

# 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 Northeast Auburn Creek Restoration Project Project Manager Fauna Nopp

River/River Mile/Bank Lower Green River / RM 25.3 / left bank

Date 10/30/2024

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 Northeast (NE) Auburn Creek restoration project is located within an agricultural and suburban reach of the lower Green River near river mile 25.3. NE Auburn Creek itself largely drains adjacent farm fields. Restoration of the mouth and lower reach of NE Auburn Creek presents a rare opportunity in the Lower Green River sub-watershed to reconnect floodplain habitat to the mainstem channel, where there is a critical need for off-channel rearing and refuge habitat for juvenile salmonids, while providing more reliable flood protection to the adjacent property owners. The updated Green/Duwamish and Central Puget Sound Watershed Salmon Habitat Plan (Water Resource Inventory Area 9 (WRIA 9, 2021) includes NE Auburn Creek (LG-5) as a tier two priority project to “enhance floodplain and stream habitat in the Lower Green River by creating off-channel rearing and high flow refuge habitat for juvenile salmon in the Horsehead Bend reach of the Lower Green River.” The fundamental purpose of this project is to provide rare salmonid tributary rearing and refuge habitat that is vital to salmonid production, particularly for ESA-listed Chinook salmon at the fry to parr life stages.

- 2. Describe the goals and objectives of the project and its relative importance to the success of DNR program goals and mandates. Identify funding source(s) and describe any applicable requirements or constraints.**

The overall goal of the NE Auburn Creek Restoration Project is to rehabilitate degraded floodplain in the Lower Green River and restore access to critical rearing and refuge habitat for juvenile salmonids.

Project Objectives:

- Replace old flap gate with fish-friendly flood gate that will remain fish-passable whenever the gates are open while maintaining existing levels of flood protection for landward properties.
- Restore access to the 20,000 linear foot drainage network of NE Auburn Creek to serve as off-channel rearing & refuge habitat.

- Improve conditions and access to 2.7 acres of riparian wetland.
- Maintain and improve riparian buffer along 2,000 feet of the Lower Green River.
- Preserve access to Horsehead Natural Area and Horsehead Farm.
- Improve drainage where possible for Horseneck Farm.
- Maintain existing flood protection for adjacent lands.

The project will be primarily funded by the following sources:

- King County Flood Control District (King County Cooperative Watershed Management Grant)
- King County (Surface Water Management Fees)
- King County (Flood Reduction Grant)
- King County (Parks Open Space Levy)

**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 project site is located at River Mile 25.3, which is well upstream of the influence of tides from Puget Sound. The river in this reach flows through a deeply incised channel that has been simplified by the extensive flood control features along its banks. There is very little structure to the channel from woody debris or boulders. This reach of the river is very low gradient and flows through a broad floodplain created by both the Green River and, prior to its diversion, the White River, which drains Mt Rainier and therefore carries a much higher sediment load than does the Green. Sediment deposited in this floodplain by the White River to the south has pushed the Green River to the north and forced it to cut a deep channel through the sediment which is partially responsible for the incised geometry of the channel. Extensive flood control facilities, including the Nursing Home Levee on the opposite bank of the River from the project area, have further contributed to the simplification and incision of the channel. These factors also disconnect the floodplain from the river. At low flow, the wetted channel is approximately 25 feet below the adjacent floodplain and the banks between are very steep, approaching vertical in places. Access to the wetted channel is therefore difficult from the floodplain above, though there are several places along the opposite right bank where access is possible from a paved trail that runs along the top of the Nursing Home Levee.

Land use along this reach of the Green River is variable. The left bank where the project is located is almost entirely in agricultural fields while the right bank beyond the large levee is occupied by multifamily residential development. Only thin strips of buffer trees separate the steep channel banks from these land uses and the reach is listed as temperature impaired.

The Lower Green River is used by a range of resident and anadromous fish, notably including ESA-listed Chinook salmon but also coho and pink salmon, steelhead trout and resident cutthroat trout.

