

## Appendix H – Projects

# WRIA 9 Project Opportunity Profile – Soos Creek Park (Pre-Identified No. 5)

## Project Summary (9-S-W1)

Update: 10/7/2020

*FLOW BENEFIT:* Additional 0.10 cfs in 2.1 miles in Big Soos Creek and 30 miles in Green River.

*PRIORITY SUBBASIN:* Soos Creek Subbasin

*ESTIMATED OFFSET:* 11 afy consumptive

*PRIORITY DATE(S):* 04/24/1959

*SOURCE AND PURPOSE:* Surface water for irrigation and fish propagation.

*PERIOD OF USE:* Seasonally from April 15<sup>th</sup> – October 1<sup>st</sup>.

*WRIA 9 INSTREAM FLOW RULE (1980):* There is a surface water closure on all tributaries to the Green River.<sup>1</sup>

*ESA LISTED FISH:* Puget Sound Chinook Salmon (Threatened) and Puget Sound Steelhead (Threatened) and Bull Trout (Threatened)

*OUTREACH STATUS:* Interested



## Project Description

The Pre-Identified No. 5 water right was included in the WRIA 9 water rights analysis at Ecology's request and WREC review. The land underlying the water right was formerly used as a park with ponds and irrigation, while currently appears to continue to be used as a park/open space without ponds and irrigation. The property is located approximately 5.5 miles southeast of Kent, WA. There is one surface water right associated with this project that was temporarily donated from 2020 to 2025 to the Trust Water Rights Program (TWRP) managed by Ecology.

### *Watershed*

Big Soos Creek is part of the Soos Creek subbasin. Big Soos Creek flows into Lower Middle Green River at approximately RM 30. Big Soos Creek is closed to future surface water appropriations but does not have an instream flow established in Chapter 173-509 WAC.

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<sup>1</sup> WAC 173-509-040

## ***Land Use & Ownership***

According to the King County Assessor, the current land use is Vacant Single Family. The property is zoned Rural Area 5, one dwelling unit per 5 acres. The land underlying Pre-Identified No. 5 includes one parcel under public ownership for the period of King County online parcel data record, while a second parcel has been under public ownership since 2015. There is only one landowner and water right holder that manages two adjacent parcels, totaling approximately 64 acres. A review of the WSDA 2019 Agricultural Land Use map, identifies commercial tree as the crop type on the properties. This assessment does reflect the prior use of the park as a commercial Christmas tree farm until converted to the current use as public park in 2015. Yet, the land use is currently a park. Irrigation delineation estimates as much as 0.9 irrigated acres in 2013 and 2019, Table 1. It is possible that the irrigated areas were covered by tree canopy, the difference of estimated irrigated acres between years analyzed maybe explained as the result of the timing of the aerial photograph, specific water use practices or from sufficient causes for non-use (RCW 90.14.140), which would be best understood through direct conversation with the water user.

**Table 1: Delineated irrigation in each year (2013, 2015, 2017, 2019)**

| <b>Year</b> | <b>Total Irrigated Acres<br/>(Med/High Confidence)</b> |
|-------------|--|
| 2013        | 0.9  |
| 2015        | 0  |
| 2017        | 0  |
| 2019        | 0.9  |

## **Water Right**

**Table 2: Current Water Rights**

| <b>Document Type</b> | <b>Qa</b> | <b>Qi</b> | <b>Priority Date</b> | <b>Purpose of Use</b>           | <b>WR Acres</b> | <b>Source</b>   |
|----------------------|-----------|-----------|----------------------|---------------------------------|-----------------|-----------------|
| Certificate          | 20 afy    | 0.10 cfs  | 4/24/1959            | Fish Propagation and Irrigation | 10              | Unnamed Springs |

These quantities only reflect what is shown on the water right document, and do not represent any beneficial use assessment by Ecology.

### ***Water Right History:***

The original certificate was issued for fish propagation and irrigation from unnamed surface water springs feeding nearby Big Soos Creek. This water right has a priority date of 4/24/1959, listed purpose of use of irrigation with a Qi of 0.10 cfs and 20 acre-feet per year as the Qa. In 2020, the water right holder donated the entire the water right, accepted by Ecology, into the TWRP through 2025.

### ***Metering Records:***

Metering records are not available in the Ecology Water Resources Explorer database or in the water right record. Instead, a detailed beneficial use assessment was found in the file record.

### **Conclusion**

This project was identified by Ecology and the WREC as a potential acquisition opportunity. The current land use is Vacant Single Family. Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which estimate as much as 0.9 irrigated acres on these parcels; however, according to the file record it appears that this water right is subject to a Chapter 90.14 RCW nonuse exemption and actual historic irrigation was in the 7-10 acre range. An estimate of crop consumption was developed based on the Washington Irrigation Guide, Appendix A, Kent, WA station using pasture/turf crop irrigation requirement as the surrogate baseline crop (17.06 inches/acre) using an assumed sprinkler irrigation application efficiency of 75%, a consumptive application factor of 10%, resulting in a total consumptive use of 85%.

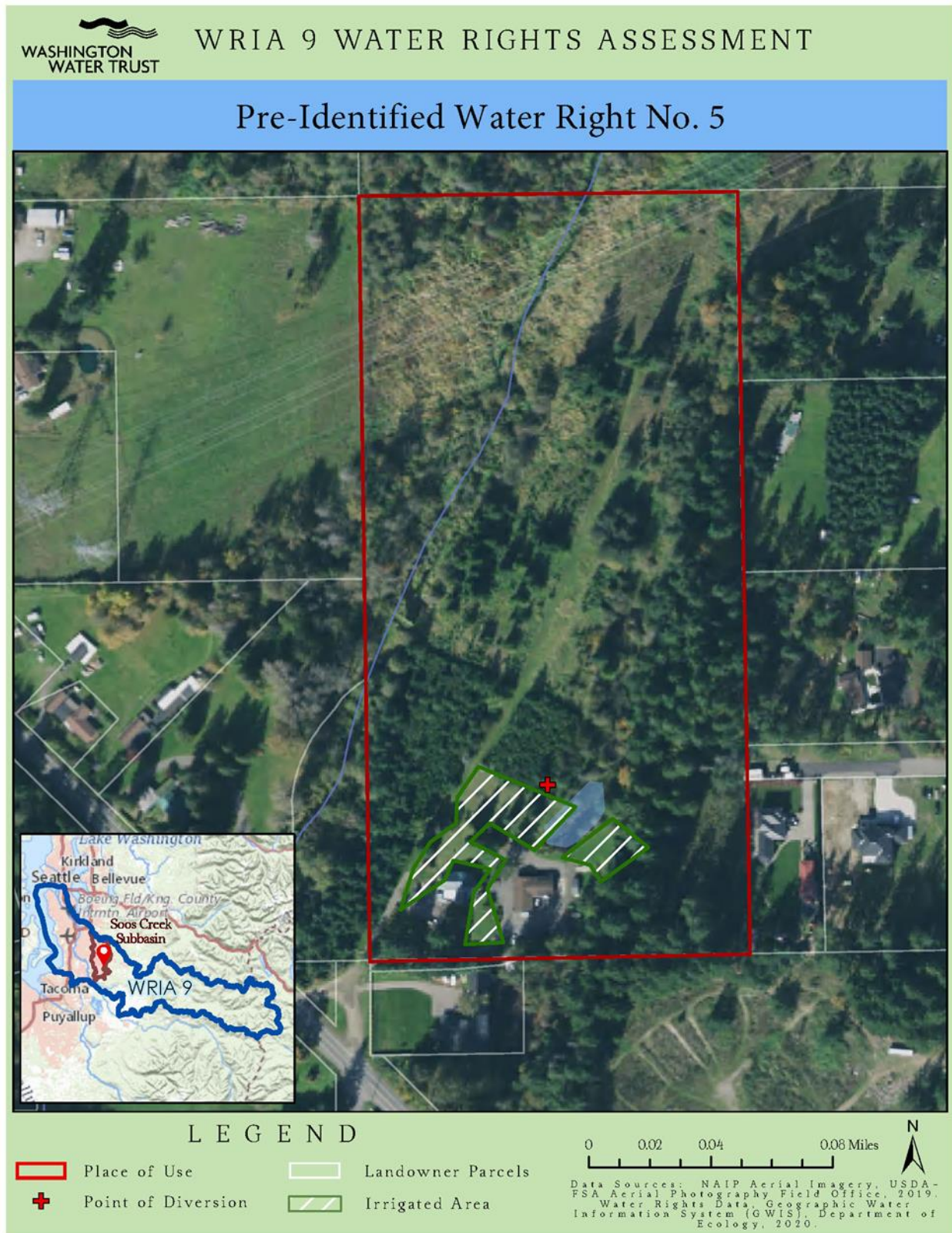
- Based on an irrigation assumption of 7 acres and assuming turf and sprinkler irrigation application, 11 afy consumptive is the estimated quantity<sup>2</sup>
- Based on an irrigation assumption of 10 acres and assuming turf and sprinkler irrigation application, 16 afy consumptive is the estimated quantity.

The Pre-Identified No. 5 water right priority date of 4/24/1959, is senior to the establishment of the Green-Duwamish River Basin Instream Resources Protection Program in 1980, but junior to the administrative closure of all tributaries of Green River dated 08/19/1953.

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<sup>2</sup> This is only an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition. If the prior use was commercial tree farm, the anticipated consumptive use is likely lower than this estimate.

## Project Map





# WRIA 9 Project Opportunity Profile – Pre-Identified No. 2

## Project Summary (9-C-W3)

Updated: 10/7/2020

**FLOW BENEFIT:** Additional 2.7 cfs in 3.5 miles of Covington Creek tributaries (Ravensdale Lake/Creek and Lake Sawyer), 6 miles of Covington Creek, 2.5 miles of Big Soos Creek, and 30 miles of Green River.

**PRIORITY SUBBASIN:** Covington Creek Subbasin

**ESTIMATED OFFSET:** 54 afy consumptive

**PRIORITY DATE:** 6/02/1967

**SOURCE AND PURPOSE:** Surface water for mining.

**PERIOD OF USE:** Year-round.

**WRIA 9 INSTREAM FLOW RULE (1980):** There is a surface water closure on all tributaries to the Green River.<sup>3</sup>

**ESA LISTED FISH:** Puget Sound Chinook Salmon (Threatened), Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

**OUTREACH STATUS:** Initial

## Project Description

The Pre-Identified No. 2 water right was included in the WRIA 9 water rights analysis at Ecology request and WREC review. The land and appurtenant water right are part of a former sand and gravel mining operation. The parcels comprising the property underlying the water right, appear to have been in the same ownership since the late 1990's according to the King County online parcel data record. The water right holder had considered a trust water donation 3 years ago but did not proceed. Washington Water Trust has initiated outreach to the water right holder.

### ***Watershed***

Ravensdale Lake/Creek is a part of the Covington Creek subbasin. Ravensdale Lake/Creek drains into Lake Sawyer, Lake Sawyer is the headwaters of Covington Creek, which Covington Creek flows into Big Soos Creek, and Big Soos Creek joins the Lower Middle Green River at approximately RM 30.



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<sup>3</sup> WAC 173-509-040

Covington Creek and tributaries have a closure to future surface water appropriations but do not have an instream flow established in Chapter 173-509 WAC.

### ***Land Use & Ownership***

According to the King County Assessor, the current land uses under the place of use are Mining/Quarry/Ore Processing, Single Family and Vacant Land, Mobile Home and Vacant Commercial. The properties are zoned Rural Area 10, one dwelling unit per 10 acres, Mineral and Forest. The land underlying Pre-Identified No. 2 appears to have been in the same ownership since the late 1990's according to the King County online parcel data record. There are four landowners and water right holders that manage 5 parcels, totaling approximately 163 acres. Review of aerial imagery shows approximately 24 acres of what appears to be leech ponds active until approximately 2014, following 2014 the prevalence of vegetation may indicate inactivity at the site, but approximately 6 acres of driveways and gravel piles appear active with little to no vegetative cover.

### **Water Right**

**Table 1: Current Water Rights**

| <b>Document Type</b> | <b>Qa</b> | <b>Qi</b> | <b>Priority Date</b> | <b>Purpose of Use</b>                  | <b>WR Acres</b> | <b>Source</b>   |
|----------------------|-----------|-----------|----------------------|--|-----------------|-----------------|
| Certificate          | 744 afy   | 2.7 cfs   | 6/02/1967            | Industrial/Processing mineral products | -               | Ravensdale Lake |

These quantities only reflect what is shown on the water right document, and do not represent any beneficial use assessment by Ecology.

### ***Water Right History:***

The original certificate was issued for "processing mineral products" from Ravensdale Lake. This water right has a priority date of 6/02/1967, listed purpose of use as processing mineral products, with 2.7 cfs identified as the Qi and 744 afy as the Qa.

### ***Metering Records:***

Metering records are not available in the Ecology Water Resources Explorer database or in the water right record. At the time of Ecology's site visit in 2017 a meter was installed but it appears that data was not obtained or available.

### **Conclusion**

This project was identified by Ecology and the WREC as a potential acquisition opportunity. The current land uses are Mining/Quarry/Ore Processing, Single Family and Vacant Land, Mobile Home and Vacant Commercial. Due to the year-round industrial nature of this water right, the actual fact pattern of beneficial use and products produced dictate quantification of consumptive use. This water right holder had considered participating in a trust water right donation 3 years ago but did not proceed. At that time,

Ecology had opportunity to review a beneficial use assessment conducted on behalf of the water right holder by a consultant in 2017, and confirmed the estimates provided at that time.

- Based on a beneficial use assessment produced by a 3<sup>rd</sup>-Party consultant and confirmed by Ecology staff, it was determined that there was as much as 106 afy of beneficial use of water with 54 afy consumptive use in 2017.<sup>4</sup>

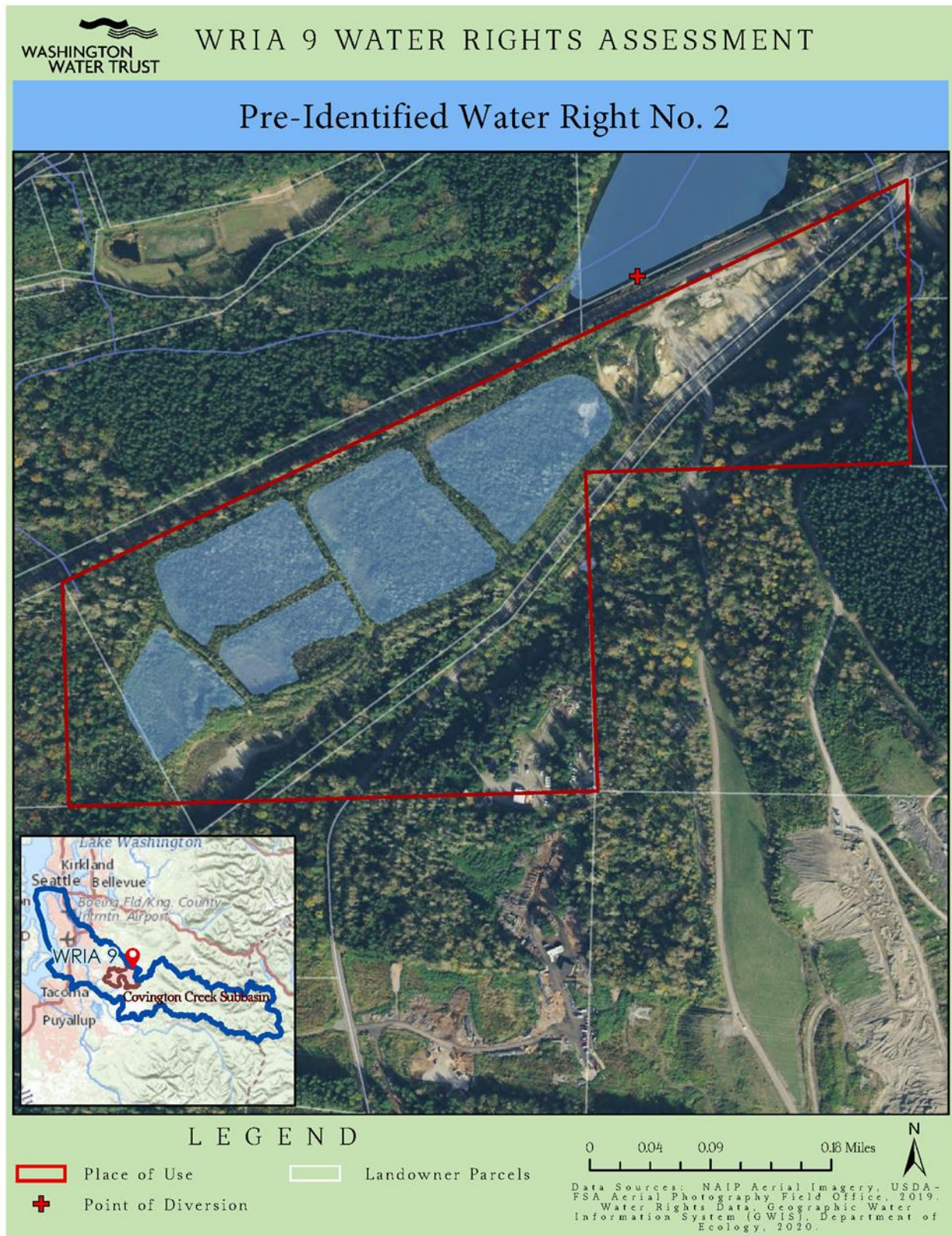
The Pre-Identified No. 2 water right priority date of 6/02/1967, is senior to the establishment of the Green-Duwamish River Basin Instream Resources Protection Program in 1980 but junior to the administrative closure of all tributaries of Green River dated 08/19/1953.

