 2 structures ..... points = 1 — 1 structure ..... points = 0	**Figure ___** **1**
	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 1/4 acre to count (see text for descriptions of hydroperiods).* ☐ Permanently flooded or inundated — 4 or more types present points = 3 ☐ Seasonally flooded or inundated — 3 or more types present ..... points = 2 ☐ Occasionally flooded or inundated — 2 types present ..... points = 1 ☒ Saturated only — 1 type present ..... points = 0 ☒ Permanently flowing stream or river in, or adjacent to, the wetland ☐ Seasonally flowing stream in, or adjacent to, the wetland ☐ **Lake-fringe wetland ..... = 2 points** ☐ **Freshwater tidal wetland ..... = 2 points** **Map of hydroperiods**	**Figure ___** **1**
	H 1.3 <u>Richness of Plant Species</u> *(see p. 75)*: Count the number of plant species in the wetland that cover at least 10 ft^2 *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle.* If you counted: > 19 species ..... points = 2 5 – 19 species ..... points = 1 List species below if you want to: < 5 species ..... points = 0 _____ _____ _____ _____	**2**
	H 1.4 Interspersion of Habitats *(see p. 76)*: Decided from the diagrams below whether interspersion between Cowardin vegetation (described in H1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always "high". **Use map of Cowardin classes.**	**Figure ___** **2**
	H 1.5 <u>Special Habitat Features</u> *(see p. 77)*: *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* ☐ Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft. long) ☐ Standing snags (diameter at the bottom > 4 inches) in the wetland ☐ Undercut banks are present for at least 6.6 ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft. (10m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* ☐ At least 1/4 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ☒ Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	**1**
	H 1 TOTAL Score – potential for providing habitat *Add the points in the column above*	**7**

H 2	**Does the wetland have the <u>opportunity</u> to provide habitat for many species?**	(only 1 score per box)
	H 2.1 <u>Buffers</u> *(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".* ☐ 100m (330 ft) 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** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference ..... **points = 4** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% circumference ..... **points = 4** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference ..... **points = 3** ☒ 50m (170 ft) 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 25m (80 ft) of wetland > 95% circumference. Light to moderate grazing or lawns are OK ..... **points = 2** ☐ No paved areas of 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 (6.6 ft) for more than 95% 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** **Arial photo showing buffers**	**Figure ___** **3**
	H 2.2 <u>Corridors and Connections</u> *(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 a 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 50 ft. wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? **YES** = **2 points** (go to H 2.3) **NO** = go to H 2.2.3 H. 2.2.3 Is the wetland: • Within 5 mi (8km) of a brackish or salt water estuary OR • Within 3 miles of a large field or pasture (> 40 acres) OR **YES** = 1 point • Within 1 mile of a lake greater than 20 acres? **NO** = 0 points	**0**

Total for page: **3**

Comments:

	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*). ☒**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*). ☒**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. ☐**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats **= 4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat **= 1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)*	**4**
	H 2.4 <u>Wetland Landscape</u>: *Choose the **one** description of the landscape around the wetland that best fits (see p. 84)* • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.....points = 5 • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .....points = 5 • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .....points = 3 • The wetland fringe on a lake **with** disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .....points = 3 • There is at least 1 wetland within 1/2 mile .....points = 2 • There are no wetlands within 1/2 mile.....points = 0	**3**
	H 2 TOTAL Score – opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	**10**
	TOTAL for H 1 from page 8	**7**
◆	**Total Score for Habitat Functions** Add the points for H 1 and H 2; then ***record the result on p. 1***	**17**

Comments:

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.*	
SC1	**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. 1**
	SC 1.2 Is the wetland at least 1 acre in size and meets at least two of the following 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 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 1. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. ☐ At least 3/4 of the landward edge of the wetland has a 100 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**
SC2	**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 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 a site with state threatened or endangered plant species? **YES** = Category 1 **NO** ☐ not a Heritage Wetland	**Cat I**
SC3	**Bogs** *(see p. 87)* Does the wetland **(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 function.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of soil profile? (See Appendix B for a field key to identify organic soils)? **YES** = go to question 3 **NO** = go to question 2 2. Does the wetland 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 question 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 question 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. 4. Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western 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*)? **YES** = Category I **NO** ☒ Is not a bog for purpose of rating	**Cat. I**

SC4	**Forested Wetlands** *(see p. 90)* Does the wetland 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 function.* ☐ **Old-growth forests**: (west of Cascade Crest) Stands of at least two three 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 an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. **YES** = Category I **NO** = ☒ not a forested wetland with special characteristics	**Cat. I**
SC5	**Wetlands in Coastal Lagoons** *(see p. 91)* Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. ☐ The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom.)* **YES** = Go to SC 5.1 **NO** ☒ not a wetland in a coastal lagoon SC 5.1 Does the wetland meet 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 3/4 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 ft.) **YES** = Category I **NO** = Category II	**Cat. I** **Cat. II**
SC6	**Interdunal Wetlands** *(see p. 93)* Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? **YES** = Go to SC 6.1 **NO** ☒ not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? **YES** = Category II **NO** = go to SC 6.2 SC 6.2 Is the wetland 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	

Comments:

GeoEngineers

Appendix D

Special Conditions for Instream Habitat Design Engineering Services

APPENDIX D
SPECIAL CONDITIONS FOR INSTREAM HABITAT DESIGN ENGINEERING SERVICES

Instream Habitat Enhancement, Stabilization and/or Restoration Structures (Structures) may involve the placement of large logs, logs with root wads, large rocks and other natural or artificial materials and/or features in and adjacent to creeks, streams and rivers (streams). These Structures are designed for various purposes including but not limited to: improvement of aquatic and riparian habitat; stabilization of eroding stream banks and channels; creation or improvement of recreational uses; irrigation; and flood management. These Structures create potential hazards, including, but not limited to: humans falling from the Structures and associated injury or death; collisions of recreational users' and their watercraft with the Structures and associated risk of injury or death, with partial or total damage of the watercraft; mobilization of a portion or all of the Structures during high water flow conditions and any subsequent related damage to downstream properties, utilities, roads, bridges and other infrastructure, and injury or death to humans; flooding; erosion; and channel avulsion. To reduce the risk of injury or death caused by these hazards, we recommend that the client post and maintain conspicuous warning signs on, upstream and downstream from the Structures for as long as the Structures remain in the stream, identifying the Structure locations, and the specific hazards the Structures present to recreational users. We further recommend that the client distribute pamphlets to nearby residents warning of the danger to children and adults posed by the Structures. Client shall indemnify GeoEngineers against any damages arising from Client's failure to follow these recommendations, to the extent provided in the INDEMNIFICATION section of the GENERAL CONDITIONS.

BIOLOGICAL EVALUATION
M.P. 99 - KELSEY CREEK CROSSING AND FISH PASSAGE MITIGATION
BELLEVUE, WASHINGTON

JUNE 22, 2009

FOR
OLYMPIC PIPE LINE COMPANY

GEOENGINEERS

Biological Evaluation
M.P. 99 Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington
File No. 0894-016-01

June 22, 2009

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BIOLOGICAL EVALUATION
KELSEY CREEK
CROSSING AND FISH PASSAGE MITIGATION
BELLEVUE, WASHINGTON
FOR
OLYMPIC PIPE LINE COMPANY

1.0 INTRODUCTION

The Olympic Pipe Line Company (Olympic) operates 16-inch diameter and 20-inch diameter petroleum products pipelines that extend generally north-south through King County. In the winter of 2007, the 16-inch pipeline was discovered to be exposed within the mainstem of Kelsey Creek in the City of Bellevue (City). Excessive drop heights and potential scour associated with existing concrete weirs in the project area have created potential fish passage barriers. The purpose of this project is to: 1) re-establish cover and protect the 16-inch pipeline and 2) improve fish passage within the stream.

Due to the nature of the project, a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (USACE) is required. This Biological Evaluation (BE) is required to address consultation requirements under Section 7(c) of the Endangered Species Act (ESA) as well as the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation Management Act. As consultant to Olympic, GeoEngineers has prepared this BE and EFH analysis to support Olympic's application for a USACE permit.

1.1 PROJECT LOCATION

The project site is located in Section 27, Township 25N, Range 5E within an Olympic easement approximately 600 feet south of Bel-Red Road in the City of Bellevue, Washington (Appendix A, Figure 1). The Olympic easement is located within a maintained utility corridor that also contains two electrical transmission circuits and a fiber optic line mounted on wooden H-poles, operated by Puget Sound Energy.

1.2 SPECIES AND HABITAT INFORMATION

1.2.1 Overview

Information on species listed under Section 7(c) of the ESA and potentially present in the project area was obtained from the U.S. Fish and Wildlife Service (USFWS) list for King County (USFWS, 2007), National Oceanic and Atmospheric Administration (NOAA) Fisheries listing for Western Washington (NOAA, 2008), the Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) maps and database (WDFW, 2008a) and Salmonscape application (WDFW, 2009a), the City of Bellevue (The Watershed Company, 2008) and the King County Salmon Watcher Program (King County 2009). These data sources indicate the presence of Chinook salmon (*Oncorhynchus tshawytscha)* in Kelsey Creek.

The USFWS species list for King County includes bull trout *(Salvelinus confluentus)*; however, WDFW maps do not show bull trout occurring within Kelsey Creek or the project action area. A Washington Department of Natural Resources (DNR) search of their Natural Heritage Program database revealed no records of any listed plants, high quality ecosystems or other significant natural features within the vicinity of the project site (DNR, 2008).

ESA-listed species occurrence in the project action area is summarized in Table 1. The species lists from USFWS and NOAA Fisheries are included as Appendix B. A description of this species' life history is included as Appendix C. Species or habitat for other ESA-listed species reported to occur in King County (Appendix B) are not present in the project vicinity; therefore, these species are not discussed in this report.

Table 1. Listed Species Occurrence in the Kelsey Creek Project Vicinity

Common Name	Species Name	Federal Status	Critical Habitat Designated?
Chinook salmon	*O. tshawytscha*	Threatened	Yes[1]

1. The project area is located in the Lake Washington subbasin of the Puget Sound Chinook Evolutionarily Significant Unit (ESU). Critical habitat is designated in the Lake Washington subbasin; however, this does not include the project action area or Kelsey Creek (70 FR 52630-52853, 2005)

1.2.2 Species Utilization in the Project Vicinity

The Kelsey Creek watershed provides spawning and rearing habitat for Chinook salmon. These fish make their way to the Pacific Ocean by swimming through Mercer Slough to Lake Washington, on to Lake Union via the Lake Washington Ship Canal, through the Hiram M. Chittenden Locks, into Puget Sound, and eventually out to the ocean. They reside in the ocean for two to four years and then return in the fall months to Kelsey Creek. Chinook salmon typically enter Mercer Slough near the beginning of September and proceed to spawning areas further upstream in Kelsey Creek where spawning continues into early November (The Watershed Company 2008). Spawner surveys have been conducted within Kelsey Creek by the City of Bellevue since 2000 and by King County since 1996 (The Watershed Company, 2008; King County, 2009). Both of these studies document the utilization of the reach of Kelsey Creek within the project action area by Chinook for spawning and migration. Both of these studies also document spawning upstream of the project site. In addition, the City's study found that nearly half (42 percent) of the redd construction occurred upstream of the project site. The City's study also noted that the concrete weirs dispersed throughout the project reach hinder fish passage at low stream flows and that log structures, stream channel modifications, and riparian area improvements could be implemented to improve stream habitat for fish (The Watershed Company, 2008).

The project area is located in the Lake Washington subbasin of the Puget Sound Chinook Evolutionarily Significant Unit (ESU). Critical habitat is designated in the Lake Washington subbasin; however, this does not include the project action area or Kelsey Creek (70 FR 52630-52853, 2005).

1.3 PREVIOUS SITE INVESTIGATIONS AND REPORTS

A number of biological, hydrological, and geotechnical investigations of the site have recently been conducted by GeoEngineers. A wetland delineation was conducted on October 14, 2008. Geologists completed a geologic and geomorphic field reconnaissance along the pipeline and stream on the same day. During that visit, the ordinary high water mark (OHWM) was marked and a fluvial geomorphic reconnaissance was completed. In addition, geotechnical field and lab studies were conducted throughout 2008 to evaluate surface and subsurface conditions within the project area. The results of these site investigations are contained within the following reports:

- Geotechnical Design Report (GeoEngineers, 2009a), and
- Critical Areas Report and Restoration Plan (GeoEngineers, 2009b).

2.0 PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

In 1995, Olympic installed grade control structures and stream bank stabilization measures at the pipeline crossings in Kelsey Creek to gain cover over the 16-inch pipeline, which was exposed at that time. Five precast concrete weirs (Weir # 1 through #5) were also installed in Kelsey Creek to prevent erosion and enable sediment to build behind the weirs, raising the grade of the existing stream bed to gain cover over the pipeline.

A small section of the Olympic 16-inch diameter product pipeline, approximately 1 foot in length, was discovered to be exposed in the channel by stream scour near the left (south) bank of the Kelsey Creek crossing during City spawning surveys in 2007. It appears that significant storm events over the past 2 years have resulted in flood-level flows within the creek that have caused scour and erosion along the banks, including the areas of the 16-inch and 20-inch pipelines. In addition, it appears that some scour has occurred in proximity of one (Weir #5) of the five concrete weirs. The river weight (concrete half-round pipe) installed over the 16-inch pipeline protects most of the pipeline from stream flows and exposure to other elements. However, the section of pipeline along the left bank, which was previously buried within the bank and stream bed, does not have the river weight protective measure and therefore needs additional protection (maintenance repair). In addition to the exposed section of 16-inch pipeline, there is bank scour in the vicinity of the 20-inch pipeline, just downstream from an existing 18-inch diameter concrete stormwater outfall pipe. In some areas, scour has also exposed and/or loosened geotextile placed over native soils during the weir installation project.

Furthermore, fish passage barriers associated with the existing concrete weirs were identified during a site visit by GeoEngineers, the City of Bellevue and WDFW Area Habitat Biologist (AHB) in February 2008. Based on information obtained from the WDFW AHB in 2008, WDFW drop heights over weirs should be a maximum of 0.8 feet (Fisher, 2008). The drop height at Weir #5 is approximately 1.4 feet, which is approximately 0.6 feet greater than the WDFW standard of 0.8 feet.

2.2 PROJECT OVERVIEW

A detailed description and full-size drawings of the project design are included in the Geotechnical Design Report (GeoEngineers, 2009a). The project will consist of:

1. Regrading and protecting the left (south) bank at the 20-inch pipeline crossing,
2. Installing a concrete river weight along the 16-inch petroleum product pipeline to protect and approximate 1-foot segment exposed on the stream channel, and restoring the bank to the existing configuration,
3. Cutting notches in Weir #2 and Weir #5 to facilitate fish passage,
4. Installing a rock drop structure (proposed Weir #6) about 60 feet downstream of Weir #5,
5. Removing a portion of an existing gabion system in the vicinity of the new weir and downstream of the new weir, as needed,
6. Installing a buried rock wing wall within the footprint of the removed gabion system, as needed, and installing coir-reinforced wrapped soil where older gabions along the stream bank will be removed,
7. Site restoration and revegetation to return the project area to pre-construction conditions or better.

2.3 PROJECT TIMELINE

Construction is scheduled to occur during a 2 to 3 week period between August 15th and September 30, 2009 or a similar time frame 2010. Construction will occur only in the dry as a result of stream diversion. It is anticipated that work within the stream channel will be completed within 5 to 7 days with an additional 7 to 10 days for site preparation and clean-up. A Hydraulic Project Approval (HPA) issued by WDFW in 2008 for a temporary pipeline mitigation project at the same location required that work within the OHWM be completed between June 15th and September 15th. It is anticipated that work within the OHWM for this project will be conducted within this same timeframe. Extension of the anticipated WDFW construction work window would be contingent upon prior approval from them.

2.4 CONSTRUCTION ACCESS AND SITE PREPARATION

The site will be accessed from the south via 136th Avenue NE within the pipeline right-of-way along an existing transmission corridor and an existing access route along an otherwise unimproved City of Bellevue street right-of-way (Appendix A, Figure 2). To the extent possible, the contractor will access the work area by traveling overland. A primary staging area will be developed at the north end of 136th Avenue NE. A quarry spall construction access will extend from the paved roadway north along the access route for a distance of at least 100 feet. It is possible the contractor may choose to temporarily improve the access route by cutting and filling along an area where the ground is inclined across the access route at gradient of 5 to 10 percent, resulting in a access corridor about 20 feet wide. Within the immediate project vicinity, the site will be accessed via a temporary 15-foot-wide access route within the footprint of an existing, overgrown access route south and east of the creek. The access route will be temporarily reinforced with gravel, quarry spalls or hog fuel placed over a geotextile fabric. The timber mats will also be used to reduce ground disturbance in areas of soft or wet soils. Equipment used for this project will generally operate stationed on the banks of the creek. Site preparation will include installing Temporary Erosion and Sedimentation Controls (TESC), establishing work areas and staging areas, and placing timber driving mats or temporary fill over delineated wetland areas (as shown on Figure 2, Appendix A). Timber mats will also be used where equipment will cross the pipelines. Brushing of blackberry shrubs will be required along the existing access route within the unimproved City of Bellevue right-of-way. It is anticipated that brushing will also be required in the staging areas adjacent to the creek. Access and work areas will be brushed out by hand or by self-propelled mowing equipment mounted on skid steers or tractors.

2.5 FISH REMOVAL/FLOW DIVERSION

It will be necessary to dewater Kelsey Creek to complete construction work. Dewatering will include the installation of a temporary diversion dam (cofferdam) upstream of the work area and discharging the water to a suitable location downstream with pumps and hoses. Silt fence and/or block nets will be installed across the creek upstream and downstream of the work area (Appendix A, Figure 3) prior to and throughout the duration of construction activities to prevent any fish from entering the construction area. Fish and other aquatic life will be relocated prior to dewatering the work area in the stream per Washington Department of Transportation (WSDOT) fish exclusion protocols outlined in *Regional Road Maintenance Endangered Species Act Program Guidelines* (WSDOT, 2008a).

The pumps and hoses used for the temporary creek bypass will be fitted with mesh screens to prevent aquatic life from entering the intake. Block nets and/or silt fencing will be placed approximately 2 to 4 feet from the end of the intake hose to assure fish are not pinned upon the screen. Screening techniques, if needed, will be in compliance with Washington State Laws RCW 77.16.220, RCW 77.55.040 and RCW 77.55.070. Bypassed stream water will be pumped through hoses or pipes and

be discharged through a diffuser tee structure (Appendix A, Figure 3) placed within the channel downstream of the work area. The pumped bypass water is expected to have similar water quality as upstream waters, therefore no treatment is expected. Potential turbidity at start-up can be reduced by increasing the pumping rate slowly. Small quantities of dewatering may be needed in work areas will likely be accomplished using sump pumps and the water will be discharged through a sediment bag or in a stable vegetated area to reduce sediment discharge and erosion to the stream.

The diversion dam and silt fencing will be left in place until all construction activities within or around the creek have been completed. Once construction is complete, these components will be broken down and removed by hand starting at the downstream end and the rest of the site will be decommissioned prior to project completion.

2.6 Pipeline Protection and Stream Bank Stabilization Measures

Stabilization of the left bank (south) in the vicinity of the 20-inch pipeline crossing will be accomplished by regrading the slope to achieve a more stable inclination and protecting the bank with rip rap. Rip rap will be placed below the stream bed to reduce the potential for erosion at the toe of the bank. The regraded stream bank will armored with rip rap. Soil lifts will be installed at approximately 2-foot vertical intervals commencing approximately 1-foot above the OHWM to allow planting of live stakes in the rip rap.

Olympic is proposing to protect the 16-inch pipeline by installing an additional river weight (concrete half-round pipe) over the unprotected section of the 16-inch pipeline in the left bank of the creek. The total length of river weight will be about 8 feet so that the protection extends into the bank about 7 feet. In order to install the river weight, it will be necessary to stage a trackhoe on the left (south) bank to remove the rip rap from over and around the 16-inch pipeline along the left bank, then place the river weight over the pipeline. The rip rap will be replaced to its original configuration along the left bank over the pipeline.

An older gabion basket system downstream of Weir #5 is in poor condition. Rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and the rock drop structure in areas where the bottom of the gabions are corroded and not protected by existing rip rap. A total of about 30-lineal feet of rip rap be selectively placed at low points to reduce existing exposure at the toe of the gabions. The resulting cross section is expected to match closely that of adjacent portions of the stream and not expected to significantly adversely affect channel hydraulics. A segment of this gabion system will also be removed to construct a rock drop structure (Appendix A, Figures 3 and 4). A heavy coir-wrapped soil over the top of existing soils will be installed and planted with native vegetation where the gabion is removed (Appendix A, Figure 5).

