To: WRIA 8 Watershed Restoration and Enhancement Committee

From: Stephanie Potts, Chair of WRIA 8 Committee

Date: September 11, 2020

Re: Review of WRIA 8 Compiled Draft Watershed Restoration and Enhancement Plan

---

The WRIA 8 Chair is providing this memo to the WRIA 8 Committee as an update on the Draft WRIA 8 Watershed Restoration and Enhancement Plan and expectations for local entity review of the draft plan. The chair requests committee members review the enclosed draft plan, in coordination with relevant decision makers at their entity, and submit comments to the chair via the Comment Tracker by **Monday, October 19, 2020**. The chair will compile all comments received by this date for discussion with the Committee at the October 29 meeting.

Background and Scope of the Watershed Restoration and Enhancement Plan

In January 2018, the Legislature passed the Streamflow Restoration law, RCW 90.94, to help restore streamflow levels. Its purpose is to support robust, healthy, and sustainable salmon populations while providing water for homes in rural Washington. The law calls for local watershed planning and project implementation that improve streamflows. The Department of Ecology (Ecology) funds implementation through its competitive grant program.

Specifically, the law directs Ecology to convene Watershed Restoration and Enhancement Committees in eight watersheds surrounding Puget Sound. Each of these committees will develop a watershed restoration and enhancement plan (watershed plan). The watershed plan must identify projects that offset the potential impacts future permit-exempt domestic groundwater withdrawals will have on streamflows and provide a net ecological benefit (NEB) to the Water Resource Inventory Area (WRIA).

All members of the WRIA 8 Watershed Restoration and Enhancement Committee must approve the watershed plan prior to submitting the plan to Ecology for review. Ecology must complete its review by June 30, 2021. If it meets the requirements of the law and guidance, Ecology will adopt the plan.

Plan Review Process and Timeline

Ecology, the WRIA 8 Committee, and technical consultants have been developing the plan since October 2018. At the March 2020 meeting, WRIA 8 Committee members shared their local entity plan review and approval process. In March 2020, the WRIA 8 Committee also discussed expectations for local entity review and timeline for approval. Based on this information, the WRIA 8 Committee expects to complete the draft plan by the end of November 2020 in order to distribute to local entities for local approval. The law states that all members of the committee must approve the plan prior to adoption. The law also requires that Ecology adopt the watershed plan by June 30, 2021, so Ecology must begin review of approved plans in early 2021.

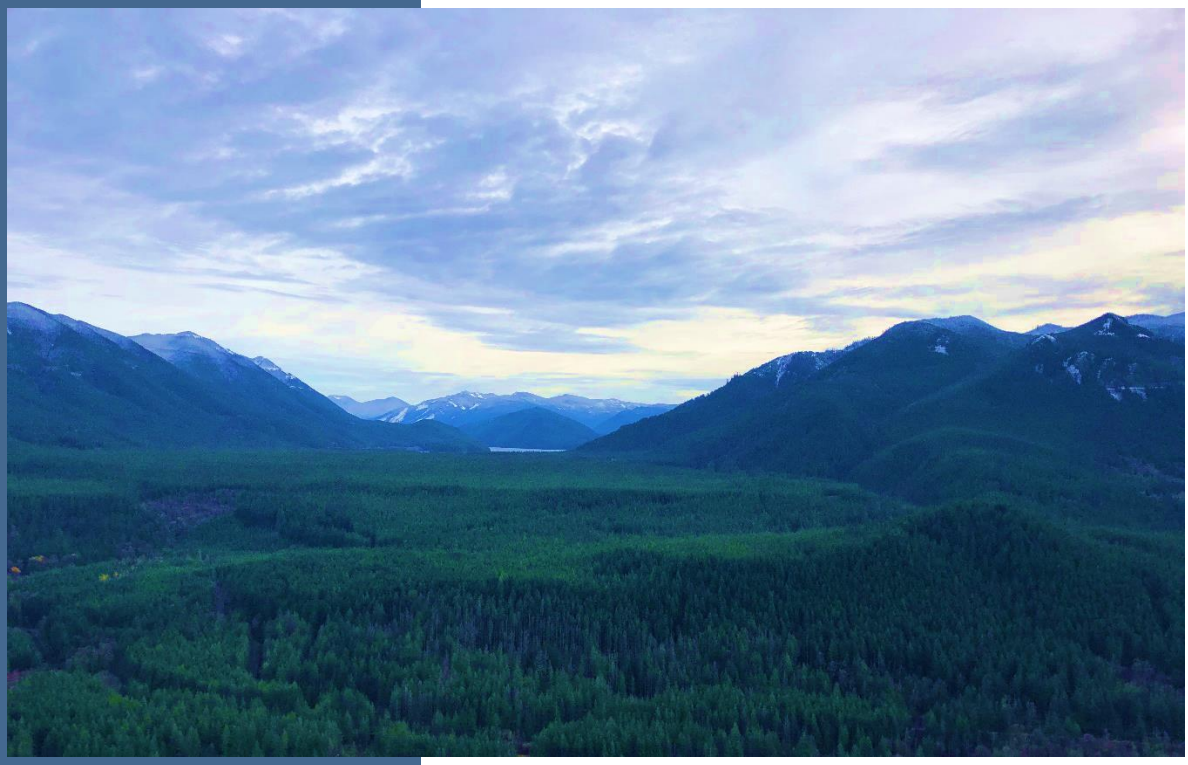
Committee members are expected to communicate frequently on committee decisions and progress to their decision-making bodies throughout the planning process. This includes thorough review and feedback of materials developed for the plan, such as technical memos and optional sections not required to be part of the plan. Reaching consensus on all plan components will be critical for final plan approval. Only plans approved by all members of the committee will move forward for Ecology review.

Draft Plan Contents

Ecology, in collaboration with the committee, prepared this compiled draft plan for review by committee members. Throughout the planning process, the chair distributed technical memos to the committee for comments and corrections. The technical memos describe the process, methods, and in some cases, the decision for technical components of the plan. Technical memos are included as appendices in the draft plan and summarized in the body of the plan. Chapters 5-7 are still in development with additional content added as decisions are made by the committee. Table 1 provides an overview of each chapter of the watershed plan and current status.

Table 1. WRIA 8 Chapter Overview and Status

Chapter	Overview	Status
1. Plan Overview	Ecology prepared standard language to provide an overview of water law and the streamflow restoration law. Ecology intends for consistency in the chapter 1 language across all eight watershed restoration and enhancement plans.	The committee has reviewed draft Chapter 1 and provided suggested changes. A revised and more complete draft Chapter 1 is included in the compiled plan.
2. Overview of the Watershed	This chapter provides an overview of geography and land uses, the relationship of this plan to other planning processes, and overview of fish presence and limiting factors, geology, hydrogeology, and streamflow.	The committee reviewed draft Chapter 2 and provided suggested changes. A revised draft Chapter 2 that includes additional information on fish presence and limiting factors is included in the compiled plan.
3. Subbasin Delineation	This chapter includes an overview of the method and results for dividing the WRIA into twelve subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets per Ecology guidance for determining Net Ecological Benefit.	The committee reviewed draft Chapter 3 and provided suggested changes. A revised draft Chapter 3 is included in the compiled plan.
4. Growth Projections and Consumptive Use	This chapter provides the projections for new domestic permit exempt well connections and their associated consumptive use for the 20-year planning horizon.	The committee reviewed draft Chapter 4 and provided suggested changes. A revised draft Chapter 4 is included in the compiled plan.
5. Projects and Actions	This chapter addresses projects and actions identified by the committee to offset consumptive use and achieve a net ecological benefit within the WRIA.	The committee has not yet reviewed this chapter. The committee is actively working to finalize the list of projects and actions to offset consumptive use and meet NEB. A draft of Chapter 5 is included in the compiled plan. Please thoroughly review the draft Chapter 5, including project descriptions and offset estimates.
6. Adaptive Management and Policy Recommendations	This chapter addresses optional components of the plan that the committee decided to include. Section 6.1 provides recommendations for plan implementation and adaptive management of the plan. Section 6.2 includes recommendations for policy and regulatory actions that could improve streamflow.	The committee reviewed and provided comments on draft Chapter 6. Comments are scheduled for discussion at the September committee meeting. Ecology made minor revisions and corrections based on the feedback from the committee and removed policy recommendations when a Committee member submitted a strong concern. Ecology will make additional revisions following the September committee meeting.
7. NEB Evaluation	The committee has the option to include a net ecological benefit evaluation in the plan.	The committee is still discussing whether to include the optional Net Ecological Benefit evaluation and NEB statement in the watershed plan. An outline of the NEB Chapter is provided for the committee's review.



Watershed Restoration and Enhancement Plan
WRIA 8 – Cedar Sammamish Watershed

Draft Plan
September 2020

DEPARTMENT OF ECOLOGY
State of Washington

ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request an ADA accommodation, contact Ecology by phone at 360-407-XXXX or email at first.last@ecy.wa.gov. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's website for more information.

Language Services

The Department of Ecology offers free language services about our programs and services for people whose primary language is not English. We can provide information written in your preferred language and qualified interpreters over the telephone.

To request these services, or to learn more about what we can provide, contact our Language Access Coordinator by phone at 360-407-6177 or email at millie.piazza@ecy.wa.gov. When you call, please allow a few moments for us to contact an interpreter.

Table of Contents

List of Figures and Tables

Figures

Tables

Acknowledgements

The authors of this report thank the following people for their contribution to this study:

- Insert name
- Insert name
- Insert name, and don't delete the following page break.

Executive Summary

[COMMENT: to be developed.]

Chapter One: Plan Overview

[COMMENT: Added content in sections 1.1.1, 1.1.2, and 1.1.3. Ecology intends for consistency in the chapter 1 language across all eight watershed restoration and enhancement plans. Ecology requests that committee members do not revise the Chapter 1 language with the exception of 1) correcting information about the WRIA; or 2) requesting additional information for inclusion. Ecology will consider and respond to the requests to include additional information.]

1.1 Plan Purpose and Structure

The purpose of the Water Resource Inventory Area (WRIA) 8 Watershed Restoration and Enhancement Plan is to offset the impacts of permit-exempt wells to streamflows. The plan is one requirement of RCW 90.94.030. The law clarifies how counties issue building permits for homes that use a permit-exempt well for a water source. Watershed restoration and enhancement plans must identify projects and actions to offset the potential consumptive impacts of new permit-exempt domestic groundwater withdrawals (PE wells) on instream flows over 20 years (2018-2038), and provide a net ecological benefit to the WRIA. The law requires that local watershed planning take place in 15 WRIAs across the state, including in the Cedar-Sammamish watershed (WRIA 8). The WRIA 8 watershed restoration and enhancement plan is coordinated with priorities for salmon recovery and watershed recovery, while ensuring it meets the intent of the law.

Pumping from wells can reduce groundwater discharge to springs and streams by capturing water that would otherwise have discharged naturally, reducing flows. Consumptive water use (that portion not returned to the aquifer) reduces streamflow, both seasonally and as average annual recharge. A well pumping from an aquifer connected to a surface water body can either reduce the quantity of water discharging to the river or increase the quantity of water leaking out of the river (Ecology 1995). Projects and actions to offset new consumptive water use associated with permit-exempt domestic wells have become a focus to minimize future impacts to instream flows and restore streamflow.

[COMMENT: *the following paragraph is language to include if the Committee votes to approve the final plan*]. While this watershed plan is narrow in scope and is not intended to address all water uses or related issues within the watershed, successful completion of the plan by the WRIA 8 Committee represents a noteworthy achievement regarding a technically and politically complex issue. This achievement by the WRIA 8 Committee could indicate that more comprehensive, improved coordination of water resources for both instream and out of stream uses, and resultant improvements in overall watershed health in our WRIA, are also achievable.

This watershed plan is divided into 7 Chapters:

1. Overview of the plan purpose and scope and plan development process;
2. Overview of the watershed, including land use and salmon presence, other planning efforts, hydrology and hydrogeology;
3. Summary of the subbasins;

4. Permit-exempt well projections and consumptive water use estimates;
5. Description of the recommended projects and actions identified to offset future permit-exempt domestic water use in WRIA 8;
6. Explanation of recommended policy, adaptive management and implementation measures; and
7. Evaluation and consideration of the net ecological benefits.

1.1.1 Legal and Regulatory Background for the WRIA 8 Watershed Restoration and Enhancement Plan

[New content]

In January 2018, the Washington State Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 (session law 2018 c 1). This law was enacted in response to the State Supreme Court's 2016 decision in Whatcom County vs. Hirst, Futurewise, et al. (commonly referred to as the "Hirst decision"). As it relates to this committee's work, the law, now primarily codified as RCW 90.94, clarifies how local governments can issue building permits for homes intending to use a permit-exempt well for their domestic water supply. The law also requires local watershed planning in 15 WRIAs, including WRIA 8.

1.1.2 Domestic Permit-Exempt Wells

[New content]

This watershed restoration and enhancement plan, the law that calls for it, and the Hirst decision are all concerned with the effects of new domestic permit-exempt water use on streamflows. Several laws pertain to the management of groundwater permit-exempt wells in WRIA 8 and are summarized in brief here for the purpose of providing context for the WRIA 8 watershed plan.

First and foremost, RCW 90.44.050, commonly referred to as "the Groundwater Permit Exemption," establishes that certain small withdrawals of groundwater are exempt from the state's water right permitting requirements, including small indoor and outdoor water use associated with homes. It is important to note that although these withdrawals do not require a state water right permit, the water right is still legally established by the beneficial use. Even though a water right permit is not required for small domestic uses under RCW 90.44.050, there is still regulatory oversight, including from local jurisdictions. Specifically, in order for an applicant to receive a building permit from their local government for a new home, the applicant must satisfy the provisions of RCW 19.27.097 for what constitutes evidence of an adequate water supply.

RCW 90.94.030 adds to the management regime for new homes using domestic permit-exempt well withdrawals in WRIA 8 and elsewhere. For example, local governments must, among other responsibilities relating to new permit-exempt domestic wells, collect a $500 fee for each building permit and record withdrawal restrictions on the title of the affected properties. Additionally, this law restricts new permit-exempt domestic withdrawals in WRIA 8 to a

maximum annual average of 950 gallons per days per connection, subject to the five thousand gallons per day and ½-acre outdoor irrigation of non-commercial lawn/garden limits established in RCW 90.44.050. Ecology has published its interpretation and implementation of RCW 19.27.097 and RCW 90.94 in Water Resources POL 2094 (Ecology 2019a). The WRIA 8 Committee directs readers to those laws and policy for comprehensive details and agency interpretations.

1.1.3 Planning Requirements Under RCW 90.94.030

[New content]

While supplementing the local building permit requirements, RCW 90.94.030(3) goes on to establish the planning criteria for WRIA 8. In doing so, it sets the minimum standard for Ecology's collaboration with the WRIA 8 Committee in the preparation of this watershed plan. In practice, the process of plan development was one of integration, collectively shared work, and a striving for consensus described in the WRIA 8 Committee's adopted operating principles, which are further discussed below and in Appendix D.

In addition to these procedural requirements, the law and consequently this watershed plan, is concerned with the identification of projects and actions intended to offset the anticipated impacts from new permit-exempt domestic groundwater withdrawals over the 20 year planning horizon and provide a net ecological benefit. In establishing the primary purpose of this watershed plan, RCW 90.94.030(3) also details both the required and recommended plan elements. Regarding the WRIA 8 Committee's approach to selecting projects and actions, the law also speaks to "high and lower priority projects." The WRIA 8 Committee understands that, as provided in the Final Guidance on Determining Net Ecological Benefit (Ecology 2019), "use of these terms is not the sole critical factor in determining whether a plan achieves a NEB…and that plan development should be focused on developing projects that provide the most benefits…regardless of how they align with [these] labels" (page 12). [COMMENT: The following is language to include if appropriate] It is the perspective of the WRIA 8 Committee that this locally approved plan satisfies the requirements of RCW 90.94.030.

1.2 Requirements of the Watershed Restoration and Enhancement Plan

RCW 90.94.030 of the Streamflow Restoration law directs Ecology to establish a watershed restoration and enhancement committee (Committee) in the Cedar-Sammamish watershed for the sole purpose of developing a watershed restoration and enhancement plan (watershed plan) in collaboration with the WRIA 8 Committee. Ecology determined that the intent was best served through collective development of the watershed plan, using an open and transparent setting and process that builds on local needs.

At a minimum, the watershed plan must include projects and actions necessary to offset projected consumptive impacts of new permit-exempt domestic groundwater withdrawals on streamflows and provide a net ecological benefit (NEB) to the WRIA.

Ecology issued the Streamflow Restoration Policy and Interpretive Statement (POL-2094) and Final Guidance on Determining Net Ecological Benefit (GUID-2094) in July 2019 to ensure consistency, conformity with state law, and transparency in implementing RCW 90.94. The Final Guidance on Determining Net Ecological Benefit (hereafter referred to as Final NEB Guidance) establishes Ecology's interpretation of the term "net ecological benefit." It also informs planning groups on the standards Ecology will apply when reviewing a watershed plan completed under RCW 90.94.020 or RCW 90.94.030. The minimum planning requirements identified in the Final NEB Guidance include the following (pages 7-8):

1. Clear and Systematic Logic: Watershed plans must be prepared with implementation in mind.
2. Delineate Subbasins: The committee must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets.
3. Estimate New Consumptive Water Uses: Watershed plans much include a new consumptive water use estimate for each subbasins, and the technical basis for such estimate.
4. Evaluate Impacts from New Consumptive Water use: Watershed plans must consider both the estimated quantity of new consumptive water use from new domestic permit-exempt wells initiated within the planning horizon and how those impacts will be distributed.
5. Describe and Evaluate Projects and Actions for their Offset Potential: Watershed plans must, at a minimum, identify projects and actions intended to offset impacts associated with new consumptive water use.

The law requires that all members of the WRIA 8 Committee approve the plan prior to submission to Ecology for review. Ecology must then determine that the plan's recommended streamflow restoration projects and actions will result in a net ecological benefit to instream resources within the WRIA after accounting for projected use of new permit-exempt domestic wells over the 20 year period of 2018-2038.

1.3 Overview of the WRIA 8 Committee

1.3.1 Formation

The Streamflow Restoration law instructed Ecology to chair the WRIA 8 Committee, and invite representatives from the following entities in the watershed to participate:

- Each federally recognized tribal government with reservation land or usual and accustomed harvest area within the WRIA.
- Each county government within the WRIA.
- Each city government within the WRIA.
- Washington State Department of Fish and Wildlife.

- The largest publically-owned water purveyor providing water within the WRIA that is not a municipality.
- The largest irrigation district within the WRIA.[1]

Ecology sent invitation letters to each of the entities named in the law in September of 2018.

The law also required Ecology to invite local organizations representing agricultural interests, environmental interests, and the residential construction industry. Businesses, environmental groups, agricultural organizations, conservation districts, and local governments nominated interest group representatives. Local governments on the WRIA 8 Committee voted on the nominees in order to select local organizations to represent agricultural interests, the residential construction industry, and environmental interests. Ecology invited the selected entities to participate on the WRIA 8 Committee.

The WRIA 8 Committee members are included in Table 1. This list includes all of the members identified by the Legislature that agreed to participate on the WRIA 8 Committee.[2]

Table 1: WRIA 8 Entities and Membership

Entity Name	**Representing**
King County	County government
Snohomish County	County government
City of Bellevue	City government
City of Bothell	City government
City of Issaquah	City government
City of Kenmore	City government
City of Kent	City government
City of Redmond	City government
City of Sammamish	City government
City of Seattle	City government
Muckleshoot Indian Tribe	Tribal government
Snoqualmie Indian Tribe	Tribal government
Tulalip Tribes	Tribal government
Washington Department of Ecology	State agency
Washington Department of Fish and Wildlife	State agency
Alderwood Water and Wastewater District	Water utility
King County Agriculture Program	Agricultural interest
Master Builder Association of King and Snohomish Counties	Residential construction
Center for Environmental Law and Policy	Environmental interest group
WRIA 8 Salmon Recovery Council – ex officio	Salmon Recovery Lead Entity

The WRIA 8 Committee roster with names of representatives and alternates is available in Appendix C.

[1] There are no irrigation districts located in WRIA 8.

[2] The law did not require invited entities to participate, and some chose not to participate on the Committee. The City of Mukilteo withdrew from the Committee in August 2020.

The WRIA 8 Committee invited the WRIA 8 Salmon Recovery Council to participate as an "ex officio" member. Although not identified in the law, the ex officio members provide valuable information and perspective as subject matter experts. The ex officio members are active but non-voting participants of the WRIA 8 Committee.

1.3.2 Committee Structure and Decision Making

The WRIA 8 Committee held its first meeting in October 2018. Between October 2018 and February 2021 [UPDATE LAST MEETING DATE, IF NEEDED], the WRIA 8 Committee held [ADD NUMBER] committee meetings open to the public. The WRIA 8 Committee met monthly or every other month, and as needed to meet deadlines.

The two and a half years of planning consisted of planning group formation, data gathering, and developing plan components. WRIA 8 Committee members had varying degrees of understanding concerning hydrogeology, water law, salmon recovery, and rural development. Ecology technical staff, WRIA 8 Committee members, and partners presented on topics to provide context for components of the plan.

In addition to playing the role of WRIA 8 Committee chair, Ecology staff provided administrative support and technical assistance, and contracted with consultants to provide facilitation and technical support for the WRIA 8 Committee. The facilitator supported the WRIA 8 Committee's discussions and decision-making. The technical consultants developed products that informed WRIA 8 Committee decisions and development of the plan. The technical consultants developed all of the technical memorandums referenced throughout this plan.

Cities had the option of participating in the Committee through a caucus, with one person attending the Committee meetings as the caucus representative. Bellevue, Bothell, Issaquah, Kenmore, Redmond, and Sammamish decided to form a cities caucus with the WRIA 8 Salmon Recovery Council representative serving as the caucus representative. The caucus representative's attendance and vote represented the participation and vote of all members of the caucus. The caucus had one collective vote on decisions that did not require approval by all Committee members. For decisions that required approval by all Committee members (adopting or amending the operating principles, final plan approval), each caucus member voted individually.

The WRIA 8 Committee established a technical workgroup to support planning efforts and to achieve specific tasks. The workgroup was open to all WRIA 8 Committee members as well as non-Committee members that brought capacity or expertise to the Committee. The workgroup made no binding decisions, but presented information to the Committee as either recommendations or findings. The WRIA 8 Committee acted on workgroup recommendations, as it deemed appropriate.

During the initial WRIA 8 Committee meetings, members developed and agreed to operating principles.[3] The operating principles set forward a process for meeting, participation expectations, procedures for voting, structure of the WRIA 8 Committee, communication, and other needs in order to support the WRIA 8 Committee in reaching agreement on a final plan.

This planning process, by statutory design, brought diverse perspectives to the table. The authorizing legislation requires all members of the Committee to approve the final plan prior to Ecology's review.[4] It was important for the Committee to identify a clear process for how it made decisions. The Committee strived for consensus on interim decisions because consensus on decisions during plan development served as the best indicator of the Committee's progress toward an approved plan. [COMMENT: The following is language to include if appropriate: Consensus was reached on all interim decisions. The chair and facilitator documented agreement and dissenting opinions, as outlined in the Committee's operating principles. The Committee did not make any decisions by two-thirds majority.]

The WRIA 8 Committee reviewed components of the watershed plan and the draft plan on an iterative basis. [COMMENT: The following is language to include if the Committee votes to approve the final plan: Once the WRIA 8 Committee reached initial agreement on the final watershed plan, broader review and approval by the entities represented on the WRIA 8 Committee was sought, as needed. The WRIA 8 Committee reached final agreement on the Watershed Restoration and Enhancement Plan on [THIS DATE] 2021.]

[3] Approved and signed operating principles can be found in Appendix D and on the WRIA 8 Committee webpage: https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/WRIA8_approved_signed_operating_principles.pdf

[4] "…all members of a watershed restoration and enhancement Committee must approve the plan prior to adoption" – RCW 90.94.030(3)

Chapter Two: Watershed Overview

2.1 Brief Introduction to WRIA 8

The Cedar-Sammamish watershed is one of the 62 designated major watersheds in Washington State, formed as a result of the Water Resources Act of 1971. The Cedar River historically flowed into the Black River and the Cedar-Sammamish watershed was formed when the Cedar River was diverted into Lake Washington. The Cedar-Sammamish watershed is approximately 692 square miles in area and includes all the lands drained by the Cedar River, the Sammamish River, Lake Washington, and marine nearshore areas that drain directly to Puget Sound. Approximately 85 percent of the watershed is located within King County and the remaining 15 percent is located within Snohomish County. WRIA 8 is bounded on the north by WRIA 7 (Snohomish), on the west by Puget Sound, on the south by WRIA 9 (Duwamish-Green), and on the east by WRIA 39 (Upper Yakima).

The upper Cedar River watershed is the municipal drinking water supply for the City of Seattle and managed under a Habitat Conservation Plan (HCP) (City of Seattle 2000). The upper portion of the Cedar River watershed contains two dams, Masonry Dam and Landsburg Dam, that City of Seattle operates for municipal water supply and hydropower generation. The dams form two reservoirs: Chester Morse Reservoir and the Masonry Pool. The northwestern portion of the watershed contains the Sammamish River, Lake Washington, Lake Union, and Lake Sammamish. Numerous smaller lakes, ponds, and wetlands are present throughout the watershed. The construction of the Lake Washington Ship Canal, reservoirs, and various flood control projects in the 20th century altered the watershed from its pre-development state (WRIA 8 Steering Committee 2005).

The Cedar River originates in the Cascade Range near Yakima Pass and flows in a generally northwest direction for approximately 51 miles before discharging to the south end of Lake Washington. The mean annual flow in the Cedar River is 679 cubic feet per second (cfs), measured near Renton (U.S. Geological Survey 2020).

The Sammamish River originates at the north end of Lake Sammamish and flows northwest for approximately 14 miles before discharging to the north end of Lake Washington. The mean annual flow in the Sammamish River is 304 cfs, measured near Woodinville (U.S. Geological Survey 2020).

Lake Washington discharges to the Lake Washington Ship Canal, a highly channelized and urbanized waterway that traverses Portage Bay, Lake Union, and Salmon Bay before exiting the Chittenden Locks and entering Puget Sound at Shilshole Bay. Other tributaries within the system include Issaquah Creek, May Creek, Coal Creek, Bear Creek, Evans Creek, Little Bear Creek, Swamp Creek, and North Creek.

2.1.1 Land Use in WRIA 8

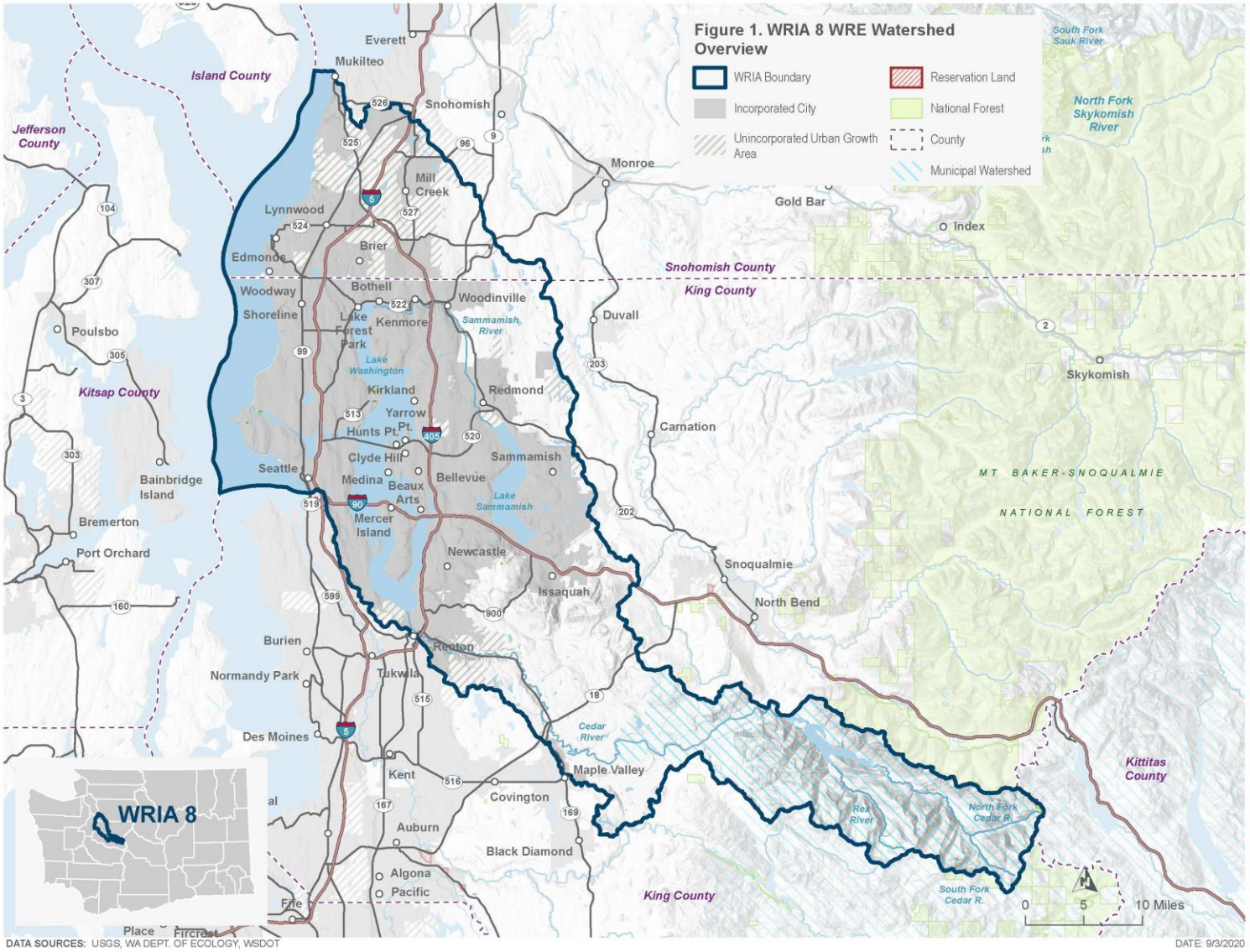
The City of Seattle's Cedar River Municipal Watershed covers over 90,000 acres in the eastern or upland portion of the watershed and generally consists of forestland (City of Seattle 2020a). Land uses shift to suburban developments and urban centers such as Maple Valley and Hobart

in the foothills of the Cascade Mountains. Extending from the city of Issaquah to the cities of Bellevue, Redmond, Seattle, and Everett the northwest portion of WRIA 8 is highly urbanized, characterized by a combination of residential, industrial, commercial, transportation, communication, and utility land covers. Over 50 percent of the watershed is within a city or designated urban growth area.

The Cedar-Sammamish watershed is the most heavily populated watershed in Washington. Industry, agriculture, commercial facilities, individual residences, and municipalities compete for a limited water supply, causing a strain on water availability. These out of stream uses compete with instream water needs, including providing water for salmon and other aquatic resources.

2.1.2 Tribal Reservations and Tribal Treat Rights

[COMMENT: Ecology is working with WRIA 8 WREC Tribal Representatives to update this section.]



1

2 Figure 1: WRIA 8 WRE Watershed Overview

2.1.3 Salmonids in WRIA 8

The Cedar-Sammamish watershed is an important and productive system for salmonids. Many tributaries provide spawning and rearing habitat for salmonids. These streams often experience low streamflows during critical rearing, migration and spawning time. In addition, levees and other flood control and navigation measures have further limited habitat in lakes, rivers and tributaries. The quality and quantity of spawning and rearing habitat, habitat access, water quality, including water temperature, and low streamflow, all affect local salmon populations (WRIA 8 Salmon Recovery Council 2017).

[New content added on salmon presence and current habitat conditions]

Salmon Presence (Fish Population and Life Histories)

The Cedar-Sammamish watershed has anadromous salmon runs that include three of the five Pacific salmon species (WDFW Salmonscape 2020a, SWIFD 2020). Chinook (*Oncorhynchus tshawytscha*), Coho (*Oncorhynchus kisutch*), and Sockeye salmon (*Oncorhynchus nerka*) migrate in and out of the Cedar-Sammamish watershed from Puget Sound. Cutthroat trout (*Oncorhynchus clarkii clarkii*), rainbow trout (*Oncorhynchus mykiss*), kokanee (*Oncorhynchus nerka*) and bull trout (*Salvelinus confluentus*) also inhabit the watershed. Steelhead trout (*Oncorhynchus mykiss*) may now be functionally extirpated from this basin.

The Puget Sound evolutionarily significant unit (ESU) of Chinook salmon was designated as threatened under the Endangered Species Act (ESA) on May 24, 1999. Designated critical habitat for Chinook salmon includes marine nearshore and freshwater habitats within WRIA 8 (70 FR 52630-52853). The Puget Sound distinct population segment (DPS) of steelhead trout was designated as threatened under ESA on May 7, 2007. Final designated critical habitat (DCH) for Puget Sound steelhead includes freshwater and estuarine habitat in Puget Sound, Washington (81 FR 9252-9325) including areas within WRIA 8. The Coastal-Puget Sound Distinct Population Segment (DPS) of Bull Trout was designated as threatened under ESA on December 1, 1999. Critical habitat has been designated for Bull Trout and includes both freshwater and saltwater aquatic habitat within WRIA 8 (75 FR 63897). Table 2 below lists the species present in the Cedar-Sammamish watershed and their regulatory status.

Table 2: Salmonids Present within the Cedar-Sammamish Watershed

Common Name	Scientific Name	Evolutionary Significant Unit	Critical Habitat	Regulatory Agency Status
Chinook salmon	*Oncorhynchus tshawytscha*	Puget Sound Chinook	Yes/2005	NMFS/ Threatened/ 1999
Coho salmon	*Oncorhynchus kisutch*	Puget Sound/Strait of Georgia Coho	No	NMFS/Species of Concern/ 1997
Sockeye salmon	*Oncorhynchus nerka*	No listing	No listing	No listing

Common Name	Scientific Name	Evolutionary Significant Unit	Critical Habitat	Regulatory Agency Status
Kokanee	*Oncorhynchus nerka*	No listing	No listing	No listing
Steelhead Trout	*Oncorhynchus mykiss*	Puget Sound Steelhead	Yes/2016	NMFS/ Threatened/ 2007
Bull Trout	*Salvelinus confluentus*	Puget Sound Dolly Varden/Bull Trout	Yes	USFWS/ Threatened/ 1999
Coastal Cutthroat Trout	*Oncorhynchus clarkii clarkii.*	No listing	No listing	No listing

Table 3 below lists the run timing and life stages of anadromous salmon and trout present throughout the watershed. Watershed specific data concerning salmonid life history and timing was largely summarized from the 2001 Salmon and Steelhead Habitat Limiting Factors Report for the Cedar-Sammamish Basin (Water Resource Inventory Area 8) (Kerwin 2001).

Table 3: Salmonid Life History Patterns within the Cedar-Sammamish Watershed

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
Sockeye	Upstream migration					■	■	■	■	■	■	■		Bear Evans Greater Lake Washington Issaquah Lake Sammamish Creeks Little Bear Creek Lower Cedar May Coal Sammamish River Valley Seattle Lake Union Swamp North Upper Cedar
	Spawning	■	■							■	■	■	■	
	Incubation[1]	■	■	■	■	■	■	■	■	■	■	■	■	
	Fry emergence				■	■	■	■						
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile outmigration				■	■	■	■	■	■	■	■	■	
Chinook (fall)	Upstream migration								■	■	■	■		All
	Spawning									■	■	■	■	
	Incubation	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile outmigration		■	■	■	■	■	■	■	■	■	■	■	
Coho	Upstream migration								■	■	■	■	■	All
	Spawning											■	■	
	Incubation	■	■										■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration				■	■	■	■						

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
Bull Trout[2]	Upstream migration							■	■	■	■	■	■	Greater Lake Washington Lake Sammamish Creeks Lower Cedar Sammamish River Valley Seattle Lake Union Upper Cedar
	Spawning									■	■	■	■	
	Incubation	■	■	■	■	■	■	■	■	■	■	■	■	
Coastal Cutthroat Trout	Upstream migration													All
	Spawning	■	■	■	■	■	■	■	■	■	■	■	■	
	Incubation	■	■	■	■	■	■	■	■	■	■	■	■	
	Fry emergence			■	■	■	■	■	■	■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration				■	■	■	■	■	■	■	■	■	
Steelhead Trout (winter)	Upstream migration	■	■	■	■	■	■	■	■	■	■	■	■	Bear Evans Greater Lake Washington Issaquah Lake Sammamish Creeks Little Bear Creek Lower Cedar May Coal Sammamish River Valley Seattle Lake Union Swamp North Upper Cedar
	Spawning		■	■	■	■	■	■	■	■	■	■	■	
	Incubation[3]	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration[3]			■	■	■	■	■	■	■	■	■	■	
Kokanee[4]	Spawning	■	■	■	■	■	■	■	■	■	■	■	■	Bear Evans Greater Lake Washington Issaquah Lake Sammamish Creeks Little Bear Creek Lower Cedar Sammamish River Valley Swamp North Upper Cedar
	Incubation	■	■	■	■	■	■	■	■	■	■	■	■	
Rainbow Trout[5]	Spawning				■	■	■	■	■	■	■	■	■	-Greater Lake Washington -Sammamish River Valley

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
	Incubation													-Upper Cedar

Notes:

1. Information on sockeye salmon incubation timing from the South Puget Sound Salmon Enhancement Group
2. Information on bull trout life history patterns specifically within the Cedar-Sammamish watershed is unavailable. Bull trout life history patterns for the Puget Sound Region were used within this report (King County 2000).
3. Information on steelhead incubation and migration timing specifically within the Cedar-Sammamish watershed is unavailable. Steelhead incubation and out-migration timing for the Puget Sound Region were used within this report (Blanton et al. 2011).
4. Information on kokanee taken from the Lake Sammamish Late Run Kokanee Synthesis Report (HDR Engineering 2009)
5. Information on rainbow trout life history specifically with the Cedar-Sammamish watershed is unavailable. Rainbow trout life history patterns for the Puget Sound Region were used within this report (Blanton et al. 2011).

Current Habitat Conditions

Habitat conditions within the Cedar-Sammamish subbasins were abstracted from the 2001 Salmon and Steelhead Habitat Limiting Factors Report (Kerwin 2001), the 2005 WRIA 8 Chinook Salmon Conservation Plan (WRIA 8 Salmon Recovery Council 2005), and the 2017 WRIA 8 Chinook Salmon Conservation Plan Update (WRIA 8 Salmon Recovery Council 2017). The Cedar-Sammamish watershed is one of the more significantly altered watersheds on the West Coast. It has been severely impacted by a variety of land uses ranging from commercial forestry in the Upper Cedar River subbasin to intense urban and suburban development throughout the western portion of the watershed. Fundamental historical changes to WRIA 8 include Seattle's use of the Cedar River as its main water supply (early 1900s), the construction of the Lake Washington Ship Canal and Hiram M. Chittenden locks (1911-1934), the redirection of the Cedar River from joining the Duwamish River via the Black River to entering the south end of Lake Washington, the channelization of the Sammamish River corridor (1920s), and the conversion of forests and farmlands to residential, commercial, and industrial uses (1945-2000).

The 2001 Salmon and Steelhead Habitat Limiting Factors Report (Kerwin 2001) and the 2005 WRIA 8 Chinook Salmon Conservation Plan list the following primary limiting factors in the Cedar-Sammamish watershed:

- Fish habitat access and passage barriers
- Increased sedimentation and altered sediment transport processes
- Loss of channel and shoreline complexity and connectivity
- Degradation or lack of riparian conditions
- Altered hydrology
- Water quality issues
- Biological processes
- Loss of floodplain connectivity

Other emerging priority issues that limit salmon survival and recovery include parasites, nighttime lighting, warming waters especially in the ship canal and Sammamish River, and predation on juvenile salmon by invasive non-native fish. Although some issues are common across WRIA 8, habitat conditions vary within the watershed's subbasins and are described below.

Puget Sound Shoreline

The Puget Sound Shoreline subbasin includes marine nearshore areas and independent tributaries to the Puget Sound. WRIA 8 tributaries to the Puget Sound have been substantially impacted by residential, commercial, and industrial uses. Development has caused fish passage barriers, altered stream hydrology, reduced channel complexity, and degraded riparian habitat in these highly impacted streams that can no longer support naturally reproducing salmonid populations. The WRIA 8 marine nearshore habitat has been adversely impacted by residential and commercial development; however, the construction of a railroad line along 87% of the shoreline represents the most significant impact within this area of the watershed. The railroad construction destroyed marine, riparian vegetation and severely impacted nearshore processes

by cutting off pocket estuaries and backshore habitats and the supply of beach sediment from bluff erosion to nearby beaches.

Seattle/Lake Union

The Seattle/Lake Union subbasin was drastically altered by the construction of the Lake Washington Ship Canal and opening of the Hiram M. Chittenden Locks which created a connection between the Puget Sound, Lake Washington, and Lake Union. The subbasin is characterized by intensive commercial and recreational boat traffic and extensive residential, commercial, and industrial shoreline development. Bulkheads and shoreline armoring have greatly reduced natural overwater cover and riparian habitat quality.

Greater Lake Washington

The Greater Lake Washington subbasin has a history of intense anthropogenic impacts beginning in 1916 when its original outlet to the Black River was blocked and flow from the Cedar River was redirected to Lake Washington and the Lake Washington Ship Canal and Ballard Locks. As a result, the water level in Lake Washington dropped by about 10 feet, leading to a dramatic reduction in overall lake surface area, shallow water habitat, and adjacent wetland area. Currently, the lake shoreline consists primarily of dense urban residential development. Approximately 71% of the Lake Washington shoreline is classified as hardened by either rip-rap or bulkheads. According to the Limiting Factors Report, “current and future land use practices all but eliminate the possibility of the shoreline to function as a natural shoreline to benefit salmonids (Kerwin 2001).” Limited natural vegetation, large wood, and natural shoreline conditions exist along the shoreline. Lake Washington tributaries have also suffered due to intense development. These streams are characterized by numerous fish passage barriers, limited pool habitat, fragmented or non-existent riparian habitat buffers, and changes to natural hydrologic regimes.

Swamp/North

The Swamp/North subbasin combines the Swamp Creek and North Creek watersheds and drains to the Sammamish River Valley. The subbasin is characterized by a mix of urban and suburban residential and commercial development. Numerous fish passage barriers are scattered throughout the subbasin. Road crossings, streambank hydromodification, channel incision, historical and on-going clearing, and development in riparian areas have greatly reduced channel complexity and floodplain connectivity. Water quality issues within the subbasin include excessive fecal coliform bacteria, water temperature, copper, lead, zinc, chromium, and low dissolved oxygen. The main issues within this subbasin include a lack of large wood, high levels of impervious surfaces, impaired riparian areas, and reduced floodplain connectivity.

Little Bear

The Little Bear Creek subbasin drains to the Sammamish River Valley and is characterized by a mix of rural and suburban residential and commercial development. The majority of the subbasin is accessible to anadromous salmon and trout. Approximately 40% of the subbasin is

still forested and the Little Bear Creek subbasin has the least degraded salmonid habitat compared to other Sammamish River tributaries. However, numerous fish passage barriers are scattered throughout the subbasin and large wood recruitment is limited. Riparian habitat condition varies widely throughout the subbasin with some riparian forests intact and others severely degraded or completely cleared.

Bear/Evans

The Bear/Evans subbasin combines the Bear Creek and Evans Creek watersheds and drains to the Sammamish River Valley. The subbasin is characterized by a mix of rural and suburban residential and commercial development. According to the Washington Department of Fish and Wildlife (WDFW) Washington State Fish Passage Map (WDFW 2020b), numerous fish passage barriers including culverts, dams, weirs, high velocity stream flows, and beaver dams are scattered throughout the subbasin. The loss of large wood and wetland habitat and the conversion of floodplain and riparian habitat areas to residential, commercial, and industrial development have dramatically reduced channel complexity and floodplain connectivity. Water quality issues within the subbasin include increased turbidity, high water temperature, and excessive fecal coliform bacteria.

Sammamish River Valley

The Sammamish River Valley subbasin extends from the north end of Lake Sammamish to the northern tip of Lake Washington. Prior to Euro-American settlement, the area was a vast complex of wetlands connected by the slow moving Sammamish River. The river corridor and adjacent areas were heavily logged throughout the 19th and 20th centuries. The 1916 opening of the Chittenden Locks lowered Lake Washington and drained large areas of sloughs and wetland habitat within the river valley. As agricultural land use expanded into the floodplain, farmers began to straighten the Sammamish River channel and construct extensive drainage ditches. In the 1960s, U.S. Army Corps of Engineers began to dredge the mainstem Sammamish River to prevent flooding of the adjacent farmlands. The combination of agricultural development and dredging of the river dramatically decreased floodplain habitat connectivity and complexity. Ultimately, the length of the river was reduced by nearly four miles and became disconnected from the floodplain and many of its tributary streams. The Sammamish River and its contributing subbasins are impacted by numerous fish passage barriers, elevated water temperatures, bank hardening features, limited pool habitat, little floodplain hydrologic connectivity, reduced forest cover, increased impervious surfaces, and reduced or fragmented riparian buffers.

Lake Sammamish Creeks

A mix of residential, commercial, agricultural, and forestry land practices impact Lake Sammamish and its tributaries. The majority of the Lake Sammamish shoreline is privately owned and consists of residential development and associated hardened shoreline. Water quality issues, invasive plant and fish species, elevated water temperatures and low dissolved oxygen, and fragmented or inadequate riparian habitat buffers are the main habitat limiting factors within the lake. Of the 27 miles of streams that flow into Lake Sammamish, only 4 miles

are accessible to anadromous fish. Erosion, dredging, and culvert blockages have rendered many of these streams inaccessible to migrating salmonids. Population density and the concomitant development of rural lands is expected to increase within the basin. Lake Sammamish tributaries are severely impacted by fish passage barriers, high levels of impervious surfaces, a lack of large woody debris, loss of channel complexity, and fragmented riparian habitat buffers.

May/Coal

The May/Coal subbasin combines the May Creek and Coal Creek watersheds and drains to Lake Washington. This subbasin is characterized by a mix of residential and commercial development. Extensive coal mining in the early 1900's changed the course of streams and urban development continues to impede natural hydrology. Major habitat impacts within the subbasin include extensive sedimentation problems, loss of channel complexity, high water temperatures, and increased impervious surfaces.

Issaquah

The Issaquah subbasin drains to Lake Sammamish and is characterized by a mixture of land uses including commercial forests; parks; quarry and mining; residential; commercial; and agricultural. The subbasin contains high quality habitat and productive populations of salmon (Kerwin 2001). However, habitat limiting factors include limited off-channel rearing and refuge habitat, a lack of large wood, several fish passage barriers, and high water temperatures (Ecology 2020). WDFW has a hatchery on Issaquah Creek that raises Chinook and Coho.

Lower Cedar

The Lower Cedar River subbasin is characterized by agricultural and forestry in the east and residential, commercial, and industrial land uses in the west. The Lower Cedar River and its tributaries are characterized by a lack of floodplain connectivity, numerous fish passage barriers (WDFW 2020b), limited pool habitat, increase in impervious surfaces, fragmented or inadequate riparian buffers, and several flood control facilities and bank hardening features. WDFW and Seattle Public Utilities co-operate a hatchery on the Cedar River near the Landsburg diversion dam.

Upper Cedar

Land use within the Upper Cedar River subbasin is slowly transitioning from commercial forestry to forest preservation. The Upper Cedar River is protected as Seattle's municipal drinking water source and is being restored following impacts from historic commercial forestry practices.

Priority Actions

The Lake Washington/Cedar/Sammamish Watershed Chinook Salmon Conservation Plan Update (WRIA 8 2017) recommends a combination of projects and programs to protect, restore, and enhance salmonid habitat and watershed ecosystem processes. Projects include physical restoration such as removing or setting back flood control levees and revetments,

installing large wood , planting native vegetation and removing invasive weeds in riparian areas throughout the watershed, replacing lakeshore armoring with natural shoreline or soft-shore alternatives, replacing fish passage barriers, as well as property acquisition to protect high functioning habitat. The plan identifies high priority habitat protection and restoration projects on the following water bodies: Cedar River, Bear/Cottage Lake Creek, Issaquah Creek, Sammamish River, Lake Washington shoreline, Lake Sammamish shoreline, Lake Union/Ship Canal, Puget Sound nearshore, North Creek, Little Bear Creek, Evans Creek, and Kelsey Creek. The WRIA 8 Salmon Conservation Plan also recommends land use actions that support habitat protection and restoration by addressing impacts from development, stormwater, increased imperious surface, etc.

2.2 Watershed Planning in WRIA 8

Citizens and local, state, federal, and tribal governments have collaborated on watershed and water resource management issues in WRIA 8 for decades. A brief summary of broad watershed planning efforts as they relate to the past, present, and future water availability in the Cedar-Sammamish watershed is provided below.

2.2.1 Other Planning Efforts in WRIA 8

This watershed plan builds on many of the past efforts to develop comprehensive plans for the entire watershed. For example, the South Central Action Area Caucus Group (South Central LIO) developed an ecosystem recovery plan, as part of the Action Agenda for Puget Sound Recovery. The planning process to develop an ecosystem recovery plan is community based with engagement by local, state, and federal agencies. The approach is holistic, addressing everything from salmon to orca recovery, stormwater runoff, and farmland and forest conservation.

The WRIA 8 Salmon Recovery Council is the Salmon Recovery Lead Entity, a collaboration of local government partners and community groups, state and federal agencies, businesses, and citizens focused on protecting and enhancing wild salmon populations. The Salmon Recovery Council formed in 2000 and developed the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan in 2005. Since 2005, the WRIA 8 Salmon Recovery Council has worked to implement the Salmon Conservation Plan and updated the plan in 2017 (WRIA 8 Salmon Recovery Council 2017).

The South Central LIO and WRIA 8 Salmon Recovery Council include many of the same organizations and individuals that participate in the WRIA 8 Watershed Restoration and Enhancement Committee. This history of collaborative planning and shared priorities has supported the success of the watershed restoration and enhancement plan development in WRIA 8.

Coordinated Water System Plans (CWSPs) are mandated by the Public Water System Coordination Act of 1977. King County passed ordinances ratifying four CWSPs (East King County, Skyway, South King County, and Vashon). Snohomish County updated their CWSP in 2010. These plans ensure that water system service areas are consistent with local growth management plans and development policies. The location of new homes in relation to and

within designated retail water system service areas and related policies determine if connection to a water system is available, or the new homes will need to rely on an alternative water source, most likely new permit-exempt domestic wells. Within their designated retail service area(s), water purveyors are given first right of refusal for new connections. The purveyor may decline to provide service if water cannot be made available in a 'reasonable and timely' manner. However, it can be the case that a new permit-exempt well is drilled without making any inquiries with the county or with the local water system.

2.2.2 Coordination with Existing Plans

Throughout the development of this watershed plan, Ecology streamflow restoration staff engaged with staff from the WRIA 8 Salmon Recovery Council, South Central LIO, and the Puget Sound Partnership, providing briefings on the streamflow restoration law, scope of the watershed plan, and plan development status updates. Throughout the planning process, the WRIA 8 Committee has coordinated closely with the WRIA 8 Salmon Recovery Council, including inviting lead entity staff to join the WRIA 8 Committee as an ex-officio member, and selecting habitat projects based on information from the Salmon Conservation Plan.

Snohomish County and King County planning staff contributed to the plan development to ensure consistency with the counties' Comprehensive Plans. The comprehensive plans set policy for development, housing, public services and facilities, and environmentally sensitive areas, among other topics. The comprehensive plans identify Snohomish and King Counties' urban growth areas, set forth standards for urban and rural development, and provide the basis for zoning districts.

2.3 WRIA 8 Geology, Hydrogeology, Hydrology, and Streamflow

2.3.1 Geologic Setting

Understanding the geologic setting of WRIA 8 helps to characterize surface and groundwater flow through the watershed. The relationships between surface water flow and deeper groundwater are important to understanding how to manage surface water resources and can be helpful in identifying strategies to offset the impacts of pumping from permit-exempt wells.

Within WRIA 8, bedrock forms mountain ranges and uplands and generally consists of igneous and sedimentary rocks. Within drainages and lowland areas, bedrock is overlain by glacial and alluvial sediments (Washington State Department of Natural Resources 2020). A minimum of four major glaciations covered the lower portion of the watershed during the Pleistocene Epoch (about 11,700 years to 2.6 million years ago), the most recent occurrence being the Vashon Stade of the Frasier Glaciation (Jones 1998; Vaccaro et al. 1998; Booth et al. 2003). The present topography and drainage network in WRIA 8 was shaped during the advance and retreat of the Vashon ice sheet (Evans 1996). These processes resulted in glacially-derived ridges and lakes linked by drainage channels (Booth and Goldstein 1994; Evans 1996). Pleistocene-age glacial and interglacial processes resulted in the deposition of a complex assemblage of sedimentary deposits in lowland areas. These glacial deposits consist of glacial till, recessional and advance outwash, and glaciolacustrine deposits. Glacial till deposits generally consist of dense, silty sand

with gravel and silt lenses. Outwash deposits generally consist of sand and gravel with locally abundant wood debris and peat. Glaciolacustrine deposits generally consist of silt and clay. This sequence of glacial deposits exceeds 1,500 feet in thickness within the lower portions of the watershed (Jones 1996; Vaccaro et al. 1998).

Recent alluvial deposits are generally associated with channel and overbank deposits from the modern Cedar and Sammamish Rivers and their tributaries. These sediments generally consist of stratified silt, sand, gravel, with minor amounts of clay.

2.3.2 Hydrogeologic Setting

The U.S. Geological Survey identified six hydrogeologic units within the sequence of Puget Sound glacial and alluvial sediments within WRIA 8 (Vaccaro 1998). The hydrogeologic units typically alternate between aquifer units and semi-confining to confining layers (aquitards) which lack sufficient permeability to form aquifers.

Within the upper portion of the watershed, glacial and alluvial sediments occur within the Cedar River valley and drainages associated with area tributaries. Shallow glacial and alluvial sediments are widespread within the lower portion of the watershed. Glacial and alluvial aquifers are generally unconfined (under water-table conditions) except where overlain by low permeability confining layers (generally till or glaciolacustrine deposits). Transmissivity (a hydraulic property related to the rate of groundwater flow through an aquifer) and storativity (a hydraulic property related to the capacity of an aquifer to store/release water) of these aquifers vary significantly with depositional environment and are generally the highest in outwash sands and gravels and lowest in fine-grained alluvial deposits. Glacial and alluvial aquifers are characterized by a shallow depth to the groundwater table and, where applicable, a direct hydraulic connection with adjacent surface water.

Bedrock aquifers underlay the entire watershed. However, within the lower portions of the watershed, glacial and alluvial sediments are hundreds to thousands of feet thick (Jones 1996; Vaccaro et al. 1998) and bedrock aquifers are seldom targeted by water supply wells. Thickness of the glacial and alluvial hydrogeologic units generally thin to the east within WRIA 8. Much of the watershed southeast of Bellevue is underlain by relatively shallow and frequently outcropping bedrock.

Bedrock aquifers are generally of relatively low transmissivity and storativity. Wells completed within bedrock aquifers typically do not have high enough capacity for municipal use. However, they can be valuable aquifers for residential water uses, and in specific areas are an important target aquifer for permit-exempt wells.

Recharge to glacial, alluvial, and bedrock aquifers within WRIA 8 is primarily associated with precipitation, applied irrigation, septic systems, leakage from surface water within losing reaches (where streamflow infiltrates to groundwater), and through leakage from adjacent aquifers. An important component of recharge, particularly to the deep aquifers, occurs through mountain front recharge. In WRIA 8 this includes recharge to shallower aquifers surrounding the Issaquah Alps and to aquifers adjacent to the Cascade Range in the southeastern part of the WRIA (Rock Creek/Ravensdale area). Watershed aquifers discharge to water supply wells, adjacent aquifers, gaining reaches of streams, and Puget Sound. Summer

base flows in WRIA 8 rivers and tributaries are sustained by groundwater (baseflow) on most of the lower-elevation tributaries.

Regionally, groundwater flow direction within watershed aquifers generally is perpendicular to the westerly slope of the Cascade Range, although groundwater flow in shallow aquifers is more influenced by surface topography and streamflow within the watershed and is directed to the northwest. This groundwater flow paradigm is complicated throughout the watershed by aquifer boundaries, aquifer heterogeneities, topography, the influence of gaining and losing stream reaches, well pumping, and other factors.

2.3.3 Hydrology and Streamflow

The Cedar River and its headwaters are located in a snowmelt transition region where the rivers are fed by both snowmelt and rainfall. Within low elevation portions of the watershed, mean annual precipitation ranges from about 30 to 40 inches per year. Mean annual precipitation increases with topographic elevation and can exceed 120 inches within the Cascade Range (MGS Engineering Service and Oregon Climate Service 2006). Most precipitation occurs during the late fall and winter. Precipitation is lowest during the summer when water demands are highest. During these low precipitation periods, streamflow is highly dependent upon groundwater inflow (baseflow).

WAC 173-508 set minimum instream flows for the Cedar River and closed lakes and streams contributing to the Lake Washington drainage above the Hiram M. Chittenden Locks to further consumptive appropriations.

In the vicinity of Chester Morse Lake and the Masonry Pool, the stage of the Cedar River is controlled for municipal supply and hydroelectric power generation by Masonry Dam and associated secondary control structures. The Instream Flow Commission, which includes City of Seattle, Muckleshoot Indian Tribe, National Marine Fisheries Service, Washington Department of Ecology, Washington Department of Fish and Wildlife, King County and the U.S. Army Corps of Engineers, meets regularly to review current hydrologic conditions and help guide real-time instream flow management for the Cedar River, pursuant to the Cedar River Watershed Habitat Conservation Plan (Seattle 2020b). The Muckleshoot Indian Tribe also has a 2006 Agreement with the City of Seattle. The Sammamish River has been extensively channelized during the 20th century and is controlled by an outlet weir installed in 1964. The Army Corps of Engineers controls the lake levels in Lake Washington through operation of the Chittenden Locks.

Cedar River and Sammamish River streamflow conditions are summarized by the following:

- USGS stream gage 12116500 (Cedar River at Cedar Falls): At this upper watershed location, mean daily discharge ranges from 100 cfs in September to 512 cfs in December (U.S. Geological Survey 2020) for the period of record from April 1914 to June 2020. This gage is the farthest upstream station on the Cedar River.
- USGS stream gage 12119000 (Cedar River at Renton): Near its discharge location in Renton, Washington, mean daily discharge ranges from 187 cfs in August to 1,140 cfs in January (U.S. Geological Survey 2020) for the consistent record from August 1945 to June 2020. This gage is also a compliance station for instream flows in WAC 173-508.

- USGS stream gage 12125200 (Sammamish River near Woodinville): Near Woodinville, Washington, mean daily discharge of the Sammamish River ranges from 72 cfs in August to 624 cfs in January (U.S. Geological Survey 2020) for February 1965 to June 2006. King County took over gaging from the USGS.
- USGS stream gage 12121600 (Issaquah Creek near mouth) mean daily discharge is 30 cfs in August and 270 cfs in January for the period of record from October 1963 through March 2020.
- King County also gages Bear Creek near the mouth (gage 02A), and other tributaries.

Anticipated future climate impacts will result in continued loss of snow in the Cascade Range, combined with rising temperatures and changes in precipitation. Earlier spring snowmelt, lower snowpack, increased evaporative losses, and warmer and drier summer conditions will intensify summer drought conditions and low flow issues in WRIA 8. These climate impacts are expected to drive changes in seasonal streamflows, increasing winter flooding, while intensifying summer low flow conditions. For the Cedar River, climate modeling predicts average minimum flows to be 25 percent lower (range: -32 to -13 percent) by the 2080s for a moderate warming scenario, relative to 1970 to 1999 (Mauger et al. 2015).

Several factors contribute to streamflow: snow pack and rate of melt, rainfall, surface water runoff and groundwater discharge. In addition to environmental factors, surface water withdrawals and groundwater pumping from wells in hydraulic continuity with surface water affect streamflow. This plan addresses impacts on groundwater discharge to streams due to withdrawals from permit-exempt wells for domestic use. Pumping from wells can reduce groundwater discharge to springs and streams by capturing water that would otherwise have discharged naturally. Groundwater pumping may diminish surface water flows. Consumptive water use (that portion not returned to the immediate water environment) potentially reduces streamflow, both seasonally and as average annual recharge. A well drawing from an aquifer connected to a surface water body either directly or through an overlying aquifer can either reduce baseflow or increase the quantity of water leaking out of the river (Ecology 1995). Water use from new permit-exempt domestic wells represents only a portion of all water use and factors affecting streamflow in the watershed.

Chapter Three: Subbasin Delineation

3.1 Introduction to Subbasins

Water Resource Inventory Areas are large watershed areas formalized under Washington Administrative Code for the purpose of administrative water management and planning. WRIAs encompass multiple landscapes, hydrogeologic regimes, levels of development, and variable natural resources. To allow for meaningful analysis of the relationship between new consumptive use and offsets per Ecology's Final NEB Guidance,[5] the WRIA 8 Committee divided WRIA 8 into subbasins. This was helpful in describing the location and timing of projected new consumptive water use, the location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. In some instances, subbasins did not correspond with hydrologic or geologic basin delineations (e.g. watershed divides).[6]

3.2 Approach to Develop Subbasins

The WRIA 8 Committee divided WRIA 8 into 12 subbasins for purposes of assessing consumptive use and project offsets. The WRIA 8 Committee based their subbasin delineation on existing subwatershed units and interim growth projections developed by Snohomish County and King County. The Committee applied the following guiding principles to delineate subbasins:

- Use USGS hydrologic unit code subwatershed (HUC-12) boundaries in the Snohomish County portion of the watershed (USGS 2013; USGS 2016);
- Use King County drainage basin boundaries in the King County portion of the watershed (King County 2018);
- Combine HUC-12s (Snohomish County) and drainage basins (King County) in areas of the watershed that are urbanized and have existing water service and are therefore unlikely to have new homes using PE wells; and
- Keep distinct subbasins for HUC-12s and drainage basins with higher projected growth of new homes using PE wells.

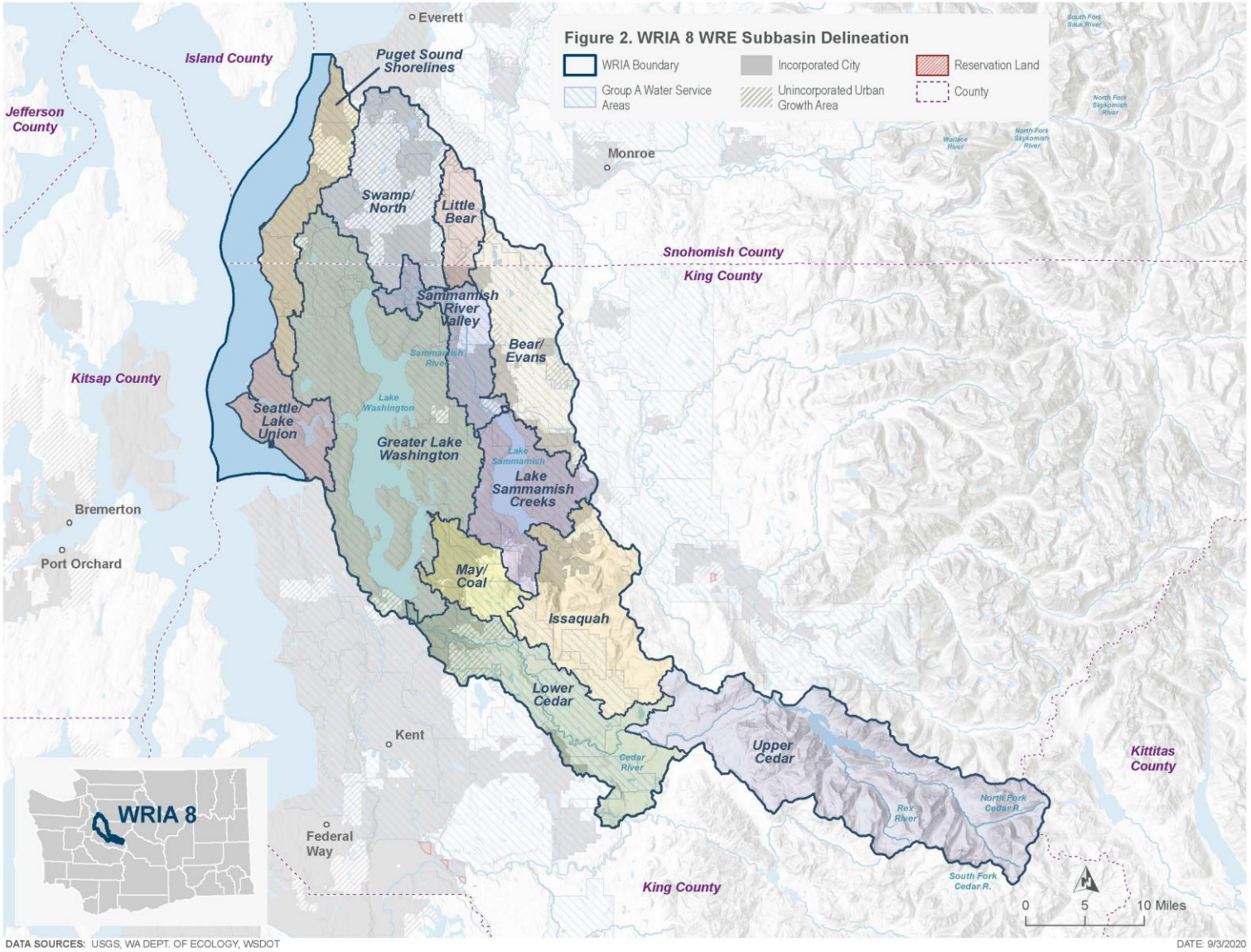
The WRIA 8 subbasin delineations are shown on Figure 2 and summarized below in Table 4. A more detailed description of the subbasin delineation is in the technical memo available in Appendix E.

[5] "Planning groups must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning groups understand and describe location and timing of projected new consumptive water use, location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act." Final NEB Guidance p. 7.

[6] This is consistent with Final NEB Guidance that defines subbasins as a geographic subarea within a WRIA. A subbasin is equivalent to the words "same basin or tributary" as used in RCW 90.94.020(4)(b).

