

# INSTREAM PROJECT 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** Belmondo Levee Repair Project      **Project Manager** Linda Bartolini Venegas

**River/River Mile/Bank:** Cedar River, River Mile 10.4, Left Bank

**Date:** August 4, 2022

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.**

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

- 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).
- This project supports the 2005 WRIA 8 Chinook Salmon Recovery Plan (updated in 2017) by installing large wood that will create and protect pools and enhance off-channel habitats.

The Project will provide bank erosion protection and enhance the quantity and quality of aquatic habitat to be consistent with state and county standards for streambank stabilization projects.

- 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 Belmondo Levee Repair Project will repair up to 100-feet of damage on the levee and engineered log jam (ELJ) located at River Mile 10.4 on the Cedar River. The project will also include habitat enhancement in the floodplain adjacent to the damaged section of levee. The goal of the project is to repair damages in order to continue providing flood protection to State Route 169, King County's Cedar River Regional Trail, and Verizon's buried interstate fiber optic line, while also enhancing aquatic habitat.

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

**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 Belmondo Reach of the Cedar River is a 1.4 mile long unconfined, aggrading and avulsing alluvial channel reach. This river reach is highly dynamic and rapidly evolving, resulting in significant changes to the channel shape including channel alignment changes, shifting gravel bars and primary flow paths, and large, varying quantities and configurations of naturally recruited large wood. An examination of historic aerial photos (1936-2020), historic and modern maps and LiDAR imagery provide strong evidence that this area of the Cedar River has a long history of ongoing river channel changes.

The project site is located on the bed and banks of an alluvial river channel and the damaged levee is situated on the historic railroad footprint. The bed of the river channel is primarily composed of alluvial deposits including unconsolidated cobbles, gravels, sands, and silt with underlying siltstone. The lower riverbank is a combination of medium dense compacted sand with gravel and rock armoring. The upper bank soils consist of loose silty fin to coarse sand with gravel fill material.

Naturally occurring large wood is present in the river and actively recruited to riverbanks and other riverine features but is rarely temporally persistent due to active channel migration.

Chinook, coho and sockeye salmon, rainbow trout/steelhead, and coastal cutthroat trout utilize the Cedar River for spawning, rearing and migration. Chinook salmon and steelhead are protected as threatened species under the Endangered Species Act.

**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 immediate vicinity of the project site includes undeveloped open space, low density residential and transportation. The Cedar River Regional Trail borders the project site and supports active and passive recreation year-round. According to the King County 2013 River Recreation Study, water-dependent active recreation includes floating (inner tubing) and fishing in summer months when flows are lower.

**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 project will repair an existing ELJ and build a new ELJ immediately adjacent and upstream of the existing, damaged ELJ. The two ELJs will redirect high river velocities and the deepest part of the river channel away from the levee and toward the center of the river channel. The design will account for changing river channel hydraulics and geometry in this highly dynamic river reach.

The existing damaged ELJ will be filled with small diameter wood and slash material. The addition of a large wood structure adjacent and upstream of the existing ELJ will protect the levee from future erosion in this location and help stabilize the upstream corner of the existing ELJ from high velocity flows. The new ELJ will be oriented facing upstream with large wood extending to the levee face being repaired with rock. The design will include “bumper logs” on the new ELJ and on the repaired ELJ to provide a surface for water-based recreationalists to fend off the structure. The bumper logs will consist of two lashed, parallel logs attached horizontally to each ELJ’s upstream face. The height and position of the bumper logs will be set to match minimum and maximum river stage during frequent recreational flows on the Cedar River. Floaters that approach the ELJ from the water will encounter the bumper logs rather than the ELJ itself and be directed along the bumper logs toward open water at the river center.

Large wood within the repaired and new ELJ will be anchored using chain lashing and ballast boulders. The ELJs will promote scour pool creation, gravel sorting and areas of reduced flow velocity which will improve habitat for salmonids. These structures will be engaged by the mainstem Cedar River at low flows, maintaining and increasing shading, cover and refuge for wildlife and fish.