If, during construction, it is determined that a significant portion of the existing gabion basket system needs to be removed, then a buried rock wing wall. The purpose of the buried rock wing wall is to protect the pipeline from potential bank erosion. It is anticipated that the gabion removal and buried rock wing wall would extend a maximum of about 25 feet downstream from the bank key for the rock drop structure.

2.7 Fish Passage Improvement Measures

Fish passage improvement measures include: notching of two existing concrete weirs and construction of a rock drop structure. Notching Weir #2 is proposed since its drop height is approaching the maximum 0.8 feet allowable by WDFW (Fisher, 2008). Based on modeling by GeoEngineers (2009b), notching

Weir #5 alone will not improve the drop adequately to meet fish passage criteria. Therefore, a rock drop structure (rock weir) is proposed downstream of Weir #5. The design of the rock drop structure is based on concepts presented in "Washington State Aquatic Habitats Guidelines Program, Integrated Streambank Protection Guidelines" [ISGP] (WDFW, 2003b). Design and installation of the rock drop structure was considered based on suggestions made by WDFW staff in a telephone conversation with Craig Erdman of GeoEngineers on March 19, 2009 (Uber, 2009). The WDFW representative also suggested incorporating large woody debris in the design to provide habitat.

The notch in Weir #2 will be approximately 2 feet wide and 0.25 feet deep. The notch in Weir #5 will be approximately 2 feet wide and 0.5 feet deep. The rock drop structure will be constructed about 60 feet downstream of Weir #5, with a crest height about 0.5 feet below the base of the notch in Weir #5.

During the time that work is being accomplished to address fish passage concerns, sediment upstream of Weir # 5 will be removed so that a grocery cart embedded in the stream bottom can be removed. The remainder of sediment and any armoring will be removed upstream and downstream of the weir to evaluate if scour occurred beneath the concrete weir. Any voids will be backfilled with suitable on-site native glacial soils excavated for the construction of the rock drop structure or imported clay soil. Geomembrane will be placed along the upstream and downstream faces of the weir, and then gravel and rip rap will be placed over the geomembrane. Woody debris consisting of two logs will be embedded in the rock drop structure. The logs will extend a maximum distance of about 10 feet downstream from the rock drop structure. The purpose of the woody debris is to provide limited bank protection but primarily to provide habitat structure for fish.

2.8 Site Restoration

2.8.1 Stream Channel

In order to restore the spawning and rearing habitat conditions that currently exist in the stream channel, impacts to the stream will be the minimum necessary to install the pipeline protection measures. As a result, it is anticipated that disturbances to the stream channel will be limited to an 8-foot wide section at the location of the 16-inch pipeline crossing, the channel in the vicinity of Weir #5, the proposed boulder drop structure and the bank downstream of the rock drop structure (gabion basket system repair/removal). WDFW-approved bed gravel will be placed as needed over rip rap bank protection or in areas where stream bed material is removed and not replaced. Imported bed gravel will consist of clean, rounded, uniformly-graded gravel with varying size composition (GeoEngineers, 2009a). In most areas, an 8-inch thick layer will be placed; however, it is anticipated that that a thickness of 18 inches over the toe of the rip rap placed along the bank at the 20-inch pipeline crossing will be required. Where the armored bank downstream of the rock drop structure will be removed and the bank will be rebuilt with bio-engineered soil lifts and revegetated with native plants. The soil lifts will be approximately 12 inches thick and constructed with native material wrapped in bio-degradable coir. Details of the soil lift construction and other stream channel restoration measures are included in the Geotechnical Design Report (GeoEngineers, 2009a) and Critical Areas Report and Restoration Plan (GeoEngineers, 2009b).

2.8.2 Wetland and Riparian Vegetation

Restoration of disturbed areas will be conducted in accordance with the procedures discussed in the Critical Areas Report and Restoration Plan (GeoEngineers, 2009b). A site-specific restoration approach and planting palette has been developed for each identified impacted habitat at the site. Invasive species will be removed prior to construction to minimize regrowth after construction. Temporarily disturbed riparian areas at the site will be restored to pre-project elevations and replanted immediately following construction with appropriate native species (Appendix A, Figures 6 and 7).

3.0 ACTION AREA

The action area for the project encompasses the extent of all direct and indirect effects related to the proposed action (as well as interdependent or interrelated activities) affecting both aquatic and terrestrial environments. For this project, the action area is defined based on the extent of project-related terrestrial (in-air) noise and the extent of project-related aquatic effects. Since project-related noise will extend farthest, the geographic limit of noise impacts is also considered the limit of the action area.

Since the project area will be dewatered during construction, there will be no in-water noise impacts. Terrestrial noise, however, will be produced during construction activities. This project will not require blasting, pile driving or any other activity that could generate unusually high levels of noise. Noise emanating from the project during construction will be from typical construction equipment, including an excavator, haul truck and front end loader as well as generators used to operate dewatering pumps. This equipment is expected to produce average maximum sound levels of up to 84 dbA measured at 50 feet from the project site (WSDOT, 2008b). Conventional noise modeling demonstrates that noise from point source construction equipment is attenuated at the rate of 6.0 dB per doubling of distance. Since the project area is considered a "soft site" (e.g., unpacked earth), 1.5 dB is added to the standard reduction factor; therefore, the effective attenuation rate is 7.5 dB per doubling of distance (WSDOT, 2008). In noise assessments, 50 feet is the standard distance used to describe initial decibel levels. As such, for every doubling of 50 feet, noise will be reduced 7.5 dB until it eventually reaches baseline levels. WSDOT provides approximate baseline levels for "suburban" conditions (WSDOT, 2008). It is expected that existing in-air noise levels in the vicinity of the project are approximately 45 to 50 dbA given the suburban residential land use. As a result, the construction noise would attenuate to background levels at 1,600 to 3,200 feet from the work areas (Table 2). Given that the actual location of noise attenuation would be between these two distances and locations near rivers and streams have higher baseline levels, an approximate average of 1/2-mile was used.

Table 2. Noise Attenuation in the Project Action Area

Distance From Project Site (Feet)	Construction Noise (-7.5dB)
50 feet	84 dB
100 feet	76.5 dB
200 feet	69 dB
400 feet	61.5 dB
800 feet	54 dB
1600 feet (.30 mile)	46.5.5 dB
3200 (.60 mile)	39 dB

Potential aquatic impacts are anticipated to be limited to sediment entering streams from adjacent work sites or access roads. Applying the State Water Quality Standards (WAC 173-201A) mixing zone standards, it is anticipated that aquatic effects may extend up to 100 feet downstream of the project site (based on a discharge rate of up to 10 cubic feet/second at the time of construction). The only contaminant of potential concern to water quality resulting from the project would be turbidity; however, all construction will be done "in the dry" due to dewatering. Therefore, an increase in turbidity is not anticipated as a result of construction activities. With the implementation of construction

Best Management Practices (BMPs) and TESC measures, the potential for discharge of sediments into Kelsey Creek is very low and considered inconsequential.

See Figure 1 (Appendix A) for the action area limits for this project.

4.0 BASELINE ENVIRONMENTAL CONDITIONS

Existing environmental conditions at the project site and general vicinity are described below. Site photographs are included in Appendix D.

4.1 GENERAL SITE CONDITIONS

The project site is located within a cleared utility corridor approximately 100 feet wide that runs north-south through residential and light commercial properties in the City of Bellevue. The 16- and 20-inch underground pipelines run parallel to each and are approximately 80 feet apart within the 100-foot wide corridor. The project site includes an approximately 550 linear-foot reach of Kelsey Creek. The stream channel crosses roughly perpendicular to the 20-inch pipeline and at an oblique angle to the 16-inch pipeline. The creek has been confined within the vicinity of the pipeline crossings by bank stabilization measures including rip rap and gabion baskets. Topography is generally flat to gently rolling. A steep slope and erosion hazard area (mapped by the City of Bellevue) is located on the north side of Kelsey Creek, mostly to the west of the 16-inch pipeline.

The utility corridor contains a variety of native and exotic vegetation species such as shore pine (*Pinus contorta*), salmonberry (*Rubus spectabilis*), Himalayan blackberry, reed canarygrass (*Phalaris arnundinacea*) and Japanese knotweed (*Polygonum cuspidatum*). The areas east and west of the utility corridor is a typical urban forested riparian corridor consisting primarily of native species such as western red cedar (*Thula plicata*), black cottonwood (*Populus balsamifera*), Douglas fir (*Pseudotsuga menziesii*), salmonberry (*Rubus spectabilis*) and sword fern (*Polystichum munitum*).

4.2 KELSEY CREEK

4.2.1 Overview

The project area is located within the Kelsey Creek Basin of Water Resource Inventory Area (WRIA) 8. The project site is within the mainstem Kelsey Creek which has its headwaters in the Phantom and Larsen Lake wetlands, approximately 3.50 miles southeast of the project site. Kelsey Creek flows northward to Bel-Red Road before bending southward, where it is joined by a series of small tributaries before discharging to Mercer Slough and ultimately into Lake Washington. The contributing basin to the stream is approximately 10,870 acres and contains more than 19 miles of streams (Kerwin, 2001). A detailed fluvial geomorphologic evaluation of the project site is included in the Design Report (GeoEngineers, 2009a) and summarized below.

4.2.2 Stream and Riparian Characterization

The section of stream channel that extends through the 16-inch pipeline crossing is highly altered and controlled by concrete weirs at the upstream and downstream end of the reach, large rip rap placed in front of the weirs when they were constructed, and rip rap armoring the banks. There is little to no sediment deposition or woody debris. The channel gradient is approximately 0.5 percent, lower relative to the upstream and downstream reaches. Scour pools have developed at the outsides of bends and some deposition of gravels has taken place at the inside of the bends. Scour along the outside of the bend at the pipeline crossing has removed cover from the pipe at the south edge of the channel (left bank). About 20 feet of the 16-inch pipeline within Kelsey Creek is currently protected by a river weight; however, a

short (about 1-foot-long) segment of the pipeline is exposed within the southern portion of the channel near the left bank. Geotextile fabric, which was installed during the 1995 weir project has become disturbed and has pulled up at several locations.

The section of stream channel just downstream of the 16-inch pipeline is also highly altered and controlled by concrete weirs. This reach is characterized by a broadly bending channel with pools below each weir and sand and gravel depositional pockets upstream of each weir. In particular, Weir #4 and #5 have created backwater conditions within the sections immediately upstream of the weirs, allowing sediment deposition and development of a stable, armored channel bed. Due to the presence of these depositional sections, the drop heights at Weirs #3, and #4 are all within WDFW regulations (0.8 feet or less). The drop height at Weir #2 was surveyed as being acceptable, but is marginal.

Weir #5 is approximately 340 feet downstream of the 16-inch pipeline crossing. A 130-foot-long pool has formed downstream of Weir #5. The drop height at this weir is approximately 1.4 feet, which is approximately 0.6 feet greater than the WDFW standard of 0.8 feet (Fisher, 2008). The channel gradient within the reach is much higher relative to the upstream and downstream reaches at approximately 1 to 5 percent with little to no sediment deposition within the reach. The channel may have been straightened during the installation of the pipeline to keep the channel oriented parallel to the pipeline rather than bending towards or across the pipeline. The relatively straight and narrow channel configuration generates higher-energy flows because the flow energy is not dissipated over a wider cross-sectional area, meander bends, or obstructions. The channel is confined by glacial till and man-placed bank armoring. Granular soil overlying the glacial till consists of gravel and sand with silt and occasional cobbles. The coarser material is relatively resistant to erosion. We observed near vertical exposures in the stream banks. The left bank is armored primarily downstream of Weir #5 for a distance of about 90 feet with gabion baskets, which create a 6-foot-high near-vertical wall along the stream channel. The armoring helps to protect the 16-inch pipeline from stream migration. Some deterioration of the gabion baskets, loss of rock from the baskets, and undermining of the baskets is occurring along the left bank. The relatively straight channel configuration, higher peak flows from upstream urbanization, in conjunction with armoring of the banks, has promoted channel incision and slight increases in erosion of the right bank within this reach.

The concrete grade control weirs that are dispersed throughout middle reaches of Kelsey Creek (including the project area) may affect spawning distribution downstream by partially blocking upstream access. Riparian vegetation and structure is present, however it is characterized by small willows (*Salix spp.*) and non-native noxious species such as Himalayan blackberry and Japanese knotweed. Large woody debris is not present and there is little opportunity for recruitment because of the bank armoring and immature woody vegetation along the banks. Pool habitat quality is good because of the consistent overhanging vegetation and deep pool depths.

The City classifies Kelsey Creek as a Type F Water. Type F waters include all waters that are not shorelines of the state and contain fish or fish habitat. On undeveloped sites (sites that do not contain a primary structure), a 100-foot-wide buffer is required from the top of bank.

4.3 WETLANDS

One wetland area (Wetland A) was identified within 200 feet of the project area. Detailed information regarding the characterization and functional attributes of the wetland is provided in the Critical Areas Report (GeoEngineers, 2009b). Wetland A is approximately 0.26 acres (11,477 square feet) and abuts the left bank of Kelsey Creek. The wetland is a saturated, palustrine shrub and emergent wetland

(Cowardin et al, 1979). Wetland A was rated a Category IV wetland (GeoEngineers, 2009b). The City requires a standard wetland buffer width of 40-feet landward from the delineated edge of Wetland A.

5.0 EFFECTS OF THE PROPOSED ACTION

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR §402.02). Direct effects will occur at the project site and may extend upstream and downstream. Direct effects may also include disturbance of species due to construction noise or activities. Indirect effects are those that are caused by the proposed action but occur later in time. They include the effects on listed species of future activities that are induced by the proposed action and that occur after the action is completed. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification, and interdependent actions are those that have no independent utility apart from the action under consideration. No interrelated or interdependent effects were identified for this project.

Short-term effects result from activities connected with construction activities at the site. Long-term effects are those associated with permanent alterations of habitat at these locations. The net effect is considered to be the overall effect on ESA species and habitat in the long term. Direct, indirect and net effects are summarized below.

5.1 DIRECT AND INDIRECT EFFECTS

5.1.1 Short-Term Effects

5.1.1.1 Water Quality. All in-water work will be completed in the dry, with the exception of the initial installation of the flow diversion system, which will occur during the designated in-water work window. Installation and removal of the flow diversion system (e.g., cofferdam and pump system) may result in a temporary increase in turbidity immediately downstream of the project site; however, WAC 173-201A allows for a temporary mixing zone during and immediately after construction. Turbidity will be monitored upstream and downstream of the project based on the turbidity monitoring plan approved by the City of Bellevue and to be included as part of the TESC plan developed for the project. If turbidity levels exceed mixing zone standards, the work will be stopped and appropriate measures taken until that condition is no longer present. While the construction activity itself may result in short-term degradation of water quality by introducing suspended sediments or releasing oil/grease contaminants into Kelsey Creek during construction, the limited extent and nature of the action, with strict adherence to permit conditions along with proper attention to specified impact avoidance and minimization measures (See Section 5.2), will result in insignificant and discountable short-term impacts to Chinook salmon.

5.1.1.2 Habitat. Short-term disturbances to salmonid habitat will occur as a result of stream channel and riparian habitat modification as well as potential runoff and turbidity generated by construction activities. Short-term disturbances of fish may occur as a result of some nearshore habitat (for spawning and migration) made inaccessible due to the flow diversion system in place during the construction period. It is anticipated that the temporary nature and the very small extent of the unavailable area relative to the available nearshore habitat within the Kelsey Creek basin is not likely to have a measurable impact on Chinook salmon that could be present during the construction period.

Excavation, fill and grading will also result in short-term disturbances to aquatic habitat. Temporary, relatively small cut and fill slopes will be required along the southern portion of the access route and in stream beds to construct keyways for rip rap. Rip rap may be placed to help temporarily support the limits of the excavation for various project components. Project BMPs and TESC measures will be in

place to minimize runoff and the transport of sediments and/or turbidity. Since the project will be completed largely in the dry, short-term direct impacts to aquatic habitat will be isolated to the immediate project vicinity.

Riparian vegetation will be removed prior to and during construction. Brushing will be required along the streambank to allow for access, staging areas, placement of rip rap and construction of various project components. Currently, the streambanks within the project area are well vegetated; however, the riparian areas within and adjacent to the utility corridor are infested with invasive Japanese knotweed. Japanese knotweed will be chemically treated by injecting stems with a concentrated glyphosate formulation, registered for use near wetlands and streams (GeoEngineers, 2009b). Other riparian vegetation to be removed includes small alder and willow trees. Replanting of all impacted areas at the site will occur immediately following construction with appropriate native species; therefore, temporary impacts to the riparian vegetation is not likely to have a measurable impact upon Chinook salmon that might be present during the construction period.

5.1.1.3 Noise. Short-term disturbances to fish associated with construction activities may include intermittent increases in noise levels associated with additional traffic and human activity and heavy equipment operations. Operation of heavy equipment can be disturbing or even injurious to salmonids, depending on whether the disturbance occurs during critical life history stages and the proximity to habitat used by the species. Installation and removal of the flow diversion system will generate underwater noise; however, no vibratory or pile driving equipment will be used and construction equipment will operate from the streambank. Due to the short-term nature of the project, the timing during August 15 through September 30, when flows are low and neither juvenile or adult Chinook are anticipated to be in the project vicinity, no adverse impacts to salmonids are expected from noise generated from project activities.

5.1.2 Long-Term Effects

The long-term effects of the project are anticipated to be beneficial, due to the improved fish passage and riparian habitat. No adverse long-term direct or indirect effects to terrestrial or aquatic habitat or water quality are anticipated. The project is intended to improve upstream migration of adults, and downstream migration of juvenile salmonids, thereby increasing adult returns and reproductive success compared with existing conditions. Thus the project will have a long-term beneficial impact on Chinook salmon.

5.1.3 Net Effects

The construction activities may have temporary effects on water quality; aquatic and riparian habitat; and noise levels, however these are anticipated to result in insignificant and discountable impacts on Chinook salmon. The habitat improvements will result in beneficial long-term effects associated with improving fish passage.

5.2 IMPACT MINIMIZATION MEASURES

Olympic and its contractors have incorporated a number of low impact design and construction techniques that will minimize the magnitude, duration and areal extent of impacts to the site and the surrounding environment. Permit conditions attached to the City of Bellevue Land Use Permit, the WDFW HPA, the Ecology Section 401 Water Quality Certification, and the USACE Section 404 permit are expected to include project requirements that will directly or indirectly control temporary and permanent impacts to Kelsey Creek. The project will be constructed during in-water work windows when Chinook are not anticipated to be present in the stream. Best Management Practices (BMPs) and temporary erosion and sediment control (TESC) measures will be utilized during the project to avoid

impacts to ESA-listed species and critical habitat. Provided that BMPs and TESC measures are selected and implemented properly, it is expected that short-term impacts will be reduced and that there will be no permanent adverse impacts to the stream, wetlands, wetland buffers, and other areas adjacent to the work areas.

The contractor will install TESC measures prior to any earth disturbing work or clearing of vegetation. TESC measures will be inspected, maintained and augmented if necessary to prevent impacts to the stream and wetland areas. After completion of the project, TESC controls will be removed from the area for offsite disposal. Temporary access routes will be re-graded, and revegetated according to the revegetation plan (GeoEngineers, 2009b). Other impact avoidance and minimization measures include:

- Silt fence will be installed to prevent migration of sediment off site or into stream areas. Orange construction fencing will also serve to establish the limits of construction activities. The boundaries will be located to minimize direct and indirect impacts to vegetation to the extent practicable. The contractor will not to operate beyond the identified construction limits.
- Site preparation, grading, and project work will be completed during drier summer weather to the extent practicable. Precipitation and runoff will be monitored during construction so that any exposed material or equipment can be protected or, if necessary, work can be suspended.
- Native vegetation at the site will be maintained to the maximum extent feasible.
- Any denuded areas will not remain exposed for more than seven days during the construction period. Denuded areas will be covered with composted mulch or erosion control fabrics as appropriate to reduce rain and runoff impacts.
- If excavated soils are very wet, a filter/straw containment area for the soil stockpile will be prepared.
- Straw wattles will be used, if necessary, to prevent sediment from entering the wetland from the adjacent disturbed areas. Water generated during excavation activities will be directed through filter socks or sediment traps prior to release in upland vegetated areas.
- Timber driving mats will be used in the wetland to reduce impacts to the soils.
- Geotextile covered with hog fuel will be used for stockpiling of materials in Weir #5/rock drop structure work area to reduce impacts to the wetland and to help demark and identify the pre-construction elevation in Wetland A. Maintaining the elevations in the wetland area is essential to restoring the wetland hydrology to pre-construction conditions.
- Daily inspections of the erosion control measures will be conducted throughout the construction period. This will ensure the effectiveness of the measures and determine the need for maintenance, repairs, or additional measures.
- Construction equipment will be refueled using a refueling truck and fueling will not be completed within 100 feet of aquatic environments, with the exception of the bypass pump system. If a separate fuel tank cannot be used, all refueling will occur within a secondary containment area suitably sized to contain the volume in the pump/generator and the refueling vehicle. All fuels and hazardous liquids will be stored in secondary containment to avoid spills and leaks. The contractor will have the necessary resources on-site, including spill kits, to address both major and minor spills at the site.