Table 4: WRIA 8 Subbasins

Subbasin Name	Primary Rivers and Tributaries	County
Seattle/Lake Union	Elliott Bay and Lake Union	King County
Puget Sound Shorelines	Streams draining directly to Puget Sound between the City of Mukilteo and the City of Seattle, including Pipers Creek, Boeing Creek, and Shell Creek	Snohomish and King County
Swamp/North	Swamp Creek and North Creek	Snohomish and King County
Little Bear	Little Bear Creek	Snohomish County and King County
Sammamish River Valley	Sammamish River	King County and Snohomish County
Bear/Evans	Bear Creek and Evans Creek	Snohomish and King County
Greater Lake Washington	Streams draining to Lake Washington, including Lyon Creek, McAleer Creek, Thornton Creek, Juanita Creek, Forbes Creek, Kelsey Creek	King County and Snohomish County
May/Coal	Coal Creek and May Creek	King County
Lake Sammamish Creeks	Streams draining to Lake Sammamish, including Tibbets Creek	King County
Issaquah	Issaquah Creek	King County
Lower Cedar	Cedar River below the Landsburg diversion dam	King County
Upper Cedar	Cedar River above the Landsburg diversion dam	King County



1

2 Figure 2: WRIA 8 WRE Subbasin Delineation

Chapter Four: New Consumptive Water Use Impacts

4.1 Introduction to Consumptive Use

The Streamflow Restoration law requires watershed plans to include "estimates of the cumulative consumptive water use impacts over the subsequent twenty years" for "new domestic groundwater withdrawals exempt from permitting under RCW 90.44.050" (RCW 90.94.030(3)(e) and RCW 90.94.030(6)).The Final NEB Guidance states that, "Watershed plans must include a new consumptive water use estimate for each subbasin, and the technical basis for such estimate" (pg. 7). This chapter provides the WRIA 8 Committee's projections of new domestic permit-exempt well connections (hereafter referred to as PE wells) and their associated consumptive use for the 20-year planning horizon.[7] This chapter summarizes information from the technical memos (Appendices F and G) prepared for, and reviewed by, the WRIA 8 Committee.

4.2 Projection of Permit-Exempt Well Connections (2018 - 2038)

The WRIA 8 Committee projects 967 PE wells over the planning horizon. Most of these wells are likely to be installed in the following subbasins outside of the Urban Growth Areas (UGAs): Lower Cedar, Issaquah, Bear/Evans, and Little Bear.

The WRIA 8 Committee developed a method that they agreed was appropriate to project the number of new PE wells over the planning horizon in WRIA 8, in order to estimate new consumptive water use. This method, referred to as the PE well projection method, is based on recommendations from Appendix A of Ecology's Final NEB Guidance (Ecology 2019). The following sections provide the 20-year projections of new PE wells for each subbasin within WRIA 8, the methods used to develop the projections (PE well projection method), and uncertainties associated with the projections.

4.2.1 Permit-Exempt Well Connections Projection by Subbasin

This WRIA 8 watershed plan compiles the Snohomish County and King County PE well projection data at both the WRIA scale and by subbasin. The projection for new PE wells in WRIA 8 by subbasin is shown in Table 5 and Figure 3.

[7] New consumptive water use in this document is from projected new homes connected to permit-exempt domestic wells associated with building permits issued during the planning horizon. Generally, new homes will be associated with wells drilled during the planning horizon. However, new uses could occur where new homes are added to existing wells serving group systems under RCW 90.44.050. In this document the well use discussed refers to both these types of new well use. PE wells may be used to supply houses, and in some cases other Equivalent Residential Units (ERUs) such as small apartments. For the purposes of this document, the terms "house" or "home" refer to any permit-exempt domestic groundwater use, including other ERUs.

Table 5: Number of PE Wells Projected between 2018 and 2038 for the WRIA 8 Subbasins

Subbasins	King County	Snohomish County	Urban Growth Areas	Total PE Wells per Subbasin
Seattle/Lake Union	0	--	0	0
Puget Sound Shorelines	0	--	2	2
Swamp/North	0	0	5	5
Little Bear	0	118	0	118
Sammamish River Valley	8	--	0	8
Bear/Evans	138	92	4	234
Greater Lake Washington	0	--	4	4
May/Coal	15	--	0	15
Lake Sammamish Creeks	6	--	0	6
Issaquah	235	--	0	235
Lower Cedar	338	--	2	340
Upper Cedar	0	--	0	0
Totals	**740**	**210**	**17**	**967**

The total projection for WRIA 8 is 967 new PE wells. King County projects approximately 740 new PE wells over the planning horizon within WRIA 8 portions of unincorporated King County. Snohomish County projects approximately 210 new PE wells over the planning horizon within WRIA 8 portions of unincorporated Snohomish County. The King and Snohomish County methods do not account for potential PE wells in cities or UGAs so the WRIA 8 Committee completed an analysis of potential new PE wells within the UGAs and projected 17 new PE wells (UGA Well Log Spot Check).

4.2.2 Methodology

The WRIA 8 Committee conferred with each county to identify an appropriate method of projecting PE wells within their jurisdiction. King and Snohomish Counties used historical building data to project new potential PE wells, assuming the rate and general location of past growth will continue over the 20-year planning horizon. Using past building permits to predict future growth is one of the recommended methods in the Final NEB Guidance (Ecology 2019). Due to data availability, which differed for the two counties, King and Snohomish County used different methods to estimate the number of homes that would be served by community water

systems and municipalities, and remove those from the PE well projection. Snohomish County considered distance to existing water lines, whereas King County considered historical rates of connection to water service within water service area boundaries.[8] King and Snohomish Counties completed their analyses in-house and the methods are described in detail in Appendix F.

The WRIA 8 Committee also evaluated potential PE wells within the UGAs using data from Ecology's Well Report Viewer database.

King County completed a PE Well Potential Assessment which identified potential parcels where development could occur within rural King County. Snohomish County completed a similar assessment which they have referred to as a Rural Capacity Analysis. The PE Well Potential Assessment and Rural Capacity Analysis results were used to assess whether a subbasin (as identified by the Committee) has the capacity to accommodate the number of PE wells projected over the 20-year planning horizon.

All methods are summarized in the sections below. The WRIA 8 Growth Projections Technical Memorandum provides a more detailed description of the analysis and methods (Appendix F).

King County PE Well Projection Methodology

King County used historical residential building permit and parcel data from 2000 through 2017 to project the number of new PE wells for the planning horizon in unincorporated King County (referred to as the past trends analysis). This data set considers economic and building trends over an 18-year period and the method assumes that past trends will continue.

King County projected the number of new PE wells over the planning horizon using the following steps:

1. Gather historical building permit and parcel data (2000–2017) for new residential structures.[9]
2. Assess the total number of permits and average number of permits per year for WRIA 8.
3. Link building permit and parcel data to determine water source for each building permit/parcel and separate into public, private, and other water source categories. Consider a building permit with water source listed as "private" as a PE well.
4. Calculate the number and percentage of building permits for each type of water source (public, private, or other) inside and outside water services areas by subbasin, and for the WRIA overall.

[8] Water service area boundaries include areas currently served by existing water lines and may also include areas not yet served by water lines. King County used historic rates of connection to water service to predict future rates of connection because King County does not have County-wide information on the location of water lines.

[9] King County used the time period 2000 through 2017 because those data were available. The building permit data for 2000 through 2017 includes both periods of high growth and periods of low growth. King County compared these data with information from the Vision 2040 regional plan and population data and is confident in using the average of this time period to project into the future.

The WRIA 8 Committee used the King County past trends analysis to develop PE well projections by subbasin using the following steps:

5. Calculate the projected number of PE wells per year for each subbasin by multiplying the average number of building permits per year by the percentage of building permits per subbasin, and percentage of building permits using a private water source (well) per subbasin.
6. Multiply the projected number of PE wells per year per subbasin by 20 to calculate the total of PE wells projected over the 20-year planning horizon for each subbasin.
7. Add 6% to 20-year PE well projection per subbasin to account for gaps in the building permit and parcel data (6% error is based on the percentage of building permits with "other" as the water source).
8. Tabulate the total PE wells projected over the 20-year planning horizon, including the 6% error, for each subbasin and sum to get the total of PE wells projected over the 20-year planning horizon in rural unincorporated King County.

Snohomish County PE Well Projection Methodology

Snohomish County developed three PE well projection scenarios based on development trends and population projections, described in Appendix F. The WRIA 8 Committee chose to use the scenario that reviewed past development trends within WRIA 8 to estimate the number and location of potential new homes over the planning horizon (referred to as the past trends analysis).

Snohomish County used a different method than King County for their past trends analysis. They used a GIS model to identify areas where homes are likely to connect to water service, based on proximity to existing water distribution lines (referred to as public water service areas). Areas that were not proximal to existing water distribution lines were assumed to be served by a PE well (referred to as PE well areas).[10] Snohomish County used this spatial model, in combination with analysis of year-built data from 2008-2018 for recently built single-family residences, to develop PE well projections. The method assumes that past trends will continue.

Snohomish County projected the number of new PE wells over the planning horizon using the following steps:

1. Gather year-built data for single-family residences (i.e. housing units or HUs) built between 2008–2018.
2. Assign HUs to "public water service areas" or "PE well areas" based on the distance to existing water mains. Assume HUs in "PE well areas" will use a PE well for the water source.

[10] PE well areas are more than 100' from a water main for homes that are not part of a subdivision and more than ¼ mile from a water main for homes that are part of a subdivision. See Snohomish County Growth Projections and Rural Capacity Analysis Methods in Appendix F for additional information.

3. Estimate the number of HUs per subbasin for each type of water source (public water service or PE well) and calculate the percentage of HUs per subbasin for each type of water source.
4. Calculate the average number of HUs per year (2008-2018) and multiply by 20 to calculate the estimated total of HUs projected over the 20-year planning horizon for rural unincorporated Snohomish County.
5. Apply HU projections to WRIA 8 subbasins based on the past percentage of growth per subbasin and past percentage of HU for each type of water source per subbasin.
6. Tabulate the total PE wells projected over the 20-year planning horizon for each subbasin and sum to get the total of PE wells projected over the 20-year planning horizon in rural unincorporated Snohomish County.

Urban Growth Area PE Well Projection Methodology

The King County and Snohomish County PE well projection methods do not account for potential PE wells within cities or UGAs. However, the WRIA 8 Committee recommended looking at the potential for PE well growth within UGAs. The WRIA 8 Committee completed an analysis of potential PE well growth within the incorporated and unincorporated UGAs using data from Ecology's Well Report Viewer database (referred to as the UGA well log spot check).

The general method included using Ecology's Well Report Viewer database (1998–2018) to query water wells with characteristics of a domestic well[11] within UGAs. The Committee randomly reviewed a subset of the water well reports and calculated the number and percentage of each type of well (domestic, irrigation, other and incorrect) located within the UGAs. They then multiplied the percentage of wells identified as domestic (assumed to be PE wells) by the total number of wells located within UGAs to estimate the number of PE wells installed over the past 20-year period. The Committee also cross-checked the physical address of the wells with the UGA boundaries to determine which subbasin the domestic wells were located in. The Committee used the total number of domestic wells per subbasin over the past 20 years to project the number of PE wells located within the UGAs over the planning horizon for each WRIA 8 subbasin. A more detailed methodology is included in Appendix F.

King County PE Well Potential Assessment

King County completed an assessment of parcels available for future residential development in unincorporated King County (referred to as the PE well potential assessment). The Committee used the PE Well Potential Assessment to assess whether a subbasin has the capacity to accommodate the number of PE wells projected over the 20-year planning horizon.

[11] Ecology's complete Well Report Viewer database was filtered for water wells 6 to 8 inches in diameter and greater than 30 feet deep, which are typical dimensions and depths for domestic wells. The Ecology Well Report Viewer database does not have the ability to filter for permit-exempt domestic wells.

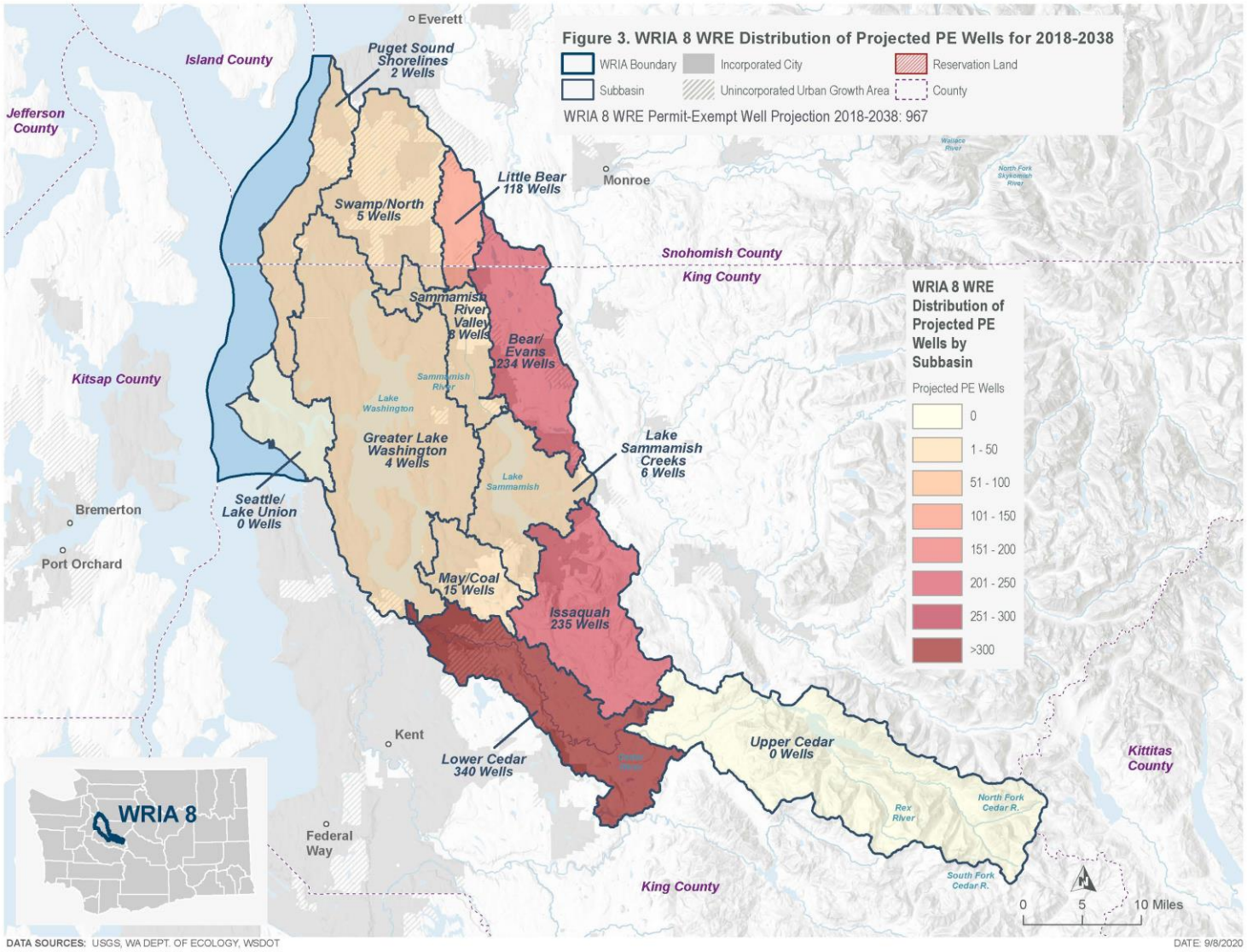
King County used screening criteria to identify parcels with potential for future residential development by subbasin. The total number of parcels and dwelling units[12] (DUs) per subbasin were determined and labeled as inside or outside the water district service boundaries. King County then projected the water source for each parcel (public water or PE well) based on historic rates of connection to water service inside water district service boundaries. King County used historic rates of connection to water service because the County does not have County-wide information on the location of water lines. The WRIA 8 Committee compared the 20-year PE well projection to the PE well potential assessment. In areas where the number of projected PE wells exceeded the potential parcels available, the Committee reallocated those PE wells to the nearest subbasin with parcel capacity and similar growth patterns. The WRIA 8 Committee redistributed 1 well from the Upper Cedar subbasin to the Lower Cedar subbasin in the King County portion of WRIA 8. A more detailed methodology and list of assumptions is included in Appendix F.

Snohomish County Rural Capacity Analysis

Snohomish County completed a Rural Capacity Analysis in 2011 that resulted in an assigned future residential development capacity for each parcel in the rural area. Snohomish County updated their 2011 analysis to determine capacity to accommodate the 20-year PE well projection at the WRIA and subbasin level.

Snohomish County used screening criteria to identify parcels with potential for future residential development by subbasin. For each parcel, Snohomish County calculated residential development capacity based on development status, parcel size, density, and other attributes. The County assigned parcels to "public water service areas" or "PE well areas" per the past trends analysis method and aggregated the residential development capacity by subbasin and water source. Snohomish County compared the 20-year PE well projection with the rural capacity analysis and calculated the shortfall or surplus of available parcels to be sourced by PE wells. In areas where the number of projected PE wells exceeded the potential parcels available, the Committee reallocated those PE wells to the nearest subbasin with parcel capacity and similar growth patterns. The WRIA 8 Committee reallocated 59 wells from the Little Bear subbasin to the Bear/Evans subbasin in the Snohomish County portion of WRIA 8. A more detailed methodology and list of assumptions is included in Appendix F.

[12] A dwelling unit is a rough estimate of subdivision potential based on parcel size and zoning (e.g. a 22-acre parcel zoned RA-5 is assumed to have 4 dwelling units).



1

2 Figure 3: WRIA 8 WRE Distribution of Projected PE Wells for 2018-2038

4.3 Impacts of New Consumptive Water Use

The WRIA 8 Committee used the 20-year projection of new wells for WRIA 8 (967) to estimate the consumptive water use that this watershed plan must address and offset. The WRIA 8 Committee estimates 425.4 acre-feet per year (0.59 cfs) of new consumptive water use in WRIA 8. The WRIA 8 Committee developed a water offset target of [XX] acre-feet per year to account for uncertainties in the PE well projections and consumptive use estimate and address higher rates of water use that could result from climate change and changing development patterns.

[COMMENT: The sentence on the offset target is included as a placeholder. The WRIA 8 Committee has not decided on a safety factor or offset target at this time. If the Committee identifies an offset target or safety factor that is higher than the consumptive use estimate in order to address uncertainty, both the consumptive use estimate and safety factor/offset target will be described in the paragraph above.]

This section includes an overview of the methods used by the WRIA 8 Committee to estimate new consumptive water use (consumptive use) and an overview of the anticipated impacts of new consumptive use in WRIA 8 over the planning horizon. The WRIA 8 Consumptive Use Estimates Technical Memorandum provides a more detailed description of the analysis and alternative scenarios considered (Appendix G).

4.3.1 Methods to Estimate Indoor and Outdoor Consumptive Water Use

Indoor water use patterns differ from outdoor water use. Indoor use is generally constant throughout the year, while outdoor use occurs primarily in the summer months. Also, the portion of water that is consumptive varies for indoor and outdoor water use. Appendix A of the Final NEB Guidance (Ecology 2019) describes a method (referred to as the Irrigated Area Method) which assumes average indoor use per person per day, and reviews aerial imagery to provide a basis to estimate irrigated area of outdoor lawn and garden areas. The Irrigated Area Method accounts for indoor and outdoor consumptive use variances by using separate approaches to estimate indoor and outdoor consumptive use.

To develop the consumptive use estimate, the WRIA 8 Committee used the Irrigated Area Method and relied on assumptions for indoor use and outdoor use from Appendix A of the Final NEB Guidance. This chapter provides a summary of the technical memo which is available in Appendix G.

Consistent with the Final NEB guidance (Appendix B, pg. 25), for the purposes of calculating an estimate of consumptive use, the Committee assumed impacts from consumptive use on surface water are steady-state, meaning impacts to the stream from pumping do not change over time. This assumption is based on the wide distribution of future well locations and depths across varying hydrogeological conditions, and because empirical data to support the assumption is not locally available.

The WRIA 8 Committee looked at other scenarios for estimating consumptive use, including (1) assuming each home has 0.5-acre irrigated lawn area (legal maximum per PE well[13]) and (2) assuming each home uses 950 gallons of water per day (legal withdrawal limit per PE well connection[14]). The Committee chose a consumptive use estimate based on the irrigated area method. The technical memo in Appendix G includes the additional consumptive use scenarios and results.

New Indoor Consumptive Water Use

Indoor water use refers to the water that households use in kitchens, bathrooms, and laundry (USGS 2012). The WRIA 8 Committee used the Irrigated Area Method and Ecology's recommended assumptions for indoor daily water use per person, local data to estimate the average number of people per household, and applied Ecology's recommended consumptive use factor to estimate new indoor consumptive water use (Ecology 2019). The assumptions the WRIA 8 Committee used to estimate household consumptive indoor water use are:

- 60 gallons per day (gpd) per person.
- 2.73 and 2.75 persons per household assumed for rural portions of King and Snohomish Counties, respectively. For areas spanning both counties, a weighted value was estimated based on the number of projected PE wells in each county.
- 10% of indoor use is consumptively used (or a consumptive use factor (CUF) of 0.10), based on the assumption that homes on PE wells are served by onsite sewage systems (septic). Onsite sewage systems return most wastewater back to the immediate water environment; a fraction of that water is lost to the atmosphere through evaporation in the drainfield.

The equation used to estimate household consumptive indoor water use is:

60 gpd x 2.73 to 2.75 people per house x 365 days x .10 CUF

This results in an annual aggregated average of 0.0184 AF[15] (16.4 gpd or 0.000025 cfs[16]) indoor consumptive water use per day per well.

New Outdoor Consumptive Water Uses

Most outdoor water use is for irrigating lawns, gardens, and landscaping. To a lesser extent, households use outdoor water for car and pet washing, exterior home maintenance, pools, and other water-based activities. Water from outdoor use does not enter onsite sewage systems,

[13] Per RCW 90.44.050

[14] Legal withdrawal limits from PE wells in WRIA 8 are defined in RCW: "an applicant may obtain approval for a withdrawal exempt from permitting under RCW 90.44.050 for domestic use only, with a maximum annual average withdrawal of nine hundred fifty gallons per day per connection" RCW 90.94.030(4)(a)(vi)(B)

[15] Acre-foot is a unit of volume for water equal to a sheet of water one acre in area and one foot in depth. It is equal to 325,851 gallons of water. 1 acre-foot per year is equal to 893 gallons per day.

[16] Cubic feet per second (CFS) is a rate of the flow in streams and rivers. It is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second. 1 cubic foot per second is equal to 646,317 gallons per day.

but instead typically infiltrates into the ground or is lost to the atmosphere through evapotranspiration (Ecology 2019).

The WRIA 8 Committee used aerial imagery to measure the irrigated areas of 153 randomly selected parcels in seven[17] WRIA 8 subbasins to develop an average outdoor irrigated area per subbasin. Parcels used for the irrigated footprint analysis were selected based on recent (2006-2017) building permits for new single-family residential homes not served by public water. There were more than 400 permits in WRIA 8 meeting these criteria. For subbasins with more than 20 applicable building permits, a statistically representative sample size was identified to ensure that the sample mean is representative over the WRIA. The average irrigated area for 131 randomly selected parcels, when aggregated across subbasins, was 0.32 acres per parcel.

The WRIA 8 Committee used the following assumptions, recommended in Appendix A of the Final NEB Guidance, to estimate household outdoor consumptive water use:

- The amount of water needed to maintain a lawn varies by subbasin due to varying temperature and precipitation across the watershed. The Committee used the Washington Irrigation Guide (WAIG) (NRCS-USDA 1997) Seattle-UW station and surrounding stations to develop a weighted average crop irrigation requirement (IR) for turf grass in each subbasin (the WRIA average IR is 15.66 inches). This value represents the amount of water needed to maintain a green lawn.
- The irrigation application efficiency (AE) used for WRIA 8 was the Ecology-recommended value of 75%. This increases the amount of water used to meet the crop's irrigation requirement.
- Consumptive use factor (CUF) of 0.8, reflecting 80% consumption for outdoor use. This means 20% of outdoor water is returned to the immediate water environment.
- Outdoor irrigated area per subbasin based on the irrigated footprint analysis (the WRIA average irrigated area size is 0.32 acres per PE well).

IR by subbasin (inches) ÷ 0.75 AE x average irrigated area by subbasin (acres) x 0.80 CUF

First, water loss is accounted for by dividing the crop irrigation requirement by the application efficiency. Next, the total water depth used to maintain turf is multiplied by the area which is irrigated. Finally, the volume of water is multiplied by 80 percent to produce the outdoor

[17] The analysis covered seven of the ten subbasins in WRIA 8 with projected PE well connections. Due to small sample sizes, the subbasin-level results for Lake Sammamish Creeks, Sammamish River Valley, and May/Coal subbasins are not considered representative. Parcels in these subbasins were included in the overall average, but average irrigated areas from similar adjacent subbasins (Bear/Evans, Little Bear, and Lower Cedar, respectively) were used for the purpose of subbasin-scale consumptive use estimates. The Puget Sound Shorelines, Greater Lake Washington, and Swamp/North subbasins (with two, four, and five projected PE well connections, respectively) did not have any recent building permits for sites without purveyor-provided water service from which to estimate subbasin-specific irrigated area. The average irrigated area for the Little Bear subbasin was applied for purposes of subbasin-scale consumptive use estimates. Puget Sound Shorelines, Greater Lake Washington, and Swamp/North subbasins are almost entirely within the Urban Growth Area (UGA) and may have homes on smaller lots with smaller lawns than homes in Little Bear subbasin, which is mostly outside the UGA.

consumptive water use. To convert the equation from inches to acre-feet, divide the result by 12.

The result is total outdoor consumptive water use per PE well per subbasin ranging from 0.36 AF per year in the Little Bear subbasin to 0.47 AF per year in the May/Coal and Issaquah Creek subbasins. The outdoor consumptive use varies by subbasin due to differences in average outdoor irrigated area size and irrigation requirements across the watershed. This is an average for the year, however the Committee expects that more water use will occur in the summer than in the other months.

4.4 Consumptive Use Estimate for WRIA 8 and by Subbasin

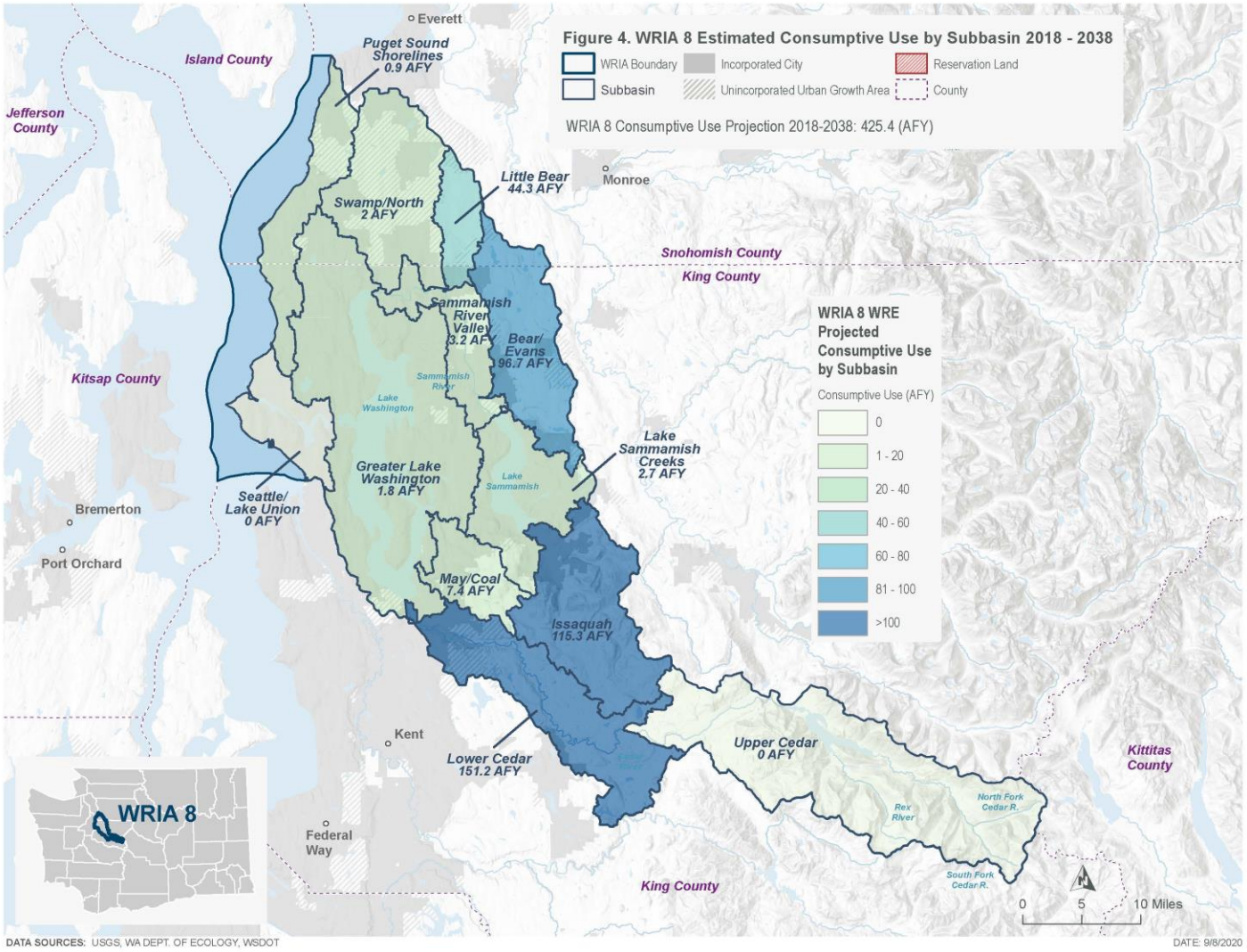
The total consumptive use estimate for WRIA 8 is 425.4 AF per year (0.59 cfs). The total consumptive use estimate for WRIA 8 is the number of PE wells projected by subbasin (see section 4.2) multiplied by the total indoor and outdoor consumptive use per PE well. Table 6 summarizes the estimated indoor and outdoor consumptive use by subbasin using the Irrigated Area Method. The highest consumptive use is expected to occur in the subbasin with the largest irrigated area per PE well and the most anticipated new PE wells, as presented in Figure 4.

Table 6: Consumptive Use Estimate Based on Irrigated Areas Method (1 Home + Subbasin Average Yard)

Subbasin	Projected PE wells	Average lawn size (acres)	Indoor CU per well (AF/yr)	Outdoor CU per well (AF/yr)	Total CU/year per well (AF/year)	Total CU 2018-2038 (AF/year)
Seattle/Lake Union	0	-	-	-	-	0
Puget Sound Shorelines	2	0.28	0.0185	0.42	0.44	0.9
Swamp/North	5	0.28	0.0185	0.38	0.40	2.0
Little Bear	118	0.28	0.0185	0.36	0.38	44.3
Sammamish River Valley	8	0.28	0.0183	0.39	0.41	3.2
Bear/Evans	234	0.31	0.0184	0.39	0.41	96.7
Greater Lake Washington	4	0.28	0.0183	0.43	0.45	1.8
May/Coal	15	0.33	0.0183	0.47	0.49	7.4
Lake Sammamish Creeks	6	0.31	0.0183	0.43	0.44	2.7

Subbasin	Projected PE wells	Average lawn size (acres)	Indoor CU per well (AF/yr)	Outdoor CU per well (AF/yr)	Total CU/year per well (AF/year)	Total CU 2018-2038 (AF/year)
Issaquah	235	0.37	0.0183	0.47	0.49	115.3
Lower Cedar	340	0.33	0.0183	0.43	0.44	151.2
Upper Cedar	0	-	-	-	-	0
WRIA 8	**967**	**0.30**	**0.0184**	**0.42**	**0.43**	**425.4**

Note: Values in table have been rounded



1

2 Figure 4: WRIA 8 Estimated Consumptive Use by Subbasin 2018-2038

4.5 Summary of Uncertainties and Scenarios

The methods described in Section 4.2 for projecting new PE wells include a number of uncertainties, which were discussed by the WRIA 8 Committee. The Committee recognized uncertainties as inherent to the planning process and addressed uncertainties where feasible. The uncertainties are shared here to provide transparency in the planning process and deliberations of the Committee, and to provide context for monitoring and adaptive management.

Historical data on the number and location of PE wells within WRIA 8 was not available to inform PE well projections. Therefore, the WRIA 8 Committee relied on building permit data, and agreed on assumptions about the water source, in order to estimate the numbers of past and future PE wells. The assumptions were not ground-truthed and may have yielded imprecise and/or inaccurate results.

Another example of uncertainty is that the counties projected new PE wells within unincorporated areas and omitted PE wells installed within city limits, including PE wells installed for lawn watering purposes. Although most cities require new homes to connect to water systems, some allow exceptions if a connection is not available (for instance, if a home is more than 200 feet from a water line), or allow a home connected to a water system to install a PE well for lawn watering. The WRIA 8 Committee attempted to address this uncertainty by including a projection for new PE wells within the UGAs.

Both counties relied on historical data and assumed that these historical building trends will continue into the future. However, future building trends may not mirror historical building trends. Water service areas and water lines are expected to continue to grow and expand at an unknown rate and in unknown locations. Water line data was not readily available in King County, so the WRIA 8 Committee was not able to compare actual water lines with the historical data to see if and how the water service has expanded. Counties and cities generally enact policies intended to direct growth to urban areas (with access to public water service) to preserve rural and resource lands and protect critical areas. However, private property rights continue to allow landowners to build homes in rural areas. Additionally, uncertain economic and social factors, including the COVID-19 pandemic and increasing ability to telework, will affect the Committee's predictions in unknown ways and may result in greater rural growth than was predicted based on past trends.

RCW 90.94 requires counties to collect fees for new homes that rely on PE wells and provide a report and portion of those fees to Ecology. King and Snohomish Counties shared information on the fees collected since those requirements went into effect in January of 2018. King County reported 10 building permits with PE wells identified as the water source within the WRIA 8 portion of unincorporated King County between January 2018 and June 2020. Snohomish County reported 7 building permits with PE wells identified as the water source within the WRIA 8 portion of unincorporated Snohomish County between January 2018 and June 2020. King and Snohomish Counties reported 17 new wells over the 30-month period, which averages to 7 new PE wells per year. The WRIA 8 Committee projected approximately 48 new PE wells per year.

The Irrigated Area Method used to estimate consumptive use (described in Section 4.3.1) contains a number of uncertainties and limitations. Measurement of consumptive water use in any setting is difficult, and it is virtually impossible for residential groundwater use, which must account for both indoor and outdoor use. PE wells are generally unmetered, so supply to each home is usually unknown, let alone the amount that is consumed versus infiltrated to the groundwater system. Therefore, the WRIA 8 Committee was limited to estimating consumptive use based on projections of future growth, local patterns and trends in water use, and generally accepted and reasonable assumptions.

The outdoor consumptive use calculation contains a high level of uncertainty. In aerial photos used to calculate average irrigated area, many parcels did not demonstrate a clear-cut distinction between irrigated and non-irrigated lawns and other landscaped areas. The WRIA 8 Committee attempted to address uncertainty and ensured consistency by applying conservative methods that err on the side of a higher irrigated area and having one GIS analyst evaluate all of the selected parcels in the WRIA. Assumptions for the aerial imagery analysis are described in detail in Appendix G.

Other factors of uncertainty in the outdoor consumptive use calculation are the assumptions about irrigation amounts and irrigation efficiencies. The calculation assumes that homeowners water their lawns and gardens at the rate needed for commercial turf grass (e.g., watering at rates that meet crop irrigation requirements per the WAIG). The irrigated area analysis demonstrated that many homeowners may irrigate their lawns enough to keep the grass alive through the dry summers, but not at the levels that commercial turf grass requires. The method also assumes that residential pop-up sprinkler systems irrigate the lawns with an efficiency of 75%. In reality, households apply water to their lawns and gardens in many different ways, some more or less efficient than pop-up sprinklers. The WRIA 8 Committee discussed these uncertainties and scenarios and recognized that there is a range of water use across the watershed and individual PE well owners.

The consumptive use estimate assumes that current rural residential landscaping practices and outdoor water use will continue over the 20-year planning horizon. Because of uncertainty inherent in estimating growth patterns, domestic PE well pumping rates, and potential changes in outdoor watering practices, the WRIA 8 Committee determined that the conservative assumptions used to estimate consumptive use based on the Irrigated Area Method, and assumptions for outdoor water use in particular, are justified.

To further address uncertainty and have a point of comparison, the Committee developed two additional consumptive use scenarios. One additional scenario assumed each home has the legal maximum 0.5-acre irrigated lawn area per PE well and resulted in a consumptive use estimate of 640 acre-feet per year for WRIA 8. The second additional scenario assumed each home withdraws the legal limit of 950 gallons per day for indoor and outdoor use and resulted in a consumptive use estimate of 698.9 acre-feet per year for WRIA 8. The technical memo in Appendix G includes the additional consumptive use scenarios and results.

The Committee also compared the Irrigated Area method to local water purveyor data, taking into consideration several factors: customers connected to public water supply are incentivized to conserve water in order to reduce their water bill; purveyor data represents total water use

(not consumptive use) and does not separate indoor and outdoor water use to account for different consumptive use factors; and water purveyors also serve areas that are more dense and urban. Especially in portions of the watershed with older homes, homes and lawns are smaller and less water is used for irrigation, so a lower water use on average over the service area is expected. The technical memo in Appendix G includes the water purveyor data.

[COMMENT: If the Committee identifies an offset target that is higher than the consumptive use estimate in order to address uncertainty, the offset target and how it addresses uncertainty will be described in the paragraph below. Placeholder language is included for now.]

The WRIA 8 Committee developed a water offset target of [XX] acre-feet per year to account for uncertainties in the PE well projection and consumptive use estimate, including higher rates of water use that could result from climate change and changing development patterns. The WRIA 8 Committee developed the water offset target by [add method and justification for the offset target].

The WRIA 8 Committee also included plan implementation and adaptive management recommendations to address uncertainties related to the consumptive use estimate and project implementation (see Chapter 6).

Chapter Five: Projects and Actions

[COMMENT: this is an initial draft of Chapter 5 and will benefit from Committee members' thorough review and input.]

5.1 Approach to Identify and Select Projects

Watershed plans must identify projects that offset the potential impacts future PE wells will have on streamflows, and provide a net ecological benefit to the WRIA. This chapter provides recommendations from the WRIA 8 Committee for projects and actions to offset consumptive use and meet NEB. The projects are described in this chapter as water offset projects and habitat projects. Water offset projects have a quantified streamflow benefit and contribute to offsetting consumptive use. Habitat projects contribute toward achieving NEB by focusing on actions that improve the ecosystem function and resilience of aquatic systems, support the recovery of threatened or endangered salmonids, and protect instream resources including important native aquatic species. Habitat projects may also result in an increase in streamflow, but the water offset benefits for these projects is difficult to quantify with a high degree of certainty. Therefore, the Committee did not rely on habitat projects to contribute toward offsetting consumptive use, however recognized they are still of value and therefore should be included in the plan.

The WRIA 8 Committee identified priorities for project types and locations to guide decisions on which projects to include in the plan. The Committee prioritized water rights acquisitions projects, followed by projects with streamflow benefits (including habitat projects with unquantified streamflow benefits), and projects that are expected to have near-term and reliable benefits. The Committee prioritized water offset projects in the following subbasins with higher projected PE wells and consumptive use: Little Bear, Bear/Evans, Issaquah, and Lower Cedar. The Committee also prioritized water offset projects in the Sammamish River Valley subbasin because of documented water temperature issues. The Committee prioritized habitat projects in subbasins with the greatest salmon habitat needs: Sammamish River Valley, Bear/Evans, Lake Sammamish Creeks, Issaquah, and Lower Cedar.

To identify the projects summarized in this chapter, the WRIA 8 Committee assembled a project inventory to capture and track all project ideas throughout the planning process. The project inventory consisted of hundreds of previously proposed projects as well as new project concepts and ideas.

Technical consultants supported the Committee's development of projects described in this chapter through researching project concepts, analyzing estimated water offset for projects, contacting project sponsors, and developing project descriptions. Initially, Ecology and the technical consultants identified projects with potential streamflow benefit from the WRIA 8 salmon recovery lead entity four-year workplans, habitat restoration plans, streamflow restoration grant applications, and other ongoing planning efforts. These projects were assigned a project type consistent with the three project type examples listed in the Final NEB Guidance (Ecology 2019). These project types included: (a) water right acquisition offset projects; (b) non-acquisition water offset projects; and (c) habitat and other related projects.

The WRIA 8 Committee also distributed a Call for Projects to request information on water offset and habitat projects at all stages of development from Committee members and partners in WRIA 8.

Non-acquisition water offset projects were underrepresented within the WRIA 8 project inventory, which consisted largely of habitat and other related projects. Development of new non-acquisition water offset projects with quantifiable streamflow benefits became necessary in order for the plan to achieve the consumptive use offset. These projects are largely centered around changes in how and when water is diverted, withdrawn, conveyed, or used to benefit streamflow and instream resources. Examples include streamflow augmentation and managed aquifer recharge projects.

Non-acquisition water offset project development occurred through three main phases: (1) initial identification through brainstorming sessions during technical workgroup and Committee meetings; (2) prioritization and further analysis; (3) and development of project descriptions for projects included in the plan. Project progression from one phase to the next occurred after the Committee agreed to move the project to the next phase. The non-acquisition water offset projects that the Committee selected for the plan are described below in section 5.2.1.

In a separate effort, Ecology contracted with Washington Water Trust (WWT) to identify opportunities for water right acquisition water offset projects within WRIA 8, including source switches to municipal water and reclaimed water. In coordination with the WRIA 8 Committee, WWT developed a water right selection criterion based on the unique local nature of water rights and water use in WRIA 8. The water rights assessment consisted of four categories of potential projects: irrigation water rights in priority subbasins, irrigation water rights near existing reclaimed water infrastructure, water rights in the Trust Water Rights Program as a temporary donation, and specific water right acquisition opportunities identified by the Committee. WWT developed twelve water right acquisition project opportunity profiles for consideration by the Committee. The water rights acquisitions projects that the Committee selected for the plan are described below in section 5.2.1.

The Committee developed the list of habitat projects by reviewing projects recommended by Committee members, projects submitted in response to the Call for Projects, and projects identified by technical workgroup members based on priorities for project types and locations (projects in priority subbasins that are likely to have streamflow benefits). The habitat projects that the Committee selected for the plan are described below in section 5.2.2.

[COMMENT: The following paragraph will be updated after the Committee decides on project tiering. The tiering results will be included in the project tables once that is completed.]

After selecting projects to include in the plan, the Committee used the following criteria to organize the list into tiers to reflect [add explanation of tiering, for example: "the location of the project with respect to subbasin priorities, the likelihood that the project will be implemented, and certainty that benefits will occur." Add description of the tiers, for example "Tier 1 projects provide benefits to priority subbasins and are more likely to be implemented and provide benefits in the near-term. Tier 2 projects are in lower priority subbasins, or are expected take longer to implement, because they may still be conceptual or may need

additional outreach to key stakeholders."] For water offset projects, this evaluation considered the following: magnitude of water offset benefit; timing of water offset benefit; location of water offset benefit with respect to water offset priority subbasins; certainty of implementation; certainty of benefit and effectiveness; resiliency; and durability. For habitat projects, this evaluation considered the following: location of benefit with respect to water offset priority subbasins and habitat priority subbasins; projects which provide multiple benefits; certainty of implementation; certainty of benefit and effectiveness; resiliency; and durability. Since the projects were in different stages of development, with some still conceptual and some ready for implementation, the process to apply the tiering criteria and tier the project list was subjective. The Committee relied on the technical workgroup to develop a recommendation on tiering based on their knowledge of the proposed project as well as assumptions based on the design and performance of similar projects in the region. The tiering results are included in tables 7 and 8.

Water offset and habitat projects that the Committee selected to offset consumptive use and achieve NEB are summarized below in section 5.2.1 and 5.2.2. Detailed project descriptions and project profiles are included in Appendix H.

In addition to the water offset and habitat projects listed below, section 5.2.3 describes the types of projects that the Committee supports for further development and implementation in the future.

5.2 Projects and Actions

The projects presented below have water offset and/or ecological benefits and the WRIA 8 Committee identified these projects as contributing toward offsetting consumptive use and achieving NEB. The WRIA 8 Committee recommends implementation of all projects included in this chapter.

5.2.1 Water Offset Projects

[COMMENT: The WRIA 8 Committee is still working to finalize the water offset projects to include in the plan. The totals may change if the Committee decides to add additional projects.]

Table 7 provides a summary of the 11 water offset projects identified by the Committee to offset consumptive use and contribute toward NEB. The total offset potential of these 11 projects for WRIA 8 is 2,086.23 AF per year. Offset benefits are anticipated in the subbasins listed in Table 7 as well as downstream of the respective project locations. Figure 5 is a map of the watershed that shows the location of the projects listed in Table 7.

The WRIA 8 Committee supports the acquisition of the valid quantity of water for the water right acquisition projects included in the plan. However, to estimate the offset potential for each water right acquisition project, the WRIA 8 Committee used the estimate generated by WWT for the consumptively used portion of the water right. The estimated return flow portion of the water right is not counted as an offset as that portion of water returns to groundwater. Before water rights are acquired and put into Ecology's Trust Water Rights Program, Ecology will conduct a full extent and validity analysis to determine the actual quantity available for acquisition and the consumptive use component. Since this analysis generally happens after the

water right holder has agreed to sell, the Committee relied on the WWT evaluations to estimate the offset volumes listed in Table 7.

[Add additional sentence about the water offset project list and tiering, e.g. "The Tier 1 water projects included in the plan all have project sponsors and are in priority subbasins."]

A summary description for each project is provided below. More detailed water offset project descriptions are provided in Appendix H.

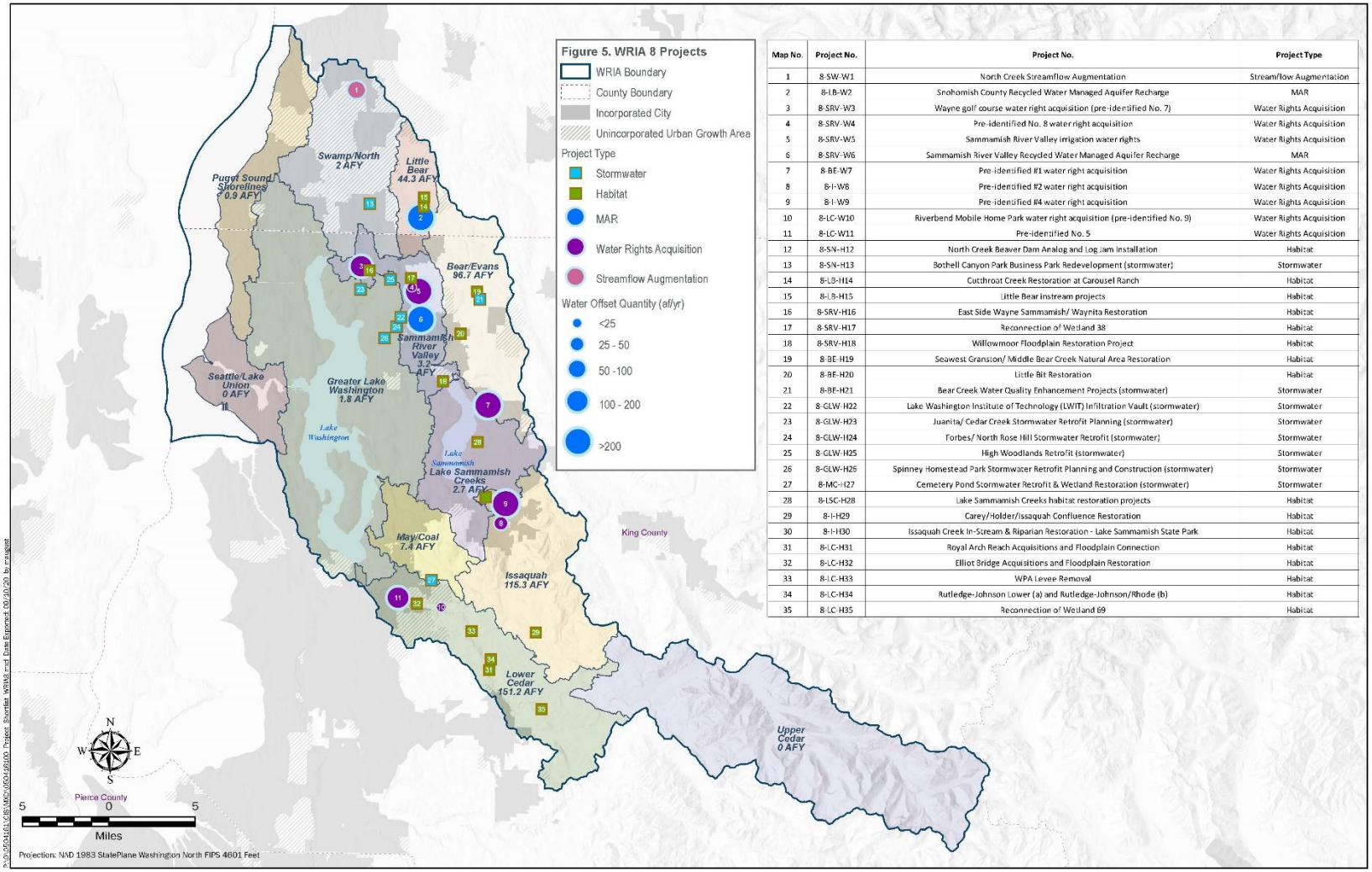
1 Table 7: WRIA 8 Water Offset Projects

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (Annual AF)	Project Sponsor	Estimated project cost	Project tier
8-SN-W1	North Creek Streamflow Augmentation	Streamflow Augmentation	Swamp/North	TBD	TBD		
Swamp/North Subbasin Subtotal				**TBD**			
8-LB-W2	Snohomish County Recycled Water Managed Aquifer Recharge	Water storage and retiming - MAR	Little Bear	181	Washington Water Trust		
Little Bear Subbasin Subtotal				**181**			
8-SRV-W3	Wayne golf course water right acquisition (pre-identified No. 7)	Water right acquisition	Sammamish River Valley	84.85	City of Bothell		
8-SRV-W4	Pre-identified No. 8 water right acquisition	Water right acquisition	Sammamish River Valley	23.43	TBD		
8-SRV-W5	Sammamish River Valley irrigation water rights	Water right acquisition	Sammamish River Valley	400	TBD		

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (Annual AF)	Project Sponsor	Estimated project cost	Project tier
8-SRV-W6	Sammamish River Valley Recycled Water Managed Aquifer Recharge	Water storage and retiming - MAR	Sammamish River Valley	181	Washington Water Trust		
Sammamish River Valley Subbasin Subtotal				**689.28**			
8-BE-W7	Pre-identified #1 water right acquisition	Water right acquisition	Bear/Evans	346.8	TBD		
Bear/Evans Subbasin Subtotal				**346.8**			
8-I-W8	Pre-identified No. 2 water right acquisition	Water right acquisition	Issaquah	27.6	TBD		
8-I-W9	Pre-identified No. 4 water right acquisition	Water right acquisition	Issaquah	336	TBD		
Issaquah Subbasin Subtotal				**363.6**			
8-LC-W10	Riverbend Mobile Home Park water right acquisition (pre-identified No. 9)	Water right acquisition	Lower Cedar	20.1	King County		

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (Annual AF)	Project Sponsor	Estimated project cost	Project tier
8-LC-W11	Pre-identified No. 5	Water right acquisition	Lower Cedar	85.4	TBD		
Lower Cedar Subbasin Subtotal				**105.5**			
WRIA 8 Total Water Offset (Cumulative from above)				**1,686.18**			
WRIA 8 Consumptive Use Estimate				**425.4**			

1



Map No.	Project No.	Project No.	Project Type
1	8-SW-W1	North Creek Streamflow Augmentation	Streamflow Augmentation
2	8-LB-W2	Snohomish County Recycled Water Managed Aquifer Recharge	MAR
3	8-SRV-W3	Wayne golf course water right acquisition (pre-identified No. 7)	Water Rights Acquisition
4	8-SRV-W4	Pre-identified No. 8 water right acquisition	Water Rights Acquisition
5	8-SRV-W5	Sammamish River Valley irrigation water rights	Water Rights Acquisition
6	8-SRV-W6	Sammamish River Valley Recycled Water Managed Aquifer Recharge	MAR
7	8-BE-W7	Pre-identified #1 water right acquisition	Water Rights Acquisition
8	8-I-W8	Pre-identified #2 water right acquisition	Water Rights Acquisition
9	8-I-W9	Pre-identified #4 water right acquisition	Water Rights Acquisition
10	8-LC-W10	Riverbend Mobile Home Park water right acquisition (pre-identified No. 9)	Water Rights Acquisition
11	8-LC-W11	Pre-identified No. 5	Water Rights Acquisition
12	8-SN-H12	North Creek Beaver Dam Analog and Log Jam Installation	Habitat
13	8-SN-H13	Bothell Canyon Park Business Park Redevelopment (stormwater)	Stormwater
14	8-LB-H14	Cutthroat Creek Restoration at Carousel Ranch	Habitat
15	8-LB-H15	Little Bear instream projects	Habitat
16	8-SRV-H16	East Side Wayne Sammamish/ Waynita Restoration	Habitat
17	8-SRV-H17	Reconnection of Wetland 38	Habitat
18	8-SRV-H18	Willowmoor Floodplain Restoration Project	Habitat
19	8-BE-H19	Seawest Granston/ Middle Bear Creek Natural Area Restoration	Habitat
20	8-BE-H20	Little Bit Restoration	Habitat
21	8-BE-H21	Bear Creek Water Quality Enhancement Projects (stormwater)	Stormwater
22	8-GLW-H22	Lake Washington Institute of Technology (LWIT) Infiltration Vault (stormwater)	Stormwater
23	8-GLW-H23	Juanita/ Cedar Creek Stormwater Retrofit Planning (stormwater)	Stormwater
24	8-GLW-H24	Forbes/ North Rose Hill Stormwater Retrofit (stormwater)	Stormwater
25	8-GLW-H25	High Woodlands Retrofit (stormwater)	Stormwater
26	8-GLW-H26	Spinney Homestead Park Stormwater Retrofit Planning and Construction (stormwater)	Stormwater
27	8-MC-H27	Cemetery Pond Stormwater Retrofit & Wetland Restoration (stormwater)	Stormwater
28	8-LSC-H28	Lake Sammamish Creeks habitat restoration projects	Habitat
29	8-I-H29	Carey/Holder/Issaquah Confluence Restoration	Habitat
30	8-I-H30	Issaquah Creek In-Stream & Riparian Restoration - Lake Sammamish State Park	Habitat
31	8-LC-H31	Royal Arch Reach Acquisitions and Floodplain Connection	Habitat
32	8-LC-H32	Elliot Bridge Acquisitions and Floodplain Restoration	Habitat
33	8-LC-H33	WPA Levee Removal	Habitat
34	8-LC-H34	Rutledge-Johnson Lower (a) and Rutledge-Johnson/Rhode (b)	Habitat
35	8-LC-H35	Reconnection of Wetland 69	Habitat

Figure 5: WRIA 8 Projects

Swamp/North Subbasin

Project Name: North Creek Streamflow Augmentation (8-SN-W1)
[COMMENT: the technical consultant team is still working on writing up this project description, including estimating the water offset potential.]
Project Description: This project proposes to augment streamflow by pumping groundwater and discharging into North Creek. The project would use wells that are already installed and currently owned by the City of Everett.

Little Bear Subbasin

Project Name: Snohomish County Recycled Water Managed Aquifer Recharge (8-LB-W2)
Project Description: The Snohomish County Recycled Water MAR project proposes to divert reclaimed water from the Brightwater treatment plant to a constructed MAR facility between May and October, when reclaimed water is expected to be available. This diverted water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges to one or more adjacent streams as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the subject stream(s), especially during the critical flow period when surface flows are lowest, by recharging the aquifer adjacent to the stream(s) and providing additional groundwater discharge to the river through MAR. Currently, reclaimed water is only available via King County's recycled water pipeline within the Sammamish River Valley. However, King County is in the process of designing and constructing additional storage capacity at Brightwater, which would allow for distribution of reclaimed water to areas proximal to the plant and eventually to other portions of Snohomish County as reclaimed water infrastructure expands to meet future demand.

Initial calculations indicate the Snohomish County Recycled Water MAR project could infiltrate approximately 181 AF annually. Additional information is included in the project description in Appendix H.

Sammamish River Valley Subbasin

Project Name: Wayne Golf Course Water Right Acquisition (Pre-Identified Water Right No. 7) (8-SRV-W3)
Project Description: The Wayne Golf Course water right acquisition project proposes to acquire two groundwater rights in the Sammamish River Valley subbasin for an estimated 84.85 AF annually of consumptively used water. The land, and a portion of the underlying water right, was previously used as a golf course. The other active irrigation within the water rights place of use occurs on a city park. The property is located within the City of Bothell. The City of Bothell purchased the property in 2017 with assistance from King County, which now holds a conservation easement over the property.

WWT utilized irrigation delineation analysis to estimate consumptive use of 84.85 AF per year. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Initial conversations have occurred between Ecology and the City of Bothell regarding a transfer of this water right into the Trust Water Rights Program for permanent streamflow benefit. Additional information is included in the project profile in Appendix H.

Project Name: Pre-identified Water Right No. 8 (8-SRV-W4)
Project Description: The Pre-Identified Water Right No. 8 water right acquisition project proposes to acquire three groundwater rights in the Sammamish River Valley subbasin for an estimated 23.43 AF annually of consumptively used water. The land under common management for this project opportunity is comprised of five parcels totaling 92.93 acres. Online sources indicate these parcels were purchased by the current owners and developed into a winery and vineyard in 1976.

WWT utilized irrigation delineation analysis to estimate consumptive use of 23.43 AF per year. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Initial conversations have occurred between King County and the landowner regarding extending reclaimed water to the property, which could make the water rights available for transfer into the Trust Water Rights Program for permanent streamflow benefit. Additional information is included in the project profile in Appendix H.

Project Name: Sammamish River Valley Irrigation Water Rights Acquisitions (8-SRV-W5)
Project Description: The project proposes to acquire up to 400 AF per year of irrigation water rights within or upstream of the Sammamish River Valley Agricultural Production District from willing sellers with access to an alternative water source, such as reclaimed water. Water rights would be permanently and legally held by Ecology in the Trust Water Rights Program to ensure that the benefits to instream resources are permanent. Additional information is included in the project profiles for Sammamish River Valley water rights 1, 3, 4, 5, and 7 in Appendix H.

Project Name: Sammamish River Valley Recycled Water Managed Aquifer Recharge (8-SRV-W6)
Project Description: This Recycled Water MAR project proposes to divert reclaimed water from the existing King County Brightwater Wastewater Treatment Plant (Brightwater) recycled water pipeline to a constructed Managed Aquifer Recharged (MAR) facility between May and October, when reclaimed water is available. This diverted water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges to the Sammamish River as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the Sammamish River, especially during the critical flow period when surface flows are lowest, by recharging the aquifer adjacent to the river and providing additional groundwater discharge to the river through MAR. A specific project location has not yet been identified.

Initial calculations indicate the Sammamish River Valley Recycled Water MAR project could infiltrate approximately 181 AF annually. Additional information is included in the project description in Appendix H.

Bear/Evans subbasin

Project Name: Pre-Identified Water Right No. 1 (8-BE-W7)
Project Description: The Pre-identified Water Right No. 1 water right acquisition project proposes to acquire three groundwater rights in the Bear/Evans subbasin for an estimated 346.8 AF annually of consumptively used water. The land, and underlying water right, currently support single-family residences and a country club with three 9-hole golf courses. According to

online sources, these facilities were constructed during 1967 and have been operated continuously since that time.

WWT utilized irrigation delineation analysis to estimate a consumptive use of 346.8 AF per year. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

WWT initiated outreach to this water right holder and, as of the time of this plan, did not receive a response. Additional information is included in the project profile in Appendix H.

Issaquah Creek Subbasin

Project Name: Pre-Identified Water Right No. 2 water right acquisition (8-I-W8)
Project Description: The pre-identified No. 2 water right acquisition project proposes to acquire two water rights in the Issaquah subbasin for an estimated 27.6 AF annually of consumptively used water. These two water rights previously provided water supply to Overdale Water Association, a Group A water system, through 2004 until Overdale Water Association completed an intertie with the Sammamish Plateau Water and Sewer District. The water right holder has temporarily donated the water right to the Trust Water Rights Program until January 1, 2036. WWT identified that the water rights appear to have been put to continuous beneficial use.

Outreach to the water right holder was initiated by WWT and the water right holder expressed interest in the acquisition. Additional information is included in the project profile in Appendix H.

Project Name: Pre-Identified Water Right No. 4 (8-I-W9)
Project Description: The Pre-identified Water Right No. 4 water right acquisition project proposes to acquire one water right in the Issaquah subbasin for up to 336 AF annually of consumptively used water. The land, and underlying water right, currently support commercial production of dairy products. According to online sources, the facility, located in the City of Issaquah's Cultural Business District, has been continuously operated since 1909. As of July 30, 2018, a portion of the annual quantity of the subject water right was temporarily donated to the Trust Water Rights Program. WWT identified that the water right appears to have been put to continuous beneficial use.

Initial outreach was completed by the Washington Water Trust and the water right holder is open to further discussions. Additional information is included in the project profile in Appendix H.

Lower Cedar subbasin

Project Name: Riverbend Mobile Home Park Water Right Acquisition (Pre-Identified Water Right No. 9) (8-LC-W10)
Project Description: The Riverbend Mobile Home Park water right acquisition project proposes to acquire one groundwater right in the Lower Cedar subbasin for an estimated 20.079 AF annually of consumptively used water. The land, and underlying water right, previously were used to support a mobile home park. According to Ecology and online sources, the property and

water right were purchased by King County in 2013 as acquisitions that formed part of a levee setback and floodplain restoration project.

WWT utilized irrigation delineation analysis to estimate a consumptive use of 20.079 AF per year available for trust water transaction. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Initial conversations have occurred between Ecology and King County regarding a transfer of this water right into the Trust Water Rights Program for permanent streamflow benefit. Additional information is included in the project profile in Appendix H.

Project Name: Pre-identified Water Right No. 5 (8-LC-W11)
Project Description: The Pre-identified Water Right No. 5 water right acquisition project proposes to acquire one groundwater right in the Lower Cedar subbasin for an estimate 85.4 AF annually of consumptively used water. The land, and underlying water right, is currently used as a golf course which, according to Ecology documents, has been in operation since the early 1930's.

WWT utilized irrigation delineation analysis to estimate consumptive use of 85.4 AF per year available for trust water transaction. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

As of the time of this plan, no outreach related to this project had been conducted. Additional information is included in the project profile in Appendix H.

5.2.2 Habitat Projects

Table 8 provides a summary of 25 habitat projects identified by the Committee to provide ecological benefits to WRIA 8. This list also includes projects that and are expected to have ecological benefits from improvements to stormwater management and infiltration. [Add additional sentence about the habitat project list and tiering, e.g. "The Tier 1 habitat projects included in the plan all have project sponsors and are in priority subbasins."] More detailed habitat project descriptions are provided in Appendix H.

Although many of these projects have potential streamflow benefits, the Committee has elected not to quantify water offsets from habitat projects.

[COMMENT: **Project sponsors** – please review the information included for your projects and provide edits.]

