

# 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: Desimone PL 84-99 Levee Rehabilitation Project

Project Manager: Patricia Robinson

River/River Mile/Bank: Green River

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.

*The Desimone Levee, located in the City of Tukwila on the Green River right bank, incurred significant damage during February 2020 flood events. The repair and improvement project is being implemented by the U.S. Army Corps of Engineers (Corps of Engineers or Corps) under the P.L. 84-99 Levee Rehabilitation and Inspection Program (PL 84-99) and includes a Locally Preferred Plan (LPP). The LPP will replace the damaged Desimone levee with a floodwall and increase the level of flood risk reduction afforded by the project between river miles 14.6 and 15.2 by raising the height of the facility. The project will repair levee slope failures, shift the alignment and trail landward to the extent possible for a more stable embankment, provide buried scour protection where needed, integrate habitat improvements, and also address seepage concerns construction of the floodwall.*

*Riparian and aquatic habitat will be improved by:*

- a. *reducing the slope of the riverside levee face to a maximum of a 3:1.*
- b. *revegetating the riverside levee face throughout the project area with native trees and shrubs.*
- c. *construction of up to eight boulder piles distributed along the length of the project at the toe of the riverward levee face to create areas of slow-water refugia for juvenile salmonids.*
- d. *placement of boulder-ballasted large-wood habitat features at varying elevations along the riverward levee face within the project area. The lowest features will be placed along the toe of the levee embankment to be in contact with river during summer low flows (approximately 300 CFS).*

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 Desimone levee is part of a larger levee system along the right bank of the Green River that provides flood risk reduction benefits to highly developed areas in the cities of Renton, Tukwila, and Kent in Washington. The Corps of Engineers estimates that under the current damaged condition, the level of flood protection is diminished from 0.67%*

(150-year) annual chance exceedance to 99% (1-year). The LLP requested by King County and accepted by the Corps will address the damage to the levee, increase the level of flood risk reduction provided by the levee allow for a more stable embankment slope, install scour protection where needed, and incorporate habitat features to improve aquatic and riparian conditions.

As a levee enrolled in the federal PL 84-99 program, the Corps will fund 80 % of the project implementation cost of the least cost in-kind repair alternative, and the King County Flood Control District will fund the remaining 20 % of an in-kind repair plus additional costs, such as property acquisition. The King County Flood Control District will fund 100% of additional costs associated with the locally preferred plan which includes increasing the design containment level, adding habitat features and reducing the steepness of the bank to approximately 3:1.

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.

*Salmon habitat in the Lower Green River is degraded compared with historical conditions because of land use changes, floodplain development, and river management activities such as channel confinement by levees and revetments, regulated flows from operation of Howard Hansen Dam, and diversion of the White River so that it no longer flows into the Green River. The highly engineered Lower Green River that resulted from these actions is characterized by confined, armored channels that lack the in-stream geomorphic complexity and floodplain connection needed to create aquatic habitats that support healthy fish populations, including ESA-listed species such as Puget Sound Chinook salmon, steelhead, and bull trout. The Lower Green River is physically isolated from its floodplain by a near continuous system of levees and revetments and is hydrologically isolated from the floodplain due to riverbed incision and altered flows from operation of the Howard Hansen Dam. Shoreline and riparian areas lack mature trees, resulting in minimal shade and elevated water temperatures. Existing water temperatures and dissolved oxygen do not meet water quality standards, leading to adverse, sometimes lethal, affects to threatened fish species; the river is on the Clean Water Act Section 303(d) list and has a total maximum daily load (TMDL) for water temperature. The lack of riparian trees and shrubs also reduces available food resources for juvenile salmonids.*

*The river channel through the project reach is confined on both sides by levees. There is almost no naturally occurring large wood in the project reach; any wood that may be present at a given time quickly moves through the reach, since there is no structural complexity to functionally retain it. Seven species of anadromous salmonids use the river in the project reach: Chinook, chum, pink, and coho salmon, and steelhead (rainbow), cutthroat, and bull trout. The project is in a section of the Lower Green River surrounded by dense development, which greatly limits opportunities for large-scale habitat restoration.*