5.3 CONCLUSIONS

While the construction activity itself may result in short-term degradation of water quality introducing suspending sediments or releasing oil/grease contaminants into Kelsey Creek during construction, the limited extent and nature of the action, with strict adherence to permit conditions along with proper attention to specified impact avoidance and minimization measures (see Section 5.2), may result in insignificant, discountable short-term impacts to Chinook salmon habitat. By improving fish passage and riparian vegetation, long-term impacts are likely to be beneficial. Therefore, the pipeline protection and fish passage improvement project within Kelsey Creek may affect, but is not likely to adversely affect, Chinook salmon in the project area (Table 3).

Table 3. Summary of Project Effects on ESA Listed Species and Critical Habitat

Population	Effect on Species	Effect on Critical Habitat
Puget Sound Chinook salmon	NLTAA[a]	NE[b] (action area not designated)

Notes:
a. NLTAA = Not Likely To Adversely Affect
b. NE = No Effect

6.0 ESSENTIAL FISH HABITAT ANALYSIS

The Magnuson-Stevens Fishery Conservation Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, established procedures designed to identify, conserve and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan (50 CFR 600). The MSA requires federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

EFH is defined by the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The MSA promotes the protection of these habitats through review, assessment and mitigation of activities that may adversely affect these habitats. The significance of small-scale projects lies in the cumulative and synergistic effects resulting from a large number of these activities occurring in a single watershed.

For the Pacific West Coast, separate fisheries management plans have been established for groundfish, coastal pelagic species and Pacific salmon. Therefore, federal agencies must consider the impact of a proposed action on EFH for any species managed under those plans.

For this project, only EFH associated with the Pacific salmon fishery (Chinook, coho and sockeye salmon) could occur at the site or otherwise be affected (PFMC, 1999). The EFH designation for the Pacific salmon fishery includes all streams, lakes, ponds, wetlands and other water bodies currently or historically accessible to salmon, except above impassable barriers. Chinook (*O. tshawytscha*), coho (*O. kisutch*) and sockeye salmon (*O. nerka*), occur in the action area and are documented within Kelsey Creek (WDFW 2008a, 2009a). These fish utilize Kelsey Creek during upstream migration as adults seeking spawning habitat and also as juveniles during out-migration towards the sea.

This EFH assessment describes potential adverse impacts to designated EFH for the Pacific salmon fishery within the action area. It also describes conservation measures proposed to avoid, minimize or otherwise offset potential adverse impacts to designated EFH resulting from the proposed action.

6.1 EFFECTS OF THE PROPOSED ACTION

For this project, effects of the action are discussed in the ESA effects analysis section of this report and apply to EFH. These direct effects are potential accidental spill of fuel, oils, or other chemicals; potential increase in turbidity and sedimentation and temporary loss of riparian habitat because of construction activities in stream buffers. Short-term, temporary construction impacts are anticipated to be minor with the specified impact avoidance and minimization measures described in this BE. Long-term, permanent impacts are expected to be beneficial due to the improved fish passage and riparian habitat.

6.2 PROPOSED CONSERVATION MEASURES

Proposed conservation measures are discussed in Section 5.2 and apply to EFH.

6.3 CONCLUSIONS REGARDING EFH

The definition of "adverse effect" is "any impact that reduces quality and/or quantity of EFH, including direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.810). For this project, the effects of the action that may impact EFH are potential accidental spill of fuel, oils, or other chemicals; potential increase in turbidity and sedimentation and temporary loss of riparian habitat because of construction activities in stream buffers. Work activities are expected to cause minor increases in water turbidity and sedimentation within the immediate project vicinity during construction. Adverse water quality impacts on adult or juvenile salmonids are not anticipated with the implementation of proposed conservation measures. Riparian habitat will be improved by invasive species removal prior to construction and revegetation immediately following construction. Large woody debris will be introduced into the creek to improve fish habitat. Thus, the project will have no adverse effect on Pacific salmon EFH in the project area.

7.0 LIMITATIONS

GeoEngineers has prepared this report in general accordance with the scope and limitations of our proposal. Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices for biological evaluations in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

This report has been prepared for the exclusive use of Olympic Pipe Line Company and their authorized agents, for submittal to the U.S. Army Corps of Engineers and other regulatory agencies, following the described methods and information available at the time of the work. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. The information contained herein should not be applied for any purpose or project except the one originally contemplated.

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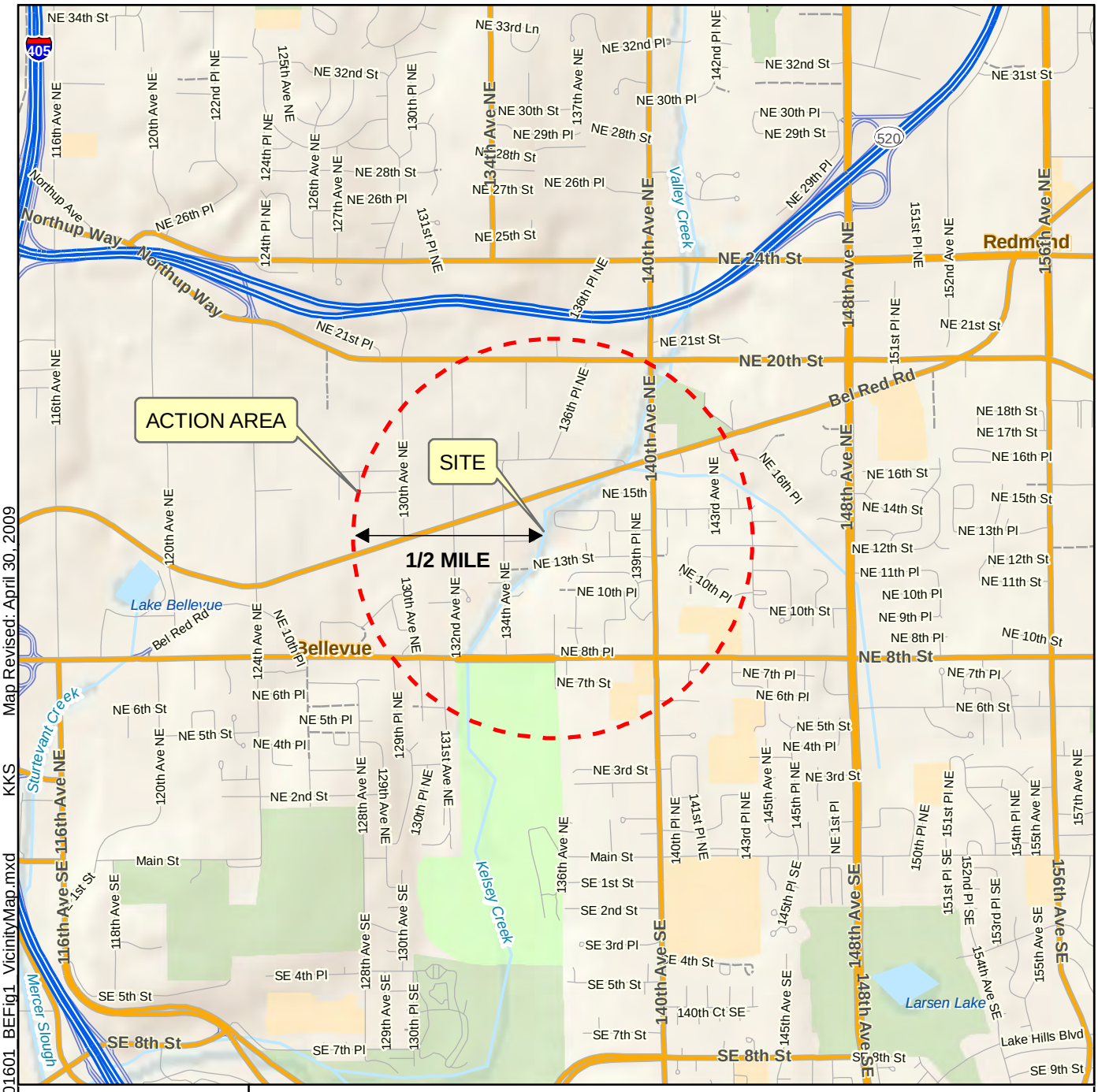
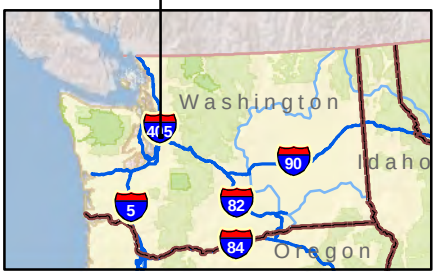
APPENDIX A
FIGURES





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Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map and Action Area

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

GEOENGINEERS

Figure 1

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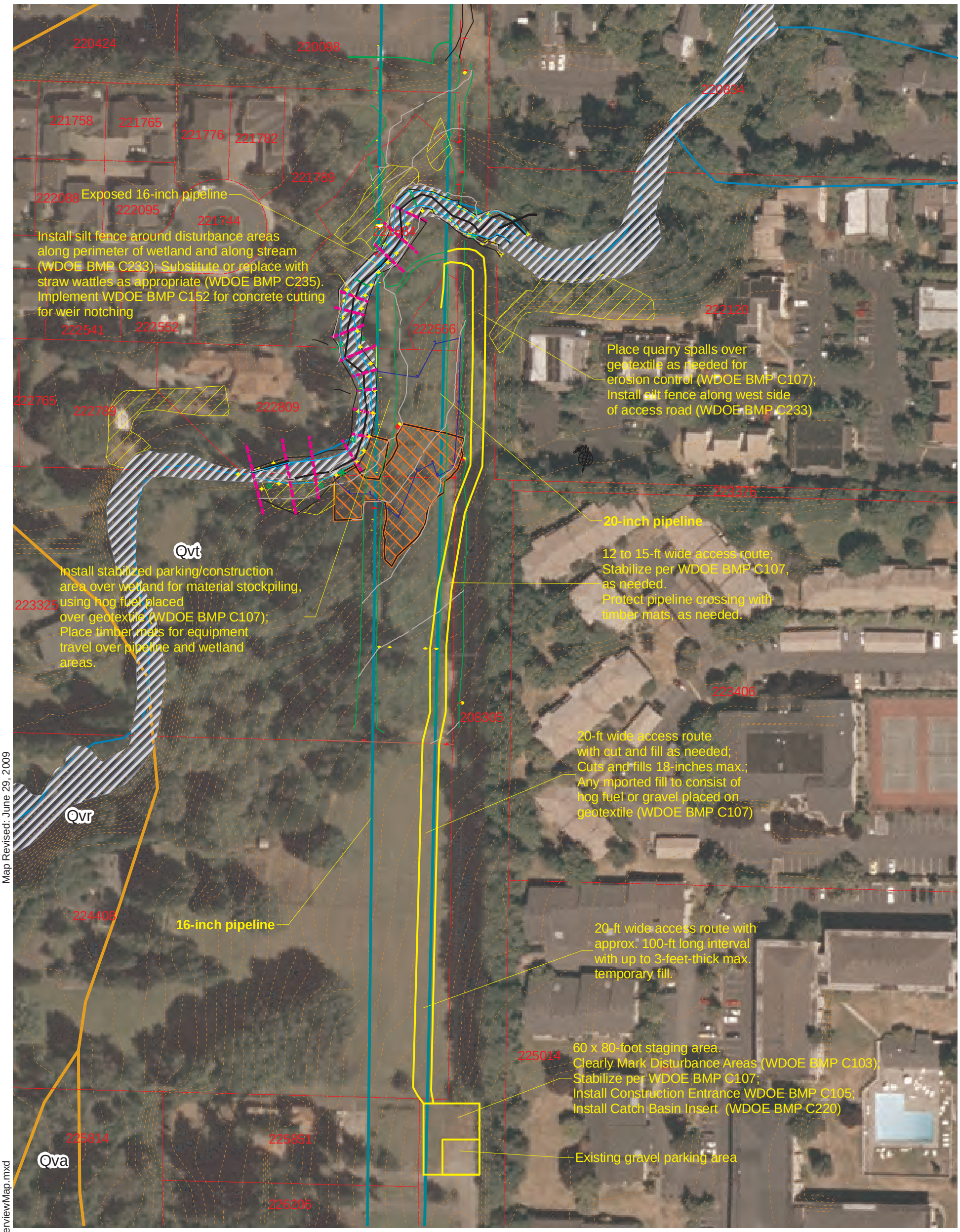

Legend

- Pipeline
- **Geohazards**
  - Landslide
  - Steep Slope
- **Wetland**
  - Delineated Wetland Edge
  - 100-Year Floodplain

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Feet

Notes:
1. The locations of all features shown are approximate.
2. Erosion hazards based on King County data or soil data obtained from the NRCS.
3. 5-contours from LiDAR obtained from King County GIS Center (2003). Slope gradients developed from 5-foot contours.
4. Steep slope and landslide hazards mapped by GeoEngineers (this study); May be limited to within approximately 200 feet of project.
5. Data presented using Washington State Plane North (feet), NAD1983.
6. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Overview Map

Olympic Pipe Line Company
MP 99 - Kelsey Creek Crossing
Belleive, Washington

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Figure 2

Map Revised: June 29, 2009

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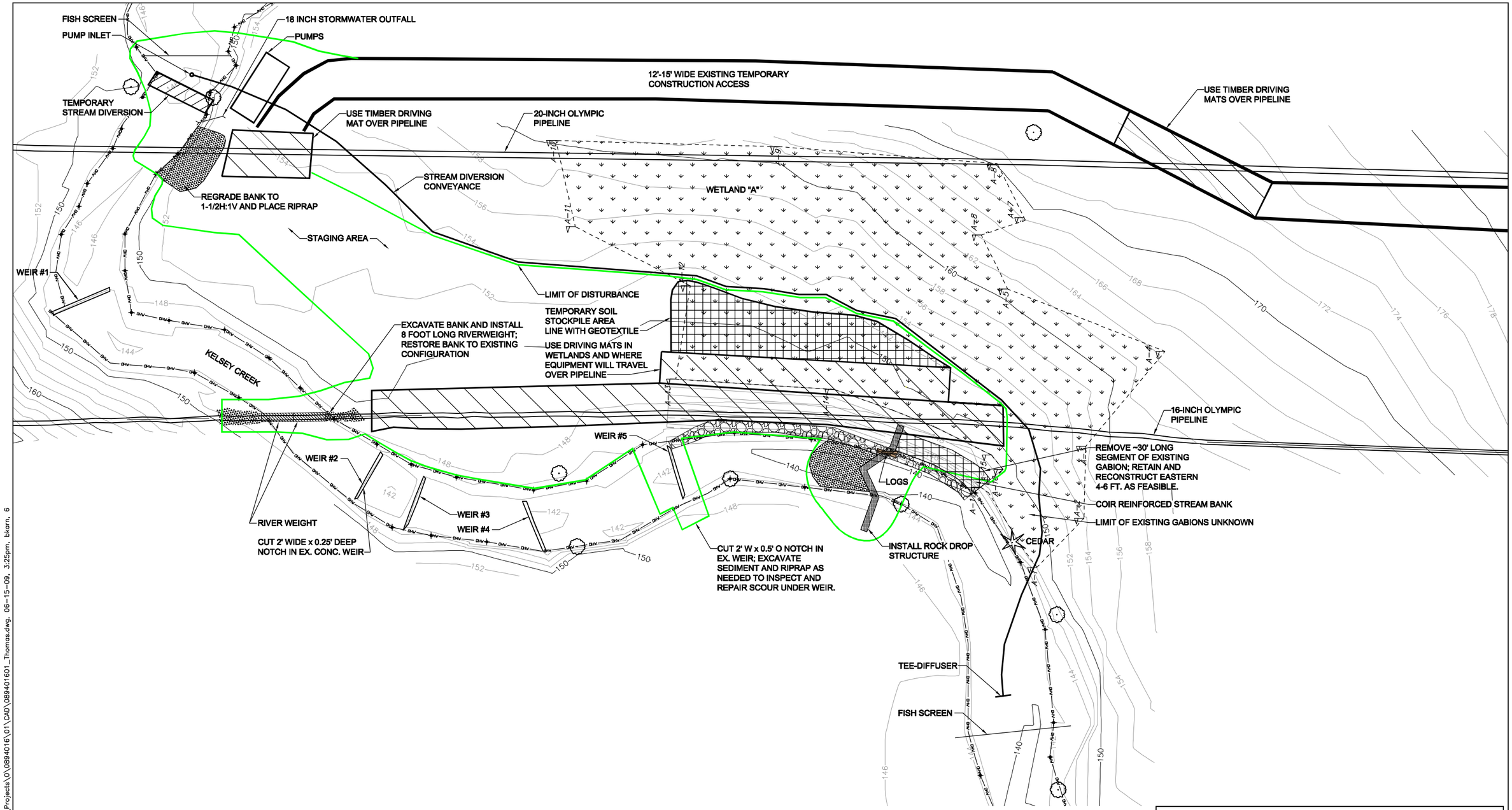

LEGEND

- ORDINARY HIGH WATER MARK
- LIMIT OF DISTURBANCE
- WETLAND A
- EXISTING TREE TO REMAIN
- EXISTING GABION BASKET WALL ALONG STREAM BANK
- PROPOSED RIP-RAP

30 0 30
FEET

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Olympic Pipe Line Company.

Site Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

GEOENGINEERS

Figure 3

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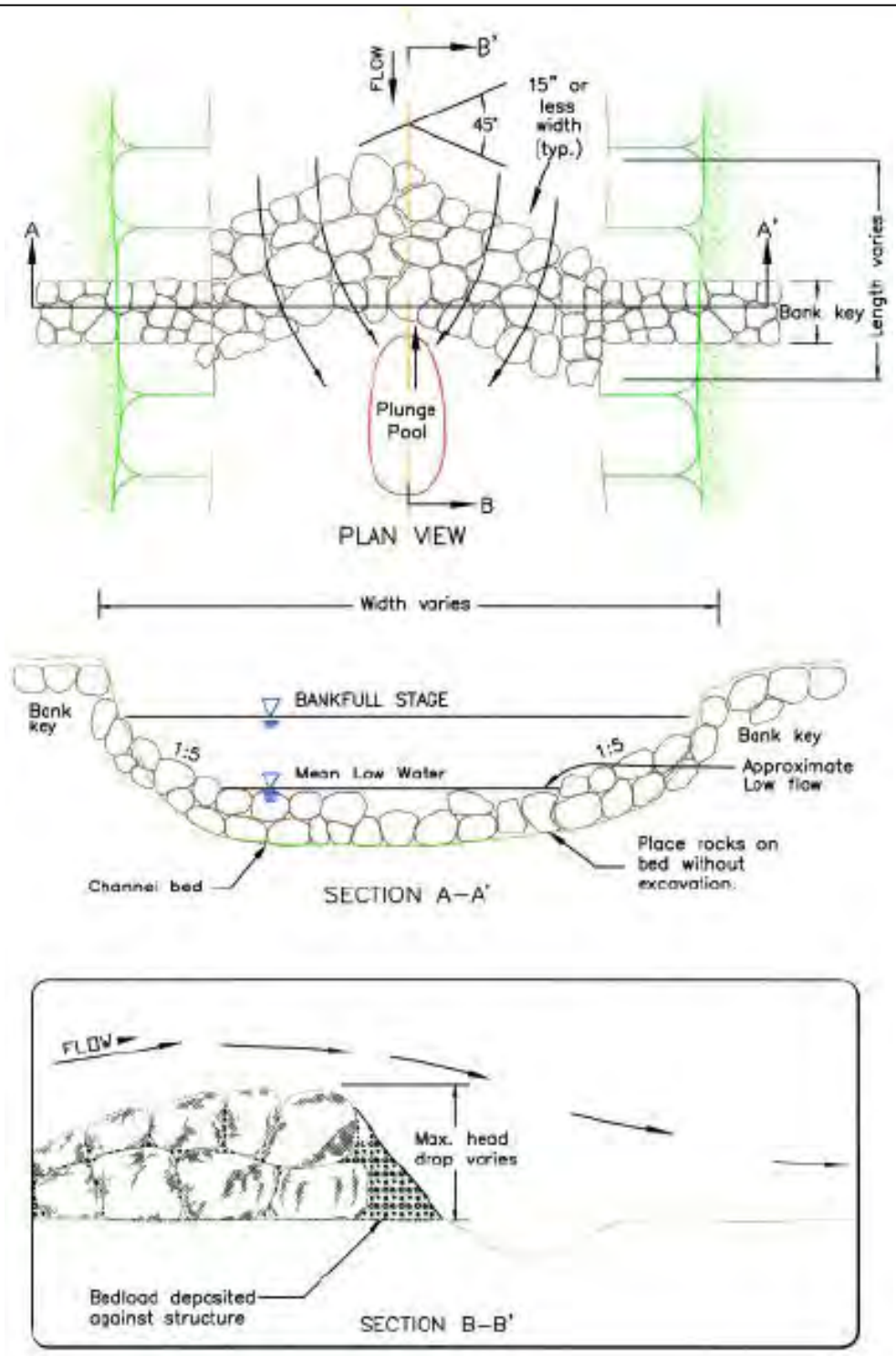

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Washington State Department of Fish & Wildlife, 2003, "Washington State Aquatic Habitats Guidelines Program, integrated Streambank Protection Guidelines." 2003.

