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 Rainbow Bend Mitigation Project Project Manager Craig Garric

River/River Mile/Bank Cedar River/ river mile (RM) ~10.2 to 11.0, Right bank downstream of Cedar Grove Road.

Date Pt I 10/27/22;

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 proposed project establishes and enhances wetland/aquatic habitat, and encourages natural riverine processes (e.g. channel migration, flooding, avulsion, and flow interactions with large wood, small wood, brush piles and sediment). The project is expected to improve connectivity to approximately 11 acres between the right bank of the Cedar River, the existing side channel, prior constructed backwater and complex riparian/wetland habitat, and create new off-channel features throughout the site. The loss of these types of off-channel habitat features has been identified as a primary factor limiting Chinook salmon productivity in the Cedar River. This project was identified is a very high priority habitat project in the WRIA 8 Chinook Salmon Conservation Plan.

   Project elements include removal of historic fill and unnatural obstructions within the floodplain to increase connectivity; the addition of habitat wood as floodplain roughening elements, and planting native vegetation to restore the floodplain community. The prior 2013 Rainbow Bend Restoration project had been identified as an important flood hazard reduction project in the 2006 Flood Hazard Management Plan (King County, 2007). This project expands on that effort and aligns with several goals outlined in Chinook Salmon Conservation Plan for the Lake Washington/Cedar/ Sammamish watershed (WRIA 8) and the 2017 WRIA 8 Chinook Salmon Conservation Plan Update: 1) reduce flood risks to people and infrastructure; 2) restore floodplain functions and processes that provide for natural development of riverine habitat and aid salmon recovery; 3) increase area of riparian cover; 4) increase wood volume to support sustainable and harvestable Chinook salmon populations; and 5) invasive species control.

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.**

   This project will fulfill in-lieu fee mitigation credit obligations for the Mitigation Reserves Program, which is providing compensatory mitigation for unavoidable wetland and aquatic area impacts associated with development in the Cedar River/Lake Washington Service Area. By creating and enhancing wetlands, placing large wood and planting riparian areas, the project generally aims to protect and improve water quality, provide wetland and aquatic habitat, and store floodwaters. Restoring these ecosystem services will improve the Rainbow Bend Natural Area, benefit area residents, and support the Water and Land Resource Division's mission and strategic plan. Funding for the project is provided through the sale of mitigation credits as part of the ongoing operations of the Mitigation Reserve Program.

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 Rainbow Bend project site is about 11 acres in size and bound on three sides by the Cedar River and a side channel between River Mile 10.2 and 11. The Cedar Grove Road bridge is located upstream of the site and flows split between the mainstem and a right bank side channel. Historically, the levees had kept the river in place, mostly pinned against the left bank, preventing the development of wetlands, side channels and other off channel floodplain habitats.

   In the right bank floodplain, past removal of a former mobile home park and the subsequent restoration project removed a right bank levee and constructed a side channel. Aerial photos, site topography and eyewitnesses indicate the Cedar River migrates throughout the project site during higher flood flows, but little wood accumulation was observed. Natural processes within the former trailer home park footprint remain restricted by obstructions such as an access road and higher ground, some filled during the development of the trailer home park.

   The side channel has accumulated wood, thereby increasing connectivity toward the right bank into the mixed forested floodplain. Wood recruitment is expected to continue as the side channel and wetland/riparian complex as flows interact with the existing trees. Several solid stands of large trees will be protected as part of the project to maintain structure and recruitment potential in the floodplain. As a result of the project wood placement and replanting, the site will provide habitat wood, floodplain roughness, and diversity in species. Some of the smaller wood will be mobile during large floods but is expected to be retained within the project area.

   Six species of salmonids utilize the Cedar River Basin: Chinook salmon, coho salmon, coastal cutthroat trout, sockeye salmon, steelhead trout, and kokanee.

