WASHINGTON STATE DEPARTMENT OF ECOLOGY

Application for a 2015-2017 Floodplains by Design Project Grant

Project Title: Middle Boise Creek Enhancement Project
Organization/Jurisdiction Name: King County Department of Natural Resources and Parks
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Legislative District(s): 7 **County:** King **WRIA:** 10/12
Congressional District: 9
Specific Project Location:
Section: 35,26,25 Township: 20N Range: R6E River Mile: 1-3
Latitude: 47.59888 Longitude: -121.33094
Major Watershed Project is in: WRIA 10/12 (Puyallup-White River Watershed)

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1. Short Description of Project (500 words or less)

King County Department of Natural Resources and Parks (KC) proposes to implement the Middle Boise Creek Enhancement Project (Boise project) to reduce flooding, improve habitat for threatened salmonids, increase agricultural viability, and improve water quality in Boise Creek, a tributary of the White River (Figure 1). This is a multi-year project that compliments and connects projects that have already been constructed as well as those planned for the future. The goals of the Boise Project will be accomplished by designing, permitting and constructing channel and floodplain improvement projects along 3,600 feet of the stream. Specifically, the project will:

- increase channel conveyance capacity by widening the channel and reducing flood potential;
- enhance floodplain ecosystem structure, functions and processes;
- improve agricultural drainage;
- create a mosaic of in-stream aquatic, wetland and riparian habitats; and
- acquire farmland development rights and preserve agricultural floodplains

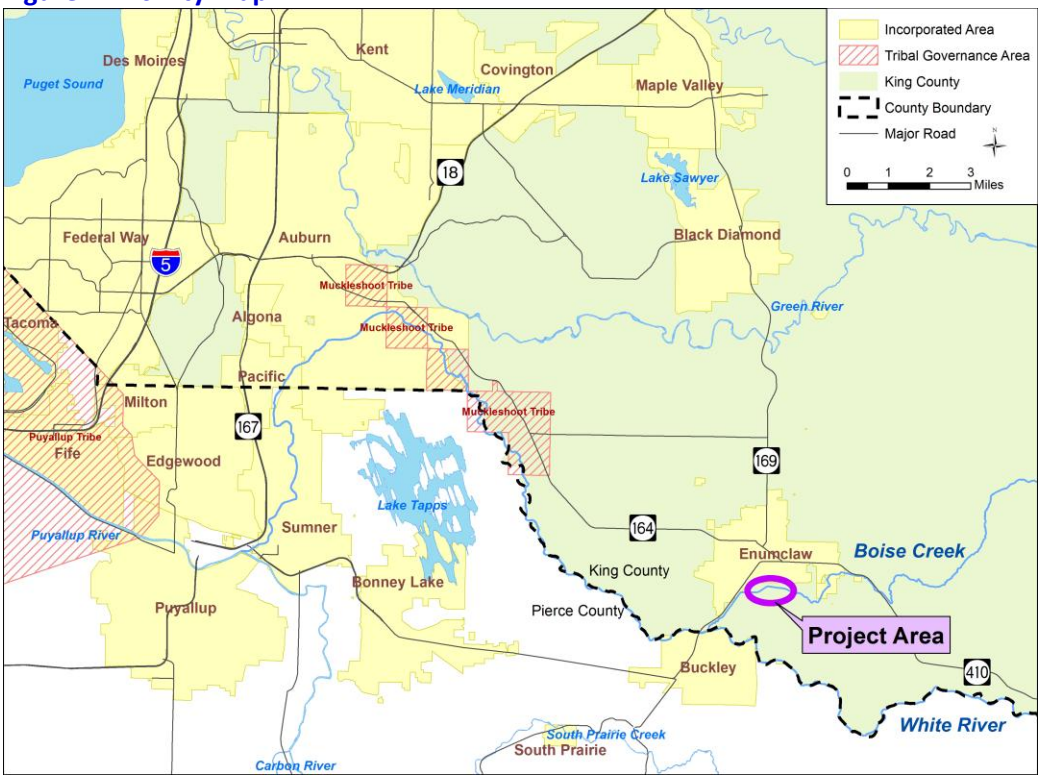
Middle Boise Creek flows through agricultural land that supports dairy, pastures, and livestock. The stream has high ecological value because it is an important primary spawning and rearing area for threatened White River spring and fall Chinook, steelhead salmon, and bull trout. The historic realignment and channelization of the stream has likely reduced smolt production from the creek relative to pre-settlement conditions. According to the WRIA 10 Salmon Recovery Plan, this can be attributed to widespread loss and degradation of in-stream aquatic, wetland, riparian and floodplain habitats. People living or farming along the creek face other challenges in the form of chronic flooding, soil saturation and poor water quality. Boise Creek is the largest source of fecal coliform loading within the Puyallup/White basin and is on the Washington State 303(d) list of temperature, pH, and bacteria. The proposed project will address these concerns.