Conceptual Rock Drop Structure Design

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

GEOENGINEERS

Figure 4

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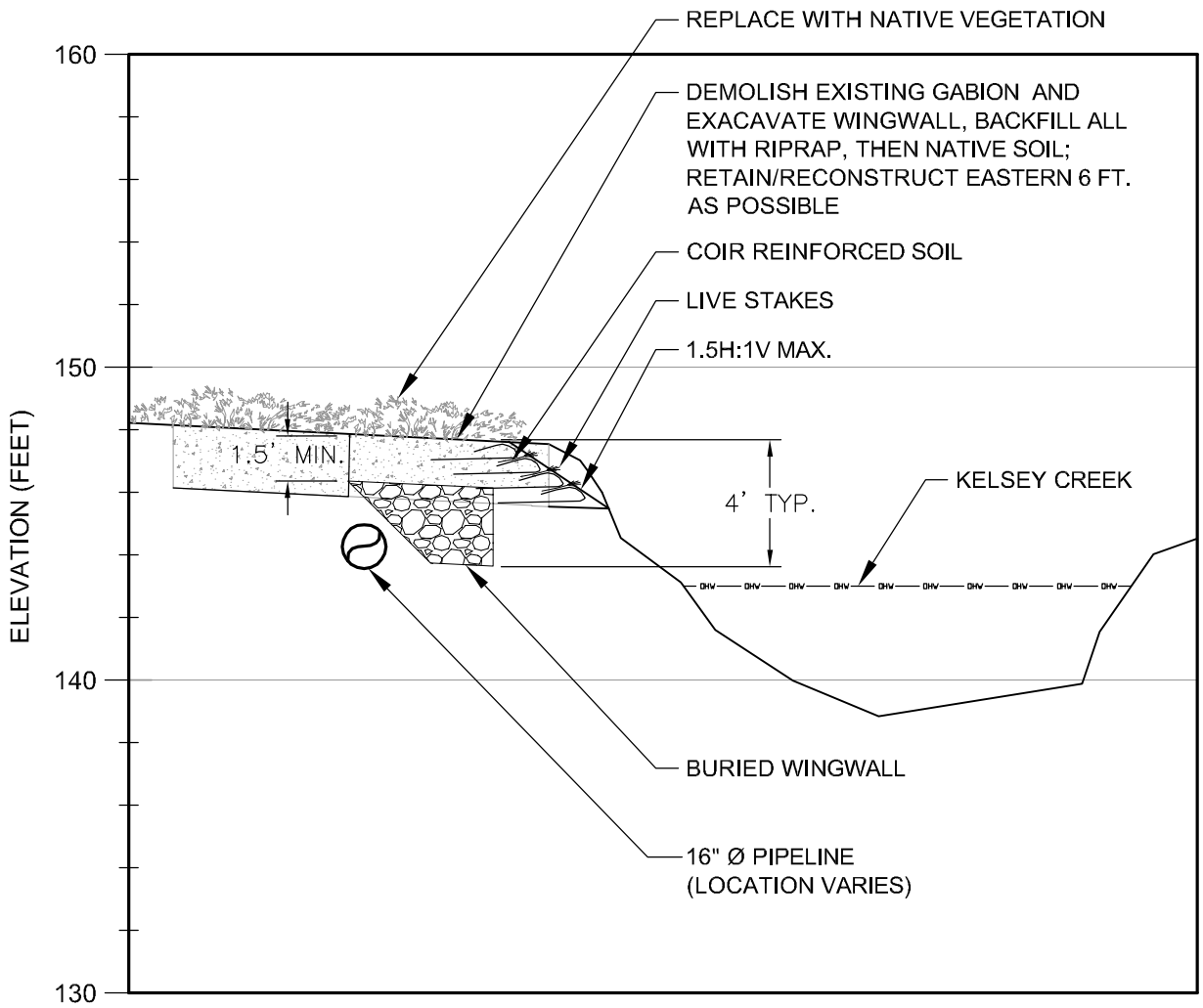

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by GeoEngineers.

Typical Reconstructed Gabion Area

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 5

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GEOTECHNICAL DESIGN REPORT
M.P. 99 - KELSEY CREEK CROSSING AND FISH PASSAGE MITIGATION
BELLEVUE, WASHINGTON

JUNE 22, 2009

FOR
OLYMPIC PIPE LINE COMPANY

GEOENGINEERS

File No. 0894-016-01

M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation Bellevue, Washington File No. 0894-016-01

June 22, 2009

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APPENDIX A – REPORT LIMITATIONS AND GUIDELINES FOR USE

M.P. 99 – KELSEY CREEK CROSSING AND FISH PASSAGE MITIGATION BELLEVUE, WASHINGTON FOR OLYMPIC PIPE LINE COMPANY

INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is pleased to present the results of our geotechnical engineering and engineering geologic services relative to design for pipeline protection and mitigation of fish passage at the Kelsey Creek crossing of Olympic Pipe Line Company's (Olympic) petroleum product pipelines, located within the city limits of Bellevue, Washington (Figure 1).

The Olympic Pipe Line Company (Olympic) operates 16-inch diameter and 20-inch diameter petroleum products pipelines that extend generally north-south through the City of Bellevue. The cleared pipeline right-of-way is approximately 100 feet wide (within an open easement) that runs north-south at this location (see Figure 2). The area north of the stream crossing consists primarily of businesses with low-rise buildings and warehouses. Residential development is present on both the east and west sides of the right-of-way; multifamily housing is present to the east while single family residences are located to the west. The ground surface is generally flat to gently rolling. The stream channel crosses roughly perpendicular to the 20-inch pipeline and at an oblique angle to the 16-inch pipeline. The channel and banks have been highly modified in the past by development and the effects of upstream urbanization. The creek has been confined in the vicinity of the pipeline crossings by dense glacial soils and by bank stabilization measures including rip rap and gabion baskets.

BACKGROUND

In 1995, Olympic installed grade control structures and stream bank stabilization measures at the pipeline crossings to gain cover over the 16-inch pipeline, which was exposed at that time. Five precast concrete weirs were installed in Kelsey Creek to prevent erosion and enable sediment to build behind the weirs, raising the grade of the existing stream bed to achieve appropriate cover over the pipeline. Shallow pools were constructed upstream of the weirs and deeper plunge pools were constructed downstream of the weirs. The bottoms of the pools were lined with geotextile fabric. The filter fabric was then covered with rip rap and/or gravel just upstream of the weirs and rip rap was placed downstream of the weirs. The fabric from both upstream and downstream pools was anchored between the concrete weirs. Approximately 150 cubic yards of rip rap was placed along the right bank to a line approximately 1 foot above the high water elevation to reduce erosion and provide a buttress for the slope. Rip rap was also placed upstream of the weirs where the weirs are keyed into the bank.

A small section of the Olympic 16-inch diameter product pipeline, approximately 1 foot in length, has recently been exposed by stream scour at the Kelsey Creek crossing in Bellevue, Washington. The exposed section of the pipeline is near the left (viewing downstream) bank of the Kelsey Creek crossing about 600 feet south of Bellevue-Redmond Road (Bel-Red Road) in Bellevue, Washington (see Figure 2). The exposed 16-inch pipeline was discovered by City of Bellevue (City) representatives during spawning surveys in the early winter of 2007. It appears that significant storm events over the past 2 years have resulted in flood-level flows that have caused scour and erosion along the banks, including the areas of the 16-inch and 20-inch pipelines. In addition, it appears that some scour has occurred in proximity to at least one (Weir #5) of five weirs (see Figure 3) installed in 1995.

In 1995, a river weight (concrete half-round pipe) was installed over a portion of the 16-inch pipeline at the creek crossing that protects most of the pipeline from stream flows and exposure to other elements. However the section of pipe along the left bank, which was previously buried within the bank and stream bed, does not have the river weight protective measure and therefore needs additional protection (maintenance repair).

In addition to the exposed section of pipe, there is bank scour in the vicinity of the 20-inch line, just downstream from an existing 18-inch diameter concrete stormwater outfall pipe on the left stream bank. Representatives from the Washington State Department of Fish and Wildlife have also expressed concern about fish passage across the weirs installed in the mid-1990s by Olympic. In some areas, scour has also exposed and/or loosened geotextile placed over native soils during the weir installation project.

A steep slope area is located along the right bank of Kelsey Creek, mostly to the west of the 16-inch pipeline. The toe of this slope, located east of the 16-inch pipeline, has been armored with rip rap. Downstream of the 16-inch pipeline crossing in an area where the pipeline is closest to the stream bank, gabion baskets were placed along the left bank prior to the work in 1995. Following the weir installation, a newer gabion basket system was installed at the top of the bank and covers the pipeline for a distance of at least 75 feet.

PROJECT DESCRIPTION

The purpose of the project is to protect the exposed pipeline from corrosion, impact from rocks or other objects, vandalism, the elements, or other possible hazards from exposure and as required by Federal law (49 CFR 195). Since active erosion is occurring along the left bank where the 20-inch pipeline crosses the creek, additional bank protection measures will be completed at this location. Lastly, fish passage concerns will be addressed by notching two of the existing concrete weirs and installing a drop structure using rock (rip rap). The work will require bypassing stream flows and dewatering segments of the stream where work is to occur.

Federal pipeline safety regulations found in 49CFR195 require that the pipeline be buried or be covered with equivalent protective measures. BP, the owner-manager of Olympic, has concluded that a concrete river weight, such as that proposed for this project, provides equivalent protection. Therefore, Olympic is proposing to protect the pipeline by installing a river weight (concrete half-round pipe) over the exposed section of the 16-inch pipeline. The total length of river weight will be about 8 feet so that the protection extends into the bank about 7 feet. In order to install the river weight, it will be necessary to stage a trackhoe on the left bank to remove the rip rap from over and around the 16-inch pipeline along the left bank, then place the river weight over the pipeline. The rip rap will be replaced to its original configuration along the left bank over the pipeline.

Stabilization of the left bank in the vicinity of the 20-inch pipeline crossing will be accomplished by regrading the slope to more stable inclination and protecting the bank with rip rap. A geotextile will be placed along the excavated slope prior to placing the rip rap to prevent loss of soil. Rip rap will be placed below the stream bed to reduce the potential for erosion at the toe of the bank. Soil lifts will be installed at approximately 2-foot-vertical intervals commencing approximately 1 foot above the Ordinary High Water Mark (OHWM) to allow planting of live stakes in the riprap.

Concerns regarding fish passage across the existing weirs will be accomplished by cutting notches in Weirs #2 and #5 and installing a rock drop structure downstream of Weir #5. The notch in Weir #2 will be approximately 2 feet wide and 0.25 feet deep. The notch in Weir #5 will be approximately 2 feet wide and 0.5 feet deep. The rock drop structure will be constructed about 60 feet downstream of Weir #5, with

a crest height about 0.5 feet below the base of the notch in Weir #5. Construction of the rock drop structure will require removing a section of an existing gabion basket system to tie in the right bank key. Depending on the extent of gabion system removed and proximity of the stream bank to the pipeline, a buried wing wall will be constructed within the footprint of the gabion basket system between the pipeline and the top of stream bank. It is anticipated that the buried wing wall will extend downstream a maximum of about 25 feet from the rock drop structure. The extent of the gabion removed will be determined in the field at the time of construction. Woody debris consisting of two logs will be embedded in the rock drop structure extending downstream a maximum distance of 10 feet. One will be placed along the left bank and one with a small root wad will be placed in the right side of the rock drop structure, near the right bank.

During the time that work is being accomplished to address fish passage concerns, sediment upstream of Weir #5 will be removed so that a grocery cart embedded in the stream bottom can be removed. The remainder of sediment and any armoring will be removed upstream and downstream of the weir to evaluate any scour that might have occurred beneath the concrete weir. Any voids will be backfilled with native glacial soils excavated from on-site or using imported clay soils. Geomembrane will be placed along the upstream and downstream faces of the weir. Rip rap will be placed over the geomembrane, and the excavated stream sediments will be placed over the rip rap to pre-existing grades. In addition, rip rap will be selectively placed along toe of existing gabion baskets downstream of Weir #5 and upstream of the rock drop structure in areas where the bottom of the gabions are corroded and not protected by the rip rap placed in 1995.

SCOPE

The purpose of our services is to provide a summary of geologic hazards, as defined by City Land Use Code (LUC) 20.25H, present in or near the areas where proposed maintenance activities will occur and to provide recommendations relative to the proposed pipeline protection and fish passage mitigation measures. Our scope of services included the following:

1. Perform an office review of available pertinent reports, maps and other literature, including:
    - **a.** Reports and maps available through the Northwest Mapping Center (GeoMap NW),
    - **b.** Digital data from the City indicating geologic hazard areas,
    - **c.** Digital soil data from the City and the Natural Resource Conservation Service (NRCS), and
    - **d.** Digital geologic data from the Washington State Department of Natural Resources.
2. Review City LUC 20.25H, pertaining to the Critical Areas Overlay District, with respect to geologic hazards criteria.
3. Provide a report summarizing our findings, including:
    - **a.** A summary of geologic and geotechnical data;
    - **b.** A discussion of potential geologic hazards, including a map showing the approximate locations of landslide/steep slope hazard areas based on our office review and site reconnaissance. Steep slopes and landslide hazard areas meeting the City definition were mapped based on our office review of literature, aerial photographs, topographic and slope gradient maps in conjunction with our site visits.;
    - **c.** Considerations for the stream by-pass system;

d. General geotechnical recommendations for:

- **i.** Site access and completion of maintenance activities in the vicinity of geologic hazard areas consisting of landslide, steep slope, and erosion hazard areas.
- **ii.** Backfill,
- **iii.** Temporary cut and fill slopes,
- **iv.** Permanent cut and fill slopes,
- **v.** Shoring,
- **vi.** Temporary erosion and sedimentation control; and
- **vii.** Design recommendations for construction of bank stabilization, rock or concrete weir design including rock sizing and estimated volumes of rock/materials.

GEOLOGIC HAZARD AREAS

DEFINITIONS

City LUC restricts development activities within or immediately adjacent to critical areas with geologic hazards, including erosion hazards, landslide hazards, steep slope hazards and coal mine hazards. This report addresses only erosion, landslide and steep slope hazards. There are no coal mine hazards mapped in the area. According to City designation of critical areas and buffers (LUC 20.25H.120.A, 2006), landslide hazards and steep slope hazards are defined as follows:

1. Landslide Hazards. Areas of slopes of 15 percent or more with more than 10 feet of rise, which also display any of the following characteristics:
   - **a.** Areas of historic failures, including those areas designated as Quaternary slumps, earthflows, mudflows or landslides.
   - **b.** Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits.
   - **c.** Slopes that are parallel or subparallel to planes of weakness in subsurface materials.
   - **d.** Slopes exhibiting geomorphological features indicative of past failures, such as hummocky ground and back-rotated benches on slopes.
   - **e.** Areas with seeps indicating a shallow groundwater table on or adjacent to the slope face.
   - **f.** Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.
2. Steep Slopes. Slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.

Erosion hazards are not formally defined in the City Critical Areas Ordinance, but are considered soils with a severe to very severe erosion hazard rating according to NRCS. Erosion hazards are addressed in the development of clearing and grading plans and permitting process.

EXEMPTIONS

Pursuant to City LUC 20.25H.055.B, certain uses and development may be allowed inside a critical area, critical area buffer, or critical area setback. These uses and activities include repair and maintenance of existing utility facilities, utility systems, stormwater facilities, and essential public facilities. A portion of this work constitutes maintenance activities. It is our understanding that the work related to fish passage

across the weirs may not be considered maintenance activity, although the weirs were installed in the mid-1990s in part to restore cover to help protect the pipelines.

LUC 20.25H.120.B defines setbacks and buffers from landslide and steep slope hazards. The top of slope buffer is 50 feet for landslide hazard areas and steep slopes. In addition to a buffer at the top of the landslide or steep slope hazard, there is a 75-foot-wide setback from the toe of the landslide hazard area or steep slope per LUC 20.25H.120.C.

PERFORMANCE STANDARDS

In addition to setbacks and buffers, there are performance standards for geologic hazard areas presented in LUC 20.25H.125 and LUC 20.25H.055.C.1. We have added italics to emphasize pertinent language within the standards relative to developing the subject parcel:

"In addition to generally applicable performance standards set forth in LUC 20.25H.055 and 20.25H.065, *development within a landslide hazard or steep slope critical area or the critical area buffers* of such hazards shall incorporate the following additional performance standards in design of the development, as applicable. The requirement for long-term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function.

- Structures and improvements *shall minimize alterations to the natural contour of the slope*, and foundations shall be tiered where possible to conform to existing topography;
- Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;
- The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;
- The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall;
- Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer;
- Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criteria;
- Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation;
- On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification;
- On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types; and
- Areas of new permanent disturbance and *all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan* meeting the requirements of LUC 20.25H.210. (Ord. 5680, 6-26-06, § 3)"

SITE CONDITIONS

GENERAL

Geologists from GeoEngineers completed a geologic and geomorphic field reconnaissance along the pipeline and stream on October 14, 2008. During that visit, the OHWM along the stream was marked and a fluvial geomorphic reconnaissance was completed. A geologist also met with the surveyors from Pacific Geomatic Survey on October 20, 2008. Access to the site is located at the end of 136th Avenue NE. A small gravel parking area is located at the end of the asphalt concrete paved road. The City of Bellevue right-of-way for this road extends to the north of the paved surface. The 16-inch line is located about 50 feet west of the street right-of-way at this location. The 20-inch pipeline is within the street right-of-way for about 70 feet. At that point, the north-south street right-of-way narrows and is located east of both pipelines. A portion of the street right-of-way is proposed for accessing the site, where an existing access route is present. Both pipelines cross private properties to the north of the paved portion of 136th Avenue NE. They are collocated in a utility easement shared with Puget Sound Energy for its electrical transmission lines.

TOPOGRAPHY

Topography within the vicinity of the project varies from flat to rolling. The low point along the alignment is at the crossing of Kelsey Creek at approximate Elevation 144 feet, while the high point within the project area of approximate Elevation 208 feet is located the end of the asphalt concrete paved access on 136th Avenue NE. Inclinations predominantly range from 0 to 15 percent, with short slope segments inclined at 15 to 40 percent, with near-vertical banks present along portions of the stream channel. Slopes inclined greater than 40 to nearly 100 percent are located along the right (viewing downstream) bank of Kelsey Creek adjacent to the 16-inch pipeline crossing. The steepest slope is to the east of the 16-inch line along the right bank of Kelsey Creek.

Vegetation within the utility corridor typically consists of lawn grass, grass, blackberry shrubs, and occasional small deciduous trees. Along the margins of the maintained utility right-of-way, trees consist of western red cedar, hemlock, alder, big leaf maple with an understory typically consisting of Oregon grape, salal, and occasional blackberry shrubs. Japanese knotweed is present along portions of the bank of Kelsey Creek within the utility right-of-way.

Surface run-off from within the project area south of the Kelsey Creek crossing flows north or west to Kelsey Creek. Kelsey Creek flows southerly from the project area to the confluence with Sturtevant Creek, eventually draining to Lake Washington and then Puget Sound.

GENERAL GEOLOGY

The near-surface geologic units in the project area primarily consist of materials deposited during two or more glacial and interglacial episodes. The most recent glaciation occurred approximately 13,000 to 15,000 years ago and is referred to as the Vashon stade of the Fraser glaciation. The geology of the project area was originally mapped by Waldron *et al.* (1962) and by Liesch *et al.* (1963). Larger scale mapping to the north of the project area was completed by Minard (1983). The geology of the project area was compiled by Yount, et al. (1993) at a slightly smaller scale, but the nomenclature for geologic units is similar to that used by Minard (1983). We also reviewed the digital geologic mapping by the Washington State Division of Geology and Earth Resources (2003) and data available from GeoMapNW (2008). The surficial geologic unit mapped in the project area consists of Vashon glacial till and consists of dense to very dense, poorly sorted, non-stratified silty sand and gravel. The glacial till has

been consolidated by the weight of overriding glacial ice. The till may include cobbles and small to large boulders. Glacial till is exposed in the stream banks of Kelsey Creek.