**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 proposed project site is situated on Horseneck Farm, a 38.58-acre King County Department of Natural Resources and Parks (DNRP) Working Resource property owned and managed by the Water and Land Resources Division (WLRD) Agriculture program. This farm is located east of Central Avenue South and

North of South 277 Street within unincorporated King County. More specifically, the site is located in Section 30, Township 22 North, Range 5 East, Willamette Meridian.

Horseneck farm is directly south of the Horsehead Bend Natural Area, managed by King County Parks and Recreation Division (Parks), and west of North Green River Park, a multi-use site managed by Parks on the right bank. To the south is farmland owned by the Carpinito Brothers that is used for commercial agricultural production.

Across the river from the project area to the west is a levee known as the Nursing Home Levee and the regional Green River Trail. Landward of the trail is mixed use development including apartment buildings, condominiums, an RV park, and a senior citizen's nursing home.

In-river recreational use of the Lower Green River is low based on the King County Synthesis of 2013 River Recreation Studies (p.32). This synthesis report is available at <https://your.kingcounty.gov/dnrp/library/water-and-land/rivers/2013-recreation-study/synthesis-of-2013-river-recreation-studies-Oct2014-report-only.pdf>. Although recreational use of the Green River along the project reach was not observed directly in this report, the studied reach between Russell Wood Park (RM 19.4) and Briscoe Park (RM 15.9) is less than 6 miles downstream of Horseneck Farm and, since there are no known put-in or take-out points between the two locations, observations in this reach are expected to be similar to recreational use in the project area. The King County study found that the Lower Green River reach has much lower numbers of people per day than areas up-river, the highest life vest usage, and the highest use of boats with paddles (canoes and kayaks) rather than rafts and inner tubes. For example, remote cameras placed between Russell Woods Park and Briscoe Park recorded a total of 167 uses of the project reach in 2013 (0.5 people per day), 94% of people observed were adults, 70.7% of the people were observed with life vests, and 85% of the vessels counted were canoes or kayaks with paddles.

- 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.**

Large wood will be placed within the new channel of NE Auburn Creek to be excavated as part of the project, as well as on the floodplain surrounding the new channel. No wood will be placed within the Green River channel and none of the wood placed in the NE Auburn Creek channel will protrude past the channel banks of the Green River.

A large, engineered structure of stabilized logs will be constructed within the NE Auburn Creek channel just upstream of its confluence with the mainstem Green River channel. This structure will be designed to both stabilize the banks of the newly excavated channel and to provide habitat for fish near the confluence of the two channels. The structure will extend from the bottom of the NE Auburn Creek channel up the western (downstream relative to the Green River) bank (Figure 1 below). The current conceptual design for the structure includes vertical log pilings and potentially battered log pilings (pilings driven at an angle). These driven logs will secure other logs to limit their movement. Chain, rope, or steel pins may be used to secure logs to the pilings.

In addition to this structure, logs will be placed on the banks and within the bed of the new channel connecting the new culvert to the Green River, to improve fish and wildlife habitat and to provide roughness and complexity to the channel. Options for stabilizing these logs under consideration include driving them into the channel bank, securing them to driven wooded piles, and soil ballast. Mechanical anchors (6 to 12 inch diameter buried metal screw or steel plate driven into the ground and attached to logs with chain) may be used if analysis indicates these other measures would not provide adequate stability or would otherwise be impractical.

Small pieces of wood will also be integrated into the new channel bed of NE Auburn Creek to provide channel roughness, stability and complexity. This wood will be buried into the substrate of the channel under gravel and cobbles.

Finally, trees that need to be removed to construct the project and that aren't used in construction of the above-described structures will be placed on the floodplain and within the adjacent riparian wetland to enhance wildlife habitat.