1 Table 8: WRIA 8 Habitat Projects

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-SN-H12	North Creek Beaver Dam Analog and Log Jam Installation	Install 16 beaver analogs/logjams at three locations in the upper 2.5 miles of North Creek.	Swamp/North	Reduction of peak flow during storm events, increase in groundwater levels and recharge, increase channel complexity, increase species diversity, and increase salmonid habitat.	Adopt a Stream Foundation		
8-SN-H13	Bothell Canyon Park Business Park Redevelopment (stormwater)	Reduce overall impervious surface area, stormwater improvements and restoration and/or wetland enhancement along North Creek.	Swamp/North	Recharge to underlying aquifers, restore degraded channel and habitat structure.	City of Bothell		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-LB-H14	Cutthroat Creek Restoration at Carousel Ranch	Stream, riparian, and upland restoration on Cutthroat Creek, including wood placement.	Little Bear	Increase hydraulic diversity, restore native vegetation, restore water temperature, provide erosion abatement.	Snohomish County		
8-LB-H15	Little Bear instream projects	Instream restoration projects along Little Bear Creek, including wood placement.	Little Bear	Improve cover and hydraulic diversity in riparian buffer zone, floodplain reconnection.	Snohomish County		
8-LB-H35	Silver Firs Stormwater Pond Retrofits (stormwater)	Retrofit two existing stormwater ponds to increase infiltration capacity.	Little Bear	Improve stormwater management.	Snohomish County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-SRV-H16	East Side Wayne Sammamish/ Waynita Restoration	Restore the eastside of the former Wayne Golf Course property, including the south bank of the Sammamish River and the mouth and lower reach of Waynita Creek.	Sammamish River Valley	Floodplain restoration.	City of Bothell		
8-SRV-H17	Reconnection of Wetland 38	Reconnect Wetland 38 to the Sammamish River	Sammamish River Valley	Wetland reconnection.	Mid Sound Fisheries Enhancement Group		
8-SRV-H18	Willowmoor Floodplain Restoration Project [Note: waiting to get confirmation that project sponsor supports including this project in the plan]	Restore Sammamish Transition Zone 1,500 above and below an existing weir.	Sammamish River Valley	Floodplain restoration, removal of non-native vegetation, addition of gravel substrate.	King County Flood Control District		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-BE-H19	Seawest Granston/ Middle Bear Creek Natural Area Restoration	Restoration of up to 3,300 lineal feet of stream and approximately 32 acres of wetland and riparian areas.	Bear/Evans	Increase baseflow and groundwater levels, increase storage capacity. May augment streamflow and moderate stream temperature.	King County		
8-BE-H20	Little Bit Restoration	Addition of woody debris, excavation of off-channel habitats and revegetation of the floodplain and riparian areas along 650 feet of Bear Creek.	Bear/Evans	Increase the volume and availability of off-channel habitat for juvenile salmonids and increase overall channel complexity and habitat quality.	King County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-BE-H21	Bear Creek Water Quality Enhancement Projects (stormwater)	Identification of stormwater retrofit projects in the Bear Creek basin.	Bear/Evans	Future projects will target water quality treatment, stream shading/temperature reduction, and/or enhanced flow control of storm runoff.	King County		
8-GLW-H22	Lake Washington Institute of Technology (LWIT) Infiltration Vault (stormwater)	The LWIT Infiltration Vault would provide water quality treatment and subsequent infiltration of stormwater for 23.4 acres of contributing area.	Greater Lake Washington	Infiltrate stormwater before it reaches Totem Lake and subsequently Juanita Creek, a salmon bearing stream in Kirkland.	City of Kirkland		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-GLW-H23	Juanita/ Cedar Creek Stormwater Retrofit Planning (stormwater)	Conduct stormwater retrofit planning for Cedar Creek, resulting in conceptual design and cost estimates for three facilities and an implementation plan.	Greater Lake Washington	Stormwater retrofit facilities will contribute to stream restoration efforts that include installation of a fish passable culvert.	City of Kirkland		
8-GLW-H24	Forbes/ North Rose Hill Stormwater Retrofit (stormwater)	Implementation of stormwater projects in the North Rose Hill and Forbes Creek stormwater retrofit plans.	Greater Lake Washington	Stormwater management will support summer streamflows and control winter peak flows.	City of Kirkland		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-GLW-H25	High Woodlands Retrofit (stormwater)	Site and size stormwater retrofit facilities within the High Woodlands subbasin of Juanita Creek.	Greater Lake Washington	Contribute to improved flows and water quality..	City of Kirkland		
8-GLW-H26	Spinney Homestead Park Stormwater Retrofit Planning and Construction (stormwater)	Conduct stormwater retrofit planning, design development, and facility construction at Spinney Homestead Park.	Greater Lake Washington	Stormwater management will support summer streamflows and control winter peak flows.	City of Kirkland		
8-MC-H27	Cemetery Pond Stormwater Retrofit & Wetland Restoration (stormwater)	Improve the water quality in May Creek through the retrofit design of an existing stormwater detention pond.	May/Coal	Support summer streamflows and control winter peak flows to May Creek by providing stormwater detention.	King County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-LSC-H28	Lake Sammamish Creeks habitat restoration projects	Habitat restoration projects in Ebright, Zackuse, and Laughing Jacobs Creeks.	Lake Sammamish Creeks	Restoration of Kokanee habitat.	TBD		
8-I-H29	Carey/Holder/Issaquah Confluence Restoration	Restore riparian vegetation, add livestock fencing, and implement other best management practices for livestock on a 120-acre site, and potentially install large woody debris.	Issaquah	Increase the volume and availability of off-channel habitat for juvenile salmonids and increase overall channel complexity and habitat quality.	King County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-I-H30	Issaquah Creek In-Stream & Riparian Restoration - Lake Sammamish State Park	Complete in-stream restoration and riparian buffer restoration along Issaquah Creek within Lake Sammamish State Park.	Issaquah	Enhance the quality and quantity of key, strategically located salmonid habitat, particularly for juvenile Chinook rearing and adult Chinook holding in Issaquah Creek.	Mountains to Sound Greenway Trust		
8-LC-H31	Royal Arch Reach Acquisitions and Floodplain Connection	Acquire floodplain properties for future floodplain reconnection and restoration.	Lower Cedar	Restore the floodplain connectivity, improving the aquatic habitats associated with the Cedar River.	Seattle Public Utilities		
8-LC-H32	Elliot Bridge Acquisitions and Floodplain Restoration	Acquire parcels near the former Elliot Bridge site to enable floodplain restoration.	Lower Cedar	Floodplain restoration, enhance habitat conditions in Madsen creek.	King County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-LC-H33	WPA Levee Removal	Acquire remaining parcel not in public ownership and setback or remove the WPA levee.	Lower Cedar	Restore the floodplain connectivity, improving the aquatic habitats along the Cedar River.	King County		
8-LC-H34	Rutledge-Johnson Lower (a) and Rutledge-Johnson/Rhode (b)	Acquire necessary property, remove/setback levees and restore reconnected floodplain along the Rutledge-Johnson levee (a) and the Rhode and Rutledge-Johnson Levees.	Lower Cedar	Restore the floodplain connectivity, improving the aquatic habitats along the Cedar River.	King County		

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost	Project tier
8-LC-H35	Reconnection of Wetland 69	Acquire necessary property to reconnect Wetland 69 to the Cedar River and remove a revetment.	Lower Cedar	Reconnect a wetland feature, known as Wetland 69,with the Cedar River, which will provide refugia for fish and vegetation and nutrients for insects and invertebrates which are a prey source for fish.	King County		

1

5.2.3 Prospective Projects and Actions

In addition to the projects described in this chapter, the WRIA 8 Committee supports projects and actions that achieve the following goals:

- Acquisitions of water rights to increase streamflows and offset the impacts of PE wells. Water rights should be permanently and legally held by Ecology in the Trust Water Rights Program to ensure that the benefits to instream resources are permanent.

  The WRIA 8 Committee acknowledges that all water rights transactions rely on willing sellers and willing buyers. The WRIA 8 Committee recognizes the importance of water availability for farmers and the limited available water supply within the Agricultural Production Districts. The WRIA 8 Committee supports the acquisition of irrigation water rights within designated Agricultural Production Districts if the properties underlying the water rights have access to an alternative water source, such as reclaimed water, that can be reliably supplied to the properties at a rate that is comparable to the cost of current irrigation management.

- Projects or programs that support connections to public water systems. Projects could provide financial incentives for homes using PE wells to connect to public water service and decommission the well; and/or provide financial support for water purveyors to extend water distribution systems further into their individual service areas, particularly where PE wells are concentrated or rapid rural growth is anticipated.

- Projects or programs that provide outreach and incentives to rural landowners with wells in order to lower indoor and outdoor water use through water conservation best practices, and comply with drought and other water use restrictions. Programs would encourage the following types of water conservation strategies and best practices: natural lawn care; irrigation efficiency; rainwater catchment and storage; drought resistant and native landscaping; smaller lawn sizes; forest, meadow and wetland conservation; indoor water conservation; and voluntary metering. Conservation and water use efficiency projects that involve water rights should permanently convey the saved water to Ecology to be held in the Trust Water Rights Program for instream flow purposes.

- Projects that beneficially switch the source of withdrawal from surface to groundwater, or other beneficial source exchanges such as a source switch to reclaimed water. The benefits of a source exchange project may depend on the connection between the sources, benefits to instream resources (e.g., a surface to groundwater source switch may have negative impacts on fish if the groundwater baseflow provides refuge areas in streams with high water temperature issues), and should take into consideration the possible consequences of unsustainable withdrawals from the affected aquifer.

- Projects that provide streamflow and habitat benefits by returning stream habitat to a more natural state, such as through levee setback or removal, river-floodplain restoration, and instream habitat restoration.

- Projects that contribute to offsetting consumptive use in the following subbasins with higher projected PE wells and consumptive use: Little Bear, Bear/Evans, Issaquah, and Lower Cedar.

5.3 Project Implementation Summary

5.3.1 Summary of Projects and Benefits

Per RCW 90.94.030(3), this watershed plan must include actions necessary to offset potential impacts to instream flows associated with new PE well water use and result in a net ecological benefit to instream resources within the WRIA.

As specified in Chapter 4, the Committee estimated 425.4 acre-feet per year of consumptive use from new PE wells over the planning horizon. [Note: Include the following if the Committee agrees to include a safety factor] The Committee developed an offset target of [XX] acre-feet per year to address uncertainty in the consumptive use estimate and ensure that projects and actions in the plan would offset consumptive use. The projects included in Table 7 provide an estimated offset of 2,086.23 acre-feet per year and exceed the offset target.

A total of 25 habitat projects have been identified by the Committee and are included in Table 8. Ecological benefits associated with these projects are myriad and include floodplain restoration, wetland reconnection, availability of off-channel habitat for juvenile salmonids, reduction of peak flow during storm events, increase in groundwater levels and baseflow, and increase in channel complexity. While many of these projects have potential streamflow benefits, water offset from habitat projects are not accounted for in this plan. The ecological and streamflow benefits from habitat projects are supplemental to the quantified water offsets.

5.3.2 Cost Estimate for Offsetting New Domestic Water Use Over 20 Year Planning Horizon

[COMMENT: Ecology and the technical consultants are working to develop cost estimates for water offset projects based on information from applications for streamflow restoration grant funding, as well as other available project cost information.]

Per RCW 90.94.030(3)(d), this watershed plan must include an evaluation or estimation of the cost of offsetting new domestic water uses over the subsequent twenty years. To satisfy this requirement, the Committee developed planning-level cost estimates for each of the water offset projects listed in Table 7. The Committee also included costs estimates for habitat projects in Table 8, when that information was readily available.

The estimated cost for implementing individual water offset projects range from XXX for YYY project to AAA for BBB project. The total estimated cost for implementing the water offset projects listed and described in this chapter is $XXXX.

The estimated cost for implementing individual habitat projects range from XXX for YYY project to AAA for BBB project. The total estimated cost for implementing the habitat projects listed and described in this chapter is $XXX.

5.3.3 Certainty of Implementation

[COMMENT: This section is still being developed. Please provide comments on what you would like to include in this section.]

The WRIA 8 Committee used a tiering process to identify the projects that are more likely to be implemented in the short term. Tier 1 projects are more likely to be implemented and provide benefits in the near-term. Tier 2 projects are expected take longer to implement, because they may still be conceptual or may need additional outreach to key stakeholders.

The WRIA 8 Committee also developed adaptive management recommendations to increase reasonable assurance that the projects and actions in the plan will be implemented.

Chapter Six: Adaptive Management and Implementation, and Policy Recommendations

[COMMENT: Ecology made minor revisions and corrections to this chapter based on the feedback from the committee during the review period. Some comments are scheduled for discussion at the September committee meeting. Ecology will make additional revisions to this chapter following the September committee meeting.]

6.1 Plan Implementation and Adaptive Management Recommendations

The WRIA 8 Committee recommends an adaptive management process for implementation of the WRIA 8 watershed plan. Adaptive management is defined in the Final NEB Guidance as "*an interactive and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions*."

Adaptive management is intended to help address uncertainty, provide more reasonable assurance for plan implementation, and to ensure that 1) water use from new permit exempt (PE) wells is adequately offset, as required by RCW 90.94.030, and 2) implementation of the watershed plan produces a net ecological benefit to the watershed, as required by RCW 90.94.030. The periodic review in this adaptive management process will provide a verifiable process for plan monitoring and ensure transparency in plan implementation.

Existing Challenges

The WRIA 8 Committee identified the following challenges in the planning process and seeks to address these challenges through monitoring and adaptive management:

- The watershed plan includes projected, not actual, PE well water use by subbasin. Monitoring the number of new PE wells, actual PE well water use, and associated consumptive water use would provide data for comparison and adjustments, as needed, in planning for ongoing offsets to ensure the mandates of RCW 90.94 are being met.

- The watershed plan includes water offset and habitat projects, and estimated benefits associated with each, by subbasin. Measuring and tracking actual water offsets and habitat projects by subbasin, to the extent possible, can be used to verify intended streamflow benefits.

- Many factors could influence the consumptive water use from new PE wells in the future, including water system infrastructure expansion, policies or programs to require or incentivize homes to connect to public water systems, water conservation regulations, and programs that provide education and incentives for homeowners to conserve water. Ongoing monitoring of plan actions could allow Ecology to update the water use estimates included in the plan and make updates when appropriate.

- Our global climate is changing. While the effects of climate change over the 20-year life of this plan cannot be precisely known, shifts in climatic conditions will influence the hydrologic regime in the watershed and will impact instream flows. Rainfall, snowmelt, and evapotranspiration have been and will continue to be identified as the primary mechanisms driving changes in groundwater storage. These mechanisms will be affected by a changing climate. Air and water temperatures will increase and summer streamflows will be reduced. Under these conditions groundwater pumping and indirect effects of irrigation and land use changes, like increases in impervious surface and reduced recharge, will have an increasing impact to groundwater resources and the availability for future water supply and instream flows. The Committee recognizes that a successful plan must acknowledge that climate is changing and include a mechanism to ensure that the statutory requirements to offset water withdrawals by new PE wells and provide a net ecological benefit will be met under future climatic conditions. Monitoring actual water use and the amount of offset water actually generated will inform this determination.

- Projects identified in the plan are expected to increase groundwater storage, augment streamflows, and provide aquatic habitat benefits. Water offset projects should be monitored in order to ensure that they continue to function as designed, and generate instream water to offset new PE wells, under a changing climate. Habitat projects should be analyzed for their resilience to changing conditions. [Include the following sentence if the Committee agrees to include a safety factor: "The WRIA 8 Committee chose to apply an overall safety factor to address these concerns, particularly as related to the estimate of the amount of consumptive water use to be offset."]. However, the safety factor does not address the possibility that a project might fail to meaningfully function under changed conditions. The adaptive management recommendations in this plan will help to monitor and assess the validity of the projections identified, to determine whether projects are functioning as designed even under climate change conditions, and to allow for course corrections where needed.

To address the above challenges, the WRIA 8 Committee recommends the following adaptive management strategies.

6.1.1 Tracking and Monitoring

The WRIA 8 Committee recommends that the Washington Department of Ecology (Ecology) monitor watershed plan implementation, in consultation with the Washington Department of Fish and Wildlife (WDFW), and King and Snohomish Counties. Specifically, the Committee recommends that Ecology, in consultation with WDFW and King and Snohomish Counties, review actions resulting from watershed plans to ensure the mandates of RCW 90.94 are being met, including;

- Track annual new permit-exempt wells by subbasin;

- Track project implementation and the actual amount of offset water generated, or reasonably certain to be generated, by subbasin; and
- Develop a process to adaptively manage implementation if Net Ecological Benefit is not being met as envisioned by the watershed plan.

The WRIA 8 Committee recommends WDFW, in collaboration with Ecology and the Recreation and Conservation Office (RCO), pilot the Salmon Recovery Portal (https://srp.rco.wa.gov/about), managed by RCO, for tracking streamflow restoration projects and new domestic permit-exempt wells. To improve harmonization of streamflow restoration with ongoing salmon recovery efforts, local salmon recovery Lead Entity Coordinators shall be consulted prior to initial data uploads. University of Washington data stewards will be employed to conduct data entry, quality assurance, and quality control.

Tracking streamflow restoration projects and new domestic permit-exempt wells will:

- improve the capacity to conduct implementation monitoring of streamflow restoration projects and actions,
- build grant funding opportunities and track streamflow restoration associated costs, and
- provide a template for adaptively managing emergent restoration needs.

Table 9 summarizes the entities responsible for carrying out this recommendation and associated funding needs.

Table 9: Implementation of Tracking and Monitoring Recommendation

Action	**Entity or Entities Responsible**	**Funding Considerations**
Track building permits issued with permit-exempt wells.	Ecology (via reporting from counties and cities)	The number of building permits and associated fees are transmitted to Ecology annually. No additional funding is needed.
Maintain an ongoing list and map of new PE wells within each subbasin.	Ecology	Update the existing Ecology well report tracking database. No additional funding is needed.
Maintain a summary of the status of implementation for each project	WDFW using the Salmon Recovery Portal	WDFW may need additional funding to support maintaining the Salmon Recovery Portal.

6.1.2 Oversight and Adaptation

The WRIA 8 Committee recommends Ecology complete a watershed plan implementation report (report) approximately every five (5) years (in 2027, 2032, 2037, and 2042), detailing the

successes, challenges, and gaps related to implementation of the watershed plan. The report should include information on whether the watershed plan is on track to achieve the expected net ecological benefit and water offsets as well as streamflow conditions, including identifying subbasins with known impacts that have not yet implemented water offset or habitat projects. In addition, the report should include information on any discretionary programs that were implemented, including for example, water conservation education and outreach, incentives for public water service connections, and voluntary PE well metering.

Ecology's report should include recommendations to adjust the projects and actions if the adopted goals of the watershed plans are not on track to being met in the plan's 20-year timeframe. If Ecology determines that the watershed plan is not on track to achieve NEB and water offsets, a notice of action to adjust the plan should be sent to members of the WRIA 8 Committee to comment. However, members of the WRIA 8 Committee are not expected to reconvene after approving the plan. Final adjustments and amendments shall be at the sole determination of Ecology after public input.

The report should be sent to all members of the WRIA 8 Committee, King and Snohomish County Councils, all local jurisdictions within the watershed, and any additional stakeholders identified at the time of reporting.

Preference for funding of new projects should be given to watersheds that have not offset permit-exempt water use.

Table 10 summarizes the entities responsible for carrying out this recommendation and associated funding needs.

Table 10: Implementation of Oversight and Adaptation Recommendation

Action	**Entity or Entities Responsible**	**Funding Considerations**
Develop and distribute Watershed plan implementation report, including any recommended adjustments to projects and actions	Ecology	Ecology may need additional funding to support development of the report.
Revise Streamflow Restoration Grant Guidance to prioritize projects in watersheds that have not offset permit-exempt water use	Ecology	No additional funding is needed.

6.1.3 Funding

The WRIA 8 Committee recommends funding plan implementation and adaptive management from a variety of sources including the Washington State Legislature, cities, counties, and

various grant programs administered by state and federal agencies. Funding and staffing at local, county and state levels is likely to see continued shortfalls due to COVID-19 related impacts over the next several years. The Committee urges a collaborative approach to fund Ecology, RCO, and WDFW to ensure plan implementation and monitoring, streamflow health, water offsets, net ecological benefit, and full compliance with the mandates found in RCW 90.94.

6.2 Policy and Regulatory Recommendations

[COMMENT: Ecology made minor revisions and corrections to this chapter based on the feedback from the committee during the review period. Some comments are scheduled for discussion at the September committee meeting. Ecology will make additional revisions to this chapter following the September committee meeting.]

The Streamflow Restoration law lists optional elements committees may consider including in the plan to manage water resources for the WRIA or a portion of the WRIA (RCW 90.94.030(3)(f)). The WRIA 8 Committee included what they have termed "policy and regulatory recommendations" in the plan to show support for programs, policies, and regulatory actions that would contribute to the goal of streamflow restoration. When similar concepts arose from other Watershed Restoration and Enhancement Committees, the WRIA 8 Committee coordinated with those other Committees to put forward common language for inclusion in the watershed plans, when appropriate. Coordination also occurred for jurisdictions that cross multiple watersheds. All projects and actions the WRIA 8 Committee intended to count toward the required consumptive use offset or Net Ecological Benefit are included in Chapter 5: Projects and Actions.[18]

As required by the NEB Guidance, the WRIA 8 Committee prepared the plan with implementation in mind. However, as articulated in the Streamflow Restoration Policy and Interpretive Statement (POL-2094), "RCW 90.94.020 and 90.94.030 do not create an obligation on any party to ensure that plans, or projects and actions in those plans or associated with rulemaking, are implemented."

The WRIA 8 Committee initially identified a list of potential policy and regulatory recommendations. After iterative rounds of discussion, the Committee narrowed the recommendations in this section to those that both supported the goal of streamflow restoration and had the support of the full Committee. Committee members identified as the implementing entity for each recommendation are committed to investigating the feasibility of the recommendation. The identification and listing of these policy and regulatory recommendations is directly from the WRIA 8 Committee members and is not endorsed or opposed by Ecology.

[18] "New regulations or amendments to existing regulations adopted after January 19, 2018, enacted to contribute to the restoration or enhancement of streamflows may count towards the required consumptive use offset and/or providing NEB." Streamflow Restoration Policy and Interpretive Statement, POL-2094

The WRIA 8 Committee supports the following recommendations:

[COMMENT: The following proposals were submitted by policy leads for consideration by the WRIA 8 Committee and have been summarized by the facilitation team and/or policy leads. The Committee has not yet indicated full support to include each proposal in the WRE Plan.

Committee members should thoroughly review the proposed policy recommendations and flag any serious concerns. Policy proposals that are not supported by the full Committee will not be included in the final plan.]

6.2.1 Well reporting upgrades

Proposed implementing entity:

Ecology

Recommendation:

Change the Ecology well tracking system in the following ways, in order to efficiently and transparently track the number and location of permit-exempt wells in use:

- Implement a web-based well report form that mimics the current well report forms, and that uploads directly to Ecology's database with Ecology verification;
- Require coordinates (latitude and longitude) of wells on well report forms, and implement an intuitive web tool for well drillers which automatically provides the Public Lands Survey (PLS) location and coordinates for a new well;
- Identify permit-exempt wells on well report forms; and
- Provide Well ID Tag numbers to older wells, and associate well decommissioning, replacement, or other well activities with the Well ID Tag.

Purpose:

Directly and efficiently address identified shortcomings in Ecology's existing well tracking database and reporting protocols. Accurate tracking of the locations and features of permit-exempt wells will support the WRIA 8 Committee's desire to engage in monitoring and adaptive management after adoption of the watershed plan.

Funding sources:

Leverage existing resources and efforts currently underway through the Ecology Well Construction Technical Advisory Group (TAG) and other departmental means. Additional funding from the Washington State Legislature or local permitting fees to increase capacity for Ecology to verify well reports may aid in implementing this recommendation in a timely manner.

Additional information or resources:

Ecology's Mason County Well Location Accuracy Study:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/PLAN/Mason%20County%20Well%20Location%20Accuracy%20Study.pdf

6.2.2 Encourage conservation and reduce impacts on tributaries and subbasins through connections to public water

Proposed implementing entities:

County and city planning departments; public utilities and other water purveyors; Ecology; Department of Health.

Recommendation:

- Adopt and implement consistent and coordinated policies that reduce dependence on water use from PE wells and promote connections to municipal and regional water supplies.
- Water purveyors and county/city land use planners explore opportunities to extend water distribution systems further into their individual service areas, particularly where rapid rural growth is anticipated.
- Develop cost-benefit analysis and fiscal implications to (1) fund programs to support connections to public water systems and (2) gain political support.

Purpose:

Reduce uncertainty about future streamflow and aquifer impacts from PE wells. Encourage state/local policies and funding to support streamflow objectives within the watershed plan. Demonstrate the WRIA 8 Committee's endorsement of encouraging conservation through promoting connections to public water systems.

Funding sources:

Fees collected through local permitting processes; pass-through fees associated with well maintenance services collected by service providers; state or local rate increases or taxes.

6.2.3 Development and use of reclaimed water

[COMMENT: because this policy had a red level comment, this policy was removed from the compiled draft plan until Seattle provides clarification on language they would support.]

6.2.4 Voluntary permit exempt well metering program

Proposed implementing entity:

Ecology; King and/or Snohomish Counties; King and/or Snohomish Conservation Districts.

Recommendation:

Pilot a voluntary five-year program in one or more WRIA 8 subbasins to meter permit-exempt wells (indoor and outdoor residential use). Supplement the voluntary metering program with a robust education and community engagement program about water consumption and conservation.

Purpose:

Increase confidence in assumptions made regarding the average water use of individual PE well users to inform the adaptive management process and future water management and planning efforts. Data could inform (1) growth policies and patterns, (2) where to target incentives and education/outreach programs, and (3) where to place resources across subbasins to help improve streamflow, water levels, and temperature.

Funding sources:

Individual landowners are not expected to pay for costs associated with participation in the program. General operation or appropriated funds from (1) the state, (2) counties, and/or (3) conservation districts related to water, habitat preservation (salmon recovery), or housing. Environmental grants.

6.2.5 Water conservation education & incentives program

Proposed implementing entity:

Ecology and counties; with support from conservation districts and non-governmental organizations.

Recommendation:

Ecology partners with counties and conservation districts to develop and implement outreach and incentives programs that encourage rural landowners with PE wells to (1) reduce their indoor and outdoor water use through water conservation best practices; and (2) comply with drought and other water use restrictions.

Education and incentives could include:

- Educate current homeowners and offer rebates to install water-saving fixtures and appliances, as well as more efficient plumbing techniques.
- Invite new and current residents to participate in the well-metering pilot program.
- Educate new and existing homeowners about the overall positive impacts water conservation has on the environment and climate.

Empower homeowners to be good stewards of rural lands. Programs could also include education and outreach to homebuilders to adopt Built Green or other green building incentives, and adopt water saving design and landscaping strategies like green roofs, rain barrels, buried retention tanks, bio retention, drip irrigation systems, and drought tolerant plantings.

Purpose:

Raise awareness of the impacts PE well water usage has on (1) groundwater levels and (2) the connection to streams and rivers. Supplement water offset and restoration projects, especially in subbasins critical for fish and where water offset projects were difficult to find.

Funding sources:

Potential funding sources could include: new funding from Washington State Legislature; grants (e.g., Ecology's Streamflow Restoration Grant Program); allocation of Ecology resources; fees associated with new PE wells; contributions from local governments and tribes; part of county or conservation district ongoing education, outreach and incentive program.

6.2.6 Statewide mandatory water conservation measures in unincorporated areas of the state during drought

[COMMENT: Any recommendation for Ecology to undergo rulemaking is at the discretion of Director. Ecology would balance its available resources with potential other Program rulemaking efforts statewide. Rulemaking is a public process to develop new or amend/repeal existing rule language and input from all entities is considered equally. Ecology cannot guarantee the outcome of a rulemaking process]

Proposed implementing entity:

Washington State Legislature, Ecology, or counties.

Recommendation:

- Implement mandatory water conservation measures for PE well users during drought events. Measures would focus on limiting outdoor water use, with exemptions for growing food. Washington State Legislature could require Ecology or counties to implement water conservation policies.
- Ecology could write a rule to require water conservation measures.
- County councils and commissions could pass ordinances mandating water conservation.

Purpose:

Reduce water usage from PE well users during drought. Reduce impacts on streamflows from PE well users and support net ecological benefit goals. Increase climate change resilience.

Funding sources:

Potential funding sources could include: new funding from Washington State Legislature; allocation of existing Ecology resources; fees associated with new PE wells.

Chapter Seven: Net Ecological Benefit

[COMMENT: The committee is still discussing whether to include the optional Net Ecological Benefit evaluation and NEB statement in the watershed plan. An outline of the NEB Chapter is provided for the committee's review.]

7.1 Water Offsets

- Compare the total WRIA offset to the total WRIA consumptive use estimate
- Compare the total WRIA offset to the safety factor/offset target if applicable.
- Determine if the watershed plan has succeeded in offsetting the impacts at the WRIA level.
- Compare the offset to the consumptive use estimate by subbasin.
- State how these projects provide additional benefits to instream resources beyond those necessary to offset the impacts from new consumptive water use within the WRIA boundary.
- State how adaptive management provides additional certainty, if applicable.

Table 11: Summary of WRIA 8 Water Offset Projects

Project Number	Project Name	Project Short Description (one sentence)	Subbasin	Estimated Water Offset Benefits (AF/YR)	Project Included in Offset Calculations/NEB Analysis
1	Project A		A	50	No
2	Project B		A	160	Yes
3	Project C		B	150	Yes

[NOTE: Some projects that are in the plan may be very general and the Committee can decide not to count them toward net ecological benefit, e.g. a project to encourage PE well users to connect to water service]

Table 12: Subbasin Water Offset Totals Compared to Permit-Exempt Well Consumptive Use Impacts

Subbasin	Offset Project Totals (AF/YR)	Permit-Exempt Well Consumptive Use (AF/YR)	Difference (AF/YR)
A	210	170	**40**
B	150	152	**-2**

Subbasin	Offset Project Totals (AF/YR)	Permit-Exempt Well Consumptive Use (AF/YR)	Difference (AF/YR)
C	0	50	**-50**
D	165	97	**68**
All	140		**140**
TOTAL	**665**	**469**	**196**

7.2 Habitat Benefits

- Summarize types of projects and anticipated benefits and limiting factors addressed.
- Summarize the distribution of projects among the subbasins and the streams that will benefit.
- State how these projects provide additional benefits to instream resources beyond those necessary to offset the impacts from new consumptive water use within the WRIA boundary.

Table 13: Summary of WRIA 8 Habitat Improvement Projects

Project Number	Project Name	Project Short Description (one sentence)	Subbasin	River Miles Benefitted	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed	Project Included in NEB Analysis
1			A				
7			B				
8			C				
9			C				
10			D				

7.3 Adaptive Management and Policy Recommendations

If applicable, reference Chapter 6 and how that increases certainty of achieving NEB.

7.4 NEB Evaluation Findings

Include a clear statement of the Committee's finding that the combined components of the watershed plan do or do not achieve a NEB. For example: "The WRIA X Committee finds that this watershed plan achieves a net ecological benefit, as required by RCW 90.94.030 and defined by the Final NEB Guidance (Ecology 2019)."

Appendix

WRIA 8 Cedar Sammamish

Draft Plan
September 2020

Appendix A – References

Blanton, M., Byrnes, C., Waldo, T., Jones, B., Clark, C. December 2011. "Puget Sound Steelhead Foundations: A Primer for Recovery Planning." Washington Department of Fish and Wildlife.

Booth, D.B., and Goldstein, B., 1994. Patterns and processes of landscape development by the Puget lobe ice sheet. In Lasmanis, Raymond; Cheney, E.S., conveners, Regional Geology of Washington State; *Washington Division of Geology and Earth Resources Bulletin* 80: 207-218.

Booth, D.B., Troost, K.G., Clague, J.J. and Waitt, R.B. 2003. The Cordilleran Ice Sheet. Developments in Quaternary Sciences 1: 17–43. https://doi.org/10.1016/S1571-0866(03)01002-9

City of Seattle. 2000. Final Cedar River Watershed Habitat Conservation Plan. https://www.seattle.gov/Documents/Departments/SPU/EnvironmentConservation/HCPCoverPagesTableofContents.pdf

City of Seattle. 2020a. Cedar River Watershed. http://www.seattle.gov/utilities/environment-and-conservation/our-watersheds/cedar-river-watershed

City of Seattle. 2020b. Instream Flow Commission (IFC). https://www.seattle.gov/utilities/environment-and-conservation/our-watersheds/habitat-conservation-plan/about-the-hcp/oversight/instream-flow-commission

Evans, S.H. 1996. Geohydrologic Review of the Cedar River Ground-water Basin. Washington Geology, Vol. 24. No. 4. December.

GeoEngineers, Inc. (GeoEngineers) 2020a. WRIA 8 Growth Projections– Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 21.

GeoEngineers. 2020b. WRIA 8 Consumptive Use Estimates –Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 21.

HDR Engineering, Inc. January 2009. "Lake Sammamish Late Run Kokanee Synthesis Report."

Jones, M.A., 1996. Thickness of unconsolidated deposits in the Puget Sound Lowland, Washington and British Columbia. Water Resources Investigation Report 94-4133. Plate 1. https://pubs.er.usgs.gov/publication/wri944133

Jones, M.A., 1998. Geologic framework for the Puget Sound aquifer system: Washington and British Columbia. U.S. Geological Survey Professional Paper 1424-C, 44 p. https://pubs.usgs.gov/pp/1424c/report.pdf

Kerwin, J. 2001. "Salmon and Steelhead Habitat Limiting Factors Report for the Cedar-Sammamish Basin (Water Resource Inventory Area 8)." Washington Conservation Commission. Olympia, WA

King County Department of Natural Resources. May 2020. "Literature Review and Recommended Sampling Protocol for Bull Trout in King County." Seattle, WA.

King County. 2018. GIS Open Data, Basin boundaries derived from terrain data, King County only / topo basin kc area. https://gis-kingcounty.opendata.arcgis.com/datasets/basin-boundaries-derived-from-terrain-data-king-county-only-topo-basin-kc-area

Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M.B. Krosby, and A.K. Snover. 2015. State of Knowledge: Climate Change in Puget Sound. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D. https://cig.uw.edu/resources/special-reports/ps-sok/

MGS Engineering Service and Oregon Climate Service. 2006. Washington Mean Annual Precipitation (MAP). January. https://www.wsdot.wa.gov/publications/fulltext/Hydraulics/WA-MeanAnnualPrecipitationMap.pdf

Natural Resources Conservation Service (NRCS), 1997. Irrigation Guide. National Engineering Handbook, Part 652. U.S. Department of Agriculture, Natural Resources Conservation Service. Issued September 1997.

Northwest Indian Fisheries Commission (NWIFC) and Washington State Department of Fish and Wildlife (WDFW). Statewide Integrated Fish Distribution (SWIFD). http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0. Publication Date: January 10, 2013. Accessed: 6/20/20

NWIFC [Northwest Indian Fisheries Commission]. 2014. Understanding Tribal Treaty Rights in Western 26 Washington. https://nwifc.org/w/wp-27 content/uploads/downloads/2014/10/understanding-treaty-rights-final.pdf

Revised Code of Washington (RCW). 2019. Streamflow Restoration, Chapter 90.94 RCW. https://app.leg.wa.gov/RCW/default.aspx?cite=90.94.

Revised Code of Washington (RCW). 2019. Watershed Planning, Chapter 90.82 RCW. https://app.leg.wa.gov/rcw/default.aspx?cite=90.82.

South Puget Sound Salmon Enhancement Group. https://spsseg.org/lifecycle/

U.S. Geological Survey (USGS). 2016. USGS National Hydrography Dataset (NHD) Downloadable Data Collection - National Geospatial Data Asset (NGDA) National Hydrography Dataset (NHD): USGS - National Geospatial Technical Operations Center (NGTOC): Rolla, MO and Denver, CO. http://nhd.usgs.gov; http://viewer.nationalmap.gov/.

U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service (USGS). 2013. *Federal Standards and Procedures for the National Watershed Boundary Dataset* (WBD) (4 ed.): Techniques and Methods 11–A3: 63. https://pubs.usgs.gov/tm/11/a3/.

U.S. Geological Survey. 2020. National Information System: Web Interface. Current Conditions for Washington Streamflow. https://waterdata.usgs.gov/wa/nwis/current/?type=flow

Vaccaro, J.J., Hansen, A.J., and Jones, M.A. 1998. Hydrogeologic framework of the Puget Sound aquifer system, Washington and British Columbia. U.S. Geological Survey Professional Paper 1424-D: 77. https://pubs.er.usgs.gov/publication/pp1424D

Washington State Department of Ecology (Ecology), 1995. Draft: Initial Watershed Assessment Water Resources Inventory Area 8 Cedar-Sammamish Watershed. https://fortress.wa.gov/ecy/publications/documents/95007.pdf

Washington State Department of Ecology (Ecology), 2019a. Final Guidance for Determining Net Ecological Benefit, GUID-2094 Water Resources Program Guidance. Washington State, Department of Ecology, Publication 19-11-079. http://leg.wa.gov/JointCommittees/WRM/Documents/EcologyFinalGuidanceForDeterminingNEB.pdf.

Washington State Department of Ecology (Ecology), 2019b. Streamflow Restoration Policy & Interpretative Statement, POL-2094, Water Resources Program Policy & Interpretative Statement. Washington State, Department of Ecology. https://appswr.ecology.wa.gov/docs/WaterRights/wrwebpdf/pol-2094.pdf.

Washington State Department of Ecology (Ecology). 2020. Washington State Water Quality Atlas. https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?CustomMap=y&RT=1&Layers=30&Filters=n,y,n,n&F2.1=0&F2.2=0&BBox=-14338616,5395963,-12562831,6503994

Washington State Department of Fish and Wildlife (WDFW). 2020a. SalmonScape. http://wdfw.wa.gov/mapping/salmonscape

Washington State Department of Fish and Wildlife (WDFW). 2020b. Fish Passage Map https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html

Washington State Department of Natural Resources, 1:100,000-Scale Geologic Maps of King and Snohomish Counties. KMZ file format. Available: https://www.dnr.wa.gov/programs-and-services/geology/publications-and-data/publications-and-maps#geologic-maps.4

WRIA 8 Salmon Recovery Council. 2017. Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan, 10-Year Update. https://www.govlink.org/watersheds/8/reports/pdf/wria-8-ten-year-salmon-conservation-plan-combined-10-25-2017.pdf

Appendix B – Glossary

Table 14: Acronyms and Definitions

Acronym	Definition
AE	Application Efficiency
AFY	Acre-Feet per Year
CFS	Cubic Feet per Second
CU	Consumptive Use
CUF	Consumptive Use Factor
GPD	Gallons per Day
GIS	Geographic Information System
IR	Irrigation Requirements
LID	Low Impact Development
LIO	Local Integrating Organization
MAR	Managed Aquifer Recharge
NEB	Net Ecological Benefit
PE	Permit-Exempt
RCW	Revised Code of Washington
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Areas

Acre-feet (AF): A unit of volume equal to the volume of a sheet of water one acre in area and one foot in depth. (USGS)

Adaptive Management: An iterative and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions. (NEB)

Annual Average Withdrawal: RCW 90.94.030 (4)(a)(vi)(B) refers to the amount of water allowed for withdrawal per connection as the annual average withdrawal. As an example, a homeowner could withdraw 4,000 gallons on a summer day, so long as they did not do so often enough that their annual average exceeds the 950 gpd.

Beaver Dam Analogue (BDA): BDAs are man-made structures designed to mimic the form and function of a natural beaver dam. They can be used to increase the probability of successful beaver translocation and function as a simple, cost-effective, non-intrusive approach to stream restoration. (From Anabranch Solutions)

Critical Flow Period: The time period of low streamflow (generally described in bi-monthly or monthly time steps) that has the greatest likelihood to negatively impact the survival and recovery of threatened or endangered salmonids or other fish species targeted by the planning group. The planning group should discuss with Ecology, local tribal and WDFW biologists to determine the critical flow period in those reaches under the planning group's evaluation. (NEB)

Cubic feet per second (CFS): A rate of the flow in streams and rivers. It is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second (about the size of one archive file box or a basketball). (USGS)

Domestic Use: In the context of Chapter 90.94 RCW, "domestic use" and the withdrawal limits from permit-exempt domestic wells include both indoor and outdoor household uses, and watering of a lawn and noncommercial garden. (NEB)

ESSB 6091: In January 2018, the Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 in response to the Hirst decision. In the Whatcom County vs. Hirst, Futurewise, et al. decision (often referred to as the "Hirst decision"), the court ruled that the county failed to comply with the Growth Management Act requirements to protect water resources. The ruling required the county to make an independent decision about legal water availability. ESSB 6091 addresses the court's decision by allowing landowners to obtain a building permit for a new home relying on a permit-exempt well. ESSB 6091 is codified as Chapter 90.94 RCW. (ECY)

Evolutionarily Significant Unit (ESU): A population of organisms that is considered distinct for purposes of conservation. For Puget Sound Chinook, the ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound and the Strait of Georgia. Also, Chinook salmon from 26 artificial propagation programs. (NOAA)

Foster Pilots and Foster Task Force: To address the impacts of the 2015 Foster decision, Chapter 90.94 RCW established a Task Force on Water Resource Mitigation and authorized the Department of Ecology to issue permit decisions for up to five water mitigation pilot projects. These pilot projects will address issues such as the treatment of surface water and groundwater appropriations and include management strategies to monitor how these appropriations affect instream flows and fish habitats. The joint legislative Task Force will (1) review the treatment of

surface water and groundwater appropriations as they relate to instream flows and fish habitat, (2) develop and recommend a mitigation sequencing process and scoring system to address such appropriations, and (3) review the Washington Supreme Court decision in Foster v. Department of Ecology. The Task Force is responsible for overseeing the five pilot projects. (ECY)

Four Year Work Plans: Four year plans are developed by salmon recovery lead entities in Puget Sound to describe each lead entity's accomplishments during the previous year, to identify the current status of recovery actions, any changes in recovery strategies, and to propose future actions anticipated over the next four years. Regional experts conduct technical and policy reviews of each watershed's four-year work plan update to evaluate the consistency and appropriate sequencing of actions with the Puget Sound Salmon Recovery Plan. (Partnership)

Gallons per day (GPD): An expression of the average rate of domestic and commercial water use. 1 million gallons per day is equivalent to 1.547 cubic feet per second.

Group A public water systems: Group A water systems have 15 or more service connections or serve 25 or more people per day. Chapter 246-290 WAC (Group A Public Water Supplies), outlines the purpose, applicability, enforcement, and other policies related to Group A water systems. (WAC)

Group B public water systems: Group B public water systems serve fewer than 15 connections and fewer than 25 people per day. Chapter 246-291 WAC (Group B Public Water Systems), outlines the purpose, applicability, enforcement, and other policies related to Group B water systems. (WAC)

Growth Management Act (GMA): Passed by the Washington Legislature and enacted in 1990, this act guides planning for growth and development in Washington State. The act requires local governments in fast growing and densely populated counties to develop, adopt, and periodically update comprehensive plans.

Home**:** A general term referring to any house, household, or other Equivalent Residential Unit. (Policy and Interpretive Statement)

Hydrologic Unit Code (HUC): Hydrologic unit codes refer to the USGS's division and sub-division of the watersheds into successively smaller hydrologic units. The units are classified into four levels: regions, sub-regions, accounting units, and cataloging units, and are arranged within each other from the largest geographic area to the smallest. Each unit is classified by a unit code (HUC) composed of two to eight digits based on the four levels of the classification in the hydrologic unit system (two-digit units are largest, and eight digits are smallest). (USGS)

Impact: For the purpose of streamflow restoration planning, impact is the same as new consumptive water use (see definition below). As provided in Ecology WR POL 2094 "Though the statute requires the offset of 'consumptive impacts to instream flows associated with permit-exempt domestic water use' (RCW 90.94.020(4)(b)) and 90.94.030(3)(b)), watershed

plans should address the consumptive use of new permit-exempt domestic well withdrawals. Ecology recommends consumptive use as a surrogate for consumptive impact to eliminate the need for detailed hydrogeologic modeling, which is costly and unlikely feasible to complete within the limited planning timeframes provided in chapter 90.94 RCW. " (NEB)

Instream Flows and Instream Flow Rule (IFR): Instream flows are a specific flow level measured at a specific location in a given stream. Seasonal changes cause natural stream flows to vary throughout the year, so instream flows usually vary from month to month rather that one flow rate year-round. State law requires that enough water in streams to protect and preserve instream resources and uses. The Department of Ecology sets flow levels in administrative rules. Once instream flow levels are established in a rule, they serve as a water right for the stream and the resources that depend on it. Instream flow rules do not affect pre-existing, or senior, water rights; rather, they protect the river from future withdrawals. Once an instream flow rule is established, the Department of Ecology may not issue water rights that would impair the instream flow level. (ECY)

Instream Resources Protection Program (IRPP): The IRPP was initiated by the Department of Ecology in September 1978 with the purpose of developing and adopting instream resource protection measures for Water Resource Inventory Areas (WRIAs) (see definition below) in Western Washington as authorized in the Water Resources Act of 1971 (RCW 90.54), and in accordance with the Water Resources Management Program (WAC 175-500).

Instream Resources: Fish and related aquatic resources. (NEB)

Large woody debris (LWD): LWD refers to the fallen trees, logs and stumps, root wads, and piles of branches along the edges of streams, rivers, lakes and Puget Sound. Wood helps stabilize shorelines and provides vital habitat for salmon and other aquatic life. Preserving the debris along shorelines is important for keeping aquatic ecosystems healthy and improving the survival of native salmon. (King County)

Lead Entities (LE): Lead Entities are local, citizen-based organizations in Puget Sound that coordinate salmon recovery strategies in their local watershed. Lead entities work with local and state agencies, tribes, citizens, and other community groups to adaptively manage their local salmon recovery chapters and ensure recovery actions are implemented. (Partnership)

Listed Species: Before a species can receive the protection provided by the Endangered Species Act (ESA), it must first be added to the federal lists of endangered and threatened wildlife and plants. The List of Endangered and Threatened Wildlife (50 CFR 17.11) and the List of Endangered and Threatened Plants (50 CFR 17.12) contain the names of all species that have been determined by the U.S. Fish and Wildlife Service (Service) or the National Marine Fisheries Service (for most marine life) to be in the greatest need of federal protection. A species is added to the list when it is determined to be endangered or threatened because of any of the following factors: the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational

purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other natural or manmade factors affecting its survival. (USFWS)

Local Integrating Organizations (LIO): Local Integrating Organizations are local forums in Puget Sound that collaboratively work to develop, coordinate, and implement strategies and actions that contribute to the protection and recovery of the local ecosystem. Funded and supported by the Puget Sound Partnership, the LIOs are recognized as the local expert bodies for ecosystem recovery in nine unique ecosystems across Puget Sound. (Partnership)

Low Impact Development (LID): Low Impact Development (LID) is a stormwater and land-use management strategy that tries to mimic natural hydrologic conditions by emphasizing techniques including conservation, use of on-site natural features, site planning, and distributed stormwater best management practices (BMPs) integrated into a project design. (ECY)

Managed Aquifer Recharge (MAR): Managed aquifer recharge projects involve the addition of water to an aquifer through infiltration basins, injection wells, or other methods. The stored water can then be used to benefit stream flows, especially during critical flow periods. (NEB)

National Pollutant Discharge Elimination System (NPDES): The NPDES permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the United States. Created by the Clean Water Act in 1972, the EPA authorizes state governments to perform many permitting, administrative, and enforcement aspects of the program. (EPA)

Net Ecological Benefit (NEB): Net Ecological Benefit is a term used in ESSB 6091 as a standard that watershed plans (see below for definition) must meet. The outcome that is anticipated to occur through implementation of projects and actions in a plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary. See *Final Guidance for Determining Net Ecological Benefit - Guid-2094 Water Resources Program Guidance.* (NEB)

Net Ecological Benefit Determination: Occurs solely upon Ecology's conclusion after its review of a watershed plan submitted to Ecology by appropriate procedures, that the plan does or does not achieves a NEB as defined in the Net Ecological Benefit guidance. The Director of Ecology will issue the results of that review and the NEB determination in the form of an order. (NEB)

Net Ecological Benefit Evaluation: A planning group's demonstration, using NEB Guidance and as reflected in their watershed plan, that their plan has or has not achieved a NEB. (NEB)

New Consumptive Water Use: The consumptive water use from the permit-exempt domestic groundwater withdrawals estimated to be initiated within the planning horizon. For the purpose of RCW 90.94, consumptive water use is considered water that is evaporated, transpired, consumed by humans, or otherwise removed from an immediate water environment due to the use of new permit-exempt domestic wells. (NEB)

Office of Financial Management (OFM): OFM is a Washington state agency that develops official state and local population estimates and projections for use in local growth management planning. (OFM)

Offset: The anticipated ability of a project or action to counterbalance some amount of the new consumptive water use over the planning horizon. Offsets need to continue beyond the planning horizon for as long as new well pumping continues. (NEB)

Permit exempt wells: The Groundwater Code (RCW 90.44), identified four "small withdrawals" of groundwater as exempt from the permitting process. Permit-exempt groundwater wells often provide water where a community supply is not available, serving single homes, small developments, irrigation of small lawns and gardens, industry, and stock watering.

Permit-exempt uses: Groundwater permit exemptions allow four small uses of groundwater without a water right permit: domestic uses of less than 5,000 gallons per day, industrial uses of less than 5,000 gallons per day, irrigation of a lawn or non-commercial garden, a half-acre or less in size, or stock water. Although exempt groundwater withdrawals don't require a water right permit, they are always subject to state water law. (ECY)

Planning groups: A general term that refers to either initiating governments, in consultation with the planning unit, preparing a watershed plan update required by Chapter 90.94.020 RCW, or a watershed restoration and enhancement committee preparing a plan required by Chapter 90.94.030 RCW. (NEB)

Planning Horizon: The 20-year period beginning on January 19, 2018 and ending on January 18, 2038, over which new consumptive water use by permit-exempt domestic withdrawals within a WRIA must be addressed, based on the requirements set forth in Chapter 90.94 RCW. (NEB)

Projects and Actions: General terms describing any activities in watershed plans to offset impacts from new consumptive water use and/or contribute to NEB. (NEB)

Puget Sound Acquisition and Restoration (PSAR) fund: This fund supports projects that recover salmon and protect and recover salmon habitat in Puget Sound. The state legislature appropriates money for PSAR every 2 years in the Capital Budget. PSAR is co-managed by the Puget Sound Partnership and the Recreation and Conservation Office, and local entities identify and propose PSAR projects. (Partnership)

Puget Sound Partnership (Partnership): The Puget Sound Partnership is the state agency leading the region's collective effort to restore and protect Puget Sound and its watersheds. The organization brings together hundreds of partners to mobilize partner action around a common agenda, advance Sound investments, and advance priority actions by supporting partners. (Partnership)

Puget Sound Regional Council (PSRC): PSRC develops policies and coordinates decisions about regional growth, transportation and economic development planning within King, Pierce, Snohomish and Kitsap counties. (PSRC)

RCW 90.03 (Water Code): This chapter outlines the role of the Department of Ecology in regulating and controlling the waters within the state. The code describes policies surrounding surface water and groundwater uses, the process of determining water rights, compliance measures and civil penalties, and various legal procedures.

RCW 90.44 (Groundwater Regulations): RCW 90.44 details regulations and policies concerning groundwater use in Washington State, and declares that public groundwaters belong to the public and are subject to appropriation for beneficial use under the terms of the chapter. The rights to appropriate surface waters of the state are not affected by the provisions of this chapter.

RCW 90.54 (Groundwater permit exemption): This code states that any withdrawal of public groundwaters after June 6, 1945 must have an associated water right from the Department of Ecology. However, any withdrawal of public groundwaters for stock-watering purposes, or for the watering of a lawn or of a noncommercial garden not exceeding one-half acre in area, or for single or group domestic uses in an amount not exceeding five thousand gallons a day, or for an industrial purpose in an amount not exceeding five thousand gallons a day, is exempt from the provisions of this section and does not need a water right.

RCW 90.82 (Watershed Planning): Watershed Planning was passed in 1997 with the purpose of developing a more thorough and cooperative method of determining what the current water resource situation is in each water resource inventory area of the state and to provide local citizens with the maximum possible input concerning their goals and objectives for water resource management and development.

RCW 90.94 (Streamflow Restoration): This chapter of the Revised Code of Washington codifies ESSB 6091, including watershed planning efforts, streamflow restoration funding program and the joint legislative task force on water resource mitigation and mitigation pilot projects (Foster task force and pilot projects).

Reasonable Assurance: Explicit statement(s) in a watershed plan that the plan's content is realistic regarding the outcomes anticipated by the plan, and that the plan content is supported with scientifically rigorous documentation of the methods, assumptions, data, and implementation considerations used by the planning group. (NEB)

Revised Code of Washington (RCW): The revised code is a compilation of all permanent laws now in force for the state of Washington. The RCWs are organized by subject area into Titles, Chapters, and Sections.

Salmon Recovery Funding Board (SRFB): Pronounced "surfboard", this state and federal board provides grants to protect and restore salmon habitat. Administered by a 10-member State

Board that includes five governor-appointed citizens and five natural resource agency directors, the board brings together the experiences and viewpoints of citizens and the major state natural resource agencies. For watersheds planning under Section 203, the Department of Ecology will submit final draft WRE Plans not adopted by the prescribed deadline to SRFB for a technical review (RCO and Policy and Interpretive Statement).

Section 202 or Section 020: Refers to Section 202 of ESSB 6091 or Section 020 of RCW 90.94 respectively. The code provides policies and requirements for new domestic groundwater withdrawals exempt from permitting with a potential impact on a closed water body and potential impairment to an instream flow. This section includes WRIAs 1, 11, 22, 23, 49, 59 and 55, are required to update watershed plans completed under RCW 90.82 and to limit new permit-exempt withdrawals to 3000 gpd annual average.

Section 203 or Section 030: Refers to Section 203 of ESSB 6091 or Section 030 of RCW 90.94 respectively. The section details the role of WRE committees and WRE plans (see definitions below) in ensuring the protection and enhancement of instream resources and watershed functions. This section includes WRIAs 7, 8, 9, 10, 12, 13, 14 and 15. New permit-exempt withdrawals are limited to 950 gpd annual average.

SEPA and SEPA Review: SEPA is the State Environmental Policy Act. SEPA identifies and analyzes environmental impacts associated with governmental decisions. These decisions may be related to issuing permits for private projects, constructing public facilitates, or adopting regulations, policies, and plans. SEPA review is a process which helps agency decision-makers, applications, and the public understand how the entire proposal will affect the environment. These reviews are necessary prior to Ecology adopting a plan or plan update and may be completed by Ecology or by a local government. (Ecology)

Subbasins: A geographic subarea within a WRIA, equivalent to the words “same basin or tributary” as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b). In some instances, subbasins may not correspond with hydrologic or geologic basin delineations (e.g. watershed divides). (NEB)

Trust Water Right Program: The program allows the Department of Ecology to hold water rights for future uses without the risk of relinquishment. Water rights held in trust contribute to streamflows and groundwater recharge, while retaining their original priority date. Ecology uses the Trust Water Right Program to manage acquisitions and accept temporary donations. The program provides flexibility to enhance flows, bank or temporarily donate water rights. (ECY)

Urban Growth Area (UGA): UGAs are unincorporated areas outside of city limits where urban growth is encouraged. Each city that is located in a GMA fully-planning county includes an urban growth area where the city can grow into through annexation. An urban growth area may include more than a single city. An urban growth area may include territory that is located outside of a city in some cases. Urban growth areas are under county jurisdiction until they are annexed or incorporated as a city. Zoning in UGAs generally reflect the city zoning, and public utilities and roads are generally built to city standards with the expectation that when annexed,

the UGA will transition seamlessly into the urban fabric. Areas outside of the UGA are generally considered rural. UGA boundaries are reviewed and sometimes adjusted during periodic comprehensive plan updates. UGAs are further defined in RCW 36.70.

WAC 173-566 (Streamflow Restoration Funding Rule): On June 25, 2019 the Department of Ecology adopted this rule for funding projects under RCW 90.94. This rule establishes processes and criteria for prioritizing and approving grants consistent with legislative intent, thus making Ecology's funding decision and contracting more transparent, consistent, and defensible.

Washington Administrative Code (WAC): The WAC contains the current and permanent rules and regulations of state agencies. It is arranged by agency and new editions are published every two years. (Washington State Legislature)

Washington Department of Ecology (DOE/ECY): The Washington State Department of Ecology is an environmental regulatory agency for the State of Washington. The department administers laws and regulations pertaining to the areas of water quality, water rights and water resources, shoreline management, toxics clean-up, nuclear and hazardous waste, and air quality.

Washington Department of Fish and Wildlife (WDFW): An agency dedicated to preserving, protecting, and perpetuating the state's fish, wildlife, and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities. Headquartered in Olympia, the department maintains six regional offices and manages dozens of wildlife areas around the state, offering fishing, hunting, wildlife viewing, and other recreational opportunities for the residents of Washington. With the tribes, WDFW is a co-manager of the state salmon fishery. (WDFW)

Washington Department of Natural Resources (WADNR or DNR): The department manages over 3,000,000 acres of forest, range, agricultural, and commercial lands in the U.S. state of Washington. The DNR also manages 2,600,000 acres of aquatic areas which include shorelines, tidelands, lands under Puget Sound and the coast, and navigable lakes and rivers. Part of the DNR's management responsibility includes monitoring of mining cleanup, environmental restoration, providing scientific information about earthquakes, landslides, and ecologically sensitive areas. (WADNR)

Water Resources (WR): The Water Resources program at Department of Ecology supports sustainable water resources management to meet the present and future water needs of people and the natural environment, in partnership with Washington communities. (ECY)

Water Resources Advisory Committee (WRAC): Established in 1996, the Water Resources Advisory Committee is a forum for issues related to water resource management in Washington State. This stakeholder group is comprised of 40 people representing state agencies, local governments, water utilities, tribes, environmental groups, consultants, law firms, and other water stakeholders. (ECY)

Watershed Plan: A general term that refers to either: a watershed plan update prepared by a WRIA's initiating governments, in collaboration with the WRIA's planning unit, per RCW 90.94.020; or a watershed restoration and enhancement plan prepared by a watershed restoration and enhancement committee, per RCW 90.94.030. This term does not refer to RCW 90.82.020(6). (NEB)

Watershed Restoration and Enhancement Plan (WRE Plan): The Watershed Restoration and Enhancement Plan is directed by Section 203 of ESSB 6091 and requires that by June 30, 2021, the Department of Ecology will prepare and adopt a watershed restoration and enhancement plan for WRIAs 7, 8, 9, 10, 12, 13, 14 and 15, in collaboration with the watershed restoration and enhancement committee. The plan should, at a minimum, offset the consumptive impact of new permit-exempt domestic water use, but may also include recommendations for projects and actions that will measure, protect, and enhance instream resources that support the recovery of threatened and endangered salmonids. Prior to adoption of an updated plan, Department of Ecology must determine that the actions in the plan will result in a "net ecological benefit" to instream resources in the WRIA. The planning group may recommend out-of-kind projects to help achieve this standard.

WRIA: Water Resource Inventory Area. WRIAs are also called basins or watersheds. There are 62 across the state and each are assigned a number and name. They were defined in 1979 for the purpose of monitoring water availability. A complete map is available here: https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up

Appendix C – Committee Roster

Table 15: WRIA 8 Committee Roster

Entity Representing	Primary Representative Name	First Alternate Name
City of Bellevue (cities caucus)	Councilmember John Stokes	Brian Landau
City of Bothell (cities caucus)	Janet Geer	Chris Hall
City of Issaquah (cities caucus)	Allen Quynn	Bob York
City of Kenmore (cities caucus)	Richard Sawyer	
City of Kent	Evan Swanson	Mike Mactutis
City of Redmond (cities caucus)	Aaron Moldver	Anne Dettelbach
City of Sammamish (cities caucus)	Danika Globokar	
City of Seattle	Michele Koehler	Elizabeth Garcia
King County	Denise Di Santo	Joan Lee
Snohomish County	Terri Strandberg	Elisa Dawson
Muckleshoot Indian Tribe	Henry Martin	Carla Carlson
Snoqualmie Indian Tribe	Matt Baerwalde	Anne Harrie
Tulalip Tribes	Kurt Nelson	Anne Savery

Entity Representing	Primary Representative Name	First Alternate Name
Alderwood Water & Wastewater District	John McClellan	Jenifer Galatas
Washington Department of Fish and Wildlife	Stewart Reinbold	Ezekiel Rohloff
Master Builders Association of King and Snohomish Counties	Gina Clark	Jennifer Anderson
Center for Environmental Law and Policy	Dan Von Seggern	Trish Rolfe
King County Agriculture Program	Rick Reinlasoder	Melissa Borsting
Washington State Department of Ecology	Stephanie Potts	Ingria Jones
WRIA 8 Salmon Recovery Council, ex officio	Jason Wilkinson (cities caucus rep)	Jason Mulvihill-Kuntz

1

Appendix D – Operating Principles

The approved and signed operating principles can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/WRIA8_approved_signed_operating_principles.pdf

Appendix E – Subbasin Delineation Memo

The Subbasin Delineation Technical Memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/PLAN/WRIA%208-WREC-SubbasinDelineationMemo_Final.pdf

Appendix F – Draft Growth Projections Memo

The Draft Growth Projections Technical Memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/202002/WRIA8-WREC-GrowthProjectionsMemo-FinalDraft-20200221.pdf

Appendix G – Draft Consumptive Use Memo

The Draft Consumptive Use Technical Memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA08/202002/WRIA8-WREC-ConsumptiveUseEstimatesMemo-FinalDraft-20200221.pdf

Appendix H – Projects

North Creek Streamflow Augmentation (8-SN-W1)

[project description forthcoming]

Snohomish County Recycled Water MAR (8-LB-W2)

WRIA 8 - Draft Project Description

September 3, 2020

Project Name

Snohomish County Recycled Water Managed Aquifer Recharge (MAR)

WRIA 7 WRE Subbasin

Little Bear

Water Offset

~181 acre-feet/year

Project Status

The WRIA 8 WREC has expressed interest in identifying potential sites and quantifying water offset potential for Managed Aquifer Recharge (MAR) projects using recycled water from the King County Brightwater Wastewater Treatment Plant (Brightwater). This project is in the conceptual development phase.

Narrative Description

One of the non-acquisition water offset project ideas identified by the WRIA 8 WREC involves using recycled water as a source for MAR projects. This project would augment stream flows by increasing surficial aquifer discharge above what occurs under existing conditions. The project concept includes diverting recycled water from Brightwater to a constructed MAR facility. Brightwater currently distributes reclaimed water from May to October, but recycled water may also be available year-round, if needed. This diverted water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges to one or more adjacent streams as re-timed groundwater baseflow. A specific site for this project has not yet been identified, however, there may be opportunity for MAR on Snohomish County-owned property immediately north of Brightwater (i.e. Carousel Ranch) or at other sites to be selected in the future. The goal of the project is to increase baseflow to the subject stream(s) by recharging the aquifer adjacent to the stream(s) and providing additional groundwater discharge to the river through MAR.

Brightwater is located in the Snohomish County portion of the City of Woodinville, Washington between State Route 9 and Highway 522 in the WRIA 8 delineated Little Bear subbasin. Currently, recycled water is only available via King County's recycled water pipeline which extends from the Brightwater tunnel alignment in Bothell, south through the Sammamish River Valley to Redmond. However, King County is in the process of designing and constructing additional storage capacity at Brightwater, which would allow for distribution of recycled water to areas proximal to the plant and eventually to other portions of Snohomish County as recycled water infrastructure expands to meet future demand.

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

The proposed recycled water MAR facility will result in streamflow benefits to one or more subject streams by diverting and temporarily storing recycled water into the shallow glacial or alluvial aquifer

underlying the project site. The project is currently conceptual, but anticipates the ability to divert recycled water from the existing pipeline at a rate of approximately 0.5 cubic feet per second (cfs) for up to six months (May through October). The goal is to increase streamflow, especially during months when demand for water is highest and surface flows are generally lowest (June through August). The proposed MAR facility will infiltrate recycled water into the shallow aquifer and provide increased baseflow to the subject stream and its tributaries, depending on where the facility is sited. The anticipated offset volume for this project is 181 acre-feet (AF) per year. The offset volume is calculated based on the quantity of water infiltrated annually, as described below.

Assuming water will be diverted between May 1 and October 31 every year (183 days), the annual diversion volume is estimated to be 181 acre-feet (AF) per year using Equation 1:

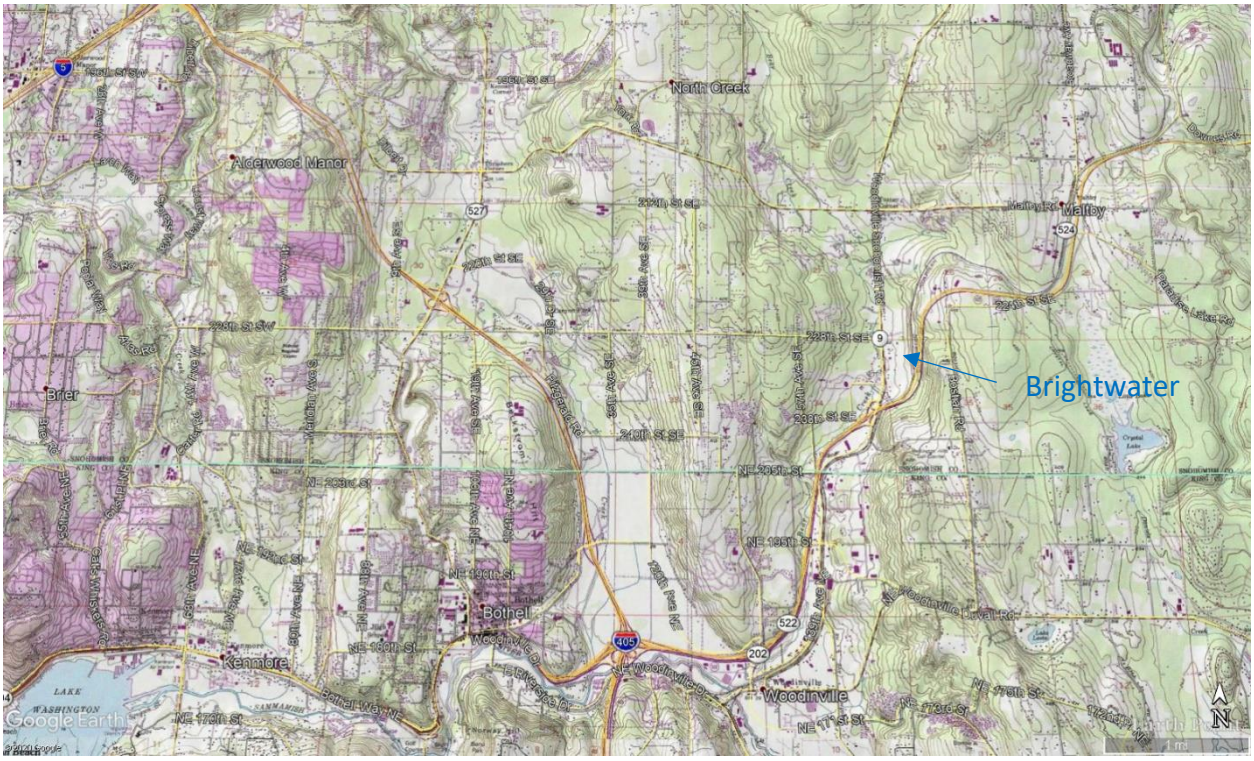
Annual Volume = Diversion Rate x Duration of Diversion Equation 1

It is anticipated that the MAR facility would be constructed as a buried infiltration gallery or open pond, but design details will be further developed at a later time. Development of this project would augment existing flow in subject stream(s) through an increase in groundwater baseflow, which could be year-round depending on site and down-gradient hydrogeology. The temporal distribution and absolute value of those benefits will be estimated during a feasibility study, which is required 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 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.

No potential MAR facility site has currently been identified. The following map provides an aerial view of Brightwater and the surrounding area.



Description of the anticipated spatial distribution of likely benefits.

Each of the Snohomish County-owned parcels are located within the WRIA 8 delineated Little Bear subbasin. The project is expected to provide streamflow benefits in the subject stream(s) and downstream subbasins (including the Sammamish River Valley, Greater Lake Washington, and Seattle Lake Union subbasins).

Location relative to future PE well demand

The consumptive use estimate for the WRIA 8 Little Bear subbasin is 44.3 AF per year (GeoEngineers 2019). Consumptive use estimates for subbasins downstream of the Sammamish River Valley subbasin include the following (GeoEngineers, 2020):

- Sammamish River Valley subbasin: 3.2 AF per year.
- Greater Lake Washington subbasin: 1.8 AF per year.
- Seattle Lake Union subbasin: Not calculated.

Performance goals and measures.

The performance goals are to increase water storage in the glacial or alluvial aquifer adjacent to the subject stream(s) by infiltrating 181 AF per year through the MAR facility to improve baseflow in the subject stream(s). The performance measures will be an increase in baseflow in the subject stream, especially during the critical flow period. The increased baseflow should have the added benefit of reducing water temperatures in the river.

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

The Sammamish River and tributaries are inhabited by numerous fish species, including summer steelhead, winter steelhead, Coho salmon, dolly varden/bull trout, pink salmon, rainbow trout, summer chinook salmon, fall chinook salmon, fall chum salmon, and coastal cutthroat trout (WDFW 2020).

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. In addition, this project would reduce the amount of treated wastewater that our region sends to Puget Sound and puts water to better use.