Although not shown in published maps to be in the project area, we also observed exposures of glacial outwash or more recent alluvial deposits in the banks of Kelsey Creek, overlying dense glacial soils. These soils generally consist of stratified, poorly graded to well-graded sand with gravel, gravelly sand (SP, SW-SP, SW) and gravel with sand and cobbles (GP). Recent alluvium is present within the active stream channel, and consists of sand, gravelly sand, and gravel with sand, cobbles, and small boulders.

SOILS

The soils in the study area have been mapped as Alderwood gravelly sandy loams where the ground slopes from 6 to 15 percent (AgC) (USDA, 1973). These soils are weakly to strongly consolidated and occur on glacial deposits, primarily till. The erosion hazard rating for AgC soils is considered moderate. However, where Alderwood series soils occur on slopes from 15 to 30 percent, the erosion hazard is considered severe. Alderwood soils are not considered to be hydric, but may contain hydric inclusions.

Observations of soil profiles exposed in the stream banks and bare soil areas observed elsewhere on-site are consistent with Alderwood gravelly sandy loams. However, we also observed 2 to 3 feet of gravelly sand and gravelly sandy loam overlying glacial till in the banks of Kelsey Creek

SURFACE CONDITIONS

A graphic overview of the alignment, proposed construction activities and potential geologic hazards of concern is presented in Figure 3. Based on review of available information, no liquefaction or coal mine hazards, as defined by the City of Bellevue, are present within or in close proximity to the proposed project area.

SUBSURFACE CONDITIONS

General

No subsurface explorations were completed for this work. However, we reviewed reports in the project vicinity as cataloged by Pacific Northwest Center for Geologic Mapping, University of Washington. In addition, we interpret subsurface soil conditions based on exposure of soil profiles in the stream banks and from review of our project files.

One study was completed to the west of the project area for the Proposed Schoning Property Planned Unit Development (AGRA Earth & Environmental, 1996). Seven explorations were completed at elevations ranging from 170 to 180 feet, significantly higher in elevation and well away from the planned project. In addition, the deepest exploration only extended 5 feet below the ground surface. Soil encountered consisted primarily of loose to medium dense silty fine sand to silty gravelly fine sand.

The second study was completed to the east for a proposed apartment development near 140th Avenue NE and Bellevue-Redmond Road (GeoLabs Washington, Inc., 1973). A total of 22 test pits were completed to depths of 6.5 to 10 feet below the ground surface. Ground surface elevations were not reported. Three test pits (TP-18, TP-21, and TP-22) were located near the western parcel boundary, and close to Kelsey Creek. Test pit TP-22 was located closest to Kelsey Creek, likely less than 100 feet from the property line. Soil described as “medium dense, dry, brown, sandy silt and gravel was encountered beneath the topsoil layer to a depth of 2 feet below the ground surface. This soil became moist below 2 feet, and extended to 5 feet below the ground surface. From 5 feet to the end of the exploration at 9 feet

below the ground surface, a "dense, gray, slightly silty sand and gravel" was observed. The authors interpreted the soil beneath the topsoil horizon as till.

Observations in Stream Banks

Native soils observed in stream banks consist typically of gray, dense to very dense, silty sand with gravel and occasional cobbles. Locally, this soil appears to be weakly laminated. This soil is interpreted to be glacial till, consistent with geologic mapping of the area. Above the glacial till, at elevations ranging from 2 to nearly 4 feet above the OHWM, we observed brown, sandy gravel with occasional cobbles (GP) that typically grades to gravelly sand (SW), poorly to well-graded sand with variable quantities of gravel (SP, SP-SW). The lower portion of this unit appears to be weakly cemented. We interpret these soils to be glacial outwash and/or older alluvium. Our observations are consistent with photographs taken at the site during installation of the weirs in the mid-1990s.

Fill is located in proximity of the pipeline crossings of Kelsey Creek and at the installations for the weirs. This material consists of rip rap along the banks upstream and downstream of the 16-inch pipeline and as bank and streambed protection at each of the weirs. In addition, gabions with crushed rock/small quarry spalls are present in gabion baskets along the left (east bank) downstream of Weir #4 to about 90 feet downstream of Weir #5. Rip rap is present along the toe of the gabion baskets, but becomes more scattered about 60 feet downstream of Weir #5. We also observed silty, sandy gravel in the left bank at the 20-inch pipeline crossing. We interpret this material as native soil backfill along the pipeline.

CHANNEL CONDITIONS

We evaluated the existing geomorphic conditions qualitatively within the project area. The evaluation was based on a review of geologic and topographic maps and on our geomorphic stream reconnaissance conducted on October 14, 2008. The purpose of the evaluation was to develop an understanding of the geomorphic character of the stream and to evaluate stream processes at and near the pipeline crossings as well as along and downstream of the existing weirs. Staff from GeoEngineers also flagged the OHWM, which was surveyed by Pacific Geomatic Services, Inc, on October 20, 2008.

The geomorphic project area was divided into four principal reaches: the upper reach, upper modified reach, weir reach, and the lower reach. The main characteristics of the four principle geomorphic reaches are summarized in the table below. The lower reach consists of a confined channel just downstream of Weir # 5. The lower reach channel is confined on the right bank by native soils consisting of till. There are also weakly cemented sand and gravel deposits above the till about 2 or more feet above the OHWM. Soil conditions on the left bank of this reach are similar. In addition, for a bank distance of about 100 feet downstream of Weir #5, a gabion basket system is present along the left bank. In 1995, the toe of the gabion system was protected by placing rip rap. At this time, the toe of the gabion basket system is exposed in the bank at low intervals of the rip rap. The last approximate 30 feet of this gabion system has been wedged out from the bank by now dead alders. A small "L" shaped segment at the end of the gabion system is unsupported.

Table 1 – Summary of Channel Reach Characteristics

Geomorphic Reach	Morphology	Bed Material	Gradient	Bankfull Channel	Floodplain Channel
Upper Reach	Moderately sinuous, planar uniform stream bed with small pools and riffles; side and overflow channels.	Coarse sand and gravel, D_{50}: .5 – 2 in.	1%	width: 20 - 40 ft depth: 1.5 ft	width: 40 - 60 ft
Upper Modified Reach	Partially confined by armoring; Moderately sinuous with planar stream bed. Shallow glides and riffles.	Medium sand and gravel D_{50}: 0.5-1 in.	0.5 - 1%	width:15 - 20 ft depth: 1 - 3 ft	width: 40 ft
Weir Reach	Stepped pools with partially confined to entrenched by artificial and natural conditions; low sinuosity	Medium sand and gravel D_{50}: 0.5-1 in.	1 - 5%	width:20 - 25 ft depth: 3 ft	width: 30 ft
Lower Reach	Broad bend with pool and riffle; confined below Weir # 5; More broadly confined from head of riffle downstream.	medium sand to cobbles, D_{50}: 0.5-2 in.; Increased particle size from head of riffle downstream	0.5 - 3%	width: 15 - 30 ft depth: 1 - 3 ft	width: 30-60 ft

GEOLOGICALLY HAZARDOUS AREAS

One area along the right bank of Kelsey Creek at the 16-inch product pipeline crossing consists of slopes inclined at gradients of greater that 40 percent, with portions of the slope inclined at gradients close to 100 percent. The slope is vegetated predominantly with Himalayan blackberry shrubs. Per LUC 20.25H.120.A (2006), this area meets the definition of a steep slope hazard. LUC 20.25H.120 (B)(1)(b) requires a 50-foot buffer from the top of this slope and LUC 20.25H.120 (C)(2)(b) requires a structure setback of 75-foot from the toe without further evaluation. The 16-inch pipeline was installed in the 1960s or early 1970s across this slope. The cut to install the pipeline may have resulted in slightly steeper slopes as standard construction practices at that time did not usually result in contouring the ground back to original shape. The lower portion of this slope is armored with rip rap that was placed at the time the weirs were installed in 1995. Because the toe of the slope, which is located along the right bank of Kelsey Creek, has been armored with riprap, there is a low potential for bank failure or lateral channel migration of the creek in this area. We observed no indications that this slope has moved. We observed no geomorphic evidence of past movement, failure or erosion. We did not observe any seeps or saturated areas on the slope that would indicate slope instability associated with groundwater discharge. Therefore, it is our opinion that this area will not be adversely impacted by activities that will occur along the left side of Kelsey Creek.

A potential landslide hazard area exists along the east side of the utility right-of-way and to the west of the access along the City of Bellevue street right-of-way. The slope is inclined at gradients of 15 to about 30 percent. Seepage or shallow perching of groundwater is expressed by the presence of a wetland along and at the base of this slope. The slope rises at an average gradient of approximately 50 percent from a deep pool on the outside bend of the creek to the top of the bank. A 32 inch western red cedar tree is located at the top of the stream bank where the downslope edge of the wetland boundary is mapped. This tree is leaning towards the creek which would indicate bank failure at the toe of the slope due to lateral stream channel migration. However, because of the size of this tree and typical growth rates, the

pistol-butted trunk of the tree indicates that the movement of the tree has been slow and ongoing. There is no indication of movement up slope of the tree which would suggest that the tree has shifted catastrophically over its estimated 50 to 75-year life span. We observed no other indication of ground movement. The bank where the tree is located is on the outside of a bend, and the bank is being undercut. However, the bank consists of till overlain by a relatively compact gravel and sand with cobbles. Based on slope gradients of greater than 15 percent with slope heights of greater than 10 feet, and the presence of seepage, this area meets the City of Bellevue definition (LUC 20.25H.120.A) of a landslide hazard area. LUC 20.25H.120 (B)(1)(a) requires a 50-foot buffer from the top of the landslide hazard and LUC 20.25H.120 (C)(2)(a) requires a 75-foot setback of structures from the toe. The toe of the landslide hazard area and a steep slope hazard area located downstream are lateral to construction activities, with the exception of placement of the stream bypass pipe. The bypass pipe will be placed by hand, reducing the potential for impacts.

Steep slope hazard areas are located along the left stream bank upstream and downstream of the mapped landslide hazard area. The proposed work area is located within the steep slope hazard area upstream of the mapped landslide area (see Figure 2 and Figure 3). This area could also be classified as a landslide hazard, but is protected by gabions installed along top and face of the stream bank to protect the pipeline from erosion of the stream bank. The gabion system is present along the left stream bank and extends about 12 feet (or more in places) back from the top of bank where most of the equipment will be operated. We did not observe any seeps or saturated areas on the slope that would indicate slope instability associated with groundwater discharge. The native glacial till found at this location is very resistant to failure and rapid stream bank erosion. A short segment of the gabion system will be partially removed and replaced with the rock drop structure and associated bank key. Olympic proposes to remove as short of a segment of the gabion system as possible to maintain protection of the pipeline. Where the gabion is removed and protection of the pipeline is needed, a buried rock wing wall will be constructed that extends downstream from the rock drop structure along the alignment of the removed gabion system. The extent of the gabion system to be removed will depend on conditions encountered in the field, but will extend no more than about 25 feet downstream from the rock drop structure (just upstream of cross section C-C'). It is our opinion that the planned construction activities along the top of the steep slope hazard area will not impact stability, provided appropriate construction measures are implemented during construction. This area is a regulated steep slope as defined by LUC 20.25H.0120 (A)(2). LUC 20.25H.120 (B)(1)(b) requires a buffer of 50 feet to be measured from the top of the steep slope hazard area and LUC 20.25H.120 (C)(2)(b) requires a 75-foot setback of structures from the toe.

The steep slope downstream of the landslide hazard area consists of slopes inclined at an overall gradient of about 50 percent from the toe to the top of bank, with gradients of about 40 percent upslope. The bypass pipe for the project will be placed across this area. However, we do not anticipate that the proposed project will impact this regulated steep slope hazard area or its associated buffer.

WETLANDS

One wetland area has been identified in the project area, based on the critical areas report prepared by GeoEngineers (2009a). The existing access route and the area proposed for staging near the stream is located within the buffer of this wetland. In addition, part of the work will result in potential temporary impacts to the wetland. However, measures will be taken to protect and/or restore the function of the wetland and its buffer, as detailed by GeoEngineers (2009a).

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

A variety of concepts were evaluated for a) protecting the 16-inch diameter pipeline and b) addressing fish passage concerns. The project as proposed will, in our opinion, result in the least impacts of the alternatives that were evaluated, while accomplishing the goals of protecting the pipeline and restoring fish passage. The site presents an array of challenges in terms of constructability and site access/layout. The 20-inch petroleum product pipeline is located near the eastern side of the roughly north-south oriented right-of-way. The 16-inch petroleum product pipeline is located near the western side of the cleared right-of-way, and subparallels Kelsey Creek for several hundred feet downstream (southerly) of the stream crossing. Dense silty sand with gravel interpreted to be glacial till of the Vashon glaciation is exposed in the banks of the stream downstream of the 16-inch pipeline crossing. Overlying the glacial soil are deposits consisting of loose to medium dense sand with gravel. We interpret the sand and gravel deposits to be glacial outwash and/or alluvium associated with Kelsey Creek.

Environmental impacts were other considerations. Pipeline lowering would require extensive excavation of the pipeline for 200 feet or so to the north of Kelsey Creek and 300 or more feet to the south, resulting in a significant impact area due to the volume of soil excavated and stockpiled. The proximity of the pipeline where it subparallels steep banks of Kelsey Creek also presents challenges and additional risk to the pipeline.

The project will consist of:

1. Regrading and protecting the left (south) bank at the 20-inch pipeline crossing,
2. Installing a concrete river weight along the 16-inch petroleum product pipeline to protect an approximate 1-foot segment exposed on the stream channel, and restoring the bank to the existing configuration,
3. Cutting notches in Weir #2 and Weir #5 to facilitate fish passage,
4. Inspecting Weir #5 for scour beneath the weir,
5. Installing a rock drop structure (proposed Weir #6) about 60 feet downstream of Weir #5,
6. Removing a portion of the gabion basket system at the location and downstream of Weir #6,
7. As needed, installing a buried rock wing wall along the alignment of the removed gabion system and installing coir-reinforced wrapped soil along the face of the stream bank where existing gabions will be removed.

Working within the creek will require bypassing the creek and discharging the dewatering volume to an appropriate location. Chinook salmon, listed under the Endangered Species Act, are known to be in Kelsey Creek, therefore, the project design and restoration plan have been developed accordingly.

The design of the rock drop structure is based on concepts presented in "Washington State Aquatic Habitats Guidelines Program, Integrated Streambank Protection Guidelines" [ISGP] (WDFW, 2003). Design and installation of the rock weir structure was considered based on suggestions made by WDFW staff in a telephone conversation with Craig Erdman of GeoEngineers in March 2009. The WDFW representative also suggested incorporating large woody debris in the design to provide habitat.

It is our opinion that the proposed project is feasible from a geologic and geotechnical perspective, provided our recommendations presented below are followed. It is further our opinion that areas meeting

the City of Bellevue definition of landslide hazard or steep slope hazard areas in the project vicinity will not be adversely impacted by the proposed activities.

ACCESS AND SITE PREPARATION

General

The project will be designed to minimize disturbance to the site. At least two track-mounted excavators, dump trucks or track-mounted dump trucks (e.g. Morookas), a loader and other equipment, as needed, will be mobilized down to the work area from the staging area at the north end of 136th Avenue NE along the pipeline right-of-way and existing access along City right-of-way. Temporary cuts and fills may be needed, but are not expected, as the proposed access route will follow the same route used in 1995. However, access development will be left to the contractor.

Site preparation will include installing Temporary Erosion and Sedimentation Controls (discussed in detail below), establishing work areas and staging areas, and placing timber driving mats or temporary fill over mapped wetland areas. Timber mats will also be used where equipment will cross the petroleum product pipelines. Brushing of blackberry shrubs will be required along the existing access route along the City right-of-way. It is anticipated that brushing will be required in the staging area near the creek.

Stream Bypass

The ISGP recommends that the method selected for dewatering an in-stream work area be capable of passing at least the one-year flow event. However, it is anticipated that the in-stream work will be less than two weeks in duration, and will be completed during in late August or September, typically the driest time of the year. Therefore, we used estimated flows used for the water bypass system design for the weir installation project in 1995. The estimated flows were approximately 4 cubic feet per second (cfs) in September 1994 and 7.5 cfs in April 1995. The one year flow is estimated to be on the order of 150 cfs. The selected means of bypassing water will consist of pumping the water from upstream of the work area to a point downstream of the work area. The bypass will require installation of a temporary diversion dam (cofferdam) upstream of the work area and discharging the water to a suitable location downstream. Fish screens would be established upstream of the diversion structure and downstream of the discharge point.

The bypass will require a pump or pumps with a recommended pumping capacity of about approximately 4 to 7.5 cfs (about 1800 to 3400 gallons per minute). One 4-inch pump and one 6-inch pump were used in 1995. However, the contractor should be prepared to pump at least 12 cfs, and/or be prepared vacate the stream channel if significant precipitation is forecast or occurring. The outlet line will have to be routed across the access route through a culvert covered with fill to protect the culverts. The line then can be routed along the eastern boundary of the work area, then downstream to a point where the discharge will not flow back into the work area. It is anticipated that the pumps will be operated only during work hours, with the cofferdam system removed at the end of each work day, provided the upstream and downstream fish barriers are maintained. Otherwise, fish removal will have to occur each day.

Alternatively, the pumps will need to be operated 24-hours a day, seven days a week during construction. The use of a full-time pump would require observation at all times of the day and night, require storage of a significant amount of fuel in close proximity to the stream. It is possible that a noise variance will be required. To reduce time during the day for dewatering of work areas, the contractor may desire operating the pumps overnight for at least two consecutive days.

The diversion pump(s) should not be operated at full capacity at diversion start up. The pump should not remove more than one-half the stream flow at the start of dewatering the work area, to allow for the capture and relocation of fish from within the work area. This should also help maintain water quality during start up of the bypass. Fish screens should be located upstream of the pump intake. A fish screen should also be located downstream of the diversion system until the work area has been cleared of fish.

Discharge from the pumped bypass should be returned to the stream at a point where water will not flow back into the work area. It will be necessary to install an energy dissipater at the outfall to prevent erosion and turbidity. This can most effectively be accomplished by installing a Tee-shaped diffuser constructed using a 4-foot-long, 36-inch diameter section of pipe capped at the ends. Holes 3-inches in diameter should be drilled into the downstream face. It will be necessary to secure the outlet pipe and diffuser Tee for the bypass using staking consisting of steel fence posts or #8 rebar perhaps augmented with sand bags. Additional holes may be needed and can be assessed as the flows are gradually increased. If necessary, sand bags could be used to protect stream bottom and banks around the diffuser Tee.

It will also likely be necessary to use a smaller pump to dewater the area downstream of Weir #2 and the area in the vicinity of the proposed rock drop structure. This water should be discharged to the same area as the full stream bypass. During start up, it may necessary to use a filter bag. The volume of water to be pumped downstream of the proposed rock drop structure could be reduced by installing a cofferdam downstream of the work area.

During the expected construction period, it is anticipated that the stormwater outfall just below the diversion structure will be dry. However, the contractor should be prepared to collect and route flows from the storm drain around work areas. The contractor may be able to time work close to the outfall such that any flows are minimal or non-existent. Otherwise, piping may need to be temporarily installed to collect and route the water around the nearby excavation. Small pumps may be needed in the immediate area of work areas to help collect and route water downstream.

TEMPORARY EXCAVATION, FILL OR GRADING

The temporary access extending from existing paved roads will be brushed out as needed. It is possible that relatively small cut and fill slopes (18 inches high or less) will be required along the southern portion of the access route where it crosses a slight side slope of about 5 to 10 percent. In addition, a slight concave slope could require up to about 3 feet of fill, although this was not necessary in 1995. Imported fill can consist of clean sand and gravel, quarry spalls, crushed rock or hog fuel, placed on a geotextile such as Mirafi 150N. Temporary cuts could be as steep as 1H:1V (horizontal:vertical), while fill slopes could be placed at an inclination of 2H:1V or flatter. Access and work areas will be brushed out by hand or by self-propelled mowing equipment mounted on skid steers or tractors.

Temporary slopes in alluvial deposits in the stream bed to construct keyways for rip rap or to evaluate potential scour underneath Weir #5 may need to be cut at 3H:1V or flatter. If water is present, it may be necessary to use sump pumps and/or use rip rap to help temporarily support the limits of the excavation.