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 land in project vicinity is within the City of Tukwila. Land use surrounding the project site is comprised of light industrial and warehouse activities. Briscoe Park, approximately 0.5 miles upstream of the project area, is the closest public park. The Green River Regional Trail, a popular paved cycling and pedestrian path, runs along the top of the Desimone Levee through the project area. The project will move the trail landward as much as possible to provide room to reduce the steepness of the levee face on the riverward side.*

*River recreational use of this reach of the river is presumed to be low based on the County's Synthesis of 2013 River Recreation Studies (pg. 31). This study did not evaluate recreational use downstream of river-mile-15.9, which is approximately 0.7 mile upstream of this project. However, we expect that recreational use in the river would be similar or less than the closest upstream reach that was surveyed between river-mile 15.9 and 19.4, as the river conditions and features are similar. Compared to the other two sections of the Green River studied further upstream, the lower Green River study area had much lower numbers of people recorded using the river per day, the highest life vest usage, and the highest use of boats (canoes and kayaks) rather than rafts and inner tubes. The full report may be found here: [SYNTHESIS OF 2013 RIVER RECREATION STUDIES KING COUNTY RIVER RECREATION STUDY](#)*

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.

*The USACE professional staff designed the large wood habitat features with consultation from King County staff. The Desimone levee rehab site incorporates multiple features designed to be beneficial to aquatic life over a range of life stages. Log sets, single logs, and boulder features are all part of the design for the Desimone levee rehabilitation project. The USACE staff prepared the following descriptions the large wood features:*

#### Log Sets

*Linear log features will be constructed at multiple elevations to ensure that a range of flow rates interact with the logs to create areas of slower water near the bank over a range of flow rates. These are sets of 2-foot diameter Douglas Fir logs, three 20-foot logs, two 15-foot logs, and one 10-foot log. The furthest upstream log is a 15-foot-long bumper log to ensure boater safety. This log does not have a rootwad and is at a 45-degree angle to the flow. The following four logs form a log and rock feature designed to create multiple overflow elevations such that the feature creates and maintains refuge areas over a range of flows and water surface elevations. Three 20-foot logs are placed in sequence, each at a 5–10-degree angle to the flow. Each has a rootwad facing upstream and is ballasted by two 60-inch boulders attached by chain. The upstream, rootwad end of each log will be chained adjacent to the boulder while the downstream end will be chained on top of the boulder. This will force a pattern of variable elevation flows across the log. By creating vertical flow diversity at the log features, the potential for sediment accumulation between the logs and banks is reduced. The single 10-foot log is placed perpendicular to the bank, across the furthest upstream 10-foot log. The rootwad is pointing into the flow and the log is chained to the ballast rock at the bank and to the 20-foot log. The furthest log downstream is 15-foot long without rootwads. It is placed furthest from the bank such that the downstream end of the log is 10 feet from the bank. This log position will generate a sheltering eddy immediately downstream of the log set. The log sets have been evaluated for stability as individual logs and as a group of chained together logs and ballast rocks. They are designed to be stable up to the 0.002 AEP event and were evaluated using a log stability analysis model adjusted for use by USACE from the Rafferty (2020) model. Log sets will be separated by 50 feet and built at a range of elevations to capture the range from low summer flows to average winter flow rates.*

#### Single logs

*Individual logs will be placed at random locations further up the bank from the 2000 cfs water surface elevation and at an approximate 30-degree angle to the flow. Douglas Fir logs 20 foot long will be used. Logs without rootwads will be chained to two 60-inch boulders for stability. The collars for the chains will be one foot from each end of the log. Logs with rootwads will be chained to a single 60-inch boulder, with the collar one-foot from the end without the rootwad. The logs will lay on the ground beside the anchor rocks. All anchor rocks should be buried halfway. The purpose is for these logs to create areas of slower water during high winter flows. Both log conditions have been evaluated for stability for flows up to the 0.002 AEP event using a single log stability analysis model adjusted for use by USACE from the Rafferty (2020) model. Each log will increase localized roughness when engaged with the flow. Engaged flows will have reduced velocities in front of each log, creating an area of slow, refuge flow, and a slight plunge.*