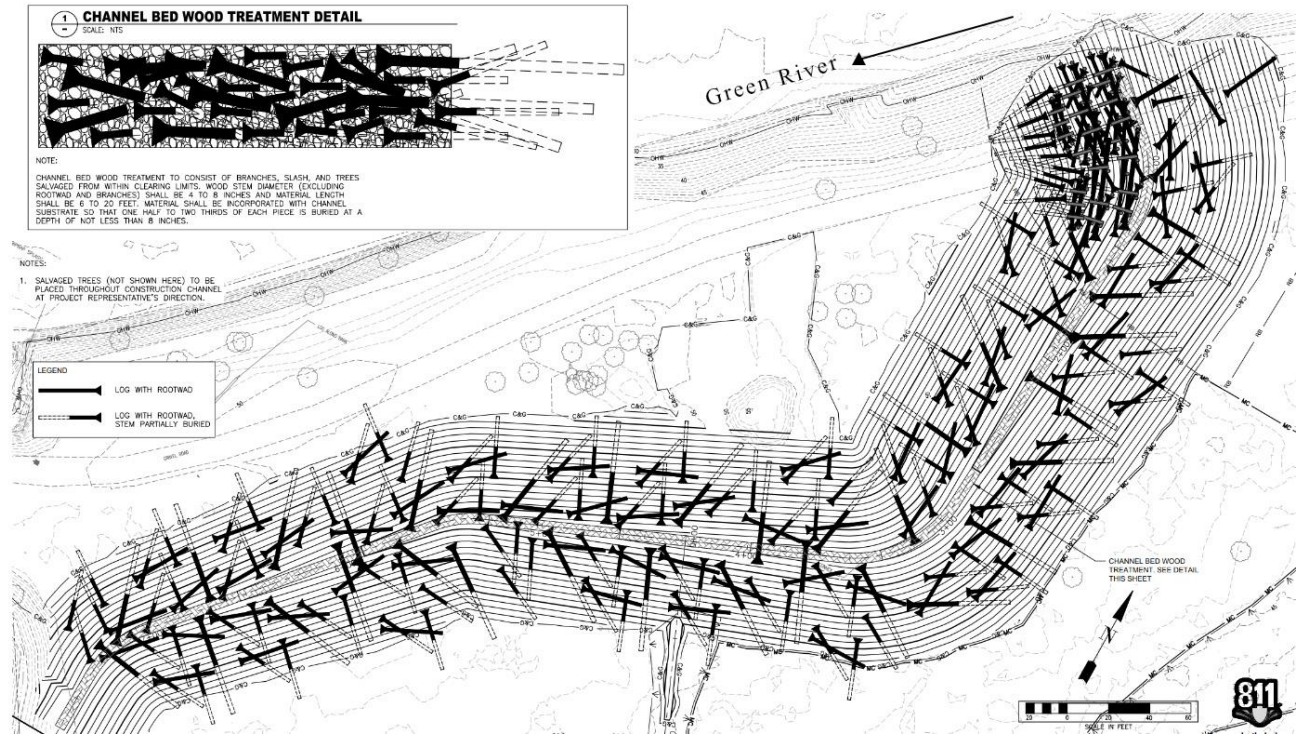


Figure 1: Large Wood Placements in NE Auburn Creek Channel

- 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?**

Wood placed in the newly constructed channel of NE Auburn Creek will serve primarily to enhance habitat for both fish and wildlife but will also stabilize potentially vulnerable channel banks and provide roughness and stability to the bed of the new channel.

The large structure near the channel confluence with the Green River (Figure 1) will extend from the bed of the new channel up its western bank. This area of the bank will potentially be exposed to local flow reversal (eddies) and other hydraulics that increase erosion potential. This wood structure will add stability to that portion of the bank by deflecting flows and slowing water velocities near the ground surface.

The new channel is meant to provide quality habitat to fish over a wide range of flows. During baseflow conditions the creek will serve as a migratory corridor for fish entering and leaving the floodplain reaches of NE Auburn Creek. Wood embedded in the bed of the new channel will provide roughness and complexity, enhancing habitat while also reducing risk of incision and unnecessary erosion. As flows in the adjacent Green River rise during flood events and backwater this new channel, they will engage wood placed higher up

on the channel banks, providing habitat for surface-oriented juvenile salmon that will use the backwatering channel as refuge from flood conditions.