Soft soils may be encountered in the area where the gabion basket system will be removed. The stable slope for temporary slopes will depend on soil conditions and the depth and lateral extent of the gabions. If medium dense to dense, relatively dry soils are encountered, it may be possible to cut near-vertical trench (4-foot-deep maximum) for the buried rock wingwall (see section titled "Buried Rock Wingwall" below). Alternatively, it may be necessary to use shoring. It may also be necessary to limit the depth of the excavation to reduce the potential for undermining support of the 16-inch pipeline in this location.

PERMANENT EXCAVATION, FILL OR GRADING

Permanent excavations in glacial till that are unprotected should be cut at 2H:1V or flatter. It is not anticipated that new permanent cut slopes will be established. In general, fill slopes for this project will consist of rip rap or wrapped soil. Specific recommendations for these fill slopes are discussed below. In other areas, it is anticipated that the ground surface will be restored to pre-existing contours, and that the inclinations will be less than 3H:1V.

BANK PROTECTION – 20-INCH PIPELINE CROSSING

General

Bank protection in this area will consist of excavating the steep cut bank to a slope of 1.5H:1V and then placing geotextile fabric covered with rip rap. Rip rap sizing from the hydraulic report (GeoEngineers, 2009b) are presented below for completeness.

Rip Rap Sizing

The rip rap was sized by following the guidelines of Washington State Department of Transportation Standard (WSDOT) Hydraulics Manual (2004), using the following equation:

$D_{50} = C_R * d * S_o,$

where:

- D_{50} = Particle size of gradation (ft)
- C_R = Rip rap coefficient
- d = Depth of flow in channel (ft)
- S_o = Slope of the channel bottom (ft/ft)

The rip rap was sized by following the guidelines of WSDOT Hydraulics Manual (2004), as used above. For the rip rap at the 20-inch pipeline crossing, we estimated $C_R = 19$ (for a slope of 1V:1.5H with angular rock, B/d=2), a flow depth from the hydraulic model for the 100-year flow, d = 4.55 feet, and for an average stream bed slope of S_o= 0.0160 ft/ft. Therefore, the median rock diameter should be approximately 17 inches. This corresponds to heavy loose rip rap per Section 9-13 of WSDOT Standard Specifications for Road and Bridge Construction (2006).

Rip Rap Placement

A keyway for the rip rap bank protection will be excavated along the toe of the bank to a depth at least 3.5 feet beneath the existing stream bed elevation. The keyway will be filled with rip rap about 3 feet thick measured vertically from the base of the keyway. The keyway should be about 2 to 3 feet wide at the base for rip rap bank protection areas. We recommend that a non-woven geotextile, such as Mirafi 150N or equivalent, be placed across the base of the keyway and up the face of the excavation to the highest point that rip rap will be placed.

The rip rap bank protection should consist of a layer that is a minimum of 3 feet thick as measured perpendicular to the slope. At the 20-inch pipeline crossing, the rip rap armoring should extend to the top of the bank slope. The rip rap should be placed at an inclination of about 1.5H:1V or flatter. We understand that a 6-inch-thick layer of soil will be placed over the rip rap at 1- to 2-foot intervals commencing about 1 foot above the OHWM to allow for installation of live plant stakes.

WEIR NOTCHING

Olympic is proposing to cut notches in Weir #2 and Weir #5 to facilitate fish passage. Based on modeling results by GeoEngineers (2009b), a notch 0.25 feet deep and 2 feet wide centered at the low point of Weir # 2 will improve the drop height at this weir to a range acceptable by WDFW. For Weir #5, the notch will be 0.5 feet deep and 2 feet wide. However, based on modeling by GeoEngineers (2009b), notching Weir #5 alone will not improve the drop adequately to meet fish passage criteria. Therefore, a rock drop structure (rock weir) is proposed about 60 feet downstream of Weir #5.

Notching will be accomplished using standard concrete cutting tools. Cutting the concrete will create dust that will need to be controlled and kept out of the stream water. Notching will be accomplished while the stream is dewatered; however, it will likely be necessary to install temporary pumps to lower the water on the downstream side of each weir (and potentially the upstream side as well). Refer to the section titled "Stream Bypass" above. To control dust, a vacuum system should be used.

WEIR #5 SCOUR INSPECTION

At present, a grocery cart is lodged in the stream bed immediately upstream of Weir #5. There are anecdotal reports that scour has occurred underneath this weir. Therefore, accumulated sediment will be excavated from the upstream side of the weir and the grocery cart will be removed and disposed of. Rip rap and other accumulated deposits on the downstream side of Weir #5 will also be excavated to observe the soil subgrade at the bottom of the weir.

Excavated sediments and rip rap should be stockpiled and stored for re-use following inspection. To facilitate draining of sediments, we recommend segregating rip rap from other soils, and placing the soils in a rectangular haybale structure lined with geotextile, such as Mirafi 150N. This will allow the water to drain and filter out any fine grained sediment that might migrate from an open stockpile.

It may be necessary to install a sump to dewater the upstream area or give the material time to fully drain unassisted. Pumped water should be routed through a filter bag, then discharged down gradient.

If a void or voids are found, we recommend placing native till soil from on-site in the area of the void. It may be necessary to mix the soil with bentonite clay or use imported clay (CL) soil. The soil should be hand-tamped in place in 3 to 6-inch thick lifts and/or by using a small hand-operated compactor such as a jumping jack to a firm condition.

If a large void is encountered, it may be necessary to remove the weir to reconstruct the subgrade supporting the weir. We recommend that any fill placed to support the weir consist of structural fill. To minimize underflow, we recommend that the structural fill consist of glacial till excavated from on-site or imported silty sand or silt soils. These soils contain a significant amount of fines (silt) and are very moisture sensitive. Thus, any excavation will need to be completely dewatered prior to placing structural fill. If excavated material is used for structural fill, dry excavated soils should be separated from wetter materials and covered until used. We recommend that the structural fill be compacted to 95 percent of the maximum dry density (MDD) in general accordance with the American Society for Testing and Materials (ASTM) D1557 test procedure. An excavator mounted compactor can be used to compact loose lifts of 8 inches. If a small plate compactor or jumping jack is used, lifts should be placed in 4 to 6-inch thick lifts. We recommend that a representative from GeoEngineers be present during subgrade preparation and structural fill placement.

After inspection, and after repairing any voids observed, we recommend placing a geomembrane fabric, such as Layfield PP40 or equivalent, along the upstream face and lapping onto the stream bottom

upstream at least 4 feet. The geomembrane should also be place across the downstream face of the weir and extend downstream at least 4 feet. The geomembrane should extend up the face of the weir at least 1 foot above the base and secured using a 1/8-inch thick minimum by 2-inch wide minimum steel plate secured to the concrete using anchor bolts installed at approximately 1-foot centers. Heavy loose rip rap salvaged from the inspection excavation should then be placed over the geomembrane. Rock salvaged from the gabions can be used to chink the rip rap. If needed, additional imported heavy loose rip rap should be used. Stream bed material excavated during the inspection can be used to bring the stream bed back to existing grade.

If the weir is removed, the bank key and protective rip rap on the bank should be restored to the original configuration.

SUPPLEMENTAL RIP RAP

Downstream of Weir #5, an older gabion basket system is exposed along the left bank for a lineal distance of approximately 100 feet. In 1995, rip rap was placed along the toe of the gabions to help protect them. About 30 lineal feet of the gabion system is exposed at the toe, and exposures are located in low points in the bank rip rap. Olympic proposes to protect these low points where the toe of the gabion basket system is exposed between Weir #5 and the proposed rock drop structure (Weir #6) with rip rap.

The rock should consist of approximately 24-inch diameter material selectively placed. A maximum of about 9 cubic yards is expected to be placed waterward of the OHWM. However, the rock is to be placed on low points on existing rip rap and should be placed to interlock with the underlying rip rap and adjacent existing riprap. The resulting cross sections are expected to match closely that of adjacent portions of the stream, and from that perspective are not expected to significantly adversely affect channel hydraulics.

ROCK DROP STRUCTURE

General

The design of the rock drop structure is based on concepts presented in the ISPG (WDFW, 2003). A "V"-shaped structure creates greater channel diversity than a straight weir, in part by focusing flows towards the center of the "V" where a scour pool is expected to form. The weir also has the benefit of slowing the high flows through this segment of the stream.

A rock drop structure typically consists of a V-shaped weir that points upstream and is constructed out of properly sized rock. A conceptual plan and profile view of the weir, as presented in the ISPG (WDFW, 2003), is shown in Figure 4. Each arm of the "V" is angled at approximately 45 degrees from the bank in an upstream direction. The arms are constructed to slope very gently down from the banks to the crest at the apex of the "V." The length of the structure between upstream and downstream ends is typically less than 15 feet. In an upstream-downstream profile view, the height of the rock fill decreases in an upstream direction to match the existing stream bed elevation.

The structure is keyed into the bank, typically to a point 1 foot or more above the 100-year flood elevation. This will require removing the gabion basket system exposed in the stream bank and at the top of the bank (refer to the section titled "Gabion Basket Removal" below).

Hydraulic modeling was accomplished to evaluate fish passage during low flows and potential changes in flood elevations for the 100-year flood event (GeoEngineers, 2009b). The low flow discharge used for fish passage design was 4 cubic feet per second, based on measurements and calculations by

GeoEngineers in September 1994. Based on this analysis, the weir should be constructed with a crest height at the low point of the weir at Elevation 141.84 feet. The crest of the weir as designed, should slope up to the tie-in with that bank at a grade of about 10 percent (10H:1V).

Typically, no excavation of the stream bed is required. However, we recommend that key rocks be installed at the downstream end of the structure similar to the design for porous rock weir structures. Key rocks should consist of D_{100} for the design and buried the full diameter. Weir rock sizing and bank key rip rap sizing from the hydraulic report (GeoEngineers, 2009b) are presented below for completeness. Refer to the "Weir Rock Sizing" below.

We also recommend that large woody debris (LWD) be incorporated into the rock drop structure. A discussion of the LWD installation is provided in the subsection "Large Woody Debris Installation" below.

It will be necessary to dewater the stream to complete the work. Since a pool exists in the stream channel in this area, it will likely be necessary to supplement the bypass dewatering by installing a pump in this area. Refer to the section titled "Stream Bypass" above.

To complete the excavation, it may be necessary to protect the steep bank by placing rock fill for the rock drop structure in the channel against the left bank. This will allow the equipment to encroach on the stream channel to excavate the bank key on the right (west) bank and place rock. This may be desirable even if a large excavator with sufficient boom length and power can be used for this work.

Weir Rock Sizing

The rip rap for the rock drop structure was sized by following the guidelines of WSDOT Standard Hydraulics Manual (2004) for bank barbs. The rock size is based on flow depth for the 100-year discharge and the bed slope. The bed slope is variable in the vicinity of the proposed rock drop structure; therefore an average stream gradient of .0160 foot/foot was used, based on an assessment of approximate overall stream bed gradient across the study area. A flow depth of 7.5 feet was obtained for the existing conditions for the 100-year flow immediately upstream of the proposed weir. Based on these values, a heavy loose rip rap per Section 9-13 of WSDOT Standard Specifications for Road and Bridge Construction (2006) with a median rock diameter (D_{50}) 2.2 feet (26.4 inches) should be used. The D_{100} is approximately 3.5 feet based upon the AASHTO Method as presented in HEC-23.

Bank Key Rip Rap Sizing

Bank key rip rap at the rock drop structure is sized using the same method as rip rap for standard bank protection described above. For design an estimated $C_R = 22$ (for a slope of 1V:1.25H with angular rock) was used, a flow depth from the hydraulic model for the 100-year flow was d = 7.5 feet, and we assumed stream bed slope of S_o= 0.0169 ft/ft. Therefore, the median rock diameter should be approximately 30 inches. This corresponds to heavy loose rip rap per Section 9-13 of WSDOT Standard Specifications for Road and Bridge Construction (2006). The size or rip rap can be reduced half way up the bank (about Elevation 144.5 feet) from the crest of the weir to light loose rip rap per Section 9-13 of WSDOT Standard Specifications for Road and Bridge Construction (2006) with a median rock size of approximately 16 inches.

Bank Key Rip Rap Placement

The keyway for the rock drop structure should extend at least 3 feet into the bank at the base of the structure. Rock sized for the weir should be placed up to the planned crest height in the bank key, then

rip rap sized for the bank key can be used. The keyway should be at least 6 feet wide along the bank. This will require removal of a portion of the existing gabion system.

The rip rap bank protection should consist of a layer that is a minimum of about 3 feet thick, and should be placed to match existing grade to the extent possible. We recommend that a non-woven geotextile, such as Mirafi 150N or equivalent, be placed across the base of the keyway and up the face of the excavation to the highest point that rip rap will be placed. At the bank key for the rock drop weir, the rip rap should be placed at an inclination matching the existing slope of about 1.25H:1V to about 1.5H:1V. Soil lifts for installing live plant stakes will be placed in rip rap layers at 1 to 2-foot vertical intervals in the bank key rip rap, commencing about 1 foot above the OHWM.

Woody Debris Installation

Woody debris consisting of two logs will be secured, one along the left bank and one in the right side of the rock drop structure. The logs will extend a maximum distance of about 10 feet downstream from the rock drop structure. The purpose of the woody debris is to provide some bank protection and to provide habitat structure for fish. All woody debris should consist of Douglas fir, western red cedar, or hemlock fir. The logs should be sound and have a minimum diameter of 18 inches, but typically range from about 18 to 24-inches. The logs should be a maximum of 30 feet long, with at least two thirds the length buried within the rock drop structure. To install the log on the left bank, it may be necessary to remove and replace some of the existing rip rap along the left bank just upstream of where the rock drop structure is keyed into the bank.

BED GRAVEL

It may be necessary to place approved bed gravel over rip rap bank protection or in areas where stream bed material is removed and not reused. Based on prior recommendations by Washington Department of Fish & Wildlife representatives for other projects, we anticipate that imported bed gravel shall consist of clean, rounded, uniformly-graded gravel with a size composition of:

15 percent	4.0 to 3.0 inches;
40 percent	3.0 to 1.5 inches;
45 percent	1.5 to 0.25 inches,
<3 percent	Fines less than 0.25 inches.

In most areas, we expect that about an 8-inch thick layer will be placed; however, we anticipate that a thickness of 18 inches over the toe of the rip rap placed along the bank at the 20-inch pipeline crossing will be required.

GABION BASKET SYSTEM REMOVAL

A segment of gabion baskets, commencing at a join between baskets located about 4 feet upstream of cross section D-D' (see Figure 3) and extending downstream of the proposed rock drop structure, will be completely or partially removed to construct the rock drop structure. The extent of gabion baskets removed will need to be established based on conditions in the field, but will extend downstream from the upstream join no more than about 30 feet (near cross section C-C' in Figure 3). This system includes gabions apparently installed in the mid-1990s as well as a portion of an older gabion basket system exposed in the stream bank face. The older gabion system in the stream bank is in poor condition and it is not possible, in our opinion, to place rip rap to protect the toe without placing a significant amount of fill in the stream channel and adversely impacting the stream processes.

It appears that the newer basket at the top of the bank is at least 8 to 12 feet wide. The thickness of the newer gabions is not known. Nor is it known how far the older gabion system extends into the bank. Plans from the weir installation in the mid-1990s show gabions extending downstream into an area well away from the pipeline. However, based on the site survey by Pacific Geomatic Services (2008) and our surface reconnaissance, the gabions along the face of the stream bank extend down to a point just upstream of cross section C-C'.

Removal of the gabions will require cutting the baskets at joins with other basket segments. If feasible from a construction perspective, it may be desirable to remove a 4-foot width of the gabion located at the top of the bank (closest to the stream channel) and leave the remainder over the pipeline for protection. Wherever the gabions are removed in whole or in part, the rock fill should be salvaged and re-used, if possible (e.g. for chinking rip rap or to construct new gabions back from the stream face).

Additional measures are recommended to protect the pipeline because of any necessary demolition of the gabion system along the stream bank and top of bank. These measures consist of a buried wing wall and a reinforced coir-wrapped soil as described below.

BURIED ROCK WING WALL

Where the gabion is removed and not replaced by the bank key for the rock drop structure, we recommend installing a buried rock wing wall between the pipeline and the top of bank formed by the gabion basket system.

It is anticipated that the buried rock wing wall will extend a maximum of about 25 feet downstream from the bank key for the rock drop structure, depending on the location of joins between baskets. The trench should be 4 feet deep and about 4 feet wide at the top. Refer to the section above titled "Temporary Excavation, Fill or Grading." If wet soils are encountered, it may be necessary to use shoring. Care should be taken working in close proximity to the pipeline to avoid removing support and to avoid direct impacts.

The trench should be backfilled to about 18 inches below the original ground surface with rock consisting of heavy loose rip rap per Section 9-13 of WSDOT Standard Specifications for Road and Bridge Construction (2006) and having a D_{50} of 23 inches.

The slope waterward of the buried wing wall should be reconstructed by installing heavy-coir-wrapped soil over the top of in-situ soils. The coir cloth wrap should be constructed with a face no steeper than 1.5H:1V for a maximum slope height of 4 feet. The wing wall rock can be covered with native soils to about 0.5 feet below the original grade and tamped in place. The native soil should then be covered with a layer of topsoil to match existing grade. A detail of the reconstructed slope with buried wing wall and coir reinforced soil is presented in Figure 5.

TEMPORARY EROSION AND SEDIMENTATION CONTROL BMP'S

Anytime there is clearing or construction there is a potential for erosion. In order to reduce and control erosion, multiple measures will be taken. Existing access routes will be utilized to the extent practical and feasible. No new access roads are planned. Temporary access will generally consist of driving equipment overland across the right-of-way brushing out existing access route outside of the right-of-way, then brushing out work and staging area in proximity to the work areas for equipment and material stockpiling. It is anticipated that wheel- or track-mounted equipment will access the work area by the stream. In addition, best management practices (BMPs) will be implemented along access and in work areas, as appropriate as discussed further below.

To reduce the potential for migration of sediment offsite during soil disturbing activities, the Washington State Department of Ecology BMPs and local regulations should be followed during and after construction activities. Provided that BMPs are selected and implemented properly, we expect that short-term impacts will be reduced and that there will be no permanent impacts to wetlands, wetland buffers, and other areas adjacent to the work areas.

Potential sources or causes of erosion and sedimentation depend upon construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. We recommend that the following erosion control measures be included in construction planning:

- Scheduling excavation and construction to minimize soil exposure;
- Retaining existing vegetation whenever feasible;
- Revegetating or mulching denuded areas;
- Directing runoff away from denuded areas;
- Preparing drainage ways and outlets to handle concentrated or increased runoff;
- Using sediment bags to collect, detain, and settle sediment from surface water runoff or water pumped from excavations (if needed);
- Confining sediment to the project site with silt fences and straw bales;
- Inspecting and maintaining control measures frequently;
- Temporarily covering soil stockpiles during construction when necessary;
- Conducting routine inspections of the construction site to ensure effectiveness of the measures and determine the need for maintenance or additional measures;
- Collecting and hauling spoil to an off-site disposal area;
- Revegetating all disturbed surfaces to provide erosion protection after construction is complete.

Construction procedures should be designed to minimize the opportunity for erosion to occur. Clearing, excavation, and grading should be limited to those areas necessary for the bank stabilization, pipeline and weir installation activities. Clearing for access and staging should be kept to the minimum width necessary to prevent interference by trees or other vegetation. The construction limits should be clearly marked in the field and equipment should not be allowed outside the work area. All disturbed areas should be restored to pre-project configuration, replanted, and plants maintained until established as described in the "Critical Areas Report, M.P. 99 – Kelsey Creek Crossing and Fish Passage Mitigation" (GeoEngineers, 2009a).

Silt fences should be constructed around the perimeter of the access route and around the perimeter of the portion of wetland outside the work area, to reduce the possibility of transport of sediment off site. Straw bales should also be incorporated as necessary to augment the silt fences.

Stockpiles of excavated materials or erodible raw material such as excavated soils should be covered during wet weather and small diversion berms used to prevent stormwater runoff from entering or eroding stockpiles. Excavated materials not being re-used on-site will be hauled off.

Until permanent erosion protection is established and stabilized, periodic monitoring should be performed to evaluate the effectiveness of post construction erosion control measures and repair and/or modify them as appropriate. Areas of observed significant erosion should be repaired using an appropriate combination of the methods discussed above.

Landslide and steep slope hazard areas identified within the project vicinity will be addressed with particular care including strict adherence to the methods and procedures detailed in the project documents and plans submitted to the City. The TESCP details the TESC BMPs that will be used by Olympic's contractor to limit erosion potentials and impacts to the earth within the project site.