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<sup>4</sup> This is only an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.



## Project Map



# WRIA 9 - Project Description

## Covington Water District Managed Aquifer Recharge

October 14, 2020

### Project Name and Number

Covington Water District Managed Aquifer Recharge (9-C-W4)

### WRIA 9 WRE Subbasin

Covington Creek

### Water Offset

~357 acre-feet/year (AF)

### Narrative Description

Covington Water District (CWD) is proposing the placement of a Managed Aquifer Recharge (MAR) infiltration facility on their property in Covington, Washington. This project would augment stream flows by increasing surficial aquifer discharge (baseflow) to Covington Creek, a tributary to Soos Creek and the Green River, above what occurs under existing conditions. The project concept includes diverting water annually from CWD's existing drinking water pipeline, which runs along the northern site boundary, between approximately November 1 and April 30 when water is available using existing water rights. Diverted water would be conveyed from CWD's existing pipeline and piped to a constructed MAR facility. This diverted water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges to Covington Creek as re-timed groundwater baseflow. The goal of the project is to increase baseflow to Covington Creek by recharging the aquifer adjacent to Covington Creek and providing additional groundwater discharge to the stream through MAR.

The proposed project site is a 54-acre undeveloped property owned by CWD located west of Lake Sawyer in the WRIA 9 Covington Creek subbasin. The site is currently covered by forest and vegetation. The property is located in Section 9, Township 21 North, Range 6 East (Willamette Meridian) and is bounded to the north by Kentlake High School, Druids Glen golf course to the west, and Covington Creek to the east and south.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits. Show how offset volume(s) were estimated.**

The proposed MAR facility will result in streamflow benefits to Covington Creek by diverting and temporarily storing excess water into the shallow alluvial aquifer. The project is currently conceptual but CWD anticipates the ability to divert water from their existing water supply and water rights at a rate of approximately 1 cubic foot per second (cfs) for up to six months (November 1 through April 30). The goal is to increase streamflow. The proposed MAR facility will infiltrate potable water into the shallow aquifer and provide increased baseflow to Covington Creek and its tributaries. The anticipated offset volume for this project is 357 acre-feet (AF) per year. The offset volume is calculated based on the quantity of water infiltrated annually, as described below.

United States Geologic Survey mapping in the area suggests that glacial outwash plain deposits are present at the proposed location (Mullineax 1965). United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil maps indicate the site is underlain by Everett very



gravelly sand loam (EvC) soils with an average saturated hydraulic conductivity (Ksat) of 3.97 inches per hour (USDA 2020). For planning purposes, Ksat is assumed to be equivalent to infiltration rate. Site-specific data were not available so a safety factor of two was applied to the raw Ksat value to derive a corrected infiltration rate of 1.95 inches per hour. Assuming water will be diverted between November 1 and April 30 every year (180 days), the annual diversion volume is estimated to be 357 AF per year using Equation 1:

$$\text{Annual Volume} = \text{Diversion Rate} \times \text{Duration of Diversion} \quad \text{Equation 1}$$

It is anticipated that the MAR facility would be constructed as a buried infiltration gallery, but design details will be further developed at a later time. Year-round groundwater baseflow will be added to actual streamflow in Covington Creek if this project is developed. The temporal distribution and absolute value of those benefits will be estimated during the feasibility study that has to be conducted before a MAR project can proceed to construction and operation. Those streamflow augmentation benefits will continue to discharge to the river after each year's storage window closes because of the lag time of water moving through an aquifer and the distance of the flow path to the river. The rate at which the infiltrated water re-enters the river will vary based on in-situ aquifer parameters that will be tested and modeled during the feasibility study.

It is assumed that a site feasibility study will be conducted pursuant with Appendix B of Ecology's Net Ecological Benefit (NEB) guidance (Ecology 2019a) and Appendix D of the Streamflow Restoration grant application requirements, if funding from Ecology is pursued during a future grant round (Ecology 2019b). All values presented in this project description are for planning purposes and may not represent actual site conditions.

### Conceptual-level map and drawings of the project and location.

The approximate site location is shown below.



### **Description of the anticipated spatial distribution of likely benefits.**

The project is expected to provide streamflow benefits in Covington Creek. Based on the estimated diversion volume, it is possible that streamflow benefits could also be observed in Soos Creek.

### **Location relative to future PE well demand**

The consumptive use estimate for the WRIA 9 Covington Creek subbasin is 21.5 AF per year (GeoEngineers 2019).

### **Performance goals and measures.**

The performance goals are to increase water storage in the alluvial aquifer adjacent to Covington Creek by infiltrating 357 AF per year through the MAR facility to improve baseflow in the Covington Creek. The increase in baseflows should reduce water temperatures in Covington Creek.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Covington Creek subbasin is inhabited by coho, fall chinook, fall chum, coastal cutthroat, and winter steelhead (WDFW 2020a and 2020b).

### **Identification of anticipated support and barriers to completion.**

This project is believed to be in alignment with the goals of the Streamflow Restoration law. MAR is one of the identified project types that could address the new consumptive water use and achievement of NEB.

The project sponsor owns of the land and will rely on existing water rights to implement the project, thereby reducing uncertainties related to land acquisition and permitting.

The barriers to completion include funding for construction and O&M costs. In addition, the water available for diversion from CWD's existing pipeline is treated drinking water. It is anticipated that water quality will be evaluated and a geochemical compatibility analysis will be conducted to ensure no water quality degradation, and/or water will be treated to mitigate any environmental impacts.

### **Potential budget and O&M costs.**

To be determined.

### **Anticipated durability and resiliency.**

In this context, durability refers to the capacity of the MAR project to maintain the estimated water offset over time and despite changing external conditions (which could include seasonal variation in streamflow, seasonal and/or long-term fluctuation in regional groundwater elevation, adjacent land use changes, and/or other factors). We anticipate that the planned project will be durable, based on the following:

- The water source would be reliable, based on a certificated water right, and the seasonal storage volume should always be available.
- The rate of diversion would be precisely maintained through engineering controls and conveyed with minimal loss to the recharge location.
- Groundwater recharge rate would be maintained through a program of periodic rehabilitation of the infiltration structure(s).
- The anticipated range in regional groundwater elevation fluctuation would not impact the groundwater flow field in a manner that significantly reduces the project offset.

- Land use changes external to the project site would have negligible impact on project function.

Herein, resiliency refers to the capacity of the project to maintain the estimated water offset despite the impacts of climate change. Within the watershed, climate change could result in an increase in seasonal temperature, a decrease in summer precipitation, an increase in winter rainfall, a decrease in winter snowfall and/or spring snowpack, an increase in the frequency and/or intensity of storm events, an increase in wildfires, an increase in sea level, and/or other impacts. We anticipate that the planned project would be resilient to the potential impacts of climate change based on the following:

- Project function would not be impacted by summer drought conditions.
- The project diversion can be engineered and constructed in a manner that is resilient to flood events.
- Wildfire damage to the MAR site and surrounding area would not impact project function and the anticipated water offset.
- Sea level increase would not impact project function.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

CWD is the project sponsor. Sponsor contact: Steve Lee, Engineering Manager. The sponsor is willing to proceed with scoping, reconnaissance, and project management support. Implementation will be dependent on several factors, including funding.

### **Documentation of sources, methods, and assumptions.**

Department of Ecology. 2019a. Final Guidance for Determining Net Ecological Benefit. GUID-2094 Water Resources Program Guidance. Publication 19-11-079. July 2019.

Department of Ecology. 2019b. Streamflow Restoration Competitive Grants, 2020: Guidance for project applicants. Publication 19-11-089. Revised December 2019.  
<https://fortress.wa.gov/ecy/publications/documents/1911089.pdf>

Geoengineers, Inc. (GeoEngineers). 2020. WRIA 9 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 2020.

Mullineaux, D.R. 1965. Geologic Map of the Black Diamond Quadrangle, King County, Washington. USGS Geologic Quadrangle Map GQ-407, Scale 1:24,000.

US Department of Agriculture (USDA), 2020. Web Soil Survey.  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Washington State Department of Fish and Wildlife (WDFW). 2020a. Salmonscape Mapping of Fish Distribution. <http://apps.wdfw.wa.gov/salmonscape/>

WDFW. 2020b. Statewide Washington Integrated Fish Distribution (SWIFD).  
[http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0)

# **WRIA 9 –Project Description**

## **Green River Managed Aquifer Recharge at Kanaskat Palmer State Park**

October 21, 2020

### **Project Name and Number**

Green River Managed Aquifer Recharge (9-UMG-W5)

### **WRIA 9 WRE Subbasin**

Upper Middle Green River

### **Water Offset**

114 acre-feet/year (AF)

### **Narrative Description**

One of the potential Managed Aquifer Recharge (MAR) sites identified by Ecology is located on Washington State Parks and Recreation property within Kanaskat-Palmer State Park near Palmer, Washington. This project would augment stream flows by increasing surficial aquifer discharge (baseflow) to the Green River above what occurs under existing conditions. The project concept includes diverting surface water annually from the Green River during high flow periods when excess water may be available. Diverted water would be conveyed through a collector well adjacent to the river (e.g. Ranney Collector well) or through an instream surface water intake and piped to a constructed MAR facility. This diverted surface water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges back to surface water as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the Green River during the low flow period (typically late summer and early fall) by recharging the aquifer at the infiltration site and by providing additional groundwater discharge to the river through MAR.

Kanaskat-Palmer State Park occupies approximately 320 acres in the WRIA 9 Upper Middle Green River subbasin and is currently covered by forest and vegetation. The site property is located in Section 10, Township 21 North, Range 7 East (Willamette Meridian) and is bounded to the north by the Green River and surrounded by forest in all other directions.

The project should be specifically designed to enhance streamflows and to avoid a negative impact to ecological functions and/or critical habitat needed to sustain threatened or endangered salmonids.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits. Show how offset volume(s) were estimated.**

The proposed MAR facility will result in streamflow benefits to the Green River by diverting and temporarily storing a portion of seasonal high flows into the shallow alluvial aquifer. This project is currently conceptual but, for planning purposes we anticipate the ability to divert surface water from the Green River at a rate of approximately 1 cubic foot per second (cfs) for up to five and a half months (December 1 through May 15). This is a preliminary estimate of the quantity of water diverted and timing of diversion, which needs further analysis through a site-specific feasibility study.



The goal of the project is to increase streamflow. For planning purposes, the Committee assumed that 327 acre-feet (AF) per year would be infiltrated annually (as described below) and based the offset volume on expected streamflow benefits during periods when flows are typically lower: late summer and early fall. The Committee used the USGS streamflow depletion software called STRMDEPL08 to estimate offset volume of approximately 114 AF for the time period June 1 through October 31, because recent streamflow data showed a significant decrease in flows during those months. The Committee chose 114 AF as the offset volume to account for uncertainties related to diversion rate, period of diversion, and timing of streamflow benefits.

USGS mapping in the area suggests that terrace gravel and stratified drift deposits (Qt) are present at the proposed location (Vine 1969). United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil maps indicate the site is underlain by Barneston gravelly ashy coarse sandy loam with an average saturated hydraulic conductivity (Ksat) of 12.4 inches per hour (USDA 2020). For planning purposes, Ksat is assumed to be equivalent to infiltration rate. Site-specific data were not available so a safety factor of two was applied to the raw Ksat value to derive a corrected infiltration rate of 6.2 inches per hour. The annual diversion volume is calculated using Equation 1:

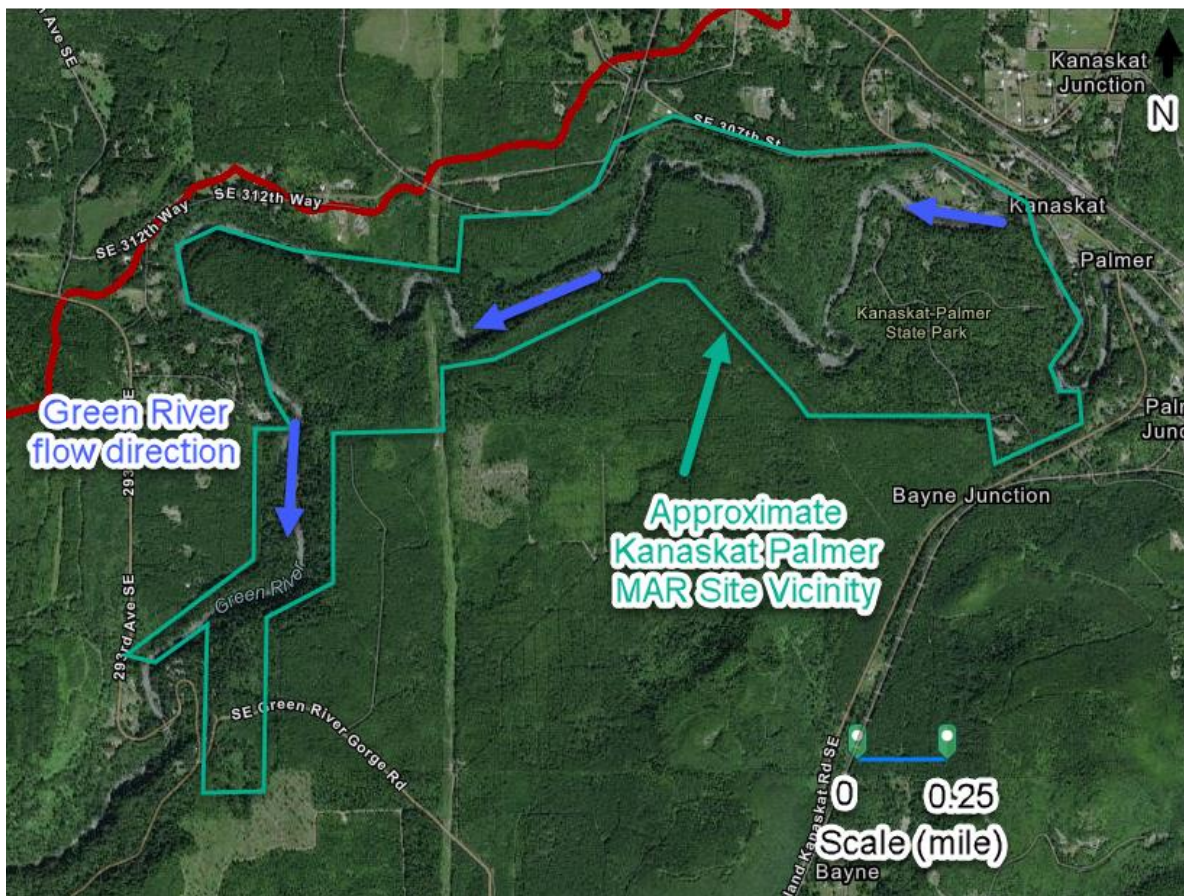
$$\text{Annual Volume} = \text{Diversion Rate} \times \text{Duration of Diversion} \text{ Equation 1}$$

It is anticipated that the MAR facility would be constructed as a buried infiltration gallery or an above ground infiltration basin, which will be determined in the future. Year-round groundwater baseflow will be added to actual streamflow in the Green River if this project is developed. The temporal distribution and absolute value of those benefits will be estimated during the feasibility study that has to be conducted before a MAR project can proceed to construction and operation. Those streamflow augmentation benefits will continue to discharge to the river after each year's storage window closes because of the lag time of water moving through an aquifer and the distance of the flow path to the river. The rate at which the infiltrated water re-enters the river will vary based on in-situ aquifer parameters that will be tested and modeled during the feasibility study.

It is assumed that this feasibility study will be conducted pursuant with Appendix B of Ecology's Net Ecological Benefit (NEB) guidance (Ecology 2019a) and Appendix D of the Streamflow Restoration Grant application requirements, if funding from Ecology is pursued during a future grant round (Ecology 2019b). All values presented in this project description are for planning purposes and may not represent actual site conditions.

### **Conceptual-level map and drawings of the project and location.**

The general site location is shown below. The specific project site and size would be determined during the feasibility study.



### **Description of the anticipated spatial distribution of likely benefits.**

The project is expected to provide streamflow benefits in the mainstem of the Green River.

### **Location relative to future PE well demand.**

The consumptive use estimate for the WRIA 9 Upper Middle Green River subbasin is 26.9 AF per year (GeoEngineers 2019). This project would also contribute to offsetting 85 AF per year of estimated consumptive use in the following downstream subbasins: Mid Middle Green, Lower Middle Green, Lower Green, and Duwamish.