The barriers to completion include funding for construction and O&M costs. In addition, the water available for diversion from the Brightwater recycled water pipeline is treated wastewater. The Brightwater plant is an advanced treatment facility that combines standard biological wastewater treatment with membrane filters to produce higher quality water that is seven to ten times cleaner than typical secondary treated wastewater. After disinfection, water is 99 percent cleaner than when it came into the treatment plant. Brightwater recycled water currently is used for irrigation of golf courses, soccer fields and farms, as an alternative to irrigating with valuable drinking water. It is also used for environmental projects wherever it is available. However, despite the advanced treatment technology, it is anticipated that, as a component of project feasibility evaluation, water quality will be evaluated, and a geochemical compatibility analysis will be conducted to evaluate the potential for water quality degradation.

Potential budget and O&M costs.

No specific MAR site has been selected. Currently, recycled water is only available via King County's recycled water pipeline which extends from the Brightwater tunnel alignment in Bothell, south through the Sammamish River Valley to Redmond. However, King County is in the process of designing and constructing additional storage capacity at Brightwater, which would allow for distribution of recycled water to areas proximal to the plant and eventually to other portions of Snohomish County as recycled water infrastructure expands to meet future demand.

Ultimately, the cost of constructing the project will depend on project location and the conveyance infrastructure required to transport recycled water from existing Brightwater conveyance structures to the MAR facility.

Purchase of reclaimed water from King County would be ongoing and dependent on the negotiated rate. Assuming a rate of $0.26 per hundred cubic feet, which was the average reclaimed water rate in Florida in 2005 (King County Department of Natural Resources and Parks, 2008), the potential annual cost for an MAR project that injects 0.5 cfs for a period of 5 months would be approximately $16,850.

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.
- 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 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 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.

Washington Water Trust is a potential sponsor for this project.

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

King County Department of Natural Resources and Parks, 2008. Reclaimed Water Feasibility Study. March. 185 p.

GeoEngineers, Inc. (GeoEngineers). 2020. WRIA 8 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 2020.

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

Pre-identified Water Right No. 7 (8-SRV-W3)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .9 cfs in 1.8 miles of Sammamish River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 84.85 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): 07/26/1949, 07/01/1974

INSTREAM FLOW RULE (1979): Sammamish River is closed to further consumptive appropriation[19]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook (Threatened), Puget Sound/Strait of Georgia Coho (Species of Concern), Winter/Summer Puget Sound Steelhead, Bull Trout (Threatened)

OUTREACH STATUS: Interested

Project Description

The Pre-identified Water Right No. 7 water right was included in the WRIA 8 water rights analysis by Ecology request. The land and an underlying a portion of the water right was previously used as a golf course, which according to online news sources, closed in 2017. The other active irrigation within the water rights places of use occurs on a city park. The property is located within the City of Bothell. The parcels comprising the golf course property, were used as a golf course from 1931-2017. Forterra purchased the property in 2016 for permanent protection as a parkland. The City of Bothell purchased the property from Forterra in 2017 with assistance from King County, which now holds a conservation easement over the property. With the property change, there may be an opportunity for a water rights acquisition. Ecology has conducted initial outreach to and the water right holder has indicated interest in temporarily donating a portion of the water rights to the Trust Water Rights Program and pursuing a permanent donation in the future.

[19] Chapter 173-508 WAC

Watershed

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. The Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979. [20]

Land Use & Ownership

According to the King County Assessor, the currently land uses are listed as Park, Public (Zoo/Arbor), Vacant (Single Family), Single Family (Residential Use), and the land is zoned R9600 and R4000. These parcels are located within the City of Bothell. Prior to coming into common ownership, these nine parcels totaling 127 acres were owned by separate entities and managed under two separate uses, a public park, and a golf course. A review of the WSDA 2019 Agricultural Land Use map, identifies Developed as the crop group, and sprinklers as the irrigation method. Additionally, portions of the place of use were developed and now part of the Riverbend and Valhalla neighborhoods while other portions are forested. Since these areas are not likely relying on the subject water right, nor owned by the water right holder, they are not discussed in this profile. Irrigation delineation indicates that as much as 44.9 irrigated acres in 2013. Delineating irrigated acreage may be challenging on this property related to known practices of irrigating only golf course tees and greens.

Table 16: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	44.9
2015	15.4
2017	23.9
2019	40.2

Water Right

Table 17: Current Water Rights

[20] Chapter 173-508 WAC

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	-	0.2 cfs	07/26/1949	Irrigation	20	Sammamish River
Certificate	96 afy	0.7 cfs	07/01/1974	Irrigation	48	Sammamish River

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:

There are two water right certificates with places of use that overlap to cover the entirety of the subject property. The original certificate was issued for the sole purpose of irrigation of 20 acres, has a priority date of 07/26/1949, and asserts 0.2 cfs as the Qi, and no listed Qa. Limited history was available for this right and supporting documents include the application, progress sheet, and certificate. The listed source of this right is the Sammamish River, withdrawn by surface pump.

The second certificate was filed by the owners of the golf course for the purpose of irrigation of 48 acres, and asserts 0.7 cfs and 96 afy. WRTS lists this use as primary, however, the application materials suggest this certificate is additive to the 07/26/1949 certificate. A Report of Examination (ROE) issued in 1975 did not modify any of the requested quantities. The listed source of this right is the Sammamish River, withdrawn by surface pump.

Metering Records:

There were no metering records available from Ecology.

Conclusion

This project was identified by Ecology as a potential acquisition opportunity. A portion of the land was as a golf course, which ceased operations in 2017. The City of Bothell currently owns the property where King County holds a conservation easement. The City of Bothell owns the other portion of the property, managed as a park. The City and Ecology have been in communication regarding temporarily donating a portion of these rights into the Trust Water Right Program. It is possible that a change in the land-use will decrease irrigation demands and a portion of these rights may be available for permanent acquisition.

No metering documents are in the WRTS database to support use of these water rights. Four years of delineations were undertaken (2013, 2015, 2017, 2019) which estimate as much as 44.9 delineated acres, a difference of 23.1 acres. Although it is possible that the difference of estimated irrigated acres between years analyzed may be 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.

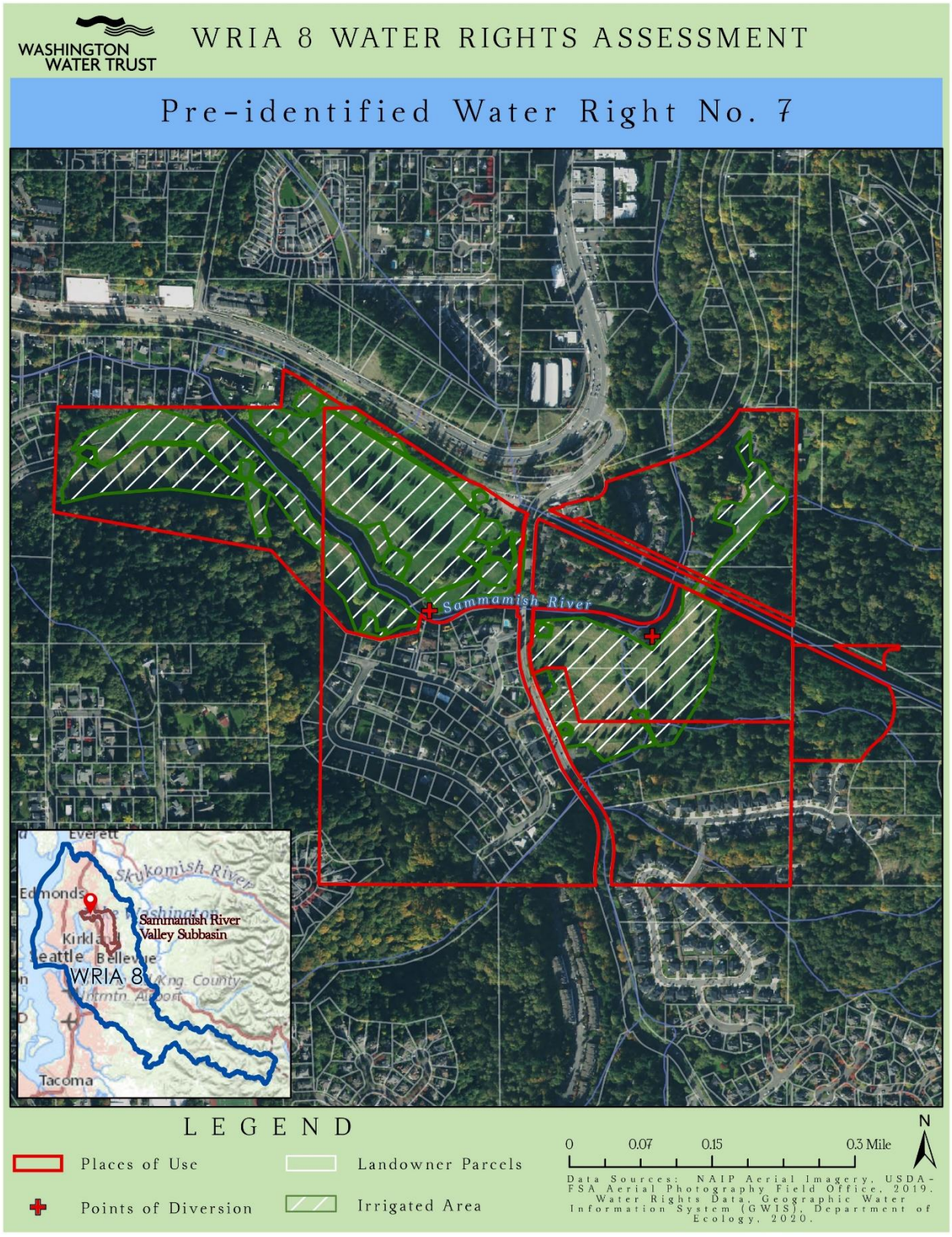
Due to lack of metering documents, WWT utilized delineations to estimate the potential consumptive use quantity that may be available for a transaction and as an offset. Since the property use is known, golf course/park, an estimate is developed based on the pasture/turf water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation method assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on the highest delineation (44.9 acres), and assuming pasture/turf and sprinkler irrigation, 84.85 afy consumptive is the estimated quantity available for a transaction.[21]

The Pre-identified No. 7 water rights have priority dates of 07/26/1949 and 07/01/1974, which are senior to the establishment of the Cedar-Sammamish Basin Instream Resources Protection Program) in 1979. These water rights do not have an instream flow provision listed in their supporting documentation.

[21] 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.

Figure 6: Project Map



Pre-identified Water Right No. 8 (8-SRV-W4)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .467 cfs in 7.4 miles of Sammamish River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 23.43 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): Claimed first use 1910, claimed first use 1974

INSTREAM FLOW RULE (1979): Sammamish River is closed to further consumptive appropriations[22]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: Initial

Project Description

The Pre-identified No. 8 water right was included in the WRIA 8 water rights analysis by Ecology request. There are three water rights appurtenant to the parcels owned by this entity. These parcels are located within the city limits of Woodinville. Two of the three water right place of use also encompasses an adjacent property that is owned and managed by a separate entity. This project opportunity excludes that portion of that place of use owned by a separate entity, discussed in a separate profile. Shared used of this water right between these two entities may make it difficult to understand how much water is has been used under each operation. Prior to this acquisition, these parcels were under common ownership and management with the other parcels within the place of use, and were operated as a farm. The other water right claim appurtenant to this property covers an area that appears to be completely forested. The land under common management for this project opportunity is comprised of five parcels totaling 92.93 acres. Online

[22] Chapter 173-508 WAC

sources indicate these parcels were purchased by the current owners and developed into a winery and vineyard in 1976. Due to proximity to the Brightwater Treatment Plant recycled water central service line, there may be potential for a source switch to recycled water. The cultivation of edible food crops and willingness to use recycled water may create a barrier to a recycled water source switch. There may be landscape irrigation needs on site as well. Washington Water Trust, King County Recycled Water and Washington State University are currently engaged in a project to assess and increase the viability of recycled water as an irrigation source. Any outreach on these water right(s) should defer to the ongoing efforts of the above project, WWT and King County. Given the parcel location within the City of Woodinville, a municipal supply source switch may also be an option. Additional documentation supporting beneficial use will be necessary to more accurately determine potential consumptive offset quantity available. Initial contact with the landowner has been made by King County Recycled Water.

Watershed

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek, and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[23]

Land Use & Ownership

According to the King County Assessor, the current land-use is Industrial (Light) and Vacant (Single-family), and zoned as Industrial and R-4 Residential. The portion of the land under common ownership has been continuously operated as a vineyard/winery since it opened in 1976. Communication with King County Natural Resources indicate the parcels managed by this entity are not enrolled in the King County Farmland Preservation Program. A review of the WSDA 2019 Agricultural Land Use map, identifies no crop type on the property. Irrigation delineation indicates that as much 12.4 acres were irrigated in 2019. Although it is possible that the difference of estimated irrigated acres between years analyzed may be 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 18: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	5.1

[23] Chapter 173-508 WAC

Year	Total Irrigated Acres (Med/High Confidence)
2015	5.1
2017	5.1
2019	12.4

Water Right

Table 19: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Long Form Claim	24 afy (claimed)	200 gpm (claimed)	1910 (claimed)	Irrigation, fire protection, stock watering, cleaning barns	12	Unnamed creek
Long Form Claim	26 afy (claimed)	140 gpm (claimed)	1910 (claimed)	Domestic Supply and Irrigation	-	Spring-fed reservoir
Long Form Claim	7 afy (claimed)	10 gpm (claimed)	1974 (claimed)	Domestic Supply and Irrigation	7	Spring

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 claim was filed was 12/23/1973 and asserted 200 gpm continuously totaling 24 afy for the purposes of irrigation of 12 acres, fire protection, stock watering, and cleaning barns. Ecology lists the priority date as “date first use” which according to the claim form is 1910. The water is diverted via headworks installed in a creek. There are no additional documents suggesting changes to this water right.

The second claim was filed 01/23/1974 and asserted 140 gpm continuously totaling 26 afy for the purposes of domestic supply, irrigation, and “milk barn”. Ecology lists the priority date as :date first use” which according to the claim form is 1910. The water is diverted via headworks installed in what is described as a spring-fed reservoir. There are no additional documents suggesting changes to this water right.

The third claim was filed 12/28/1973 and claimed 10 gpm continuously totaling 7 afy for the purposes of irrigation of 7 acres and domestic supply. Ecology lists the priority date as "date first use" which according to the claim form is 1974. The water is diverted via headworks. There are no additional documents suggesting changes to this water right.

Metering Records:

Ecology issued an Administrative Order dated 6/7/2002, ordering the water right holder to comply with metering actions described in Chapter 13-173 WAC. Communication with the Ecology Metering Coordinator revealed metering records for these rights were unavailable in the database.

Conclusion

This project was identified by Ecology as a potential acquisition opportunity. Initial conversations have occurred between King County and the landowner. There are three claims appurtenant to this property, all of which present challenges for acquisition. The places of use associated with the 1910 claims encompass property under different ownership and management. It may be difficult to determine to what extent these right have been exercised by both parties. Additionally, aside from irrigation of 12 acres, these rights asserts stock watering, fire protection, and cleaning barns as purposes of use. No metering records were available to indicate water use under these rights. The third water right mapped place of use appears to be completely forested. Irrigation and domestic use are listed as the purposes for this right. No metering records were available to indicate water use under this right. The production portion of the property is currently a vineyard/winery, and has been operated as such since it opened in 1976. There is a possibility that one or both of these rights are used to support wine production and a de facto change of use may have occurred. Ecology will have to make the determination if this is the case.

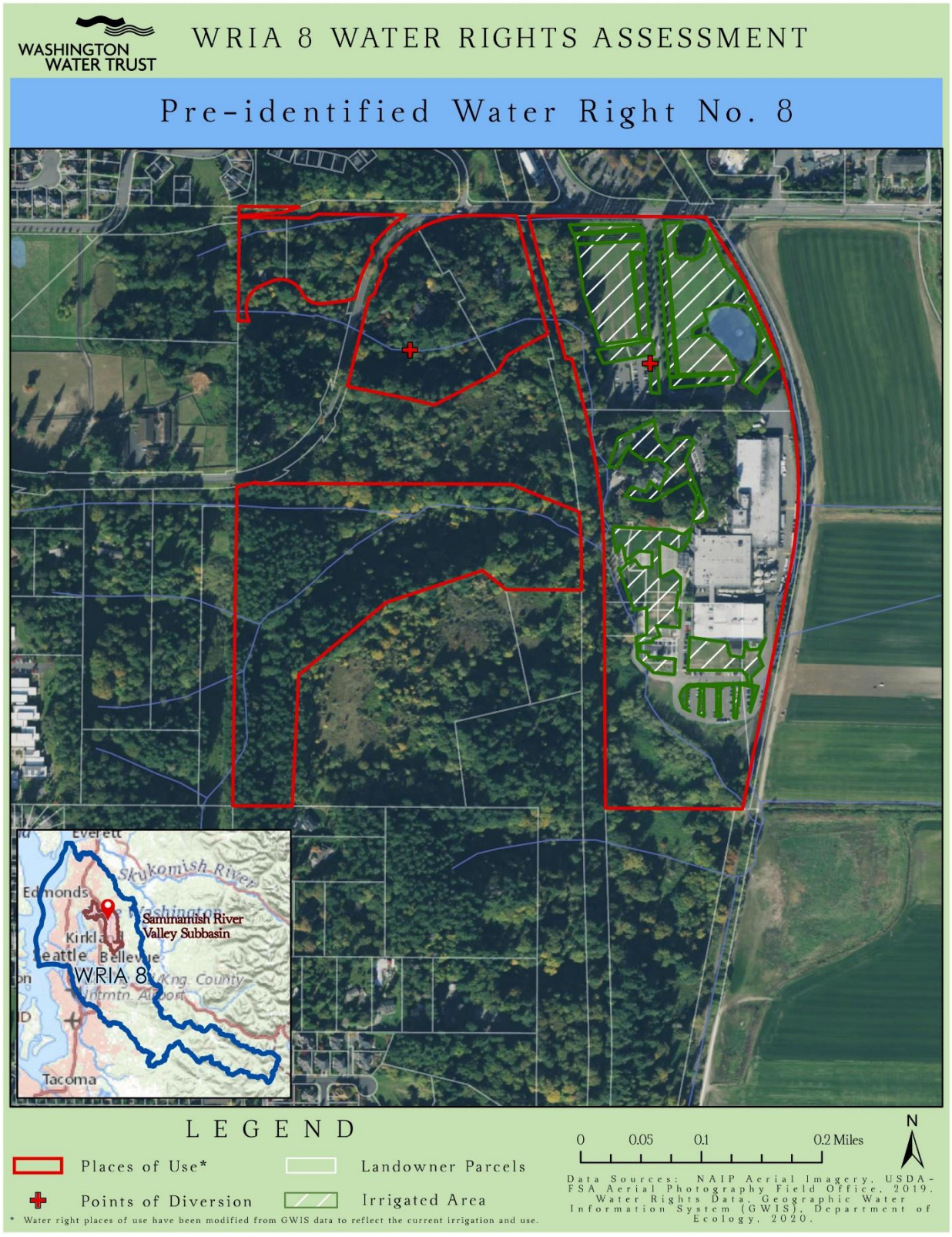
Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which estimate as much as 12.4 irrigated acres. Although it is possible that the difference of estimated irrigated acres between years analyzed may be explained as the result of the timing of the aerial photograph, specific 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. Due to a lack of metering records, WWT utilized these delineations to estimate the potential consumptive use quantity that may be available to serve as an offset. Review of aerial imagery suggests the irrigated portion of the property appears to be primarily grass/turf. The estimate is developed based on the turf/pasture water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation method is assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on the irrigation delineation of 12.4 acres and assuming turf/pasture, and sprinkler irrigation, 23.43 afy consumptive is the estimated quantity available for trust water transaction.[24]

The Pre-identified No. 8 water rights have claimed first use priority dates of 1910 and 1974, which is senior to the establishment of the Cedar-Sammamish Basin Instream Resources Protection Program in 1979. These water rights do not have instream flow provisions listed in supporting documentation.

[24] 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..

1 Figure 7: Project Map



2

Sammamish River Valley No. 1 (8-SRV-W5)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .425 cfs in .4 miles of Sammamish River tributaries (Wildcat Creek, Unnamed Stream), 6.4 miles Sammamish River mainstem, downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 36.66 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): 03/22/1948, 06/14/1951, 07/09/1951, 02/21/1952, 09/28/1951, 08/31/1977

INSTREAM FLOW RULE (1979): Sammamish River and its tributaries are closed to further consumptive appropriation.[25]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: None

Project Description

The Sammamish River Valley No. 1 water right was identified in the WRIA 8 irrigation analysis. The property is located about 1-mile south of the City of Woodinville. There are six water rights and their places of uses, which comprise this project opportunity. Irrigation delineation indicated irrigation has occurred under these places of use. This property is located in close proximity to the recycled water central service line and may be a candidate for a recycled water source switch. Landowner willingness to switch recycled water may be a barrier to this opportunity. To our knowledge, there has been no outreach to the water right holder by any entity, at this time.

Watershed

[25]Chapter 173-508 WAC

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek, and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[26]

Land Use & Ownership

According to the King County Assessor, the parcels which underlie the water right places of use, is owned by four separate landowners. The largest of these landowners owns four parcels totaling 42.63 acres, plus an additional contiguous parcel outside the mapped places of use that is 18.44 acres. The King County Assessor lists Sports Facility, Resort/Lodge/Retreat, and Single Family (Res Use/Zone) as the current use on these parcels with zoning designated as RA5-Rural Area and A10-Agricultural. Communication with King County Natural Resources indicate the parcels managed by this entity are not enrolled in the King County Farmland Preservation Program. According to online sources, these parcels were originally managed as an amusement park in the 1960's until becoming a tennis and sports club in 1978. The facility added a golf range in 1991. The current owners acquired the facility in 2018, have continued to manage it as a sports club. A review of the WSDA 2019 Agricultural Land Use map identifies 20.57 acres turf grass as the crop type on the property with sprinklers as the irrigation method. Irrigation delineation estimates as much as 19.4 irrigated acres in 2019. This acreage excludes the 18.44 acre parcel outside of the water right place of use, although under common management and appears to be irrigated as well.

There are three parcels within the mapped places of use under separate ownership. According to King County Assessor, these parcels are 15.39 acres, 1.2 acres, and .73 acres. Current land use on these parcels are Single Family (Res Use/Zone) with zoning designated as RA2.5-Rural Area and RA5-Rural Area. There is an estimated 1-acre of delineated on these parcels.

Table 20: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	6.5
2015	.1
2017	5.0
2019	19.4

[26] Chapter 173-508 WAC

Water Right

Table 21: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	-	.03 cfs	03/22/1948	Irrigation (Supplemental)	3	Unnamed Stream
Certificate	-	.29 cfs	06/14/1951	Irrigation (Primary)	29	Unnamed Stream
Certificate	-	.025 cfs	07/09/1951	Irrigation (Primary)	2.5	Wildcat Creek
Certificate of Change	-	.02 cfs	09/28/1951	Irrigation (Unknown), Domestic Single (Unknown)	2	Wildcat Creek
Certificate	-	.02 cfs	02/21/1952	Irrigation (Supplemental)	2	Wildcat Creek
Certificate	4 afy	.04 cfs	08/31/1977	Domestic Single, Irrigation (Primary)	2	Unnamed Spring

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 certificate with a 03/22/1948 priority date was issued for the purpose of irrigation of 3 acres with .03 cfs listed as the Qi and no listed Qa. Ecology's Water Rights Tracking System (WRTS) lists "Supplemental" as a provision to this right, however, this is not corroborated elsewhere in the supporting documentation. According to WRTS, there have been no changes made to this right. The source of this right is an unnamed stream, a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system.

The certificate with a 06/14/1951 priority date has the purpose of irrigation of 29 acres with a Qi of .29 cfs and no listed Qa. According to WRTS, there have been no changes made to this right. The source of this right is an unnamed stream, which is a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system.

The certificate with a 07/09/1951 priority date has the purpose of irrigation of 2.5 acres with a Qi of .025 cfs and no listed Qa. According to WRTS, there have been no changes made to this right. The

ROE issued with this right recommended a Qi of .035 cfs, with .025 cfs for irrigation and .01 cfs for domestic use while the certificate authorizes 0.02 cfs. The source of this right is Wildcat Creek, a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system.

The certificate with a 02/21/1952 priority date has the purpose of irrigation of 2 acres with a Qi of .02 cfs with no listed Qa. According to WRTS, there have been no changes made to this right and the use type is "Supplemental". The source of this right is Wildcat Creek, a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system. The ROE notes that there was an additional surface water certificate serving this property, to which this right is supplemental.

According to the certificate of change with a priority date of 09/28/1951, this certificate changed an existing claim with a listed purpose of use of irrigation, milk cooling and domestic use with a Qi of 5.0 cfs and no listed Qa, to domestic use with a Qi of .02 cfs. The certificate of change also notes two places of use for this change. WRTS lists a purpose of irrigation of 2 acres and domestic single (also with 2 acres listed) and a use type of "unknown". The source of this water right is Wildcat Creek, a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system.

The certificate with a 08/31/1977 priority date has the purposes of domestic supply with a Qi of .02 cfs and a listed Qa of 2.0 afy, and irrigation of 1-acre with a Qi of .02 cfs and a listed Qa of 2.0 afy, totaling a cumulative Qi of .04 cfs and Qa of 4.0 afy. According to WRTS, there have been no changes made to this right. The ROE notes this application may be part of an existing certificate, however, it could not be determined. The source for this right is an unnamed creek (Gold Creek), which is a tributary to the Sammamish River. Water is diverted via headworks into a gravity flow system.

Metering Records:

No metering records were available for these rights.

Conclusion

This project was identified by during the WRIA 8 irrigation analysis as a potential source switch to recycled water. The subject property is in proximity to the recycled water central service line and existing irrigation appears used on a non-edible crop (turf). The presence of six water rights and four landowners within the mapped places of use create a potential barrier of complexity for transaction, though it appears the majority of the consistent irrigation has occurred on the property managed as a sports complex. The sum of irrigable acres authorized by these water rights documents is 40.5, whereas irrigation delineation suggests the as much as 19.4 irrigated acres in the most recent 5-year period. Although it is possible that 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.

The additional parcel owned and managed by the sports complex appears to be irrigated, and may qualify as a de facto change.[27] Additionally, the lack of clarity concerning the relationship of the water right documents creates a data gap that will need to be addressed, prior to further project development.

Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which indicate areas as much as 19.4 acres were irrigated. Due to lack of metering records, WWT utilized irrigation delineations to estimate the potential consumptive use quantity that may be available to serve as an offset. The estimate was developed based on the pasture/turf water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation methods assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

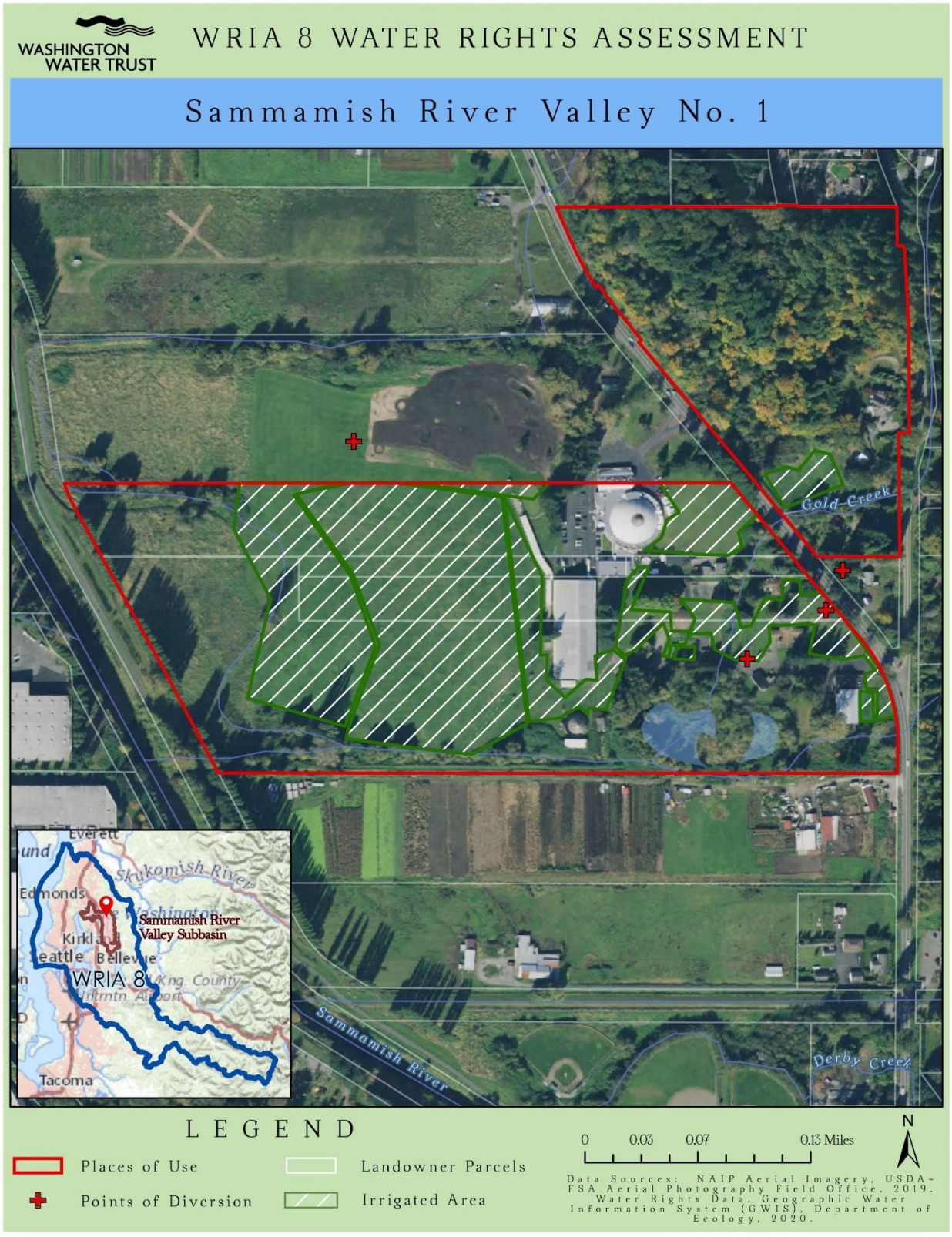
- Based on the delineation of 19.4 irrigated acres and assuming pasture/turf and sprinkler irrigation, 36.66 afy consumptive is the estimated quantity available for transaction.[28]

The Sammamish River Valley No. 1 water rights have priority dates of 03/22/1948, 06/14/1951, 07/09/1951, 02/21/1952, 09/28/1951, and 08/31/1977, which are senior to the establishment of the Cedar-Sammamish Instream Resources Protection Program in 1979.

[27] "In some situations, changes to historic uses associated with water rights have been made in the diversion or use of water without first obtaining authorization for the changes pursuant to chapters 90.03 and 90.44 RCW. Such unauthorized changes to existing water rights are commonly referred to as "de facto, or after-the-fact changes"." https://appswr.ecology.wa.gov/docs/WaterRights/wrwebpdf/pol1120.pdf

[28] 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.

1 Figure 8: Project Map



2

Sammamish River Valley No. 3 (8-SRV-W5)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional 1.65 cfs in 7.4 miles of Sammamish River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 551.83 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): 03/29/1947, 07/09/1965, Pre-1901 (claimed)

INSTREAM FLOW RULE (1979): Sammamish River is closed to further consumptive appropriation.[29]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: Initial

Project Description

The Sammamish River Valley No. 3 water right was identified in the WRIA 8 irrigation analysis performed by WWT. The property is located approximately 4 miles northwest of the City of Redmond. There are fifteen water right documents with congruent or overlapping places of use, held by the water right holder. Discussions with Ecology revealed that twelve of these are 97-98 era claims. Pursuant RCW 90.14.068, claims filed during this period are subordinate to any water right (permit, certificate, or claim) filed prior to July 27, 1997. Therefore, these claims are junior to the Cedar-Sammamish instream flow and thus not discussed further in this profile. Additional analysis of these rights would be necessary to determine their project potential. The three remaining rights appurtenant to the property have likely been used to irrigate the property since the farm's establishment prior to 1910, according to online sources. The property is in close proximity the central service line for recycled water. In previous contact with the land user by WWT, they have

[29] Chapter 173-508 WAC

expressed interest in learning more about the possibility of switching to recycled water. Additional information regarding the suitability of recycled water and cost associated to the switch to this source are potential barriers to this transaction with this user.

Watershed

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. The Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek, and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow is cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[30]

Land Use & Ownership

These parcels, located in the King County designated Agriculture Production District. Communication with King County Natural Resources indicate three of the four parcels managed by this entity are dually enrolled in the King County Farmland Preservation, and Farm and Ag incentive programs.[31] The fourth parcel is also enrolled in the Farm and Ag incentive program. According to the King County Assessor, the current land-use is Agricultural and the parcels are zoned as A10-Agricultural. The landowner holds four parcels totaling 401.87 acres. The smallest of these parcels is non-contiguous, located in the City of Kirkland jurisdiction, zoned RSA1 and completely forested. No agriculture appears to occur on this parcel. Review of the WSDA 2019 Agricultural Land Use map identifies turf grass as the crop type on irrigated portions of the property. Irrigation delineation suggests as much as 320.6 irrigated acres in 2019. The current operators lease the two larger parcels from the landowners. Underlying one of the water right documents, there is a portion of land owned and managed by a separate entity. At Ecology's request, this property is separately reviewed.

Table 22: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	311.3
2015	311.3
2017	314.7
2019	320.6

[30] Chapter 173-508 WAC.
[31] https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/rural-regional-services-section/agriculture-program/farmland-preservation-program.aspx

Water Right

Table 23: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	-	.8 cfs	03/29/1947	Irrigation	80	Sammamish River
Certificate	96 afy	.4 cfs	07/09/1965	Irrigation	200	Sammamish River
Claim Long Form	24 afy	.45 cfs	1910 (claimed)	Irrigation, Fire protection, Stock watering, Cleaning Barns	12	Sammamish River

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 has a priority date of 03/29/1947 for the purpose of irrigation of 80 acres, with .8 cfs listed as the Qi and no listed Qa. This certificate has a metering order from Ecology, dated 06/04/2002. The source of this right is the Sammamish River and with water diverted to the property via a surface water pump.

The second certificate has a priority date of 07/09/1965 for the purpose of irrigation of 200 acres, with .4 cfs listed as Qi and 96 afy listed as the Qa. During the permit period for this certificate, an ROE directed a reduction in the Qa and Qi listed on the application Certificated quantities were further reduced from those listed in the ROE. This certificate has a metering order from Ecology, dated 06/04/2002. The source for this right is the Sammamish River with water diverted via two surface water pumps.

The long form claim asserts first use as 1910, a purpose of fire protection, stock watering, cleaning barns, and irrigation of 12 acres, with .45 cfs asserted as the Qi and 24 afy listed as the Qa. This right has a metering order from Ecology, dated 06/07/2002. A portion of this water right place of use is under different ownership and management, and reviewed separately for Pre-identified Water Right No. 8. The source for this right is a creek, which flows to the Sammamish River. Water is diverted from the creek using head works and a gravity system.

Metering Records:

Metering records are available by request from Ecology from 2006-2019. These records indicate water use from four separate diversions. These diversions serve the two certificates discussed above and two 97-98 era claims. These diversions are shared and further analysis is necessary to determine quantities used under each right. Meter records report as much as 326.7 afy of water during the last 5 years.

Conclusion

This project was identified by WWT as a potential source switch to recycled water. The land operates as a commercial turf farm. Given the non-edible crop type and the property's proximity to the recycled water central service line, this project shows strong potential to receive recycled water. Washington Water Trust and King County have conducted initial outreach to the operators of this farm. Washington Water Trust, King County Recycled Water and Washington State University are currently engaged in a project to assess and increase the viability of recycled water as an irrigation source. Any outreach on these water right(s) should defer to the ongoing efforts of the above project, WWT and King County.

The three rights discussed in this profile and the twelve additional 97-98 era claims present a complexity to fully understanding the quantity and validity of water rights appurtenant to this property. Quantities claimed on the 97-98 era claims appear excessive (e.g. Qa 36,500 afy, Qi 50 cfs). Additionally, incomplete metering records provide data for only four of the fifteen rights. Further due diligence is required to fully understand the extent of water use on this property.

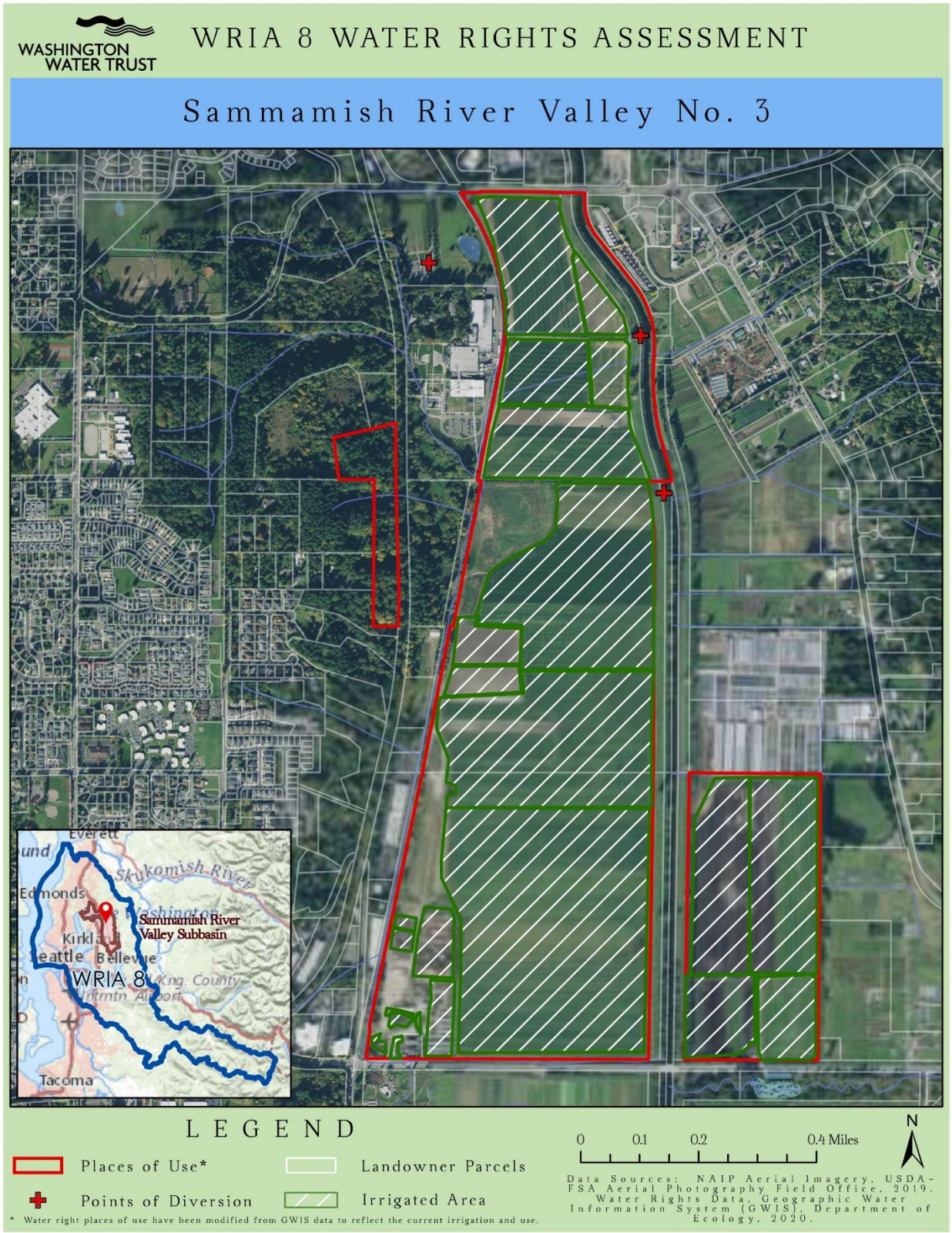
Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which estimate as much as 320.6 irrigated acres. Consistent irrigation across years examined led WWT to utilize irrigation delineations to estimate the potential consumptive use quantity that may be available to serve as an offset. The estimated irrigation acreage was reduced to align with the total irrigated acreage under the three subject water rights. Since the property use is known, turf farm, an estimate is developed based on the turf/pasture water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation method is assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on the three water rights documents listed above which authorize or assert 292 acres of irrigation, and assuming turf/pasture, and sprinkler irrigation, 551.83 afy consumptive is the estimated quantity available for transaction.[32]

The Sammamish River Valley No. 3 water rights have priority dates of 03/29/1947, 07/09/1965, and Pre-1901 (claimed), which are senior to the establishment of the Cedar-Sammamish Instream Resources Protection Program in 1979.

[32] 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.

Figure 9: Project Map



Sammamish River Valley No. 5 (8-SRV-W5)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .27 cfs in 8.1 miles of Sammamish River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 31.08 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): 03/03/1977, 03/03/1977

INSTREAM FLOW RULE (1979): Sammamish River is closed to further consumptive appropriation [33]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: None

Project Description

The Sammamish River Valley No. 5 water rights were identified in the WRIA 8 irrigation analysis. The property underlying the water rights is located approximately 4 miles northwest of the City of Redmond. Two water right certificates with overlapping places of use are held by the water right holder and covering five parcels. Three of these parcels are under common management. These parcels are close in proximity to a recycled water central service line and may be a candidate for a source switch to recycled water. A change application has been filed pertaining to the surface water right. No documents are available on the Ecology Water Right Tracking System (WRTS) regarding this change application. A lack of metering records create a data gap in fully understanding water use on these parcels. Online resources indicate part of this property is operated as a Community Supported Agriculture (CSA) program. The cultivation of edible food crops and willingness to use recycled water may create a barrier to a recycled water source switch. Washington Water Trust, King County Recycled Water and Washington State University are currently engaged in a project to

[33] Chapter 173-508 WAC

assess and increase the viability of recycled water as an irrigation source. Any outreach on these water right(s) should defer to the ongoing efforts of the above project, WWT and King County. To our knowledge, there has been no outreach to the water right holder by any entity at this time.

Watershed

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek, and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[34]

Land Use & Ownership

These parcels are located in the King County designated Agriculture Production District. Communication with King County Natural Resources indicate four of the five parcels within the places of use are enrolled in the King County Farmland Preservation, and the Farm and Ag incentive programs.[35] The fifth parcel is enrolled in the King County Public Benefit Rating System program.[36] According to the King County Assessor, the current land-use is listed as agricultural and zoned A10-Agricultural. The landowner owns three contiguous parcels totaling 23.05 acres lying immediately east of the Sammamish River. Google Earth aerial imagery indicates these parcels have been in production since at least 1990. A review of the WSDA 2019 Agricultural Land Use map, identifies vegetable as the crop group and sprinkler as the irrigation type covering 18.25 acres. Irrigation delineation estimates that as much as 16.4 irrigated acres in 2019. It is possible that the difference of estimated irrigated acres between years analyzed maybe explained as the result of the timing of the aerial photograph or specific water use practices better understood through direct conversation with the water user.

Table 24: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	13.8
2015	13.8
2017	14.1
2019	16.4

[34] Chapter 173-508 WAC
[35] https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/rural-regional-services-section/agriculture-program/farmland-preservation-program.aspx
[36] https://your.kingcounty.gov/dnrp/library/water-and-land/incentives/pbrs-resource-information.pdf

Water Right

Table 25: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	22 afy	22 gpm	03/03/1977	Commercial and Industrial, Irrigation	11	Groundwater
Certificate	22	.22 cfs	03/03/1977	Dairy, Irrigation	11	Sammamish River
Change-ROE	14.1	50 cfs	05/05/2000	Irrigation	11	Groundwater

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 groundwater certificate with a priority date of 03/03/1977, issued 01/05/1991, lists commercial and industrial, and irrigation of 11 acres as the purpose of use, with a Qi of 22 gpm and 22 afy authorized as the Qa. The original application lists irrigation and vegetable processing as the purpose of use. The well serving this right is located on the property.

The surface water certificate with a priority date of 03/03/1977, issued 01/15/1985, lists agricultural processing, and irrigation as the purpose of use, with a Qi of .22 cfs and 22 afy authorized as the Qa. The permit for this right lists it as supplemental to the abovementioned groundwater certificate and notes the annual total use from both shall not exceed 22 afy. The source for this right is the Sammamish River and water is diverted via a surface water pump.

The Change-ROE water right document is the child of the surface water document and was submitted 05/05/2000. The stage for this application listed on WRTS is PA notice (proof of appropriation), and the attributes indicate the purpose is irrigation of 11 acres, with 50 cfs listed as the Qi and 14.1 afy listed as the Qa, and groundwater listed as the source. Given that WRTS lists groundwater as the source of this right, suggests the 50 cfs is a clerical error and may intend to be 50 gpm.

Well Information:

Well records are available and indicate the well serving the groundwater right was drilled 12/01/1987 with a diameter of 10 inches to depth of 62 feet, and was completed at a depth of 62 feet. It is unclear how this right was fulfilled prior to the installation of this well.

Metering Records:

WWT requested metering records from the Ecology and No metering records were available for these water rights.

Conclusion

This project was identified during the WRIA 8 irrigation analysis. Water right documents suggest this land has been used for vegetable production and processing since water right permits were issued. No metering records were available to indicate water use on the property. The change application related to the surface water right was submitted 05/05/2000, and is still listed as active in WRTS. No further information regarding this application was available in WRTS. The nature and purpose of this application may need to be discussed with the landowner to better understand transaction potential. This property is in close proximity to the Brightwater Treatment Plant central service line and may be a candidate for a recycled water source switch. According to online sources there is a CSA on the property. The cultivation of edible food crops and willingness to use recycled water may create a barrier to a recycled water source switch.

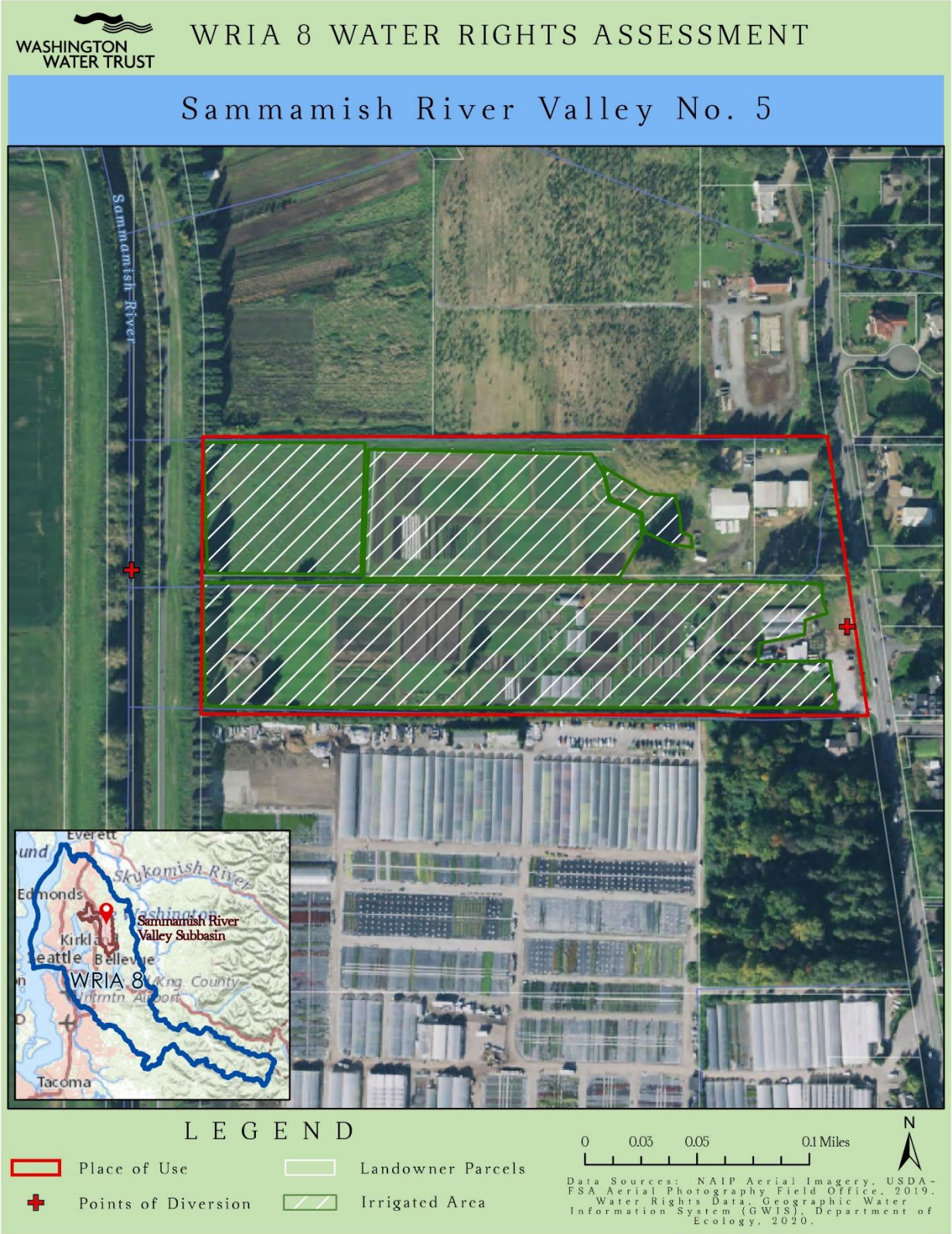
Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which estimate as much as 16.4 irrigated acres. Due to a lack of metering records, WWT utilized irrigation delineations to estimate the potential consumptive use quantity that may be available to serve as an offset. Since the specific vegetable types are unknown, the estimate was developed based on the pasture/turf water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation methods assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency). This estimate based on pasture is likely larger than the actual consumptive quantity based on vegetable row crops.

- Based on the delineation of 16.4 irrigated acres and assuming pasture/turf and sprinkler irrigation, 31.08 afy consumptive is the estimated quantity available for trust water transaction.[37]

The Sammamish River Valley No. 5 water rights have a priority date of 03/03/1977 which is senior to the establishment of the Cedar-Sammamish Instream Resources Protection Program in 1979. These water rights do not have an instream flow provision included in their ROEs.

[37] 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.

Figure 10: Project Map



Sammamish River Valley No. 7 (8-SRV-W5)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .4 cfs in 9 miles of Sammamish River downstream to Lake Washington.

PRIORITY SUBBASIN: Sammamish River Valley

ESTIMATED OFFSET: 68.98 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 3.2-5.8 afy

PRIORITY DATE(S): 07/08/1949

INSTREAM FLOW RULE (1979): Sammamish River is closed to further consumptive appropriations.[38]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: None

Project Description

The Sammamish River Valley No. 7 water right was included in the WRIA 8 water rights analysis after identification from the WWT irrigation analysis. Review of aerial imagery suggests the land and underlying the water right is used to support an equestrian facility since the early 2000's. The property is located in the Sammamish River Valley, approximately 2.5 miles north of the City of Redmond. There was an ownership change in 2010. The continued use of this property may provide an opportunity for a source switch to recycled water. An acquisition of the water right(s) could contribute to WREC offsets if, the water use is confirmed with further evidence and validated by Ecology. To our knowledge, there has been no outreach to the water right holder by any entity at this time.

Watershed

[38] Chapter 173-508 WAC

The Sammamish River is part of the Sammamish River Valley subbasin. The Sammamish River leaves Lake Sammamish and flows 14 miles before joining Lake Washington. The Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek, and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River with increased flow cited as a solution. The Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[39]

Land Use & Ownership

According to the King County Assessor, the current land-use is listed as Single Family (Res Use/Zone) and is zoned as A10 (Agricultural). This property is comprised of two parcels totaling 45.57 acres. The current owners acquired the property in 2010. Communication with King County Natural Resources indicate these parcels are enrolled in the King County Farm Preservation, and Farm and Ag incentive programs.[40] Review of the WSDA 2019 Agricultural Land Use map, identifies 20.6 acres of hay/silage and 17.6 acres of pastures as the crop types on the property. Irrigation delineation suggests as much as 36.5 irrigated acres in 2019.

Table 26: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	34.1
2015	28.6
2017	34.1
2019	36.5

Water Right

Table 27: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	-	.4 cfs	07/08/1949	Irrigation	40	Sammamish River

[39] Chapter 173-508 WAC
[40] https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/rural-regional-services-section/agriculture-program/farmland-preservation-program.aspx

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 certificate issued was for irrigation of 40 acres. This water right has a priority date of 07/08/1949, with .4 cfs identified as the Qi and no listed Qa. After issuance of this certificate, there are no subsequent documents suggesting changes to this water right. Based on this water right, water is diverted via a surface water pump from the Sammamish River.

Metering Records:

No metering records were available for this water right.

Conclusion

This project was identified by WWT as a potential source switch to recycled water. The land is used as pasture and a horse boarding facility. Given the crop type (pasture) and the property's location within the valley, this project shows strong potential to receive recycled water. Washington Water Trust, King County Recycled Water and Washington State University are currently engaged in a project to assess and increase the viability of recycled water as an irrigation source. Any outreach on these water right(s) should defer to the ongoing efforts of the above project, WWT and King County. Landowner willingness is unknown for a source switch and transaction.

Four years of irrigation delineation were undertaken (2013, 2015, 2017, 2019) which estimate as much as 36.5 irrigated acres. Consistent irrigation across years examined and no asserted Qa listed on the certificate led WWT to utilize irrigation delineations to estimate the potential consumptive use quantity that may be available to serve as an offset.

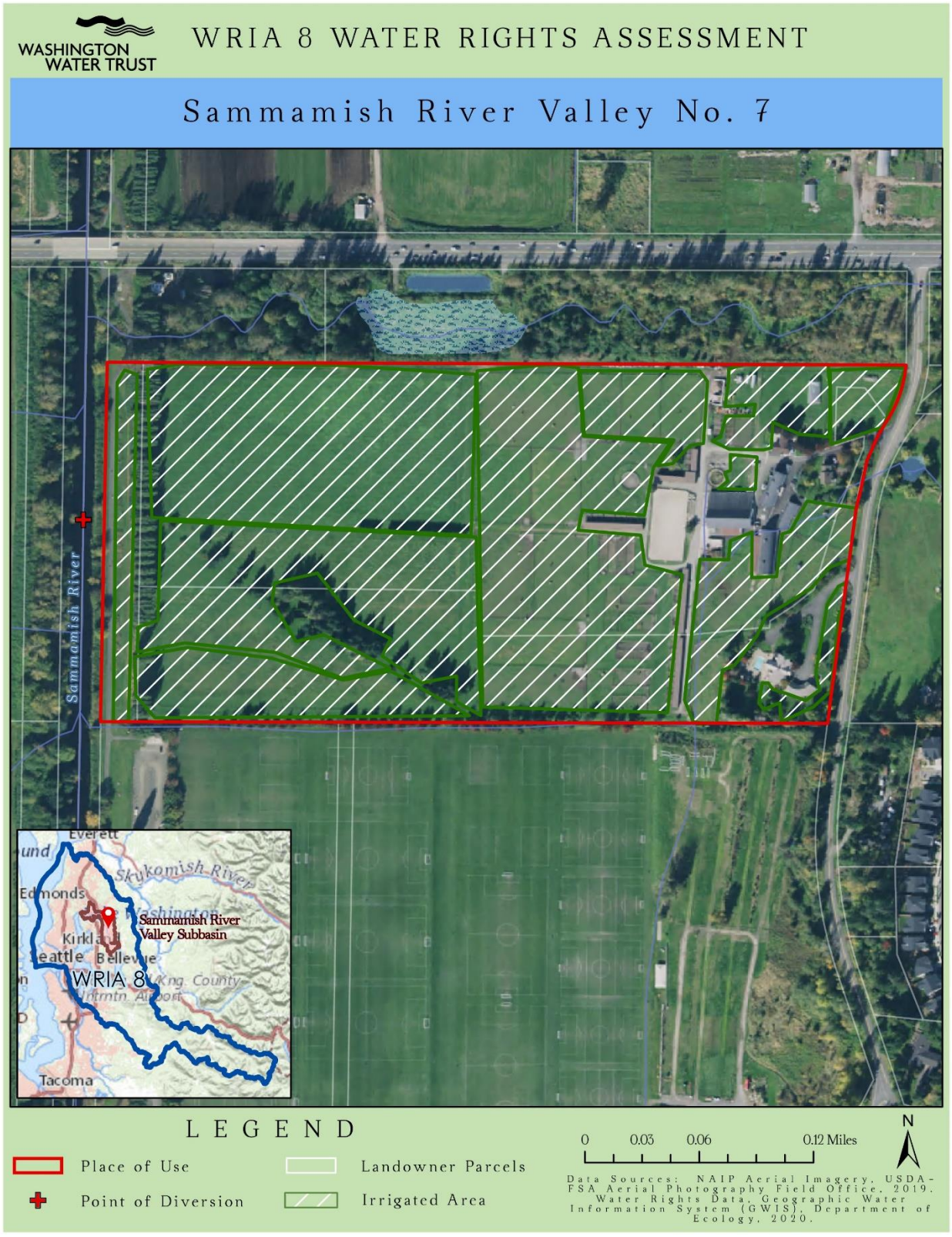
Since the property use is known, an estimate was developed based on the turf/pasture water duty (201.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation method is assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on the 2019 irrigation delineation and assuming turf/pasture as the crop, and sprinkler irrigation, 68.98 afy consumptive is the estimated quantity available for transaction.[41]

The Sammamish River Valley No. 7 water right has a priority date of 07/08/1949, which is senior to the establishment of the Cedar-Sammamish Instream Resources Protection Program) in 1979. This water right does not have an instream flow provision listed in the ROE.

[41] 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.

Figure 11: Project Map



Sammamish River Valley Recycled Water MAR (8-SRV-W6)

WRIA 8 - Draft Project Description

September 3, 2020

Project Name

Sammamish River Valley Recycled Water Managed Aquifer Recharge (MAR)

WRIA 8 WRE Subbasin

Sammamish River Valley

Water Offset

~181 acre-feet/year

Project Status

The WRIA 8 WREC has expressed interest in identifying potential sites and quantifying water offset potential for Managed Aquifer Recharge (MAR) projects using recycled water from the King County Brightwater Wastewater Treatment Plant (Brightwater). This project description was completed for review by the WRIA 8 Technical Workgroup.

Narrative Description

One of the non-acquisition water offset project ideas identified by the WRIA 8 WREC involves using recycled water for MAR. This project would augment stream flows by increasing surficial aquifer discharge to the Sammamish River above what occurs under existing conditions. The project concept includes diverting recycled water from the existing Brightwater recycled water pipeline, which extends from the Brightwater tunnel alignment in Bothell, south through the Sammamish River Valley to Redmond. Brightwater currently distributes reclaimed water from May to October, but recycled water may also be available year-round, if needed. Diverted water would be conveyed from the recycled water pipeline and piped to a constructed MAR facility. This diverted water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges to the Sammamish River as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the Sammamish River by recharging the aquifer adjacent to the river and providing additional groundwater discharge to the river through MAR.

A specific project site has not yet been identified, however, there are several suitable sites near the existing pipeline and in the WRIA 8 Sammamish River Valley subbasin.

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

The proposed recycled water MAR facility will result in streamflow benefits to the Sammamish River by diverting and temporarily storing recycled water into the shallow alluvial aquifer. The project is currently conceptual, but anticipates the ability to divert recycled water from the existing pipeline at a rate of approximately 0.5 cubic feet per second (cfs) for up to six months (May through October). The goal is to increase streamflow, especially during months when demand for water is highest and surface flows are generally lowest (June through August). The proposed MAR facility will infiltrate recycled water into the shallow aquifer and provide increased baseflow to the Sammamish River and its tributaries, depending

on where the facility is sited. The anticipated offset volume for this project is 181 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 alluvium deposits are present at the proposed locations (Minard 1983, 1985). United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil maps indicate the sites are underlain by Snohomish silt loam, Tukwila muck, and Earlmont silt loam soils with an average saturated hydraulic conductivity (Ksat) ranging from 0.39 to 1.28 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 ranging from 0.19 to 0.63 inches per hour. Assuming water will be diverted between May 1 and October 31 every year (183 days), the annual diversion volume is estimated to be 181 AF per year using Equation 1:

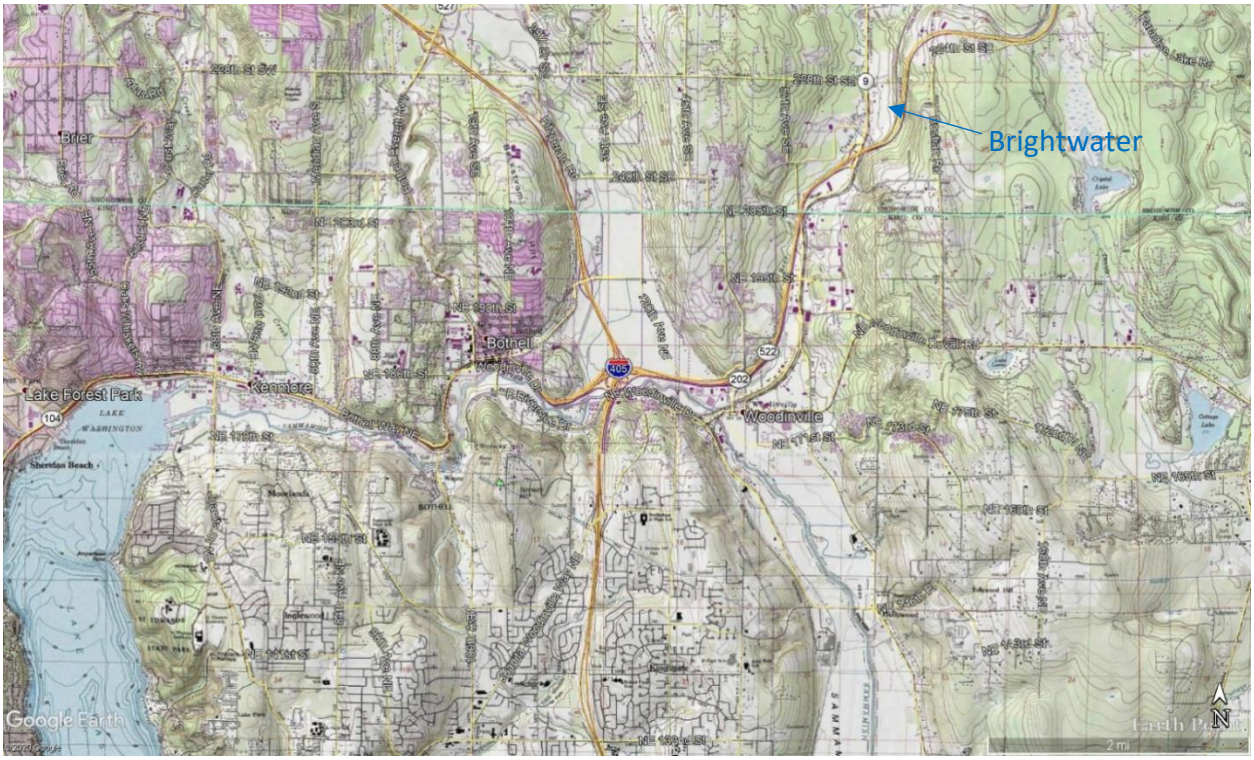
Annual Volume = Diversion Rate x Duration of Diversion Equation 1

It is anticipated that the MAR facility would be constructed as a buried infiltration gallery or open pond, but design details will be further developed at a later time. Year-round groundwater baseflow will be added to actual streamflow in the Sammamish 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 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.

No potential MAR facility site has currently been identified. The following map provides an aerial view of Brightwater and the surrounding area.



Description of the anticipated spatial distribution of likely benefits.

The project is expected to provide streamflow benefits in the Sammamish River and downstream subbasins (including the Greater Lake Washington and Seattle Lake Union subbasins).

Location relative to future PE well demand

The consumptive use estimate for the WRIA 8 Sammamish River Valley subbasin is 3.2 AF per year (GeoEngineers 2020). Consumptive use estimates for subbasins downstream of the Sammamish River Valley subbasin include the following (GeoEngineers, 2020):

- Greater Lake Washington subbasin: 1.8 AF per year.
- Seattle Lake Union subbasin: Not calculated.

Performance goals and measures.

The performance goals are to increase water storage in the alluvial aquifer adjacent to the Sammamish River by infiltrating 181 AF per year through the MAR facility to improve baseflow in the Sammamish River. The performance measures will be an increase in baseflow in the Sammamish River, especially during the critical flow period. The increased baseflow should reduce water temperatures in the river.

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

The Sammamish River and tributaries are inhabited by numerous fish species, including summer steelhead, winter steelhead, Coho salmon, dolly varden/bull trout, pink salmon, rainbow trout, summer chinook salmon, fall chinook salmon, fall chum salmon, and coastal cutthroat trout (WDFW 2020).

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. In addition, this project would reduce the amount of treated wastewater that our region sends to Puget Sound and puts water to better use.

The barriers to completion include funding for construction and O&M costs. In addition, the water available for diversion from the Brightwater recycled water pipeline is treated wastewater. The Brightwater plant is an advanced treatment facility that combines standard biological wastewater treatment with membrane filters to produce higher quality water that is seven to ten times cleaner than typical secondary treated wastewater. After disinfection, water is 99 percent cleaner than when it came into the treatment plant. Brightwater recycled water is reused on golf courses, soccer fields and farms, instead of using valuable drinking water for irrigation, and for environmental projects wherever it is available. However, despite the advanced treatment technology, it is anticipated that water quality will be evaluated and a geochemical compatibility analysis will be conducted to ensure no water quality degradation.

Potential budget and O&M costs.

No specific MAR site has been selected. Currently, recycled water is only available via King County's recycled water pipeline which extends from the Brightwater tunnel alignment in Bothell, south through the Sammamish River Valley to Redmond. However, King County is in the process of designing and constructing additional storage capacity at Brightwater, which would allow for distribution of recycled water to areas proximal to the plant and eventually to other portions of Snohomish County as recycled water infrastructure expands to meet future demand.

Ultimately, the cost of constructing the project will depend on project location and the conveyance infrastructure required to transport recycled water from existing Brightwater conveyance structures to the MAR facility.

Purchase of reclaimed water from King County would be ongoing and dependent on the negotiated rate. Assuming a rate of $0.26 per hundred cubic feet, which was the average reclaimed water rate in Florida in 2005 (King County Department of Natural Resources and Parks, 2008), the potential annual cost for an MAR project that injects 0.5 cfs for a period of 5 months would be approximately $16,850.

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.
- 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 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 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.