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 adjacent private properties to the north of the access road are owned by Cedar Shores Land LLC, a commercial construction company. The project area is owned by King County, part of the Larry Phillips Natural Area, and is open to the public for walk-in, passive recreation. The project has no boating access. There is no formal trail corridor, but an access road runs from the entrance to the project area. The natural area was established in the early 2010s with the County's acquisition of the properties and the implementation of the Rainbow Bend Levee Removal and Floodplain Reconnection Project. Frequent passive recreational use (walking, birdwatching, etc.) of the site has been observed by KC staff. The mainstem of the Cedar River is used for recreational floating in the summertime, but the interior of the site in the project area is inaccessible to boaters and floaters.

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 Rainbow Bend mitigation project will include four main categories of wood placement, none of which will be placed in the main, active river channel:

1. Floodplain Jam Type A
    a. 10 Critical Floodplain Jams will be installed. All of them will be placed within the Project Site, located in the Cedar River's 100-year floodplain, along projected future floodplain flow paths. These jams will be made up of 6-10 logs that vary from 10 to 36 inch in diameter and 30 to 60 feet in length. The logs will be a combination of

trees salvaged during site clearing and grading and imported logs. The orientation of the logs will vary from perpendicular to parallel with the projected flow direction. These jams are being designed to be stable during a 10-year flood event and the method of anchoring is still being determined. These structures are expected to engage with the Cedar River during flood events, 2000 cfs and above.

2. Floodplain Jam Type B
    a. 10 Non-Critical Floodplain Jams will be installed as part of the project. These structures will be scattered throughout the Project Site, located in the Cedar River's 100-year floodplain. These jams will be made up of 8-10 logs that vary from 6 to 18 inches in diameter and 30 to 50 feet in length. The logs will be a combination of trees salvaged during site clearing and grading and imported logs. The orientation of the logs will vary from perpendicular to parallel with the projected flow direction. These jams are being designed to deform and move within the project site. They will be planted with livestakes to help stabilize these jams if the wood doesn't move in advance of their maturity. These structures are expected to engage with the Cedar River during flood events, 2000 cfs and above.
3. Habitat Wood Piles
    a. 25 Habitat Wood Piles will be installed as part of the project. These structures will also be scattered throughout the Project Site. The wood piles will be made up of six logs that vary from 4 to 10 inches in diameter and 20-30 feet in length. These logs will primarily be from trees salvaged during site clearing and grading. The orientation of the logs will vary from perpendicular to parallel with the projected flow direction. These wood piles are being designed to deform and move within the project site. They will be planted with livestakes to help stabilize these jams if the wood doesn't move in advance of their maturity. These structures are expected to engage with the Cedar River during flood events, 2000 cfs and above.
4. Habitat Snags
    a. Up to 48 snags will be installed as part of the project. Snags will also be scatter throughout the Project Site. Each snag is one log that is greater than 12 inches in diameter and 20 feet or longer; sizes will vary. Snags will be buried in the ground in growth position. Snags are expected to engage with the Cedar River during flood events, 2000 cfs and above.

Over time, natural wood recruitment may expand constructed jams and channel migration may engage jams more fully, but much of the placed wood has been designed to deform and adjust to changes in the river in an effort to closely mimic naturally occurring large wood in similar stream settings.

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?**

Most of the proposed large wood placement in the project area floodplain is intended to engage at flood flows. It should provide hydraulic complexity, floodplain roughness, structure to rack small and large recruited wood, and help to build and sustain habitat forming processes. Within the wetted areas of the pre-existing backwater feature, and created wetland swales, the wood shall provide structure and cover important for salmonids, as well as to encourage beaver damming, floodplain connectivity and local increases in groundwater levels. Over time, natural wood recruitment may expand constructed jams and channel migration may engage jams more fully, but much of the placed wood has been designed to deform and adjust to changes in the river in an effort to closely mimic naturally occurring large wood in similar stream settings. Foraging and nesting snags will be scattered through the site for beneficial bird and wildlife habitat and will also rack recruited large and small wood at high flows. It is expected most wood will be retained on site, but as in a natural system, wood may accumulate and then be remobilized during large floods or in response to channel changes.