### **Performance goals and measures.**

The performance goals are to increase water storage in the alluvial aquifer adjacent to the Green River by infiltrating water through the MAR facility to improve baseflow in the Green River. The performance measures will be an increase in baseflow in the Green River. Specific quantities and timing for surface water diversion would be determined during a feasibility study.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Green River is inhabited by sockeye, fall chinook, coho, chum, bull trout, and winter and summer steelhead (WDFW 2020a and 2020b). Chinook and steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Identification of anticipated support and barriers to completion.**

This project is believed to be in alignment with the goals of the Streamflow Restoration law. MAR is one of the identified project types that could address the new consumptive water use and achievement of NEB.

GeoEngineers initiated outreach to the landowner (Washington State Department of Parks and Recreation) to evaluate their level of support for the project and they expressed support for the project concept.

The barriers to completion include funding for construction and O&M costs and obtaining a water right from the Green River or the adjacent aquifer for beneficial use at the MAR facility.

### **Potential budget and O&M costs.**

To be determined.

### **Anticipated durability and resiliency.**

In this context, durability refers to the capacity of the MAR project to maintain the estimated water offset over time and despite changing external conditions (which could include seasonal variation in streamflow, seasonal and/or long-term fluctuation in regional groundwater elevation, adjacent land use changes, and/or other factors). We anticipate that the planned project will be durable, based on the following:

- The water source would be reliable, based on a certificated water right, and while interruptible, the seasonal storage volume should always be available.
- The rate of diversion would be precisely maintained through engineering controls and conveyed with minimal loss to the recharge location.
- Groundwater recharge rate would be maintained through a program of periodic rehabilitation of the infiltration structure(s).
- The anticipated range in regional groundwater elevation fluctuation would not impact the groundwater flow field in a manner that significantly reduces the project offset.
- Land use changes external to the project site would have negligible impact on project function.

Herein, resiliency refers to the capacity of the project to maintain the estimated water offset despite the impacts of climate change. Within the watershed, climate change could result in an increase in seasonal temperature, a decrease in summer precipitation, an increase in winter rainfall, a decrease in winter snowfall and/or spring snowpack, an increase in the frequency and/or intensity of storm events, an increase in wildfires, an increase in sea level, and/or other impacts. We anticipate that the planned project would be resilient to the potential impacts of climate change based on the following:

- Ideally, diversion would occur during late fall through spring, which generally does not coincide with anticipated (post-climate change) low-streamflow conditions.
- Project function would not be impacted by summer drought conditions.
- The project diversion can be engineered and constructed in a manner that is resilient to flood events.
- Wildfire damage to the MAR site and surrounding area would not impact project function and the anticipated water offset.
- Sea level increase would not impact project function.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

Washington Water Trust is a potential project sponsor.

### **Documentation of sources, methods, and assumptions.**

Department of Ecology. 2019a. Final Guidance for Determining Net Ecological Benefit. GUID-2094 Water Resources Program Guidance. Publication 19-11-079. July 2019.

Department of Ecology. 2019b. Streamflow Restoration Competitive Grants, 2020: Guidance for project applicants. Publication 19-11-089. Revised December 2019.  
<https://fortress.wa.gov/ecy/publications/documents/1911089.pdf>

Geoengineers, Inc. (GeoEngineers). 2020. WRIA 9 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 2020. US Department of Agriculture (USDA). 2020. Web Soil Survey.  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Vine, J.L. 1969. Geology and Coal Resources of the Cumberland, Hobart, and Maple Valley Quadrangles, King County, Washington. USGS Professional Paper PP-624, scale 1:24,000.

US Department of Agriculture (USDA), 2020. Web Soil Survey.  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Washington State Department of Fish and Wildlife (WDFW). 2020a. Salmonscape Mapping of Fish Distribution. <http://apps.wdfw.wa.gov/salmonscape/>

WDFW. 2020b. Statewide Washington Integrated Fish Distribution (SWIFD).  
[http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0)

# **WRIA 9 – Project Description**

## **Green River Managed Aquifer Recharge at Tacoma Water Filtration Facility**

October 21, 2020

### **Project Name and Number**

Green River Managed Aquifer Recharge (9-UMG-W5)

### **WRIA 9 WRE Subbasin**

Upper Middle Green River

### **Water Offset**

114 acre-feet/year (AF)

### **Narrative Description**

One of the potential Managed Aquifer Recharge (MAR) sites identified by Ecology is located on Tacoma Water property near Palmer, Washington. The site is located approximately ½-mile downstream of Tacoma Water's Green River Filtration Facility. This project would augment stream flows by increasing surficial aquifer discharge (baseflow) to the Green River above what occurs under existing conditions. The project concept includes diverting surface water annually from the Green River during high flow periods when excess water may be available. Diverted water would be conveyed through a collector well adjacent to the river (e.g. Ranney Collector well) or through an instream surface water intake and piped to a constructed MAR facility. This diverted surface water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges back to surface water as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the Green River during the low flow period (typically late summer and early fall) by recharging the aquifer at the infiltration site and providing additional groundwater discharge to the river through MAR.

The site is located in the WRIA 9 Upper Middle Green River subbasin and is currently covered by forest and vegetation. The site is located in Section 13, Township 21 North, Range 7 East (Willamette Meridian) and is bounded to the north by SE Green River Headworks Road, to the south by Burlington Northern Santa Fe railroad by forest to the east and west.

The project should be specifically designed to enhance streamflows and to avoid a negative impact to ecological functions and/or critical habitat needed to sustain threatened or endangered salmonids.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits. Show how offset volume(s) were estimated.**

The proposed MAR facility will result in streamflow benefits to the Green River by diverting and temporarily storing a portion of seasonal high flows into the shallow alluvial aquifer. This project is currently conceptual but, for planning purposes we anticipate the ability to divert surface water from the Green River at a rate of approximately 1 cubic foot per second (cfs) for up to five and a half months (December 1 through May 15). This is a preliminary estimate of the quantity of water diverted and timing of diversion, which needs further analysis through a site-specific feasibility study.



The goal of the project is to increase streamflow. For planning purposes, the Committee assumed that 327 acre-feet (AF) per year would be infiltrated annually (as described below) and based the offset volume on expected streamflow benefits during periods when flows are typically lower: late summer and early fall. The Committee used the USGS streamflow depletion software called STRMDEPL08 to estimate offset volume of approximately 114 AF for the time period June 1 through October 31, because recent streamflow data showed a significant decrease in flows during those months. The Committee chose 114 AF as the offset volume to account for uncertainties related to diversion rate, period of diversion, and timing of streamflow benefits.

USGS mapping in the area suggests that alluvium aquifer material should be present at the proposed location (Jones 1999). United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil maps indicate the site is underlain by Udifluent gravelly sandy loam soils with an average saturated hydraulic conductivity (Ksat) of 3.97 inches per hour (USDA 2020). For planning purposes, Ksat is assumed to be equivalent to infiltration rate. Site-specific data were not available so safety factor of two was applied to the raw Ksat value to derive a corrected infiltration rate of 1.98 inches per hour. The annual diversion volume is calculated using Equation 1:

$$\text{Annual Volume} = \text{Diversion Rate} \times \text{Duration of Diversion (days)} \quad \text{Equation 1}$$

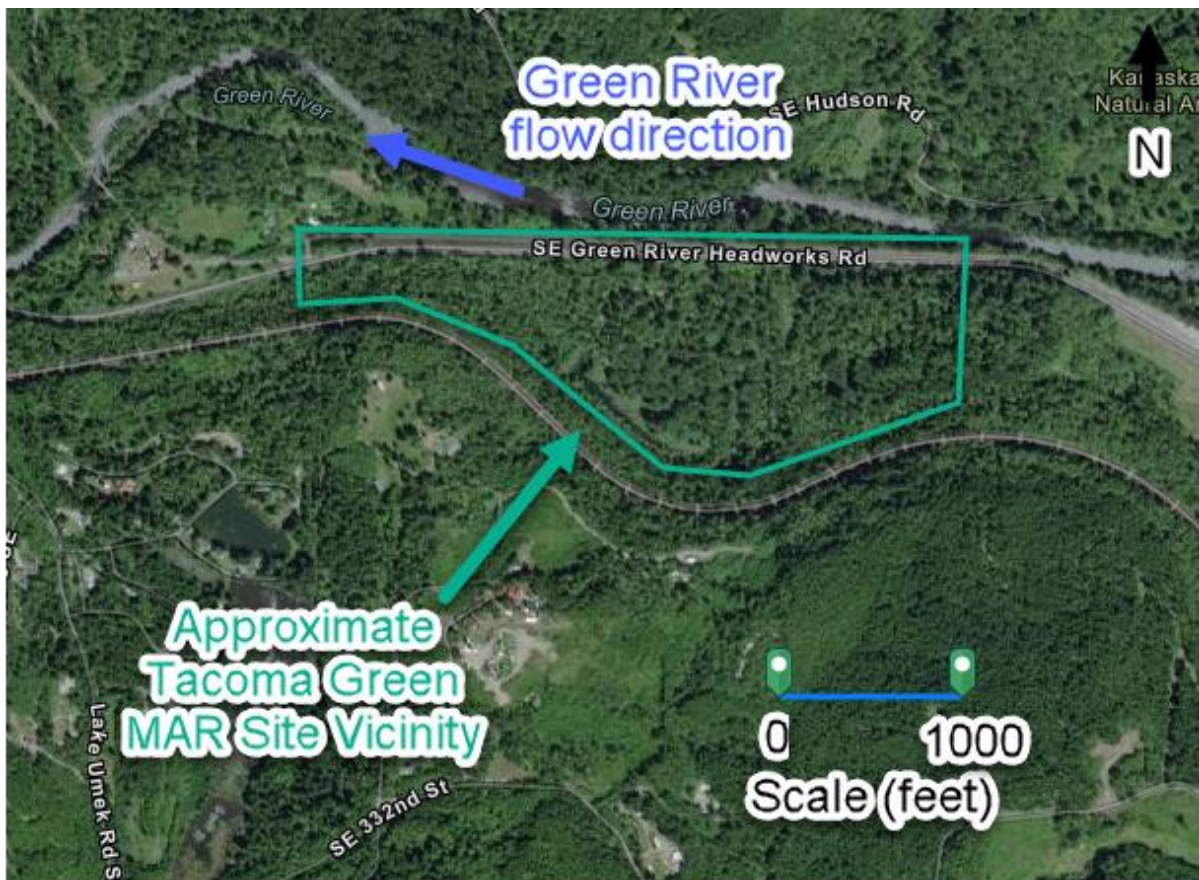
It is anticipated that the MAR facility would be constructed as a buried infiltration gallery or an above ground infiltration basin which will be determined in the future. Year-round groundwater baseflow will be added to actual streamflow in the Green River if this project is developed. The temporal distribution and absolute value of those benefits will be estimated during the feasibility study that has to be conducted before a MAR project can proceed to construction and operation. Those streamflow augmentation benefits will continue to discharge to the river after each year's storage window closes because of the lag time of water moving through an aquifer and the distance of the flow path to the river. The rate at which the infiltrated water re-enters the river will vary based on in-situ aquifer parameters that will be tested and modeled during the feasibility study.

It is assumed that this feasibility study will be conducted pursuant with Appendix B of Ecology's Net Ecological Benefit (NEB) guidance (Ecology 2019a) and Appendix D of the Streamflow Restoration Grant application requirements, if funding from Ecology is pursued during a future grant round (Ecology 2019b). All values presented in this project description are for planning purposes and may not represent actual site conditions.

### **Conceptual-level map and drawings of the project and location.**

The general site location is shown below. The specific project site and size would be determined during the feasibility study.





### **Description of the anticipated spatial distribution of likely benefits.**

The project is expected to provide streamflow benefits in the mainstem of the Green River and in downstream subbasins.

### **Location relative to future PE well demand.**

The consumptive use estimate for the WRIA 9 Upper Middle Green River subbasin is 26.9 AF per year (GeoEngineers 2019). This project would also contribute to offsetting 85 AF per year of estimated consumptive use in the following downstream subbasins: Mid Middle Green, Lower Middle Green, Lower Green, and Duwamish.

### **Performance goals and measures.**

The performance goals are to increase water storage in the alluvial aquifer adjacent to the Green River by infiltrating water through the MAR facility to improve baseflow in the Green River. The performance measures will be an increase in baseflow in the Green River. Specific quantities and timing for surface water diversion would be determined during a feasibility study.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Green River is inhabited by sockeye, fall chinook, coho, chum, bull trout, and winter and summer steelhead (WDFW 2020a and 2020b). Chinook and steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Identification of anticipated support and barriers to completion.**

This project is believed to be in alignment with the goals of the Streamflow Restoration Act. MAR is one of the identified project types that could address the new consumptive water use and achievement of NEB.

Ecology conducted outreach to Tacoma Water regarding the location of this project on their Green River filtration facility and Tacoma Water expressed support for the project concept.

The barriers to completion include funding for construction and O&M costs, and obtaining a water right from the Green River or the adjacent aquifer for beneficial use at the MAR facility.

### **Potential budget and O&M costs.**

To be determined.

### **Anticipated durability and resiliency.**

In this context, durability refers to the capacity of the MAR project to maintain the estimated water offset over time and despite changing external conditions (which could include seasonal variation in streamflow, seasonal and/or long-term fluctuation in regional groundwater elevation, adjacent land use changes, and/or other factors). We anticipate that the planned project will be durable, based on the following:

- The water source would be reliable, based on a certificated water right, and while interruptible, the seasonal storage volume should always be available.
- The rate of diversion would be precisely maintained through engineering controls and conveyed with minimal loss to the recharge location.
- Groundwater recharge rate would be maintained through a program of periodic rehabilitation of the infiltration structure(s).
- The anticipated range in regional groundwater elevation fluctuation would not impact the groundwater flow field in a manner that significantly reduces the project offset.
- Land use changes external to the project site would have negligible impact on project function.

Herein, resiliency refers to the capacity of the project to maintain the estimated water offset despite the impacts of climate change. Within the watershed, climate change could result in an increase in seasonal temperature, a decrease in summer precipitation, an increase in winter rainfall, a decrease in winter snowfall and/or spring snowpack, an increase in the frequency and/or intensity of storm events, an increase in wildfires, an increase in sea level, and/or other impacts. We anticipate that the planned project would be resilient to the potential impacts of climate change based on the following:

- Ideally, diversion would occur during late fall through spring, which generally does not coincide with anticipated (post-climate change) low-streamflow conditions.
- Project function would not be impacted by summer drought conditions.
- The project diversion can be engineered and constructed in a manner that is resilient to flood events.
- Wildfire damage to the MAR site and surrounding area would not impact project function and the anticipated water offset.
- Sea level increase would not impact project function.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

Washington Water Trust is a potential project sponsor.

### **Documentation of sources, methods, and assumptions.**

Department of Ecology. 2019a. Final Guidance for Determining Net Ecological Benefit. GUID-2094 Water Resources Program Guidance. Publication 19-11-079. July 2019.

Department of Ecology. 2019b. Streamflow Restoration Competitive Grants, 2020: Guidance for project applicants. Publication 19-11-089. Revised December 2019.  
<https://fortress.wa.gov/ecy/publications/documents/1911089.pdf>

Geoengineers, Inc. (GeoEngineers). 2020. WRIA 9 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 2020.

Jones, M.A. 1999. Geologic Framework for the Puget Sound Aquifer System, Washington and British Columbia. USGS Professional Paper PP-1424-C, scale 1:100,000.

US Department of Agriculture (USDA), 2020. Web Soil Survey.  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Washington State Department of Fish and Wildlife (WDFW). 2020a. Salmonscape Mapping of Fish Distribution. <http://apps.wdfw.wa.gov/salmonscape/>

WDFW. 2020b. Statewide Washington Integrated Fish Distribution (SWIFD).  
[http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0)

# WRIA 9 - Project Description

## Tacoma Water Streamflow Augmentation and Eagle Lake Siphon

October 12, 2020

### Project Name and Number

Tacoma Water Streamflow Augmentation and Eagle Lake Siphon (9-UG-W6)

### WRIA 9 WRE Subbasin

Upper Green River

### Water Offset

357 acre-feet per year (AF/yr)

### Narrative Description

This project would augment streamflow through the release of 2 cubic feet per second (cfs) of raw, untreated water for a period of 90 days (during the summer low-flow period) into the mainstem Green River using Tacoma Water's existing water rights. If this project is constructed, Tacoma Water envisions this could be done by requesting the Army Corps of Engineers release 2 cfs more water than what Tacoma Water withdraws as part of regular Howard Hanson Dam flow coordination.

The commitment to release an additional 2 cfs to the Green River would be contingent on Tacoma Water securing a water right for up to 1,000 acre-feet (AF) per year of dead storage out of Eagle Lake to use as needed. This commitment would also be contingent on securing grant funding to construct the Eagle Lake Siphon project and any additional infrastructure required. This project is expected to improve streamflows in the Green River in summer when surface flows are generally lowest.