Washington Water Trust is a potential sponsor for this project.

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 8 Consumptive Use Estimates – Final Draft. Technical memorandum prepared for Washington State Department of Ecology. February 2020.

King County Department of Natural Resources and Parks, 2008. Reclaimed Water Feasibility Study. March. 185 p.

Minard, J.P. 1985. Geologic Map of the Bothell Quadrangle, Snohomish and King Counties, Washington. USGS Miscellaneous Field Map MF-1747, Scale 1:24,000.

Minard, J.P. 1983. Geologic Map of the Kirkland Quadrangle, Washington. USGS Miscellaneous Field Map MF-1543, 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). 2020. Salmonscape Mapping of Fish Distribution. http://apps.wdfw.wa.gov/salmonscape/

Pre-identified Water Right No. 1 (8-BE-W7)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional 1.29 cfs in Evans Creek, Bear Creek, and 14 miles of Sammamish River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Bear/Evans

ESTIMATED OFFSET: 346.8 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 96.7-169.1 afy

PRIORITY DATE(S): 03/05/1968, 08/08/1968, 04/21/1977

INSTREAM FLOW RULE (1979): Sammamish River and its tributaries are closed to further consumptive appropriation[42]

ESA LISTED FISH: Puget Sound Spring/Summer/Fall Chinook (Threatened), Puget Sound/Strait of Georgia Coho (Species of Concern), Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: None

Project Description

The Pre-identified No. 1 water rights were identified in the WRIA 8 irrigation analysis of golf courses within priority subbasins and with water rights, at the request of Ecology. The property is located 4 miles southwest of the city of Redmond and straddles the Lake Sammamish and Bear/Evans Creeks subbasins. The lands underlying the water rights are currently used for single family residences and a country club with three 9-hole courses. According to online sources, the country club and golf course were developed in 1967, as was the surrounding community. There are three water rights covering this area, two with large congruent places of use overlapping properties outside of the golf course, and one with a smaller place of use that more tightly conforms to the golf course property. The two rights with large places of use list irrigation and domestic multiple as purposes of use, while the third right only lists irrigation. This project was selected for further review due to the clear presence of irrigation, location within a priority subbasin and three

[42] Chapter 173-508 WAC.

water rights with irrigation as a listed purpose. To our knowledge, there has been no outreach to the water right holder by any entity, at this time.

Watershed

Evans Creek is within the Bear/Evans subbasin. Evans Creek flows into Bear Creek before joining the Sammamish River, which flows into Lake Washington. Sammamish River tributaries include: Little Bear Creek, Cottage Lake Creek, North Creek, Swamp Creek and Wildcat Creek. Water temperature and dissolved oxygen levels have been problems in the Sammamish River and increased flow has been cited as a solution. Sammamish River and its tributaries were closed to further consumptive appropriation on the September 06, 1979.[43]

Land Use & Ownership

According to the King County Assessor, the current land use is a Golf Course and Single Family (ResUse/Zone) and zoned as R4 – Residential. It is important to note that there are two places of use under these three water rights. Two of these rights have a large congruent places of use (POU), which contain numerous residences as well as the smaller place of use. The smaller POU conforms more closely to the golf course property and contains fewer residences. The original water rights for the development and irrigation of the golf course were secured in the late 1960's when the area was developed. A review of the WSDA 2019 Agricultural Land Use map, identifies turf grass as the crop type on the golf course totaling 106.23 acres, with sprinklers identified as the irrigation type. Irrigation delineation indicates that as much as 185.51 acres were irrigated in 2019. It is possible that the difference of estimated irrigated acres between years analyzed may be explained by the timing of the aerial photographs, specific water use practices or from sufficient causes for non-use (RCW 90.14.140). These details would be better understood through direct conversation with the water user.

Table 28: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	171.4
2015	167.2
2017	167.2
2019	183.5

Water Right

[43] Chapter 173-508 WAC

Table 29: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	275 afy	190 gpm	03/05/1968	Domestic Multiple, Irrigation	200	Groundwater
Certificate	335 afy	230 gpm	08/08/1968	Domestic Multiple, Irrigation	200	Groundwater
Certificate	80 afy	160 gpm	04/21/1977	Irrigation	200	Groundwater

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 first certificate was issued with a priority date of 03/05/1968 for community domestic supply and irrigation of 200 acres with 190 gpm identified as the Qi and 275 afy identified as the Qa. Both irrigation and community domestic supply are listed as primary purposes. The application notes an estimated future population of 300 in the community. This water right has a large place of use that encompasses numerous private residences, the 27-hole golf course and the country club. A change application was filed 07/10/1992 to change the location of one well serving this right. The purpose is noted as "backup supply in the event of well failure". This application was rejected.

The second certificate was issued with a priority date of 08/08/1968 for community domestic supply and irrigation of 200 acres with 230 gpm identified as the Qi and 335 afy identified as the Qa. Both irrigation and community domestic supply are listed as primary purposes. The place of use for this certificate coincides with the place of use of the 03/05/1968 certificate. A change application was filed 03/21/1988 requesting a change to the point of withdrawal and place of use. This application was cancelled. Metering records were obtained from Ecology which report well use for this certificate and another separate municipal right.

The third certificate was issued with a priority date of 04/21/1977 for irrigation of 200 acres with a Qi of 160 gpm and Qa of 80 afy. The application specifically notes golf course irrigation as the purpose. The application for this certificate requested 530 gpm as the Qi and 230 afy. An ROE was issued following four protests during the public comment period. The ROE examined potential "interference due to pumping" to other wells, concluded the interference would not have "an adverse effect on existing rights", and ultimately recommended reducing the Qi to 200 gpm and Qa to 312 afy based on irrigation demand of the course.

Evidence of irrigation in the northern portion of the 1968 certificates' place of use was found during analysis. Further review revealed two unmapped water rights with irrigation as a purpose of use held by the property owner where the irrigation was delineated. Additionally, there are other municipal rights that overlap portions of the subject places of use. One of these other municipal rights shares a point of diversion and a meter with the 08/08/1968 right.

Further investigation revealed the two certificates with domestic multiple listed as a purpose were acquired by a municipal water and sewer corporation in 1982, but remain in the name of the original entity issued the certificates. It is unclear if the third right with the sole purpose of irrigation is still held and utilized exclusively by the country club, or if it was also acquired by the municipal corporation in 1982. Each of these three rights list irrigation of 200 acres as a primary purpose, suggesting these water rights are additive.

Well Information:

The 03/05/1968 certificate is served by two wells according to Ecology's Water Rights Tracking System. Ecology's Well Construction and Licensing Search Tool indicates one of the wells is 10 inches in diameter and drilled to 517 feet, was completed on 07/20/1968. Ecology's Well Construction and Licensing Search Tool indicates a second well in the vicinity, 12 inches in diameter, drilled to 543 feet, and completed at 540 feet on 09/08/1992.

The 08/08/1968 certificate is served by two wells according to Ecology's Water Rights Tracking System. Ecology's Well Construction and Licensing Search Tool indicates one of the wells is 16 inches in diameter, drilled 250 feet deep, and was completed at a depth of 160 feet on 12/07/1968. Clear information depicting the location and attributes of the second well were not readily available and will take additional analysis to determine.

The well serving the 04/21/1977 certificate is not mapped in Ecology's WRTS. The supporting documentation on WRTS contained a well report that indicates the well serving this right is 12 inches in diameter, drilled to a depth of 431 feet, and completed at 426 feet. The well log provides a general location of SW¼NW¼ Sec 21, T. 25 N., R. 6 E.W.M. No dates are provided on the well log.

Metering Records:

WWT requested and received metering records from Ecology for the 08/08/1968 priority certificate. These records accounted for use from 2014-2019 with as much as 216.28 afy of water use. There are periods during this time where no data was reported. These metering records indicate these records serve two rights, one of which is not part of this profile and is for the purpose of municipal supply.

Conclusion

This project was identified during WWT's WRIA 8 irrigation analysis while examining golf courses, at Ecology's request. This course has been continually operated since 1967. Each of these three rights lists irrigation as a primary use for 200 acres each, totaling 600 acres. A lack of clarity as to

which right or rights have been used to irrigate the golf course may create a temporary barrier to understanding what water may be available for transaction. Additionally, the discrepancy between delineated irrigated acres and irrigated acres asserted on the certificates creates concern for partial relinquishment. The lack of metering records for two of the certificates (one of which lists irrigation as its sole purpose of use) increases the difficulty of quantifying beneficial use without further due diligence. Additionally, the metering records provided by Ecology for one well reflect use under two certificates, one of which is for municipal supply.

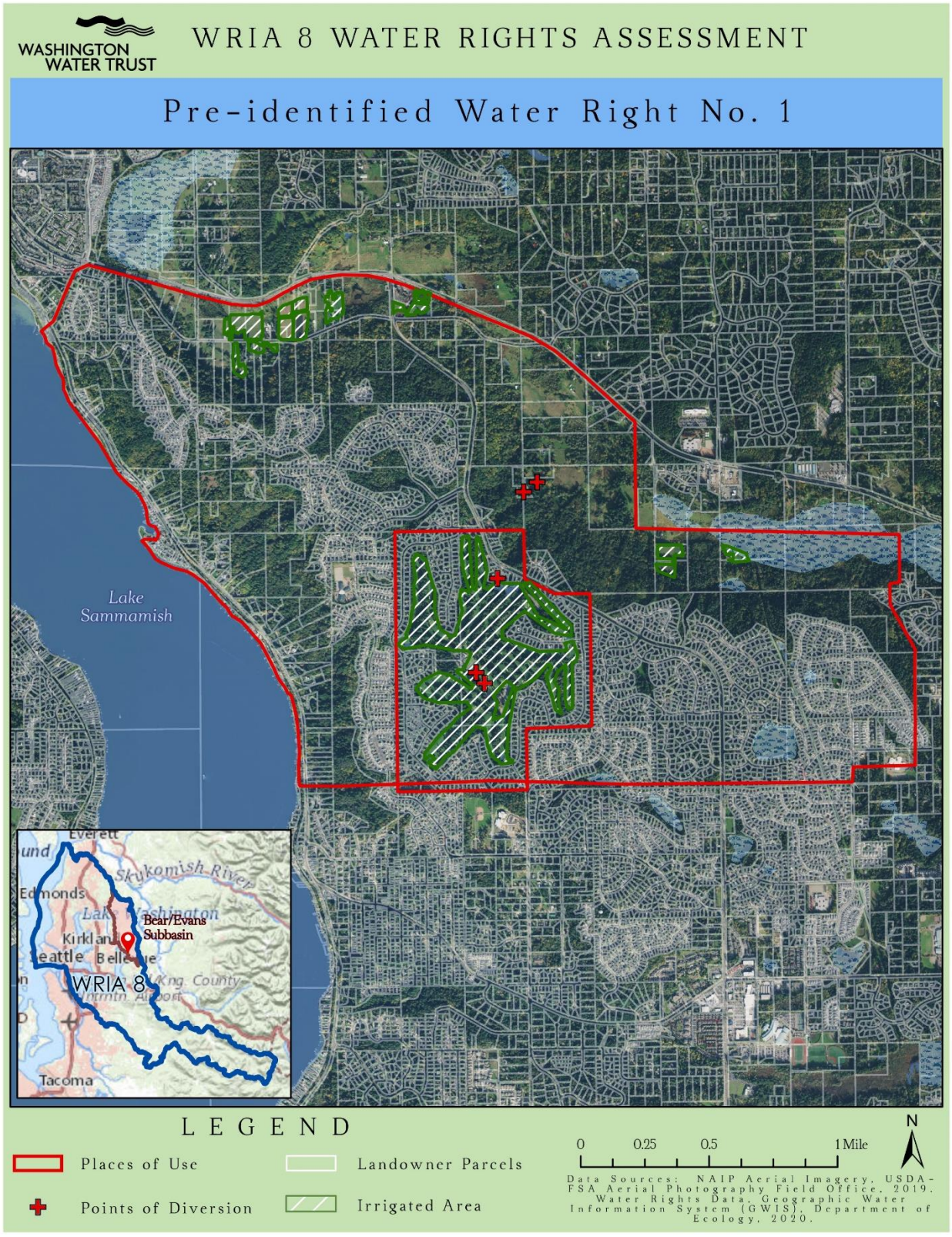
Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which indicate areas as much as 183.51 acres were irrigated. WWT utilized delineated irrigation to estimate the potential consumptive use quantity that may be available to serve as an offset. Since the property use is known, golf course, an estimate was developed based on pasture/turf water duty (20.01 inches) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B) and irrigation method assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on the highest delineation (183.51 acres), and assuming pasture/turf and sprinkler irrigation, 346.80 afy consumptive is the estimated quantity available for trust water transaction.[44]

Project opportunities for this water right may include acquisition of the transactable portion of the 04/21/1977 certificate if irrigation needs can be met by the overlapping municipal water district rights, and/or upgrades in irrigation efficiency. The Pre-identified No. 1 water rights have priority dates of 03/05/1968, 08/08/1968, and 04/21/1977, which is senior to the establishment of the Cedar-Sammamish Instream Resources Protection Program in 1979. These water rights do not have instream flow provisions in the ROE.

[44] 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.

Figure 12: Project Map



Pre-identified Water Right No. 2 (8-I-W8)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional 0.38 cfs in 1 mile of Issaquah Creek, Lake Sammamish, 13 miles of Sammamish River mainstem, downstream to Lake Washington.

PRIORITY SUBBASIN: Issaquah and Sammamish River Valley

ESTIMATED OFFSET: 27.6 afy (consumptive), 52 afy (perfected), 110 afy (water right documents)

SUBBASIN CONSUMPTIVE USE ESTIMATE: Issaquah: 115.3-169.9 AFY; Sammamish River Valley 3.2-5.8 afy

PRIORITY DATE(S): 06/01/1954, 09/02/1958

INSTREAM FLOW RULE (1979): Issaquah Creek, Lake Sammamish, and Sammamish River are closed to Appropriation.[45]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened).

OUTREACH STATUS: Interested

Project Description

The Overdale Water Association (Overdale) water right was pre-identified by Ecology request as a potential transaction. These two water rights previously served a Group A community water supply through 2004 until Overdale completed an intertie with the Sammamish Plateau Water and Sewer District (SPWSD) in 2005. Since completing the intertie, Overdale has relied on SPWSD for community water supply. The water right holder has temporarily donated the water right to the Trust Water Rights Program (TWRP) until January 01, 2036. Outreach to the water right holder has been initiated by Washington Water Trust.

Watershed

[45] Chapter 173-508 WAC

Issaquah Creek is within the Issaquah subbasin and a tributary to Sammamish River Valley subbasin. Issaquah Creek joins Sammamish Lake, which flows into the Sammamish River. Issaquah Creek, Sammamish Lake and Sammamish River were closed to appropriation in the September 06, 1979 WRIA 8 instream flow rule, Chapter 173-508 WAC.

Land Use & Ownership

Overdale is a community water system that fits the definition of a municipality under the State's municipal water law. Overdale serves primarily residential homes through an intertie with SPWSD completed in 2005. After 2005, Overdale has not utilized its water rights to serve the community known as Overdale Park.

Water Right

Table 30: Current Water Rights

Document Type	Qa[46]	Qi	Priority Date	Purpose of Use	WR Acres	Source
Trust Water Temp. Donation	52 afy	120 gpm	10/11/2016	Groundwater Preservation	-	Groundwater
Trust Water Temp. Donation	52 afy	50 gpm	10/11/2016	Groundwater Preservation	-	Groundwater
Certificate	30	190 gpm	06/01/1954	Domestic Multiple	-	Groundwater
Certificate	80	50 gpm	09/02/1958	Domestic Multiple	-	Groundwater

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:

Water rights appurtenant to Overdale consist of two water right certificates: 1) GWC5975-A (G1-*03656CWRIS), and 2) GWC 4066-A (G1-*04988CWRIS). The following summarizes findings from previous beneficial use evaluations (Aspect, 2014) and Ecology's Trust Water Donation Letter. Trust Water Quantification, Department of Ecology, August, 18, 2017: "The Department of Ecology has reviewed the information provided by Overdale and by Aspect Consulting. Pursuant to RCW 90.42.080(l)(b), Ecology accepts your temporary donation in the amounts of 170 gpm (50 gpm +

[46] Quantities are non-additive.

120 gpm) and 52 afy (27.6 afy consumptive) under GWC 4066-A and GWC 5975-A. The purpose of your donation, per your request, is for groundwater preservation and instream flows."

Well Information:

According to Ecology records, the well serving the 06/01/1954 certificate was replaced in 2008. No dates were included in the well driller's log. This well has a diameter of eight inches, was drilled to a depth of 144 feet and was completed at 143 feet. It is noted in this paperwork that the original well was left open as a monitoring well and had not yet been decommissioned as required by Chapter 18.104 RCW.

The well serving the 09/02/1968 certificate is 12 inches in diameter and was completed 08/28/1958 at a depth of 510 feet.

Metering Records:

Table 31: SPWSD Deliveries to Overdale Water System[47]

Year	Annual Total (Million Gallons)[48]	Annual Total (afy) 1	Annual Total (afy) 2[49]
2005 (partial year)	11.7	35.9	NR
2006	16.5	50.6	52.1
2007	13.4	41.1	41.7
2008	13.8	42.4	41.0
2009	15.1	46.3	44.3
2010	12.6	38.7	38.6
2011	13.7	42.0	NR

Conclusion

According to the beneficial use report, summarized metering records and Ecology's Trust Water Donation Acceptance, the subject water rights appear to:

[47] Compiled by Aspect Consulting
[48] Annual totals in afy calculated from annual totals in millions of gallons reported by SPWSD.
[49] Annual totals as reported by Cascade Water Alliance
NR – Not reported

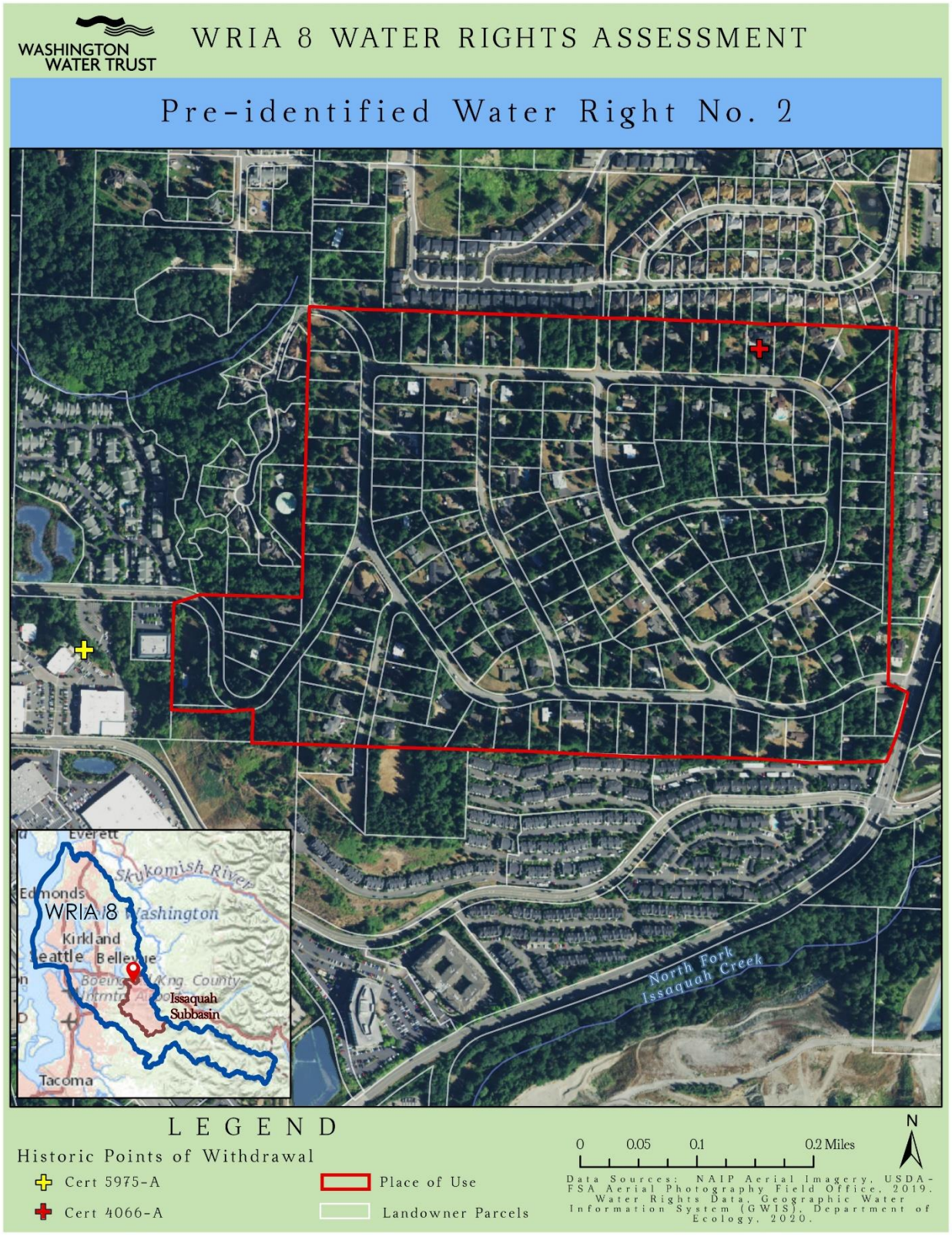
1) have been exempt from non-use as a municipal water supply, and

2) accepted in TWRP in the amounts of 170 GPM, an annual quantity of 52 afy and an estimated 27.6 afy consumptive use. Table 1 above summarizes the water right record.

This project was identified by Ecology request as a potential early acquisition opportunity. Review of the water right record, beneficial use analysis and recent Ecology decisions indicate strong evidence that the water right is valid and viable as a transaction. Initial outreach by Washington Water Trust confirms that Overdale is willing to discuss a transaction and interested in selling this water right.

Based on the water right record and previous technical analysis, and Ecology's trust water donation, an annual quantity of 52 afy (perfected) with an estimated 27.6 afy consumptive use is likely available for trust water transaction, though the sum of the certificates is 110 afy.

Figure 13: Project Map



Pre-identified Water Right No. 4 (8-I-W9)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional 2.45 cfs in .1 miles of East Fork Issaquah Creek, 3 miles of Issaquah Creek, Lake Sammamish, and 14 miles Sammamish River mainstem.

PRIORITY SUBBASIN: Issaquah

ESTIMATED OFFSET: 336 afy consumptive[50]

SUBBASIN CONSUMPTIVE USE ESTIMATE: 115.3-169.9 afy

PRIORITY DATE(S): 04/06/1949 and 05/16/1974

INSTREAM FLOW RULE (1979): Issaquah Creek, Lake Sammamish, and Sammamish River are closed to appropriation.[51]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: Initial

Project Description

The Pre-identified Water Right No. 4 was included in the WRIA 8 water rights analysis by Ecology request as a potential transaction. The land, and underlying water right, currently support commercial production of dairy products. According to online sources the facility, located in the City of Issaquah's Cultural Business District, has been continuously operated since 1909. As of 7/30/2018, a portion of the annual quantity of the subject water right was temporarily donated to the Trust Water Rights Program. The initial outreach was completed by the Washington Water Trust and the water right holder is open to future discussion. Further investigation revealed the water right holder holds a second water right certificate to support operations.

Watershed

[50] Assumes 100% of Qa indicated by metering records is used consumptively.
[51] Chapter 173-508 WAC.

Issaquah Creek is within the Issaquah subbasin and a tributary to Lake Sammamish. Issaquah Creek joins Lake Sammamish, which flows into the Sammamish River for 14 miles before joining Lake Washington. Ecology notes that groundwater in the vicinity has direct effect on instream flows and lake levels.

Land Use & Ownership

According to the King County Assessor, the current land-use is listed as Industrial (Gen Purpose) and the land is zoned as CBD (Cultural and Business District) by the City of Issaquah. The land underlying the Pre-identified Water Right No. 4, has been continuously used for production of dairy products since 1909. The property was acquired by its current owners in the early 1960's.

Water Right

Table 32: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Change Application (Withdrawn)	1232 afy	2.45 cfs	3/1/1999	Fish Propagation	N/A	Groundwater
Trust Water Temporary Donation	286 afy	0 cfs	7/30/2018	Groundwater Preservation	N/A	Groundwater
Certificate	1232 afy	2.45 cfs	5/16/1974	Commercial and Industrial	N/A	Groundwater

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 water right certificate of interest was issued for continuous manufacturing at an existing facility. Prior to issuance of this certificate, the facility was served by a surface water right from the East Fork Issaquah Creek and a groundwater right. Relinquishment of the surface water right was a condition for issuance of the 05/16/1974 groundwater certificate. This certificate is listed as primary and approves an instantaneous quantity of 2.45 cfs totaling 1232 afy for the purpose of Commercial and Industrial. There was a change application was filed 3/1/1999 for this certificate, which was later withdrawn. On 7/30/2018, 286 afy of this right was temporarily donated to the Trust Water Right Program for the purpose of groundwater preservation. The water right holder provided metering records with the donation application and noted that 336 afy were put to beneficial use under this right in the past 5 year period (2013-2017), which may suggest relinquishment of the remaining 896 afy listed on the certificate. The donation letter requests that 286 afy be placed in the Trust Water Rights Program and 50 afy be retained for use. The water right

holder retained the full instantaneous quantity and noted on the application that they expect to withdraw the donated portion when plant activities increase to regular levels.

Review of documents associated with the 05/16/1974 certificate revealed the water right holder also holds a second groundwater certificate with a priority date of 04/06/1949. This certificate is listed as primary and approves an instantaneous quantity of 1.11 cfs totaling 405 afy for the purpose of Commercial and Industrial.

Well Information:

The Ecology Well Report Map contained no information regarding either of the wells serving this right. The ROE for the 1974 right notes that the well was completed in 1937 and is 16 inches in diameter and drilled to a depth of 89'. A well report for this right dated 01/16/1996 documents the replacement of the original well completed in 1937. The new well is located 15 feet south of the original well. This well is 16 inches in diameter and was drilled to a depth of 113 feet and completed at a depth of 101 feet. It is noted in the report that the new well is incapable of meeting the certificated instantaneous quantity, and it is recommended that the 1937 well be used as a monitoring well, providing the option for reconstruction to provide increased pumping capacity during summer months.

Metering Records:

Metering records for 2013-2017 were submitted with the donation application. It is noted on this document that there were periods during this time that the well meter failed. Usage for these periods was calculated based on average usage during the same months in different years. As much as 336 acre feet of water use was indicated by these records during this 5-year period. A metering request to Ecology produced no additional metering records.

Conclusion

This project was identified by Ecology as a potential acquisition opportunity based on a portion of the right being donated to the Trust Water Rights Program. The land use has remained constant since the facility opened in 1909. The 2018 temporary donation of 286 afy citing a temporary reduction in production quantified total use under this certificate in the most recent 5-year period as 336 afy. This use history may indicate relinquishment of 896 afy of the annual quantity listed on the original certificate. This water right may provide an opportunity for a full or partial transaction.

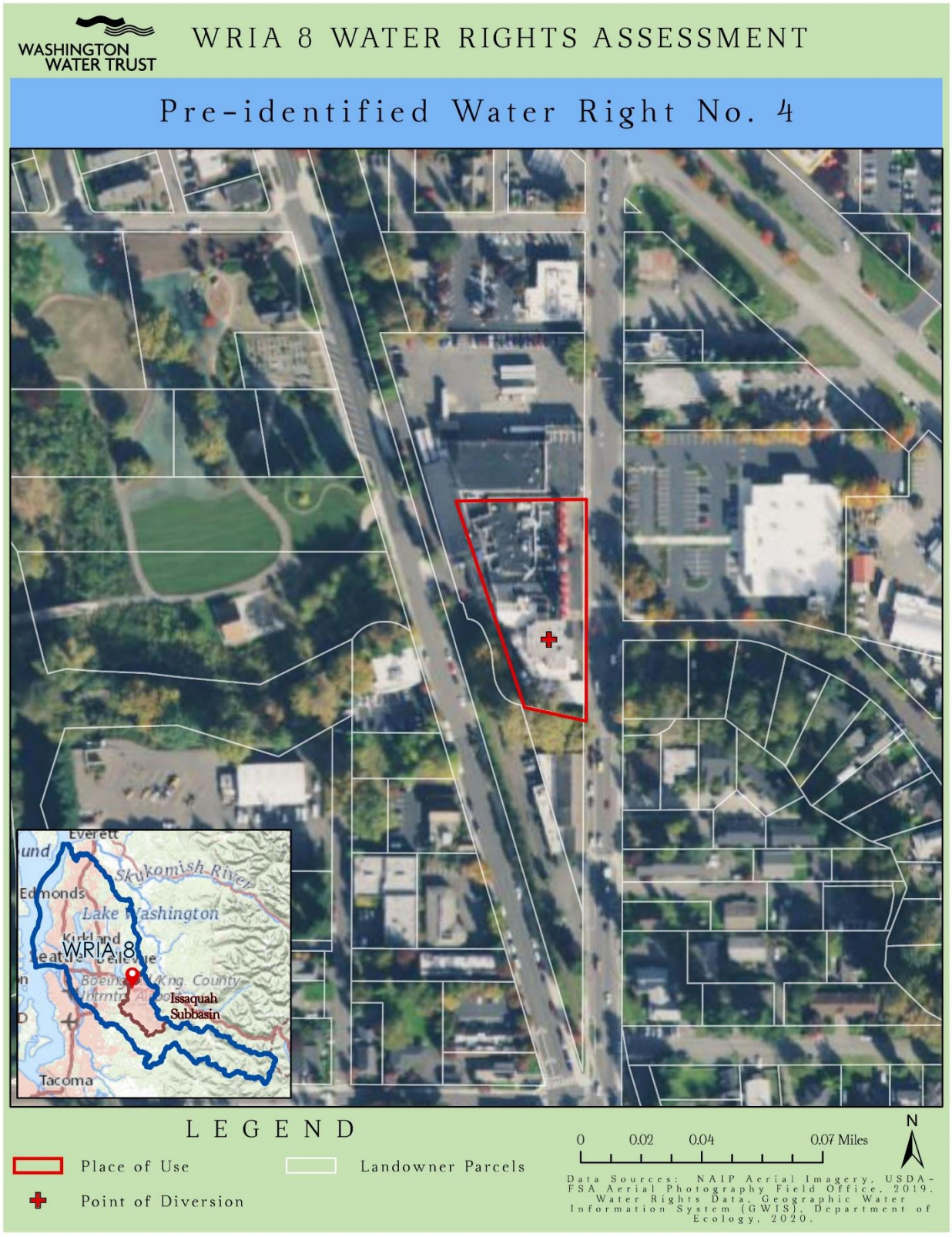
Potential to return to previous production levels at the facility may create a barrier to permanent acquisition. Additionally, a lack of comprehensive metering documents as well as an understanding of water use practices at this time make it difficult to estimate beneficial use and consumptive quantities. Ultimately, these quantities must be determined by Ecology. Based on the 2018 donation application, 336 afy (diverted) may be available for transaction. Of this 336 afy, 286 afy have been donated to the Trust Water Rights Program through 08/01/2023.

- Based on the water right document which authorizes 1232 afy (diverted) and the 7/30/2018 donation application suggesting 336 afy (diverted) of beneficial use at the time of donation, and 336 afy (consumptive) is the estimated quantity available for transaction.[52]

Further due diligence is necessary to determine consumptive quantities associated with this opportunity. The Pre-identified No. 4 water right has a priority date of 05/16/1974, which is senior to the establishment of the Cedar-Sammamish Basin Instream Resources Protection Program (Instream Flow Rule) in 1979. This water right does not have an instream flow provision.

[52] This is only an estimate of consumptive use quantity and assumes 100% consumption for dairy production. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

1 Figure 148: Project Map



2

Pre-identified Water Right No. 9 (8-LC-W10)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional .6 cfs in 7.5 miles of the Cedar River mainstem downstream to Lake Washington.

PRIORITY SUBBASIN: Lower Cedar

ESTIMATED OFFSET: 20.079 afy (consumptive), TBD[53] (perfected), 120 afy (water right document)

SUBBASIN CONSUMPTIVE USE ESTIMATE: 151.2-245.8 afy

PRIORITY DATE(S): 1/9/1973

INSTREAM FLOW RULE (1979): There is an instream flow established in the Cedar River. [54]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: Interested

Project Description

The Pre-identified No. 9 water right was included in the WRIA 8 water rights analysis by Ecology request. The land, and underlying water right, were previously used as a mobile home park, and are located 4.5 miles east of the City of Renton. Per communications with Ecology and online records, the property and water right were acquired by King County in 2013. The property was purchased as part of a levee setback and floodplain restoration project. The property change of use may provide an opportunity for water rights acquisition. A lack of available metering records create a data gap in determining the portion of the certificate available for transaction. Ecology has been in contact with King County discuss permanent donation of this water right.

[53] At the time of this report no information was available indicating the perfected quantity of this right
[54] Chapter 173-508 WAC

Watershed

The Cedar River originates in the Cascade Mountains and flows 45 miles through the Upper and Lower Cedar subbasins to Lake Washington. The Cedar River and its tributaries including Rock Creek and Jones Creek are under restricted appropriation subject to low flow limitations consistent with Chapter 75.20 RCW as of September 06, 1979.[55]

Land Use & Ownership

According to the King County Assessor, the current land-use is listed as Mobile Home Park (18.64 ac) and zoned as RA-5 (Rural Area). There are two parcels in the southeast corner of the water right place of use, which are not part of the mobile home park. These parcels have a current land-use of Single Family (Res Use/Zone) and zoned RA5 (Rural Area 5). The landowner and water right holder also own an adjacent property to the east with a current land use of Vacant (Multi-family) and zoned as RA5 (Rural Area 5). A review of the WSDA 2019 Agricultural Land Use map, identifies no crop type on the property. Irrigation delineation indicates as much as 9.3 acres were irrigated in 2019. These parcels were acquired by King County in 2013 as part of a strategy to address chronic flooding and for floodplain restoration. According to online resources, resident relocation was completed in 2016. Due to the change in use of the property, there may be an opportunity for acquisition of the water right.

Table 33: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	.4
2015	.5
2017	0
2019	9.3

Water Right

Table 34: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source
Certificate	120 afy	268 gpm	1/9/1973	Domestic Multiple	N/A	Groundwater

[55] Chapter 173-508 WAC

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 water right application was filed 1/9/1973 for continuous community domestic water supply. The initial Report of Examination (ROE) was completed on 4/26/1973 recommended a Qi of 268 gpm and a Qa of 120 afy for continuous domestic supply for 94 mobile homes and 40 travel trailers. Proof of appropriation was filed 4/14/1975. The certificate was issued 6/30/1975 for the amounts listed in the ROE. It was noted in the ROE that the works were completed prior to the submission of the application. The source of this water right is a well. No applications related to changing this water right are documented in Ecology's Water Rights Tracking System.

Well Information:

The proof of appropriation documentation indicates that the approximate completion date of the well and first use of the water occurred in 1957. The well is 10 inches in diameter and was completed at an estimated depth of 28 feet. Review of Ecology's Well Construction and Licensing tool indicate no additional information is available.

Metering Records:

Communication with the Ecology revealed that no metering records are available for this well.

Conclusion

This project was identified by Ecology as a potential acquisition opportunity. The previous land use was a mobile home park which appears to have fully ceased operations in 2016, making the water potentially available for acquisition. The lack of metering records make beneficial use difficult to quantify. Four years of irrigation delineations were undertaken (2013, 2015, 207, 2019) suggesting as much as 9.3 acres of irrigation occurred as recent as 2019.

Lack of metering data make it difficult to quantify beneficial use. Proof of appropriation was filed August 14, 1975. Per RCW 90.03.015(4)(a), this water right meets the criteria for a Group A water system (over 15 connections). Therefore, this right may not be subject to relinquishment as a municipal water right.[56] Determining the portion of the 120 afy authorized on the certificate that is available for transaction will require a determination of extent and validity by Ecology. Four years of irrigation delineations were undertaken (2013, 2015, 2017, 2019) which indicate areas as much as 9.3 acres were irrigated. Due to lack of meter records, WWT utilized the irrigation delineations and the WRIA 8 Consumptive Use Estimate for indoor consumptive use to estimate the potential consumptive use quantity that may be available to serve as an offset. The irrigation estimate was based on the turf/pasture water duty (20.01 inches) found in the Washington Irrigation Guide

[56] RCW 90.14.140

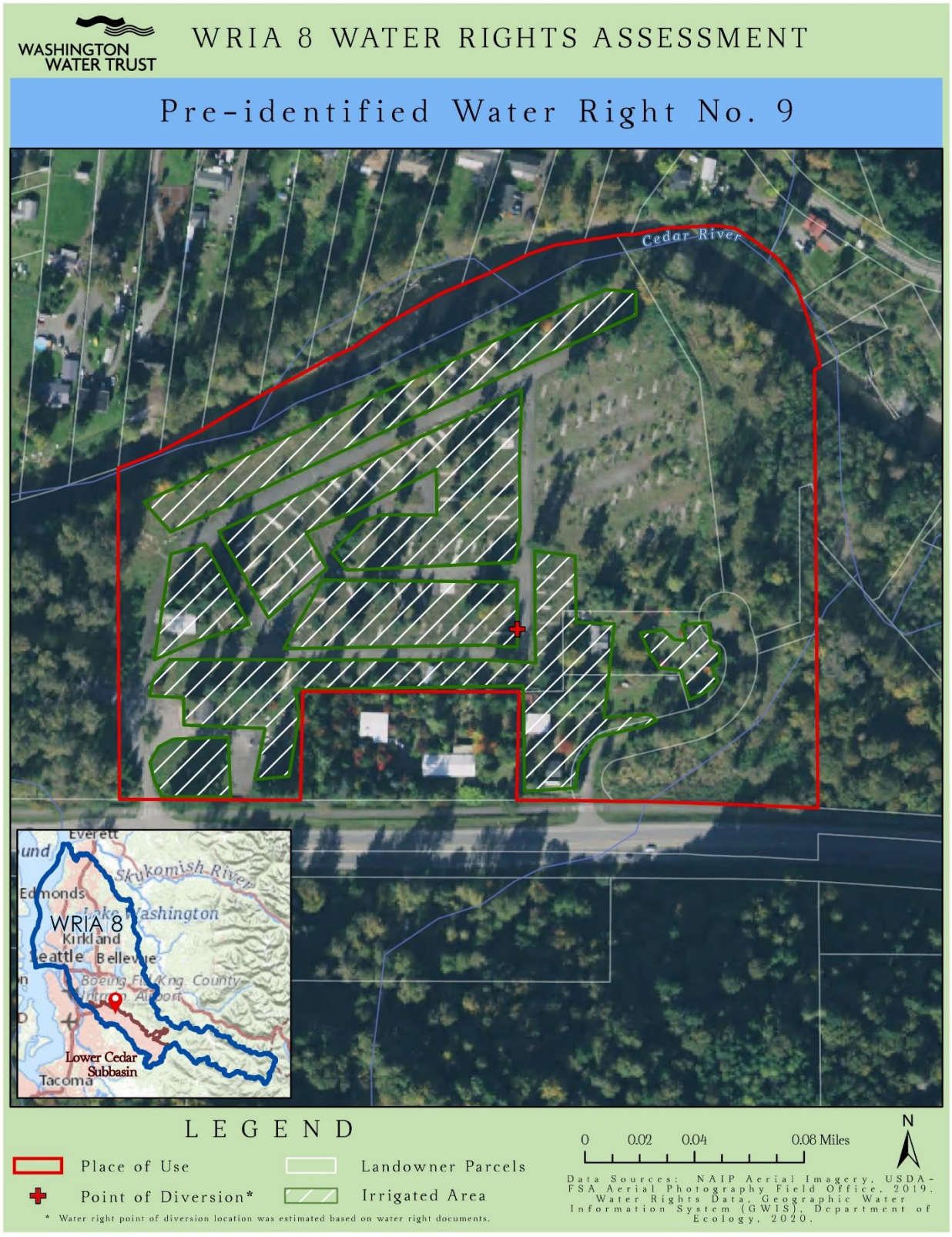
(Seattle-Tacoma, Appendix B) and irrigation method assumed to be sprinkler (75% irrigation efficiency, 10% application efficiency).

- Based on an estimated 60 gpd per person domestic use (10% consumptive), 2.73 people per household, and assuming full occupancy of the mobile home park (134 residences[57]), and 9.3 acres of delineated irrigation and assuming pasture/turf and sprinkler irrigation, 20.079 afy consumptive use is the estimated quantity available for transaction.[58]
- The Qa listed in on the water right document is 120 afy. Without further examination, it is unclear what portion of this quantity has been perfected.

The Pre-identified Water Right No. 9 has a priority date of 01/09/1973, which is senior to the establishment of the Cedar-Sammamish Basin Instream Resources Protection Program in 1979. This water right does not have instream flow provisions included in the ROE.

[57] The ROE issued 01/09/1973 reported 94 mobile homes and 40 travel trailers.
[58] This is an estimate only, actual indoor use in mobile homes may be less. An extent and validity determination would be required to determine the quantity available for acquisition.

Figure 159: Project Map



Pre-identified Water Right No. 5 (8-LC-W11)

WRIA 8 Project Opportunity Profile

Project Summary

FLOW BENEFIT: Additional 1.07 cfs in 3.4 miles of the Cedar River downstream to its confluence with Lake Washington.

PRIORITY SUBBASIN: Lower Cedar

ESTIMATED OFFSET: 85.4 afy consumptive

SUBBASIN CONSUMPTIVE USE ESTIMATE: 151.2-245.8 afy

PRIORITY DATE(S): Before 1917

INSTREAM FLOW RULE (1979): There is an instream flow established in the Cedar River.[59]

ESA LISTED FISH: Spring/Summer/Fall Puget Sound Chinook Salmon (Threatened), Puget Sound/Strait of Georgia Coho Salmon (Species of Concern), Winter/Summer Puget Sound Steelhead (Threatened), Bull Trout (Threatened)

OUTREACH STATUS: None

Project Description

The Pre-identified No. 5 water right was included in the WRIA 8 water rights analysis by Ecology request. The land, and underlying water right is currently used as a golf course, which according to Ecology Water Rights Tracking System (WRTS) documents, has been in operation since the early 1930's. Prior to this time (1905-1933) this property and water right operated as a farm company. The golf course is located within the city limits of the City of Renton, and lies 1-mile east of the Renton Central Business District. This water right was selected for further due diligence because it lists irrigation as a purpose of use, appears to have been put to beneficial use on greater than 5 acres, and is within a priority subbasin. Potential project opportunities include a source switch to City water. Further due diligence has revealed a low likelihood that a transaction may occur due to continued operation of the property, a reduction of the water right validated through issuance of a certificate of change and reportedly efficient irrigation. The viability of switching to municipal

[59] Chapter 173-508 WAC

service is unknown. To our knowledge, there has been no outreach to the water right holder by any entity at this time.

Watershed

The Cedar River originates in the Cascade Mountains and flows 45 miles through the Upper and Lower Cedar subbasins to Lake Washington. The Cedar River and its tributaries including Rock Creek and Jones Creek are under restricted appropriation subject to low flow limitations consistent with Chapter 75.20 RCW as of September 06, 1979.[60].

Land Use & Ownership

According to the King County Assessor, the current land-use is Golf Course and Vacant Land (Commercial) and zoned as Resource Conservation (RC). The land to which Pre-identified Water Right No. 5 is appurtenant has operated as a golf course since 1932. Prior to that, the property operated as a farm, established in 1905. The landowner and water right holder manages 13 parcels totaling 218.45 acres. A portion of this property is the Ron Regis Park. A review of the WSDA 2019 Agricultural Land Use map, identifies 77.22 acres of turf grass as the crop type on the property. Irrigation delineation indicates as much as 88.8 acres were irrigated in 2019. Delineating acreage may be challenging on this property related to known practices of irrigating only golf course tees and greens. It is possible that the difference of estimated irrigated acres between years analyzed may be explained as the result of the timing of the aerial photograph or specific water use practices, which would be best understood through direct conversation with the water user.

Table 35: Delineated irrigation in each year (2013, 2015, 2017, 2019)

Year	Total Irrigated Acres (Med/High Confidence)
2013	84.0
2015	79.2
2017	79.2
2019	88.8

Water Right

Table 36: Current Water Rights

Document Type	Qa	Qi	Priority Date	Purpose of Use	WR Acres	Source

[60] Chapter 173-508 WAC

Long Form Claim	200 afy	750 gpm	Before 1917	Irrigation, Domestic Use	100	Creek
Change Application	-	750 gpm	05/26/1999	-	-	Groundwater
Certificate of Change	85.4 afy	400 gpm	Before 1917	Irrigation	87.5	Groundwater

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 claim was filed 06/26/1974 for domestic use and irrigation of 100 acres. The claim asserts 2 acre feet per acre and a listed Qi of 750 gpm. The place of use and point(s) of diversion associated with this claim are not mapped in WRTS. This claim is subject to an administrative order filed by Ecology 04/01/2002 requiring metering. The source of this right was a creek, and water was diverted via headworks and conveyed using a gravity flow system.

A change application was submitted 05/26/1999 requesting to change the source to groundwater. The purpose of this change is noted as providing consistent irrigation and minimizing impacts to Maplewood Creek and the Cedar River. The ROE issued during the change application process noted a "de facto" change to this claim had occurred in 1998. Ecology was satisfied that appropriation under this claim was perfected, and recommended issuance of a certificate of change for the full instantaneous and annual quantities. The ROE also describes irrigation history under this claim across shifting property ownership. Most notably, the City of Renton acquired the property in 1985 and continued operating it as a golf course. The City also upgraded the irrigation system on the course, earning a Certified Audubon Cooperative Sanctuary Golf Course award for water conservation and quality management. The ROE indicates irrigated acreage decreased from 100 to 87.5 acres, of which 7.5 acres are the City-owned Ron Regis Park. The ROE estimated 85.4 afy to be the highest consumptive use on the 87.5 acres in the prior 5 years. The ROE recommends approval of the change application reducing claimed quantities to 400 gpm Qi (additive) and 85.4 afy Qa (additive) for irrigation of 87.5 acres.

The certificate of change was issued 02/12/016 authorizing irrigation on 87.5 acres with 400 gpm listed as the Qi and 85.4 afy listed as the Qa. The approved source of this right is two wells located on the golf course property. The certificate of change specifies these quantities are additive, but does not specify to which right they are additive.

Well Information:

Well reports are available on WTRS for the two wells serving this right. The first of the two wells was drilled 03/16/1989 with a diameter of 12 inches to a depth of 56 feet and was completed at 56 feet. At this time the well test suggested this well was capable of producing 300 gpm with a

drawdown of 6.9 feet after 4.5 hours. The second well was also drilled 03/16/1989 with a diameter of 8 inches to a depth of 50 feet and was completed at 49 feet. These records also note the presence of a third well drilled during October 1994 with a diameter of 16 inches to a depth of 225 feet and was completed at 210 feet. At this time the well test suggested this well was capable of producing 620 gpm with a drawdown of 11 feet after 24 hours. Without further investigation, it is unclear if this third well is utilized for irrigation of the golf course.

Metering Records:

Metering records were provided by Ecology upon request. Metering records for this water right indicate water from these wells from 2002-2019. As much as 85.4 acre feet of water use was indicated by metering records in the last 5 years.

Conclusion

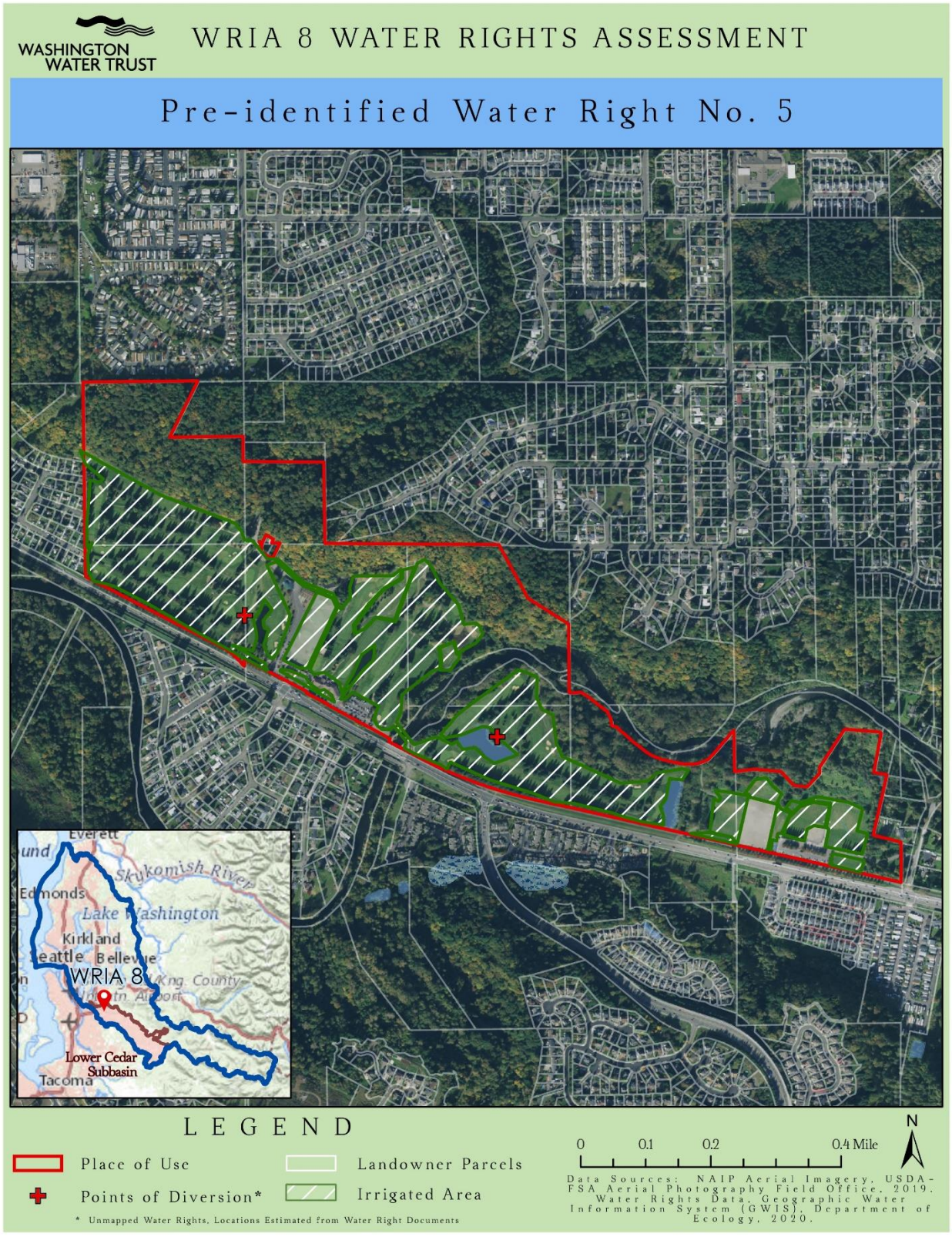
The Pre-identified No. 5 water right was identified during an analysis of WRIA 8 golf courses at Ecology's request. Ecology has reviewed and affirmed this water right through a change application and issuance of an ROE. Metering records from 2002-2019 corroborate this use and indicate as much as 85.4 acre feet have been used in the last 5 years. Four years of delineations were undertaken (2013, 2015, 2017, 2019) which indicate as much as 88.8 acres were irrigated.

Though the use history is consistent and has been validated through the issuance of an ROE, a data gap still exists concerning this water right. The ROE noted that the course has an efficient irrigation system and consumptive use for the 87.5 acres was estimated to be 85.4 afy, which is less than crop irrigation requirement for pasture/turf (1.6675 af/ac) found in the Washington Irrigation Guide (Seattle-Tacoma station, Appendix B). The certificate of change issued 12/02/2016 notes a Qi of 400 gpm and 85.4 afy Qa as additive. It is unclear as to what right these quantities are additive. Further due diligence is required to understand the quantities associated with this certificate of change. Since the ROE thoroughly reviewed irrigation practices on these 87.5 irrigated acres and determined 85.4 afy to be the consumptive use, 85.4 afy is the estimated quantity available for trust water transaction. Given that this water right has recently been validated by Ecology, the property continues to be operated as a golf course and park, and it was noted in the ROE that the irrigation efficiency on site is high, this water right yields little opportunity for transaction, unless a municipal or other source switch option is viable.

The Pre-identified No. 5 water right has a priority date of before 1917, which is senior to the establishment of the Cedar-Sammamish Basin Instream Resources Protection Program in 1979. This water right does not have an instream flow provision listed in the ROE.[61]

[61] Delineations may not reflect management practices of watering only tees and greens on the golf course. 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.

Figure 16: Project Map



North Creek Beaver Dam Analog and Log Jam Installation Project (8-SN-H12)

Draft Project Description

August 11, 2020

Project Name

North Creek Beaver Dam Analog and Log Jam Installation Project

WRIA 8 WRE Subbasin

Swamp/North

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

In partnership with the City of Everett and Snohomish Co. Parks, Adopt-A-Stream Foundation (AASF) will install 16-beaver dam analogs (BDA) and logjams at 3 locations in the upper 2.5 miles of North Creek. These 3-locations are in the upper third of the main stem of North Creek that flows from South Everett to Bothell and the Sammamish River. Installation of BDAS and logjams in the headwaters of this heavily urbanized stream will improve habitat for all aquatic life and a wide range of wildlife. These features will reduce peak winter flows and increase groundwater recharge improving summer flows. AASF will also contact 162 landowners between site locations to inform them that the purpose of the project is to increase the water table, channel complexity, species diversity, and salmonid habitat. Each landowner will be encouraged to consider making riparian improvements where North Creek flows through their property. This project will benefit documented Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout that utilize the North Creek as spawning and rearing habitat. Chinook and Steelhead are protected under the 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 installed series of beaver analogs and log jams will improve the habitat for all aquatic life and a wide range of wildlife; reduce peak storm flows and channel scouring; and increase sediment deposition. The restoration actions will improve the function of North Creek's hyporheic zone at the 3 locations and allow stream flows to move laterally into soils adjacent to the stream channel that will slowly release back into the channel when rainfalls decrease. Salmonid spawning and rearing habitat will improve.

A map and drawings of the project location.

This project proposes to install beaver analogs and log jam features at three locations along North Creek's headwaters. Site 1 is within an 80-acre park, Site 2 is a 6.16-acre natural area and Site 3 is a 5.08-acre natural are a (see attached Site Plan). Site photos are also included at the end of this document.

Description of the anticipated spatial distribution of likely benefits.

The project proposes to install beaver analogs and logjam features at 3 locations within the upper 2.5-miles of North Creek. These installed features will provide immediate and direct habitat benefits at those location and, water quality/quantity benefits downstream.

Performance goals and measures.

Installed BDAs and logjams will result in reduced channel down-cutting and sediment aggradation at three North Creek headwater locations and increased groundwater, channel complexity and salmonid habitat.

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

A primary objective of this project is to reduce peak winter flows and the duration of time that the headwaters of North Creek are dry in the summer so it can again be suitable habitat for salmonid spawning and rearing. Specific species that have been documented within this section of North Creek are: Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout. Chinook and Steelhead are priority species, protected under the ESA.

Identification of anticipated support and barriers to completion.

One site is on property owned by Snohomish Co. Parks, Rec. and Tourism, and two sites are City of Everett property. They and the downstream cities of Mill Creek and Bothell have issued letters of support. In addition, WDFW Habitat Biologist Miles Penk has determined that this is a "fish enhancement project" and that drawings submitted with the grant application are sufficient for the required JARPA.

Estimate of capital costs and reoccurring O&M costs.

Estimated total cost is anticipated to be up to $94,193.

Anticipated durability and resiliency.

Each of the 3 publicly owned project locations are heavily wooded natural areas. The 16 installed structures will recruit woody debris long after project completion. It is anticipated that this will be a very durable and resilient project

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

Adopt-A-Stream Foundation. Sponsor contact: Tom Murdoch, tomm@streamkeeper.org. The sponsor is ready to proceed when funded.

Documentation of sources, methods, uncertainties, and assumptions.

Benefits of the installation of BDA's and logjams are well documented. Materials required are on site and can be installed with minimal equipment. Landowners are enthusiastic. This project will be a success.

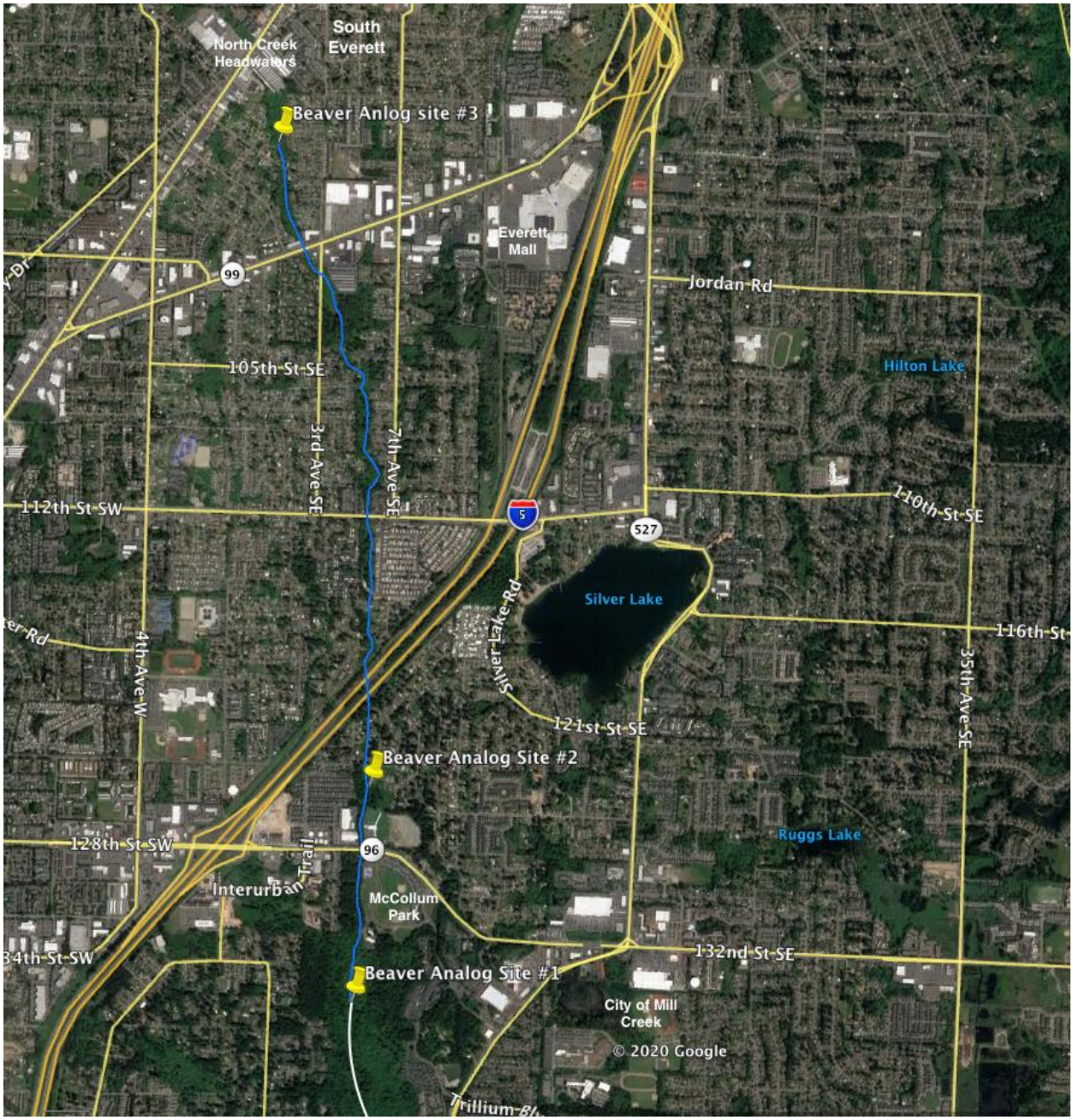


Figure 1. Site Plan for North Creek Beaver Dam Analog and Log Jam Project. Site 1 is in Snohomish County's McCollum Park; Sites 2 and 3 are located in natural areas owned by the City of Everett.

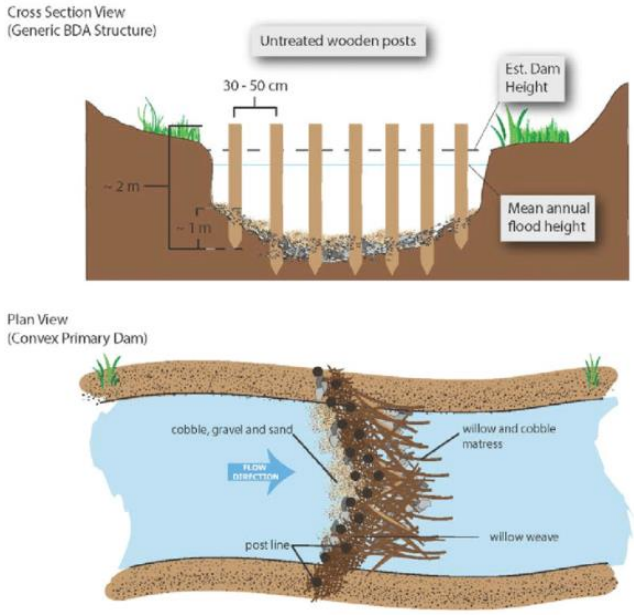
Photographs 1 and 2. Site 1: channel-spanning logjams and BDA's will be installed in the 14-foot wide channel to reduce scour down cutting that is up to four feet deep on both sides of the channel as shown below.

Photograph 3. Site 2 bank erosion up to 2-feet in depth that will benefit from logjams and BDA's.

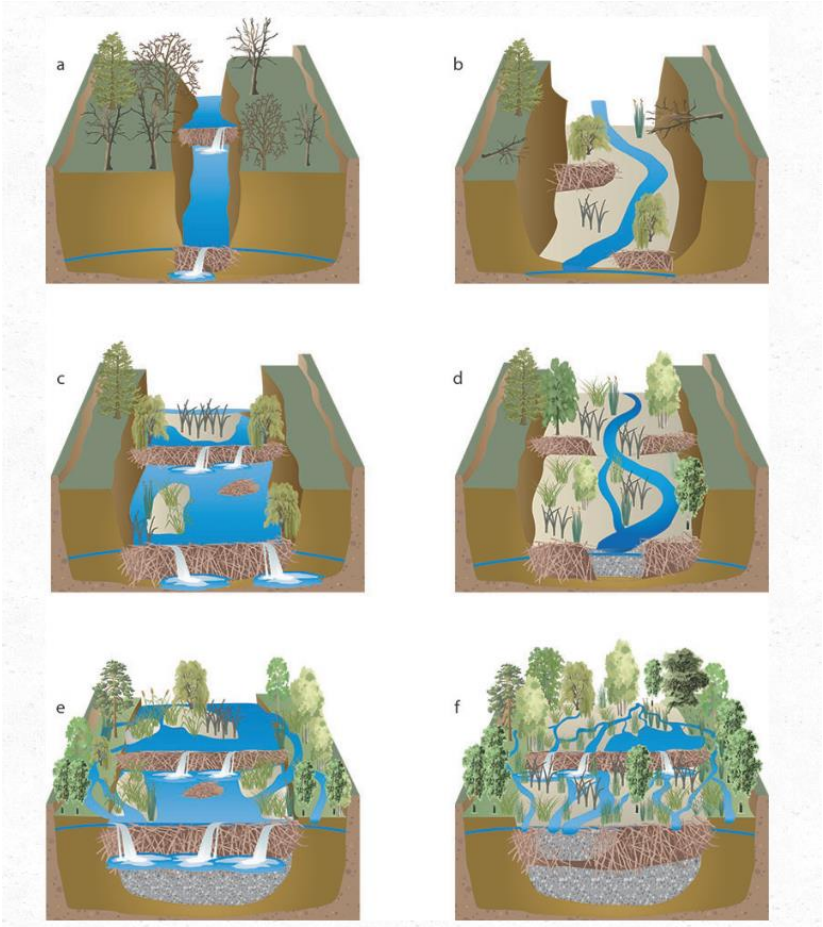
Photograph 4. Riparian intrusion from residential structure just upstream from Site 2 (photograph taken March 25, 2020)

Photograph 5. Site 3 includes great material for construction of BDA's and channel spanning logjams (photograph taken March 25, 2020)

Basic Beaver Dam Analog design



Over time the effects should resemble the graphic below:



Canyon Park Business Park Redevelopment (8-SN-H13)

Draft Project Description

July 7, 2020

Project Status:

Project is in very early phases and specific information is not yet available. The project would support redevelopment of the Canyon Park business park, potentially reducing overall impervious surface area, and would include stormwater improvements and potentially restoration and/or wetland enhancements along North Creek.

Project Name

Canyon Park Business Park Redevelopment

Narrative Description

The City of Bothell is rezoning the Canyon Park business park area to include mixed use. The project would potentially reduce overall impervious surface area and would include stormwater improvements and potentially restoration and/or wetland enhancements along North Creek.

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

The project would include improvements to the existing stormwater system, including additional detention and infiltration. LID techniques could be incorporated into the design to provide additional infiltration and impervious surface reduction. Redevelopment will trigger water quality and flow control requirements, so only treatment exceeding those requirements would count toward offsets. Based on hydrologic modeling of stormwater infiltration for several projects in King and Snohomish counties, infiltration could transfer on the order of 1 acre-foot per acre of contributing area from surface runoff to groundwater, delaying contribution to streamflow. Magnitude of infiltration offset would depend on infiltration rates at the site as well as the amount of infiltration area added above and beyond required stormwater treatment. Wetland enhancements could also provide some (likely small) storage benefit.

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

Canyon Park area map at end.

Description of the anticipated spatial distribution of likely benefits.

North Creek through and downstream of Canyon Park.

Performance goals and measures.

For stormwater, retrofit area treated, infiltration footprint, infiltration rates. For wetland, stream length restored, wetland water levels.

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

Historically, North Creek supported runs of Chinook, sockeye, kokanee, and Coho salmon and steelhead and coastal cutthroat trout. From 1997 to 2015, volunteers with the Salmon Watcher Program recorded

salmon observations at various locations in North Creek. Volunteers consistently saw Chinook, Coho, kokanee and sockeye in the creek. Less commonly spotted were chum salmon. The Canyon Park segment of North Creek features multiple wetlands. Channel and habitat structure through this portion of the creek is generally degraded compared to properly functioning conditions.

Identification of anticipated support and barriers to completion.