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 is positioned downstream of the prior Rainbow Bend Levee Removal and Floodplain Reconnection Project, which makes it hydrologically connected to a dynamic floodplain where natural wood recruitment has been high in recent years. Much of the fallen and accumulated wood and debris is contained within the heavily vegetated restored area. The project aims to connect the two project areas, and the new project will likely capture some recruited wood released from the upstream project during large flood events. A narrow wetland swale at the southwest side of the project will likely capture new fallen trees and will provide fish habitat at higher flows.

The mitigation reserve project requires some stability to ensure wetland creation and enhancement. However, the project is designed to encourage natural processes and floodplain connectivity. Long term, some Cedar River side channel migration into the site or new formation is possible.

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 project area has limited but regular passive recreational use throughout the year. The site is accessible by walking down a gravel access road and contains no formal trails. Seasonal recreational floaters use the mainstem of the Cedar River upstream of and around the project area in the summer but have no float/boater access to the internal project area where construction of the restoration project will occur.

   b. Wood location, positioning, and anchoring techniques;

   Large and small wood will be placed outside of the mainstem of the Cedar River within a backwater area, two constructed wetland swales, and throughout the floodplain. None of the placed wood is in navigable waters of the Cedar River, and is located interior of the site, inaccessible by recreational floaters and boaters. The vast majority of the project site is surrounded by mature riparian forest, which separates the project elements from the mainstem river channel. The large floodplain wood will be engaged at high flows, above typical summer recreational use periods. Wood will be anchored by wood pilings, or wedged between existing trees, vegetation and hummocks, with the ability to use mechanical anchors though design favors natural anchoring. Some wood will be deformable and allowed to move during high flows. All wood will be visible and will be placed in a way to dissuade large scale mobilization, but will allow adjustments to changing channel conditions which should mimic natural log jams and reduce hazards.

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

   There is little recreational risk due to the interior location of the project. The majority of wood will be placed in the floodplain in an area surrounded by existing mature riparian forest, and a few pieces will be placed in the wetted area of the backwater feature and wetland swales, all of which are unnavigable. Floodplain wood will be engaged at flood flows >2000 cfs. Project wood will be visible and avoidable.

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

   The project has been designed by an interdisciplinary team of experienced ecologists, engineers and geologists who all have extensive experience addressing recreational risks on similar project sites.

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?**

   The Project Supervising Engineer, Project Manager and Senior Engineer are Licensed Professional Engineers. A Licensed Engineering Geologist and Senior Ecologist supported the Senior Engineer during project design. Scott Muchard, P.E. is the engineer of record and will perform final review of the design package (plans, specifications, engineers estimate and basis-of-design) and provide his seal. Alex Hallenius, P.E. will perform independent QA/QC review of the design package at the 60%, 90% and final 100% design.

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?**

    The project has been reviewed and approved at 30% design by Laura Hartema and Dan Eastman, both professional ecologists. They have verified that the project design is consistent with project goals, existing policies and regulations, and expected permit conditions.

11. **What is the anticipated schedule for completing project milestones (30-40% design, final design, major construction/earthmoving) and for soliciting public input)?**

The project went through public review at the King County DNRP Large Wood Installations public review on May 17, 2022. No questions or concerns were posed. The project anticipates 60% plans by December 2022; a 90% by January 2023; and final design by March 2023. Construction is estimated to occur between May and September 2023.

Garric, Craig

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Project Manager Date

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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.* Answers below are preliminary and will be updated at 90-100% design.

1. 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.

Response: Regarding question X- TBD

2. 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.

