King County

INSTREAM PROJECT CHECKLIST

For Construction and Maintenance of Flood and Erosion Protection Facilities and Habitat Restoration Projects that may include large wood elements

Project Name: Riverbend Levee Setback and Floodplain Restoration Project Manager: Jon Hansen

River/River Mile/Bank Cedar River, PM 6.5-7.5, left bank Date September 27, 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.

   The Riverbend Levee Setback and Floodplain Restoration Project is located along the left (south) bank of the Cedar River between River Mile 6.5 and 7.5. The project site encompasses Cavanaugh Pond Natural Area and the former site of the Riverbend Mobile Home and RV Park, which King County purchased in 2013. Cavanaugh Pond and other small depressions on the site are remnants of a gravel mining operation active in the western half of the site during the 1950s and 1960s. The upstream portion of the site was historically the site of a mobile home park. The site was purchased by King County as part of an ongoing, basin-wide project to reduce flood risks and restore salmon habitat.

   The project is a high priority, multi-benefit floodplain restoration effort identified in the WRIA 8 Salmon Recovery Plan and the WRIA 8 Four-Year Work Plan. The Cedar River is the highest priority sub-basin for Chinook salmon recovery in WRIA 8, and restoring off-channel habitat through property acquisition and floodplain reconnection as proposed is central to WRIA 8's Cedar River salmon recovery strategy. Purchase of the mobile home park and reconnection of the floodplain (including Cavanaugh Pond) was listed as a multi-objective flood risk reduction and salmon habitat restoration project in Appendix G of the 2006 King County Flood Hazard Management Plan.

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 goals of the project are to:

- Restore riverine processes and functions in the Cedar River and its floodplain in order to improve the quality, quantity, and sustainability of salmonid spawning and rearing habitat;
- Reduce flood and erosion risks to people, property, and infrastructure;
- Accommodate public use consistent with future ecological conditions at the site; and
- Balance flood and ecological benefits and other objectives with project costs.

Currently, project funding is provided by:

- Floodplains by Design Partnership
- King County Water and Land Resources Division
- Washington State Salmon Recovery Funding Board
- City of Seattle

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 mainstem Cedar River is channelized through the project reach, with very little low velocity edge habitat available for juvenile salmonid rearing (Beechie, et al. 2005). In addition, high flows through this channelized reach limit spawning gravel retention, increase the risk of redd scour, and limit wood retention. With the levees in place, the reach is considered a transport reach and when last surveyed had only a few small pieces of wood located along the edge of the channel.

The following salmonids use the mainstem river through the project site for spawning and rearing: Chinook, coho and sockeye salmon, rainbow trout/steelhead, and coastal cutthroat trout. Bull trout have also been documented to use the Cedar River for foraging and migration, but there is no known resident population. Three species— Chinook salmon, steelhead, and bull trout— are all protected as threatened species under the Endangered Species Act. Cavanaugh Pond is used for spawning by sockeye salmon, though use has been declining over time. Other fish species found in the pond include largemouth bass, rock bass, cutthroat trout, sculpin species, largescale suckers, bridgelip suckers, and three-spine stickleback.

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 property on both banks is zoned for rural residential use with density of one unit per 5 acre parcel (RA-5). Prior to acquisition, the Riverbend project site supported a mobile home park with over 100 units and capacity to support 55 RV units. This was developed prior to modern zoning and far exceeds the density than that would be allowed if proposed today. The right bank (north side of the river) is developed for single family use with over 30 single family homes opposite from the existing Riverbend levee. A little farther downstream and across the river, there are another 8 homes behind another flood protection facility referred to as the Herzman levee.

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.

Detailed plans are still being developed, but preliminary designs include approximately 450 pieces of large wood within the newly created side channels, backwater and floodplain. At this time, no wood is proposed to be placed within the mainstem of the Cedar River. The wood will be placed in strategic locations within the floodplain and newly created side channel network to begin to replicate natural levels of LWD loading, provide initial channel roughness and complexity and recruit additional wood.

Wood placed in newly created side channels will also be used to stabilize channel inlets, meter flow entering the channel and provide bed control (set and maintain bed elevation) and to create instream cover and structure for salmon and other aquatic species. Final configuration of the inlet structures may also include bumper logs and/or similar structures to provide reduced risk to recreational floaters. These floodplain structures are intended to facilitate side channel formation, but should also help reduce the potential for large-scale channel migration or avulsion.

