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: Shake Mill Left Bank Revetment Repair Project Manager: Gus Kays

River/River Mile/Bank: North Fork Snoqualmie River/ RM 0.3 – 0.45 Left Bank Date December 4, 2018

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 river reach are informed by several plans and related documents that provide context for flood hazard management, salmon recovery, and agriculture.

   - This project is consistent with the alternatives for managing King County's flood protection facilities in the adopted 2006 King County Flood Hazard Management Plan (updated in 2013).
   - The Snohomish River Basin Salmon Conservation Plan (2005) provides a snapshot of the salmon recovery strategy for sub-basins of the Snoqualmie River above Snoqualmie Falls on pages 11-81-84. The highest ecological recovery need for this area is preserving habitat for hydrologic and sediment processes.
   - As a stabilization project in the Conservancy Shoreline Environment, the proposed buried setback revetment must meet specific criteria in the King County Shoreline Code (KCC 21A.25.170).

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.**

   Geomorphic change and ongoing erosion has caused the destruction of an approximately 400-foot long section of the 1700-foot long Shake Mill Left Bank/Tarp Revetment on the left bank of the North Fork of the Snoqualmie River on King County-owned parcel (parcel number 3424089075) over the last decade. The goal of the project is to protect the North Fork Snoqualmie Bridge and the 428th Ave SE roadway embankment. The failure and erosion of the Shake Mill Left Bank Revetment has increased risk to the road and bridge. After completing an alternatives analysis and considering risks, opportunities and constraints, the King County River and Floodplain Management Section project team recommended construction of a buried setback revetment comprised of matrix of large wood pieces, and large rock ballast along the north property line of the King County-owned parcel. Construction of this alternative has been approved by the King County Flood Control District.

   The objectives of the project include:

   - Addressing significant damage to the Shake Mill Left Bank Revetment by constructing a buried setback revetment landward of the alignment of the damaged facility.

- Reduce channel migration and avulsion risks to 428th Ave SE, the North Fork Snoqualmie Bridge, and private property.
- Conduct repair to minimize long-term maintenance needs and associated costs.
- Provide aquatic and riparian habitat benefits to comply with regulatory requirements.

The project is funded by the King County Flood Control District.

Primary constraints on project implementation include:

- The Project will need to demonstrate no rise in the base flood elevation (100-year recurrence interval) water surface elevations to meet Federal Emergency Management Agency (FEMA) floodplain regulations.
- The project must be in compliance with all federal, state, and local permit requirements. The project is designed to be self-mitigating to meet the general requirement in King County's Shoreline Master Program that projects in the Shoreline District have not net loss of function of riparian habitat.

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 primary property on which the proposed project will occur previously had a shake mill and a single-family residence. It also contains the Shake Mill Left Bank/Tarp Revetment, which sustained significant damage during flooding in 2009. After this damage the North Fork Snoqualmie River began to migrate to the south, putting the single-family house and shake mill at risk. King County RFMS purchased the parcel in 2012, demolished the structures, and began working on plans to address the channel migration to reduce risk to the 428th St SE and the bridge over the North Fork. The land cover is predominantly pasture, blackberry, reed canary grass, and scattered native conifer and deciduous trees.

The surrounding properties are predominantly low density rural residential with a mix of pasture and forest. Two largely forested parcels immediately to the north and northeast owned by King County Parks contain a segment of the North Fork Snoqualmie River. Approximately, 1400 feet downstream of the project, the North Fork Snoqualmie joins the Middle Fork Snoqualmie River in the King County-owned Three Forks Park.

The North Fork Snoqualmie River is a Type S (Shoreline) stream under King County's stream classification system. The parcel abutting the watercourse (project site) is within the Conservancy Shoreline Management Designation. Tate Creek, a Type F (Fish) tributary stream, drains from the north into the North Fork Snoqualmie River immediately across the river from the project area. The project site is located above Snoqualmie Falls. Anadromous salmon are not present above Snoqualmie Falls. Several species of trout are documented above the Falls, including coastal cutthroat trout (*Oncorhynchus clarki, clarki*), rainbow trout (*O. mykiss*), westslope cutthroat trout (*O. clarki lewisi*), hybrid or unidentified Pacific trout Oncorhynchus species (Onxx), eastern brook trout (*Salvelinus fontinalis*) and mountain whitefish (*Prosopium williamsoni*).