The owners, developers, and property managers are very interested in working together on a combined regional facility. While this project is not yet listed in Bothell's Capital Facilities Plan, there is an ongoing retrofit program with partnerships that would meet this criteria. The City does not currently own and operate this regional pond, so would need permission to expand the existing private pond or would create features downstream within the right-of-way on city-owned property. If storage of the existing pond is expanded, dam safety regulations from Ecology may be triggered if the total capacity exceeds 10 acre feet. For wetland/stream restoration and enhancement, options would be discussed with the permitting agencies to see what is needed.

Potential budget and O&M costs.

To be determined. The budget for a feasibility study would likely be around $150,000 depending on what monitoring is needed. Funding for design and construction would include regional pond, ditch, and swale redesign, wetland/stream enhancement and restoration, and low impact development features to provide additional flow control and water quality benefit for existing development. The O&M costs would be absorbed by the City Stormwater Utility while a covenant would be placed on any private systems to require the private property owners to maintain all improvements as needed.

Anticipated durability and resiliency.

This project will be designed to the highest stormwater criteria for flow control and water quality treatment. This area was originally designed in the 1980's, so there is very minimal flow control and water quality existing onsite. Any designs will also include additional flood storage capacity, so this system would be anticipated to increase durability and resiliency within the Canyon Park Subarea.

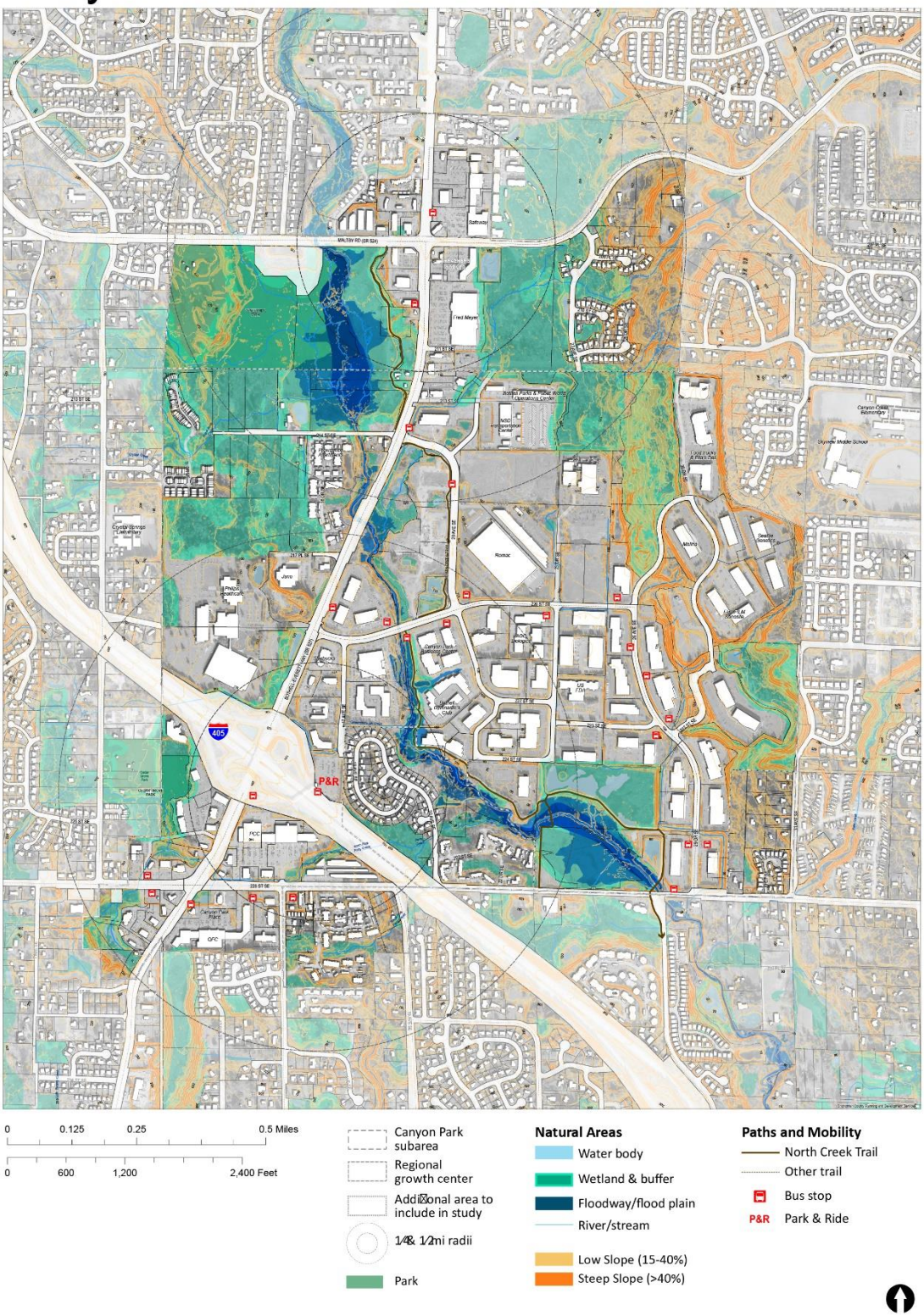
Project sponsor(s) (if identified) and readiness to proceed/implement.

City of Bothell would be the project sponsor.

Documentation of sources, methods, and assumptions.

Original plat documents and drainage reports for subarea development
Past and current Bothell Surface Water Design Manuals
Assumptions are that we will increase dead and live storage under any scenario, which will decrease stormwater runoff flow rates, increase water quality benefit through retrofitting and enhancing the existing storm system, and increase effective wetland areas through restoration and enhancement.

Canyon Park Subarea



1
2

Cutthroat Creek Restoration at Carousel Ranch Project (8-LB-H14)

Draft Project Description

August 10, 2020

Project Name

Cutthroat Creek Restoration at Carousel Ranch Project

WRIA 8 WRE Subbasin

Little Bear

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes stream, riparian, and upland restoration on Cutthroat Creek at Carousel Ranch, a tributary to Little Bear Creek within the Little Bear subbasin in Woodinville, Washington. The project will implement improvements along 870-feet of Cutthroat Creek. Restoration actions include large wood debris (LWD) placement to increase hydraulic diversity and structure and to build/maintain channel grade at the new Maltby Area Community Park. This project will restore stream habitat, native vegetation, protect and restore water temperature, provide active erosion abatement, and control invasive vegetation. These restoration actions will also benefit Little Bear Creek downstream.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout that utilize Cutthroat Creek 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.

The proposed project will restore the stream, riparian and upland habitats associated with Cutthroat Creek. Installation of LWD has several ecological functions including increasing hydraulic diversity, 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. Shade from installed riparian vegetation will moderate water temperature, reduce evaporation and create habitat.

A map and drawings of the project location.

This project proposes restoration actions along Cutthroat Creek at Carousel Ranch located in Woodinville, Washington. For this project, two concepts have been proposed depending on funding available to complete. The project site is shown in relation to surrounding physical features on the attached Site Plan.

Concept A includes traditional channel restoration including wood placement to increase hydraulic diversity and structure and build/maintain channel grade throughout Zone 1 (see Figure 1). This includes

bank stabilization/erosion management along the steep left bank portion of Cutthroat Creek from approximate station 0+50 to 1+50.

Concept B includes elements in addition to Concept A (see Figure 2). This concept includes aggressive floodplain grading and instream wood placement from culvert to 400 feet upstream of culvert to the high-quality wetland area. The goal would be to spread flow, reduce shear stress, and engage floodplain to convert to wetland function with a smaller defined low-flow channel. Additionally, this concept includes targeted wood placement, from approximate station 4+00 to the upstream parcel boundary, to induce scour and create covered pool habitat. Concept B incorporates groupings of brush wood to function as small jams relative to the creek, providing cover and habitat enhancement.

Description of the anticipated spatial distribution of likely benefits.

The project proposes to restore 870 feet of Cutthroat Creek at Carousel Ranch, which will also benefit the Little Bear Creek downstream.

Performance goals and measures.

The goal for this project is to shift the stream from an alluvial condition to a wetland condition, from approximately 400 to 800 feet upstream of the culvert, in anticipation of reduction in sediment mobility. Water quality is expected to improve with reduction of erosion and temperature as a direct benefit of increased shading. The control of sediment transport and reduction and maintenance of reduced temperatures are beneficial to the mainstem of Little Bear Creek that provides direct benefit for improvement to Chinook habitat. In addition, increased riparian vegetation and cover will likely improve B-IBI (Benthic Index of Biotic Integrity) scores.

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, Sockeye, and resident Cutthroat Trout that utilize Cutthroat Creek as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA. LWD and restoration of riparian vegetation will directly benefit prey availability, spawning success as well as survival of pre-migrant and out-migrating juvenile salmonids.

Identification of anticipated support and barriers to completion.

A Centennial Clean Water Fund (CCWF) application is a candidate source of support for either Concept A or Concept B. The WRIA 8 Watershed Restoration Enhancement Committee funding is another applicable funding opportunity for this project. The project area has moderate communication with the groundwater table and contributes to a high infiltration area along the confluence of Little Bear Creek and Cutthroat Creek.

Barriers to completion include funding for preliminary and full design, and construction. Since the parcel is owned by Snohomish County Parks Division, this location is accessible for construction and presents no additional costs to Snohomish County for property acquisition.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are estimated at $330,000 in 4-year work plan and between $412,000 to $669,000 in Little Bear Plan.

Anticipated durability and resiliency.

The current stream condition includes aggradation at several locations with identifiable knick points that would be addressed with proposed design concept elements. Spreading flow reduces shear stress and reduces sediment transport currently a problem in the lower portion of the project area. Engaging the floodplain to convert to wetland function with a smaller defined low-flow channel will ensure reduction of potential for future sediment transport.

Resiliency of the project has key components that are focused on sediment transport reduction and maintenance of in-channel water volume during drought years. Expanding the wetland footprint and spreading flow will reduce eroding streambanks and aggradation of the stream channel during high flows. Spreading flow increases the footprint of open water along with wetland expansion potentially interacting with the groundwater table.

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

Snohomish County. Sponsor contact: Elisa Dawson, Elisa.Dawson@co.snohomish.wa.us. The sponsor is at the conceptual design stage and ready to proceed with design immediately.

Documentation of sources, methods, uncertainties, and assumptions.

A conceptual plan was completed for this site with development of two concepts to accommodate for available funding. This project is a component of a larger effort to identify and prioritize five projects in the Little Bear Creek watershed. Citation for this report is as follows:

Snohomish County. 2018. Instream Projects: Final Report of Task 2.07.2 of the Little Bear Creek Basin Plan, A Final Watershed-Scale Stormwater Plan. Prepared by Northwest Hydraulic Consultants Inc. Snohomish County Surface Water Management Division, Everett, WA. 42p.

A single design uncertainty was identified as moderate in the ranking process of potential projects sites. Overhead power lines near the culvert traverse the project area was determined to be of moderate concern when considering proposed restoration improvements. In ranking of potential project locations, this project was ranked highest priority for implementation.

Assumptions include agreement with Snohomish County Parks Division's willingness to expand the footprint on this County-owned property to include this restoration project along with the planned Maltby Area Community Park. Parks Division and the project sponsor are in agreement to move forward with addition of the restoration project. Park implementation is expected to begin as early as May 2021. This restoration project occupies the northwest corner of this Carousel Ranch property.

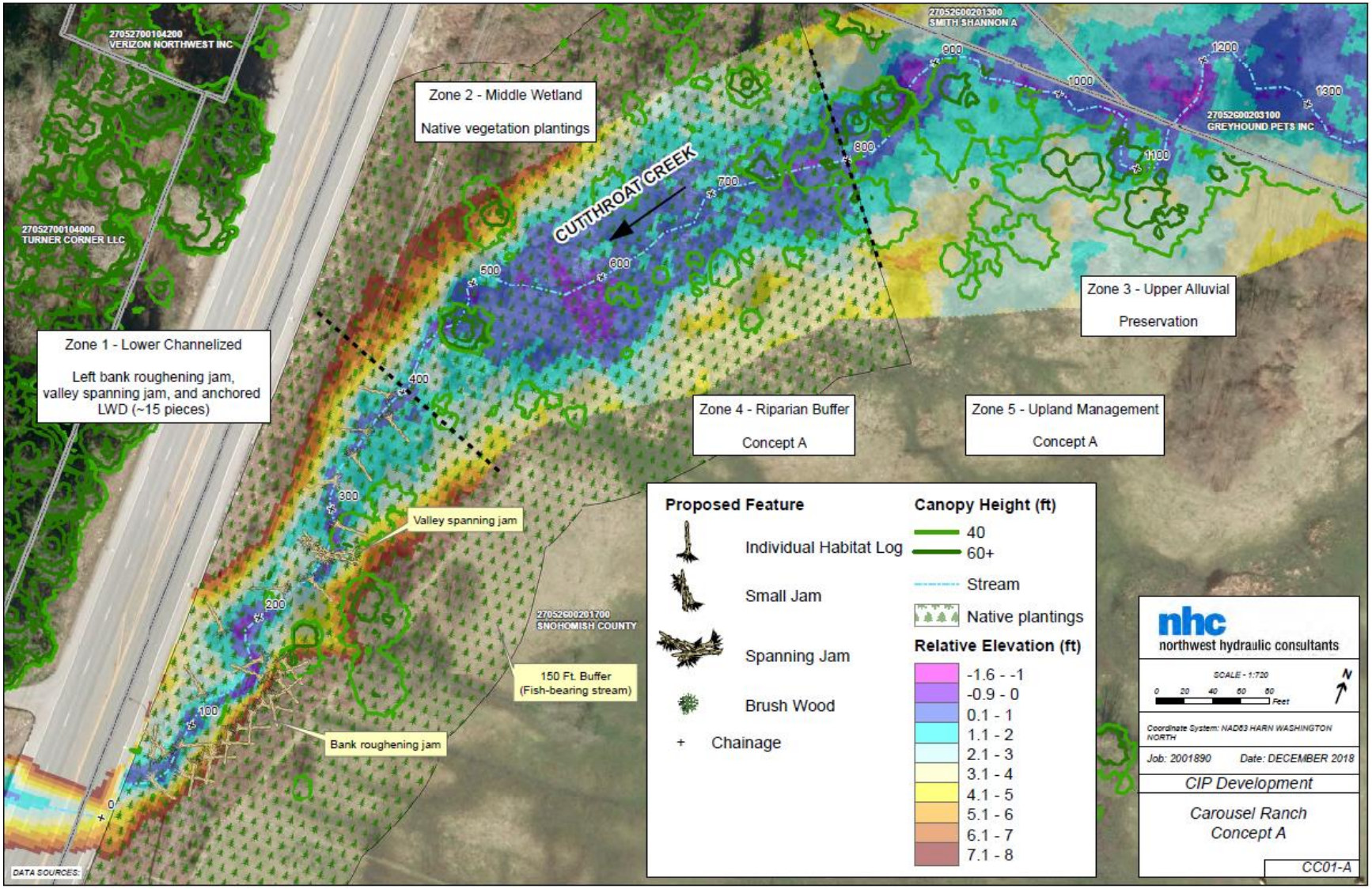


Figure 1. Site Plan for Carousel Ranch Concept A

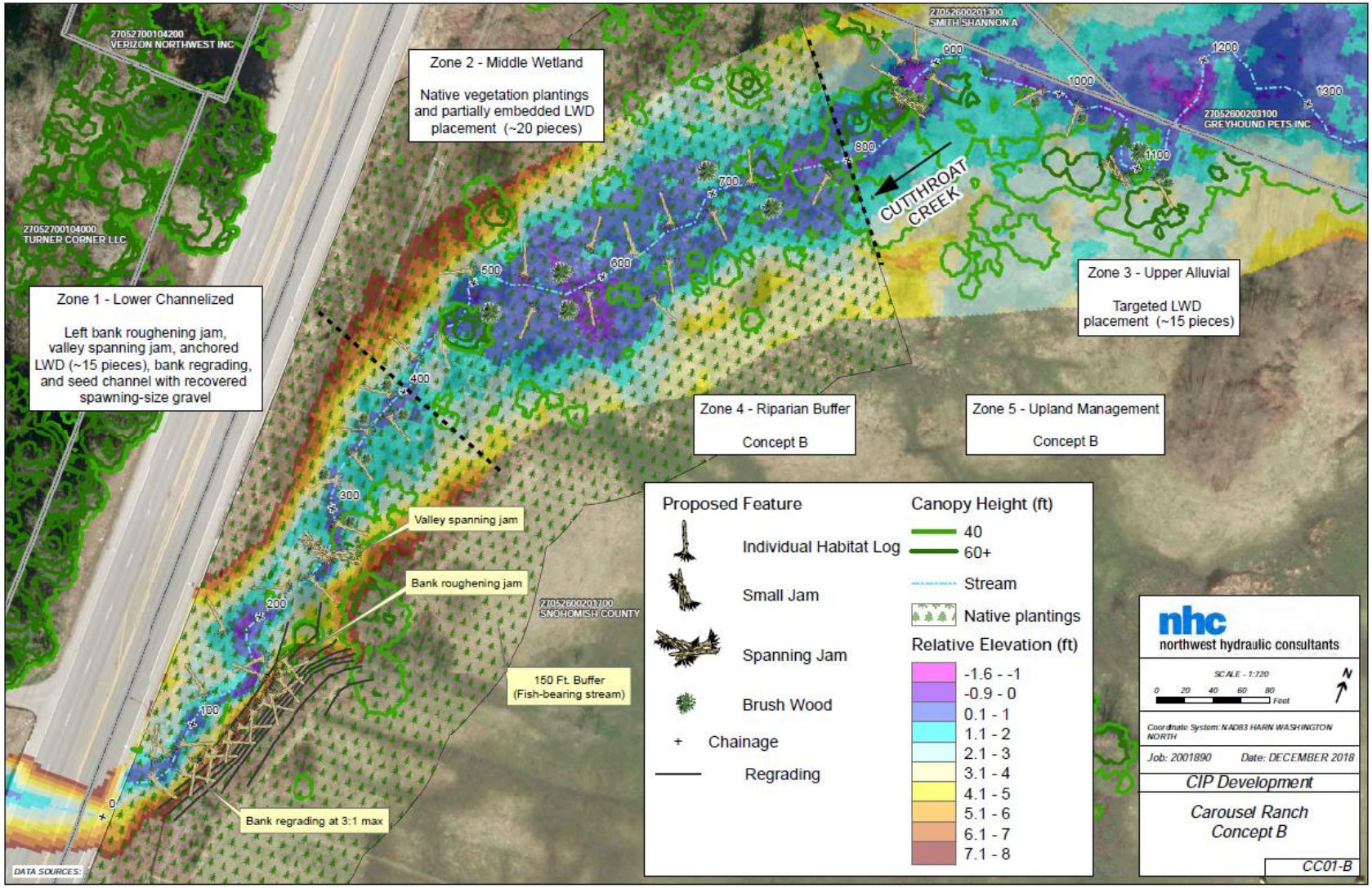


Figure 2. Site Plan for Carousel Ranch Concept B

Little Bear Instream Projects (8-LB-H15)

Draft Project Description

August 10, 2020

Project Name

Little Bear Instream Projects

WRIA 8 WRE Subbasin

Little Bear

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes multiple sites along Little Bear Creek located in the Little Bear subbasin in Woodinville, Washington. A total of four sites along Little Bear Creek are proposed for restoration. The four sites and the proposed restoration actions are:

- LB02 (Little Bear Creek at 228th Street SE): Improve riparian cover and hydraulic diversity with large woody debris (LWD) placement instream. Add riparian buffer zone. Include a modified log jack (angled log pile) at head of sediment bar to encourage persistent flow split (dividing flow between two or among more channels) and roughened right bank to improve eroding conditions. Increase meander length.
- LB03 (Little Bear Creek near 224th Street SE): Floodplain reconnection and riprap removal. Add LWD and incorporate small training (encouraging flow away from areas prone to erosion) features
- LB05 (Little Beak Creek at Trovas HOA at 196th Street SE): Stabilize eroding tributary and improve hydraulic diversity by adding instream wood and more riparian planting.
- LB06 (Little Bear Creek at Lightfoot): Riparian planting and removal of invasives, incorporate wood in-channel.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, Kokanee, and resident Cutthroat Trout that utilize Little Bear Creek 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.

The proposed project will restore the stream and riparian habitats associated with Little Bear Creek. Installation of LWD has several ecological functions including increasing hydraulic diversity, 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. Shade from installed riparian vegetation will moderate water temperature, reduce evaporation and create habitat.

A map and drawings of the project location.

This project proposes to restoration actions at four sites along Little Bear Creek in Woodinville, Washington. The project site is shown in relation to surrounding physical features on the attached series of Site Plans included at the end of this document (Figures 1 through 8).

Description of the anticipated spatial distribution of likely benefits.

The project proposes restoration actions at four different locations along Little Bear Creek. Two conceptual plans have been proposed for each of the projects: LB02, LB03, LB05, and LB06. Concept selection depends on funding available to implement each project. See attached site plans (end of document) for spatial distribution of benefits.

Performance goals and measures.

LB02

Large woody debris in Concept A may lead to a moderate increase of Chinook habitat quality due to increased instream cover and hydraulic complexity. Adding riparian plantings will improve shading and thereby maintain and reduce instream temperatures, providing direct benefit to Chinook habitat. The wood jam in Concept B will create and support lower velocity refugia habitat.

LB03

Both concepts are expected to increase habitat quantity and quality and reduce roadway-related contaminant inputs. These projects will create substantial additional spawning and rearing area for Chinook near high-value beaver-dammed pond rearing habitat. Woody debris incorporation would improve bed material gradation and hydraulic diversity for Chinook habitat uplift.

LB05

Arresting tributary erosion will reduce sediment load and help improve water quality and Chinook spawning habitat. Increasing LWD along the mainstem would provide hydraulic complexity and cover, providing Chinook habitat uplift.

LB06

Riparian restoration would provide shading to reduce stream temperatures, enhance natural wood recruitment, and provide food sources for Chinook and other aquatic species. Woody debris incorporation would improve bed material gradation, cover, and hydraulic diversity for Chinook habitat uplift.

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, Sockeye, Kokanee, and resident Cutthroat Trout that utilize Little Bear Creek as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA. LWD and restoration of riparian vegetation will directly benefit prey availability, spawning success as well as survival of pre-migrant and out-migrating juvenile salmonids.

Identification of anticipated support and barriers to completion.

A Centennial Clean Water Fund (CCWF) application is a candidate source of support for either Concept A or Concept B for each of the Little Bear Creek projects. The WRIA 8 Watershed Restoration

Enhancement Committee funding is another applicable funding opportunity when two or more of these projects are bundled in order to increase the combined groundwater contribution estimate that meets the minimum annual goals. Areas along Little Bear Creek are known to have high infiltration rates to groundwater.

Barriers to completion include funding for preliminary and full design, and construction. Parcels in the project areas are either County-owned or owned by the Washington State Department of Transportation (WSDOT). WSDOT and USACE have been updated on the County's proposed projects, where applicable, and are in agreement with project concepts.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are estimated by restoration site are:

- LB02: $153,000 - $167,000
- LB03: $246,000 - $298,000
- LB05: $170,000-$270,00
- LB06: $69,000 - $109,000

Anticipated durability and resiliency.

Little Bear Creek project locations are deficient in the variety of habitat types that support Chinook salmon; spawning and rearing among the most important. Outmigrants are effected by warm water temperatures during their migration to larger rivers. Reduction of road runoff into some of the project areas as well as re-establishing riparian areas that serve as barriers to pollutant introduction to these reaches are central themes.

Retention of water for earlier life stages is important on the mainstem and establishing a variety of hydraulic habitats will enhance survivability of several life stages. The mainstem of Little Bear Creek has substantial sediment transport mediated by winter stormflows and catastrophic summer stormflow events. Burying of benthic habitat is a significant barrier for Chinook salmon life cycle completion. These projects, sometimes working in tandem have a greater effect on achieving goals and in maintaining suitable habitat.

Resiliency of these projects have key components that are focused on sediment transport reduction, maintenance of in-channel water volume during drought years and maintenance of low water temperatures. Hydraulic diversity promotes reduction eroding streambanks and aggradation of the stream channel during high flows. Spreading flow out increases the footprint of open water potentially allowing interaction with the groundwater table.

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

Snohomish County. Sponsor contact: Elisa Dawson, Elisa.Dawson@co.snohomish.wa.us. The sponsor is at the conceptual design stage and ready to proceed with design immediately.

Documentation of sources, methods, uncertainties, and assumptions.

A conceptual plan was completed for this site with development of two concepts to accommodate for available funding. This project is a component of a larger effort to identify and prioritize five projects in the Little Bear Creek watershed. Citation for this report is as follows:

Snohomish County. 2018. Instream Projects: Final Report of Task 2.07.2 of the Little Bear Creek Basin Plan, A Final Watershed-Scale Stormwater Plan. Prepared by Northwest Hydraulic Consultants Inc. Snohomish County Surface Water Management Division, Everett, WA. 42p.

Design uncertainties were identified for each of the Little Bear Creek mainstem projects. Uncertainties were ranked based on specific issues identified at each of the property locations. Those uncertainties are listed below:

LB02

Design Uncertainty: Concept A is **Low** (no identified issues with design elements). Concept B requires further investigation of adjacent parcels and infrastructure for impacts in the floodplain (**Moderate**). Concept C has the same concerns as Concept B and would require work on private land. (**Moderate to High** uncertainty).

LB03

Design Uncertainty: Concept A includes removal of riprap off bed would cause the creek to be less stable. Removing riprap creates slight risk of down cutting in the channel upstream, which could adversely impact beneficial beaver-dammed reach (**Moderate** uncertainty). Concept B would result in less flow in this location and would be a situation that is less risky. Concepts could affect beaver activity and realignment of the channel could impact mitigation credits (WSDOT property in Year 7 of Mitigation Monitoring) (this Concept presents a **Moderate** uncertainty).

LB05

Design Uncertainty at this location in Little Bear Creek involves determining source of erosion and coordination with property owner to mitigate transport to Little Bear Creek (uncertainty is determined to be **Moderate** at this location).

LB06

There are no identifiable design uncertainties at this proposed project location (uncertainty is determined to be **Low**).

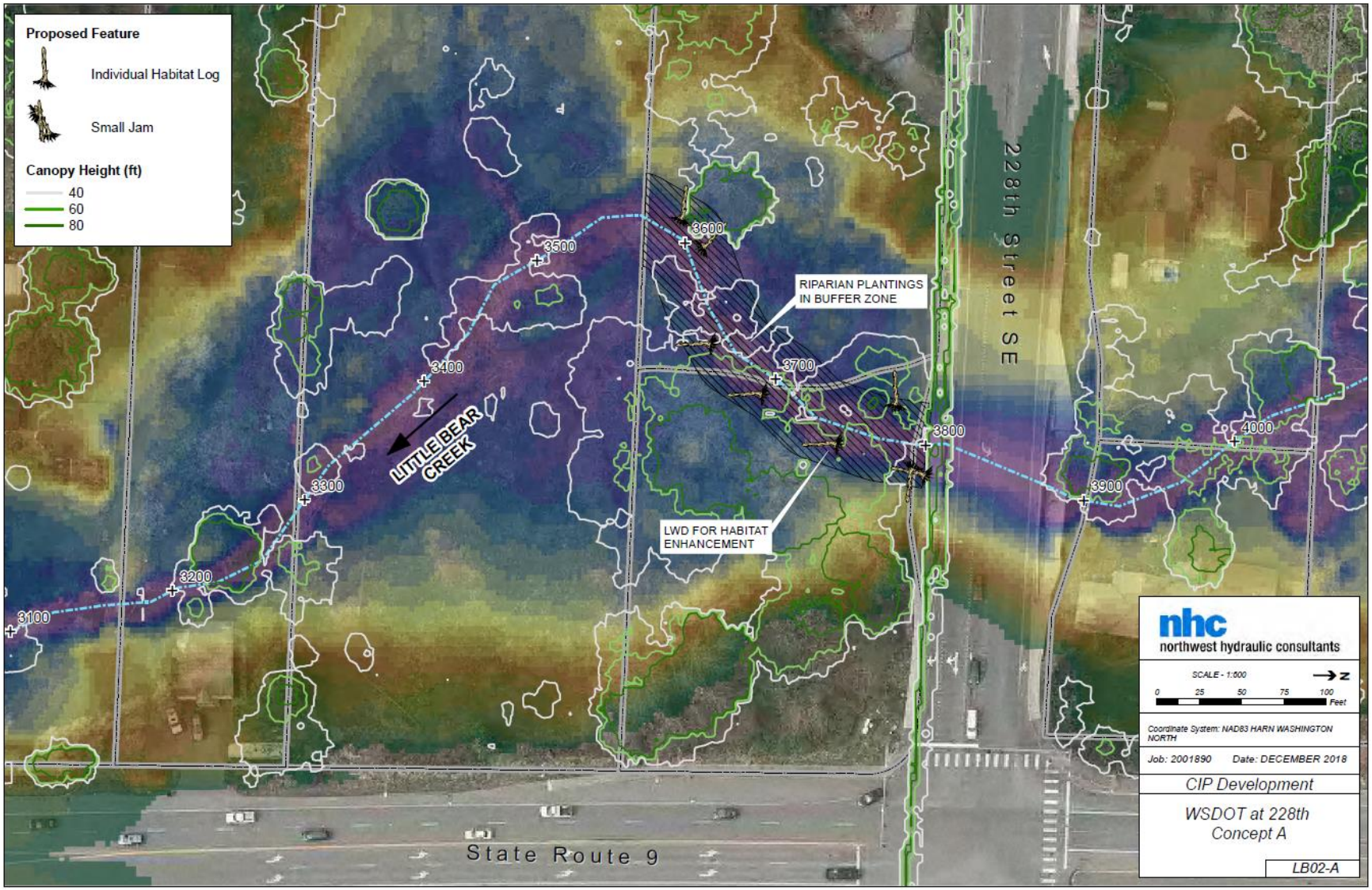


Figure 1. Site Map for Little Bear Instream LB02 Concept A

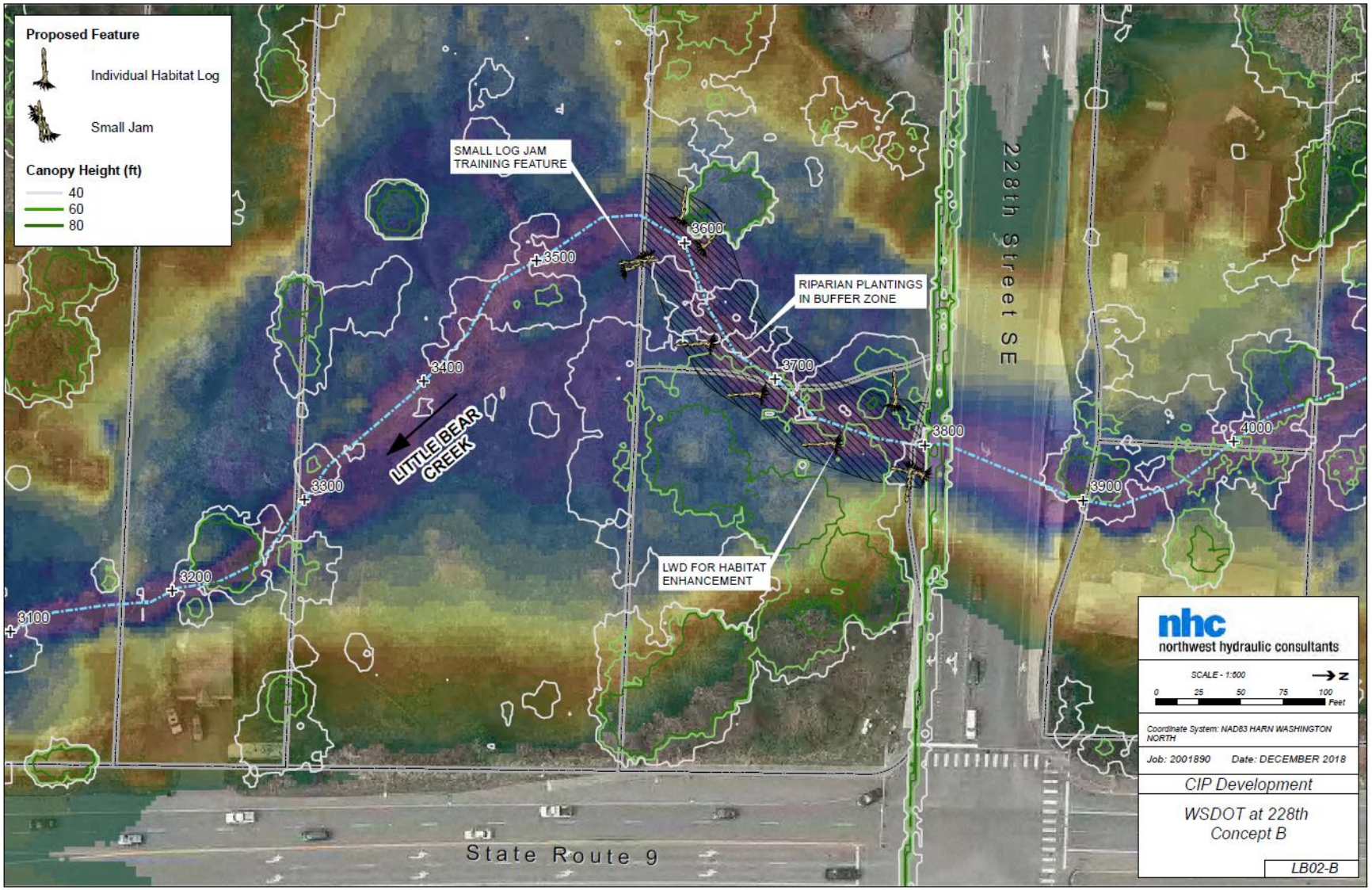


Figure 2. Site Map for Little Bear Instream LB02 Concept B

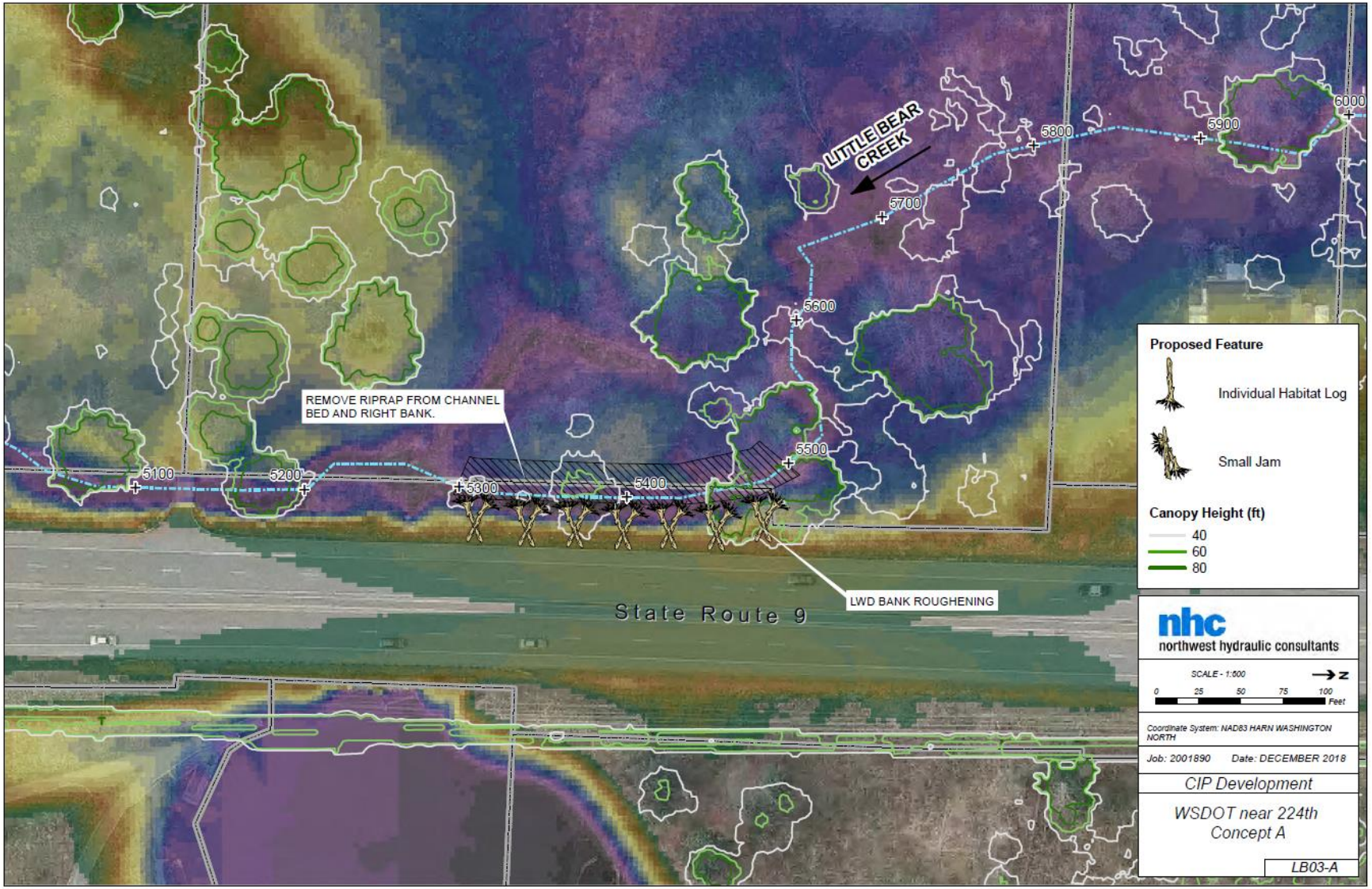


Figure 3. Site Map for Little Bear Instream LB03 Concept A

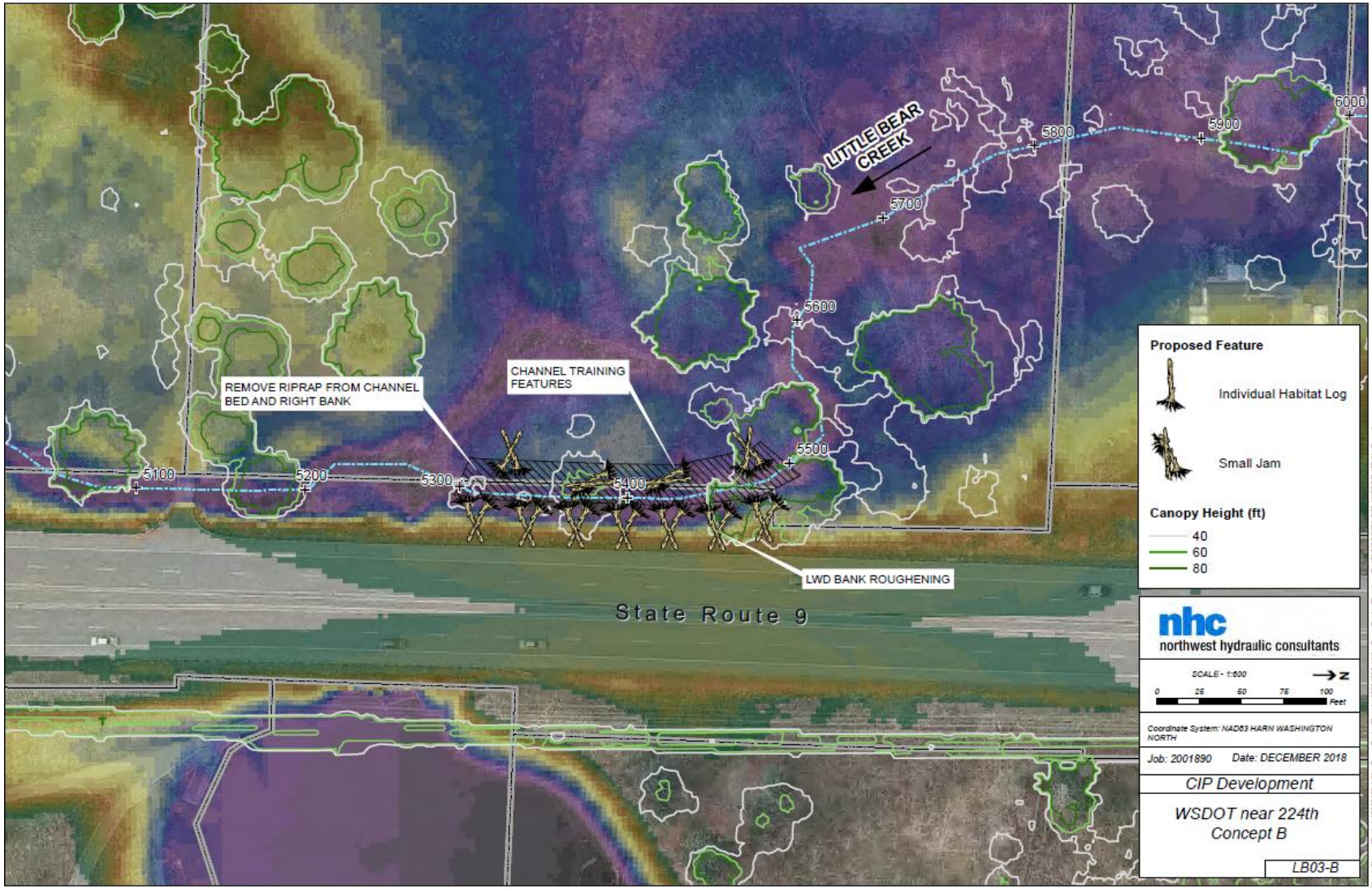


Figure 4. Site Map for Little Bear Instream LB03 Concept B

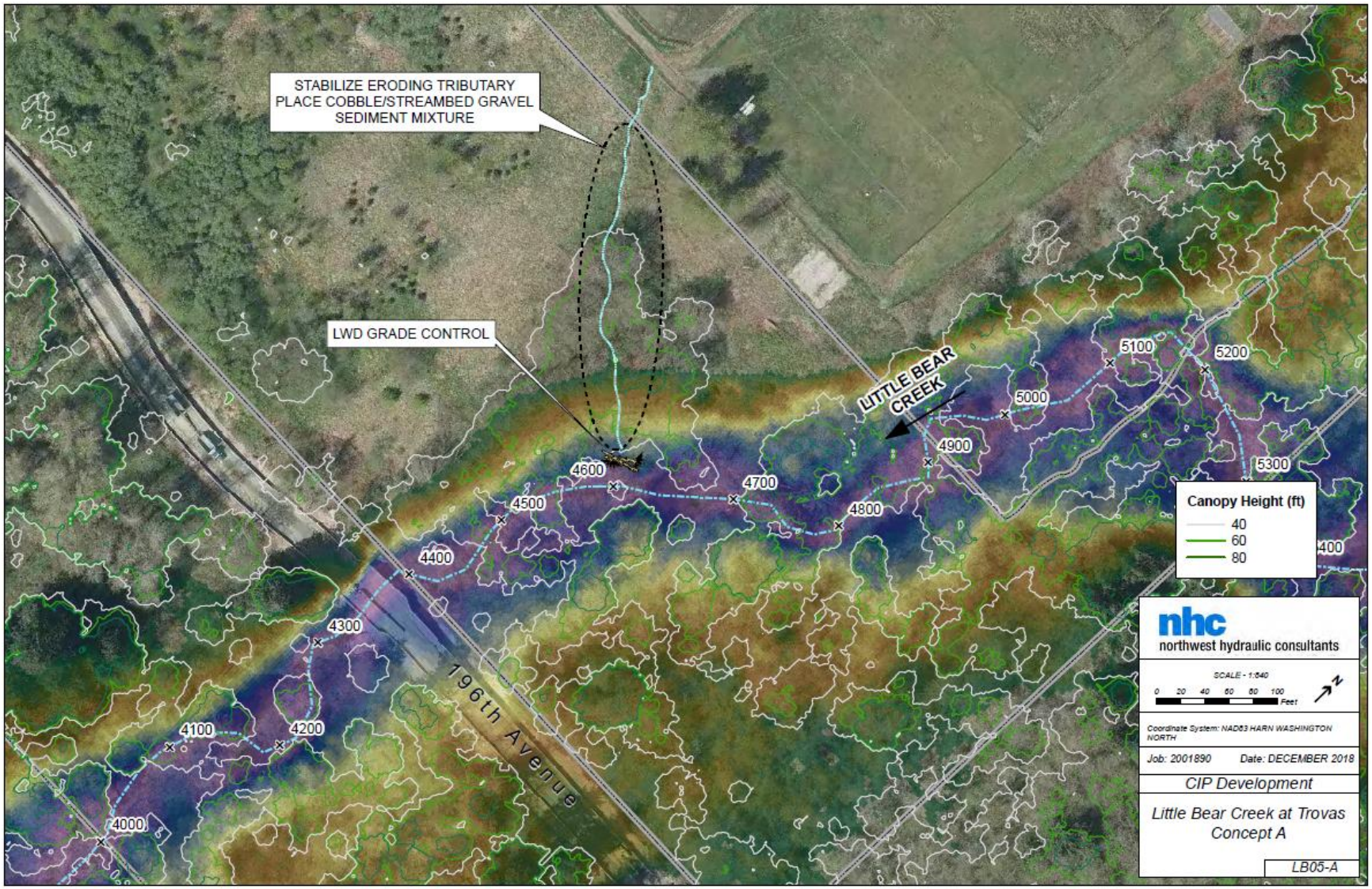


Figure 5. Site Map for Little Bear Instream LB05 Concept A

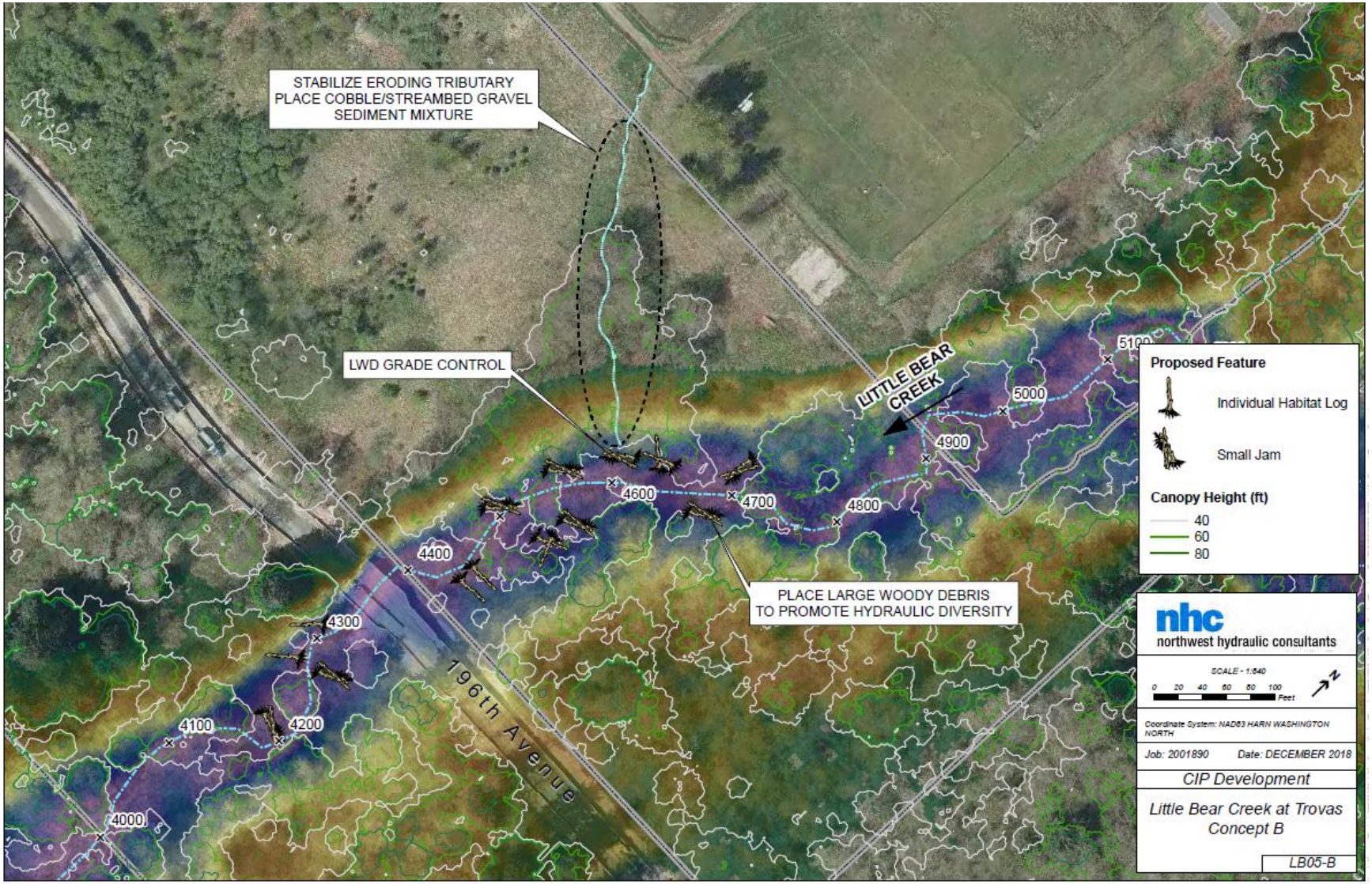


Figure 6. Site Map for Little Bear Instream LB05 Concept B

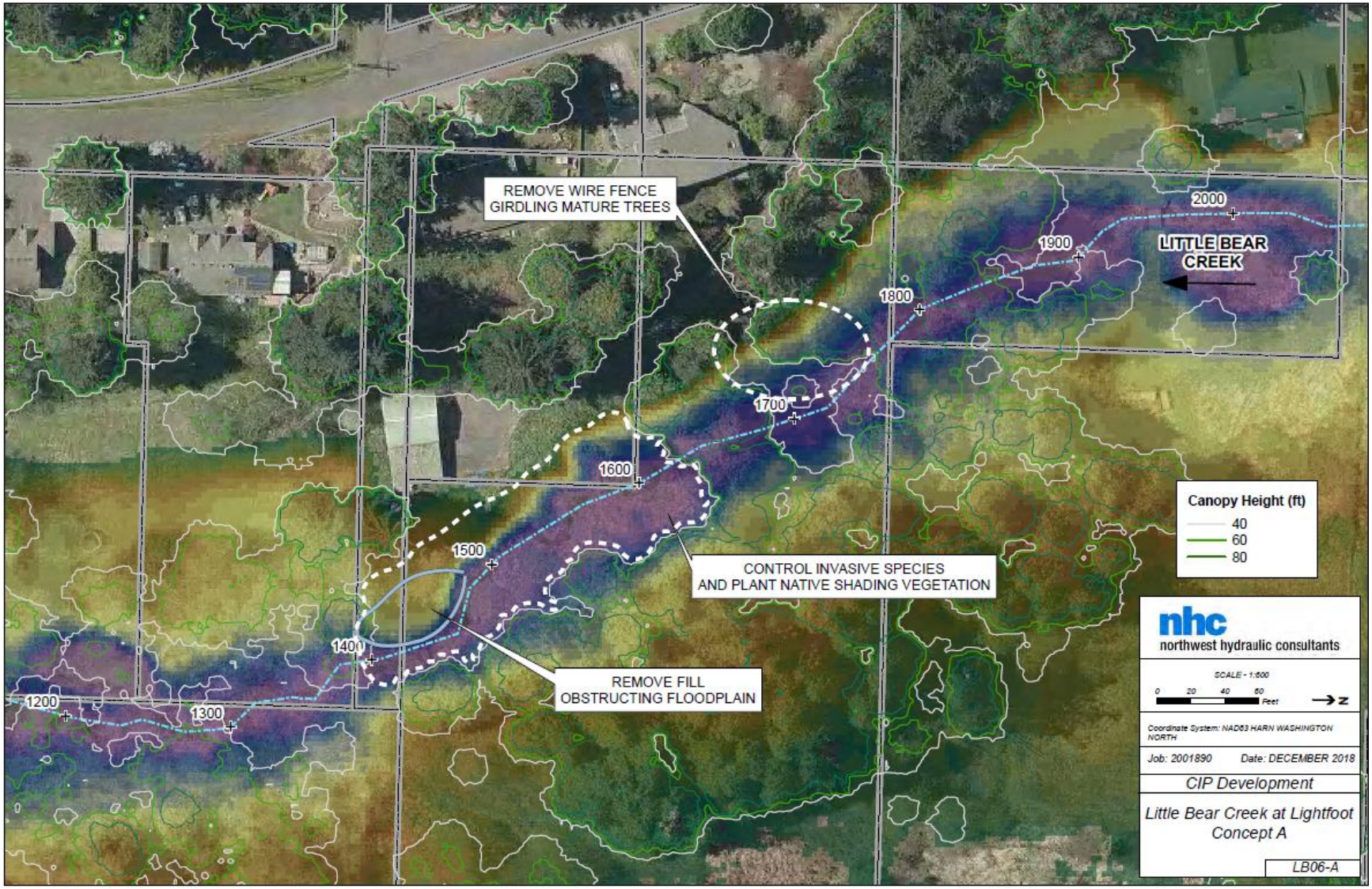


Figure 7. Site Map for Little Bear Instream LB06 Concept A

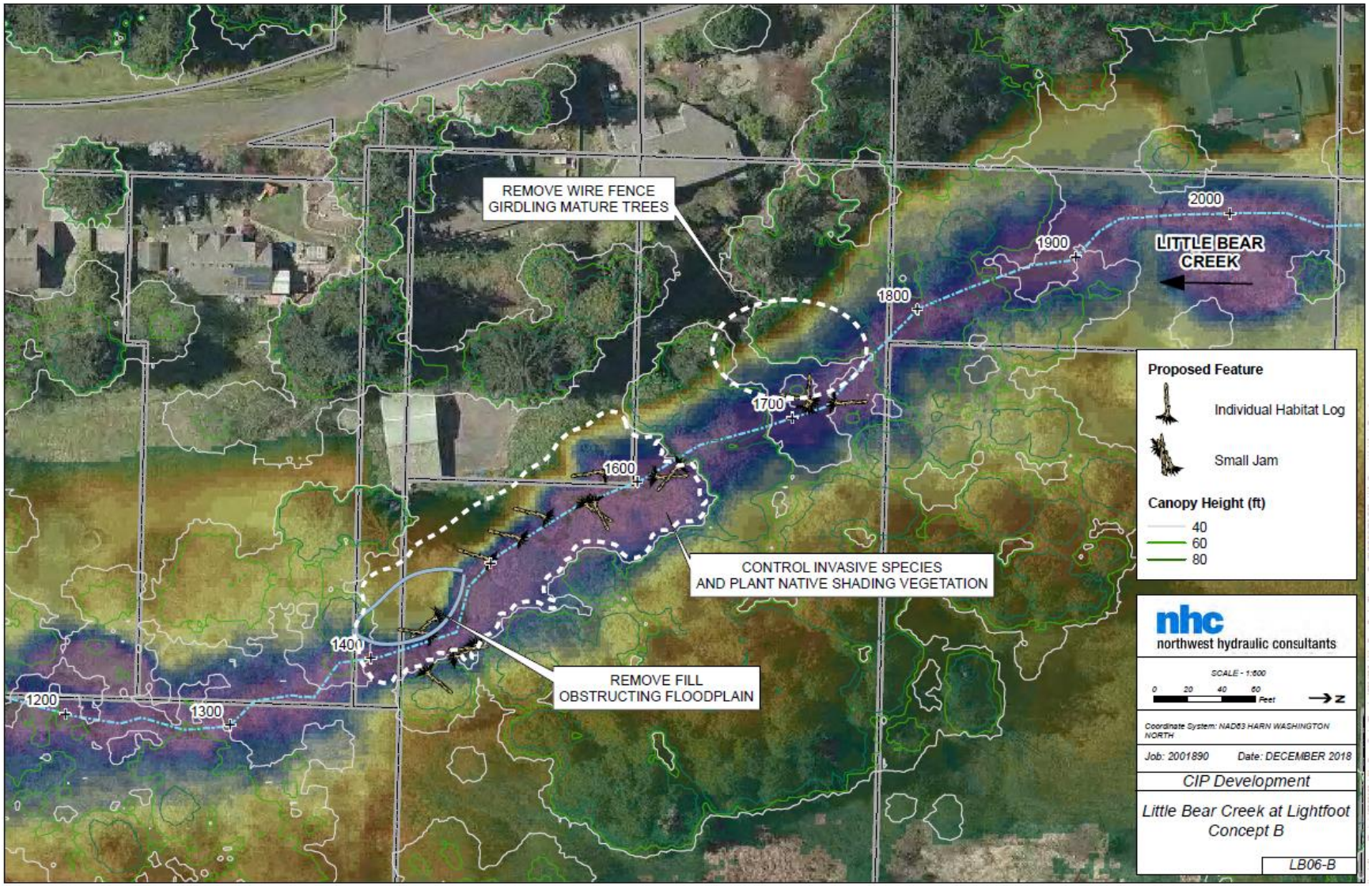


Figure 8. Site Map for Little Bear Instream LB06 Concept B

Silver Firs Stormwater Pond Retrofits (8-LB-H35)

Draft Project Description

July 6, 2020

Project Status:

Snohomish County has identified two stormwater pond retrofit projects in the northern part of the Little Bear Creek basin. Preliminary modeling and conceptual design have been performed and the projects are included on the County CIP list.

Project Name

Silver Firs Stormwater Pond Retrofits

Narrative Description

Snohomish County has identified several potential stormwater retrofit projects in the Little Bear Creek basin, including two stormwater pond infiltration retrofits in the Silver Firs subdivision. The County plans to retrofit two existing ponds to increase infiltration capacity. The two ponds are part of the existing stormwater drainage system; each receives surface storm runoff from about 125 acres of residential development.

The first pond (County CIP site 10) is located in Silver Firs Sector 3 Division 7. The project would involve expanding the existing pond by deepening and increasing pond infiltration potential. This would add 1.09 acre-feet (af) of storage and increase infiltration. The second pond (CIP site 16) is located in Silver Firs Sector 7. This project would increase the existing pond volume by deepening and increase pond infiltration potential. This would add 2.0 af of storage. Neither existing pond was designed as an infiltration facility, but infiltration has been observed to occur. The difference between existing infiltration and infiltration after retrofits would provide water offset.

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

HSPF modeling was conducted as part of Snohomish County's retrofit analysis to quantify benefits of proposed projects. The HSPF model was used to estimate the average annual offset volumes for the two pond projects. The modeling analysis assumed existing infiltration at 1.2 inches per hour for both ponds, doubling to 2.4 inches per hour with modifications.

At Site 10, the model showed a net increase of 38 af/year of infiltration. Additional infiltration at Site 16 was estimated to be 7 af/year. A minimum annual offset can be estimated by looking at just the driest years in the simulated record. Using the 10 driest years from the 63-year simulation (based on annual precipitation), the minimum annual offset can be estimated as 25 af/year for Site 10 and 2 af/year for Site 16.

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

Included at end of description.

Description of the anticipated spatial distribution of likely benefits.

Based on previous groundwater studies and watershed modeling (Golder, 2005; King County, 2005; Snohomish County, 2017), it is believed that groundwater in this area flows east to the Snoqualmie River, rather than locally to Little Bear Creek. Thus, water offsets from enhanced infiltration would accrue to WRIA 7 rather than WRIA 8 (though reductions in peak streamflows and stream flashiness would benefit Little Bear Creek).

The closest mapped streams in WRIA 7 to the pond locations are Thomas Creek (approximately 5,000 feet to mapped headwater) and Larimer Creek (approximately 5,500 feet to mapped headwaters). Both streams drain through lowland agricultural drainage systems to the Snohomish River in the vicinity of Ebey Slough.

Performance goals and measures.

Performance goal is to infiltrate as much water from the ponds as possible. Infiltration is difficult to measure directly; proxy measures include area treated, pond water levels, and pond outlet discharges.

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

The Little Bear Creek system is an important resource for fish and the following salmonid species are known to be present in the basin: chinook, sockeye, kokanee, and coho salmon. The WRIA 8 Chinook Salmon Recovery Plan notes that the estimated number of Chinook salmon spawning in Little Bear Creek averaged 11 fish for many years up to 1998. Coastal cutthroat trout and steelhead/rainbow trout have also been observed. Anadromous salmon and trout access almost all of this system, though there are some significant passage barriers to adults during periods of low stream water flows, and to juveniles during high flows

Identification of anticipated support and barriers to completion.

This project is currently listed in Snohomish County's Little Bear Creek Basin Plan and Snohomish County intends to implement the project, when funding is available.

Potential budget and O&M costs.

CIP Site 10: $600,000 design & construction
CIP Site 16: $815,000 design & construction

Anticipated durability and resiliency.

Facilities would be designed to typical County standards.

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

Snohomish County Public Works.

Documentation of sources, methods, and assumptions.

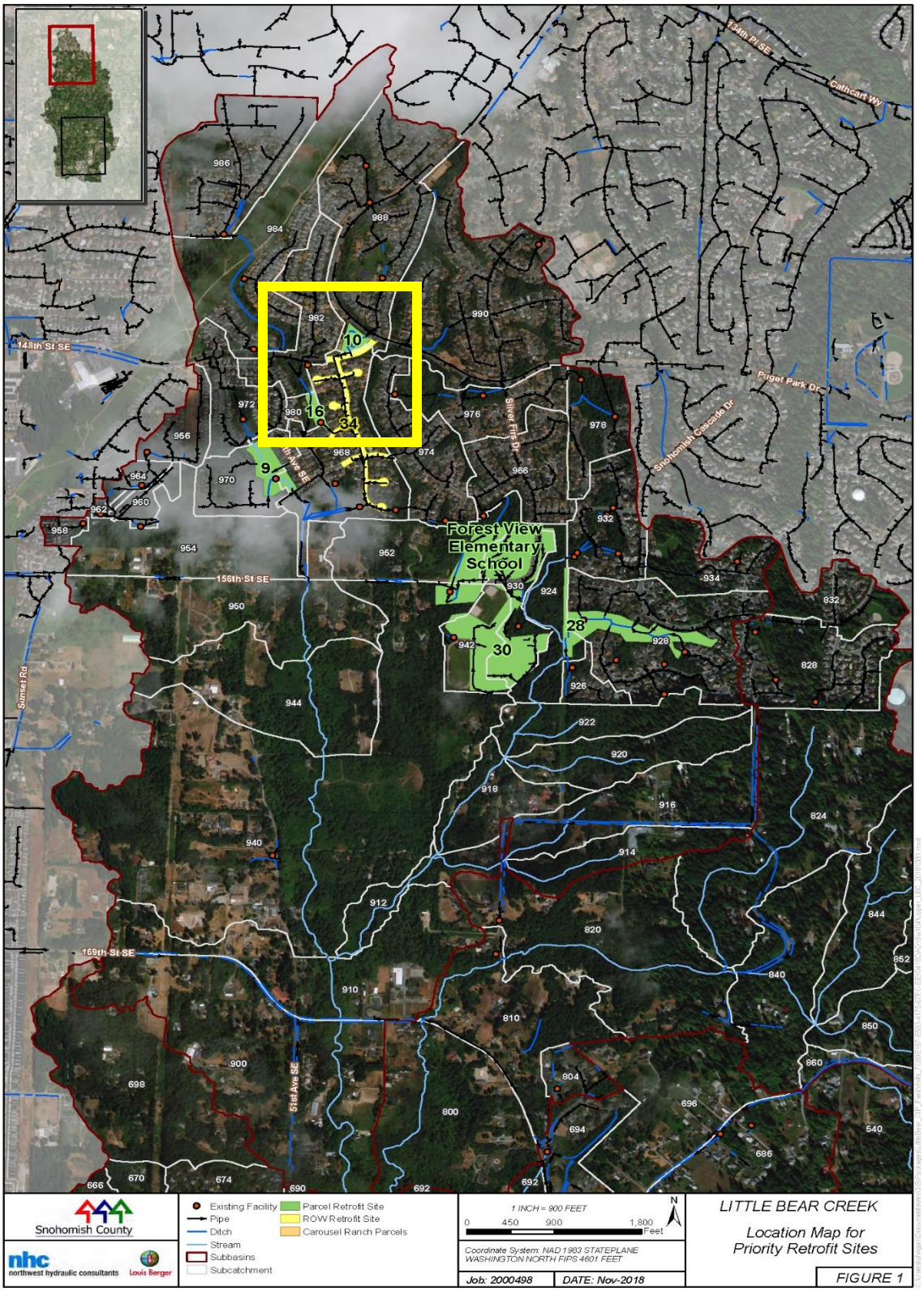
Golder and Associates, 2005. *Little Bear Creek Hydrogeologic Overview*. Prepared for Jones and Stokes and Snohomish County.

King County, 2005. *Brightwater Treatment System Environmental Impact Statement*. Available online: http://www.kingcounty.gov/environment/wtd/Construction/North/Brightwater/Background/Env-Review.aspx

Snohomish County, 2016. Little Bear Creek Basin Planning: Current Conditions Assessment Report.

Snohomish County, 2017. Little Bear Creek Basin Plan. Appendix B: Watershed Modeling Report.

Snohomish County, 2019. Stormwater Treatment CIPs: Final Report of Task 2.07.1 of the Little Bear Creek Basin Plan.


Forest View Elementary School
148th St SE
156th St SE
169th St SE
134th Pl SE
Cathcart Wy
Puget Park Dr
Snohomish Cascade Dr
Silver Firs Dr
Sunset Rd
51st Ave SE
10
16
34
9
28
30
Snohomish County
nhc
northwest hydraulic consultants
Louis Berger
Existing Facility
Pipe
Ditch
Stream
Subbasins
Subcatchment
Parcel Retrofit Site
ROW Retrofit Site
Carousel Ranch Parcels
1 INCH = 900 FEET
0 450 900 1,800 Feet
N
Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET
Job: 2000498
DATE: Nov-2018
LITTLE BEAR CREEK
Location Map for Priority Retrofit Sites
FIGURE 1

1
2

East Side Wayne Sammamish/Waynita Restoration Project (8-SRV-H16)

Draft Project Description

August 3, 2020

Project Name

East Side Wayne Sammamish/Waynita Restoration Project

WRIA 8 WRE Subbasin

Sammamish River Valley

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes restoration of the eastside of the former Wayne Golf Course property, which is formerly the back nine and covers 31.6 acres. The project is located within the WRIA 8 Sammamish River Valley subbasin. This property includes 1,000 linear feet of the south bank of the Sammamish River, along with the mouth and lower reach of Waynita Creek. Restoration approach is dependent on results from a feasibility study but could include: enhancing Waynita Creek habitat at the mouth, Sammamish floodplain restoration, improving riparian conditions, and creating cold water refuge.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, Kokanee, Bull Trout, Rainbow Trout, Largemouth Bass, and resident Cutthroat Trout that utilize the Sammamish River and Lake Sammamish 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 1,000 linear feet of the south bank of the Sammamish River along with the mouth and lower reach of Waynita Creek. These restoration actions are designed to enhance the habitat at the mouth of Waynita Creek with the Sammamish River, restore floodplain function of the Sammamish River, improve riparian conditions, and create cold water refuge for fish species.