1. Flood hazard / risk reduction (*60 points*)

Historical Conditions:

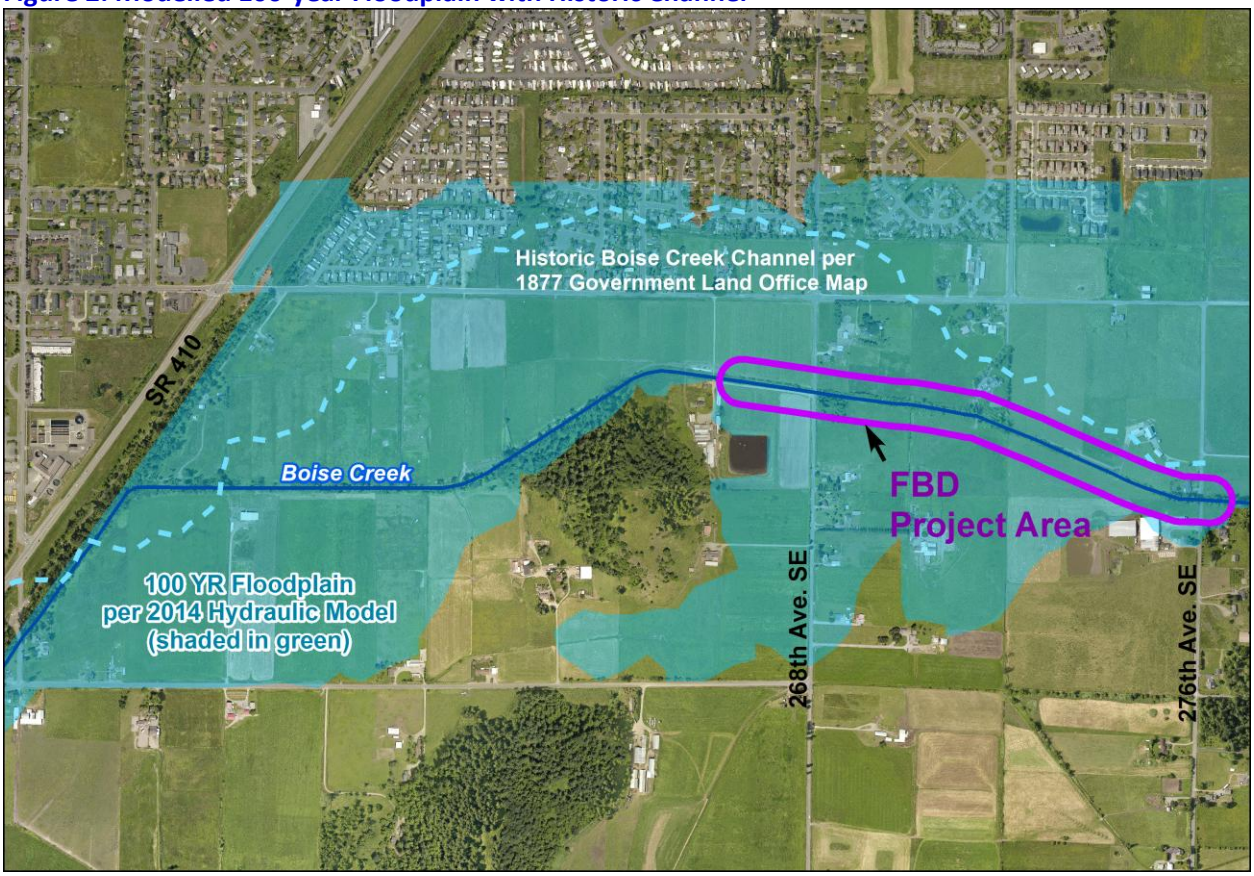
Boise Creek was realigned and channelized over 100 years ago to improve drainage and agricultural activities. The creek flows through fine sedimentary deposits which contributes to ongoing drainage problems for farmers. Middle Boise Creek was shorted by approximately 18 percent as a result of realignment and channelization based on a comparison of the existing creek alignment with the 1877 General Land Office (GLO) survey map (Figure 2). The GLO map indicates that Boise Creek was situated within a wetland landscape thousands of acres in size, which would have historically provided hydrologic attenuation of flooding in this area.

Figure 1: Vicinity Map



Following the realignment of Boise Creek around 1900, Drainage District 6 was established to fund regular dredging of accumulated wood and sediment in order to maintain channel conveyance and reduce flooding. Stream dredging and side casting of dredge spoils in the top of the stream bank parallel with the stream have created artificial berms. These spoil berms increase the duration of inundation and soil saturation by preventing return flows during and after higher-flow events. The construction of undersized bridges and approach roads also created flood backwater which disrupt stream and floodplain connectivity. Drainage District 6 ceased routine dredging of the channel in the late 1980's as environmental regulations emerged. When dredging by Drainage District 6 ceased, the occurrence of flood events increased, according to local landowners, as stream sediment accumulated upstream of the undersized 268th Ave SE Bridge.

Figure 2. Modelled 100-year Floodplain with Historic Channel



Existing Flood Hazards:

KC developed a calibrated River Flow 2D hydraulic model for Middle Boise Creek. This model simulates channel flow, unconfined overland flow, and street flow over complex topography. The draft model results for the 100-year flow event show flooding to be even more extensive than previously considered (**Error! Reference source not found.**). The FEMA Flood Insurance Rate Map (FIRM) classifies Boise Creek as having a Zone "A" floodplain, though it lacks a topographically-defined floodplain as a result of channelization. Regardless, this is a high risk area with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In 2009, a flood inundated the valley causing property damage and livestock loss (Figures 3 and 4). In order to quantify the scope of flooding problems, KC analyzed flood frequencies from existing flow records. The results indicated that in some reaches of Boise Creek, overbank flooding begins with a recurrence interval of greater than once per year.