The streamflow benefits from this project would be additive and measurable, and go above Tacoma Water's existing instream flow commitments.

### Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits. Show how offset volume(s) were estimated.

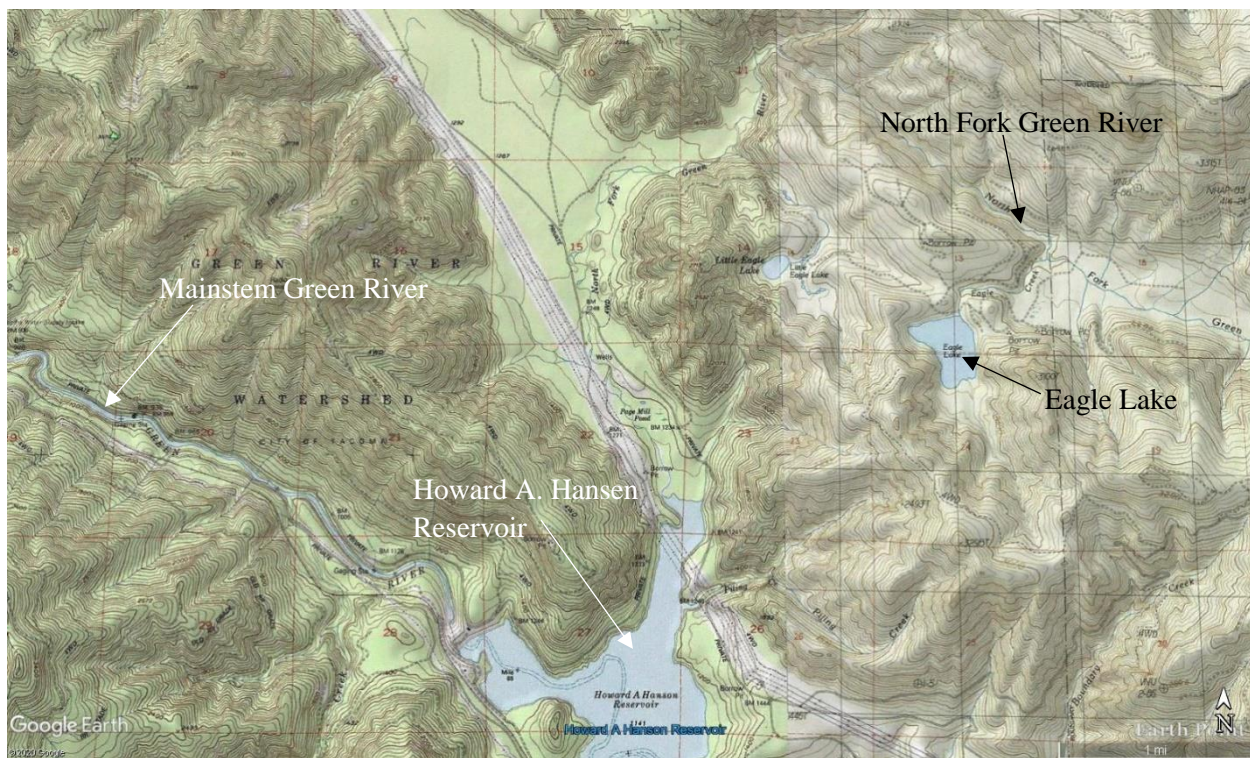
The proposed streamflow augmentation project will result in benefits to the Green River by releasing an additional 2 cfs of water from behind Howard Hanson Dam for a period of 90 days. The anticipated offset volume for this project is 357 AF per year using Equation 1:

$$\text{Annual Volume} = \text{Release Rate} \times \text{Duration of Diversion (days)} \quad \text{Equation 1}$$

### Conceptual-level map and drawings of the project and location.

The project site is shown in relation to surrounding physical features on the below conceptual-level map.





### **Description of the anticipated spatial distribution of likely benefits.**

The project is expected to provide streamflow benefits in the mainstem of the Green River within the following subbasins: Upper Green River, Upper Middle Green River, Mid Middle Green River, Lower Middle Green River, Lower Green River, and the Duwamish River.

### **Location relative to future PE well demand**

There is no forecast consumptive use for the WRIA 9 delineated Upper Green River subbasin (GeoEngineers 2020). This project would contribute to offsetting 111.9 AF per year of estimated consumptive use in the following downstream subbasins: Upper Middle Green, Mid Middle Green, Lower Middle Green, Lower Green, and Duwamish.

### **Performance goals and measures.**

The performance goals are to increase streamflow within the Green River by releasing 2 cfs of additional water during the summer low flow period. The performance measures will be an increase in streamflow in summer in the Green River.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed.**

The Green River is inhabited by sockeye, fall chinook, coho, chum, bull trout, and winter and summer steelhead trout (WDFW 2020a and 2020b).

### **Identification of anticipated support and barriers to completion.**

Tacoma Water has agreed to sponsor and commit to this project with the following conditions:

1. This commitment would be contingent on Tacoma Water securing a water right for up to 1000 AF per year of dead storage out of Eagle Lake to use as needed.

2. This commitment would be contingent on securing grant funding to construct the Eagle Lake Siphon project and any additional infrastructure required.

### **Potential budget and O&M costs.**

The project proponent estimates the total cost for pre-design, design, permitting, and construction of the Eagle Lake Siphon project will be approximately \$315,000. The application process for securing a new water right is estimated to be \$85,000, for a total project cost of approximately \$400,000. Annual O&M costs are estimated to be approximately \$10,000.

### **Anticipated durability and resiliency.**

In this context, durability refers to the capacity of the streamflow augmentation project to maintain the estimated water offset over time and despite changing external conditions (which could include seasonal variation in streamflow, seasonal and/or long-term fluctuation in regional groundwater elevation, adjacent land use changes, and/or other factors). We anticipate that the planned project will be durable, based on the following:

- The project would be actively managed by Tacoma Water.
- The water source would be reliable and not subject to interruption.
- The project relies primarily on infrastructure that is already in place and maintained for the purposes of flood control and drinking water storage.
- The rate of release would be maintained through engineering controls and conveyed with minimal loss to the river.
- Seasonal streamflow variation would have negligible impact on project function.
- Land use changes would have negligible impact on project function.

Herein, resiliency refers to the capacity of the project to maintain the estimated water offset despite the impacts of climate change. Within the watershed, climate change could result in an increase in seasonal temperature, a decrease in summer precipitation, an increase in winter rainfall, a decrease in winter snowfall and/or spring snowpack, an increase in the frequency and/or intensity of storm events, an increase in wildfires, an increase in sea level, or other impacts. We anticipate that the planned project would be resilient to the potential impacts of climate change based on the following:

- The ability to use water from dead storage in Eagle Lake will increase resiliency to drought or other climatic conditions.

### **Project sponsor(s) (if identified) and readiness to proceed/implement.**

The identified project sponsor is Tacoma Water. The sponsor contact is Greg Volkhardt, Water Division Manager. The sponsor is willing to proceed with scoping, reconnaissance, and project management support. Implementation will be dependent on several factors, including funding.

### **Documentation of sources, methods, and assumptions.**

GeoEngineers, Inc. and NHC. 2020. WRIA 9 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 21, 2020.

Washington State Department of Fish and Wildlife (WDFW). 2020a. Salmonscape Mapping of Fish Distribution. <http://apps.wdfw.wa.gov/salmonscape/>

Washington State Department of Fish and Wildlife (WDFW). 2020b. Statewide Washington Integrated Fish Distribution (SWIFD). [http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0)



# WRIA 9 - Project Description

## Mill Creek Tributary 51 Basin Retrofit

November 9, 2020

### **Project Name and Number**

Mill Creek Stormwater Retrofit (9-LG-H7)

### **WRIA 9 WRE Subbasin**

Lower Green River

### **Narrative Description**

King County is conducting a retrofit planning project in the Mill Creek Tributary 51 drainage basin west of Auburn. The project will identify potential stormwater retrofit sites and select one concept to advance to 90% design.

This project will help protect and restore water quality by reducing stormwater impacts from existing infrastructure and development within the basin. The Mill Creek Tributary 51 watershed is identified by Ecology's map of target watersheds for stormwater retrofit as having an "integrity score" of 9-. This is the highest score possible and suggests that retrofit actions within the watershed will have a greater probability of contributing to the recovery and stability of a functioning aquatic ecosystem.

If constructed, this project will meet King County's sustainability infrastructure scorecard by: implementing erosion and sedimentation control best management practices, using on-site materials in construction as best as possible and enhancing riparian conditions, planning for efficient construction delivery and staging, and reusing native soils and, to the extent possible, angular rock on-site.

### **Quantitative or qualitative assessment of how the project will function, including anticipated offset benefits, if applicable.**

Infiltration retrofits or enhancements redirect surface runoff to groundwater, delaying contribution to streamflow. The project design will be determined by the study so potential offsets cannot be determined at this time. Infiltration offsets will depend on the pond design and infiltration capacity, size of the contributing area, and local hydrogeology.

A rough estimate of potential infiltration for a typical project can be made using assumed project characteristics (infiltration area and rate) and rainfall frequency characteristics to estimate availability of inflow for infiltration. Assuming a pond infiltration footprint of 3,000 square feet and an average of 800 hours of rain per year, on the order of 2 to 14 acre-feet could be infiltrated per year on average, depending on infiltration rate.

### **A map and drawings of the project location.**

Watershed map and proposed location map provided at end of description.

### **Description of the spatial distribution of likely benefits.**

Primary benefits expected for Mill Creek Tributary 51. Benefits may carry down to Mill Creek.

### **Performance goals and measures.**

To be determined.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

Coho, chum, and winter steelhead have been observed spawning in Mill Creek. Juvenile coho, chum, winter steelhead, cutthroat, and Chinook have been captured in the creek (Kerwin and Nelson, 2000). The Lower Green River Baseline Habitat Survey Report (Anchor Environmental, 2004) provides detailed information about fisheries habitat conditions in the Mill Creek area. Chinook and Steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

**Identification of anticipated support and barriers to completion.**

To be determined.

**Estimate of capital costs and reoccurring O&M costs.**

To be determined.

**Project durability and resiliency.**

In this context, durability refers to the capacity of the stormwater project to maintain the estimated water offset over time and despite changing external conditions (which could include seasonal variation in stormwater runoff, seasonal and/or long-term fluctuation in regional groundwater elevation, adjacent land use changes, and/or other factors). We anticipate that the planned project will be moderately durable, based on the following:

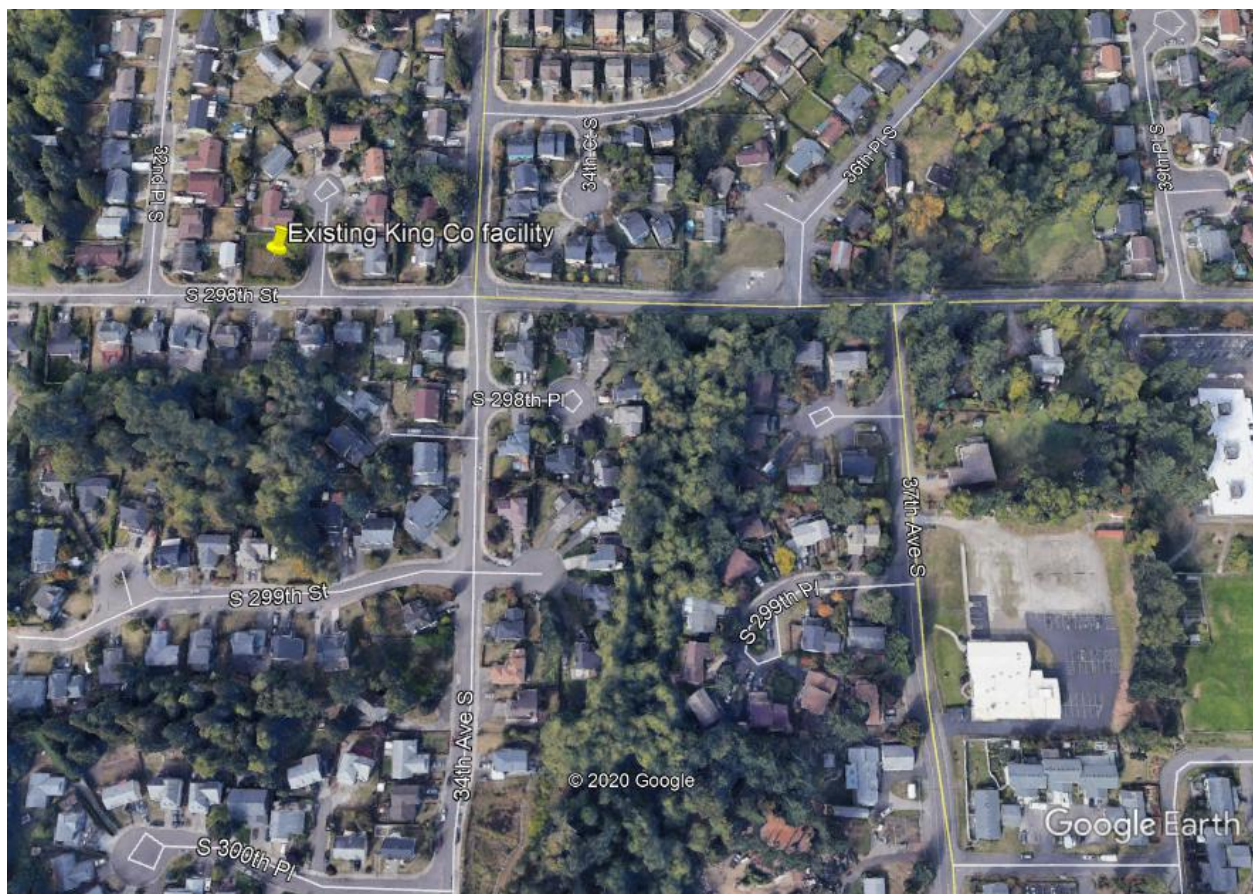
- Stormwater infrastructure would be maintained through engineering controls and conveyed with minimal loss to the recharge location.
- Groundwater recharge rate would be maintained through a program of periodic rehabilitation of the infiltration structure(s).
- The subject river reach is perennially gaining and the anticipated range in regional groundwater elevation fluctuation would not impact the groundwater flow field in a manner that impacts the project offset.
- Land use changes external to the project site would have negligible impact on project function.
- The water source likely would lack the predictability inherent to other types of managed aquifer recharge projects because it relies on the timing, rate, and volume of area precipitation.

Herein, resiliency refers to the capacity of the project to maintain the estimated water offset despite the impacts of climate change. Within the watershed, climate change could result in an increase in seasonal temperature, a decrease in summer precipitation, an increase in winter rainfall, a decrease in winter snowfall and/or spring snowpack, an increase in the frequency and/or intensity of storm events, an increase in wildfires, an increase in sea level, or other impacts. We anticipate that the planned project would be moderately resilient to the potential impacts of climate change based on the following:

- The project water source is not tied to the water right permitting process and is not subject to regulatory or other anthropogenic interruption.
- The project does not remove water from surface water, and therefore is not reliant on minimum streamflow requirements.
- The project does not remove water from a groundwater body, and therefore is not subject to well interference.
- The project diversion can be engineered and constructed in a manner that is resilient to flood events.
- Wildfire damage to the stormwater infiltration site and surrounding area likely would not impact project function and the anticipated water offset.
- Sea level increase would not impact project function.







Proposed project location – existing stormwater facility at S 298<sup>th</sup> Street and 33<sup>rd</sup> Avenue S, Auburn.  
(GoogleEarth image)

# WRIA 9 - Project Description

## Lower Soos Creek Restoration

October 16, 2020

### **Project Name and Number**

Lower Soos Creek Restoration (9-S-H8)

### **WRIA 9 WRE Subbasin**

Soos Creek

### **Narrative Description**

This project includes land acquisition, design and permitting, and restoration actions along Lower Soos Creek, a tributary to the Green River, east of Auburn, Washington. Collectively, these proposed actions will improve the aquatic, riparian and wetland habitat. The project is located within the WRIA 9 Soos Creek subbasin.

This proposed restoration actions include acquiring land adjacent to the stream, removing structures from floodplain, placing large woody debris (LWD) in the stream channel and wetlands and revegetating the stream and wetland areas with native trees and shrubs. These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize the Green River as rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

The proposed project will restore three miles of stream. Installation of LWD has several ecological functions including managing flows, creating deeper pools that provide refugia for fish, preventing bank erosion, and trapping organic material that provides nutrients for insects and invertebrates which are a prey source for fish. Planted native trees and shrubs will provide instream shade to protect salmon and other fish species that utilize this habitat.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves restoration of aquatic, riparian and wetland habitats along three miles of Lower Soos Creek within the Soos Creek subbasin east of Auburn, Washington.