- US Army Corps of Engineers Section 404 Permit Package, including:
  - Nationwide 27;
  - NMFS and USWFS ESA Section 7 compliance documentation;
  - Washington Department of Ecology
    - Section 401 Water Quality Certification; and
    - Coastal Zone Management Act (CZM Consistency)
  - National Historic Preservation Act Section 106 compliance documentation

- SEPA (State Environmental Policy Act) amendment
- Washington Department of Fish & Wildlife Hydraulic Project Approval
- Washington Department of Ecology's NPDES Construction Stormwater General Permit
- WA State Shoreline Management Act (SMA)-Substantial Development Permit Exemption

- King County Department of Local Services Clearing and Grading, including:
  - King County DLS Floodplain Development Permit/ Flood Hazard Certification
  - King County Roads Right of Way Review

- King County DNRP Wood installation public review (LWD Ordinance 16581, Public Rule LUD 12-1: Placing Large Wood in Waterway)

LARGE WOODY MATERIAL
Conditions TBD

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

The pre-60% design poses no additional public safety concerns as compared to initial design. A temporary sign will be posted during construction to alert the public.

A Mitigation Plan is in place that includes qualitative inspection of the installed wood within the project reach. Floodplain jams and habitat wood was designed to allow naturally recruited wood to rack on the structures and their stabilizing elements including wood pilings, topographic highs/mosaic hummocks, or live vegetation and minimal mechanical anchoring as possible. The floodplain jams will be somewhat stabilized by large sized wood, lateral pilings and native planting, but still may shift and move within the project area during flood flows. Most of the wood is expected to remain within the project parcels, and some loss to the Cedar River is acceptable. If the monitoring ecologist lead notices heavy wood accumulations at outlets or other potential site safety and stability concerns, the project engineer or equivalent will inspect the issue and along with the ecologist, determine the appropriate adaptive management action, if any.

4. 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.

- SEPA review: The project goals and objectives and footprint are in alignment with the SEPA review conducted for the adjacent Rainbow Bend Levee Removal and Floodplain Reconnection project that was completed in 2013. A SEPA amendment was submitted and adopted in April 2022 for the Rainbow Bend Mitigation Project.

- Neighboring property owned Cedar Shores Land, LLC, is receiving project updates by Megan Webb, Mitigation Reserves Program manager.
- Project was presented at the King County DNRP Wood installation public meeting for review (LWD Ordinance 16581, Public Rule LUD 12-1: Placing Large Wood in Waterway
- Project was presented to the King County Cedar River Council on 4/26/2022 and they made a site visit on 6/29/2022.

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

No modifications to design or other actions were needed to date.

6. 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.

Temporary signs will be posted during construction duration at the entrance to the site and along the river for public awareness.

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

Wood will be placed interiorly in the floodplain, in an existing backwater channel and in wetland swales, all areas inaccessible by floaters/boaters. As in a natural system, wood may accumulate and then be remobilized during large floods or in response to channel changes. Channel migration and tree recruitment are desired and expected long-term outcomes from this project. Most wood will be retained on site, so should have no large scale or significant effect on downstream wood loads in the mainstem.

A Mitigation Plan that includes a 10-year monitoring and maintenance period. It includes qualitative inspection of the installed wood within the project reach. Floodplain jams and habitat wood were designed to allow naturally recruited wood to rack on the structures and their stabilizing elements including wood pilings, topographic highs/mosaic hummocks, or live vegetation and minimal mechanical anchoring as possible. The floodplain jams will be somewhat stabilized by large sized wood, lateral pilings and native planting, but still may shift and move within the project area during flood flows. Most of the wood is expected to remain within the project parcels, and some loss to the Cedar River is acceptable. Pieces would likely leave the site singularly. If the monitoring ecologist notices heavy wood accumulations at outlets or other potential site safety and stability concerns, the project engineer or equivalent will inspect the issue and along with the ecologist, determine the appropriate adaptive management action, if any.

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Project Manager Date

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Supervising Engineer, Project Supervisor or Unit Manager Date