Figure 3. Backwater Flooding at 268th Ave SE Bridge during 2009 flood

Figure 4: Adjacent Property Flooding

Proposal to Address Existing Flood Hazard:
This proposal will provide for the design, permitting and construction of projects along a mile of Boise Creek to increase channel conveyance capacity by:

- Expanding the channel width, potentially up to three times the existing width, to increase conveyance capacity and reduce the frequency of high occurrence (i.e. 1.01 – 5 year) floods
- Restoring floodplain connectivity by removing existing dredge-spoil berms to improve return flows and reduce frequency and duration of inundation following flood events;
- Replacing two undersized bridges at 268th and 276th Ave SE with structures potentially three times the existing width in order to eliminate flood backwater and improve instream habitat.

Boise Creek is crossed by seven bridges within the project area located at 284th, 276th, 268th, and 252nd Avenues SE, as well as three privately owned bridges. The River Flow 2D hydraulic model has been used to analyze the effects of the approach roads and bridges on channel and floodplain hydraulics. The model results indicate that 268th and 276th Ave SE bridges and associated road prisms act as hydraulic controls on the channel and floodplain and are causing backwater flooding. The existing approach road prisms would be re-graded to reduce their elevated profile, and the channel would be widened to increase channel conveyance and habitat functions with a compound or braided channel. Widening the channel downstream of the bridge would require close communication and design coordination with Drainage District 6, which owns the channel, as well as adjacent farmers who maintain pasture up to the top of the streambank. These existing bridges have 15-foot wide openings; the replacement bridges will have channel openings up to 45 feet wide. The KC Roads Division have no near-term plans to replace these bridges because they are currently functional for vehicles, even though they are not functional for flooding and habitat.

2. Floodplain ecosystem protection or restoration element (*60 points*)

The White River was listed as the 8th most endangered river in the United States by American Rivers (2014). Boise Creek is the most important tributary of the White River downstream of Buckley Diversion Dam because it supports three ESA-listed species: spring and fall-run Chinook, steelhead, and bull trout. The Boise project will enhance floodplain ecosystem structure, functions and processes and benefit salmon. The principle ecosystem restoration elements include: 1) widening the active channel by creating multi-thread channels that will improve flood conveyance; 2) increasing the quantity/quality of salmon spawning and rearing habitat; 3) restoring floodplain connectivity by replacing the 268th and 276th Ave SE bridges and removing associated elevated road prisms; 4) improving floodplain connectivity by removing existing dredge-spoil berms to improve return flows following flood events; 5) reducing fecal coliform and improving aquatic habitat functions by excluding livestock with fencing and enhancing and revegetating riparian buffers; and 6) protecting floodplains by purchasing farmland development rights.

Existing Ecological Conditions:
No other stream in the Puyallup/White basin, except for South Prairie Creek on the Puyallup River, is as productive in terms of spawning density (number of spawners per mile) and total escapement size. Boise Creek provides critical spawning and rearing habitat for spring and fall Chinook and steelhead as well as, coho, pink, chum, sockeye and cutthroat trout. The highest density of listed steelhead spawning in the Puyallup River watershed occurs in Boise Creek. Bull trout have been observed in the mouth of Boise Creek up river mile (RM) 0.1 (Figure 5).

Figure 3. Salmonid species in Boise Creek, and conservation status

Species	Life History Present	Population Trend	SaSI Stock Status	ESA Listing Status	Life History Target
White River (Spring) Chinook (*O. tshawytscha*)	Egg, juvenile, adult	Decline	Critical	Threatened	Adult spawning, Juvenile rearing
White River (Fall) Chinook (*O. tshawytscha*)	Egg, juvenile, adult	Decline	Unknown	Threatened	Adult spawning, Juvenile rearing
White River (Puyallup) Steelhead (*O. mykiss*)	Egg, juvenile, adult	Unknown	Depressed	Threatened	Adult spawning, Juvenile rearing
Bull Trout *(Salvelinus confluentus)*	adult	Decline	Unknown	Threatened	Unknown
Coho (*O. kisutch*)	Egg, juv., adult	Stable	Healthy	Species of concern	Adult spawning, Juvenile rearing
Chum (*O.keta)*	Egg, juv., adult	Rising	Healthy	Unknown	Not targeted
Pink (*O. gorbuscha)*	Egg, juv., adult	Rising	Healthy	Depressed	Not targeted

Primary factors of declines in Chinook and steelhead salmon populations in the Boise Creek sub-basin have been attributed to widespread loss and degradation of aquatic, wetland and riparian habitats with the elimination of large wood and associated pool habitat. Channelization, the lack of channel capacity and the lack of large wood contribute to vertical and lateral erosion in some reaches of Boise Creek, while sediment deposition and increased soil saturation and flooding occur in other reaches. Boise Creek is the largest source of fecal coliform loading within the Puyallup/White basin and is on the Washington State 303(d) list of temperature, pH, and bacteria.