### **Performance goals and measures.**

Acres acquired, structures removed, large logs installed instream, and number of trees and shrubs planted.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize Lower Soos Creek and the Green River. Chinook,

Steelhead, and Bull Trout are priority species, protected under the ESA. Specifically, salmonids have been documented as using this stream section for spawning and rearing. LWD and riparian plantings will directly benefit prey availability, spawning success as well as survival of pre-migrant and outmigrating juvenile salmonids.

**Identification of anticipated support and barriers to completion.**

The acquisition and restoration efforts will be supported by King County, WDFW, and NGOs such as the Green River Coalition, Soos Creek Area Response, and Friends of Soos Creek. The only barrier to completion pertains to a lack of funding.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels, design and permit, and revegetate stream and wetland areas is anticipated to be approximately \$1.5 million.

**Anticipated durability and resiliency.**

Once the native plants are installed, irrigation and maintenance will be required to ensure plant survival and to manage non-native/invasive plant species. Monitoring plant survival, native plant/shrub cover and non-native invasive plant cover will be performed for a minimum of five years post-project implementation.

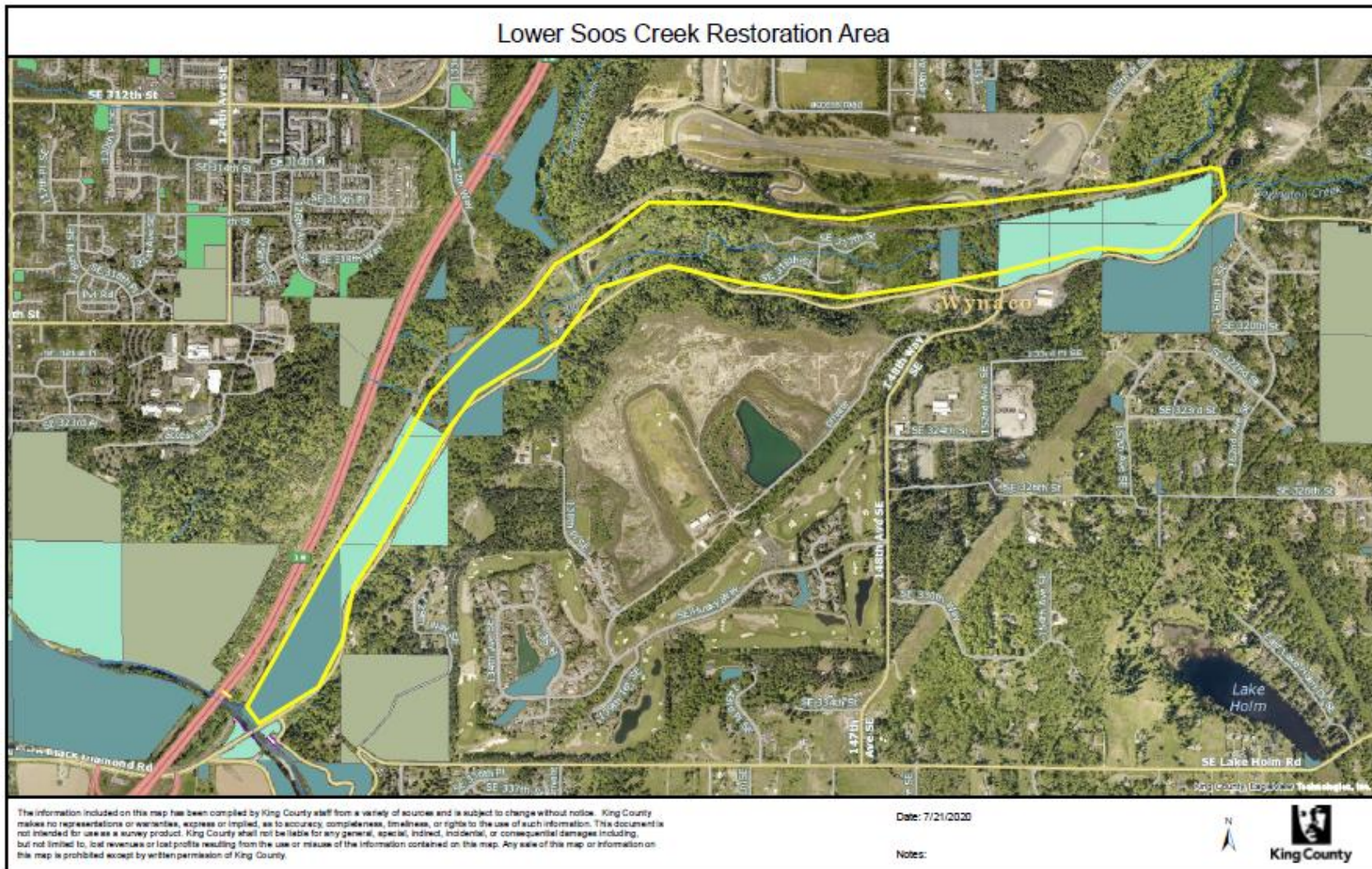
**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

**Documentation of sources.**

None





Site Plan for Lower Soos Creek Restoration Area

# WRIA 9 - Project Description

## Turley Levee Setback

October 16, 2020

### **Project Name and Number**

Turley Levee Setback (9-LMG-H9)

### **WRIA 9 WRE Subbasin**

Lower Middle Green River

### **Narrative Description**

This project includes land acquisition, design and permitting to setback 1,000 feet of the Turley Levee, located along the Green River east of Auburn, Washington. Collectively, these efforts will improve floodplain connectivity and create 40 acres of aquatic habitat as the river traverses an unconstrained floodplain. The project is located within the WRIA 9 Lower Middle Green River subbasin.

This proposed project will remove the levee and relocate gravel in the levee under-structure into the river channel. The setback levee will be constructed away from the river. This project includes installation of dozens of large trees with root wads in the river channel and remnant river channel, which currently lack large woody debris (LWD). In addition, hundreds of native trees and shrubs will be planted within the riparian and wetland habitats created. These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize the Green River as rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Quantitatively, this project includes removal of the current levee, which is 1,300-feet long by 50-feet wide, installation of dozens of large trees with root wads into the river channel and associated floodplain wetlands, and planting hundreds of native trees and shrubs. The setback levee will be approximately 1,000-feet long. The total project area is 53 acres and is projected to create 40 acres of salmon rearing habitat as the river reestablishes the floodplain within this area.

The addition of gravel material from the levee under-structure into the river will improve spawning and rearing habitat. Installation of LWD has several ecological functions including managing flows, creating deeper pools that provide refugia for fish, preventing bank erosion, and trapping organic material that provides nutrients for insects and invertebrates, which are a prey source for fish. Planted native trees and shrubs will provide instream shade to protect salmon and other fish species that utilize this habitat.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves setting back the Turley Levee located along the right bank of the Green River within the Lower Middle Green River subbasin east of Auburn, Washington. The total project area proposed for restoration is approximately 53 acres, with creation of 40 acres of aquatic habitat for rearing salmonids.

The length of Turley Levee is 1,800 feet. This proposed project would remove the existing levee and construct a setback feature for erosion control a substantial distance from the river (over 800').

**Performance goals and measures.**

Performance goals and measures will be based on length of levee removed, area of floodplain reconnected to the river, number of large wood structures placed in the floodplain, and number of trees and shrubs planted.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize the Green River. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Specifically, salmonids have been documented as using this river section for spawning and rearing habitat. Levee setback will expand existing aquatic habitat by 40 acres. Gravel placement, LWD and riparian plantings will directly benefit prey availability, spawning success as well as survival of pre-migrant and outmigrating juvenile salmonids.

**Identification of anticipated support and barriers to completion.**

Funding is primary barrier, along with landowner willingness and King County's Farmland Preservation Program covenants which makes it challenging to build habitat restoration projects.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels, design, and permit, remove levee structure, replace levee and replant will be approximately \$6 million.

**Anticipated durability and resiliency.**

Once the native plants are installed, irrigation and maintenance will be required to ensure plant survival. Monitoring of plant survival, native plant/shrub cover and non-native invasive plant cover will be performed for five years.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

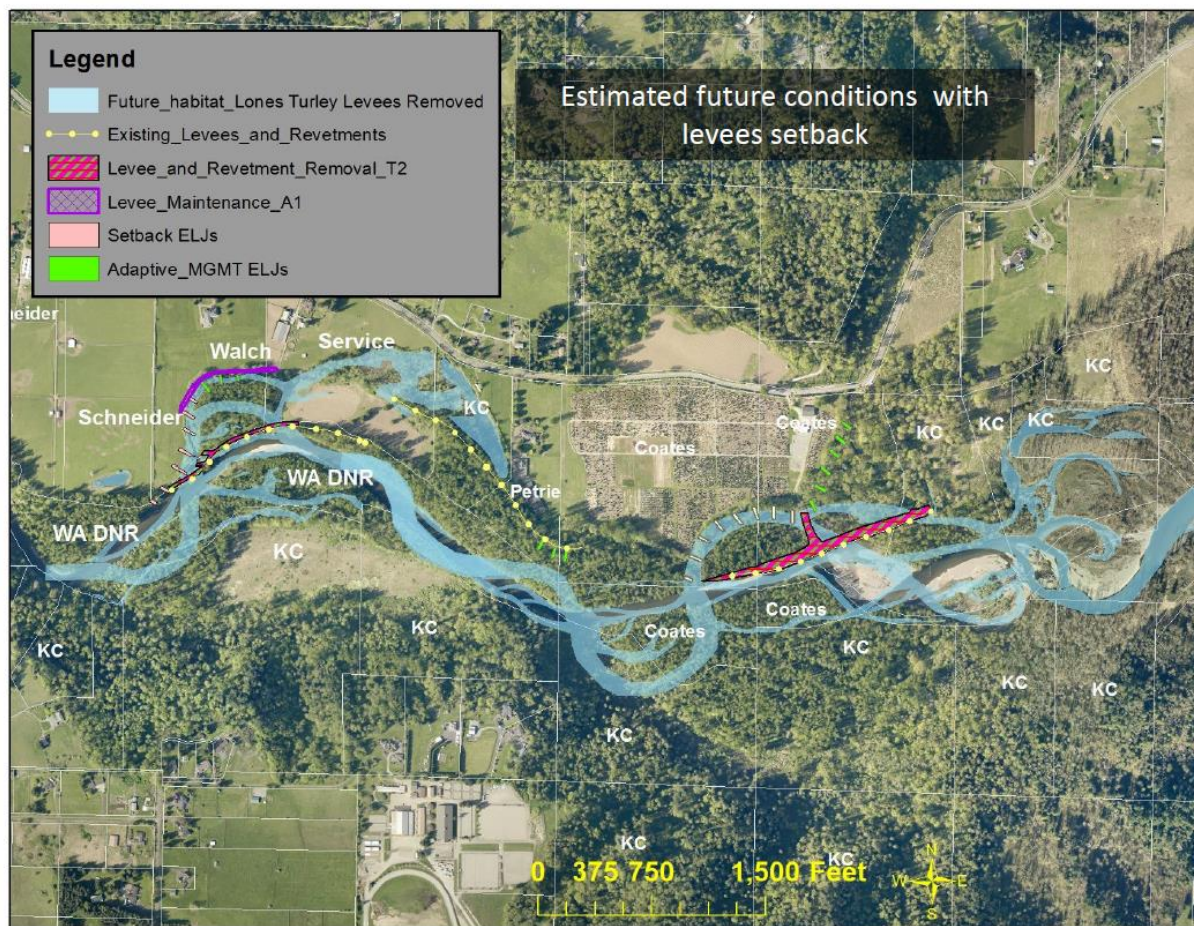
**Documentation of sources.**

None



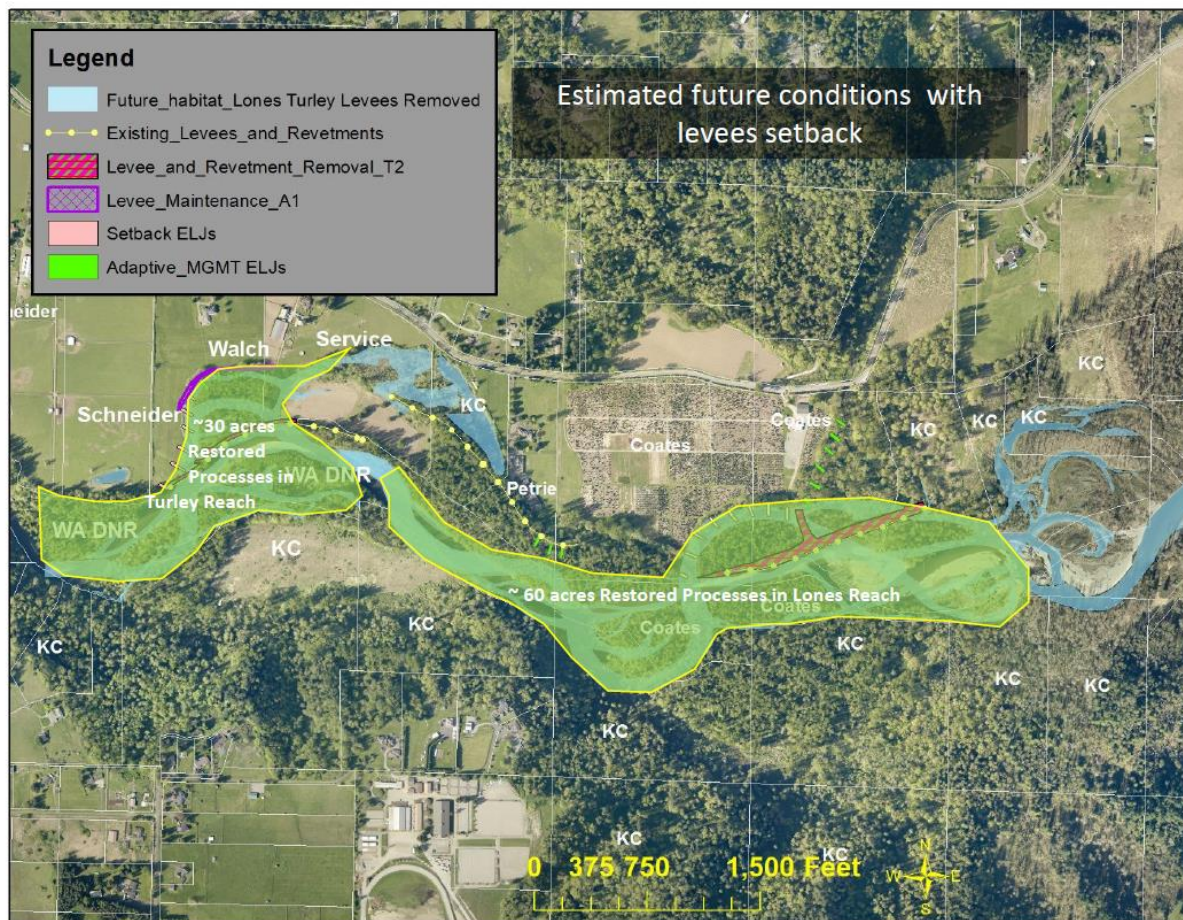




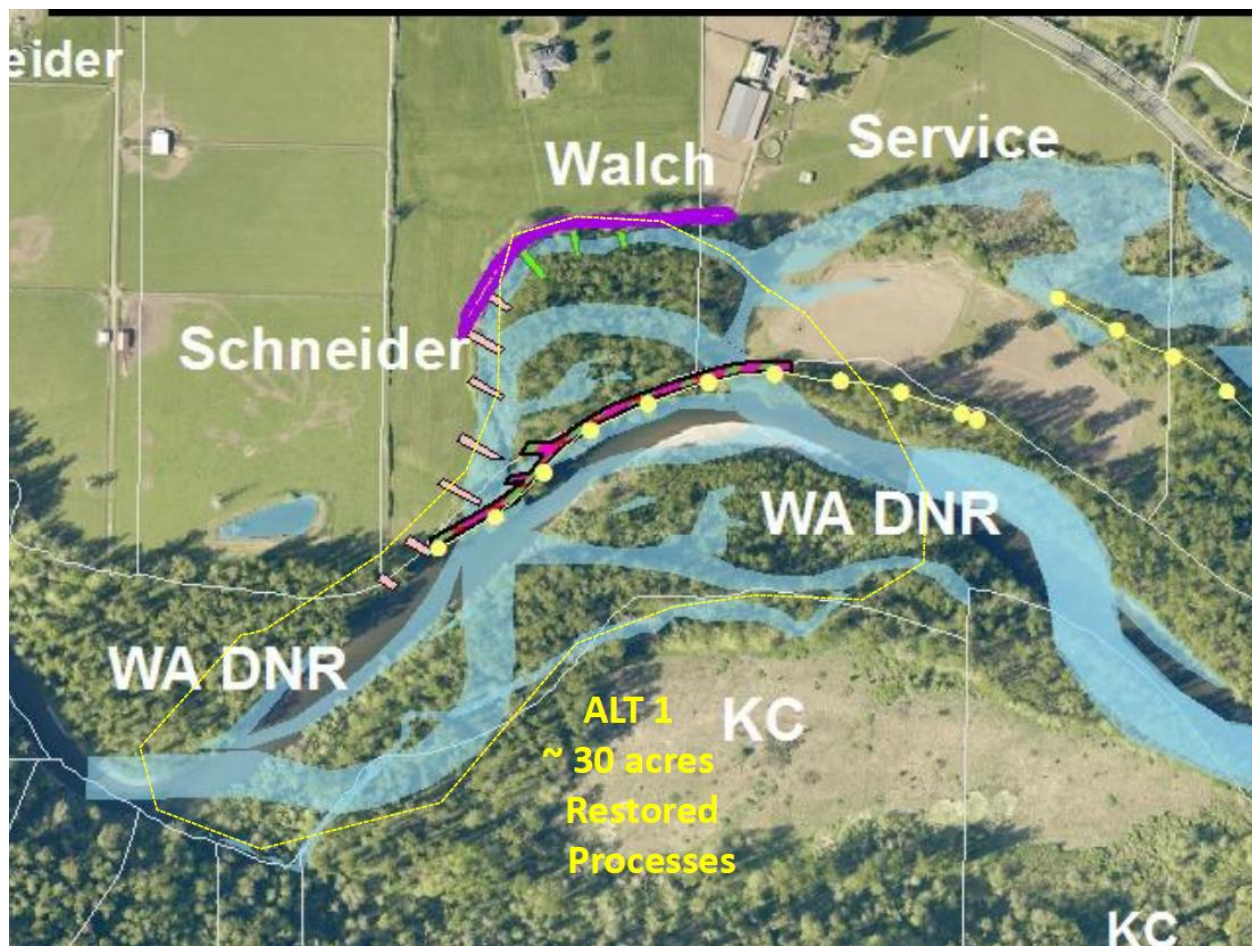


Site Plan for Turley Levee Setback -Estimated Future Conditions with Levees Setback





## Site Plan for Turley Levee Setback -Estimated Future Conditions with Levees Setback



Site Plan for Turley Levee Setback -Estimated Future Conditions with Levees Setback



# WRIA 9 - Project Description

## Hamakami Levee Setback

October 16, 2020

### **Project Name and Number**

Hamakami Levee Setback (9-LMG-H10)

### **WRIA 9 WRE Subbasin**

Lower Middle Green River

### **Narrative Description**

This project includes land acquisition, design and permitting to setback the Hamakami Levee located along the Green River east of Auburn, Washington. Collectively, these efforts will improve floodplain connectivity and create 40 acres of aquatic habitat as the river traverses an unconstrained floodplain. The project is located within the WRIA 9 Lower Middle Green River subbasin.