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?**

The surrounding properties is the general vicinity of the project site are predominantly low density rural residential parcels with a mix of pasture and forest. There are two largely forested parcels to the immediate north and northeast of the project site, which are owned by King County Parks. Additional parcels owned by King County Parks comprising the Three Forks Natural Area are to the west of the project site on the opposite side of 428th Ave SE. This park contains a vehicle parking area and supports passive recreation with an informal trail network providing access to the banks of the North and Middle Forks of the Snoqualmie River. To the immediate south there is a farm property that grows holly and blueberries.

The North Fork Snoqualmie River is used for several types of recreational activities in the project site vicinity including fishing, casual floating, canoeing, and kayaking. However, recreational use in the North Fork Snoqualmie River in the project reach has been classified as generally infrequent (Carol MacIlroy Consulting Corporation 2009). 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 steeply sloping banks.

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.**

This project proposes a buried setback revetment using a mix of wood (logs) and rocks. It is anticipated that 300-400 logs will be used to build the 850-foot long buried setback revetment. These logs will be anchored to resist buoyancy and drag forces through embedment into the bank and the earth pressures associated with the embedment. Additionally, the logs will be anchored by ballast rock collars (a pair of rocks tethered to the rocks with chain). The logs length will be predominantly buried/embedded into the bank with a portion of the log extending beyond the bank such that when engaged by the river (in the future) these exposed portions of the logs will provide hydraulic complexity and habitat. The log elevations will be approximately flush with the existing channel bottom at their lowest point and approximately flush with the ordinary high water level at their highest point. Generally the logs will be 18-24 inches in diameter with a range of lengths from 20-40 feet. Less than half of the logs used to construct the revetment will have the rootwads attached. An additional 20-40 logs/trees cleared during construction will be buried unanchored immediately riverward of the structure. These logs will be set at a similar range of elevations and will have their rootwads and branches left intact to mimic the natural recruitment that would have occurred if the site had not been cleared for construction of the revetment. Immediately after construction, no project wood will be interacting with the river.

There is currently an accumulation of naturally occurring large wood throughout the North Fork River Channel adjacent to the site.

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?**

Structural functions include:

- Provide increased protection to the 428th roadway embankment by holding/pushing the erosive hydraulic forces of the flood waters away from the bank. Additionally the wood structures have variability in their projection away from the bank reducing the likelihood that the river will become entrained/trapped against the revetment.

Ecological functions include:

- Increased structural complexity of riverine habitat.
- Creation of scoured pools and areas of reduced flow velocity to benefit resident fish.
- Increase shading and refuge for wildlife and fish.

Hydraulic functions include:

- Reduces flow velocities at the revetment interface with the river when engaged to reduce the ongoing erosion risk to the bank and downstream structures. Minimize erosion risks to the existing bridge piers associated with changes in directions in flow to the extent practicable.

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.**

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 as it does under existing conditions. It is anticipated that naturally occurring large wood will be transported 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 swimming, fishing, casual floating, and kayaking. However, recreational use in the Snoqualmie River in the project reach has been classified as generally infrequent (Carol MacIlroy Consulting Corporation 2009). 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. The slow nature of the river flow during summer months will make it easy for any river user to avoid the naturally occurring 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*:

Wood will be embedded in the bank anchored by the weight of soil on top of the structure and by rock collars (boulders chained to the logs). All wood will be placed 40-150 feet landward of the current bank. The wood structure will be positioned to encourage channel complexity once the river engages with the feature.

Additionally, there will be non-structural, non-anchored salvaged trees buried riverward of the setback revetment. These salvaged trees are being removed from the footprint of the setback revetment (salvaged) and then incorporated as buried features riverward of the setback revetment. These logs are intended to mimic natural process as the site evolves by being recruited into the river much in the same way they would have if they had remained standing.

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

All work is as far away from the river edge as feasible. Wood that is being added to the site (not salvaged) will be anchored making it stable during flooding.

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 Project Manager and Engineer Gus Kays, King County Supervising Engineer Chase Barton, and Consultant Design Team Project Manager Jerry Scheller (TetraTech). The Engineer of Record is Chase Barton, King County, and Bill Fullerton (TetraTech), will stamp the final design. Chase Barton is also a licensed professional geologist.

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, Seth Amrhein, ecologist on the Snoqualmie basin team within the River and Floodplain Management Section, is on the project team and has reviewed and approved the final design.

Project Manager — Date 1/14/19

Chase Barton — 1/14/19

Supervising Engineer, Project Supervisor or Unit Manager — 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?**

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Project Manager Date

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Supervising Engineer, Project Supervisor or Unit Manager Date

III. Post-Construction Actions or Project Modifications

- 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.

- 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.

- 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