Large wood elements (anchored clusters of three logs) will also be placed adjacent to an existing rock barb to enhance existing habitat as well as to provide additional roughness to the rock barb at high flows. Large wood will also be anchored parallel to the bank in select areas along the levee repair section to increase bank roughness and improve aquatic edge habitat. The large wood elements and logs will be anchored using chain lashing and ballast boulders.

Large wood will also be placed upstream of the levee in the floodplain. This wood placement will increase floodplain complexity and roughness. Unanchored wood pieces will be placed where they will be engaged by flow in backwater and tributary channels at median spring rearing flow, to provide cover for rearing juvenile salmonids. Wood will also improve flood refuge habitat in the floodplain by creating complex hydraulics, increasing cover, and promoting sediment sorting.

**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 intended structural and hydraulic function of the ELJs is to shift high flow velocities away from the levee and toward the center of the river channel.

The ELJs and wood placement is intended to serve an ecological function as fish habitat. Ecological functions include:

- Increased structural complexity of riverine habitat by increasing channel roughness and hydraulic diversity.
- Increase shading, cover and refuge for wildlife and fish.
- Maintain and create mainstem pool habitat.

The project is not intended to recruit or trap additional large wood. The flow patterns created by the deflectors along with the bumper logs on their upstream face will likely create conditions that encourage wood to pass through the main channel, although some wood may accrue at this location.

**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. Existing recruitment of small/medium woody debris is evident within this reach upstream and downstream of the project site. Racking of small woody debris after construction is expected at the local project site, which will likely be highly transient. This project will not change the accumulation regime of natural large wood. This project design is intended to stabilize the bank.

**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:** King County performed a recreation study in 2013 that covered most of the County's rivers including the Cedar River. The Belmondo reach recorded an average of 1.0 people per day and fewer than 0.3 groups per day during the study period in the reach from Rainbow Bend RM 11.4 RB to Belmondo RM 10.3 LB. The majority of recreational users on the Cedar River during the study were observed in the area downstream of the Belmondo Reach. Total average people recorded per day for the Cedar River was 6.9.

- b. **Wood location, positioning, and anchoring techniques:** Large wood will be anchored or embedded into the levee or existing ELJ, which will prevent mobilization of placed wood in the active channel area. Bumper logs will be secured to the ELJs, in order to provide a smooth surface that floaters can easily push off of should they contact the structure. All wood structures are at location with a sight distance of approximately 400 feet upstream, and at simulated low flow velocities floaters will have in excess of 2 minutes reaction time prior to the structure and portage opportunities exist on both left and right banks. Large wood in the floodplain upstream of the levee will not be anchored but will be placed in between existing trees.
- c. **Maximizing achievement of project goals and objectives while minimizing potential public safety risks:** Public safety has been a design consideration from the beginning of project. The current design strives to use wood to improve habitat while minimizing potential public safety risks to recreational floaters. This is being accomplished by through use of bumper logs on the ELJs, appropriate anchoring techniques, and documentation of likely approach trajectories and timelines.
- 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?**

Yes. Mark Beggs (Engineer of Record, Professional Engineer) and Mark Ruebel (Professional Engineer) designed the levee repair and will oversee the wood placement. Alex Lincoln (Project Ecologist) and Judi Radloff (Project Geomorphologist) provided design support and review. The project is currently at 30% design. All design reviews and approvals have been completed.

**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)?**

Alex Lincoln, Project Ecologist, approved of the design and wood placement. The project is currently at 30% design. The anticipated project construction date is August 2023.

The project was presented at in the May 2022 King County Large Wood Public Meeting. Opportunity to review and comment on 30% design will occur in summer 2022.

<i>Linda Bartolini Venegas</i>	8/4/22
Project Manager	Date
<i>Mark Ruebel</i>	Aug 4, 2022
Supervising Engineer, Project Supervisor or Unit Manager	Date