Figure 6. Ditch-like Middle Boise Creek looking east from SR-410 (project area in upper left)

Figure 7: Sloughing Streambanks

Figure 8: Degraded riparian zones, incised channel, looking west (downstream) in project area

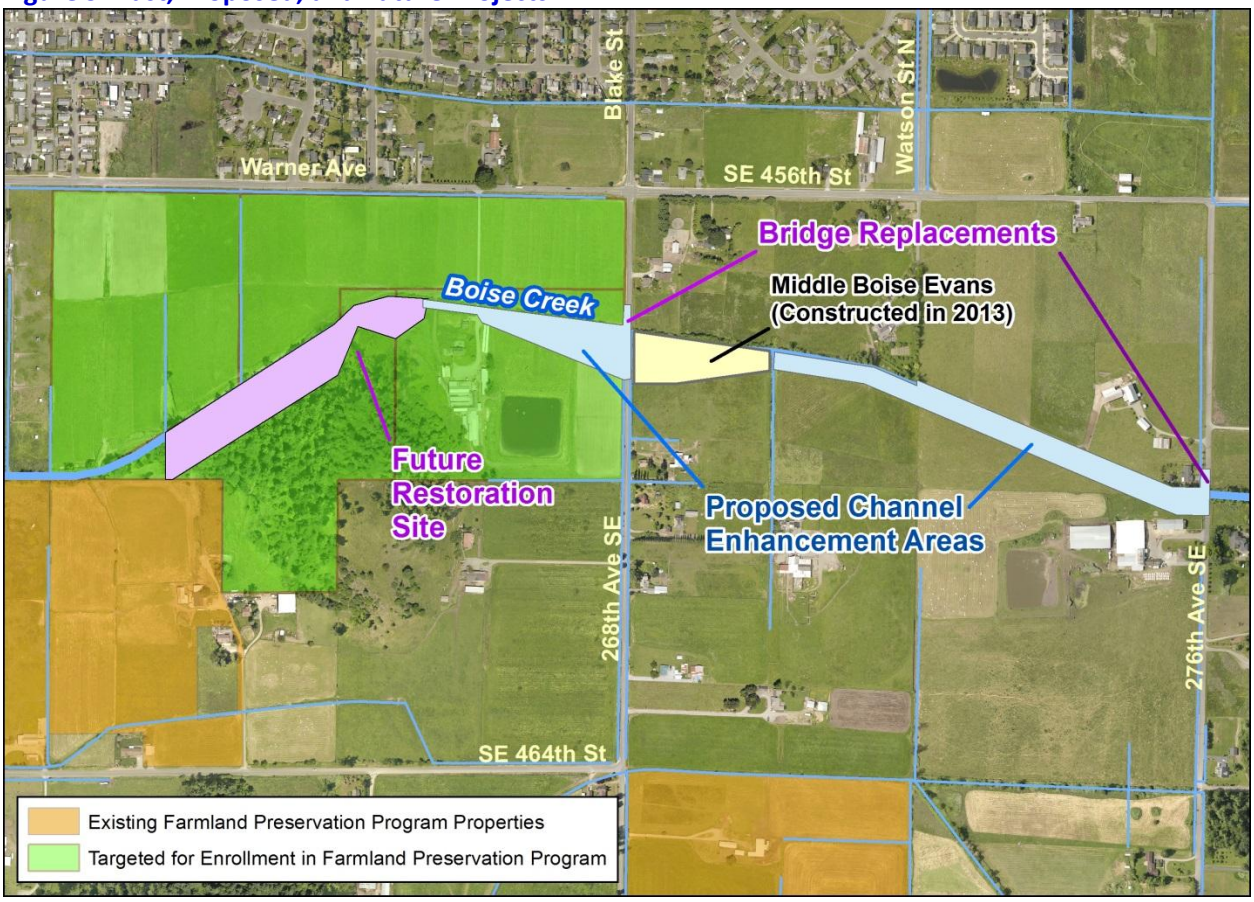
Restoration Goal:

The restoration goal of this project is to restore floodplain ecosystem structure, functions and processes and create in-stream, lateral and margin-type rearing habitat and riparian buffers to benefit threatened spring and fall Chinook, steelhead, bull trout and four other species of salmonids. The restoration of Boise Creek is important because it supports the only remaining spring Chinook run in south Puget Sound. Creating high quality rearing habitat is particularly important for juvenile spring Chinook because they rear in freshwater for a full year prior to outmigration.

According to the NOAA Fisheries, one of the critical targets for the Puget Sound Evolutionarily Significant Unit (ESU) to reach a viable status, is for the spring Chinook population to achieve a low-risk status. Achieving this goal will require comprehensive restoration; the White River, which contains Boise Creek, was listed as the 8th most endangered river in the United States by American Rivers. Boise Creek is a "Usual and Accustomed" fishing area for the Muckleshoot and Puyallup tribes and both have formally raised concerns about poor salmon habitat and water quality conditions in Boise Creek.

The Boise Creek Enhancement Project will connect together a variety of projects that have already been constructed as well as projects that are planned for future construction (Figure 9). Three restoration projects that have already been constructed include the Lower Boise Creek Channel Restoration project, the Middle Boise Evans project, and the Vanweiringen Riparian project. Future projects include the Reach 7 and Reach 6 Restoration Projects, both located on the Vanweiringen farm. These projects all share similar designs elements: they increase channel hydraulic conveyance capacity by widening the channel, create slow-water margin and riverine wetland habitats, enhance channel complexity with additional large wood, and restore riparian buffers with dense plantings of native trees and shrubs.