Olympic or its representatives will monitor and review the use and maintenance of TESC measures employed throughout construction. The TESCP for work within the City are being prepared for review and approval prior to the start of construction.

Turbidity will be monitored upgradient and downgradient of the project based on approval of a turbidity monitoring plan developed for the project.

REPLANTING AND SITE RESTORATION

Recommendations for replanting the disturbed areas are provided in the revegetation and restoration plan, incorporated into the Critical Areas Report by GeoEngineers, Inc. (2009a). Permanent techniques and measures include seeding with a native grass mix and/or other species in sensitive areas or buffers as necessary. Following completion of construction activities, the disturbed work areas will be graded, as needed, to a stable free-draining configuration treated with appropriate erosion control measures (e.g., mulching and/or placing jute matting and installation of water bars as needed to control runoff), and seeded as needed.

Live stakes should be installed in topsoil placed in gaps of the rip rap during construction or chinked into openings in the rip rap after rip rap placement. The live plantings should be installed in soils lifts at 2- to 3-foot intervals starting approximately 1 foot above the OWHM.

Along the left bank downstream of the rock drop weir, we recommend installing a heavy coir-wrapped soil over the top of glacial soils where gabions are removed be. The coir cloth wrap should be constructed with a face no steeper than 1.5H:1V for a maximum slope height of 4 feet. A detail of the coir reinforced soil is presented in Figure 5.

Large woody debris consisting of logs will be incorporated in the rock drop structure to provide fish habitat and minor erosion protection along the downstream of the structure. The areas of Japanese knotweed will be re-vegetated with native vegetation species. A replanting specialist will be contracted by Olympic to implement the revegetation and restoration plan.

MONITORING

Olympic should complete regular site visits during the first winter following installation of the proposed bank stabilization measures to make observations of the stream. If undesirable conditions are observed, such as bank erosion or turbid water, the observed conditions will be reported to Olympic management to evaluate what, if any additional measures need to be taken.

In addition, an annual visit will be completed for a period of 5 years, to occur at the same time that revegetated areas will be observed. The observations of the stream bank and in-stream structures will be combined with the summary for the revegetation, along with any recommendations for further actions, if needed.

LIMITATIONS

GeoEngineers has developed this geotechnical report to address geologic hazards present within or in proximity to the proposed project and to provide geotechnical recommendations for design and construction of the pipeline crossing mitigation measures and for the fish passage mitigation project at Olympic's pipeline crossings of Kelsey Creek in Bellevue, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices for slope stability evaluations in this area at the time this report was prepared.

This report has been prepared for the exclusive use of Olympic Pipe Line Company, their authorized agents, and regulatory agencies following the described methods and information available at the time of the work. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. The information contained herein should not be applied for any purpose or project except the one originally contemplated.

Any alteration, deletion or editing of this document without explicit written permission from GeoEngineers is strictly prohibited and may jeopardize the success of the plans. Any other unauthorized use of this document is prohibited. This document is intended to be used in its entirety. If an excerpt is quoted or paraphrased, it must be properly referenced.

Please refer to Appendix A titled Report Limitations and Guidelines for Use for additional information pertaining to use of this report.

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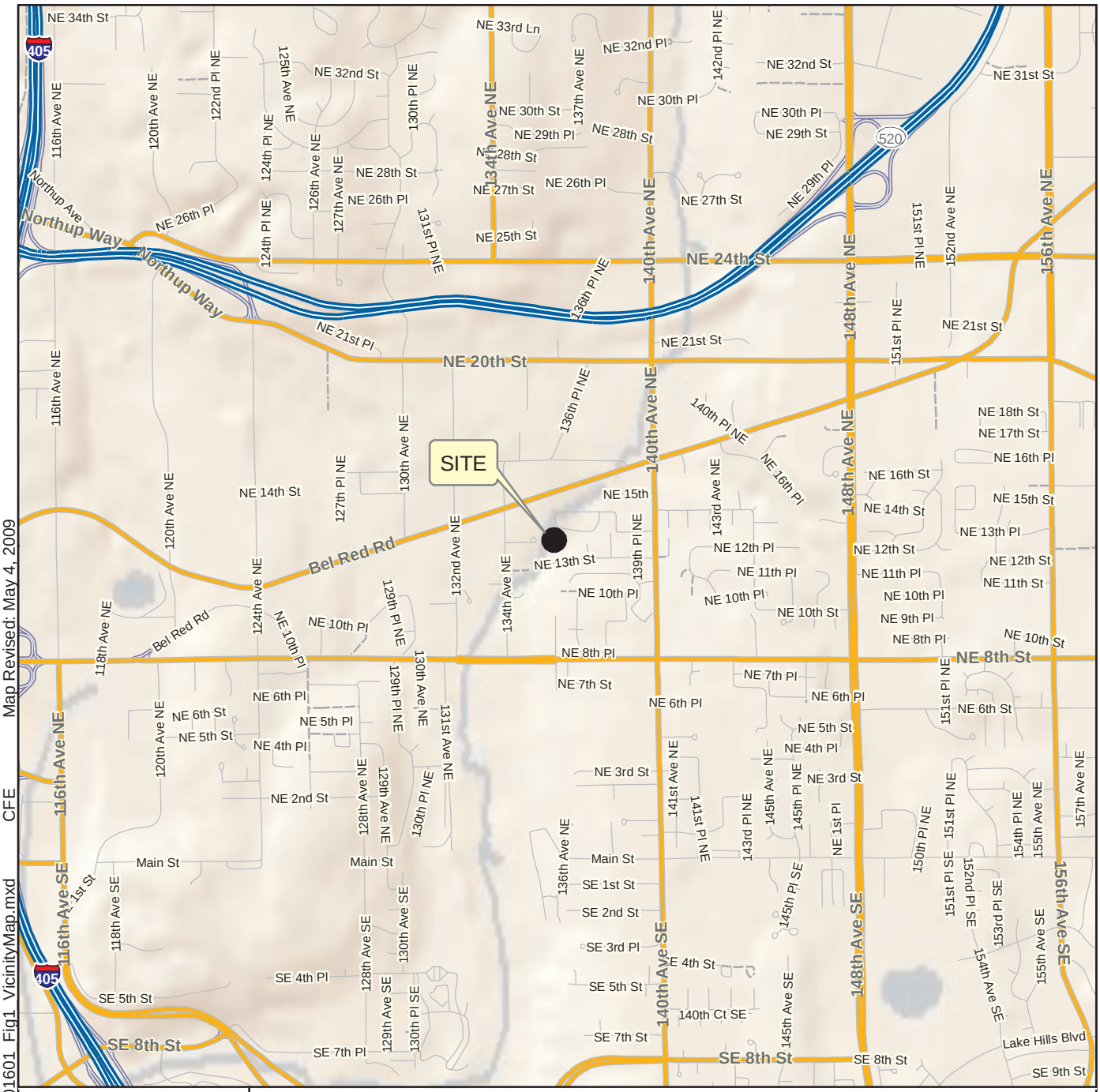

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Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Olympic Pipe Line Company
Kelsey Creek Pipeline Protection Project
Bellevue, Washington

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Figure 1

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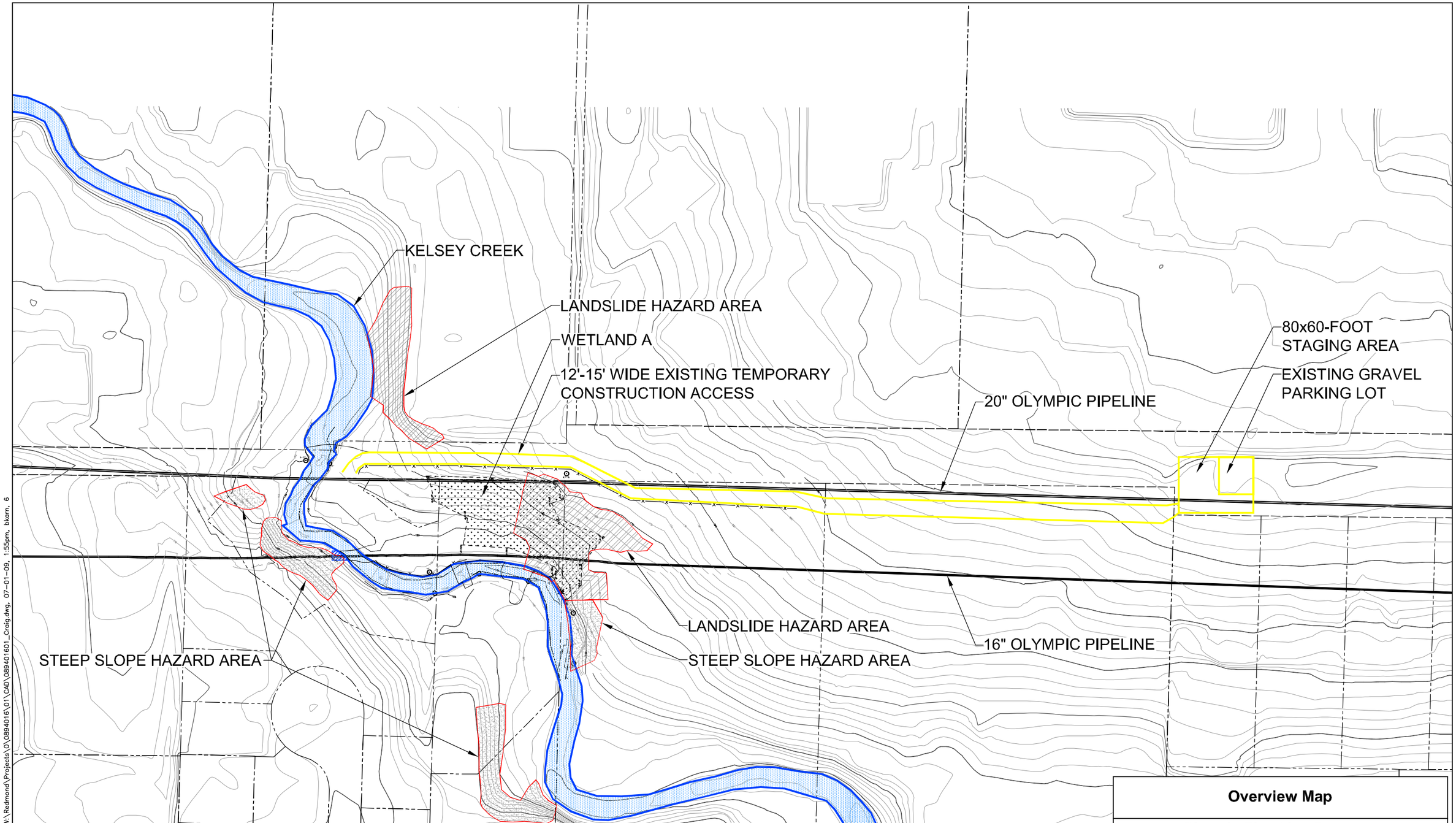

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Reference: Drawing provided by Olympic Pipe Line Company.

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Overview Map

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 2

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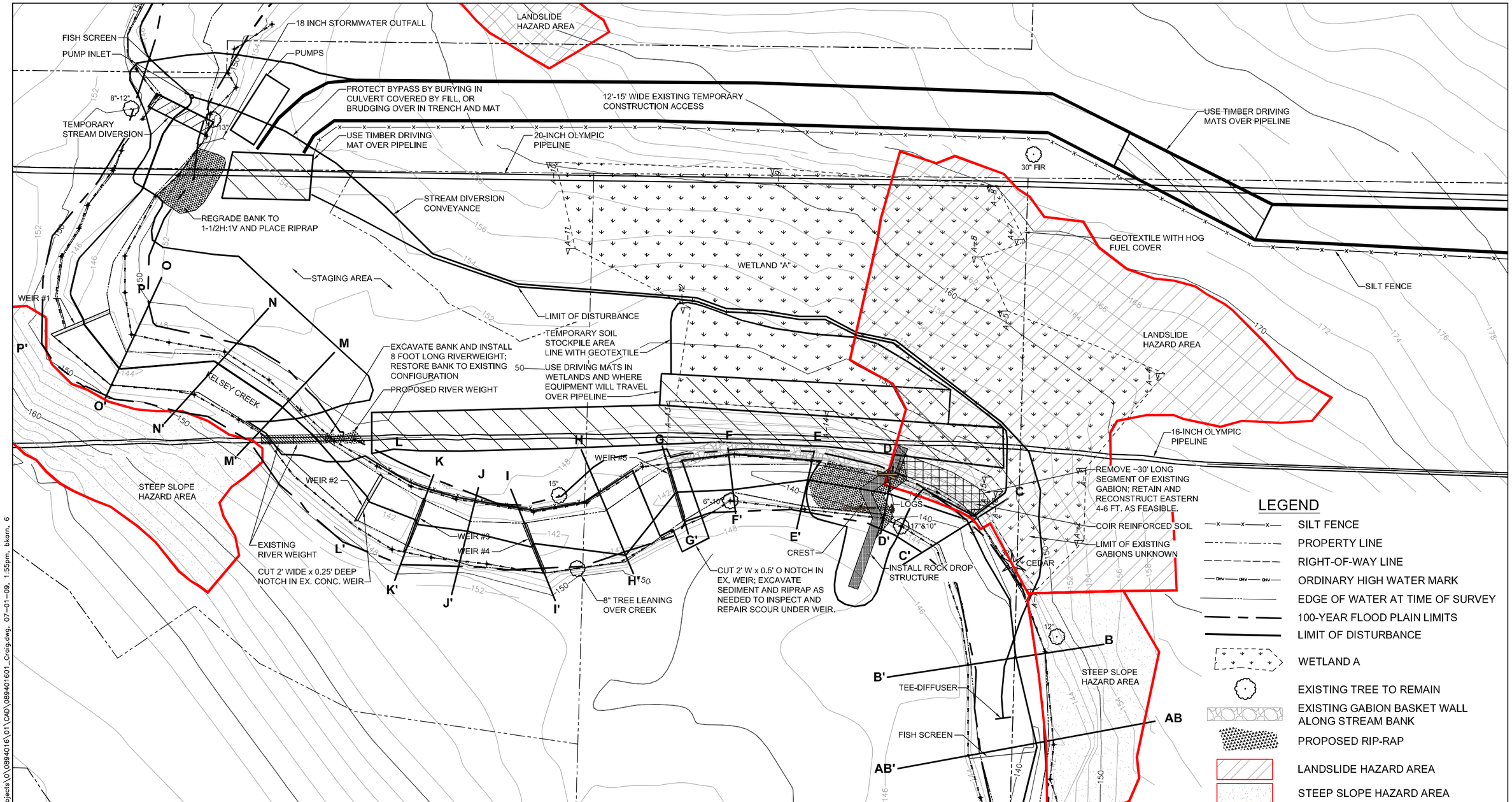

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Reference: Drawing provided by Olympic Pipe Line Company.

Site Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 3

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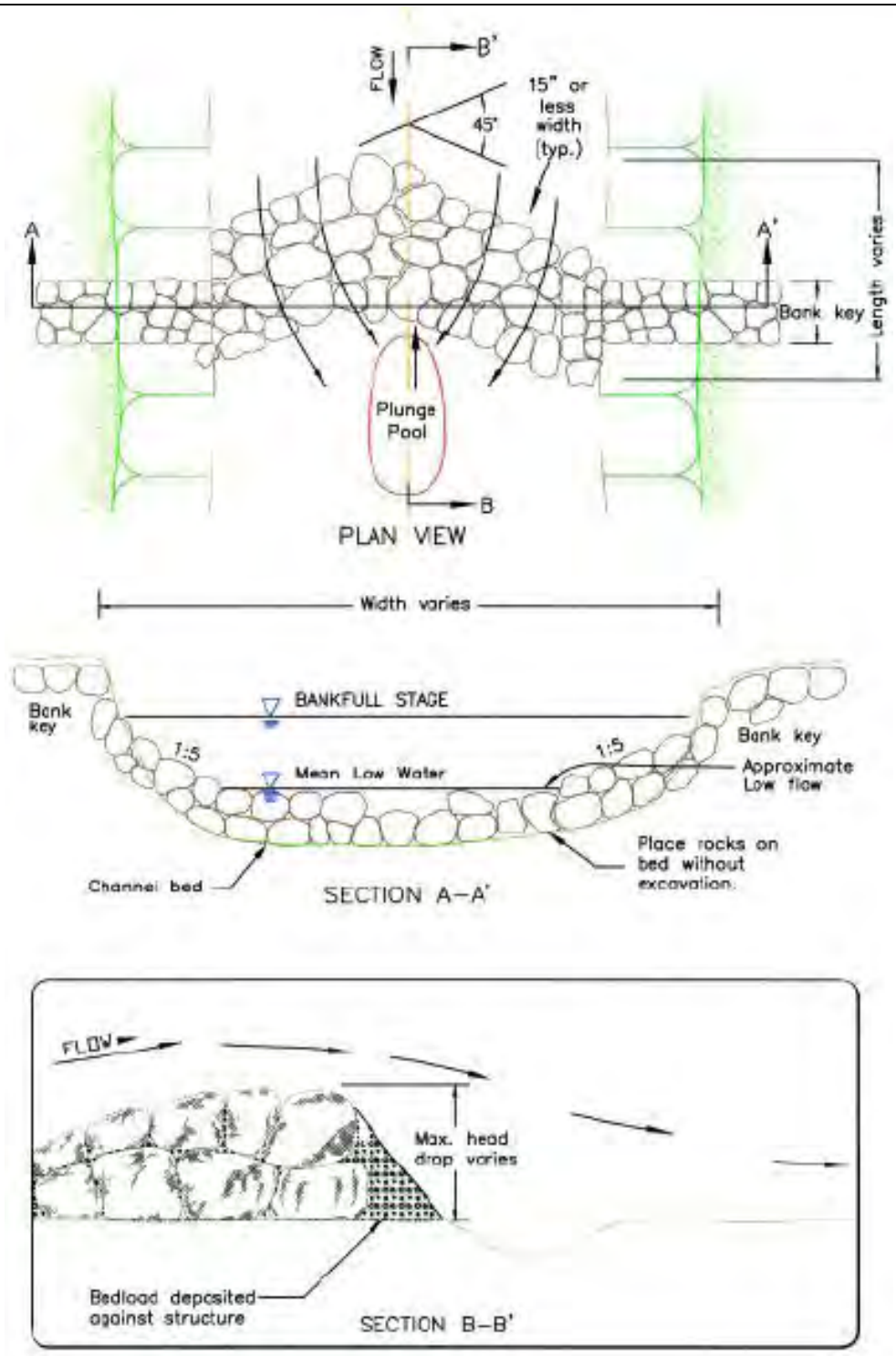

Notes:
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Reference: Drawing provided by Washington State Department of Fish & Wildlife, 2003, "Washington State Aquatic Habitats Guidelines Program, integrated Streambank Protection Guidelines." 2003.