A map and drawings of the project location.

This project proposes to restore 1,000 linear feet of the south bank of the Sammamish River, located in in Bothell, Washington. 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.

The project proposes to restore 1,000 linear feet of the south bank of the Sammamish River along with the mouth and lower reach of the Waynita Creek, located in Kenmore, Washington.

Performance goals and measures.

All performance goals will be based off results from feasibility study and conceptual design but may include: linear feet of cool water refuge in relation to Sammamish River, linear feet of day-lighted tributary, acres of buffer added, large wood additions, and acres of invasive vegetation removal.

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, Sockeye, Kokanee, Bull Trout, Rainbow Trout, Largemouth Bass, and resident Cutthroat Trout that utilize the Sammamish River as spawning and rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Restoring floodplain function and improving riparian habitat will have numerous benefits including benefitting prey availability for fish species, water quality and water quantity.

Identification of anticipated support and barriers to completion.

Anticipated support includes King County, WRIA 8, KCFCD, and City of Bothell Parks Department. Currently phase I (feasibility study and conceptual design) is expected to be fully funded. The City will seek further funding for final design and construction of the preferred restoration alternative. The final restoration alternative chosen for construction will need to be approved by City Council. This site is also a public park and the final restoration will need to balance recreation with ecological restoration goals. Potential barriers to completion would be lack of grant funding for future phases.

Estimate of capital costs and reoccurring O&M costs.

Estimated total cost will be dependent on the preferred restoration alternative chosen. Depending on the selected restoration alternative, total costs could be up to $7 million.

Anticipated durability and resiliency.

Once the construction phase is completed, post restoration maintenance and monitoring will need to be conducted for plant survival, invasive maintenance, and potential in-stream channel monitoring. Most likely invasive vegetation control will be continual on-site after construction. All maintenance and monitoring activities will be determined after the preferred restoration alternative is selected.

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

City of Bothell. Sponsor contact: Chris Hall, chris.hall@bothellwa.gov. The sponsor is at the ready to begin a feasibility study to develop conceptual restoration design.

Documentation of sources, methods, uncertainties, and assumptions.

Uncertainties for the site include potential for groundwater interception and future funding for the design and construction phase. Currently the City is conducting groundwater monitoring.

Figure 1. Site Plan for the East Side Wayne Sammamish/Waynita Restoration Project

Reconnection of Wetland 38 Project (8-SRV-H17)

Draft Project Description

September 3, 2020

Project Name

Reconnection of Wetland 38 Project

WRIA 8 WRE Subbasin

Sammamish River Valley

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project proposes to reconnect Wetland 38 with the Sammamish River, located within the Sammamish River Valley subbasin at the south end of the City of Woodinville, Washington. This project would need to evaluate whether reconnecting the wetland to the river would affect the hydrology of the wetland and potentially drain the wetland feature. The project does have the potential to provide an additional source of cold water to the river to augment streamflow and reduce temperature simultaneously. There are other adjacent projects already working to address water temperatures and flow in the river both through riparian restoration and reconnecting Derby Creek and cool water inputs on the opposite bank and just upstream of this site.

Connecting this wetland with the Sammamish River has the potential to benefit documented Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout that utilize Sammamish River as spawning and 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 reconnect a wetland feature, known as Wetland 38, with the Sammamish River which will improve hydrologic conditions and provide refugia for fish and vegetation and nutrients for insects and invertebrates which are a prey source for fish. Reconnecting the wetland with the river will potentially provide another source of cool water directly to the Sammamish.

A map and drawings of the project location.

This project proposes to connect Wetland 38, located on the Sammamish River in Woodinville, Washington. 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.

The project proposes to connect Wetland 38 with the Sammamish River, which will benefit the fish species that spawn and rear within this section. Connecting the Sammamish River with Wetland 38 will also have downstream water quality and water quantity benefits.

Performance goals and measures.

Performance goals and measures will be based on area of wetland reconnected to the river, number of pieces of wood placed in the wetland to provide refugia habitat, area of refugia habitat created, number of trees and shrubs planted around the reconnected wetland, water temperature at the outlet of the wetland where it enters the river.

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, Sockeye, and resident Cutthroat Trout that utilize Sammamish River as spawning and rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Connecting Wetland 38 with the Sammamish River has significant benefits to juvenile salmonids by directly benefit prey availability, spawning success as well as survival of pre-migrant and out-migrating juvenile salmonids.

Identification of anticipated support and barriers to completion.

The project is identified in the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan as potential habitat restoration for the Sammamish River. Assuming the project could reconnect the wetland to the Sammamish River without draining the wetland, WRIA 8 would likely support the project as salmon habitat restoration.

Potential barriers include approval from current property owner and funding for implementation. One recent development is there is a change in usage of the wetland area of the property by the current owner's tenants that may make it more available for restoration.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are currently unknown.

Anticipated durability and resiliency.

The durability and resiliency of the project depend on project feasibility and design.

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

Mid Sound Fisheries Enhancement Group. The sponsor is ready to proceed with basic scoping and reconnaissance. Additional feasibility analysis would be possible if funding was available. The sponsor is visiting the site regularly to implement riparian restoration on the river shoreline adjacent to the wetland site and has the necessary landowner contact information to initiate conversations.

Documentation of sources, methods, uncertainties, and assumptions.

Uncertainties pertain to funding, landowner willingness to allow restoration, and design considerations related to hydrology changes and infrastructure on the site.

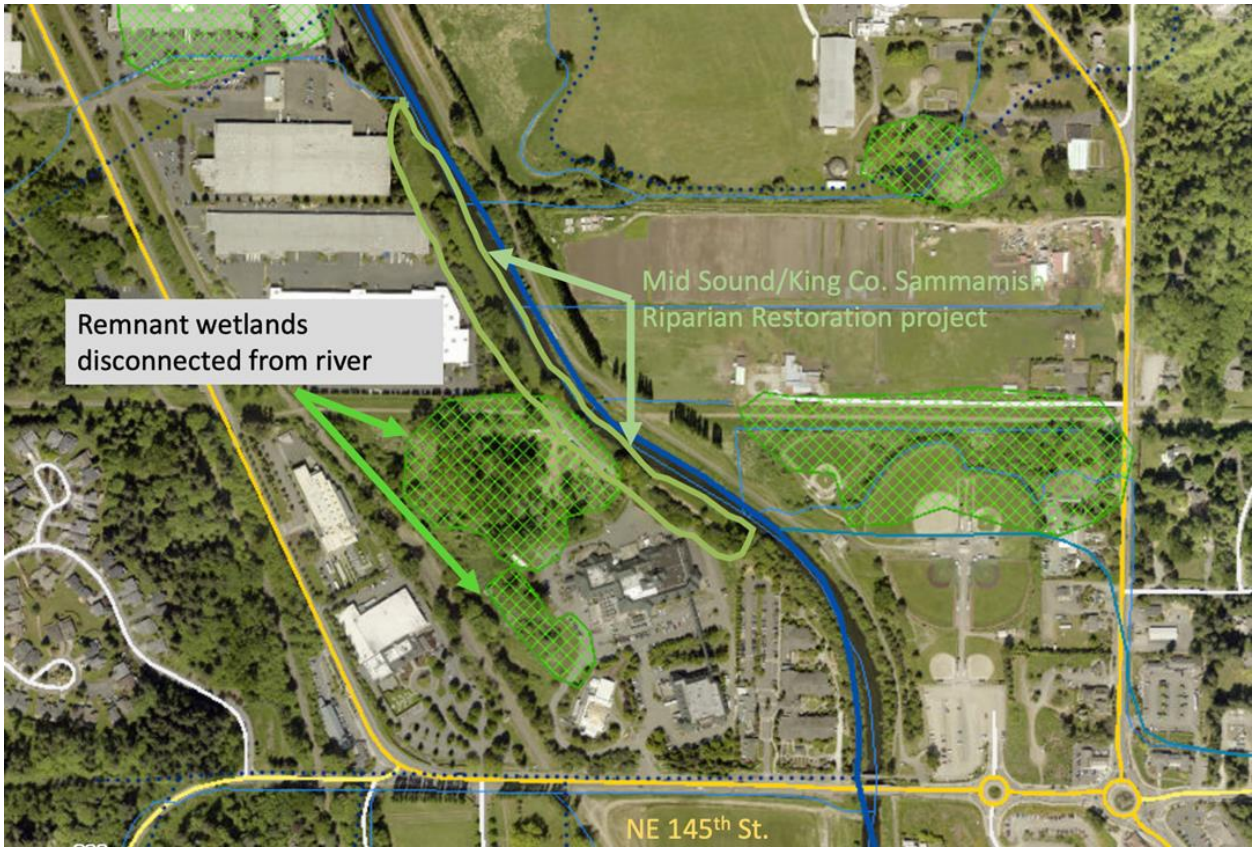


Figure 1. Site Map for Reconnection of Wetland 38 Project

Willowmoor Floodplain Restoration Project (8-SRV-H18)

[Note: waiting to get confirmation that project sponsor supports including this project in the plan]

Seawest Granston/Middle Bear Creek Natural Area Restoration Project (8-BE-H19)

Draft Project Description

August 21, 2020

Project Name

Seawest Granston/Middle Bear Creek Natural Area Restoration Project

WRIA 8 WRE Subbasin

Bear/Evans

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

King County is proposing enhancements to the Seawest Granston Reach of Bear Creek within the Bear/Evans subbasin in Cottage Lake, Washington. This project proposes the addition of woody debris, creation of off-channel habitats and revegetation of the floodplain and riparian areas. This project will restore up to 3,300 lineal feet of stream and approximately 32 acres of wetland and riparian areas in this reach of Bear Creek. Given the scale of this project, it will provide the Middle Bear reach with a significant amount of improved salmonid habitat.

The goal of this project will be to increase the volume and availability of off-channel habitat for juvenile salmonids and to increase overall channel complexity and habitat quality. To accomplish this, the project design will implement a "Stage Zero" strategy to push the channel plan form from a single-threaded channel towards an anastomosing plan form with multiple channels and off-channel features. This strategy will include adding woody debris and beaver dam analogue structures to the mainstem channel and potentially excavating side channels, backwater channels and/or pilot channels within the floodplain. It is expected that these measures will raise baseflow and groundwater elevations in the surrounding floodplain to more frequently inundate off-channel features, many of which already exist and more of which may be created by excavation. This project will also provide increased storage capacity and may augment streamflow and help to moderate stream temperature during critical low flow periods.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, Kokanee, and resident Cutthroat Trout that utilize the Bear Creek 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.

This project will restore up to 3,300 lineal feet of stream and approximately 32 acres of wetland and riparian areas in this reach of Bear Creek. It is expected that the proposed restoration measures will

raise baseflow and groundwater elevations in the surrounding floodplain to more frequently inundate off-channel features, many of which already exist and more of which may be created by excavation. This project will also provide increased storage capacity and may augment streamflow and help to moderate stream temperature during critical low flow periods.

A map and drawings of the project location.

This project will restore up to 3,300 lineal feet of stream and approximately 32 acres of wetland and riparian areas in this reach of Bear Creek in Cottage Lake, Washington. The project site is shown in relation to surrounding physical features on the attached Site Plan. The project is in predesign phase and site plans are not currently available.

Description of the anticipated spatial distribution of likely benefits.

This project will restore up to 3,300 lineal feet of stream and approximately 32 acres of wetland and riparian areas in this reach of Bear Creek. Given the scale of this project, it will provide the Middle Bear reach with a significant amount of improved salmonid habitat.

Performance goals and measures.

1. Provide instream structure and provoke sorting of the substrate by adding woody debris.
2. Increase connection with the floodplain and activate existing habitat features by raising water elevation several inches.
3. Decrease instream water temperatures at the downstream end of the reach by planting the riparian areas with native species and, possibly, by grading new features in the floodplain that increase groundwater exchange.
4. Enhance the ecological functions of the existing Class 1 wetland by replanting degraded areas with appropriate native species.

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, Sockeye, Kokanee, and resident Cutthroat Trout that utilize the Bear Creek as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA.

Creation of side channels, backwater channels and/or pilot channels within the addition of woody debris and beaver dam analogue structures will provide hydraulic complexity in addition to benefitting prey availability for fish species, water quality and water quantity.

Identification of anticipated support and barriers to completion.

This project is supported by the WRIA 8 Salmon Recovery Council and King County. There are no known barriers to completion, although the project footprint will benefit from a conservation easement on one property not yet attained.

Estimate of capital costs and reoccurring O&M costs.

Estimated total cost to design, permit, and construct the project is $1,440,000.

Anticipated durability and resiliency.

This project will reconnect the creek with its floodplain through the creation of side channels that will provide additional conveyance capacity and enhance and maintain floodplain processes and riparian health. Additions of instream large wood, and potentially beaver dam analogs will also aid in hyporheic exchange. Ecosystem benefits and hydrologic outcomes are expected to endure and help to ameliorate stream temperatures by lowering them during critical low flow periods.

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

King County. Sponsor contact: Denise Di Santo, ddisantoz@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

Documentation of sources, methods, uncertainties, and assumptions.

The County is conducting a current conditions assessment, including streamflow data collection and monitoring the project site groundwater table. The project footprint will not change.

Little Bit Restoration Project (8-BE-H20)

Draft Project Description

August 21, 2020

Project Name
Little Bit Restoration Project

WRIA 8 WRE Subbasin
Bear/Evans

Project Status
The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description
This project includes restoration of Bear Creek along the Little Bit Reach, within the Bear/Evans subbasin in Redmond, Washington named for its proximity to the Little Bit Therapeutic Riding Center facilities near NE 106th. This reach is about 650 feet long and situated between two other reaches owned by King County, both locations of recent restoration efforts.

King County is proposing similar enhancements to the Little Bit Reach, including addition of woody debris, excavation of off-channel habitats and revegetation of the floodplain and riparian areas. The channel within this reach also runs against the Avondale Road NE embankment for about 250 feet, which prevents natural channel migration and morphology and compromises riparian functions. The goal of this project will be to increase the volume and availability of off-channel habitat for juvenile salmonids and to increase overall channel complexity and habitat quality. To accomplish this, the project design will add woody debris and incorporate elements such as excavated side channels, backwater channels and/or pilot channels within the floodplain.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, Kokanee, and resident Cutthroat Trout that utilize the Bear Creek 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.
This project will restore up to 650 feet of Bear Creek within the Little Bit Reach to connect to recent restoration projects performed by King County. The project proposes to add woody debris, create off-channel habitat and revegetate the floodplain and riparian areas. These restoration actions will increase the volume and availability of off-channel habitat for juvenile salmonids and to increase overall channel complexity and habitat quality. To accomplish this, the project design will add woody debris and incorporate elements such as excavated side channels, backwater channels and/or pilot channels within the floodplain.

A map and drawings of the project location.

This project will restore 650 feet of the Little Bit Reach of Bear Creek in Redmond, Washington. 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 will restore up to 650 feet of Bear Creek within the Little Bit Reach. This restoration will connect two recent restoration efforts performed by King County and provide a significant stretch of restored stream with improved salmonid habitat.

Performance goals and measures.

1. Constraints to channel migration and habitat forming processes will be removed or minimized from 800 linear feet of Bear Creek;
2. Missing structure in the form of woody debris will be restored to the 8001 linear feet of Bear Creek to create more complex and diverse instream habitat;
3. A more effective buffer will be established between Avondale Road NE and the channel of Bear Creek;
4. 2.7 acres of riparian habitat will be enhanced by removing or suppressing invasive species and planting with native trees and shrubs.

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, Sockeye, Kokanee, and resident Cutthroat Trout that utilize the Bear Creek as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA.

Creation of side channels, backwater channels and/or pilot channels within the addition of woody debris and beaver dam analogue structures will provide hydraulic complexity in addition to benefitting prey availability for fish species, water quality and water quantity.

Identification of anticipated support and barriers to completion.

This project is supported by WRIA 8 Salmon Recovery Council. There are no known barriers to completion.

Estimate of capital costs and reoccurring O&M costs.

Estimated total cost to design, permit and construct the project is $1,000,000.

Anticipated durability and resiliency.

This project will reconnect the creek with its floodplain through the creation of side channels that will provide additional conveyance capacity and enhance and maintain floodplain processes and riparian health. Additions of instream large wood will also aid in hyporheic exchange. Ecosystem benefits and hydrologic outcomes are expected to endure over time under low and high flow conditions.

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

King County. Sponsor contact: Denise Di Santo, ddisanto@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance immediately.

Documentation of sources, methods, uncertainties, and assumptions.

The project footprint will not change. Hydrologic modeling will be completed to assess design alternatives and ability to meet project goals and objectives. The project is expected to be constructed in 2023.

Figure 1. Site map for Little Bit Restoration Project

Bear Creek Water Quality Enhancement Projects (8-BE-H21)

Draft Project Description

July 1, 2020

Project Status:

King County has a planning project underway to prioritize 3 subbasins for further investigation of future stormwater retrofit projects. These investigations will work to identify and prioritize potential Water Quality Capital Improvement Projects within the prioritized subbasins.

Project Name

Bear Creek Water Quality Enhancement Projects

Narrative Description

The current planning project will leverage the Bear Creek Watershed Management Study (KC April 2018) to prioritize subbasins and identify sites for Water Quality Capital Improvement Projects within the prioritized subbasins. Future project types have not yet been defined but would be targeted at water quality treatment, stream shading/temperature reduction, and or enhanced flow control of storm runoff.

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

Projects to be determined by the study so potential offsets cannot be determined at this time. Infiltration retrofits or enhancements could be expected to redirect on the order of 10 to 100 acre-feet per year from surface runoff to groundwater, delaying contribution to streamflow.

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

The map at the end of the description shows the portion of Bear Creek considered in the Bear Creek Watershed Management Study. Project locations have not been determined.

Description of the anticipated spatial distribution of likely benefits.

Depends on project location(s). Benefits anticipated to occur to portions of Bear Creek and its tributaries within King County.

Performance goals and measures.

To be determined.

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

Bear Creek currently supports a wide range of salmonids including Chinook, sockeye, Coho, kokanee, steelhead and coastal cutthroat. Moreover, Bear Creek has been identified as one of two high priority habitats to restore for Chinook Salmon recovery (known as "Tier 1" habitat) by the Water Resource Inventory Area 8 (WRIA 8) Salmon Conservation Plan, covering the Greater Lake Washington Watershed. The Washington Department of Ecology identified Bear Creek as a targeted watershed for stormwater retrofit planning due to its high ecological integrity.

Identification of anticipated support and barriers to completion.

To be determined.

Potential budget and O&M costs.

To be determined.

Anticipated durability and resiliency.

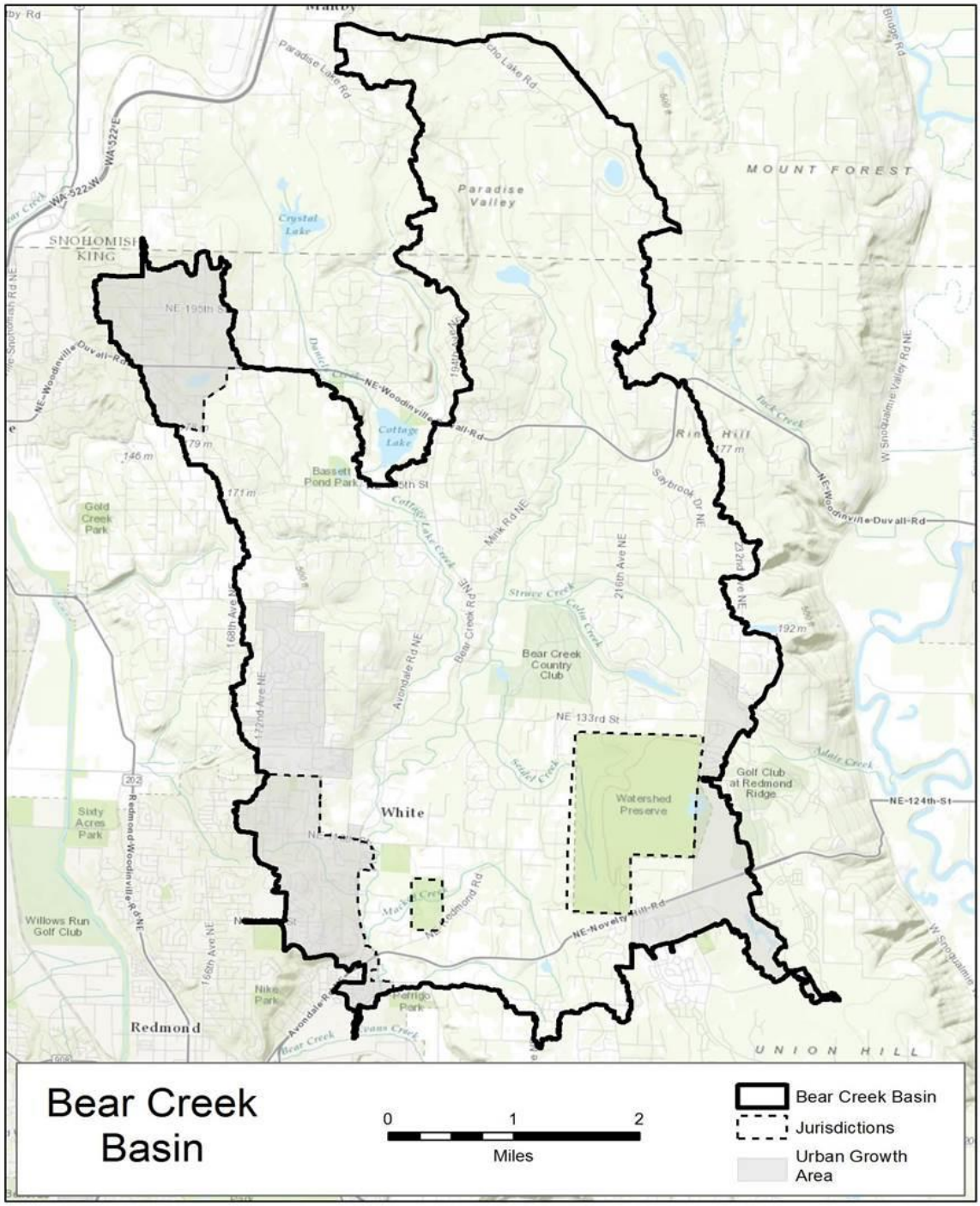
To be determined.

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

King County is the likely project sponsor. Projects have not yet been identified so are at least several years from implementation.

Documentation of sources, methods, and assumptions.

King County. 2018. Bear Creek Watershed Management Study. Prepared by Timothy Clark, Sevin Bilir, Jeff Burkey, Jessica Engel, Eric Ferguson, Claire Jonson, Josh Kubo, Scott Miller, Jen Vanderhoof, and Mark Wilgus, Water and Land Resources Division. Seattle, Washington.


Bear Creek Basin
0
1
2
Miles
Bear Creek Basin
Jurisdictions
Urban Growth Area
MOUNT FOREST
Paradise Valley
Crystal Lake
SNOHOMISH
KING
Cottage Lake
Bassett Pond Park
Gold Creek Park
Bear Creek Country Club
Watershed Preserve
Golf Club at Redmond Ridge
White
Sixty Acres Park
Willows Run Golf Club
Nike Park
Perrigo Park
Redmond
UNION HILL
NE 133rd St
NE 124th St
NE Novelty Hill Rd
NE Woodinville-Duvall Rd
Redmond-Woodinville Rd NE
Avondale Rd NE
168th Ave NE
172nd Ave NE
216th Ave NE
232nd Ave NE
Mink Rd NE
Bear Creek Rd NE
Soybrook Dr NE
Paradise Lake Rd
Echo Lake Rd
WA-522-W
WA-522-E

Lake Washington Institute of Technology Infiltration Vault - City of Kirkland (8-GLW-H22)

Draft Project Description

June 18, 2020

Narrative Description

The Lake Washington Institute of Technology (LWIT) Infiltration Vault would provide water quality treatment and subsequent infiltration of stormwater for 23.4 acres of contributing area. It was developed through the Totem Lake Stormwater Retrofit Planning Effort, a watershed scale plan that investigated opportunities for stormwater retrofit projects. The project will infiltrate stormwater before it reaches Totem Lake and subsequently Juanita Creek, a Salmon bearing stream in Kirkland.

Quantitative and Qualitative Assessment

The project is at the conceptual design phase. The LWIT Infiltration Vault project is anticipated to include two vaults, beginning with a pre-treatment vault, followed by an infiltration vault. These vaults would be constructed underneath an existing parking lot and would clean and infiltrate stormwater from 23.4 acres. The infiltration vault will be sized totaling 15,000 square feet by 10.5 feet deep live storage (assuming 2 in./hr. infiltration rate). A similar project within Kirkland, *132nd Square Park* with 48.5 acres of contributing area, has been designed to achieve an annual infiltration volume of approximately 70 acre-feet. This project is expected to be similar in size and scope, and based on the *132nd Square Park* results, anticipates an annual infiltration volume of approximately 33.8 acre-feet. The actual infiltration volume achieved will be dependent on geotechnical exploration beneath the proposed facility.

Conceptual-Level Map and Spatial Distribution

See *Appendix A – LWIT Vicinity Map*.

Performance Goals and Measures

The performance goal is to infiltrate as much stormwater runoff as feasible given site constraints. See the Stormwater Retrofit Analysis for Juanita Creek Basin in the Lake Washington Watershed (King County, 2012) report for further details. See *Appendix B – Additional Questions for Water Offset Projects and References* for additional goals and measures anticipated.

Ecosystem Structure

The retrofit projects are designed using design practice per the Ecology manual to restore hydrology of the stream and watershed.

Support and Barriers to Completion

Support from Lake Washington Institute of Technology is critical to the success of the project; this will be sought early in the design phase. Funding for the project, particularly considering COVID-19 budget impacts, is likely the primary barrier to completion of the project.

Budget and O&M Costs

Budget and O&M costs will be approximately $2.5M per retrofit plan in FY2015 USD, or $2.71M in FY2020 USD considering inflation.

Durability and Resiliency

The infiltration facilities are typically designed with a 25-year lifespan and will be maintained by the City of Kirkland maintenance crews while viable.

Project Sponsor(s)

Project is in conceptual design phase. Project sponsor not yet identified.

Documentation of Sources, Methods, and Assumptions

Plans will be structured similarly to deliverables from recently completed projects in Kirkland. Resources include, but are not limited to, 2015 Totem Lake/Juanita Creek Basin Stormwater Retrofit Conceptual Design Plan, Kirkland GIS program, continuous flow monitoring software (WWHM, MGS Flood, etc.), and the City of Kirkland Pre-Approved Plans and King County Stormwater Drainage Manual. See *Appendix B – Additional Questions for Water Offset Projects and References* for information on related to this evaluation summary.

ATTACHMENT A

LWIT

VICINITY MAP


Lake Washington Institute of Technology / Totem Lake Retrofit Planning
Vicinity Map
Legend
Parcel Containing Facility
Open Streams in Totem Lake Basin
LWIT Contributing Area
Totem Lake Subbasin
City Limits
Lakes
Juanita High School
132nd Square Park
Totem Lake
I-405
Redmond
LWIT Contributing Area

1

ATTACHMENT B

ADDITIONAL QUESTIONS FOR WATER OFFSET PROJECTS AND REFERENCES

Stormwater projects

- **How will stormwater be intercepted and stored?**
  - The stormwater system within the 23.4 acres of contributing area is already established and gravity flows through or nearby to this parking lot.
  - The two separate pipe systems that flow here would be connected to the vault treatment and infiltration system through to-be-constructed short sections of pipe.
  - The vault will be sized to accommodate the treatment and infiltration of the stormwater, up through and including a 50-year storm event. Because of the large area available, the vault will be sized as large as is feasible based on budget constraints.
- **What are the anticipated permitting requirements?**
  - City of Kirkland Public Works (PUB).
  - City of Kirkland Clearing and Grading.
  - City of Kirkland Building.
  - City of Kirkland Public Easement Access.
- **How does this project go above and beyond existing stormwater requirements?**
  - Currently Kirkland is a Phase II permittee under the NPDES Stormwater Permit. Retrofitting stormwater systems installed before stormwater regulations became required for most development projects is not required through this permit. This treatment, infiltration, and flow control would be voluntary and beyond existing stormwater requirements.
  - This project will ensure flow control and water quality to meet *2016 King County Stormwater Drainage Manual* requirements and *City of Kirkland Policy D-10, the Addendum to the King County Stormwater Drainage Manual*.
- **How will the stormwater be treated, if applicable?**
  - Flow control facilities (infiltration vault), and
  - Water quality facilities (pre-treatment vault). This vault will either allow for sediment to settle out by reducing flow or will include cartridges which force stormwater to be filtered through media.
  - Both techniques remove suspended solids which are known to contain nutrients, pesticides, heavy metals, and volatile chemicals, such as petroleum products.
- **What is the river and reach that the discharge will benefit?**
  - Improvements in this stormwater system will benefit the Totem Lake tributary of Juanita Creek and Totem Lake and its associated wetland complex as well.
- **What is the estimated amount of benefit within the target river and reach? Speak to retimed flows, flow levels, and fish species benefiting.**
  - Target flows will be meeting the ECY08 target.
  - Target water quality will be to provide the Basic Water Quality Treatment for all pollution generating impervious surface (PGIS).
  - The Totem Lake Tributary to Juanita Creek supports Coho and Resident Cutthroat Trout and the mainstem of Juanita Creek additionally supports Winter Steelhead, Sockeye, and Fall Chinook.
  - Totem Lake/Juanita Creek Basin Stormwater Retrofit Conceptual Design Plan (City of Kirkland,2015).

References

King County, 2012. *Stormwater Retrofit Analysis for Juanita Creek Basin in the Lake Washington Watershed. Ecology Grant: G0800618.* King County Department of Natural Resources and Parks, Water and Land Resources Division, Seattle, WA.

City of Kirkland, 2015. *Totem Lake/Juanita Creek Basin Stormwater Retrofit Conceptual Design Plan*. City of Kirkland, Storm & Surface Water Division, Kirkland, WA.

Juanita/Cedar Creek Stormwater Retrofit Planning – City of Kirkland (8-GLW-H23)

Draft Project Description

June 18, 2020

Narrative Description

The Juanita/Cedar Creek Stormwater Retrofit Planning project will conduct stormwater retrofit planning for Cedar Creek, a 500-acre subbasin of the Juanita Creek Watershed, resulting in conceptual design and cost estimates for three facilities and an implementation plan. Stormwater retrofit facilities will contribute to stream restoration efforts that include installation of a fish passable culvert.

Quantitative and Qualitative Assessment

The project is currently in the planning phase. The retrofit facilities will be designed to be as large as is feasible within the spatial constraints of the basin. The land use is mostly residential. The facilities will likely treat and infiltrate or detain as much polluted runoff as feasible, and excess flows will bypass the facilities. A similar project underway within Kirkland (132nd Square Park retrofit) is designed to achieve an annual infiltration rate of 70 acre-feet/year with a contributing basin of approximately 50 acres. The Cedar Creek retrofit project will seek similar treatment performance but is highly dependent on the type of soils beneath the infiltration facilities, which will require exploration work.

Conceptual-Level Map and Spatial Distribution

See *Appendix A – Cedar Creek Vicinity Map*.

Performance Goals and Measures

The performance goal is to infiltrate as much stormwater runoff as feasible given site constraints.

Ecosystem Structure

A habitat restoration plan for Cedar Creek is currently being co-developed with this project to guide decision-making on future retrofit facilities. The project will complement installation of fish passable culverts on Juanita Creek at 100th Avenue NE and at NE 137th Place – City projects which are currently in design and construction.

Support and Barriers to Completion

Funding for construction of the identified projects, particularly considering budget impacts related to the COVID-19 pandemic, is likely the primary barrier to their completion.

Budget and O&M Costs

Based on experience from previous projects within Kirkland, capital costs will be approximately $1.5M - $2.0M for each of the three retrofit projects, for a total of $6 million in 2020 US dollars. O&M costs are approximately $5000 per year for each facility, for a total of $15,000 in 2020 US dollars.

Durability and Resiliency

Stormwater retrofit facilities are typically designed with a 25-year lifespan and will be maintained by the City of Kirkland maintenance crews.

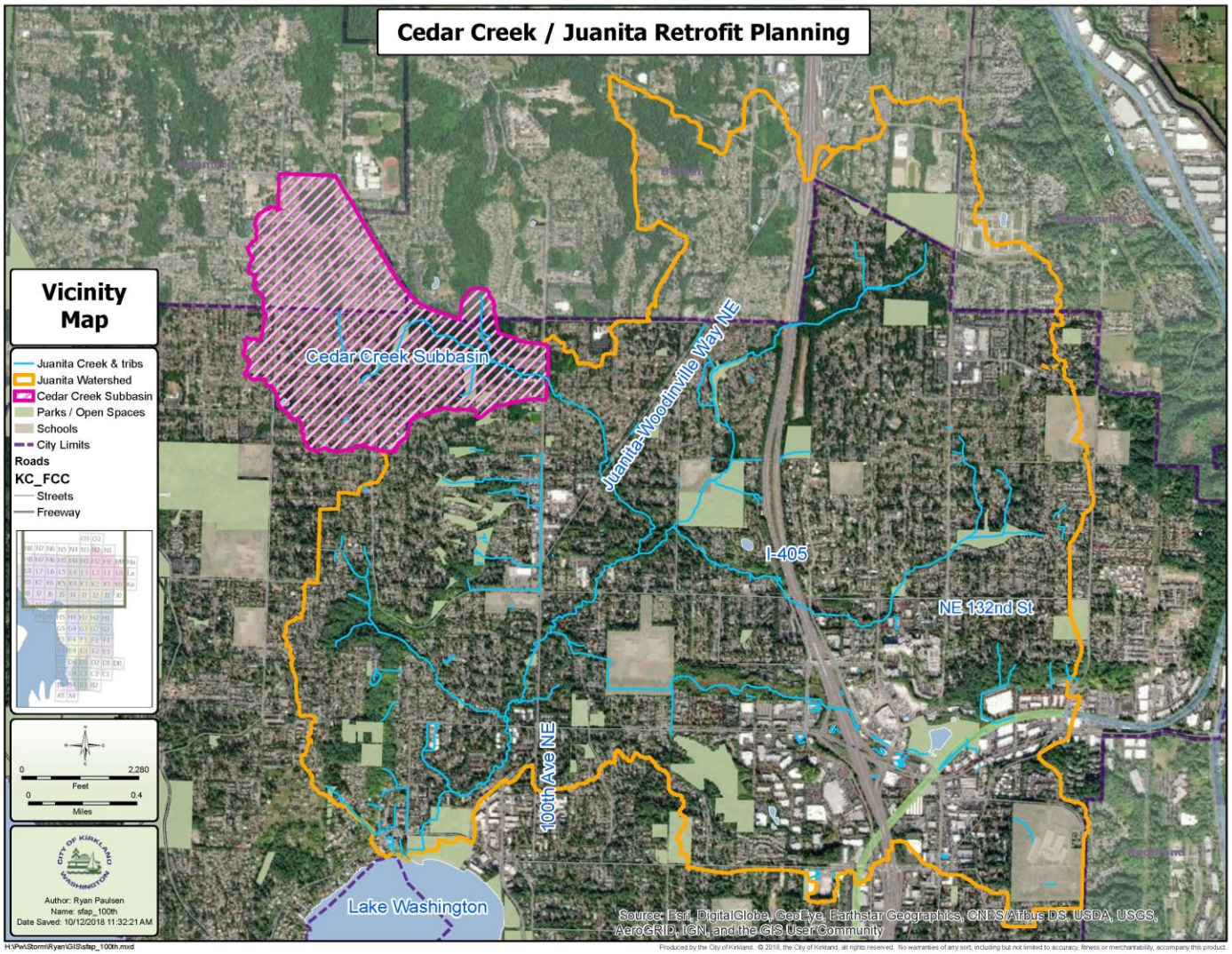
Project Sponsor(s)

An Ecology grant (Stormwater Financial Assistance Program) is being used to fund the planning effort, which will produce three 30% designs for retrofit projects. Additional funding will be needed to complete designs and construction.

Documentation of Sources, Methods, and Assumptions

Ecology SFAP grant agreement available upon request. 2012 King County retrofit study available at: https://www.kingcounty.gov/services/environment/watersheds/cedar-river-lake-wa/documents/juanita-creek- stormwater-retrofit.aspx

ATTACHMENT A
CEDAR CREEK RETROFIT
VICINITY MAP


Cedar Creek / Juanita Retrofit Planning
Vicinity Map
Juanita Creek & tribs
Juanita Watershed
Cedar Creek Subbasin
Parks / Open Spaces
Schools
City Limits
Roads
KC_FCC
Streets
Freeway
0
2,280
Feet
0
0.4
Miles
Author: Ryan Paulsen
Name: sfap_100th
Date Saved: 10/12/2018 11:32:21 AM
Cedar Creek Subbasin
Juanita-Woodinville Way NE
I-405
NE 132nd St
100th Ave NE
Lake Washington
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
H:\PwkStorm\Ryan\GIS\sfap_100th.mxd
Produced by the City of Kirkland. © 2018, the City of Kirkland, all rights reserved. No warranties of any sort, including but not limited to accuracy, fitness or merchantability, accompany this product.

ATTACHMENT B
ADDITIONAL QUESTIONS
FOR WATER OFFSET PROJECTS

Stormwater projects

- **How will stormwater be intercepted and stored?**
  - The project will likely use new and existing storm infrastructure typical of urban ROW (catch basin with grate, curb inlets, drainage pipes, etc).
- **What are the anticipated permitting requirements?**
  - Depending on the size and scope of the final designs, the required permits could potentially include:
    - Hydraulic Project Approval (HPA)
    - City of Kirkland Public Works and/or Land Surface Modification Permits
    - State Environmental Policy Act (SEPA).
    - Cultural resource review
- **How does this project go above and beyond existing stormwater requirements?**
  - This retrofit project will voluntarily improve existing stormwater infrastructure, most of which was built before modern stormwater standards were in place, and in an area that is unlikely to redevelop in a way that would require new stormwater detention and water quality measures.
- **How will the stormwater be treated, if applicable?**
  - Enhanced WQ per the Ecology stormwater manual or equivalent
- **What is the river and reach that the discharge will benefit?**
  - Cedar Creek/Juanita Creek
- **What is the estimated amount of benefit within the target river and reach? Speak to retimed flows, flow levels, and fish species benefiting.**
  - Not yet determined.

Forbes North Rose Hill Stormwater – City of Kirkland (8-GLW-H24)

Draft Project Description

June 18, 2020

Narrative Description

City of Kirkland (City) has conducted stormwater retrofit planning for the North Rose Hill subbasin of the Forbes Creek Watershed. This 230-acre subbasin contributes almost 30% of the flow to Forbes Creek for the 2-year 24-hour storm though it comprises only 13% of the overall watershed area. Forbes Creek has degraded habitat conditions (BIBI scores of POOR) and poor water quality (multiple Ecology 303(d) listings). Restoration of Forbes Creek depends on control of the flow and quality of stormwater. Infiltration of stormwater is the preferred approach, as this supports summer stream flows as it controls winter peak flows and peak durations.

The stormwater retrofit planning process included site screening, hydrologic/hydraulic analysis, geotechnical exploration, and public outreach. This work resulted in development of 30% designs and an implementation plan for three stormwater retrofit projects. Two of the three projects identified propose to use water quality treatment followed by infiltration wells. The remainder of this project description will discuss costs and benefits of these two stormwater infiltration projects, known as Site 2 and Site 5 in the attached plans that were produced for the retrofit planning project.

Quantitative and Qualitative Assessment

These two projects are at 30% design, and so this information is preliminary. The limiting factor in sizing the facilities is the capacity required to treat stormwater before discharging it to the ground. Current Underground Injection Control regulations require the "Basic" level of treatment per the Stormwater Management Manual for Western Washington, which requires treatment of 91% of the annual runoff volume at or below the treatment flow rate for the facility type. Thus the project will be sized by determining the number/size of infiltration wells necessary to infiltrate the water quality flow from the tributary area based on geologic conditions. Based on an infiltration amount of 70 acre-feet per year for 50 acres of upstream contributing area as observed with the 132nd Square Park Stormwater Retrofit Project, it is expected that the site 2 project would infiltrate approximately 14 acre-feet per year, and that Site 5 would infiltrate approximately 33 acre-feet per year.

Conceptual-Level Map and Spatial Distribution

See *Appendix A –North Rose Hill Retrofit Vicinity Map*.

Performance Goals and Measures

Full infiltration, or infiltration of stormwater to the maximum extent feasible, will be pursued for the area draining to each facility.

Ecosystem Structure

Stormwater management will be pursued in balance with restoring ecosystem health by

upgrading culverts to be fish- passable, and constructing projects to reconnect the creek with the floodplain and to add habitat complexity.

Support and Barriers to Completion

Public outreach was conducted during the planning process, and the neighborhood is in support of the proposed projects. Ecology has provided a draft offer of funding for construction of the Site 2 projects via the 2020 Stormwater Financial Assistance Program. There currently is no funding for design or construction of the Site 5 project.

Budget and O&M Costs

The Site 2 total project cost is estimated to be $1,413,500 in 2019 dollars. The project will treat and infiltrate flow from a 10-acre area. The Site 5 total project cost is estimated at $3.4 million which was scaled from the Site project cost based on area served (24 acres versus 10 acres). Operation and maintenance costs would be approximately $5,000 per year, and will vary somewhat based on the number and placement of infiltration wells.

Durability and Resiliency

Infiltration facilities are typically designed with a 25-year lifespan, and will be maintained by the City maintenance crews.

Project Sponsor(s)

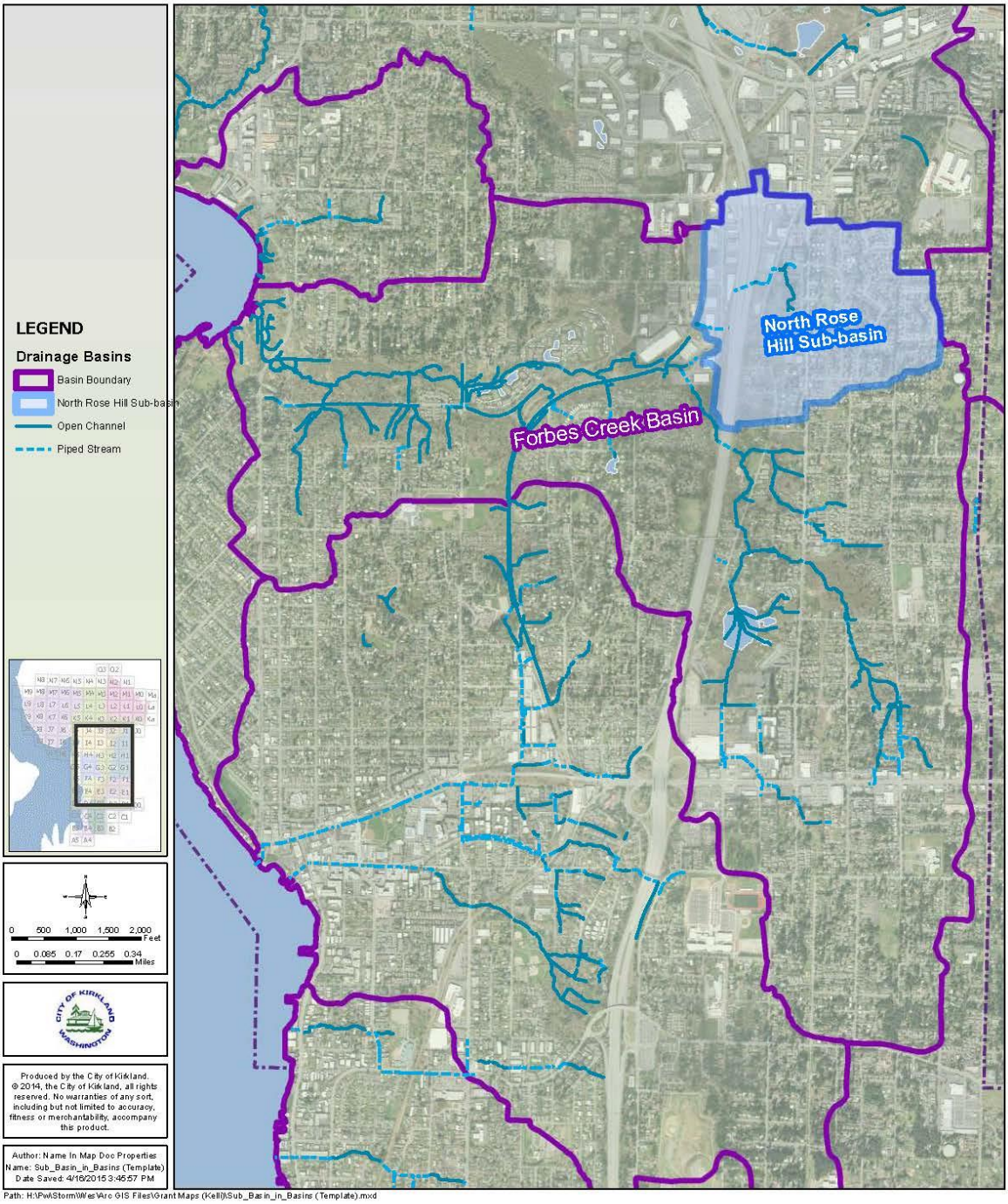
Planning efforts were sponsored by Ecology and by local stormwater utility funding from the City of Kirkland.

Documentation of Sources, Methods, and Assumptions

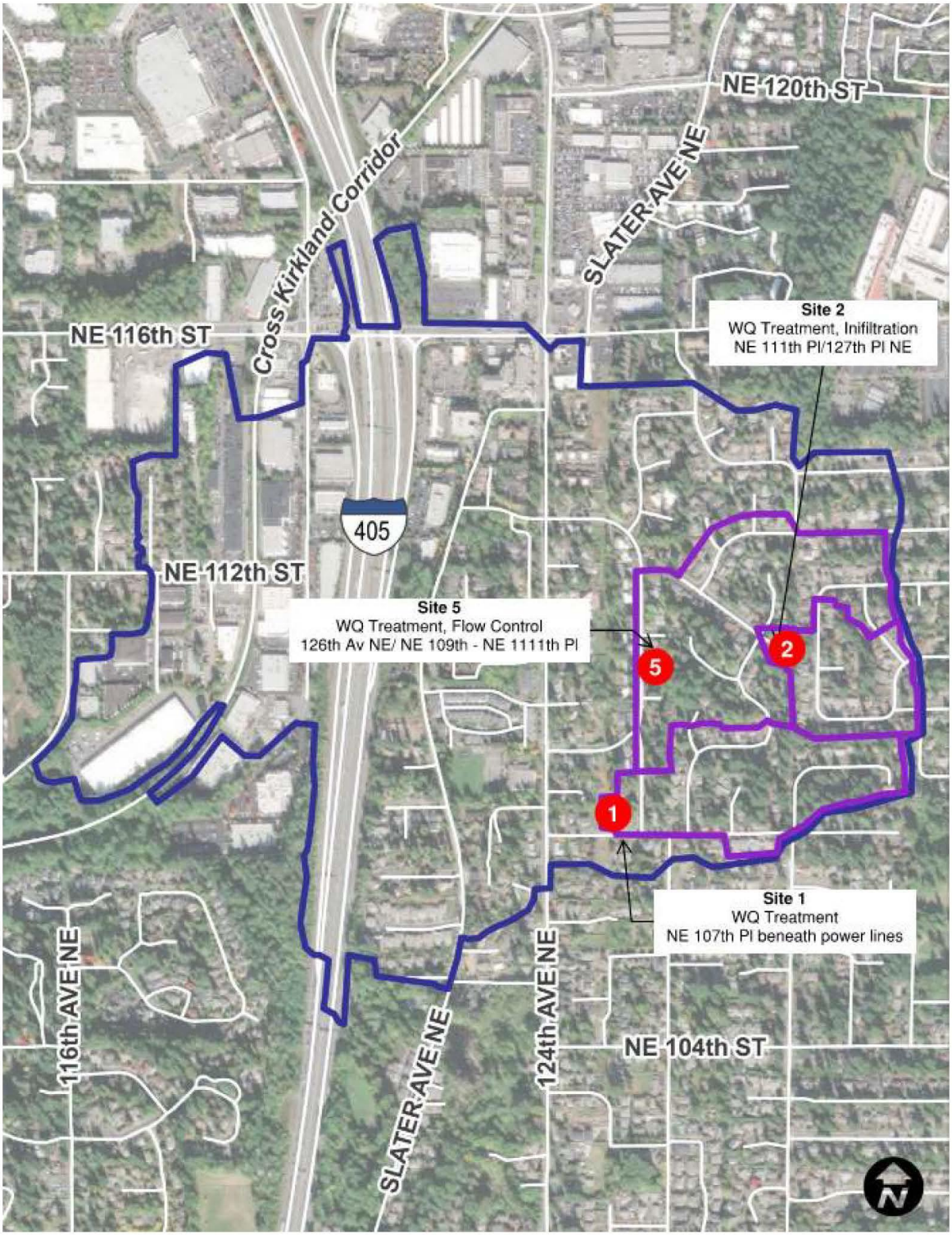
Reports and plans will be structured similarly to deliverables from recently completed projects in the City. See *Appendix B – Site 2 & 5 30% Design Plans*. See *Appendix C – Additional Questions for Water Offset Projects and References* for information related to this evaluation summary.

ATTACHMENT A
NORTH ROSE HILL STORMWATER RETROFIT PROJECTS
VICINITY MAP

Figure 3 - North Rose Hill Sub-basin within Forbes Creek



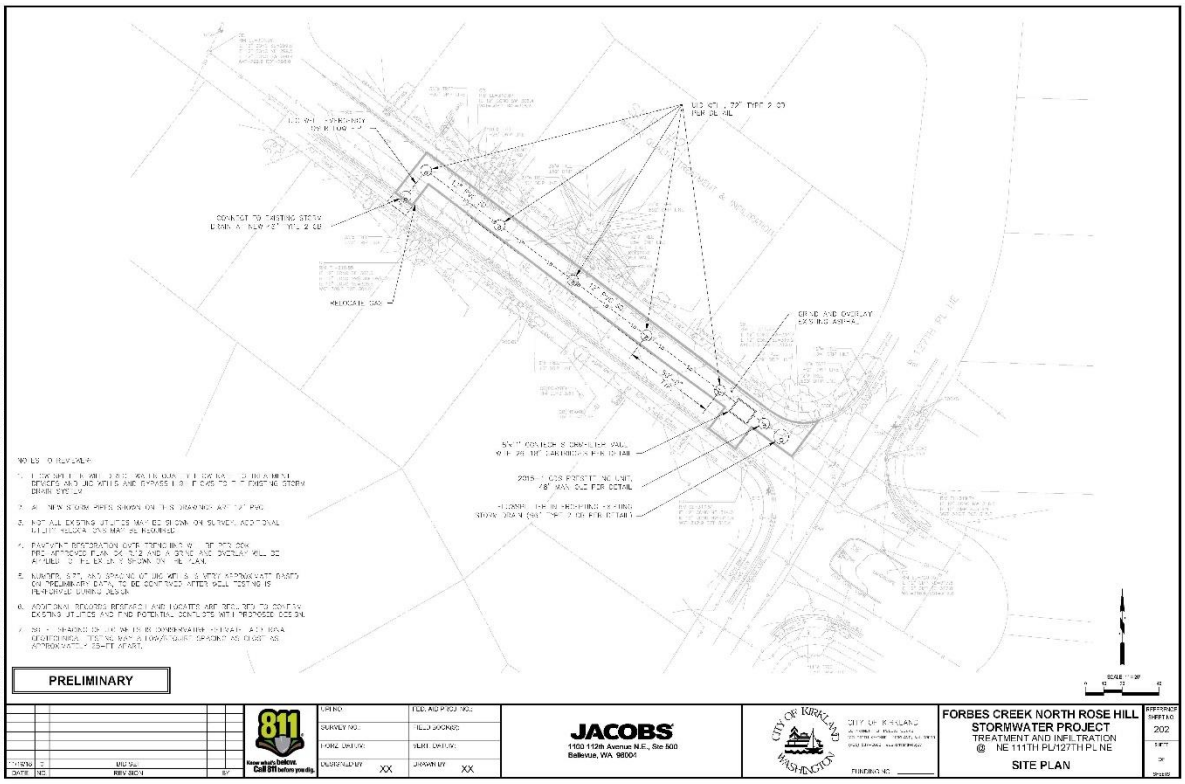
1


NE 120th ST
SLATER AVE NE
Cross Kirkland Corridor
NE 116th ST
Site 2
WQ Treatment, Inifiltration
NE 111th Pl/127th Pl NE
405
NE 112th ST
Site 5
WQ Treatment, Flow Control
126th Av NE/ NE 109th - NE 111th Pl
5
2
1
Site 1
WQ Treatment
NE 107th Pl beneath power lines
116th AVE NE
SLATER AVE NE
124th AVE NE
NE 104th ST
N

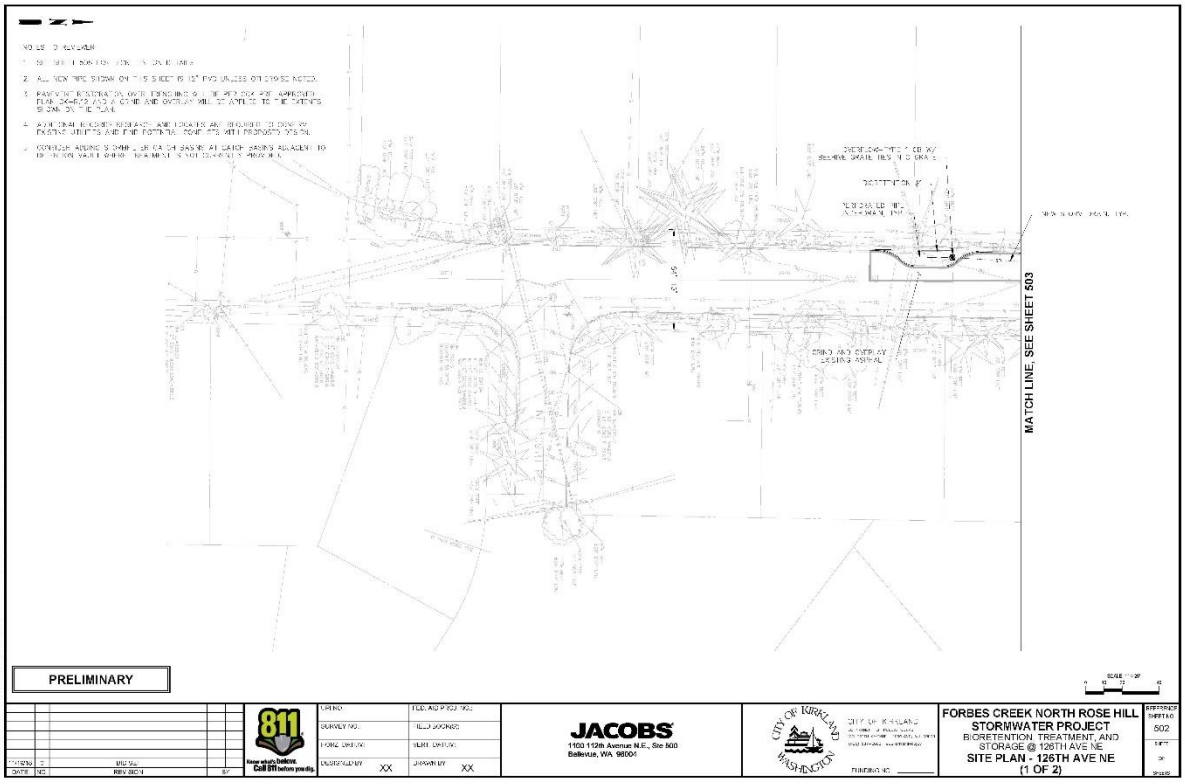
1

2

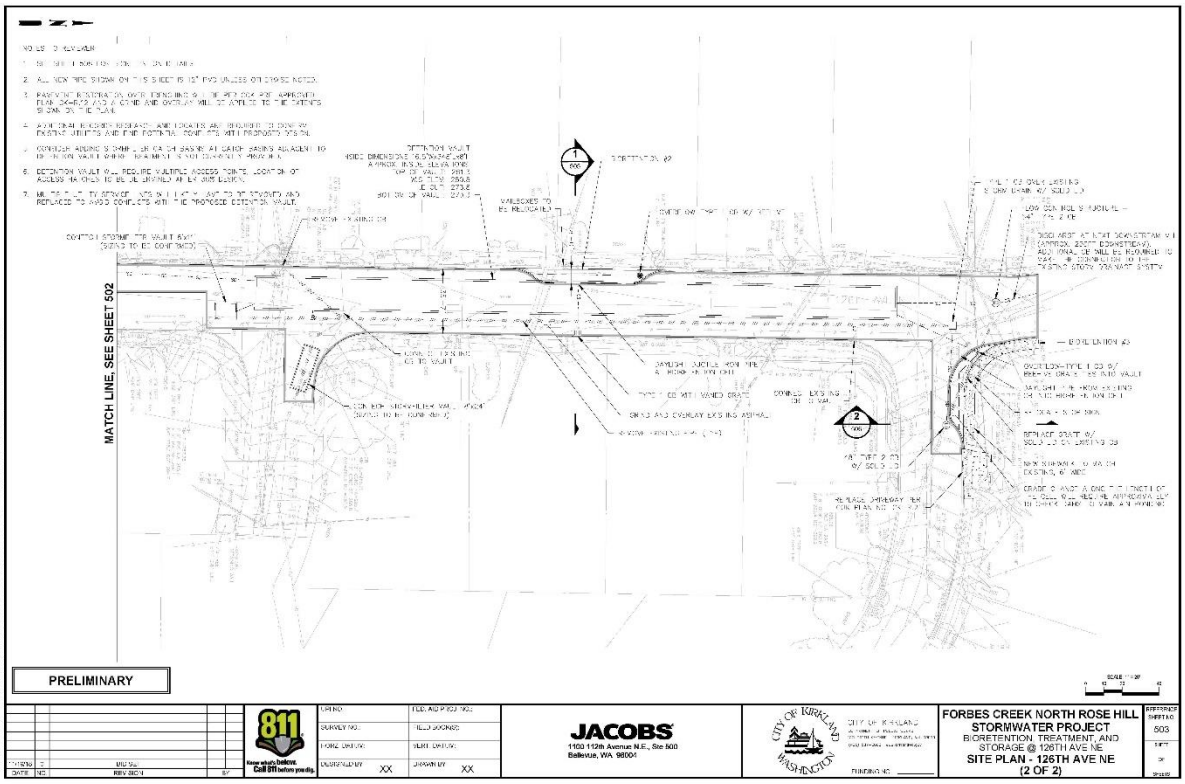
ATTACHMENT B
SITE 2 & 5 30% DESIGN PLANS


PRELIMINARY
JACOBS
1100 112th Avenue N.E., Ste 500
Bellevue, WA 98004
CITY OF KIRKLAND
WASHINGTON
FORBES CREEK NORTH ROSE HILL
STORMWATER PROJECT
TREATMENT AND INFILTRATION
@ NE 111TH PL/127TH PL NE
SITE PLAN

1


MATCH LINE, SEE SHEET 503
PRELIMINARY
JACOBS
1100 112th Avenue N.E., Ste 500
Bellevue, WA 98004
CITY OF KIRKLAND
WASHINGTON
FORBES CREEK NORTH ROSE HILL
STORMWATER PROJECT
BIORETENTION TREATMENT, AND
STORAGE @ 126TH AVE NE
SITE PLAN - 126TH AVE NE
(1 OF 2)

2


MATCH LINE, SEE SHEET 502
PRELIMINARY
JACOBS
1100 112th Avenue N.E., Ste 500
Bellevue, WA 98004
CITY OF KIRKLAND
WASHINGTON
FORBES CREEK NORTH ROSE HILL
STORMWATER PROJECT
BIORETENTION TREATMENT, AND
STORAGE @ 126TH AVE NE
SITE PLAN - 126TH AVE NE
(2 OF 2)

1

2

ATTACHMENT C

ADDITIONAL QUESTIONS FOR WATER OFFSET PROJECTS AND REFERENCES

Stormwater projects

- **How will stormwater be intercepted and stored?**
  - Re-routing or initiating stormwater connections (storm drainage lines, curb cuts, etc.)
  - Water will be treated before discharge to infiltration wells. Water will not be stored.
- **What are the anticipated permitting requirements?**
  - State Environmental Policy Act (SEPA).
  - City of Kirkland Building Permit
  - City of Kirkland Right-of-Way (ROW) Use Permit
- **How does this project go above and beyond existing stormwater requirements?**
  - There is no regulatory requirement to provide stormwater controls to serve existing development. This retrofit project will voluntarily improve existing stormwater infrastructure, most of which was built before modern stormwater standards were in place, and in an area that is unlikely to redevelop in a way that would require new stormwater detention and water quality measures.
  - Retrofit projects, though voluntary, will be designed to meet flow control standards of the 2019 Stormwater Management Manual for Western Washington for the area draining to the facility.
- **How will the stormwater be treated, if applicable?**
  - Water quality facilities to meet at least the Basic treatment standard per the 2019 Stormwater Management Manual for Western Washington
- **What is the river and reach that the discharge will benefit?**
  - The project will benefit Forbes Creek downstream of I-405
  - Forbes Creek drains to Lake Washington, which is part of the Cedar/Lake Washington/Lake Sammamish Water resources Inventory Area (WRIA) 8
- **What is the estimated amount of benefit within the target river and reach? Speak to retimed flows, flow levels, and fish species benefiting.**
  - The target will be the LID and Flow Control performance standards in the 2014 Stormwater Management Manual for Western Washington
  - Target water quality treatment will be the Basic Water Quality Treatment for all pollution generating impervious surface (PGIS) as noted in the 2014 Stormwater Management Manual for Western Washington

References

City of Kirkland, 2019. Forbes/North Rose Hill Stormwater Retrofit Planning Project – grant deliverables. Ecology National Estuary Program Grant: WQNEP2016-KirkPW-00010.

King County, 2012. *Stormwater Retrofit Analysis for Juanita Creek Basin in the Lake Washington Watershed. Ecology Grant: G0800618.* King County Department of Natural Resources and Parks, Water and Land Resources Division, Seattle, WA.

High Woodlands Retrofit Stormwater – City of Kirkland (H-GLW-H25)

Draft Project Description

June 18, 2020

Narrative Description

The City of Kirkland (City) will site and size stormwater retrofit facilities within the High Woodlands sub-basin of Juanita Creek. Retrofit facilities in this 431-acre basin will contribute to improved flows and water quality in the overall Juanita Creek Watershed as envisioned in King County's 2012 Juanita Retrofit Study. Stormwater retrofit facilities will contribute to stream restoration efforts that include installation of a fish passable culvert at I-405/NE 145th Street to be installed by WSDOT by 2025.

Quantitative and Qualitative Assessment

The project is currently in the planning phase. Planning will quantify the overall need for flow control and water quality facilities, and will identify sites and 30% designs for up to 3 facilities. Infiltration is the preferred stormwater management method. The project will include geotechnical exploration to identify and size infiltration projects such as infiltration wells or infiltration vaults. Although specific information is not yet available for projects in this basin, a similar project within Kirkland, *132nd Square Park* with 48.5 acres of contributing area, has been designed to achieve an annual infiltration volume of approximately 70 acre-feet. A rough estimate for this subbasin is that the three projects would together serve a similar area.

Conceptual-Level Map and Spatial Distribution

See *Appendix A – High Woodlands Retrofit Vicinity Map*.

Performance Goals and Measures

The performance goal is to infiltrate as much stormwater runoff as feasible given site constraints. See the Stormwater Retrofit Analysis for Juanita Creek Basin in the Lake Washington Watershed (King County, 2012) report for further details.

Ecosystem Structure

Restoration of the pre-development hydrologic regime through stormwater management is one aspect of an overall stream restoration program that also includes installation of fish passable culverts (Kirkland recently replaced the culvert at 111th Ave NE/NE 141st Street, and WSDOT will be replacing the culvert at I-405 and NE 145th Street by 2025), instream physical habitat restoration, and water quality improvement efforts such as spill control/cleanup and public education. Taken as a whole, this program has the goal of restoring salmon populations in Juanita Creek.

Support and Barriers to Completion

Community outreach will be part of the planning process – identified stormwater projects must provide ancillary benefits where possible, and must be designed to incorporate community interests and concerns. Funding for the project, particularly considering COVID-19 budget impacts, is likely the primary barrier to construction of the projects identified via this planning effort.

Budget and O&M Costs

Based on experience from previous projects within Kirkland, it is likely that projects to serve 10-20 acres

of tributary area will cost on the order of $2 million, for a total of $6 million for the three projects identified via this planning process. Operation and Maintenance costs for water quality treatment and infiltration facilities of this size are generally in the order of $5,000 per year each, for a total of $15,000 per year for three facilities.

Durability and Resiliency

The infiltration facilities are typically designed with a 25-year lifespan and will be maintained by the City of Kirkland maintenance crews while viable.

Project Sponsor(s)

This project is currently supported by funds from the Kirkland Surface Water Utility (i.e. local funds).

