

## 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 Bear Creek – Doyle Property Restoration

Project Manager Laird O’Rollins

River/River Mile/Bank RM 3.25, both banks

Date February 27, 2017

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.

*Bear Creek is a lowland stream system originating in a large area of forests and wetlands in southern Snohomish and northern King Counties and runs through areas of generally low- to medium density residential developments. The stream supports runs of Chinook, coho, sockeye and kokanee salmon, as well as steelhead trout and resident cutthroat and rainbow trout. Bear Creek has retained relatively high habitat values that have enabled the perseverance of these anadromous fish runs, though fish numbers continue to decline. The Bear Creek Basin Plan (King County, 1989), WRIA 8 Near-Term Action Agenda for Salmon Habitat Conservation (WRIA 8 Forum, 2002) and the Final WRIA 8 Chinook Salmon Conservation Plan all call for the improvement of instream habitat in the lower reaches of Bear Creek to preserve and improve existing salmon runs.*

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 goal of this project is to stimulate the natural processes that create high-quality fish habitat and to provide off-channel habitats that are missing from much of Bear Creek and other stream systems. These types of habitat are especially valuable to rearing juvenile salmon and have been identified as limiting factors in salmon survival. This goal will be accomplished by adding woody debris in a variety of sizes to the mainstem channel, by excavating side channels, and by improving riparian vegetation. One goal of the King County Strategic Plan (ES.1.e) is to, “Restore Puget Sound and protect vulnerable, threatened, endangered species, and habitat.”*

*This project will be designed and implemented in partnership with the City of Redmond, which shares jurisdiction over the project site, and is committed to restoring salmon habitat. Funding will come from Redmond, King County Surface Water Management funds and, possibly, from Community Watershed Management grants.*

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 reach is relatively free of direct alteration, to the stream channel, such as channelization or realignment, with the notable exception of the culvert beneath Novelty Hill Road at the downstream end of the reach, and an eroding bank adjacent to Avondale Way just upstream of the reach. However, the channel has little complexity or variation, and only a fraction of large wood, compared to historic stream conditions. Only two pieces of large wood (one of which is an alder tree that recently fell across the channel) and no off-channel features exist within the project reach. The substrate*

is unsorted and consists mostly of sand over cobbles. The reach is used by Chinook, coho, sockeye and kokanee salmon, as well as steelhead and resident trout for both spawning and juvenile rearing.

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 area is generally residential, though there is a corridor of publicly-owned or controlled land along the creek, including the project area itself. (The east bank and areas upstream are owned by King County and managed as "Ecological Lands". The west bank, owned by the Fairwinds Retirement Center, is protected by a native growth protection easement with the City of Redmond.) Both banks are vegetated and undeveloped, though major roadways and residential development exist just beyond the stream's riparian buffers. There is no formal recreational development or use of Bear Creek, though there are informal trails along parts of the creek. Bear Creek is generally too small for recreational floating and none has been documented. As mentioned above, the Fairwinds Retirement Center is located just outside the riparian buffer on the west bank and residents there are known to occasionally visit the riparian areas of the creek and have also completed riparian planting projects there in the past.*

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.

*Project design calls for placement of large wood in quantities approximating those recommended in "A Regional and Geomorphic Reference for Quantities and Volumes of Instream Wood in Unmanaged Forested Basins of Washington State" (Fox and Bolton, 2007), which would be about 55 pieces of wood throughout the 600-foot reach. These pieces would be of varying sizes, ranging from two very large spruce trees (~3' in diameter and 90' long) to small "Christmas tree"-size. These pieces of wood will mostly be arranged into five large "jams". All wood will be securely anchored to prevent mobilization during 100-year floods, using either mechanical anchors or driven wood piles. Wood will be placed such that it interacts with flows at all flow stages. Wood will not be placed in the side channels that will be excavated along both banks of Bear Creek.*

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?

*Placement of wood in this reach of Bear Creek is intended to encourage morphological changes in the channel bed, including formation of pools and backwaters. The wood will also likely cause limited lateral channel migration and increased dynamism within the confined floodplain of Bear Creek. Placed wood will provide increased cover for juvenile salmonids by creating interstitial spaces and hiding areas safe from both instream and terrestrial predation. Increasing juvenile salmonid survival is seen as essential to recovery of salmon stocks and is consistent with the goal of this project.*

*The wood structures may also recruit and trap additional wood mobilized from upstream reaches, though the quantity of wood moving into this reach is likely limited by the lack of dense riparian forests upstream.*

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 wood structures, along with the side channels to be excavated as part of this project, will provoke some channel migration and increased dynamism within the confined floodplain of Bear Creek and may cause some additional trees and wood to be recruited by the creek. Such recruitment is already happening and causes improvements to instream habitat. The anchored wood structures to be installed as part of this project will likely decrease the mobilization of these recruited trees. Most (though not all) existing riparian trees are relatively small and deciduous, which means that they will likely decompose fairly fast once they fall into the channel. Also, most trees that fall into the creek would be of a length that would restrict their mobility even without the presence of placed wood structures, so they are unlikely to become hazards.*

*It is imperative that no placed wood is allowed to obstruct the entrance to the culvert conveying Bear Creek beneath Novelty Hill Road at the downstream end of the project reach. For this reason, all placed wood will be securely anchored in place and none will be placed immediately upstream of the culvert. An adaptive management plan will be developed to specify culvert inspection after storms and procedures for removing any wood pieces that are deemed a hazard. Inspection records for this culvert contain no references to obstructions caused by logs or trees.*

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;

*Recreational use of Bear Creek is generally passive. The stream is closed to fishing by WDFW and is too small for recreational floating, so recreational use consists primarily of walking, wildlife and bird viewing in the riparian areas. These uses may occur throughout the year.*

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

*Wood will be organized into a series of "jams", each with at least one or two large "key" pieces with smaller pieces racked onto the upstream ends of the key pieces. These jams will be positioned to interact with a large proportion of the channel's cross section to maximize their effect on the channel. All wood will be anchored in place using mechanical anchors driven into the stream bed and chain.*

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

*Logs will be placed aggressively to maximize their effect on the channel and habitat conditions. Bear Creek is too small for recreational floating, so safety concerns are restricted to ensuring that the logs remain anchored in place and do not "escape" to obstruct the culvert downstream at Novelty Hill Road or cause other problems.*

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

*The project plans will be reviewed by at least two licensed Professional Engineers with specific expertise in design of aquatic restoration projects. In addition, the design receives input and review from a licensed engineering geologist who also has expertise in aquatic systems and fluvial geomorphology. Project design and plans are also reviewed at multiple stages by engineers and ecologists with the City of Redmond.*

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?

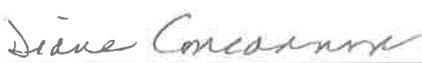
*Yes. Project design and plans will be reviewed, approved and stamped by a Licensed Civil Engineer. Project plans are being developed by a Licensed Professional Engineer and reviewed by a Licensed Engineering Geologist. All reviews of 30% plans have been completed.*

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)?

*Yes. The project is being managed and primarily designed by a King County Senior Ecologist (Wm. Laird O'Rollins). He reviewed 30% plans which were completed in December, 2016. 60% plans should be completed by the end of March, 2017 and Final Plans by the end of May, 2017. Construction will occur during the summer of 2017 followed by planting in the winter of 2017-18.*

  
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Project Manager

*2/27/17*  
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Date

  
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Supervising Engineer, Project Supervisor or Unit Manager

*2/28/17*  
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Date