This proposed project will remove the levee and relocate gravel in the levee under-structure into the river channel. The setback levee will be constructed away from the river. This project includes installation of dozens of large trees with root wads in the river channel and remnant river channel, which currently lack large woody debris (LWD). In addition, hundreds of native trees and shrubs will be planted within the riparian and wetlands habitats created. These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize the Green River as rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Quantitatively, this project includes removal of the current levee which is 1,200-feet long by 50-feet wide, installation of dozens of large trees with root wads into the river channel and associated floodplain wetlands, and planting hundreds of native trees and shrubs. The setback levee will be at least 1,200-feet long. The total project area is 47 acres and is projected to create 35 acres of salmon rearing habitat as the river reestablishes the floodplain within this area.

The addition of gravel material from the levee under-structure into the river will improve spawning and rearing habitat. Installation of LWD has several ecological functions including managing flows, creating deeper pools that provide refugia for fish, preventing bank erosion, and trapping organic material that provides nutrients for insects and invertebrates which are a prey source for fish. Planted native trees and shrubs will provide instream shade to protect salmon and other fish species that utilize this habitat.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves setting back the Hamakami Levee located along the right bank of the Green River within the Lower Middle Green River subbasin east of Auburn, Washington. The total project area proposed for restoration is approximately 47 acres, with creation of 35 acres of aquatic habitat for rearing salmonids.



**Performance goals and measures.**

Performance goals and measures will be based on length of levee removed, area of floodplain reconnected to the river, number of large wood structures placed in the floodplain, and number of trees and shrubs planted.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Pink, Sockeye, Bull Trout and resident Cutthroat Trout that utilize the Green River. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Specifically, salmonids have been documented as using this stream sections for spawning and rearing habitat. Levee setback will expand existing aquatic habitat by 35 acres. Gravel placement, LWD and riparian plantings will directly benefit prey availability, spawning success as well as survival of pre-migrant and outmigrating juvenile salmonids.

**Identification of anticipated support and barriers to completion.**

Funding is primary barrier, along with landowner willingness and King County's Farmland Preservation Program covenants which makes it challenging to build habitat restoration projects.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels, design and permit, remove levee structure, replace levee and replant will be approximately \$6 million.

**Anticipated durability and resiliency.**

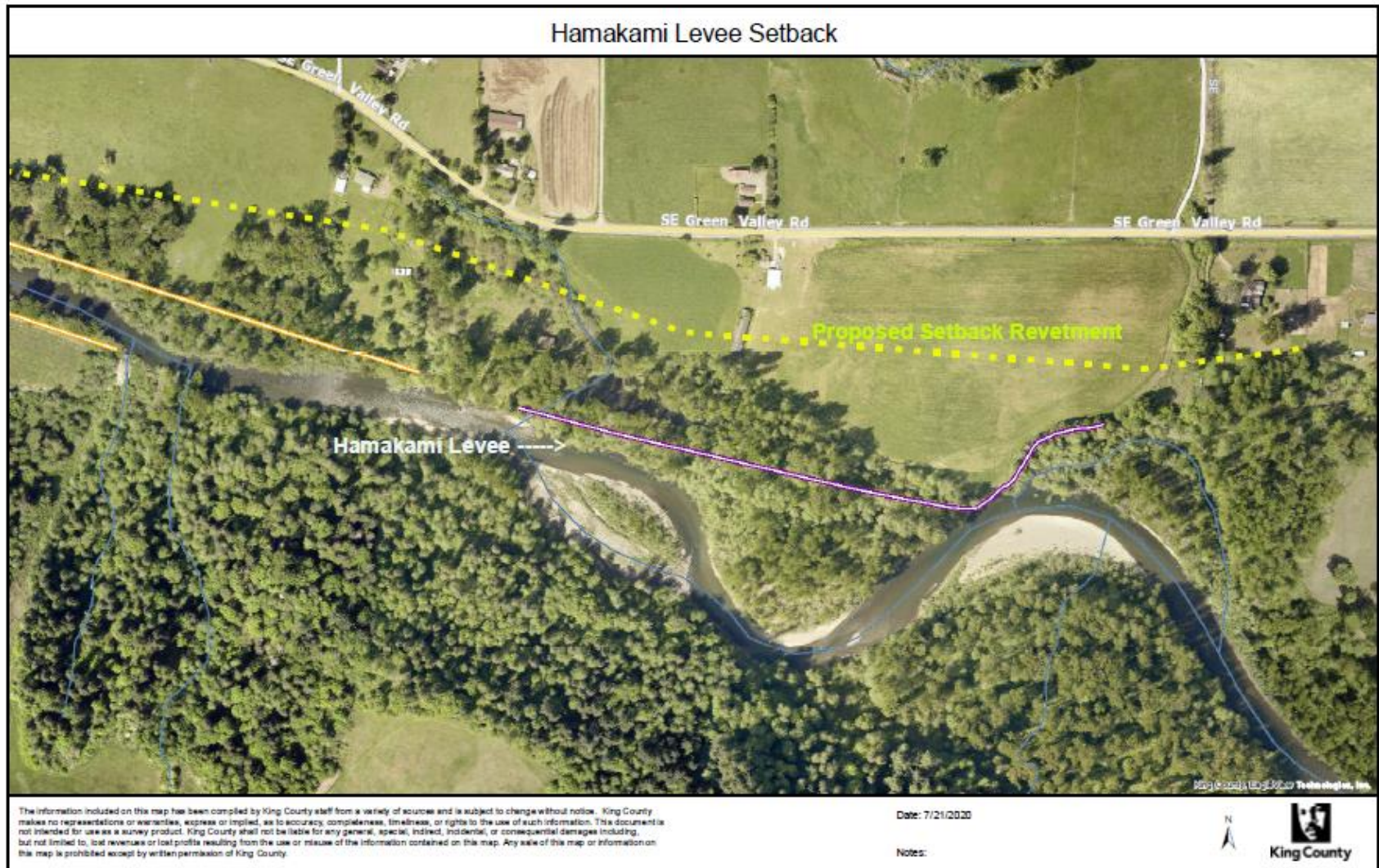
Once the project is implemented, long-term ecological monitoring will take place for at least 10 years.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

**Documentation of sources.**

None



Site Plan for Hamakami Levee Setback

# WRIA 9 - Project Description

## Burns Creek Restoration

October 5, 2020

### **Project Name and Number**

Burns Creek Restoration (9-LMG-H11)

### **WRIA 9 WRE Subbasin**

Lower Middle Green River

### **Narrative Description**

This project includes acquisition of several parcels or portions of parcels of land, and construction of associated habitat restoration along the lower two miles of Burns Creek, a tributary to the Green River, located east of Auburn, Washington. This project is located within the WRIA 9 Lower Middle Green River subbasin.

This proposed project will install hundreds of large trees with root wads in the stream and wetlands, as these habitats are almost completely lacking in-channel large woody debris (LWD). In addition, thousands of native trees and shrubs will be planted within the riparian and wetlands habitats created. These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, and resident trout that utilize these streams as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Quantitatively, the project includes acquiring several parcels along Burns Creek, installing of large logs with root wads into the stream and associated wetlands, and planting thousands of native trees and shrubs along the lower two miles of stream.

Large instream wood has several ecological functions including managing flows, creating deeper pools that provide refugia for fish, preventing bank erosion, and trapping organic material that provides nutrients for insects and invertebrates which are a prey source for fish. Planted native trees and shrubs will provide shade in stream sections which currently reach temperatures that are approximately 6°C above the threshold for protection of designated aquatic life use for Core Summer Salmonid Habitat.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves work along the lower two miles of Burns Creek, a tributary to the Green River, just east of Auburn, Washington. Estimated acreage of restored riparian zone: 28.

**Performance goals and measures.**

Acres acquired and protected, large log structures installed instream, and number of trees and shrubs planted in the Burns Creek riparian zone.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, and resident trout that utilize Burns Creek. Chinook and Steelhead are priority species, protected under the ESA. Specifically, salmonids have been documented as using this lower section of Burns Creek for spawning and rearing habitat. LWD and riparian and wetland plantings will directly benefit prey availability, spawning success as well as survival of pre-migrant and outmigrating juvenile salmonids.

**Identification of anticipated support and barriers to completion.**

Funding and landowner willingness to sell their property.

**Estimate of capital costs and reoccurring O&M costs.**

Total cost to acquire target parcels, remove structures and replant is estimated at \$2,000,000.

**Anticipated durability and resiliency.**

Once the native plants are installed, irrigation and maintenance will be required to ensure plant survival. Monitoring of plant survival, native plant/shrub cover and non-native invasive plant cover will be performed for a minimum of five years post-planting.

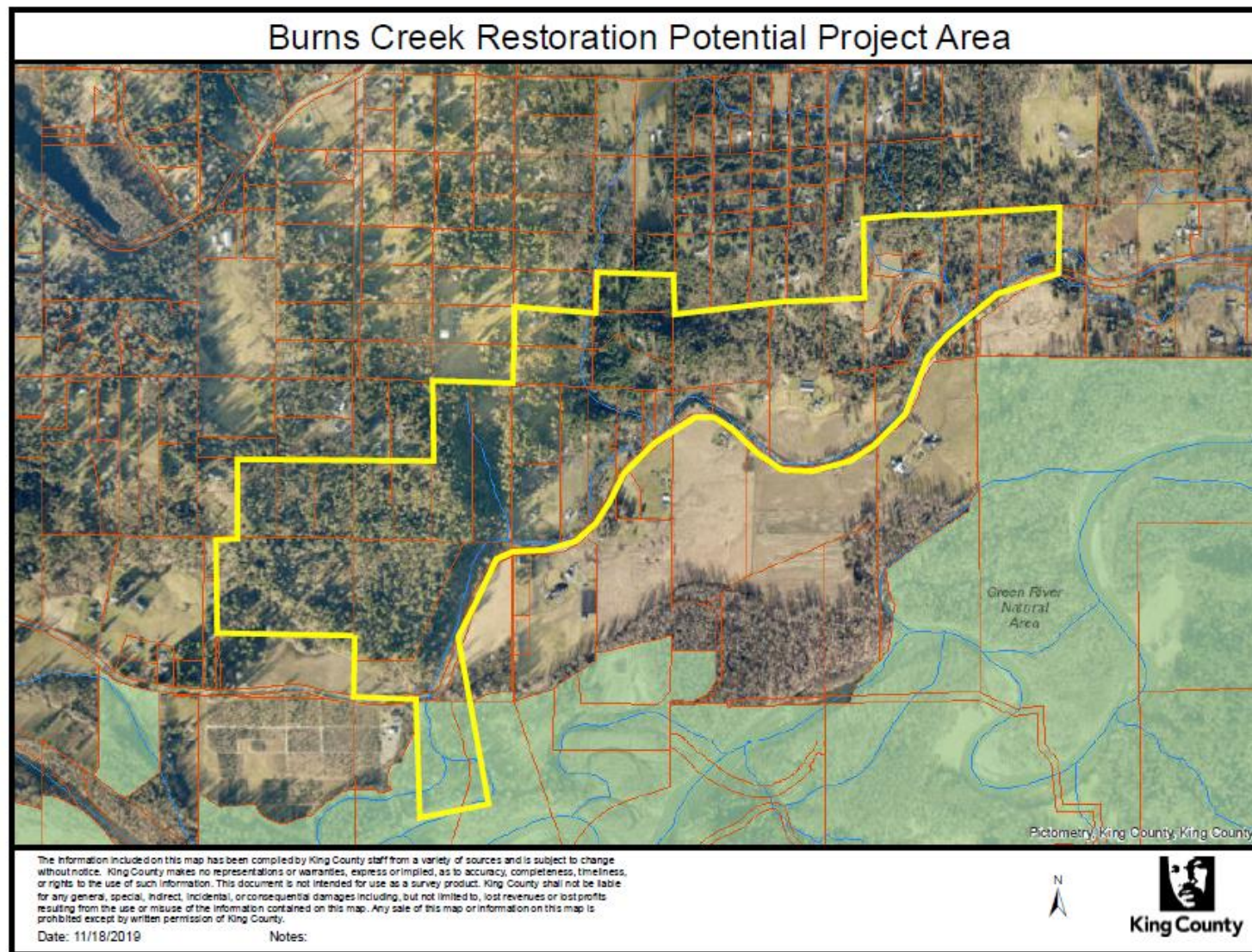
**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with the acquisition process immediately upon receipt of funding.

**Documentation of sources.**

None





Site Plan for Burns Creek Restoration Area

# WRIA 9 - Project Description

## Crisp Creek Watershed Protection Project

October 6, 2020

### **Project Name and Number**

Crisp Creek Watershed Protection Project (9-MMG-H12)

### **Narrative Description**

This project supports an ongoing effort within the Crisp Creek watershed to acquire undeveloped forest lands which would benefit the hydrologic integrity of the WRIA 9 Mid Middle Green River subbasin and protect the water supply and water rights for the Muckleshoot Indian Tribe's Keta Creek Hatchery. The Crisp Creek watershed is located in South King County between the cities of Black Diamond and Maple Valley, Washington and Crisp Creek is an important tributary to the Green River. Watershed protection through land acquisition is important to the Class A Diamond Springs Water Association's water supply. Crisp Creek is one of the highest quality streams in King County and provides cold, clean water to the Green River. This project would be phased in over time and would involve preserving over 400 acres. Protection of the hydrologic function within the Crisp Creek watershed will benefit both hatchery and wild salmon in the Green River including Chinook, Coho, Steelhead, and Chum. Chinook and Steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Acquiring undeveloped forest land within the Crisp Creek watershed protects the long-term hydrologic integrity of the basin, the water quality of Crisp Creek, and the fisheries and aquatic resources of the Green River.

### **A map and drawings of the project location.**

The project area is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves acquisition of numerous parcels of undeveloped forest land within the Crisp Creek watershed. Distribution of benefits is dependent on the location of acquired parcels within the watershed, but all parcels will be within the Mid Middle Green River subbasin.

### **Performance goals and measures.**

To be determined.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

Protection of the hydrologic function through acquisition of developed or undeveloped land within the Green River Watershed has the potential to benefit salmon, including Chinook, Coho, Steelhead, and Chum. Chinook and Steelhead are priority species, protected under the ESA.

### **Identification of anticipated support and barriers to completion.**

To be determined.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels is currently unknown.

**Anticipated durability and resiliency.**

The acquisition and protection of land in the Crisp Creek sub-watershed will provide increased resiliency for the basin to provide continual cold, clean water to the downstream fish hatchery and to the Green River salmon resources.