Figure 9: Past, Proposed, and Future Projects



Design criteria will be tailored to local reach characteristics such as gradient, hydraulics, hydrology, soils and land use factors. Design criteria will be derived from natural analogs, empirical and analytical sources and then tested and refined using the River Flow 2D model. Different types of widened channel designs may be employed: in some reaches a multiple channel may be used, while in other reaches a multiple channel design may be better. One design may be more suitable to land use constraints, while still providing residual margin and lateral rearing habitat at lower flows. The other may accommodate

high sediment deposition with a broader active channel area and riverine wetlands that can provide both rearing and water quality functions.

3. Is your project in a Puget Sound Partnership Priority Floodplain? *(5 points*)

Yes, the Puyallup River.

4. Other benefits (*40 points*)

a. Agricultural viability.

The middle reaches of Boise Creek flow through the KC Comprehensive Plan-designated Enumclaw Agricultural Production District (APD); agricultural practices are zoned as the primary land use in APDs. There are over 1,000 acres of the middle Boise Creek basin within the Enumclaw APD. KC has strong policies protecting APDs through a combination of land use and zoning regulations.

Boise Creek floods adjacent properties during larger than 1-year floods, with water saturating fine-grained agricultural soils for weeks afterwards thereby reducing agricultural productivity. Agricultural viability will be increased and sustained by this proposal in a number of ways:

- Expanding the conveyance capacity of Boise Creek by widening the channel. The additional conveyance capacity will reduce river stage for higher frequency events (i.e. 2-5 year), thereby reducing the frequency and duration of floodplain inundation that are contributing to soil saturation and reduced pasturage.
- Replacing undersized bridges at 268th and 276th Ave SE that constrict downstream conveyance and contribute to backwater flooding of agricultural properties.
- Increasing pasture productivity by reducing the frequency and duration of soil saturation through soil top-dressing (i.e., with spoils from creek widening) and grass seeding.
- Assisting landowners to improve onsite drainage.
- Constructing livestock exclusion fences near Boise Creek to protect both the restored habitat of the riparian zone and prevent livestock accessing the stream.
- Purchasing development rights via conservation easements on adjacent farmlands to permanently preserve valuable farmland and sustain agricultural viability in this region. About 154 acres in the Boise Creek sub-basin are enrolled in the KC Farmland Preservation Program, which acquires development rights on agricultural lands. Preserving farming in this area has strategic growth management benefits since the property is located adjacent to and south of the KC's Urban Growth Area boundary (city limits of Enumclaw).

b. Water quality improvement.

The Puyallup River Watershed TMDL identified Boise Creek as contributing the highest fecal coliform concentration of any tributary in the watershed (WDOE 2010); a KC water quality study in 2009 determined that the stream is excessively warm during the summer. Based on recorded high fecal coliform and water temperatures, Boise Creek has been added to the State's 303(d) list of impaired waterbodies for temperature, pH, and bacteria. Boise Creek is currently named in the KC Municipal Storm and Sanitary Sewer System NPDES permit as a system that requires total maximum daily load (TMDL) compliance by the end of the permitted period. Among the potential water pollution sources implicated in Boise Creek are poor drainage, livestock and manure management practices, failing septic/sewerage systems, and pet waste.

Agricultural BMP Implementation: KC will work with landowners to promote existing King Conservation District (KCD) and KC agricultural support programs (such as KC's Drainage Assistance Program, pasture improvement, manure management programs) and assist landowners with making informed choices

about environmentally protective ways to manage their properties. This could also include fencing livestock from stream and wetland areas.

Riparian Revegetation: The proposed riparian revegetation associated with this project will build upon previous riparian enhancement projects implemented along Boise Creek by KC (e.g. the Vanweiringen Riparian Restoration Project (2009). This work will contribute to ongoing improvements in stream temperatures which currently exceed state standards. All revegetated areas will be protected from livestock with fencing. Revegetation efforts will take into consideration the needs of agricultural property management.

c. Public open space/recreation access

This project in of itself will not improve recreation access. However, the project occurs near a proposed regional trail (Enumclaw Foothills Trail) and could provide a unique opportunity to promote public education relative to watershed health and salmon recovery at the restoration site. The Lower Boise Creek Channel Restoration Project is located on this trail system, is part of the Salmon Tails and Trails system (http://salmontrails.org/watershed/puyallup-white-chambers-clover/), and is open to the public. The previously-constructed Middle Boise Creek – Evans project is a KC property and open to the public.

d. Economic development

By improving drainage on adjacent farm fields, this project will make them more productive for pasture and crops. In addition, this project could act as a catalyst for future enhancement projects on nearby properties which would likely benefit the economic situation of nearby farmers.

e. Other floodplain values or services of local importance.

Finding solutions to habitat, flooding, and water quality problems on private property in rural KC is challenging. Implementing this proposal would provide a blueprint that can be applied to other agricultural areas in KC and the state. We are confident this project will succeed because we have learned important lessons from previous landowner outreach efforts in the Boise Creek sub-basin, including the need for ongoing land owner involvement and the importance of collaboration with trusted agricultural partners such as the King Conservation District.

5. Cost-effectiveness (*20 points*)

a. Is budget appropriate to the project scope, and designed for project success.

The KC Ecological Restoration and Engineering Services (KC ERES) will be responsible for managing all aspects of design, stakeholder coordination, permitting, construction, maintenance and monitoring. KC has over 20 years of experience employing a design-build approach to habitat restoration projects and constructed two successful projects on Boise Creek within the last four years including the Lower Boise Creek Channel Restoration Project (2010) and the Middle Boise Evans Restoration Project (2013). The Middle Boise Evans Restoration Project included many of the same project elements as this project, including floodplain ecosystem restoration and agricultural improvement. KC is confident that the proposed budget is appropriate to the project scope and the implementation of a successful project.

b. Describe how project will be continued or maintained after the grant has been completed.