The majority of the wood placed in the floodplain will be placed in jams or clusters and anchored in place. The specific anchoring technique has not yet been designed, but key pieces are expected to be partially buried with rock and soil and/or be placed amongst logs with rootwads buried at relatively shallow depth in growth position (roots buried 8-10 feet below the surface and trunk sticking up above the 100 year floodplain elevation. These structures, in combination with plantings, are intended to maintain a complex network of side channels and to prevent specific side channels from capturing a majority of the flow, especially during the first 10-15 years following construction. The installations are designed to become mobilized if the river were to migrate as a result of a large flood event. The floodplain and side channel roughening function will be replaced over time by maturing vegetation and naturally accumulating large wood.

Driven piles are not currently planned for the project but may be considered for inclusion in later plans in areas where channel migration or expansion cannot be allowed to occur. These types of structures would be used sparingly; along the perimeter of the project and/or where they can remain stable and effective under all future channel migration scenarios.

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 woody debris that may be floating in the river?

Large wood will be strategically placed (as single pieces, in clusters or as jams) in the new side channels, backwater habitats and floodplain to help stabilize inlets and restrict/meter flow and restrict channel expansion and headcutting. Wood is being placed in the floodplain to increase roughness, dissipate energy and trap wood and sediment. Within the backwater features, wood is expected increase complexity, roughness and provide cover and stability.

By removing portions of the levee and encouraging flow into the floodplain, we expect the project reach to trap and store wood that is already mobile in the river. The exact location and orientation will change over time, but we expect wood to be more abundant within the reach especially along the margins and on gravel bars. Some wood may be recruited from the site as the channel expands over time, but there are few large standing trees available to recruit in the upstream half of the site.

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 site may recruit wood in the floodplain during flood events. Similarly, trees remaining in the floodplain after construction may be more susceptible to mobilization during flood events due to more frequent and widespread floodplain inundation. Over time, the site is expected to reach equilibrium with wood recruitment and mobilization approaching rates seen in a natural floodplain environment.

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

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

The project site is located on King County property, the upstream half of which was recently acquired for flood hazard reduction and habitat restoration. As such, the upstream half does not provide any formal recreational facilities. The downstream half of the property is owned by King County Parks. The site features a smooth gravel levee access road that leads to a shoreline beach and is a popular site for birdwatching, volunteer stewardship, and accessing the river for swimming, fishing, and floating. The project site is adjacent to a regional trail (Cedar River Trail) which is a popular recreational amenity providing opportunities for walking, jogging, bicycling, and river viewing.

The adjacent Cedar River is also regularly used by recreational floaters/boaters. Floating the Cedar River, particularly in tubes and small rafts, is a very popular summer recreational activity. The primary access to the river in the project reach is through informal trails within the project site and in the Cedar Rapids reach upstream. A local gas station across SR-169 from the project reach sells inner-tubes for river floating.

b. Wood location, positioning, and anchoring techniques;

At this time, no wood is proposed to be placed in the main Cedar River channel. All proposed wood is located in the floodplain, side channels, and backwaters. See Question 5 for information on positioning and anchoring techniques.

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

Public safety has been a primary consideration from the beginning of project design. The current design strives to use wood to improve habitat, promote side channel formation and stabilize the floodplain while minimizing the potential for conflict with recreational floater/boaters. This is being accomplished by placing wood in the interior of the site, allowing for deformable structures that will adjust as the site changes and designing structures at the new inlets that will be less threatening to inexperienced floaters. The project team has sought early input from river safety advocates and will continue to do so as the design advances

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

The project team consists of licensed professional engineers, licensed engineering geologists, and ecologists with experience designing these types of projects.

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 – the Engineer of Record (Will Mansfield) reviewed and approved the design. Alex Hallenius (Licensed Professional Civil Engineer) and Todd Hurley (Licensed Engineering Geologist) are in lead design roles on the 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?

Yes – Sarah McCarthy (project ecologist) evaluated the consistency of the design with project goals, environmental regulations and known permit conditions.

Project Manager	Date 10/11/18
Supervising Engineer, Project Supervisor or Unit Manager	Date 10/11/18