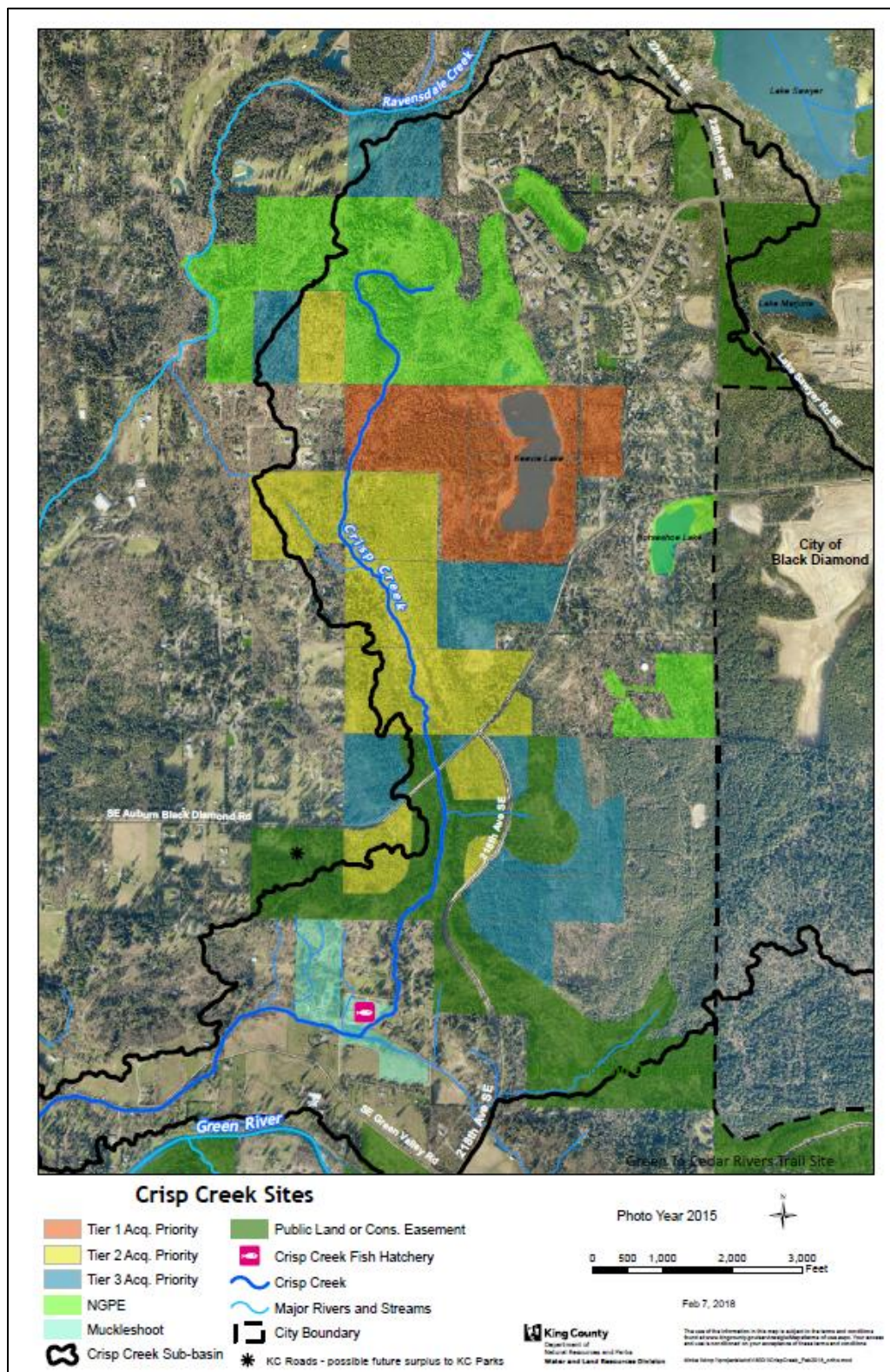
**Project sponsor(s) (if identified) and readiness to proceed/implement.**

Muckleshoot Indian Tribe and King County. Sponsor contact: Carla Carlson, Carla.Carlson@muckleshoot.nsn.us. The sponsor is ready to proceed with scoping and reconnaissance immediately. There are only a few landowners in the upper portion of the Crisp Creek basin, each owning substantial land.

**Documentation of sources.**

None





Site Plan for Crisp Creek Restoration Area



# WRIA 9 - Project Description

## Flaming Geyser Revegetation

October 16, 2020

### **Project Name and Number**

Flaming Geyser Revegetation (9-MMG-H13)

### **WRIA 9 WRE Subbasin**

Mid Middle Green River

### **Narrative Description**

This project includes revegetating the Green River riparian zones and floodplain wetland within Flaming Geyser State Park which is located about eight miles east of Auburn, Washington. This effort will improve shade and overhanging cover to the river which will moderate water temperatures, reduce evaporation, and enhance fish habitat. The project is located within the WRIA 9 Mid Middle Green River subbasin.

These restoration actions will benefit Chinook, Coho, steelhead, chum, pink, and sockeye salmon, and cutthroat trout that use the Green River for spawning and rearing habitat. Chinook and Steelhead are protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Planting thousands of native trees and shrubs will provide instream shade to the river to moderate water temperatures and protect salmon and other fish species that use this habitat. Post planting, the trees and shrubs will be monitored and maintained for a minimum of five years.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves planting the riparian zone of the Green River as it flows for two miles through Flaming Geyser State Park which is currently mostly unvegetated. The total project area proposed for restoration is approximately 42 acres.

### **Performance goals and measures.**

Acres and stream miles revegetated and number and percentage of trees and shrubs that survived after five years.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

The proposed revegetation action will benefit Chinook, Coho, Steelhead, Chum, Pink, and Sockeye salmon, along with resident Cutthroat Trout. Chinook and Steelhead are protected under the ESA. Specifically, salmonids have been documented as using this river section for spawning and rearing habitat.

**Identification of anticipated support and barriers to completion.**

Funding is our only limiting factor at this point.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to revegetate the 42 acres of riparian habitat and monitor and maintain the sites is approximately \$1.5 million.

**Anticipated durability and resiliency.**

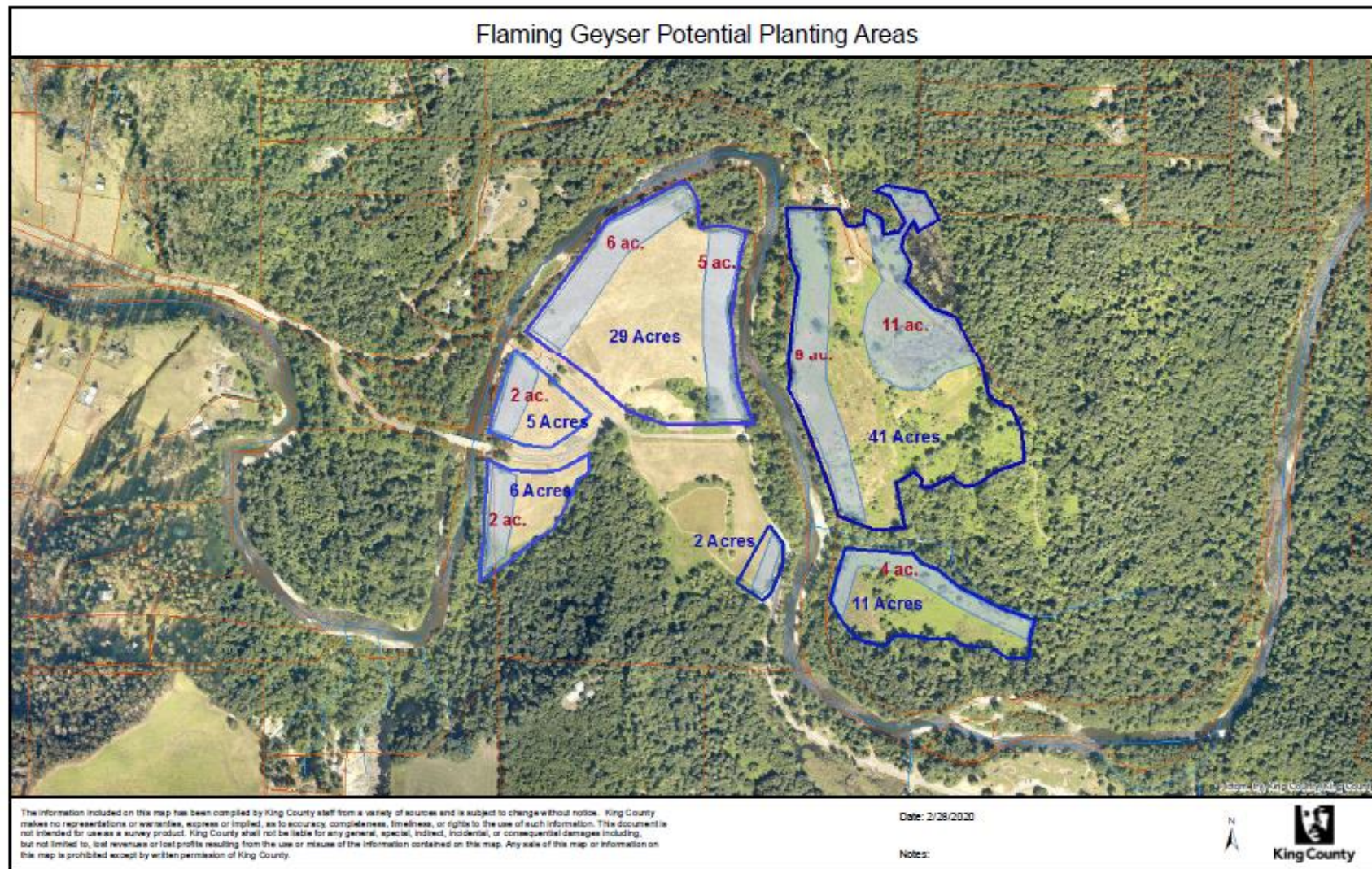
Once native plants are installed, irrigation and maintenance will be required to ensure plant survival. Monitoring and maintenance of planted vegetation will be performed for five years.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

**Documentation of sources.**

None



Site Plan for Flaming Geyser Potential Planting Area.



# **WRIA 9 - Project Description**

## **Newaukum Creek Riparian Revegetation and Beaver Colonization**

October 16, 2020

### **Project Name and Number**

Newaukum Creek Riparian Revegetation and Beaver Colonization (9-N-H14)

### **WRIA 9 WRE Subbasin**

Newaukum Creek

### **Narrative Description**

This project includes acquisition of several parcels along Newaukum Creek and Big Spring Creek located in the City of Enumclaw, Washington. The project is located within the WRIA 9 Newaukum Creek subbasin.

This project targets sections of Newaukum Creek and Big Spring Creek that currently have low effective shade with corresponding high water temperatures. This proposal includes removing structures (buildings, fences, septic infrastructure, etc.) along these stream sections and planting 160,000 native trees and shrubs on 61 acres. These streams flow through active agricultural lands and a livestock exclusion fence will be constructed at one of the sites. These actions will attract beaver colonization, which occurred at a nearby restoration site along Big Spring Creek. Beavers will construct dams and maintain streamflows by ponding water. Shade from installed riparian vegetation will moderate water temperature, reduce evaporation and create habitat. This could be particularly beneficial to documented Chinook, Coho, Steelhead, Chum, Sockeye and resident trout that utilize these streams as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Quantitatively, this project will include planting 160,000 native trees and shrubs on 61 acres along Newaukum Creek and Big Spring Creek. Approximately four miles of stream (one side of creek) will be planted as part of this project.

Native trees and shrubs will provide shade along these stream sections which currently reach temperatures that meet or exceed the threshold for protection of designated aquatic life use of Core Summer Salmonid Habitat. Beaver colonization will result in dams, which will slow water and produce ponds of deeper, cooler water for fish. Newly planted trees will serve as a food supply to attract and support beaver colonization.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.



**Description of the spatial distribution of likely benefits.**

This project involves three sites along Newaukum Creek: Brandjes, Gaddy and Gwerder. All three project sites are in the City of Enumclaw, Washington. The Brandjes site is 14 acres, Gaddy site is 9 acres and the Gwerder site is 38 acres, for a total project area of 61 acres along Newaukum Creek and Big Spring Creek. This project will plant native trees and shrubs across 61 acres of riparian zone/wetland habitat.

**Performance goals and measures.**

Acres and stream miles revegetated. Also, localized flooding as a result of beaver dam construction will have to be monitored and addressed, if necessary, by King County.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Sockeye, and resident trout that utilize these streams. Chinook and Steelhead are priority species, protected under the ESA. Specifically, salmonids have been documented as using these stream sections for spawning and rearing habitat. Improving streamflows and water temperatures through beaver colonization and riparian plantings will directly benefit spawning success as well as survival of pre-migrant and outmigrating juvenile salmonids.

**Identification of anticipated support for and barriers to completion.**

Funding is our only limiting factor at this point.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels, remove structures and replant is currently unknown.

**Project durability and resiliency.**

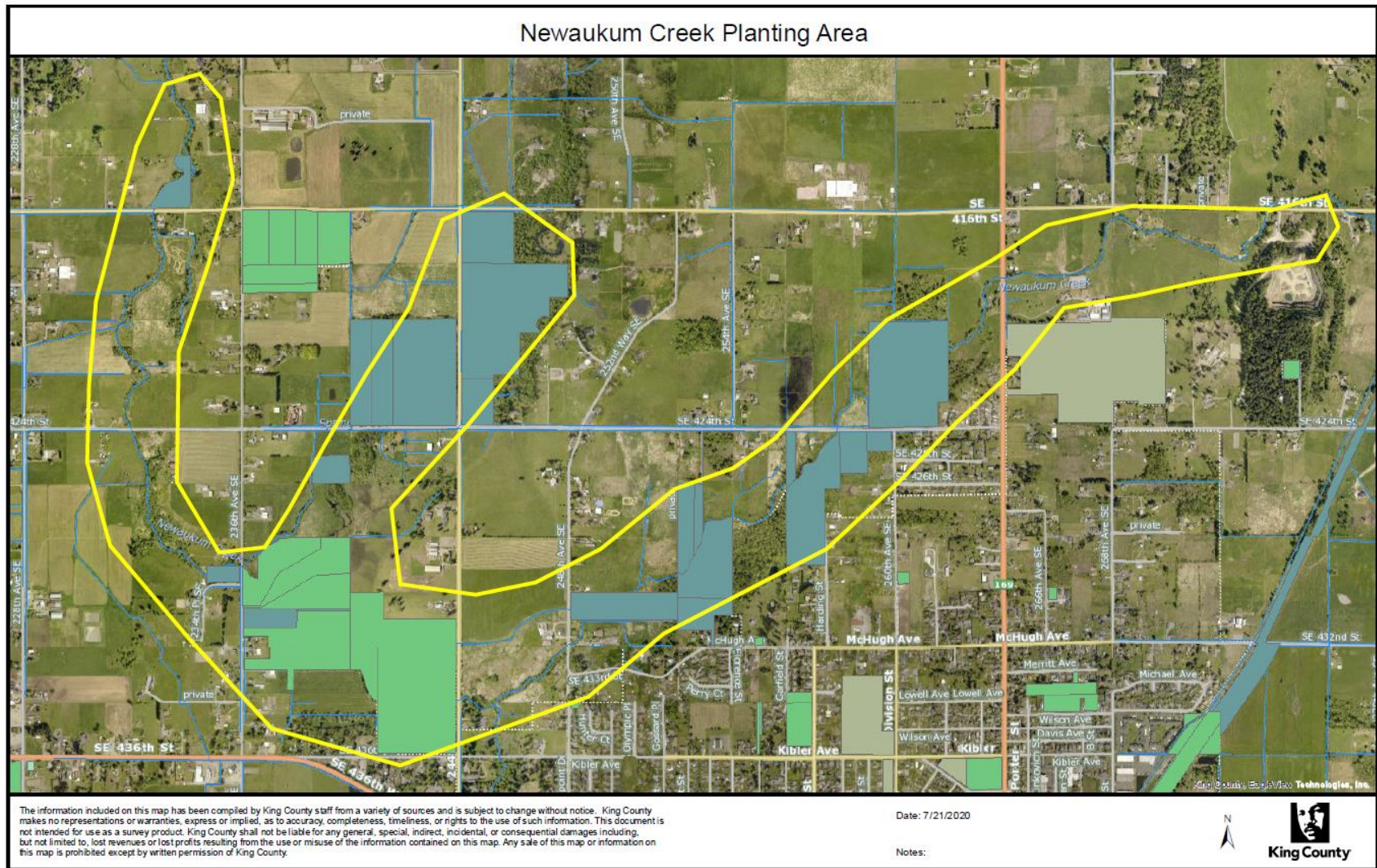
Once the native plants are installed, maintenance (weed control, watering, and plant replacement) will be required to ensure a high plant survival rate. Monitoring plant survival, native plant/shrub cover and non-native invasive plant cover will be performed for at least the first five years post-implementation.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with implementation immediately upon receipt of project funding.