The monitoring and maintenance (M&M) of these projects will be conducted by KC staff members who are dedicated to develop and implement M&M plans for every KC enhancement project constructed. These plans describe the scope, schedule, level of effort, adaptive management activities and deliverables for the M&M activities. M & M activities will be implemented for at least five years after

construction is complete. Bridge maintenance will be the responsibility of KC Department of Transportation.

c. If project cannot be fully funded, explain how the project could be scaled downward.

It would be possible to phase this project. However, multiple mobilization costs would significantly increase the overall cost of the effort and would cause additional disruption to the adjacent land owners.

6. Long-term cost avoidance: (*30 points*)

a. Describe how your project minimizes or eliminates future costs for maintenance, operation, or emergency response. (*15 points*)

This project will provide long-term economic benefits and cost avoidance by reducing emergency flood hazard response costs and eliminating flood insurance recovery costs. Emergency response costs will be reduced by improving channel and floodplain conveyance and diminishing the risk of flood damage. The need for emergence service personnel and funds will be reduced during flood events. Flood insurance recovery costs will be eliminated by acquiring development rights from floodplain properties and preventing future housing development within high flood risk zones. KC is planning to collaborate with NOAA, the UW Climate Impacts Group, and other partners to evaluate and quantify climate change impacts that could affect project design and implementation.

b. Describe how your project accounts for expected future changes to hydrology, sediment regimes, or water supply resulting from other floodplain management efforts, land use changes, extreme weather events, or other causes. (*15 points*)

KC takes an adaptive management approach to project performance during both design and monitoring phases of the project. During the design phase various empirical and analytical methods may be used to model and forecast possible project outcomes. These may include the use of two dimensional hydraulic models, temperature equilibrium models, hydrologic and sediment transport models. Mitigating risks is accomplished by: 1) identifying risk factors for success (e.g. elevated temperatures during vegetation establishment period); 2) selecting monitoring approaches to track and mitigate risk factors (e.g.: temperature data loggers and regular inspections); 3) preparing contingency plans to mitigate risk factors (e.g.: deploying shade cloth, diverting and concentrating channel flow).

The Boise project increases the resilience of the creek system to future perturbations through:

- Widened channels that will convey larger floods more effectively
- Wider bridges that will be less prone to damage or backwater effects from larger floods
- Increased stream complexity that makes it more likely that there will be refugia for instream organisms during times of extreme drought or high water temperatures.
- Integration of agricultural issues into the design concepts that will encourage ongoing open space and agricultural uses of adjacent land into the future.

8. Demonstration of need and support (*30 points*)

a. Describe how project is consistent with intent of existing floodplain management or habitat recovery plans or is specifically identified through existing plans/work programs. *(15 points*)

This project will build upon four technical studies prepared for Middle Boise Creek including:

- *Middle Boise Creek River Flow 2D Hydraulic Model*. (in development). Prepared for KC by Herrera Environmental Consultants. Seattle, WA.
- *Boise Creek Restoration Plan*. 2014. KC DNRP. Seattle, WA.

- *Middle Boise Creek Habitat Restoration and Flood Reduction Study*. 2012. Prepared for KC by Herrera Environmental Consultants. Seattle, WA.
- *Boise Creek Rapid Rural Reconnaissance Report, Volume 1*. 2004. KC DNRP, Seattle, WA.

This project is entirely consistent with salmon habitat recovery plans prepared for WRIA 10 including:

- *Middle Boise Creek Restoration Plan* (KC 2013) identified and analyzed specific restoration sites along Middle Boise Creek including the one identified in this proposal.
- *WRIA 10/12 Three-Year Work Program* (2012) identified the preservation and restoration of highly productive tributaries including Boise Creek, as a top implementation priority for the next three years. The Program lists Boise Creek Restoration which includes the purchase of conservation easements, to restore instream and riparian habitat of Boise Creek between RM 1 and 3. Boise Creek Restoration Projects are Tier 1 (top-ranked) projects in this plan.
- *Streams Water Quality Index Study* (KC 2009) concluded that salmonids use of Boise Creek is likely limited by high water temperatures.
- *WRIA 10/12 Salmon Habitat Protection and Restoration Strategy* (2008) noted that tributaries to the White River, including Boise Creek, suffer from low quantities of LWD, poor riparian function, and high sediment load. The Strategy identifies protecting/restoring habitat through riparian revegetation and LWD placement in Boise Creek as a near-term high-priority action that will be most effective in improving conditions necessary to support increased fish populations. Boise Creek LWD enhancement and revegetation ranked among the top 10 projects in the strategy for recovering White River fish.
- *Puget Sound Salmon Recovery Plan* (NMFS 2007) promotes the restoration of waterbodies with ESA-listed species including Boise Creek.
- *Washington State 303(d) list of Impaired Waterbodies* listed Boise Creek based on recorded high water temperatures and fecal concentrations.

b. Describe which flood control authorities, Tribal Nations, local governments, lead entities, key stakeholders or decision-makers representing floodplain interests located within the river reach or affected by the project have provided letters of support explicitly endorsing the project and its outcomes for their interests. (*15 points*)

Letters of support will be provided.