The new channel confluence may entrain large wood floating down the Green River during flood events. This will not detract from the projects goals or objectives and would likely enhance local habitat conditions.

- 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 excavated NE Auburn Creek channel will be designed to generally maintain its constructed configuration over time. It is not anticipated to function as an active side channel of the Green River and is not expected to undergo lateral migration. Furthermore, as mentioned above, the large wood structure that will be constructed in the channel just upstream of its confluence with the mainstem Green River will be designed to both stabilize the channel banks and provide fish habitat.

Slope stability analysis will be performed to select stable side slopes for the channel excavation. Areas where channel banks will be subject to increased erosion potential due to water entering the channel from the adjacent floodplain will be protected by measures such as placement of appropriate vegetative cover and/or placement of streambed gravel or cobble materials. Placement of wood and streambed gravel and cobble substrate in the channel bed will be aimed at reducing risk of incision and unnecessary erosion.

Due to the anticipated stability of the new channel and very little hydraulic change in the main channel, the project is not expected to significantly increase recruitment of large wood into the Green River. It is possible that eddies that develop during higher water events on the Green River may act to entrain additional woody material and other debris in the wood structure at the confluence with the Green River, but hydraulic changes are expected to be modest and unlikely to result in significant changes to wood recruitment, mobility or accumulation.

- 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;**

As stated above, during King County's Synthesis of 2013 River Recreation Studies (.05 people per day) use of this reach of the river was low. Compared to the other two reaches of the Green River studied (upstream at Whitney Bridge at RM 41.3, and Auburn-Black Diamond to Isaac Evans Park from RM 29.1-33.4), the Lower Green River through the project site had much lower numbers of people per day, the highest life vest usage, and the highest use of boats with paddles rather than rafts and inner tubes.

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

As mentioned in the response to Question 5, no wood will be placed within the Green River channel and none of the wood placed in the NE Auburn Creek channel will protrude past the channel banks of the Green River. The stabilization approaches described in the response to Question 5 are intended to reduce the likelihood of wood placed for the project leaving the site and posing risk to public safety. Calculations used in designing the wood stability measures will consider buoyant and drag forces and, where appropriate, will include additional drag forces from accumulated woody debris.

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

This project is intended to provide fish access to critical off-channel habitat in the lower Green River for rearing and refuge habitat. To achieve these goals within the constrained project area, the project design relies heavily on wood to provide necessary bed and bank stability along with the hydraulic complexity and cover that are critical for salmonid rearing and refuge. Placed wood is all located within NE Auburn Creek where it addresses fish passage and off-channel habitat while minimizing potential interactions with recreational users. No wood will be placed within the Green River channel and none of the wood placed in the NE Auburn Creek channel will protrude past the channel banks of the Green River.

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

The project is being designed in-house by King County habitat restoration staff, who have extensive experience in designing wood placement projects in all of King County's major rivers. The team includes licensed profession engineers, a licensed engineering geologist, and ecologists. The team is supported by geotechnical consultant Shannon and Wilson, who are providing slope stability, culvert foundation, wood piling, and mechanical earth anchor analysis.

**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 engineering design of the project is being led by Scott Muchard, PE, a licensed professional engineer in the State of Washington with over 25 years of experience in water resources engineering. Scott will be the engineer of record for the project. Scott is supported by King County licensed professional engineer Brandon Duncan, PE and King County licensed engineering geologist Todd Hurley, LEG, both licensed in the State of Washington. Independent quality control review of project deliverables is being provided by King County licensed professional engineers Alex Hallenius and Will Mansfield, both licensed in the State of Washington.

**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 team includes three ecologists with a combined 75+ years of professional experience in researching, planning, designing and monitoring capital projects on King County rivers and streams. The project plans are also being reviewed by the Unit Manager, Sarah McCarthy, who has over 20 years of experience in the field of ecological restoration.

Project Schedule:

Preliminary design: Completed, July 2024

Final design: Expected completion in November 2025

Construction: Expected summer of 2026

*Fauna Nopp*  
Project Manager

10/30/2024

Date

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Supervising Engineer, Project Supervisor or Unit Manager

Date