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 primary purpose of the large wood placement is to provide areas of slower moving water for small out-migrating salmonids to seek refuge to feed and rest in a range of flow conditions. Providing more opportunity for these fish to remain in the river system longer to feed and grow before entering the ocean is associated with higher rates of survival in the marine environment.*

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.

*Due to extensive development in the Green River Basin, there is little naturally occurring large wood accumulation, especially in the project area in the highly urbanized lower Green River floodplain. The project is not designed or expected to trap/capture the occasional piece of large wood that may be floating downstream during high flows. It is*

*possible, however, that such wood may become lodged in the installed wood. However, being unanchored, it would be unlikely to remain in the project site permanently, as subsequent high flows will likely move the wood further downstream.*

*Large wood complexes were placed on the opposite bank in conjunction with a repair completed in 2008. There appears to be no accumulation of natural large wood at this site.*

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;

*No studies of recreational use of the Green River in the project area have been completed. However, we presume that recreational use in the project area is low, based on the County's Synthesis of 2013 River Recreation Studies (link above) and findings in the reach immediately upstream. Most usage is expected to be small, unpowered boats, like canoes and kayaks, during the low flow conditions in the warmer parts of the year. Some rafters and tubers may float through the project area in warmer weather, but this is likely quite uncommon.*

- b. Wood location, positioning, and anchoring techniques;

*See #5 above for a more complete description of wood location, positioning and anchoring techniques. For the lower elevation six-log sets that will be placed on the lower levee embankment, a deflector log without a rootwad will be installed at the upstream end of each of the large wood complexes planned for placement on the bank in the levee repair areas. This treatment may lessen the likelihood of a recreational boater or floater becoming caught in the large wood feature. The features will be along the margins of the river, with minimal projection into the channel where boaters or floaters would be expected. The one-log and two-log features will be placed higher up on the levee embankment. These higher elevations would only interact with the river during higher flow events when recreational use is not expected.*

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

*This project will add large wood features along the channel margins at varying elevations on the levee embankment with the primary purpose of creating refugia for juvenile salmonids during a variety of flow conditions. Minimizing the projection of the large wood features into the channel and the use of deflector logs at the upstream end of each six-log set in an area of low in-water recreational use will minimize public safety risks associated with the large wood installation.*

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

*The large wood features have been designed by professional staff at the Seattle District Corps of Engineers with input from ecologists and engineers with King County. Both entities have experience designing and installing similar large wood habitat features at other sites along the Green River in the vicinity of the project.*

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?

*As a PL 84-99 levee rehabilitation project, the design and implementation of this project is being wholly undertaken by professional staff at the Seattle District Corps of Engineers. King County engineers are consulted but not directly responsible for the design, review, and/or approval of this type of project.*

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)?

*The project is being designed and implemented by professional staff at the Seattle District Corps of Engineers). King County Senior Ecologists provided general feedback on the types of habitat features that are expected to provide habitat benefits in the project repair area. The Seattle District Corps of Engineers will make all final design decisions and locations of the habitat features.*

*The Corps of Engineers issued a [Draft Environmental Assessment \(EA\)](#) (PDF) and 65% Plans September 12<sup>th</sup>, 2024 with a 30-day comment and review period. Opportunity for comments and feedback on this project wase through the Corps of Engineers National Environmental Policy Act (NEPA) public consultation process and Draft Environmental Assessment. Please see [insert website link] for further information including Corps of Engineers contact information and project plans.*

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8/13/2024  
Date

Julie Fitchbourne  
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8/15/2024  
Date