**Documentation of sources.**

Non



Site Plan of Newaukum Creek Planting Area

# **WRIA 9 - Project Description**

## **Newaukum Creek Tributary Restoration (Gwerder, et al.)**

October 16, 2020

### **Project Name and Number**

Newaukum Creek Tributary Restoration (Gwerder, et al) (9-N-H15)

### **WRIA 9 WRE Subbasin**

Newaukum Creek

### **Narrative Description**

This project includes excavation and restoration of wetlands and stream channels of Newaukum Creek tributaries located within the City of Enumclaw, Washington. The project is located within the WRIA 9 Newaukum Creek subbasin. This proposed project will install hundreds of large trees with rootwads in the streams and wetlands, as these habitats are almost completely lacking in-channel large woody debris (LWD). In addition, tens of thousands of native trees and shrubs will be planted within the riparian and wetland habitats created. These restoration actions will benefit documented Chinook, Coho, Steelhead, Chum, Sockeye and resident trout that utilize these streams as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Quantitatively, this project includes installation of hundreds of large trees with rootwads into streams and wetlands and planting tens of thousands of native trees and shrubs on approximately 75 acres. Approximately 0.5 miles of stream will be planted as part of this project.

LWD has several ecological functions including managing flows, creating deeper pools that provide refugia for fish, preventing bank erosion, and trapping organic material that provides nutrients for insects and invertebrates which are a prey source for fish. Planted native trees and shrubs will provide shade in stream sections which currently reach temperatures that are approximately 6°C below the threshold for protection of designated aquatic life use for Core Summer Salmonid Habitat.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves work at the Gwerder site located along the right bank of Stonequarry Creek, a tributary to Newaukum Creek, located within the City of Enumclaw, Washington. The total acreage proposed for riparian and wetland restoration is approximately 50 acres.

### **Performance goals and measures.**

To be determined.

**Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

This project is expected to improve stream habitat with the installation of LWD and reduce in-stream temperatures through shade created by installed native trees and shrubs. These restoration actions will directly benefit documented Chinook, Coho, Steelhead, Chum, Sockeye and resident trout that utilize these streams. Specifically, Chinook, Coho, Steelhead, and Chum are documented as using these stream sections for spawning habitat. Chinook and Steelhead are priority species, protected under the ESA.

**Identification of anticipated support and barriers to completion.**

Funding and landowner willingness to sell property are the major barriers to completion.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels, remove structures and replant is currently unknown.

**Anticipated durability and resiliency.**

Once the native plants are installed, irrigation and maintenance will be required to ensure plant survival. Monitoring of plant survival, native plant/shrub cover and non-native invasive plant cover will be performed for a minimum of five years post-construction.

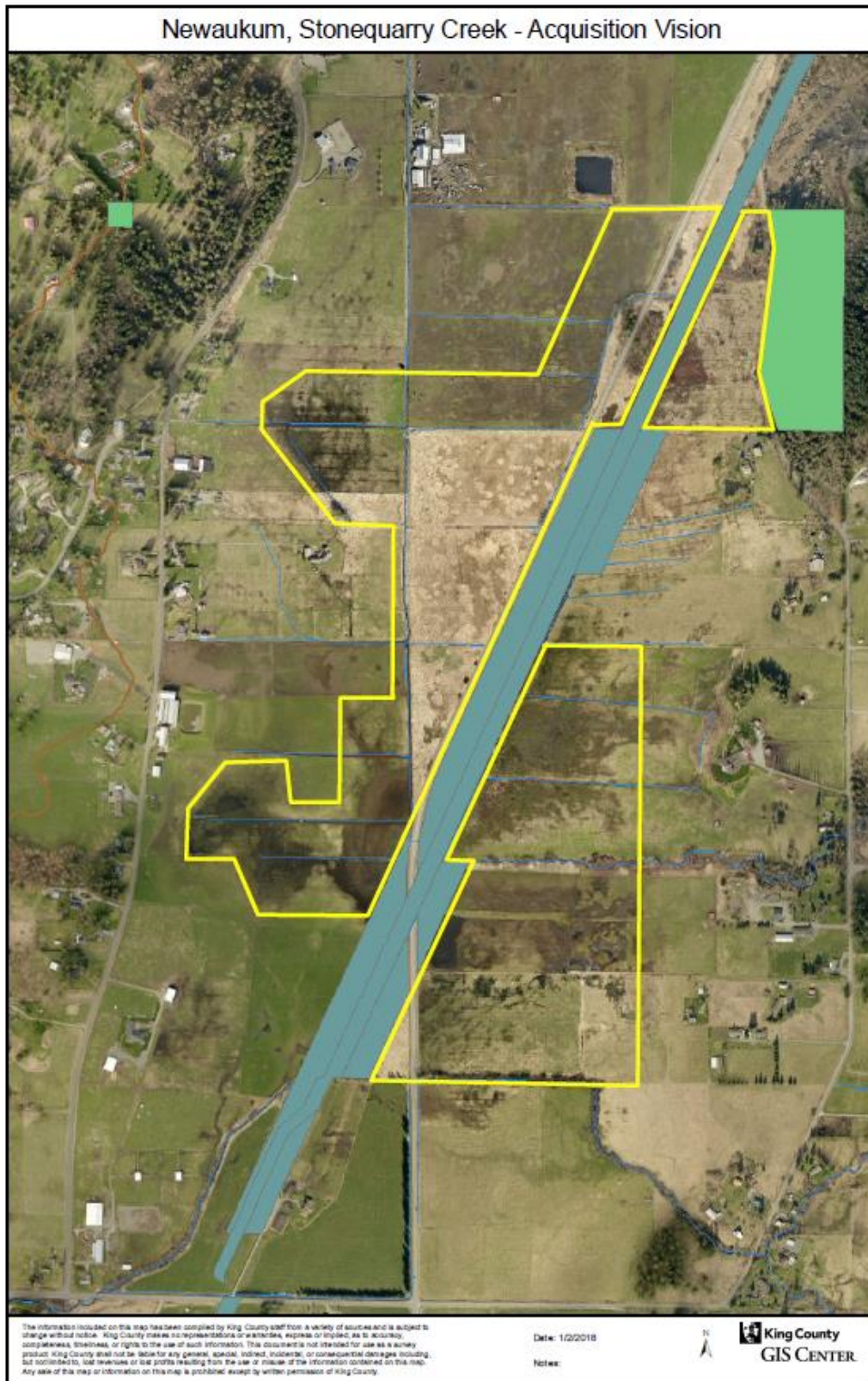
**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with acquisition, design, and permitting immediately.

**Documentation of sources.**

None





Site Plan for Newaukum Creek Tributary Restoration Site

# WRIA 9 - Project Description

## Middle Green River Open Space Acquisitions

October 16, 2020

### **Project Name and Number**

Middle Green River Open Space Acquisitions (9-MG-H16)

### **WRIA 9 WRE Subbasin**

Soos Creek, Jenkins Creek, Covington Creek, Lower Middle Green River, Mid Middle Green River, Newaukum Creek, and Upper Middle Green River

### **Narrative Description**

This project supports an ongoing effort within the Green River Watershed to acquire developed or developable land which would benefit the hydrologic integrity of the basin. If acquired land was previously developed, structures would be removed including homes, septic systems, and wells. Protection of the hydrologic function within the Green River Watershed has the potential to benefit salmon, including, Chinook, Coho, Steelhead, Chum, as well as Bull Trout and resident trout. Chinook, Steelhead, and Bull Trout are priority species, protected under the U.S. Endangered Species Act (ESA).

### **Quantitative or qualitative assessment of how the project will function, including water offset benefits, if applicable.**

Acquiring developed or developable land within the Green River watershed protects the long-term hydrologic integrity of the basin.

### **A map and drawings of the project location.**

The project site is shown in relation to surrounding physical features on the attached Site Plan.

### **Description of the anticipated spatial distribution of likely benefits.**

This project involves acquisition of land within the Green River Watershed. Distribution of benefits is dependent on the location of acquired parcels within the watershed. The pertinent Middle Green River subbasins include: Soos Creek, Jenkins Creek, Covington Creek, Lower Middle Green River, Mid Middle Green River, Newaukum Creek, and Upper Middle Green River.

### **Performance goals and measures.**

To be determined.

### **Descriptions of the species, life stages and specific ecosystem structure, composition, or function addressed. Note if threatened and endangered fish species would benefit.**

Protection of the hydrologic function through acquisition of developed or undeveloped land within the Green River Watershed has the potential to benefit salmon, including, Chinook, Coho, Steelhead, Chum, as well as Bull Trout and resident trout. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA.

### **Identification of anticipated support and barriers to completion.**

The only barriers to completion are funding and landowner willingness to sell property.

**Estimate of capital costs and reoccurring O&M costs.**

Estimated total cost to acquire target parcels is currently unknown. King County will match funding on a 1:1 basis.

**Project durability and resiliency.**

The acquisition, restoration and long-term protection of land provides watershed hydrological durability and resiliency.

**Project sponsor(s) (if identified) and readiness to proceed/implement.**

King County. Sponsor contact: Josh Kahan, Josh.Kahan@kingcounty.gov. The sponsor is ready to proceed with Implementation if funding is provided.

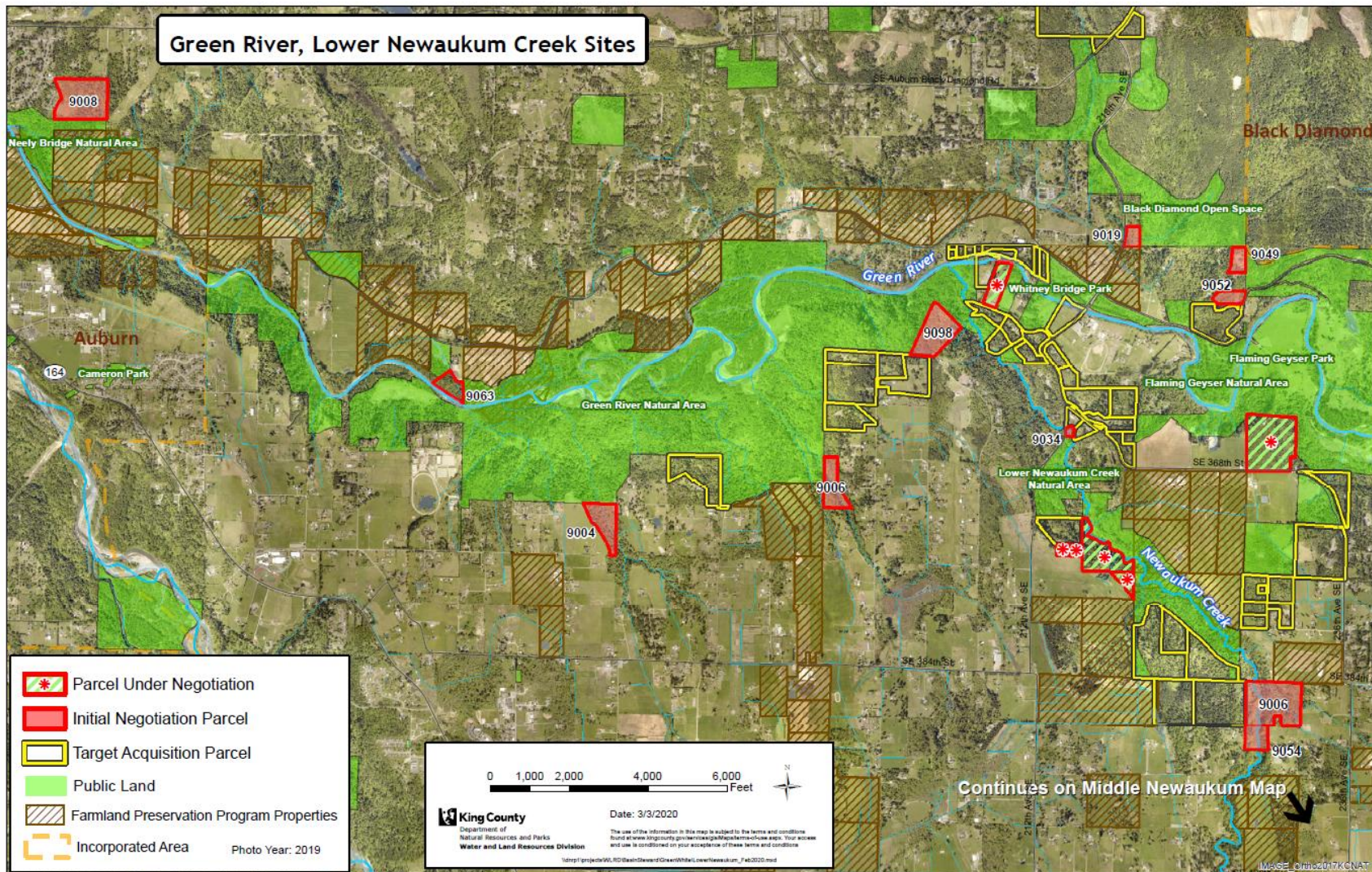
**Documentation of sources.**

None.



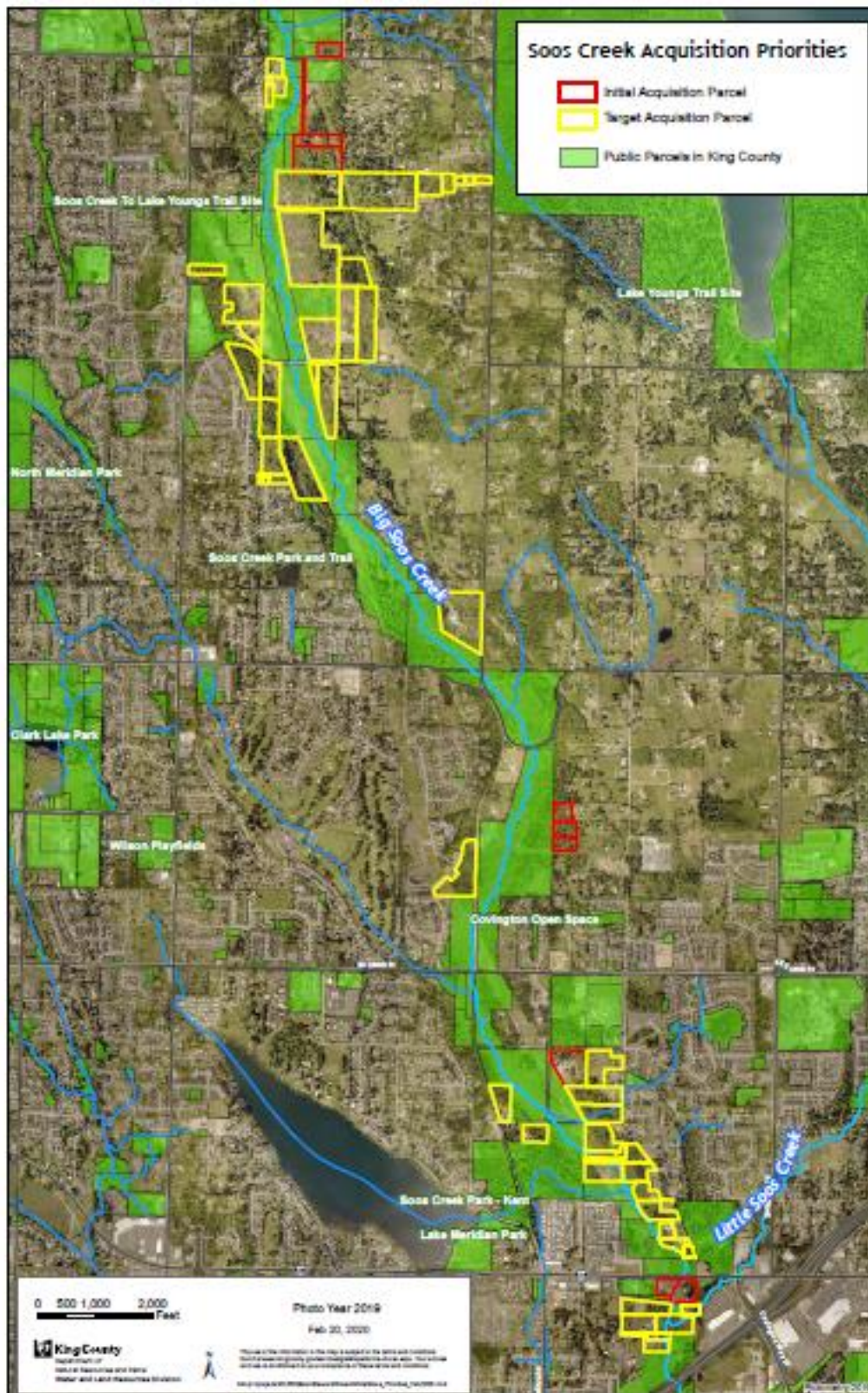






Site Plan for Middle Green River Open Space Acquisitions – Lower Newaukum Creek Sites





Site Plan for Middle Green River Open Space Acquisitions – Little Soos Creek Sites