Conceptual Rock Drop Structure Design

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 4

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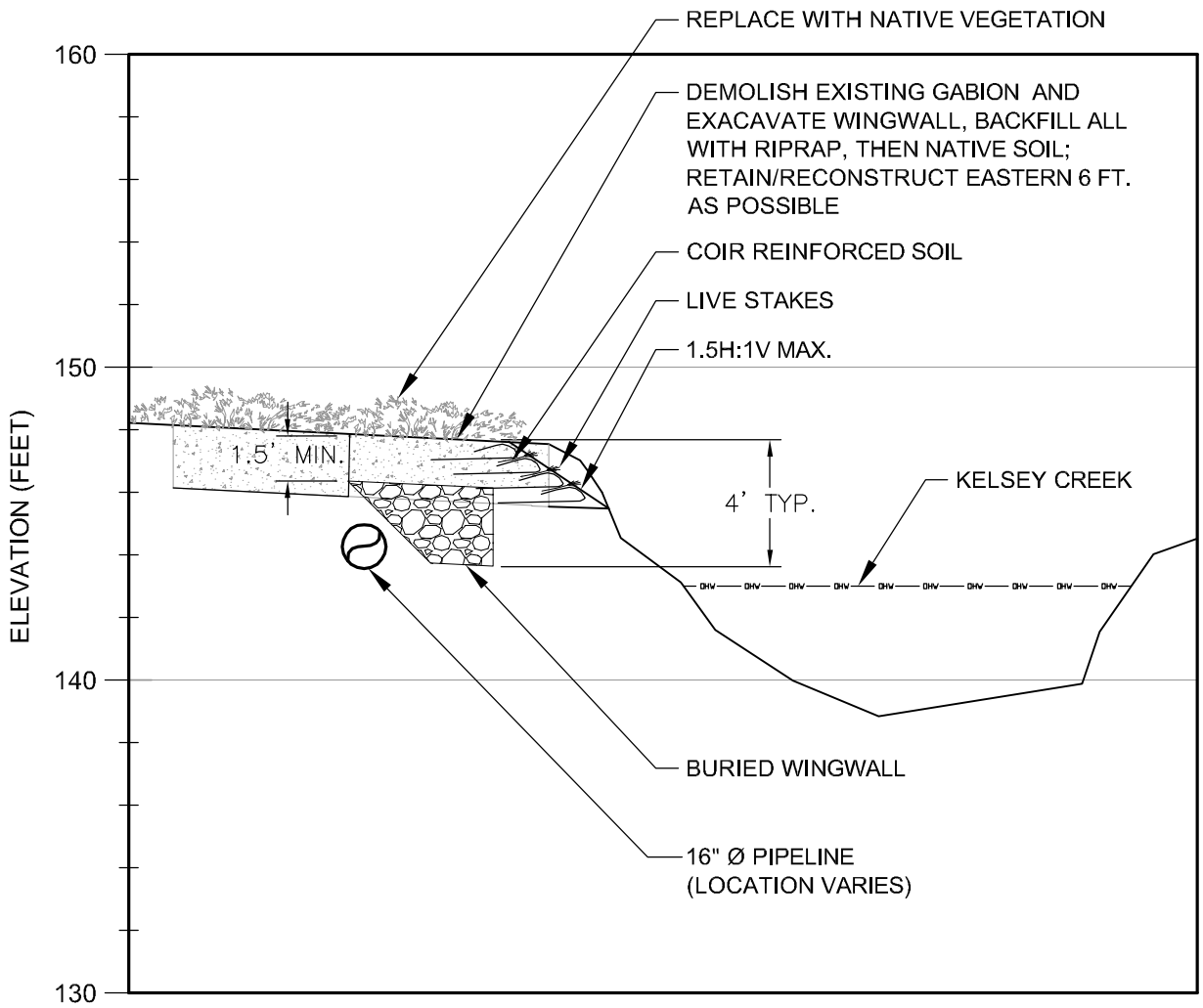

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Reference: Drawing provided by GeoEngineers.

Typical Reconstructed Gabion Area

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 5

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Appendix A

Report Limitations And Guidelines For Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report has been prepared for the exclusive use of Olympic Pipe Line Company and their authorized agents. This report may be made available to the City of Bellevue for review to aid in permitting. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared.. This report should not be applied for any purpose or project except the one originally contemplated.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

This report has been prepared to guide construction activities related to maintenance of Olympic's petroleum products pipeline and related restoration of fish passage. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org .

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

MOST GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

DO NOT REDRAW THE EXPLORATION LOGS

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

READ THESE PROVISIONS CLOSELY

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

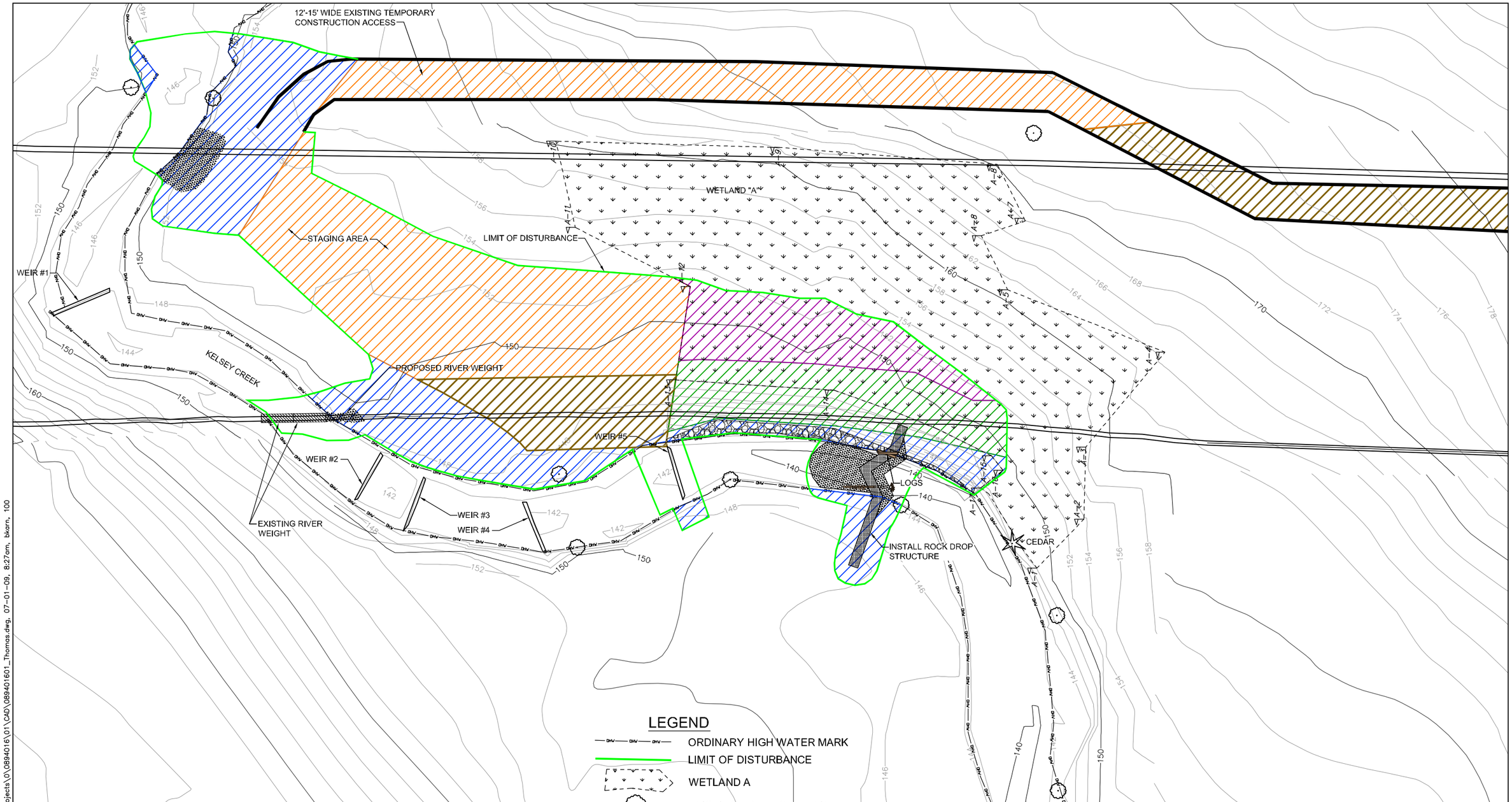
GEOTECHNICAL, GEOLOGIC AND ENVIRONMENTAL REPORTS SHOULD NOT BE INTERCHANGED

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

BIOLOGICAL POLLUTANTS

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.



LEGEND

- ORDINARY HIGH WATER MARK
- LIMIT OF DISTURBANCE
- WETLAND A
- EXISTING TREE TO REMAIN
- GABION BASKET WALL
- PROPOSED RIP-RAP
- EMERGENT WETLAND (PEM)
- SHRUB WETLAND (PSS)
- RIPARIAN
- EMERGENT UPLAND
- SHRUB UPLAND

30 0 30
FEET

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Reference: Drawing provided by Olympic Pipe Line Company.

Site Restoration Plan

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 6

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Kelsey Creek Planting Schedule

Plant Species		Indicator Status
Common Name	**Scientific Name**	
Small-fuited bulrush	*Scirpus microcarpus*	OBL
Creeping spikerush	*Eleocharis palustris*	OBL
Soft rush	*Juncus effusus*	FACW+
Tufted hairgrass	*Deschampsia caespitosa*	FACW
Snowberry	*Symphoricarpos albus*	FACU
Oceanspray	*Holodiscus discolor*	UPL
Nootka rose	*Rosa nutkana*	FAC
Red-osier dogwood	*Cornus sericea*	FACW
Salmonberry	*Rubus spectabilis*	FAC+
Pacific ninebark	*Physocarpus capitatus*	FACW-
Hardhack	*Spirea douglasii*	FACW
Sitka willow	*Salix sitchensis*	FACW

Shrub Wetland Planting Schedule (1,571 sq. ft.)

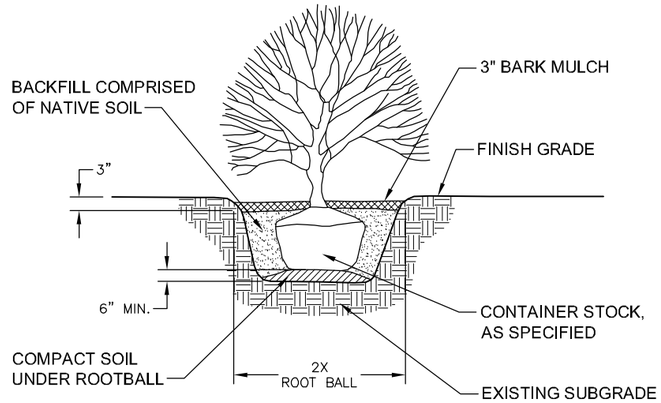
Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	8
Red-osier dogwood	*Cornus sericea*	FACW	2 Feet	Live Stakes	65
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	8
Pacific ninebark	*Physocarpus capitatus*	FACW-	6 Feet	5 GALLON	8
Hardhack	*Spirea douglasii*	FACW	6 Feet	5 GALLON	8
Sitka willow	*Salix sitchensis*	FACW	2 Feet	Live Stakes	65

Riparian Planting Schedule (4,799 sq. ft.)

Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	23
Red-osier dogwood	*Cornus sericea*	FACW	2 Feet	Live Stakes	200
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	23
Snowberry	*Symphoricarpos albus*	FACU	6 Feet	5 GALLON	23
Oceanspray	*Holodiscus discolor*	UPL	6 Feet	5 GALLON	23
Sitka willow	*Salix sitchensis*	FACW	2 Feet	Live Stakes	200

Shrub Upland Planting Schedule (8,075 sq. ft.)

Plant Species		Indicator Status	On-Center Spacing	Size	Quantity
Common Name	**Scientific Name**				
Nootka rose	*Rosa nutkana*	FAC	6 Feet	5 GALLON	57
Salmonberry	*Rubus spectabilis*	FAC+	6 Feet	5 GALLON	57
Snowberry	*Symphoricarpos albus*	FACU	6 Feet	5 GALLON	57
Oceanspray	*Holodiscus discolor*	UPL	6 Feet	5 GALLON	57



TYPICAL PLANTING DETAIL

NOT TO SCALE

Restoration Notes:

1. Disturbed areas of the site will be revegetated as shown on the Site Restoration Plan. Plant installation will be conducted on a vegetation community layout. Species will be grouped at the site based upon their specific hydrologic growing requirements. Vegetation communities are shown on the Site Restoration Plan.
2. Revegetation will be conducted immediately following construction during the relatively dry summer months to minimize sediment migration from the site and to rectify for actual construction impacts.
3. The contractor will leave the BMPs in place for the duration of the revegetation. The contractor will add additional BMPs to prevent sedimentation of the wetland, if necessary.
4. Once the pre-construction topography has been restored a layer of stockpiled native material, organic topsoil or compost will be incorporated into the finished grade to aid in the establishment of plant communities.
5. Revegetated areas at the completion of planting will be covered with composted mulch, arborist chips or similar.
6. Woody debris accumulated during the project will remain on site and contribute to habitat complexity and function at the site.
7. Plant material quantities shown on the plant schedules are estimates and actual quantities may vary.

SEED MIX SPECIFICATIONS

Emergent Upland Seed Blend: (15,005 SQ. FT.)	40% Rough bentgrass (*Agrostis scabra*)
	30% Red fescue (*Festuca Rubra*)
	30% Alaska brome (*Bromus sitchensis*)
Emergent Wetland Seed Blend: (1,918 SQ. FT.)	30% Small-fuited bulrush (*Scirpus microcarpus*)
	30% Soft rush (*Juncus effusus*)
	30% Tufted hairgrass (*Deschampsia caespitosa*)
	10% Creeping spikerush (*Eleocharis palustris*)
Seed Rate:	60 - 100 lbs per acre depending on the slope
Ground Prep:	Soil must be loose enough for the roots to establish
Mulching:	Apply 1-2 inches of composted mulch after broadcasting seed to protect seed from erosion and browsing by birds.

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Reference: Drawing provided by GeoEngineers.

Restoration Details

Olympic Pipe Line Company
Kelsey Creek Crossing and Fish Passage Mitigation
Bellevue, Washington

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Figure 7

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Appendix B
Species Lists

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN KING COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WESTERN WASHINGTON FISH AND WILDLIFE OFFICE

(Revised November 1, 2007)

LISTED

Bull trout (*Salvelinus confluentus*)

Canada lynx (*Lynx canadensis*)

Gray wolf (*Canis lupus*)

Grizzly bear (*Ursus arctos = U. a. horribilis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush) [historic]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

PROPOSED

None

CANDIDATE

Oregon spotted frog (*Rana pretiosa*)
Yellow-billed cuckoo (*Coccyzus americanus*)

SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)
Beller's ground beetle (*Agonum belleri*)
California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana cascadae*)
Hatch's click beetle (*Eanus hatchi*)
Larch Mountain salamander (*Plethodon larselli*)

Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend=s big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Tailed frog (*Ascaphus truei*)

Valley silverspot (*Speyeria zerene bremeri*)
Western toad (*Bufo boreas*)
Aster curtus (white-top aster)
Botrychium pedunculosum (stalked moonwort)
Cimicifuga elata (tall bugbane)

Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated Sept. 25, 2008)

Species[1]			*Current Endangered Species Act Listing Status*[2]	*ESA Listing Actions Under Review*
Sockeye Salmon (*Oncorhynchus nerka*)	1	Snake River	***Endangered***	
	2	Ozette Lake	***Threatened***	
	3	Baker River	*Not Warranted*	
	4	Okanogan River	*Not Warranted*	
	5	Lake Wenatchee	*Not Warranted*	
	6	Quinalt Lake	*Not Warranted*	
	7	Lake Pleasant	*Not Warranted*	
Chinook Salmon (*O. tshawytscha*)	8	Sacramento River Winter-run	***Endangered***	
	9	Upper Columbia River Spring-run	***Endangered***	
	10	Snake River Spring/Summer-run	***Threatened***	
	11	Snake River Fall-run	***Threatened***	
	12	Puget Sound	***Threatened***	
	13	Lower Columbia River	***Threatened***	
	14	Upper Willamette River	***Threatened***	
	15	Central Valley Spring-run	***Threatened***	
	16	California Coastal	***Threatened***	
	17	Central Valley Fall and Late Fall-run	***Species of Concern***	
	18	Upper Klamath-Trinity Rivers	*Not Warranted*	
	19	Oregon Coast	*Not Warranted*	
	20	Washington Coast	*Not Warranted*	
	21	Middle Columbia River spring-run	*Not Warranted*	
	22	Upper Columbia River summer/fall-run	*Not Warranted*	
	23	Southern Oregon and Northern California Coast	*Not Warranted*	
	24	Deschutes River summer/fall-run	*Not Warranted*	
Coho Salmon (*O. kisutch*)	25	Central California Coast	***Endangered***	
	26	Southern Oregon/Northern California	***Threatened***	
	27	Lower Columbia River	***Threatened***	• Critical habitat
	28	Oregon Coast	***Threatened***	
	29	Southwest Washington	*Undetermined*	
	30	Puget Sound/Strait of Georgia	***Species of Concern***	
	31	Olympic Peninsula	*Not Warranted*	
Chum Salmon (*O. keta*)	32	Hood Canal Summer-run	***Threatened***	
	33	Columbia River	***Threatened***	
	34	Puget Sound/Strait of Georgia	*Not Warranted*	
	35	Pacific Coast	*Not Warranted*	
Steelhead (*O. mykiss*)	36	Southern California	***Endangered***	
	37	Upper Columbia River	***Endangered***	
	38	Central California Coast	***Threatened***	
	39	South Central California Coast	***Threatened***	
	40	Snake River Basin	***Threatened***	
	41	Lower Columbia River	***Threatened***	
	42	California Central Valley	***Threatened***	
	43	Upper Willamette River	***Threatened***	
	44	Middle Columbia River	***Threatened***	
	45	Northern California	***Threatened***	
	46	Oregon Coast	***Species of Concern***	
	47	Southwest Washington	*Not Warranted*	
	48	Olympic Peninsula	*Not Warranted*	
	49	Puget Sound	***Threatened***	• Critical habitat
	50	Klamath Mountains Province	*Not Warranted*	
Pink Salmon (*O. gorbuscha*)	51	Even-year	*Not Warranted*	
	52	Odd-year	*Not Warranted*	

1 The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as "species" under the ESA.

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Appendix C
Life Histories of Listed Species

*Chinook Salmon (*Oncorhynchus tshawytscha*)*

ESA Listing and Stock Status

As a result of the National Marine Fisheries Service's (NMFS) status review of Chinook salmon populations in Washington, Oregon, Idaho and California, five Evolutionary Significant Units (ESUs) were defined. The Puget Sound ESU, composed of all naturally spawning spring, summer and fall runs of Chinook salmon populations from the Elwha River to the Nooksack River, was listed as threatened under the ESA in March 1999 (64 FR 14308) and reaffirmed in 2005 (70 FR 37160). Critical habitat was designated for Puget Sound Chinook in 2000, but was vacated by court order in 2002. National Oceanic and Atmospheric Administration (NOAA) Fisheries reevaluated the critical habitat designations for Chinook in the Puget Sound and published the rules on this issue in 2005 (70 FR 52630).

Overall abundance of Chinook in the Puget Sound ESU has declined substantially from historic levels, and there has been concern over the effects of a high degree of hatchery supplementation on the genetic fitness of wild stocks. Additional factors leading to declines in the ESU include habitat degradation and high harvest rates, which in recent years have exceeded 90 percent (Myers et al. 1998).

Life History

Chinook salmon in Water Resources Inventory Area (WRIA) 8 are primarily produced in three watersheds: the Cedar River, the Big Bear/Cottage Lake system, and Issaquah Creek. Some production also occurs in smaller Lake Washington tributaries such as the Kelsey Creek system (WDFW/PSIT 2004). Two hatcheries, one at Portage Bay operated by the University of Washington and the other on Issaquah Creek operated by the WDFW, also release salmon within WRIA 8. A direct tributary to Lake Washington, Kelsey Creek is most closely associated with the Sammamish/North Lake Washington population.

Chinook salmon are anadromous. Adults migrate from marine environments and spawn in freshwater, while juveniles rear in freshwater for varying periods of time before migrating out to saltwater where they mature. Chinook use a wide variety of freshwater habitats from headwaters to the estuary but are typically found in low-gradient streams dominated by gravel and cobble (Scott and Crossman 1973). They require clean gravel for spawning. Juvenile Chinook are typically associated with low-gradient, meandering, unconstrained stream reaches (Lee et al. 1996) and require abundant habitat complexity such as that associated with accumulations of large woody debris and overhanging vegetation (USDI 1996). Juvenile Chinook often move into side channels, beaver ponds and sloughs for over-wintering habitat.

Most juvenile Chinook salmon migrate to the marine environment as smolts during their first year although their early life history patterns vary. Some migrate downstream almost immediately after emerging from the gravel. Others migrate downstream and enter side-channels where they may rear for several weeks before migrating to marine waters. A third life history strategy involves a more extended rearing time (up to 2 years) in the river before migrating to salt water.

Juvenile Chinook salmon reside for a period of time in shallow intertidal areas before migrating to the sea. The availability of rearing habitat that includes an abundance of food items and security from predation during this early marine phase is critical to their growth and survival.

As smolts mature into juveniles, they move into the North Pacific to feed and mature into adults. As juveniles, their diet consists usually of either small crustaceans or insects in fresh water and small crustaceans in the sea; as they mature their diet includes a greater proportion of small fish (Royce 1972). As juvenile salmon shift their prey preference to fish species such as juvenile herring and sandlance, they

become dependent on these prey species as a forage base and are more likely to be found in shoreline zones containing eelgrass and other habitat features that support their prey.

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Appendix D
Site Photographs

Photo 1: Typical site conditions upstream from project site.

Photo 2: The maintained 16-inch pipeline corridor, facing north. The emergent community of Wetland A is in the foreground and the shrub community is at right. Kelsey Creek is at left.

Photo 3: Weir #5 from downstream (note embedded grocery cart on upstream side).

Photo 4: Typical stream conditions within the subject reach of Kelsey Creek. Weir #3 is in the foreground and Weir #2 is in the background.

Photo 5: Photo illustrates existing access road within corridor to be used for construction access.

Photo 6: Typical stream conditions within the subject reach of Kelsey Creek. Weir #3 is in the foreground and Weir #2 is in the background.

Photo 7: Typical rip rap within Kelsey Creek.

Photo 8: 16-inch pipeline corridor at creek crossing (right bank).