King County

INSTREAM PROJECT DESIGN CHECKLIST

For Design and Construction of Flood and Erosion Protection Facilities and Habitat Restoration Projects that May Include Large Wood Placement or Natural Wood Recruitment

Project Name Tolt Pipeline Protection Project Project Manager Chase Barton

River/River Mile/Bank Snoqualmie River/12.9-13.1/Right bank Date December 28, 2015

Check one or both:

☑ Project includes placement of large wood elements

☑ Project may influence the recruitment, mobility and accumulation of natural large wood.

Note: If the project is comprised of emergency work, then fill out and file this form within 30 days of completion of emergency work.

I. Project Background and Preliminary Design (30-40 Percent) Information

(Provide general information at a conceptual level)

1. Describe the overall river management context, strategy and objectives for the river reach. Refer to pertinent plans, policies or documents pertaining to flood hazards, salmon recovery, etc.

River management approaches in this reach are informed by several plans and related documents that provide context for flood hazard management and salmon recovery.

King County's 2013 Flood Hazard Management Plan Update identifies the project reach as part of the Chinook Bend to County Line Meander Segment. This segment is low gradient and low velocity flood flows across the valley are relatively frequent. Floodplain management efforts are focused on reducing flood and erosion risks, supporting sustainable agriculture, and restoring ecological processes.

The Snohomish River Basin Salmon Conservation Plan (2005) provides a snapshot of this mainstem reach on pages 11-29 and 11-43. The recovery focus is to restore watershed processes by restoring forest, increasing floodplain connectivity, and increasing channel complexity. The greatly diminished quantity and quality of rearing habitat, particularly along the channel margins is a problem. For the Snoqualmie River, the lack of large wood in the river is specifically called out.

The site is also located in the Snoqualmie Agricultural Production District, and numerous County policies in the Comprehensive Plan and elsewhere support efforts to sustain viable agriculture in this portion of the Snoqualmie valley.

2. Describe the goals and objectives of the project and its relative importance to the success of DNRP program goals and mandates. Identify funding source(s) and describe any applicable requirements or constraints.

The Tolt Pipeline Protection Project will reconstruct approximately 1,000 linear feet of the Winkelman revetment, protecting the City of Seattle's Tolt Pipeline. This project provides regional benefits by protecting the Tolt Pipeline, which carries approximately 30% of the City of Seattle's water supply source.

The project goals and objectives are based on those of the King County Flood Hazard Management Plan, factoring in the context of this reach. The project goals are to protect the Tolt River water supply pipeline by reconstructing the revetment on the north side of the river, to reconstruct the revetment in a way that minimizes long-term maintenance needs, and to provide benefits to aquatic habitat and to agricultural land uses in the vicinity to the extent possible. The project design was developed to protect regionally important infrastructure in a way that does not increase adverse environmental impacts.

The funding for the project is being provided by the King County Flood Control District. Expenditures to date include analyses of critical areas and geotechnical conditions, engineering design, preparation of permit applications, coordination with neighboring property owners, and community outreach. Permit conditions are pending but the 60% design reflects input from the permit agencies during site visits and other discussions to date. The environmental features are intended to provide appropriate levels of mitigation anticipated to be supported by the permit agencies and reflected in permit language. It is anticipated that in-water work will be limited to July through September. If the project was postponed to 2017, the project would likely sustain additional expenses, depending on the degree of continued bank erosion.

3. Describe the existing (and historic, if relevant) site and reach conditions, including structural features, channel form, and the presence of naturally-deposited large wood. Describe known utilization by salmonids and any important or unique biological or ecological attributes.

The Snoqualmie River in the vicinity of the project reach is low gradient and meandering, and predominantly confined to a single threaded channel. Sand bars are present on the inside bank of river meanders and gravel bars are occasionally present where the river is not confined by bank protection and has widened. Naturally deposited large wood is common in the main channel and is also found at the project site, specifically along the right bank. Wood at the project site appears to have recruited locally due to ongoing bank erosion.

King County commissioned Collins and Sheikh to map historical conditions in the Snoqualmie River valley (2002). This report indicates (Figure 5) that large conifers including red cedar and Sitka spruce were present in the riparian corridor. The presence of these large conifers was confirmed by adjacent property owner Dr. Larry Pickering (December 2015, personal communication) though they are currently absent from the bank. The channel only became navigable to Fall City in the 1880s according to A History of the Snoqualmie Valley by Hill (1970).