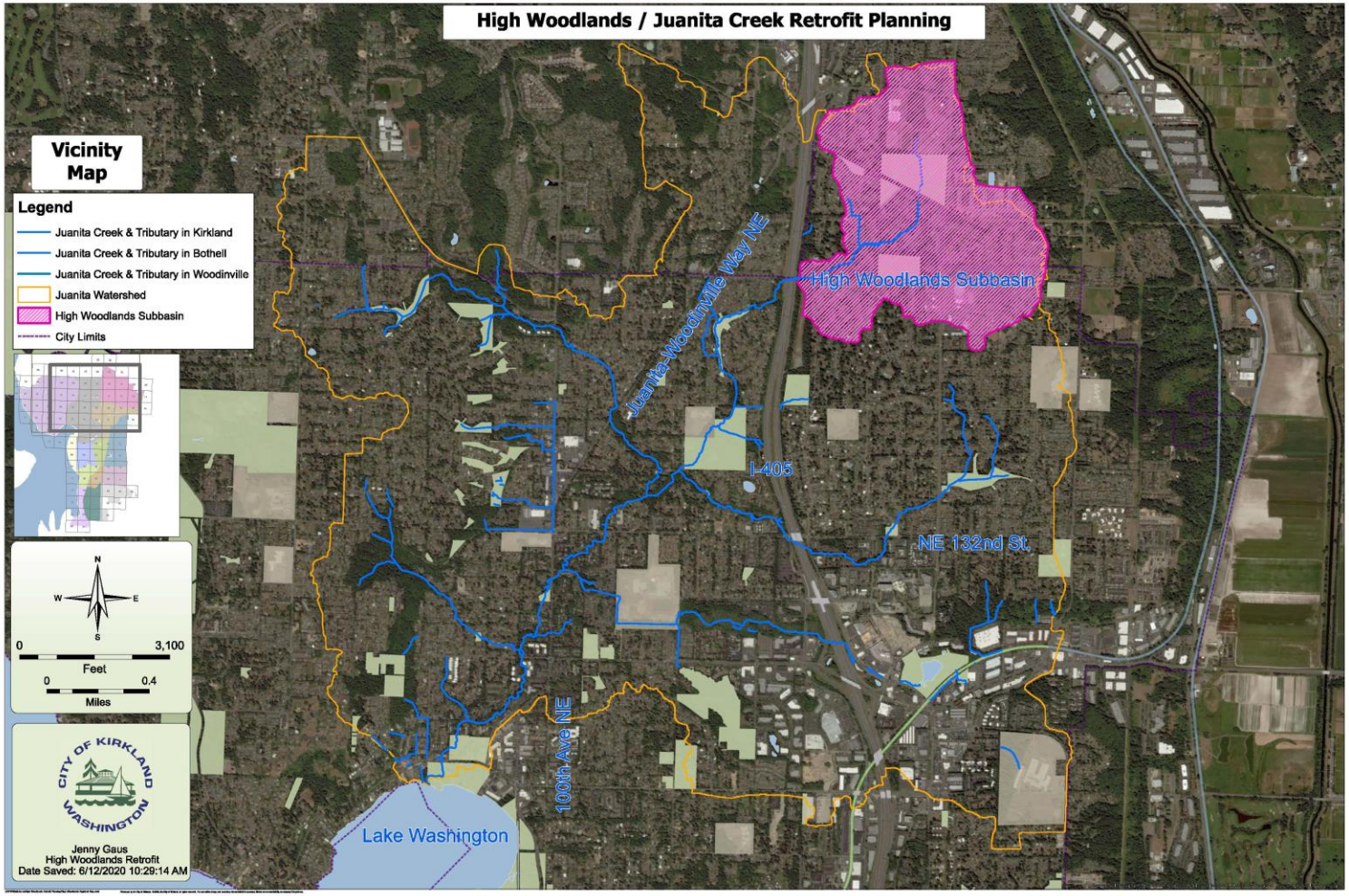
Documentation of Sources, Methods, and Assumptions

Reports and plans will be structured similarly to deliverables from recently completed projects in Kirkland. Resources will include, but are not limited to, Kirkland GIS program, continuous flow monitoring software (WWHM, MGS Flood, etc.), and the City of Kirkland Pre-Approved Plans and King County Stormwater Drainage Manual. See *Appendix B – Additional Questions for Water Offset Projects and References* for information on related to this evaluation summary.

ATTACHMENT A

HIGH WOODLANDS RETROFIT

VICINITY MAP


High Woodlands / Juanita Creek Retrofit Planning
Vicinity Map
Legend
Juanita Creek & Tributary in Kirkland
Juanita Creek & Tributary in Bothell
Juanita Creek & Tributary in Woodinville
Juanita Watershed
High Woodlands Subbasin
City Limits
N
W
E
S
0
3,100
Feet
0
0.4
Miles
CITY OF KIRKLAND WASHINGTON
Jenny Gaus
High Woodlands Retrofit
Date Saved: 6/12/2020 10:29:14 AM
High Woodlands Subbasin
Juanita-Woodinville Way NE
I-405
NE 132nd St
100th Ave NE
Lake Washington

1

ATTACHMENT B

ADDITIONAL QUESTIONS FOR WATER OFFSET PROJECTS AND REFERENCES

Stormwater projects

- **How will stormwater be intercepted and stored?**
  - Re-routing or initiating stormwater connections (storm drainage lines, curb cuts, etc.) and/or,
  - Flow control facilities (detention tank, vault, etc.).
- **What are the anticipated permitting requirements?**
  - Washington State Environmental Policy Act (SEPA).
  - City of Kirkland Building.
  - City of Kirkland Right-of-Way (ROW) Use.
  - City of Kirkland Public Works (PUB).
  - City of Kirkland Public Easement Access.
- **How does this project go above and beyond existing stormwater requirements?**
  - There are currently no requirement for stormwater retrofit of existing development
  - In order to make as much progress as possible toward restoration of pre-development hydrologic conditions, this project will to the degree feasible apply flow control and water quality treatment requirements of the *2016 King County Stormwater Drainage Manual* to the tributary area for the project.
- **How will the stormwater be treated, if applicable?**
  - Water quality facilities (wetvault, UIC, proprietary treatment, etc.). Facilities will meet the Basic and/or Enhanced level of treatment as noted in the *2016 King County Stormwater Drainage Manual*
- **What is the river and reach that the discharge will benefit?**
  - This project focuses on the High Woodlands Sub-basin of the Juanita Creek Watershed. Juanita Creek drains to Lake Washington, part of the Lake Washington/Cedar/Sammamish Water Resources Inventory Area (WRIA) 8.
  - The project channel extent for hydrologic analysis and stream protection and enhancement includes the reach from the culvert at the intersection of 111th Avenue NE and NE 141st Street upstream to a stormwater inlet on 119th Avenue NE near the intersection with NE 148th Street.
- **What is the estimated amount of benefit within the target river and reach? Speak to retimed flows, flow levels, and fish species benefiting.**
  - Target flows will be meeting the ECY08 target.
  - Target water quality will be to provide the Basic Water Quality Treatment for all pollution generating impervious surface (PGIS).
  - Metrics found in December 2019 Preliminary Hydraulic Design Report (WSDOT, 2019).

References

King County, 2012. *Stormwater Retrofit Analysis for Juanita Creek Basin in the Lake Washington Watershed. Ecology Grant: G0800618.* King County Department of Natural Resources and Parks, Water and Land Resources Division, Seattle, WA.

WSDOT, 2019. *I-405 MP 21.94 Juanita Creek: Preliminary Hydraulic Design Report*. Washington Department of Transportation, Headquarters Hydraulics Office, Olympia, WA.

Spinney Homestead Park Stormwater Retrofit Planning and Construction - City of Kirkland (8-GLW-H26)

Draft Project Description

June 18, 2020

Narrative Description

The Spinney Homestead Park Stormwater Retrofit Planning and Construction Project (project) will conduct stormwater retrofit planning, design development, and facility construction at Spinney Homestead Park. The stormwater from 53 acres that surround the park is conveyed by pipes and flows untreated into Forbes Creek. The park is situated ideally in the Forbes Watershed landscape to receive this re-routed stormwater, treat and infiltrate or detain as much of the stormwater as possible. Excess flows will bypass the facility.

Quantitative and Qualitative Assessment

The project is currently in the feasibility analysis phase. The facility will be designed as feasible within the spatial constraints of the park. The facility will be sized between 23,000 square feet by 4 feet deep (assuming 10 in./hr. infiltration rate) to 67,600 square feet by 5 feet deep (assuming minimal infiltration). A similar project within Kirkland, *132nd Square Park* with 48.5 acres of contributing area, has been designed to achieve an annual infiltration volume of approximately 70 acre-feet. This is project expected to be similar in size and scope, anticipating an infiltration volume of approximately 76.5 acre-feet. This expectation is highly dependent on geotechnical exploration beneath the infiltration facility.

Conceptual-Level Map and Spatial Distribution

See *Appendix A – Spinney Homestead Park Vicinity Map*.

Performance Goals and Measures

The performance goal is to infiltrate as much stormwater runoff as feasible given site constraints. See the King County's Stream Report Webpage for further details.

Ecosystem Structure

The retrofit projects are designed using standard design practices to benefit the overall environmental health of Forbes Creek through reduction of runoff and removal of pollutants, but specific habitat improvements are not considered.

Support and Barriers to Completion

Funding for the project, particularly considering COVID-19 budget impacts, is likely the primary barrier to completion of the project.

Budget and O&M Costs

Based on experience from previous projects within Kirkland, capital costs will be approximately $4.2M - $5.2M for each of the retrofit facility in 2020 US dollars. O&M costs are approximately $5,000 per year in 2020 US dollars.

Durability and Resiliency

The infiltration facilities are typically designed with a 25-year lifespan and will be maintained by the City of Kirkland maintenance crews while viable.

Project Sponsor(s)

The Kirkland City Council has funded the feasibility study and conceptual design.

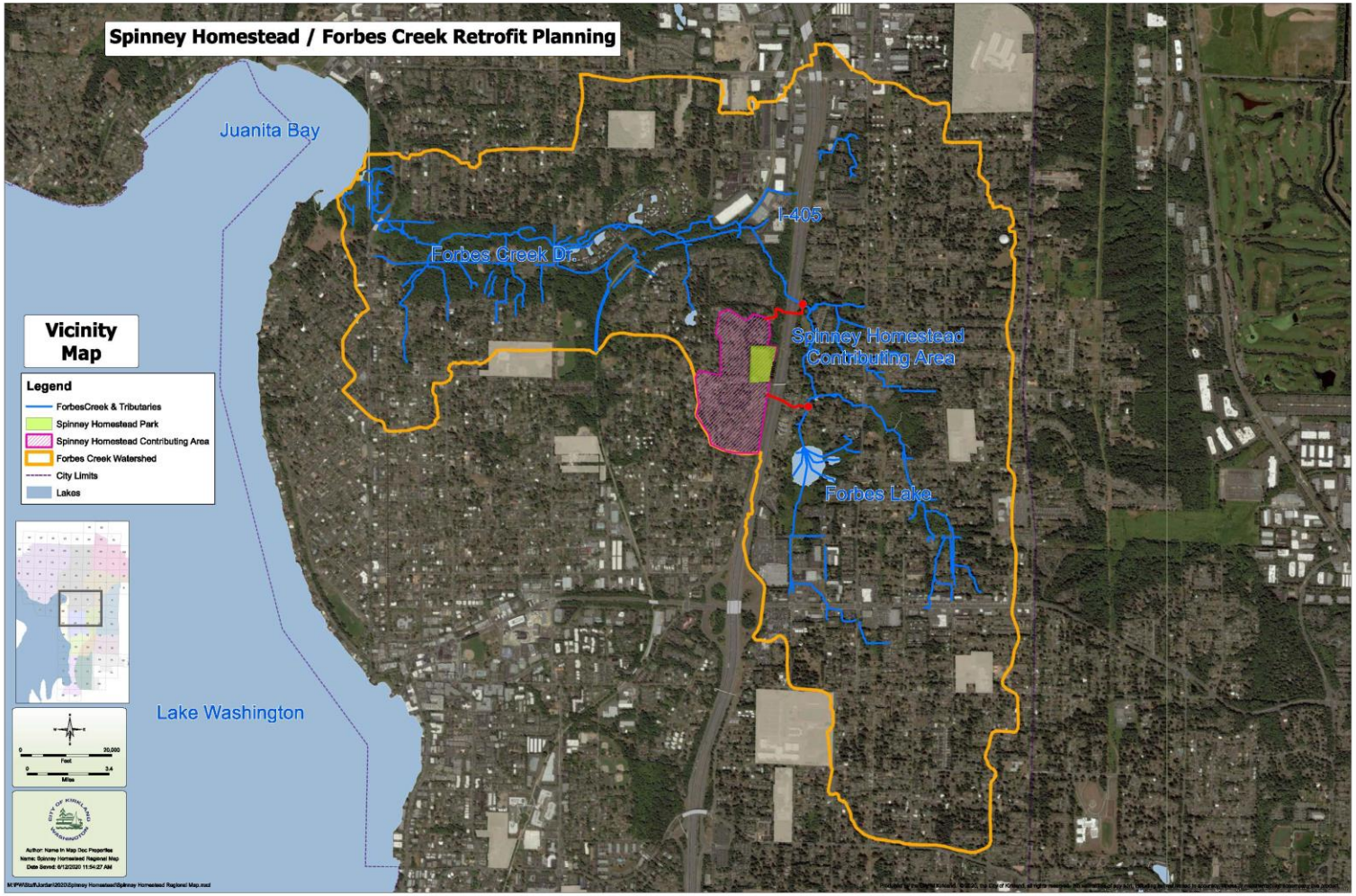
Documentation of Sources, Methods, and Assumptions

Reports and plans will be structured similarly to deliverables from recently completed projects in Kirkland. Resources will include, but are not limited to, Kirkland GIS program, continuous flow monitoring software (WWHM, MGS Flood, etc.), and the City of Kirkland Pre-Approved Plans and King County Stormwater Drainage Manual. See *Appendix B – Additional Questions for Water Offset Projects and References* for information on related to this evaluation summary.

ATTACHMENT A

SPINNEY HOMESTEAD

VICINITY MAP


Spinney Homestead / Forbes Creek Retrofit Planning
Juanita Bay
I-405
Forbes Creek Dr.
Spinney Homestead
Contributing Area
Forbes Lake
Lake Washington
Vicinity Map
Legend
ForbesCreek & Tributaries
Spinney Homestead Park
Spinney Homestead Contributing Area
Forbes Creek Watershed
City Limits
Lakes

1

ATTACHMENT B

ADDITIONAL QUESTIONS FOR WATER OFFSET PROJECTS AND REFERENCES

Stormwater projects

- **How will stormwater be intercepted and stored?**
  - Currently two stormwater systems flow around the park and outlet to Forbes Creek. These two systems would be piped into the park and managed through the retrofit facility.
  - The project is still in the feasibility phase but as more information is gathered Kirkland will prioritize water quality with infiltration first, followed by a detention facility.
  - Due to the desire to retain community use of the ball field, the systems will be underground vaults or tanks.
- **What are the anticipated permitting requirements?**
  - City of Kirkland Land Surface Modification (LSM).
  - City of Kirkland Public Works (PUB).
  - City of Kirkland Building.
- **How does this project go above and beyond existing stormwater requirements?**
  - Currently Kirkland is a Phase II permittee under the NPDES Stormwater Permit. Retrofitting stormwater systems installed before stormwater regulations became required for most development projects is not required through this permit. This treatment, infiltration, and flow control would be voluntary and beyond existing stormwater requirements.
  - This project will ensure flow control and water quality to meet *2016 King County Stormwater Drainage Manual* requirements and *City of Kirkland Policy D-10, the Addendum to the King County Stormwater Drainage Manual*.
- **How will the stormwater be treated, if applicable?**
  - Flow control facilities (detention tank, vault, etc.) and/or,
  - Water quality facilities (wetvault, UIC, proprietary treatment, etc.).
  - Both techniques remove suspended solids which are known to contain nutrients, pesticides, heavy metals, and volatile chemicals, such as petroleum products.
- **What is the river and reach that the discharge will benefit?**
  - Improvements in this stormwater system will benefit Forbes Creek.
- **What is the estimated amount of benefit within the target river and reach? Speak to retimed flows, flow levels, and fish species benefiting.**
  - One of the predominant issues of stormwater is that it changes local hydrology to increase the speed and height of peak flows following a rain event. These quicker, larger flows can be extremely erosive for creeks that had once been surrounded by forest.
  - Forbes Creek supports Coho and steelhead salmon.
  - Target flows will be meeting the ECY08 target.
  - Target water quality will be to provide the Basic Water Quality Treatment for all pollution generating impervious surface (PGIS).

References

"Stream Report." *Stream Report - King County*, 2 Nov. 2016, green2.kingcounty.gov/streamsdata/watershedinfo.aspx?Locator=0456.

Cemetery Pond Stormwater Retrofit & Wetland Restoration (8-MC-H27)

Draft Project Description

July 1, 2020

Project Status:

The project is currently in early design stages under a grant from Washington Department of Ecology. The 90% design package will be completed in June 2021.

Project Name

Cemetery Pond Stormwater Retrofit and Wetland Restoration

Narrative Description

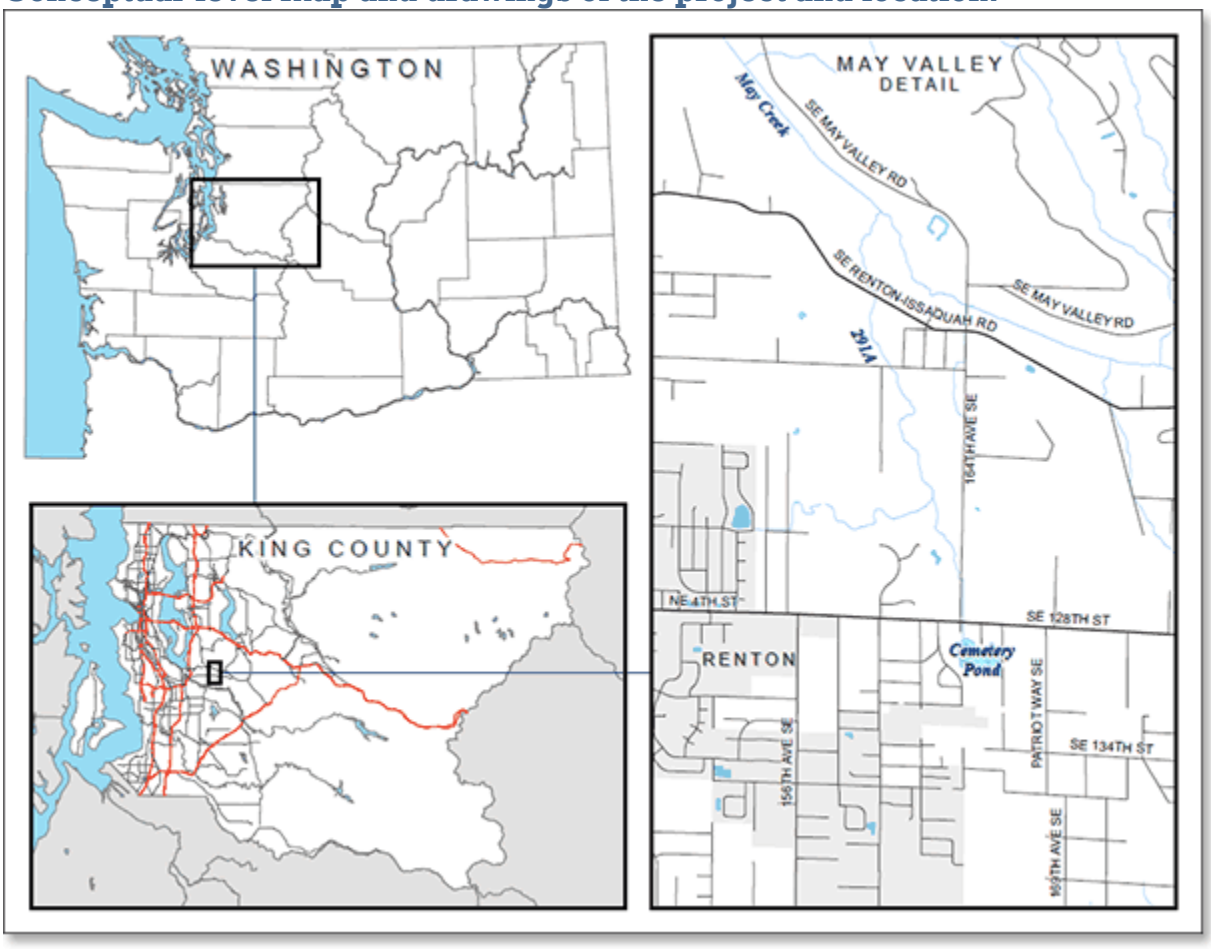
This project will improve the water quality in May Creek through the retrofit design of an existing stormwater detention pond (DR0509) at SE 128th Street and 165th Avenue SE in an unincorporated area of King County near Renton. The facility will reduce flows to May Creek by providing stormwater detention.

The Washington Department of Ecology identified May Creek as a targeted watershed for stormwater retrofit planning due to its high ecological integrity, indicating that stormwater retrofit actions within the watershed will have a greater probability of contributing to the recovery and stability of a functioning aquatic ecosystem. The Final Adopted May Creek Basin Action Plan recommends enhancement and restoration of the wetland by cleanup of existing trash piles, replanting of native vegetation and restoration of filled wetland areas. This work will serve as a pilot demonstration project to inform future stormwater retrofit projects involving wetlands.

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

The project is anticipated to reduce flows to May Creek by providing stormwater detention. Infiltration capacity at the site has not yet been determined. Surface geology at the site consists of wetland and till, so significant infiltration is unlikely.

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



Map source: https://kingcounty.gov/depts/dnrp/wlr/sections-programs/stormwater-services-section/capital-services-unit/small-stream-basin-retrofit/may-creek-trib-291A-retrofit.aspx

Description of the anticipated spatial distribution of likely benefits.

Primary benefits expected for May Creek Tributary 291A. Benefits may carry down to May Creek.

Performance goals and measures.

Pond water levels, storm flow releases, downstream water quality and B-IBI scores.

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

May Creek supports five species of fish: Chinook, sockeye, Coho and kokanee salmon, and steelhead and cutthroat trout (Kerwin, 2002; "Stream List," 2016). From 2000 to 2015, volunteers with the King County Salmon Watcher Program observed salmon in May Creek. Volunteers consistently saw sockeye salmon. Less commonly spotted were Chinook salmon, Coho salmon, cutthroat trout, and kokanee salmon.

Identification of anticipated support and barriers to completion.

King County currently has ownership of the project. The project has not yet confirmed willingness of current owners to sell the proposed project site, nor support from surrounding neighbors.

Potential budget and O&M costs.

Construction and O&M costs not yet determined.

Anticipated durability and resiliency.

Depends on nature of project. Engineered structures would be built to King County standards.

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

King County is conducting project design with grant funding from Washington Department of Ecology. Additional grant funding would likely be sought for project implementation, no earlier than 2022.

Documentation of sources, methods, and assumptions.

Project website: https://kingcounty.gov/depts/dnrp/wlr/sections-programs/stormwater-services-section/capital-services-unit/small-stream-basin-retrofit/may-creek-trib-291A-retrofit.aspx

Lake Sammamish Habitat Projects

There is not a detailed project description for this project.

Carey/Holder/Issaquah Confluence Restoration Project (8-I-H29)

Draft Project Description

September 4, 2020

Project Name

Carey/Holder/Issaquah Confluence Restoration Project

WRIA 8 WRE Subbasin

Issaquah

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes restoration at the confluence of Carey, Holder and Issaquah Creek located in the Issaquah subbasin in Hobart, Washington. The confluence is on a 120-acre site in King County ownership. This project proposes restoration of riparian vegetation, add livestock fencing, and implement other best management practices for livestock. Some fencing has already been built. This project also has the opportunity to install large woody debris to facilitate floodplain interactions, off-channel habitat creation, including wetlands.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, and resident cutthroat trout that utilize these three creeks 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.

This project will restore the confluence of Carey, Holder, and Issaquah Creek on a site in King County ownership. The project proposed restoration actions include to adding woody debris to facilitate flood plain interactions and create off-channel habitat, including wetlands. This proposal also includes revegetating riparian areas and installing livestock fencing. These restoration actions will increase the volume and availability of off-channel habitat for juvenile salmonids and to increase overall channel complexity and habitat quality.

A map and drawings of the project location.

This project will restore the riparian and floodplain habitat associated with the confluence of Carey, Holder and Issaquah Creek in Hobart, Washington. 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 includes restoration at the confluence of Carey, Holder and Issaquah Creek located in the Issaquah subbasin in Hobart, Washington. The confluence is on a 120-acre site is in King County ownership. Associated wetlands and small streams will also be included in future project footprint.

Performance goals and measures.

Project is in feasibility phase, performance goals and measures are in development at this time.

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, Sockeye, and resident cutthroat trout that utilize these three creeks as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA.

Creation of edge habitat and enhanced riparian buffers through the addition of woody debris and restoration of wetlands will provide hydraulic complexity in addition to benefitting prey availability for fish species, water quality and water quantity. Riparian vegetation will provide shade to help protect water temperatures and detritus, essential for the aquatic food web.

Identification of anticipated support and barriers to completion.

Project is in feasibility phase and anticipated support and barriers to completion are unknown at this time.

Estimate of capital costs and reoccurring O&M costs.

Estimated total cost is unknown at this time.

Anticipated durability and resiliency.

Not available at this feasibility stage.

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

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

Documentation of sources, methods, uncertainties, and assumptions.

Not available at this feasibility stage.

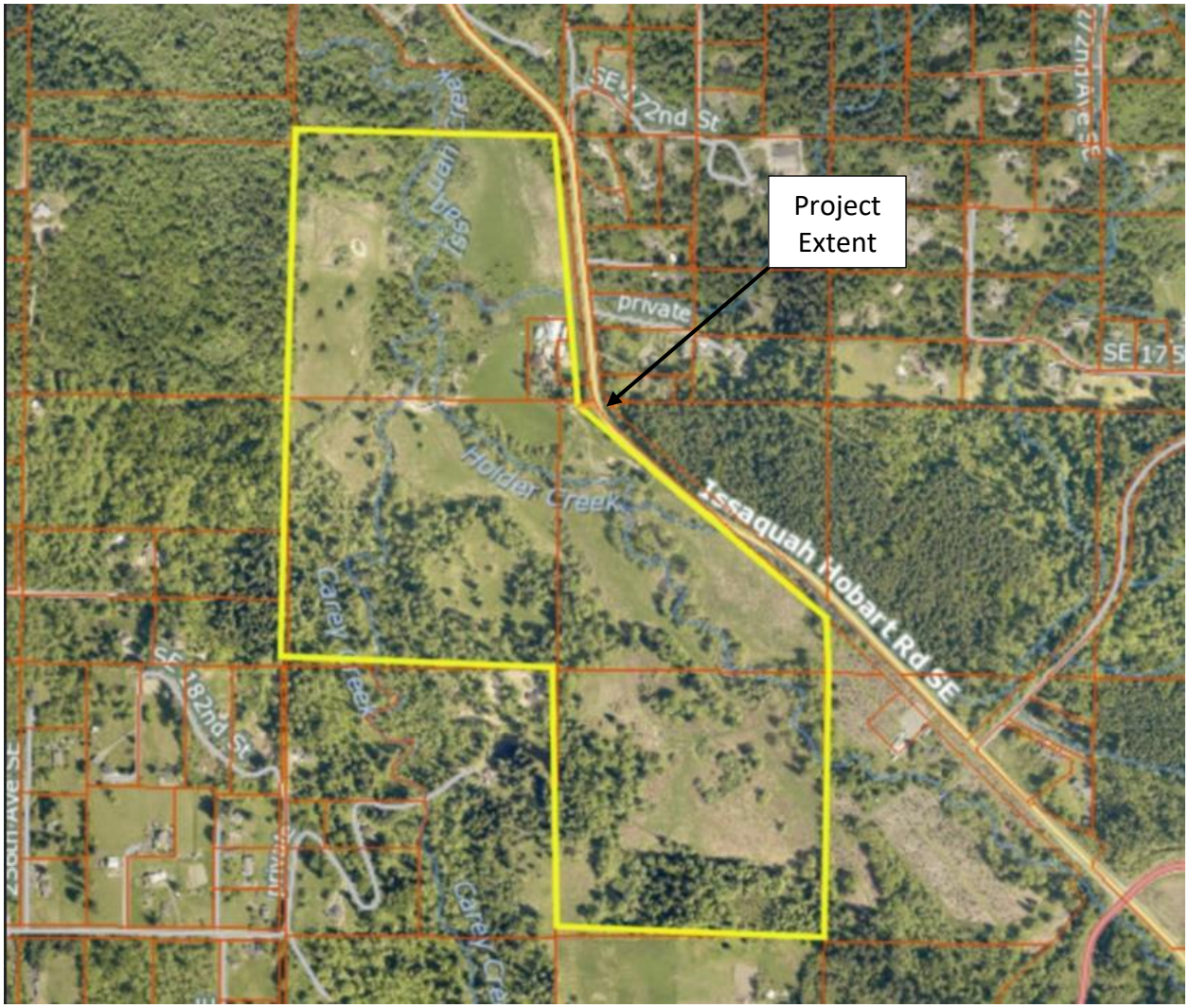


Figure 1. Site Plan for Cary/Holder Issaquah Confluence Restoration Project

Issaquah Creek In-Stream & Riparian Restoration - Lake Sammamish State Park Project (8-I-H30)

Draft Project Description

August 11, 2020

Project Name

Issaquah Creek In-Stream & Riparian Restoration - Lake Sammamish State Park Project

WRIA 8 WRE Subbasin

Issaquah

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

The Mountains to Sound Greenway Trust will complete in-stream restoration and riparian buffer restoration along 6,000' of Issaquah Creek within Lake Sammamish State Park, a Tier 1 system in WRIA 8, within the Issaquah subbasin in Issaquah, Washington. This project will provide significant habitat benefits for juvenile Chinook and other salmonids including in-creek Large Woody Material (LWM) placement for structural diversity and creation of floodplain and side-channel connectivity, resulting in more functional and complex refuge and foraging habitat.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, Kokanee, and resident Cutthroat Trout that utilize Issaquah Creek 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.

The proposed project will restore the stream and riparian habitats associated with Issaquah Creek within Lake Sammamish State Park. Creation of floodplain and side-channel connectivity and installation of LWM has several ecological functions including increasing hydraulic diversity, managing flows, creating deeper pools that provide refugia for fish, and trapping organic material that provides nutrients for insects and invertebrates which are a prey source for fish. Shade from installed riparian vegetation will moderate water temperature, reduce evaporation, create habitat, and provide long-term recruitment of LWM.

A map and drawings of the project location.

This project proposes to restoration actions along Issaquah Creek within Lake Sammamish State Park located in Issaquah, Washington. 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.

The project proposes to restore 6,000 feet of Issaquah Creek within the Lake Sammamish State Park, which connects with Lake Sammamish immediately downstream of the proposed project area.

Performance goals and measures.

The primary goal for this project is to enhance the quality and quantity of key, strategically located salmonid habitat, particularly for juvenile Chinook rearing and adult Chinook holding in Issaquah Creek to support WRIA 8 Salmon recovery goals. Adding large wood to the creek will create a suite of low-velocity habitats promoting longer stream residence. The hydrology of the system will engage the floodplain, and the LWM will scour out pools. Increase in refuge areas will result in longer periods of rearing, helping fish achieve greater fitness and condition. Riparian reforestation will provide future LWM recruitment, shade the creek, provide additional nutrients, and other benefits.

This will be completed through the following objectives/measures:

- Improve canopy cover by revegetating 5 acres of riparian habitat with the installation of 4,000 native trees and shrubs (in 2022 and 2023) to achieve a diverse conifer-based forest to increase shading and food sources for salmonids within 150' of creek. Installed trees will provide an important source of wood recruitment to the stream over the coming decades.
- Continue active restoration on more than 40 acres of existing riparian buffer enhancement projects. Install at least 5,000 native trees and shrubs to continue establishment of coniferous forest canopy.
- Create a 193' pilot channel to reconnect the creek to oxbow channel providing an additional 0.3 miles (1.5 acres) of habit for salmonids which will be available immediately and provide opportunity for the creek to migrate more freely within the delineated channel migration zone.
- Scrape 250' of steep banks to accelerate channel widening and increase sinuosity. Assuming a 10-year event, an additional 50' of bank is expected to naturally erode increasing the width of the lower floodplain bench and adding channel length.
- Construct 3 apex jams and 17 large spur jams to partition stream flow, increase sinuosity, create a velocity shadow downstream to form gravel bars, improve hyporheic flow to reduce stream temps, and create 23 pools for juvenile rearing/adult holding.
- Install 32 logs, 16 log jacks and 1 small spur jam in and along the creek and oxbow channel to immediately improve in-water habitat for salmonids, increase bank roughness to provide refugia for juvenile salmonids during higher flows, and supporting pool and multifractional size sediment bar formation (operating in conjunction with larger structures).

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, Sockeye, Kokanee, and resident Cutthroat Trout that utilize Issaquah Creek as spawning and rearing habitat. Chinook and Steelhead are priority species, protected under the ESA. LWM and restoration of riparian vegetation will directly benefit prey availability, spawning success as well as survival of pre-migrant and out-migrating juvenile salmonids.

Identification of anticipated support and barriers to completion.

The Greenway Trust has completed significant partner and stakeholder engagement in this effort, with efforts including Washington State Parks & Recreation Commission (the landowner and land manager) engaged routinely and regularly in planning and design, seeking input from staff from multiple tribes ongoing conversations with the City of Issaquah, close coordination with the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) and the WRIA 8 Technical Committee, and

discussion with other interested parties (Washington Dept. of Fish and Wildlife, King County Kokanee Work Group, nonprofit partners).

Funding for the design phase of the project has been secured via grants from the WRIA 8 / King County Flood Control District (KCFCD) Cooperative Watershed Management (CWM) grant program, the Salmon Recovery Funding Board (through the Washington State Recreation & Conservation Office), and from private contributions from The Boeing Company.

The Greenway Trust is currently seeking funding to complete construction of the project in Phases, with anticipated grants from WRIA 8/KCFCD CWM program, and from the Salmon Recovery Funding Board and Puget Sound Acquisition and Restoration programs. The Greenway Trust is also seeking funding from other public and private sources including the National Fish and Wildlife Foundation.

Possible barriers to completion are limited. An uncommon aspect of this project is the relatively unique opportunity to complete in-stream and riparian habitat restoration on such a large stretch of Creek within an otherwise heavily developing area. Two key project partners (State Parks and the City of Issaquah) have placed only a handful of limitations on the project:

- No additional adverse impact to existing and future State Parks facilities (Sunset Beach bathhouse and pedestrian bridge, small pump station in Reach 4).
- Leave an area for a future mid-Park channel-spanning bridge across the Creek (in Reach 3, where the Creek is deeply incised and unlikely to meander substantially).
- Flood Impacts: Zero rise at the Park-City boundary upstream, and compliance with City and FEMA requirements for projects within a FEMA-regulated floodway.

An additional possible constraint is associated with the overall cost of the project, as funding is being sought to complete the effort in multiple Phases. The Greenway Trust anticipates initiating the project in the 2022 construction window using grants that are conditionally approved at this time and will continue to seek funding to complete the project in the coming years.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are estimated at $427,142.

Anticipated durability and resiliency.

After the project is completed, there will still be some need for site maintenance in order to achieve functional forested riparian habitat. Throughout the duration of this project, the Greenway Trust will focus on invasive weed control, mulching, monitoring and adaptive site management, and plant replacement with a goal of minimizing the need for long term maintenance. The Greenway Trust will complete a minimum of 5 years of intensive maintenance of the riparian buffer restoration plantings with a focus on native plant survival and invasive weed control. Maintenance intervals will be reduced as viable after 5 years. The Greenway Trust has a 15+ year history of performing similar activities in the Park, supported by local grants, Greenway Trust staff, sponsored AmeriCorps members, volunteers, and other elements. The Greenway Trust has been successful in obtaining stewardship and maintenance funding from other funding sources, including state and local grants and private funding from the Greenway Trust's partnership with Carter Subaru. The Greenway Trust also has a long history of working

with volunteers and schools in Lake Sammamish State Park and will continue to lead volunteer stewardship events to remove invasive weeds in the riparian corridor of Issaquah Creek.

In-stream restoration will be monitored, and is not anticipated to be maintained. The in-stream elements of the project are designed and engineered with minimal anchoring to function naturally in a dynamic process-based system. The Greenway Trust is working with State Parks on a conceptual plan for maintenance of the in-stream features to support prevention of damage to the Park's facilities, and this plan will continue to be refined over the coming years. As described elsewhere in this proposal, the in-stream restoration components incorporate many elements that are designed to provide long-term functionality, including spur and apex jams that will help to capture mobile wood throughout the project area.

Numerous stakeholders have expressed an interest in long-term effectiveness monitoring for the project, and while funding has not been identified, this aspect will continue to be explored.

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

Mountains to Sound Greenway Trust. Sponsor contact: Mackenzie Dolstad, mackenzie.dolstad@mtsgreenway.org. The sponsor has submitted for funding and ready to proceed with implementation of riparian buffer restoration immediately, as funding from other sources allows for completion of Final Design for in-stream restoration components.

Documentation of sources, methods, uncertainties, and assumptions.

More details on the sources, methods, uncertainties, assumptions, and proposal can be found in the Greenway Trust's Preliminary Design report for the project, prepared by Northwest Hydraulic Consultants and The Watershed Company (2020).

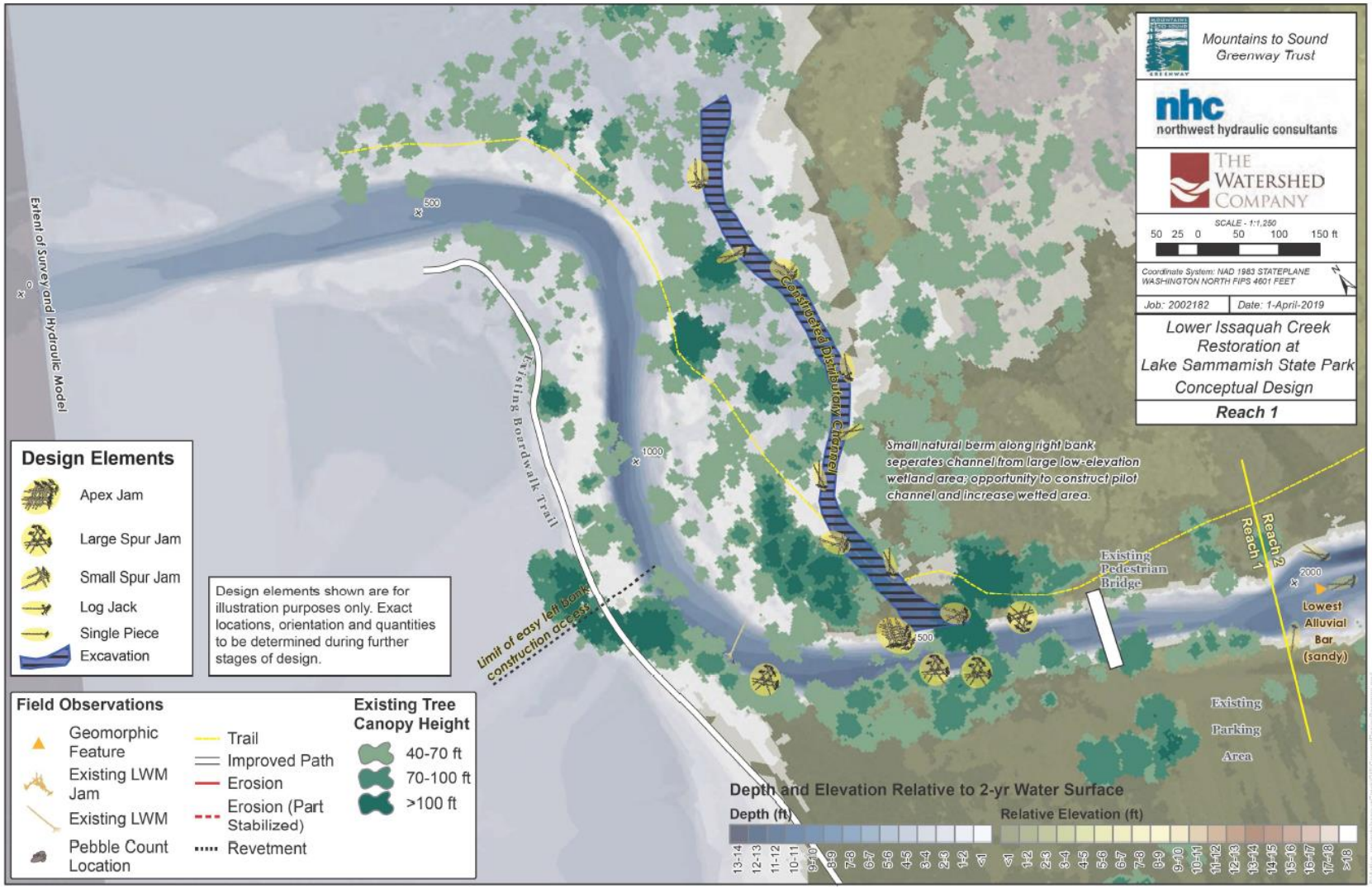


Figure 1. Site Plan for the Issaquah Creek In-Stream & Riparian Restoration Project

Royal Arch Reach Acquisitions and Floodplain Connection Project (8-LC-H31)

Draft Project Description

July 28, 2020

Project Name

Royal Arch Reach Acquisitions and Floodplain Connection Project

WRIA 8 WRE Subbasin

Lower Cedar

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes floodplain reconnection and restoration along the Cedar River within the Royal Arch Reach located in the Lower Cedar subbasin just north of Maple Valley, Washington.

Specifically, this project proposes to acquire floodplain properties from State Route (SR) 169 to Highway (HWY) 18 for future floodplain reconnection and restoration. Some floodplain properties are already in public ownership as a result of an effort being led by Seattle Public Utilities. These efforts align with the Cedar Corridor Plan Habitat Opportunity Area #20 and 21. Upon acquiring sufficient land along the right bank, the project proposes to remove bank armoring and reconnect and restore the floodplain in the reach. These efforts align with Cedar Corridor Plan Habitat Opportunity Area #20 and Project 21. The first sub-project is now in design to restore approximately 8 acres of floodplain in the upper Royal Arch Reach.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye and resident Cutthroat Trout that utilize the Cedar River 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.

The proposed project will restore the floodplain connectivity improving the aquatic habitats associated with the Cedar River through acquisition of properties within the floodplain from SR 169 to HWY 18.

A map and drawings of the project location.

This project proposes to implement floodplain restoration actions along the Cedar River from SR 169 to HWY 18 just north Maple Valley, Washington, in what is known as the Royal Arch Reach. 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.

The project proposes to restore floodplain connectivity along the Cedar River Royal Arch Reach from SR 169 to HYW 18.

Performance goals and measures.

Acquire property and remove hardened banks, historic fills, and structures to restore connectivity of the natural floodplain of the Cedar river in the reach, with the primary goal of increasing off-channel rearing and refuge habitat for juvenile salmonids.

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

Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout that utilize the Cedar River as spawning and especially rearing habitat. Chinook and Steelhead are priority species, protected under the ESA. Floodplain restoration will directly benefit fish by restoring riparian vegetation communities, food web complexity and expanding available habitats for flood refuge, foraging, and spawning.

Identification of anticipated support and barriers to completion.

Consistent and repeated funding support has come from WA State Salmon Recover Funding Board (SRFB), including the current sub-project now in design. The biggest barrier to full-reach-scale acquisition and restoration is unwilling sellers of large parcels of land, especially the Royal Arch Mason Park.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are estimated at $3.5-5 million.

Anticipated durability and resiliency.

Acquisition of land in-fee, followed by process-based reconnection of natural floodplain is anticipated to be naturally resilient and perpetually durable.

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

Seattle Public Utilities. Sponsor contact: Brent Lackey, Brent.Lackey@seattle.gov. The sponsor actively seeking additional property acquisitions (15 parcels/30 acres have been acquired as 2020) in the 70-acre reach. Currently in design of first large floodplain reconnection sub-project.

Documentation of sources, methods, uncertainties, and assumptions.

Historic floodplain maps and detailed flow and inundation modeling and studies (SPU 2014-2020); Feasibility and options analyses, and multiple grant application proposals (SPU 2007-2020). Assumes river hydrology is largely static over the course of at least this century. Assumes ongoing occupation of Cedar river by target salmonid species.

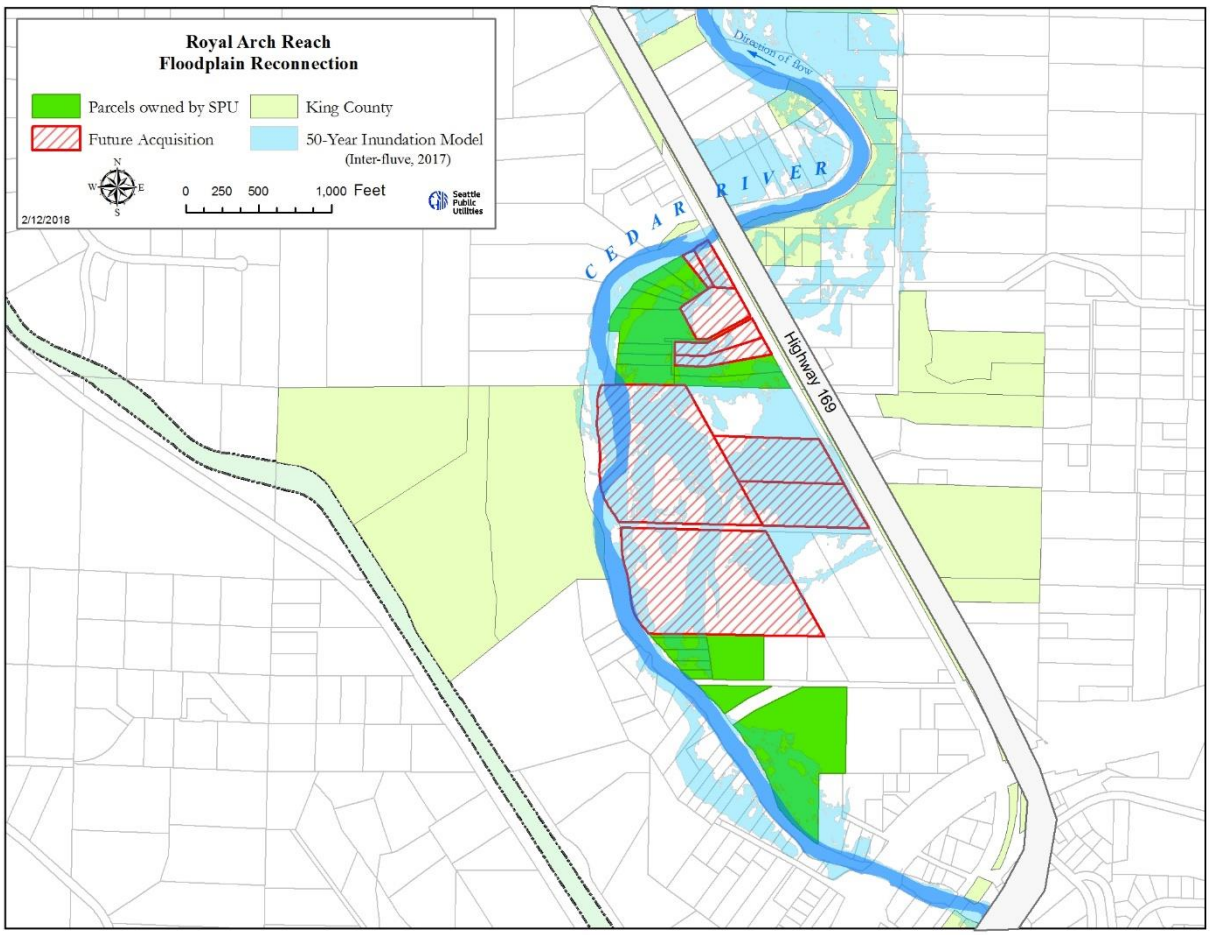


Figure 1. Site Plan for Royal Arch Reach Project

Elliot Bridge Reach Floodplain Restoration (8-LC-H32)

Draft Project Description

September 1, 2020

Project Name

Elliot Bridge Floodplain Restoration Project

WRIA 8 WRE Subbasin

Lower Cedar

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes acquisition of parcels near the former Elliot Bridge site to enable floodplain reconnection and restoration along the Cedar River located in the Lower Cedar subbasin in Renton, Washington.

Once property is acquired, the project proposes to restore the floodplain, including setting back or removing the Elliot Bridge levee, removing the old Elliot Bridge abutments and portions of 149th Ave., and potentially removing the toe rock from the Orting Hill revetment (left in place following a mitigation project). As part of this restoration, this project will also evaluate relocation of lower Madsen Creek to enhance habitat conditions in the creek.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout, Kokanee and Bull Trout that utilize the Cedar River as spawning and 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 the floodplain connectivity improving the aquatic habitats associated with the Cedar River through acquisition of properties within the floodplain.

A map and drawings of the project location.

This project proposes to floodplain restoration actions along the Cedar River in Renton, Washington. 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.

The project proposes to restore floodplain connectivity along the Cedar River through acquisition of two parcels on the right bank just upstream of the Punnett Briggs revetment and up to four parcels on the left bank along the river and 149th Ave SE. This project proposes to remove the Elliot Bridge levee and abutments and potentially the toe rock from the Orting Hill revetment. The project will also evaluate the relocation of lower Madsen Creek to improve habitat conditions with its connection point with the Cedar River.

Performance goals and measures.

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

Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout, Kokanee and Bull Trout that utilize the Cedar River as spawning and rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Floodplain restoration will directly benefit fish by restoring riparian vegetation communities, food web complexity and expanding available habitats for foraging and spawning.

Identification of anticipated support and barriers to completion.

Project has been identified by King County and WRIA 8 as important habitat recovery planning area.

Estimate of capital costs and reoccurring O&M costs.

The total project costs are currently unknown.

Anticipated durability and resiliency.

Project will encourage the establishment of natural riverine processes.

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

Sponsor contact: Judy Blanco, jublanco@kingcounty.gov. The project sponsor will proceed with scoping and reconnaissance once additional property is conserved.

Documentation of sources, methods, uncertainties, and assumptions.

Project is outlined in King County basin planning documents and is included in the WRIA 8 project list.

Figure 1. Site Plan for Elliott Bridge Reach Floodplain Restoration

WPA Levee Removal Project (8-LC-H33)

Draft Project Description

September 4, 2020

Project Name

WPA Levee Removal Project

WRIA 8 WRE Subbasin

Lower Cedar

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project proposes to acquire the remaining parcel not on public ownership and setback or remove the WPA levee. This would allow for floodplain restoration along the Cedar River in the Lower Cedar subbasin in the East Renton Highlands, Washington. This project would also include revegetation of the floodplain with riparian plantings.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout, Kokanee and Bull Trout that utilize the Cedar River as spawning and 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 the floodplain connectivity improving the aquatic habitats associated with the WPA levee on the Cedar River through acquisition of the remaining parcel not in public ownership.

A map and drawings of the project location.

This project proposes to floodplain restoration actions by setting back or removing the WPA levee located on the Cedar River in the East Renton Highlands, Washington. 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.

The spatial distribution of the proposed WPA levee setback or WPA levee removal would have direct benefits within the footprint of the project but also provide benefit to downstream habitats through water quality, water quantity and nutrient availability.

Performance goals and measures.

Project goals and measures have not been drafted yet.

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

The species that will benefit are Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout, Kokanee and Bull Trout that utilize the Cedar River as spawning and rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Floodplain restoration will directly benefit fish by restoring riparian vegetation communities, food web complexity and expanding available habitats for foraging and spawning.

Identification of anticipated support and barriers to completion.

Future project area has one inholding that will require acquisition to move forward.

Estimate of capital costs and reoccurring O&M costs.

The total cost of the proposed project is unknown.

Anticipated durability and resiliency.

Floodplain connectivity will restore natural riverine processes to the site.

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

King County. Sponsor contact: Judy Blanco, Jublanco@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance once inholding parcel is secured.

Documentation of sources, methods, uncertainties, and assumptions.

Not known at this stage of the project.

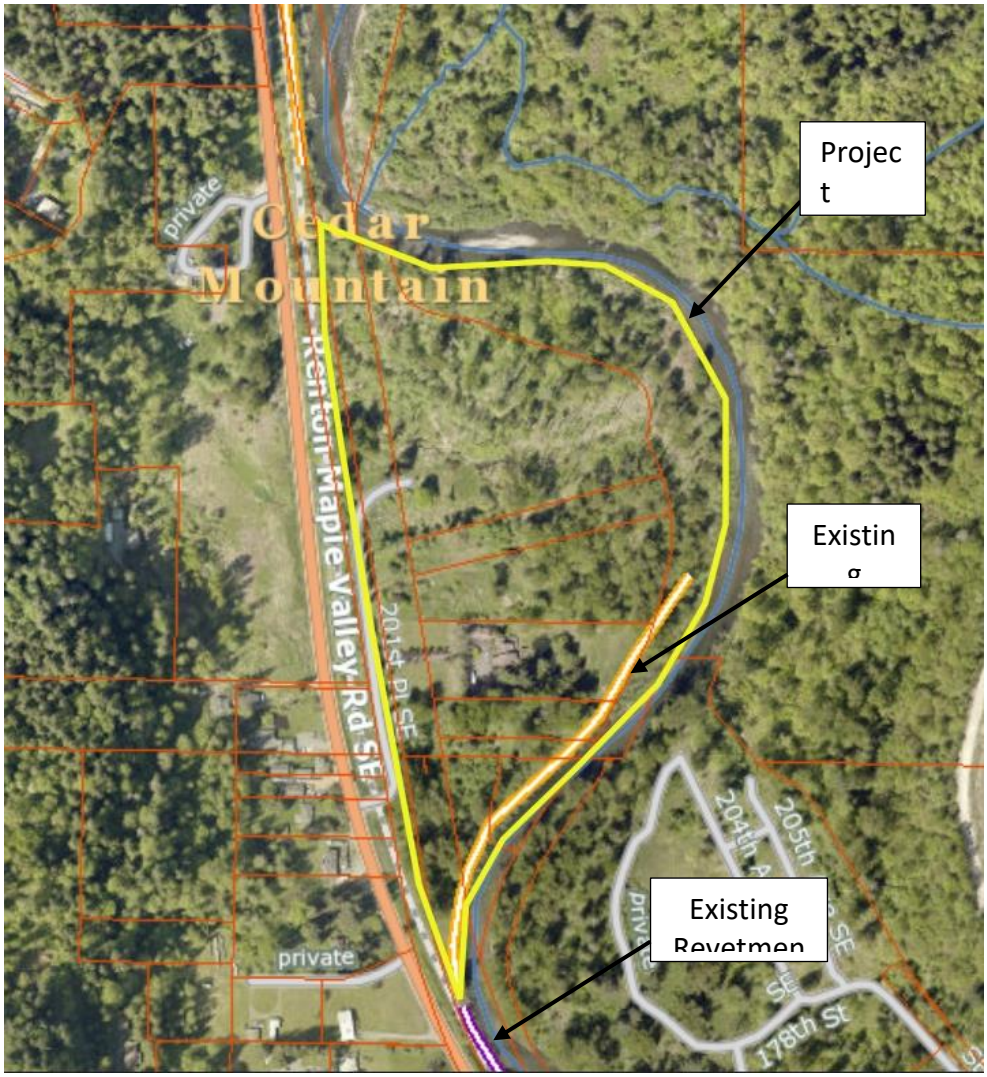


Figure 1. Site Plan for WPA Levee Removal Project

Rutledge-Johnson Lower (a) and Rutledge Johnson/Rhode (b) (8-LC-H34)

Draft Project Description

September 4, 2020

Project Name

Rutledge-Johnson Lower (a) and Rutledge Johnson/Rhode (b) Project

WRIA 8 WRE Subbasin

Lower Cedar

Project Status

The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description

This project includes two proposals along the Cedar River in the Lower Cedar subbasin in Maple Valley, Washington. These proposals are the Rutledge-Johnson Lower and Rutledge-Johnson/Rhode. The Rutledge-Johnson Lower project proposes removal or setback of the downstream 600 feet of the Rutledge-Johnson levee to allow for floodplain connection with an existing King County owned parcel. This would restore 16 acres of reconnected floodplain habitat. The second proposal under this project is the Rutledge Johnson/Rhode project which proposes to acquire remaining parcels along the left bank behind the Rhode and Rutledge-Johnson levee and remove or setback the levees and restore the floodplain.

These restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout that utilize the Cedar River 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.

The proposed project will restore the floodplain connectivity improving the aquatic habitats associated with the Cedar River through levee removal or setback. The Rutledge-Johnson levee removal or setback is estimated to restore 16 acres of reconnected floodplain habitat.

A map and drawings of the project location.

This project proposes floodplain restoration along the Cedar River, just south of Cedar Grove in Maple Valley, Washington. 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.

The project proposes to restore floodplain connectivity along the Cedar River in area around the Rutledge-Johnson and the Rhode levees. Floodplain restoration will directly benefit the habitat within the project footprint but there are downstream benefits with respect to water quality, water quantity and nutrient availability.

Performance goals and measures.

This is not applicable at this early design phase of the project.

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

Chinook, Coho, Steelhead, Sockeye, resident Cutthroat Trout, Kokanee and Bull Trout that utilize the Cedar River as spawning and rearing habitat will benefit from these proposed actions. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Floodplain restoration will directly benefit fish by restoring riparian vegetation communities, food web complexity and expanding available habitats for foraging and spawning.

Identification of anticipated support and barriers to completion.

Project is supported by WRIA 8 and has received design funding from state and local sources.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are currently unknown.

Anticipated durability and resiliency.

Project will allow natural riverine processes to return to the site.

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

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

Documentation of sources, methods, uncertainties, and assumptions.

Project is in early design phase and anticipated support and barriers to completion are currently under review.

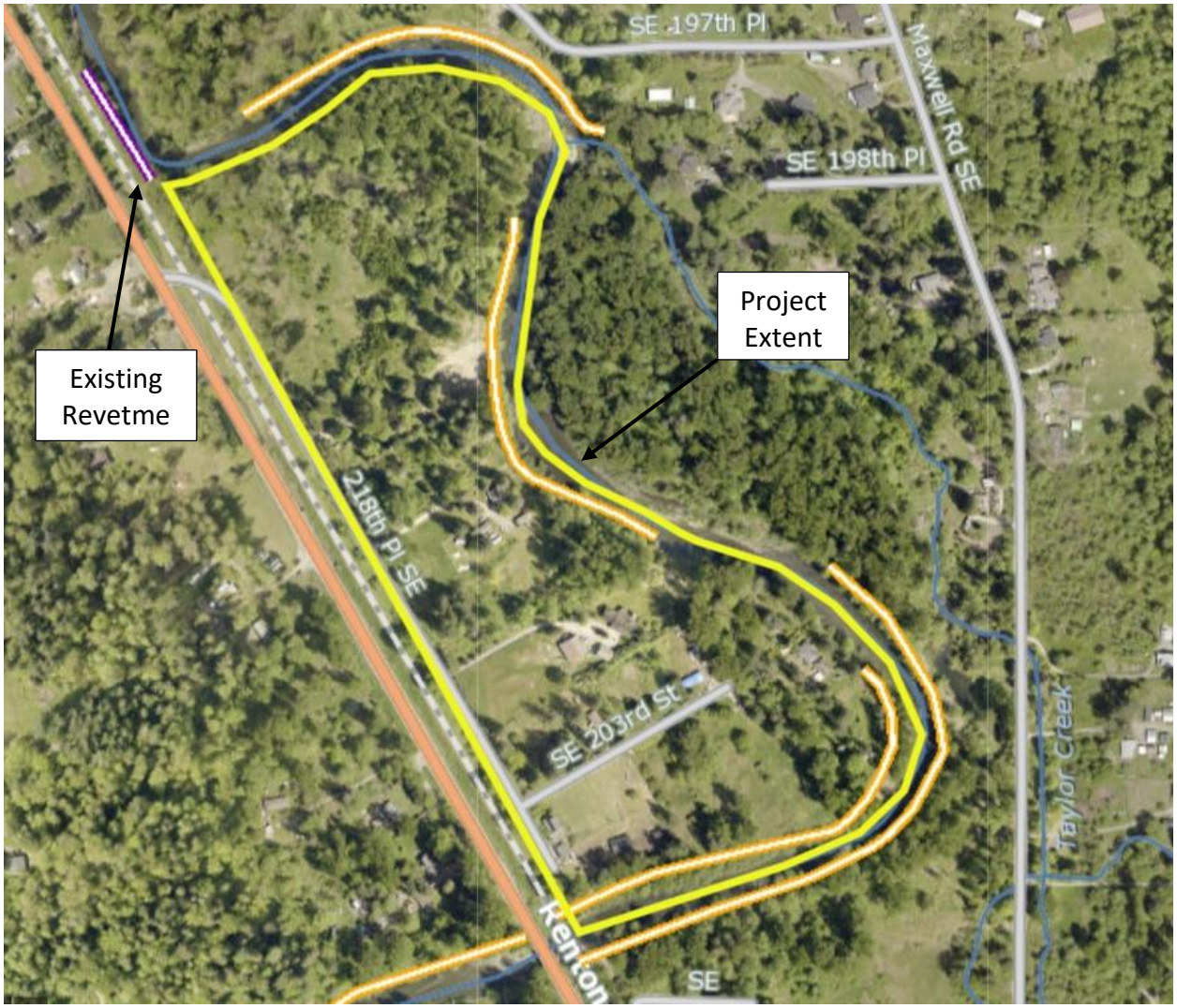


Figure 1. Site Plan for Rutledge-Johnson Lower (a) and Rutledge Johnson/Rhode (b) Project

Reconnection of Wetland 69 Project (8-LC-H35)

Draft Project Description

September 4, 2020

Project Name
Reconnection of Wetland 69 Project

WRIA 8 WRE Subbasin
Lower Cedar

Project Status
The WRIA 8 WREC discussed the project at the June 25 meeting and supported including the project in the plan.

Narrative Description
This project proposes to reconnect Wetland 69, an oxbow, with the Cedar River. This project is located within the Lower Cedar subbasin in Hobart, Washington. This project also proposes removing all, or portions of, the CRT 9 Revetment. To accomplish these project tasks, additional land acquisition is necessary as well as relocating a trail behind the wetland.

These proposed restoration actions will benefit documented Chinook, Coho, Steelhead, Sockeye, and resident Cutthroat Trout, that utilize Cedar River 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.
The proposed project will reconnect a wetland feature, known as Wetland 69, with the Cedar River which will provide refugia for fish and vegetation and nutrients for insects and invertebrates which are a prey source for fish.

A map and drawings of the project location.
This project proposes to connect Wetland 69 with the Cedar River and remove all, or portions of, the CRT9 Revetment located in Hobart, Washington. 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.
The project proposes to connect Wetland 69 with the Cedar River, which will benefit the fish species that spawn and rear within this section. Connecting the Cedar River with Wetland 69 will also have downstream water quality and water quantity benefits.

Performance goals and measures.
Unknown at this project stage.

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, Sockeye, and resident Cutthroat Trout, and Bull Trout that utilize Cedar River as spawning and rearing habitat. Chinook, Steelhead, and Bull Trout are priority species, protected under the ESA. Connecting Wetland 69 with the Cedar River has significant benefits to juvenile salmonids by directly benefit prey availability, spawning success as well as survival of pre-migrant and out-migrating juvenile salmonids.

Identification of anticipated support and barriers to completion.

Unknown at this project stage.

Estimate of capital costs and reoccurring O&M costs.

Total project costs are currently unknown.

Anticipated durability and resiliency.

Unknown at this project stage.

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

King County. Sponsor contact: Judy Blanco, JuBlanco@kingcounty.gov. The sponsor is ready to proceed with scoping and reconnaissance if project area is secured through land acquisition.

Documentation of sources, methods, uncertainties, and assumptions.

Project is outlined in King County basin planning documents and is included in the WRIA 8 project list.

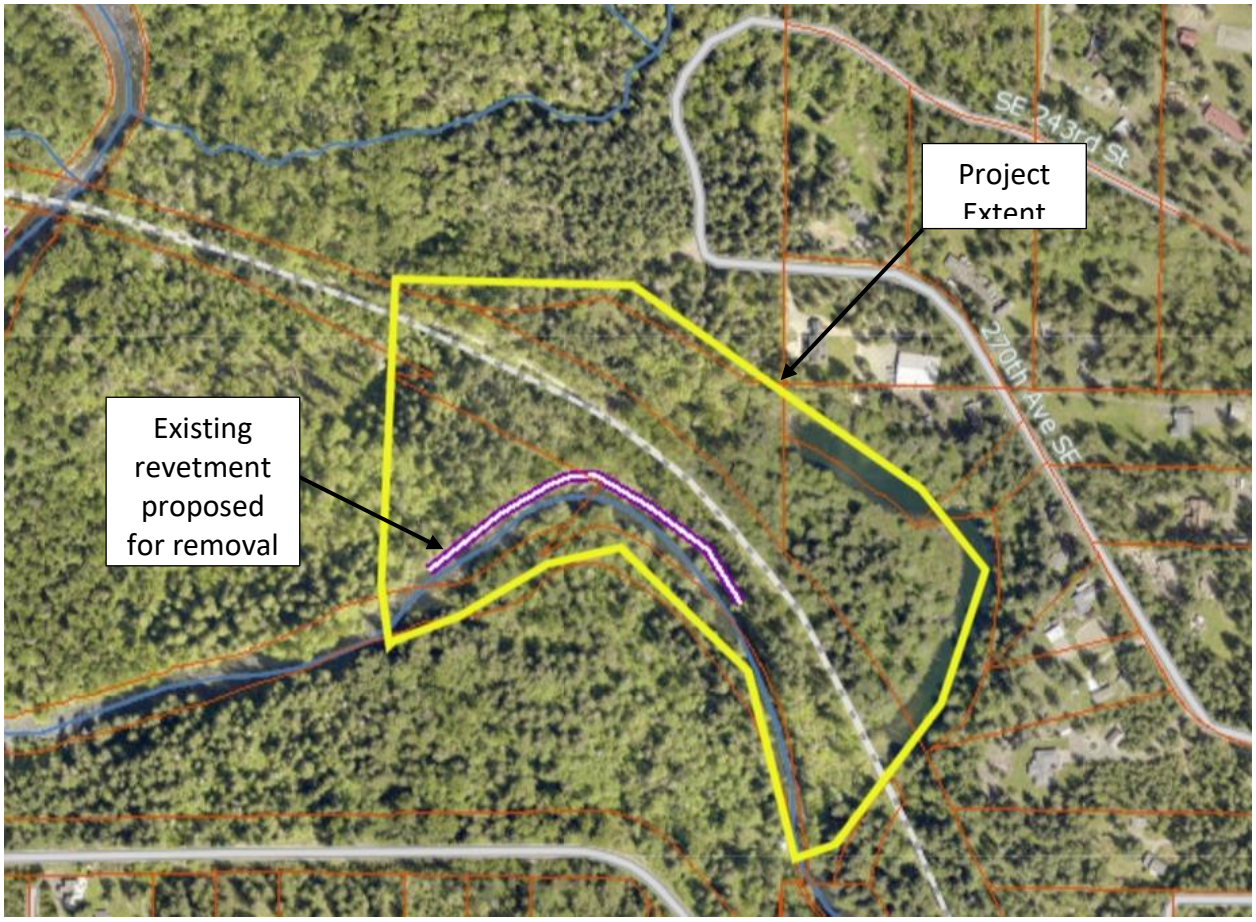


Figure 1. Site Plan for Reconnection of Wetland 69 Project