9. Readiness to proceed and complete the proposed phase of the project. Describe how your project is ready to proceed with the scope of work, and your capacity to complete the project successfully and maintain it over time, including your project schedule and deliverables. Describe your experience with similar projects (*25 points)*.

KC has over five years of experience designing, constructing, and maintaining restoration projects on Boise Creek, and over 20 years of experience performing similar projects throughout the county. The experience on Boise Creek has required extensive public and stakeholder outreach and communication; KC staff members have met and are familiar with most if not all of the riparian property owners on Boise Creek. In 2013 a survey questionnaire was sent out to over 60 residents residing in the floodplain of Middle Boise Creek. KC includes technical staff, including project managers, restoration ecologists, ecological engineers, hydrologists and modelers with experience managing large and complex ecological restoration projects. These require extensive stakeholder communication and coordination, numerous federal, state and local permits, and multiple funding sources with separate reporting requirements. KC also sustains a strong partnership with KCD and collaborates on outreach efforts such as will be needed for successful completion of this project.

Construction requires experience with contract procurement and management, phased construction

schedules, construction inspection, adaptive management with field changes, and oversight of contractors occurring over multiple years; KC has a robust procurement and Construction Management and Inspection program. M&M study plans and performance requirements are performed by staff with expertise in research design, sample analysis and reporting.

With respect to experience on similar types of projects, KC designed and constructed Lower Boise Creek Channel Restoration Project (2010). The lower 500 feet of the creek had been steepened and straightened; the restoration project relocated the lowest 500 feet of channel into a constructed channel approximately 900 feet in length (Figure 10). Large wood was added to the new channel to provide roughness, allowing the creek to scour pools, form riffles, build terraces, and actively migrate. This project has been monitored extensively since before construction and for four years after. Indicators of project performance have included: channel length and area, floodplain area, juvenile salmonid densities, pool: riffle ratios, residual pool depths, stream temperatures, buffer width, and plant cover and survival. The project is meeting or exceeding most of its goals and objectives. Valuable lessons were learned for future designs and maintenance:

- If a new flow-through channel is excavated and the old channel is left intact and connected to discharge, plug the old channel with gravel and wood or slash instead of leaving it 'as-is'.
- Extend the scope of permits to cover maintenance needs
- Use scenario-planning in advance of implementation to evaluate potential ecological risks
- Creating multiple channels in Boise Creek carries ecological risks and rewards
- Develop monitoring and maintenance plans collaboratively with project design teams

Figure 10: Lower Boise Creek Channel Restoration - Constructed in 2010

2010 (as-built)

2014

Similarly, the Middle Boise Restoration Project - Evans (2013) included many of the same project elements specified in this FBD proposal (Figure 11). The goal of this project was to restore fish habitat and improving flooding and drainage. Specific objectives included: a) excavating and expanding the channel; b) placing wood in the stream to create forested islands; and c) re-vegetating the riparian zone with native trees and shrubs. The project promoted the formation of more complex stream and wetland habitat, and created a multi-threaded channel. The widened channel allows natural stream processes to create rearing and refuge habitat for Chinook salmon and steelhead trout, The wood, increased wetted channel length, and margin habitat provides structure and hydraulic complexity and captured transported gravels which likely increase hyporheic exchange. The project reduced the duration of flood inundation in three ways: 1) the channel was widened to improve conveyance capacity; 2) dredge spoil berms on top of the stream bank that were preventing flood return-flows were removed from the

floodplain; and 3) topsoil was salvaged from the project site and top-dressed on the adjacent pasture. This soil top-dressing improved pasture productivity by adding organic matter, raising the ground surface elevation, and reducing soil saturation.

The Middle Boise Restoration Project - Evans site has been monitored intensively since construction using time-lapse cameras and underwater videography, in addition to standard stream survey techniques. Salmonids are using the site in very high abundances and gravel deposits have greatly increased the complexity of the site. Slash has been used to proactively manage flow paths and temperatures in summer, avoiding the need for flow diversions and shade cloth. KC has a long track record of prioritizing monitoring so projects can be continually improved over time. The proposed FBD project will benefit from experiences gained on previous nearby projects. KC will monitor and maintain the proposed Middle Boise Creek Enhancement project area for at least five years after completion. Monitoring and maintenance plans will be outlined in early design and negotiated with regulatory agencies to provide maximum cost-effectiveness and added value for the sake of future projects. The plan will follow a standardized template being developed by KC and is likely to resemble the plan developed for Middle Boise Creek.

Figure 11: Middle Boise Evans Restoration – Constructed in 2013

Extensive landowner outreach has been conducted in this reach of Boise Creek of this new proposed work and our confidence in being able to work with the targeted landowners is very high. The approach to landowners will be personal and highly responsive to individual needs as we have done on past projects along Boise Creek and on other projects throughout KC. In this case, the land owner work is simplified since most of the proposed project area has just one landowner who is very supportive of the project.