The Snohomish River Basin Salmon Conservation Plan (2005) describes the reach as the mid-mainstem Snoqualmie sub-basin and it is ranked high priority for protection and restoration by the ecological analysis for salmon restoration done for the plan in part because it downstream of all core Chinook spawning areas in the Snoqualmie. Recommendations in the plan that apply to this project include improving edge complexity (page 11-45) and using bioengineering for bank stabilization projects (page 10-11). The project design uses wood to stabilize the bank and increase edge complexity. Cottonwood boles along the upper slope and diverse species in the buffer planting at grade have also been integrated into the design to address water quality, habitat and permit issues.

4. Describe what is known about adjacent land uses and the type, frequency, and seasonality of recreational uses in the project area. Are there nearby trail corridors, schools or parks? What is the source(s) of your information?

Land use in the vicinity of the project is primarily agricultural use. The project site and all adjacent properties are in private ownership with no terrestrial public access. Other land uses include the City of Seattle's property for the Tolt Pipeline corridor and the City of Duvall's Duvall Park located west of State Highway 203 north of the project site. The closest school is several miles from the project site in Duvall.

The Snoqualmie River is used for several types of recreational activities in the project site vicinity including jet skiing, fishing, casual floating, stand up paddle boarding, canoeing, and kayaking. However, recreational use in the Snoqualmie River in the project reach has been classified as generally infrequent (Carol MacIlroy Consulting Corporation 2009; Herrera 2014). Floating of any kind is rare because the put-in locations are widely spaced and the river flows quite slowly, particularly in the summertime, when recreational use is highest. During three overflights of the entire reach between Carnation and Duvall on optimum summertime floating days in 2013, only seven boaters were found (Herrera 2014). Bank and wading access is also limited by private property and steep bank slopes. Therefore, the dominant user group in the project reach is motorized boaters, rated as having a moderate level of use (Carol MacIlroy Consulting Corporation 2009). Given the slow-moving nature of the river in the project reach when motorized boaters are present (primarily in the summer) and the nature of the use (motorized), the proposed project is not expected to affect this user group.

5. If the project includes wood placement, describe the conceptual design of large wood elements of the project, including, if known at this stage in the design, the amount, size, location, orientation, elevation, anchoring techniques, and type of interaction with the river and stream at a range of flows.

Three types of Engineered Log Structures (ELS) are included in the Tolt Pipeline Protection Project design. They are Ballasted Log Jacks, a continuous Bank Roughening Jam, and Alcove Engineered Logjams.

Below an elevation of 20 feet (around 5 feet below summer low water levels) wood will be placed as individual ballasted log jacks. Dewatering the bend is not feasible, and the water depths preclude connecting logs together in place. Therefore, the jacks will be assembled prior to installation and lowered to depth. Each log jack will interlock with other log jacks. The purpose of the log jacks is to provide erosion protection at the toe of the bank, to cover the rock toe and induce sedimentation over it, and to provide habitat benefits in the deeper water portions of the channel. The revetment is not designed to meet formal seismic safety criteria, however, the ballasted log jacks provide a flexible cover that will self-adjust if the bank settles or slumps or the toe scours. In these conditions, the log jacks would continue to provide extensive roughness along the bank toe. The design includes 680 log jacks with 4 pieces of large wood that are each 10 feet in length. None of these pieces include rootwads and this large wood will be below the water surface under all flow conditions.

Above an elevation of 20 feet, boulder ballasted logs will be attached to wood piles to form a continuous multi-layer bank roughening jam. The irregular shape created by interweaving of the logs will slow velocities and encourage suspended sediment to drop out and bury the logs. The bank roughening jam will be constructed up to an elevation of 35 feet, approximately 5 feet above the line of perennial vegetation. Slash and racking logs will be placed in between the key logs, and the soil between the logs at higher elevations will be planted. Approximately 180 pieces of large wood with rootwads intact will be integrated into the bank roughening jam. The bank roughening jam will be wrapped around the downstream end of the alcove to ensure there is no outflanking erosion, in addition to being extended along the bank upstream of the opening of an alcove being constructed at the mouth of a small tributary stream and wetland system. Summer low flows (1,000 cfs and below) will engage

only the lowest layer of logs in any ELS and the structures are largely submerged at Ordinary High Water (approximately 7,000 cfs).

Alcove Engineered Logjams will be placed in the floodplain reconnection alcove located on a small tributary off of the mainstem Snoqualmie River. The purpose of these structures is to provide hydraulic complexity to the remeandered tributary channel. Approximately 72 pieces of large wood will be used in these structures. Wood will be secured in place by chain lashing to boulders and timber piles. The alcove will not be accessible to recreational users at summertime flows and these structures will be engaged by tributary flows and Snoqualmie mainstem backwater between approximately 7,000 and 14,000 cfs.

All ELS are designed to remain stable for all anticipated future conditions during Snoqualmie River flood flows up to the 100-year recurrence interval event.

6. If the project includes wood placement, what is the intended structural, ecological or hydraulic function of the placed wood? What role does the placed wood have in meeting the project's goals and objectives? Is the project intended to recruit or trap additional large wood that may be floating in the river?

The Engineered Log Structures (ELS) are intended to discourage erosion at the toe of the embankment by reducing the likelihood that the deepest part of the channel becomes entrained along the embankment toe. This function reduces the required depth of the shoring wall providing considerable project costs savings. The ELSs also add physical complexity to the river bank, enhancing aquatic habitat.

The wood within the ELSs is also intended to reduce environmental impacts associated with floodplain management at this site consistent with the goals of the King County Floodplain Management Plan, and to help address some of the ecological problems described in the Salmon Conservation Plan described in part under item three above. To construct the project, a federal permit (from the US Army Corps of Engineers) is required. This triggers compliance with the Endangered Species Act and elevates the need to address the problems that have been identified for salmonids in the river. The ELSs are intended to provide areas of slow water refuge for fish during all flow conditions. The wood will be imbedded in the bank and provide areas for riparian vegetation to provide shade and ecologically beneficial detrital inputs. In addition to providing velocity refuge, the wood, in combination with vegetation on the bank, will provide habitat for salmonid prey organisms. Wood from upstream sources may accumulate periodically on the ELSs. It is anticipated that naturally occurring large wood will continue to move downstream if it is temporarily deposited on the ELSs.

7. Is the project likely to affect the recruitment, mobility or accumulation of natural large wood, e.g., by encouraging wood deposition on or near the site or promoting bank erosion that may cause tree toppling? Describe expected site evolution and its potential effects on natural wood dynamics.

The project will reduce local recruitment of large wood by stabilizing an embankment that is eroding and depositing wood at the margin of the main channel. Current patterns of wood mobility or accumulation are not likely to change as a result of the project. Wood from upstream sources may accumulate periodically at the site. It is anticipated, however, that naturally occurring large wood will again move downstream in the case it is temporarily deposited within the project area.

8. Describe how public safety considerations have been incorporated into the preliminary project design. For placed wood, address each of the considerations:

   a. Type, frequency, and seasonality of recreational use;

The Snoqualmie River is used for several types of recreational activities in the project site vicinity including jet skiing, fishing, casual floating, canoeing, and kayaking. However, recreational use in the Snoqualmie River in the project reach has been classified as generally infrequent (Carol MacIlroy Consulting Corporation 2009; Herrera 2014). Floating of any kind is rare because the put-in locations are widely spaced and the river flows quite slowly, particularly in the summertime, when recreational use is highest. Bank and wading access is also limited by private property and steep bank slopes. Therefore, the dominant user group in the project reach is motorized boaters, rated as having a moderate level of use (Carol MacIlroy Consulting Corporation 2009). Given the slow-moving nature of the river in the project reach when motorized boaters are present (primarily in the summer) and the nature of the use (motorized), the proposed project is not expected to affect this user group. The slow nature of the river flow during summer months will make it easy for any river user to avoid the placed wood. In addition, this low velocity nature of the river minimizes any potential risks to the rare non-motorized boaters who may use the river along this site.

   b. Wood location, positioning, and anchoring techniques;

The ELSs are positioned at the channel margin and at depth below the low flow water surface and will be securely anchored with piles and ballast. The position of the wood will be visible from a great distance upstream with adequate time to navigate away from it, particularly given the low velocity nature of the river at this location.

   c. Maximizing achievement of project goals and objectives while minimizing potential public safety risks;

Inclusion of large wood and the ELSs are integral to a cost effective flood hazard reduction project that reduces risks from flood and channel migration hazards, avoids or minimize environmental impacts of flood hazard management, and reduces the long term costs of flood hazard management.

Public safety risks are minimized by the project design (including stable structures visible from a great distance upstream) and the slow velocities that characterize this section of the Snoqualmie River.

   d. Use of established and recognized engineering, geological, and ecological expertise.