10. Pilot project and leverage opportunities *(25 points)*

a. If applicable, describe how your project could serve as a pilot effort or result in changes or results with broader impacts to the state. *(10 points)*

KC and the KCD have been active in landowner outreach efforts in the Boise Creek sub-basin for several years. The following outreach efforts have already been undertaken:

- The KCD received funding from The Russell Family Foundation to implement an outreach plan tasked with a grant deliverable of contacting 95% of landowners in the Boise Creek basin by March 2014; the outreach plan focusing on farm tours, neighborhood gatherings, volunteer events, educational opportunities, and KCD community presence, was developed and launched in September 2013. As part of this funding, KCD is partnering with Pierce Conservation District to survey knotweed presence in the Boise Creek riparian zone. KCD also received funding from the

KC Flood District to expand Boise Creek outreach events through December 2014. This funding source includes additional partnering with PCD to implement a Stream Steward volunteer water quality monitoring program in the Boise Creek Basin. KC will work in close collaboration with KCD on this effort to ensure that KC work builds on the KCD outreach success.

- Three years ago, KC contacted 18 landowners along Middle Boise Creek to determine their interest in future flood/habitat enhancement projects on their properties; a large number of property owners responded positively. This was followed by on-the-ground meetings with those who expressed an interest in enhancement projects taking place on their properties.

b. If applicable, describe how your project leverages existing investments, such as SRFB, FCZDs, Dike Districts, TMDLs, WWRP, ESRP, NEP, and other funding sources. Evidence of this will be based on the amount and diversity of the leveraged funding sources. *(10 points)*

Local match funding will be provided to this effort, some of which would come from the KC Surface Water Management Fee program. Previous funding for Boise Creek enhancement efforts has come from SRFB, WDOE (TMDL program), the KCD, and KC.

c. If applicable, describe how your project addresses inequity or social justice issue by benefitting underserved communities. *(5 points)*

This proposal addresses the deep social justice and equity issues embedded in the recovery of salmonids species relative to tribal uses. It also addresses the equity issues associated with preserving salmon for future generations.

11. Budget (add more tasks as needed).

Task	WDOE $ Request
Acquisition	
Appraisal	$5,000
Staff Time	$5,000
268th Ave SE Property purchase	$85,286
2,2000 lf of Boise on Vanweirigen property	$106,608
Project Management	
Team mgmt and coord	$30,000
Design	
Preliminary Investigations	
Wetland Investigations	$30,000
Geotechnical Analysis	$15,000
268th Ave SE Bridge replacement feasibility	$38,000
252nd Ave SE bridge replacement feasibility	$38,000
Survey	$15,000
Predesign	
Stakeholder Coordination	$30,000
Permits	$10,000
SEPA	$24,000
Corp	$5,000
Grading	$20,000
HPA	$1,000
Alternatives Analysis	$30,000
River Flow2D modelling	$50,000
Final Design	

PSE	$150,000
Procurement	15,000
Construction	
3,000 channel	$300,000
268th Ave SE bridge	$1,200,000
276th Ave SE bridge	$1,200,000
Drainage Assistance	$50,000
Adaptive Management and Monitoring	$50,000
Project Closeout	$5,000
Total Project Request	**$3,507,894**

Other funding sources for project

Task	Other $ Sources
Non-State Matching Funds	
King County Surface Water Management	$250,000
Farmland Preservation Program Acquisitions	$100,000
Salmon Recovery Funding Board	$300,000
KC Flood Control District Conservation Watershed Management grant	$150,000
King County Conservation Futures Tax	$25,000
Middle Boise – Evans (in-kind)	$105,000
King County staff (in-kind)	$27,000
Total match	**$957,000**

Total Budget	
Amount requested from Ecology	**$3,507,894**
Non-state matching funds	**$957,000**
Total Project Cost	**$4,464,894**

12. Scope of Work:

A scope of work has been attached; schedule is below.

Preliminary Project Schedule:

Task Name	Finish
Obtain DOE FBD Grant Proposal Award	**7/31/15**
Obtain Spending Authority from KC Council	**8/28/15**
Sign Contract with WDOE	**9/31/15**
Planning Phase	**11/20/15**
Preliminary Design Phase	**6/3/16**
Preliminary Design & Permit Package	**12/9/16**
Acquisition of Agricultural Development Rights	**1/29/18**
Final Design Phase	**2/27/19**
Implementation Phase	**8/14/19**
Project Management Monitor, Control, Integration	**3/8/19**
Construct Project	**8/14/19**

13. Maps:

A vicinity map, project area map, and project design are included within the text of the proposal.

14. Planting Maintenance/Survival: If your project includes plantings, please provide a description of how you will ensure plant survival and maintenance.

KC has been actively involved in conducting planting and maintenance experiments to continually improve cost-effectiveness of methods to establish native canopies of trees and shrubs. The results of these studies will be used to design a site-specific strategy for site-preparation, planting strategy, maintenance (i.e., establishment care), and weed control post-project. Examples include:

- Pre-project assessment and treatment of invasive weeds
- Careful handling of any weed-contaminated spoils
- BMPs to avoid/minimize/mitigate soil compaction or other types of degradation by heavy equip.
- Selection of robust plant stock
- Professional plant installation techniques
- Post-project establishment care, potentially including mulch or irrigation, but only as needed.
- Plant replacement during post-project period if necessary, and weed control

Plant performance would focus on achieving robust native woody cover rather than on survival, and would set realistic weed targets for each invasive species. Plants will be actively monitored and maintained for a minimum of five years post project construction.

Certification

I certify to the best of my knowledge that the information provided above is true and correct and that I am legally authorized to sign and submit this information on behalf of the organization applying for this grant.

_____

Signature Date

_____

Printed name and Title

_____

Name of Organization Applying for Grant