Professional engineers, geologists and ecologists have been involved in design and review of the project. The methods used to design this project are consistent with best professional practices.

9. Has the project been reviewed and approved by a Licensed Professional Civil Engineer? Please list other licensed technical staff who have reviewed and provided input on the design (e.g., Licensed Geologist and Licensed Engineering Geologist). Specify the Engineer of Record for the design and any other Licensed Professionals who have sealed their portion of the design plans. Were all reviews and approvals completed?

Professional Civil Engineers that are integral to project design include King County Engineer of Record Clint Loper, King County Project Manager and Engineer Chase Barton, King County Engineers Mary Lear and Craig Garric, Consultant Design Team Project Manager Cynthia Carlstad (Carlstad Consulting), Consultant Design Team Lead Engineers Vaughn Collins (Northwest Hydraulic Consultants) and Mike (Rocky) Hrachovech (Natural Systems Designs) and Consultant Design Team Geotechnical Lead Deborah Overbay (GeoEngineers). The Engineer of Record is Clint Loper, King County, and additional professional engineers that will stamp the

final design plans include Vaughn Collins and Mike (Rocky) Hrachovech. King County Project Manager Chase Barton and Consultant Design Team Project Manager Cynthia Carlstad are also licensed professional geologists. Project reviews and approvals (including third party reviews) have and will be completed at design milestones and management decision points consistent with King County Water and Land Resources Division Project Management Manual (2014).

10. Has the project been reviewed and approved by a King County Professional Ecologist (e.g., person with an advanced degree in aquatic and/or biological sciences from an accredited university or equivalent level of experience) if ecological benefits are an intended project objective, to evaluate the consistency of the design with project goals, existing environmental policies and regulations, and expected or known permit conditions? Specify the Reviewing Ecologist for the project. Was this review and approval completed? What is the anticipated schedule for completing project milestones (30-40% design, final design, major construction/earthmoving) and for soliciting public input)?

Yes, Phyllis Meyers, Senior Ecologist on the Snoqualmie basin team within the River and Floodplain Management Section has been on the project development team and has handled permitting. This project requires compliance with federal regulations, including the Endangered Species Act. As a result, several professional biologists reviewed the project. The project was designed with anticipation of these reviews in mind. Review for compliance with the Clean Water Act, Endangered Species Act and Washington State Hydraulic Code are all underway. A 60% plan set is provided for review with this checklist. Final design will be completed in the first quarter of 2016. Construction is scheduled for summer and fall of 2016.

for Chase Barton 28 DEC 2015

Project Manager Date

12-28-15

Supervising Engineer Date

II. Pre-Construction Information (70% or 100% design with permits) *These questions relate to the designed and permitted project. Information should include input resulting from permit review process, SEPA, boater safety meetings and any other stakeholders.*

11. Have any answers provided in Section I at the Preliminary Design Phase changed in the interim? If so, provide the new answers and the rationale for the change.

12. What regulatory review or permits are required for the project (e.g. HPA, Clearing and Grading permit, COE permits)? List any conditions or requirements included in the permit approvals relevant to placement of large wood in the project.

13. What specific actions or project elements were employed to address public safety in the final, permit-approved design?

14. Describe how the project team solicited public input on the preliminary design. Describe the input received from the public and how, if appropriate, the project team has responded to this input.

15. Describe any additional design modifications or mitigating actions that were or will be taken in response to the public comments.

16. Will further educational or informational materials be made available to the public to heighten awareness of the project (e.g., public meeting, press release, informational website, or temporary or permanent signage posted in the vicinity of the project)? If so, explain.

17. If the project is expected to influence the recruitment, mobility or accumulation of natural wood, has a Public Safety Management Plan been completed?

Project Manager Date

Supervising Engineer, Project Supervisor or Unit Manager Date

III. Post-Construction Actions or Project Modifications

18. Have any answers provided in Sections I and II at the Preliminary design and Pre-Construction phases changed in the interim? If so, provide the new answers and the rationale for the change.

19. Briefly describe the scope and timing of post-construction monitoring and inspection activities planned for the project as they relate to large wood. If a Public Safety Management Plan or Monitoring Plan has been developed for the project, you may simply reference and attach that document.

20. If post construction monitoring or inspections result in modifications to the project, please describe the action taken and the rationale and consistency with the Public Safety Management Plan, if applicable.

Project Manager Date

Supervising Engineer, Project Supervisor or Unit Manager Date